Appendix A

Parameters

Draft

Subbasin Parameters			Loss Model Parameters		Unit Hydrograph Parameters		Bulking factor
Basin ID	Area		Composite curve number (CN)	Directly connected impervious area	Time of concentration	Lag [a]	
	(ac)	(mi^2)	()	(%)	(h)	(min)	()
A_001	26	0.0401	74	0.0	0.27	10	1.18
A_101	420	0.6563	78	0.0	0.57	20	1.17
A_102	219	0.3415	74	0.0	0.63	23	1.17
A_103	207	0.3233	74	0.0	0.51	18	1.18
A_104	123	0.1926	74	0.0	0.33	12	1.18
A_105	386	0.6036	74	0.0	0.70	25	1.18
A_106	93	0.1447	74	0.0	0.27	10	1.17
A_107	90	0.1402	74	0.0	0.38	14	1.18
A_108	30	0.0476	74	0.1	0.25	9	1.18
A_109	38	0.0598	74	0.0	0.26	10	1.17
A_110	440	0.6869	76	1.6	0.92	33	1.16
A_111	279	0.4353	75	0.4	0.93	33	1.17
A_112	517	0.8078	77	5.9	1.03	37	1.14
A_113	680	1.0626	75	1.0	0.82	30	1.16
A_114	334	0.5226	74	0.0	0.77	28	1.17
A_115	340	0.5317	78	16.3	0.58	21	1.12
A_116	579	0.9042	79	21.0	0.38	14	1.11
A_201	33	0.0509	74	0.0	0.53	19	1.17
B_101	1075	1.6790	75	0.0	0.98	35	1.17
B_102	962	1.5026	74	0.1	1.20	43	1.17
B_103	660	1.0313	74	0.0	0.86	31	1.17
B_104	845	1.3203	75	0.6	1.11	40	1.17
B_105	926	1.4468	75	0.4	0.76	27	1.17
B_201	491	0.7673	74	0.1	1.47	53	1.17
B_202	1047	1.6362	75	0.7	1.70	61	1.17
B_301	867	1.3551	74	0.0	1.23	44	1.17
C_101	1001	1.5640	74	0.0	1.43	51	1.17
C_102	981	1.5334	74	0.1	0.80	29	1.17
C_103	320	0.4999	74	0.1	0.45	16	1.17
C_104	527	0.8230	75	1.0	0.89	32	1.16
D_101	257	0.4021	75	0.7	0.91	33	1.16
D_102	297	0.4640	75	0.7	0.70	25	1.17
D_103	854	1.3350	75	0.6	0.87	31	1.16
D_104	388	0.6069	75	0.3	1.03	37	1.17
D_201	278	0.4337	75	0.2	0.76	27	1.17
E_101	635	0.9921	75	0.9	1.18	43	1.16
F_101	629	0.9822	74	0.0	1.04	37	1.17
F_102	614	0.9598	76	0.0	1.00	36	1.16
F_103	549	0.8582	74	0.0	0.72	26	1.17
G_101	1114	1.7411	74	0.0	1.10	40	1.17
G_102	940	1.4688	74	0.0	1.03	37	1.17
G_201	399	0.6230	74	0.0	1.13	41	1.17
H_101	788	1.2313	76	0.0	0.72	26	1.16

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Subbasin Parameters			Loss Model Parameters		Unit Hydrograph Parameters		Bulking factor
Basin ID	Area		Composite curve number (CN)	Directly connected impervious area	Time of concentration	Lag [a]	
	(ac)	(mi^2)	()	(%)	(h)	(min)	()
H_102	333	0.5209	74	0.0	0.76	27	1.18
I_101	774	1.2101	77	0.0	0.98	35	1.16
I_102	462	0.7215	74	0.0	0.82	29	1.18
I_201	603	0.9419	75	0.0	1.01	36	1.17
I_202	120	0.1881	74	0.0	0.57	20	1.18
I_203	50	0.0788	74	0.0	0.45	16	1.18
J_101	502	0.7845	83	0.0	1.09	39	1.12
J_102	295	0.4606	74	0.0	0.87	31	1.17
J_103	324	0.5060	74	0.0	0.89	32	1.17
K_101	439	0.6859	74	0.0	1.36	49	1.17
L_101	335	0.5233	81	0.0	0.94	34	1.14
L_102	349	0.5459	82	0.0	0.83	30	1.14
L_103	293	0.4582	78	0.0	0.72	26	1.18
M_101	745	1.1647	78	0.0	1.09	39	1.17
M_102	561	0.8761	78	0.0	0.69	25	1.18
N_101	372	0.5812	74	0.0	1.04	37	1.17
N_102	518	0.8099	74	0.0	1.07	39	1.17
N_103	322	0.5032	75	0.0	0.82	29	1.17
N_104	602	0.9408	74	0.0	1.03	37	1.18
N_105	395	0.6166	75	0.1	1.00	36	1.17
N_201	687	1.0742	75	0.0	1.45	52	1.17
O_001	25	0.0388	74	0.0	0.46	16	1.18
O_101	194	0.3026	75	0.0	1.21	43	1.17
O_102	561	0.8763	74	0.0	1.06	38	1.18
O_103	311	0.4852	75	0.0	0.80	29	1.17
P_001	30	0.0476	74	0.0	0.41	15	1.18
P_002	14	0.0222	75	0.0	0.20	7	1.17
P_003	22	0.0339	74	0.0	0.22	8	1.18
P_004	26	0.0399	74	0.0	0.18	7	1.18
P_101	359	0.5609	75	0.0	1.33	48	1.17
P_102	491	0.7669	74	0.0	0.95	34	1.17
P_103a	294	0.4591	75	0.0	0.83	30	1.17
P_103b	77	0.1201	76	3.1	1.44	52	1.15
P_103c	459	0.7177	78	5.9	1.14	41	1.12
P_104	635	0.9923	75	1.4	0.93	34	1.16
P_201	31	0.0478	85	34.0	0.40	15	1.06
Q_101	310	0.4849	79	15.5	0.85	31	1.11
Q_102	294	0.4598	75	2.3	0.49	18	1.16
Q_201	62	0.0972	80	8.3	0.38	14	1.10
Q_202	19	0.0290	84	30.5	0.28	10	1.07
Q_301	53	0.0830	80	13.1	0.74	27	1.09
R_101	115	0.1798	77	3.8	0.57	20	1.13
R_102	205	0.3205	80	6.2	0.78	28	1.10

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Subbasin Parameters			Loss Model Parameters		Unit Hydrograph Parameters		Bulking factor
Basin ID	Area		Composite curve number (CN)	Directly connected impervious area	Time of concentration	Lag [a]	
	(ac)	(mi^2)	()	(%)	(h)	(min)	()
R_103	187	0.2916	75	0.4	0.55	20	1.16
R_104a	177	0.2765	76	2.6	0.82	30	1.15
R_104b	109	0.1704	83	24.0	0.42	15	1.07
R_105	86	0.1340	83	28.2	0.32	11	1.07
R_106	129	0.2021	75	3.9	0.58	21	1.16
R_107	54	0.0845	77	0.0	0.34	12	1.15
S_101	274	0.4285	77	2.5	0.39	14	1.14
T_101	63	0.0981	78	1.8	0.52	19	1.14
T_102	70	0.1092	75	0.0	0.53	19	1.17
T_103	109	0.1701	86	22.6	0.39	14	1.06
T_104	27	0.0422	86	15.9	0.14	5	1.06
T_105	30	0.0475	85	2.6	0.43	16	1.06
T_106	29	0.0451	80	20.2	0.49	18	1.11
U_101	1112	1.7375	74	0.0	1.20	43	1.18
U_102	1132	1.7689	74	0.0	1.00	36	1.18
U_103	934	1.4590	74	0.0	1.35	49	1.18
U_104	419	0.6547	74	0.0	0.65	23	1.18
U_201	727	1.1358	74	0.0	0.80	29	1.17
U_301	1121	1.7522	75	0.0	1.11	40	1.17
U_302	1098	1.7163	74	0.0	1.13	41	1.17
U_401	498	0.7776	74	0.0	1.13	41	1.17
U_501	354	0.5537	74	0.0	1.58	57	1.18
W_101	1340	2.0934	74	0.0	1.42	51	1.18
W_102	820	1.2814	76	0.0	0.94	34	1.16
W_103	2261	3.5329	74	0.0	1.19	43	1.18
W_104	842	1.3164	75	2.6	0.68	24	1.16
W_105	275	0.4301	80	26.8	0.36	13	1.10
W_201	608	0.9501	79	23.5	0.61	22	1.11
W_202	148	0.2313	84	35.1	0.99	36	1.07
W_203	345	0.5394	81	33.8	0.32	12	1.08
W_301	95	0.1481	82	34.5	0.69	25	1.08

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Routing Parameters										
Reach	Length	Slope	Manning's n	Space-Time Method	Index Method	Index Flow *	Shape	Diamater	Width	Side Slope
	ft	ft/ft				cfs		ft	ft	xH : 1V
A_101_R1	9011	0.0125	0.0250	Auto DX Auto DT	Flow	451	Trapezoid		30	2
A_102_R1	7729	0.0120	0.0250	Auto DX Auto DT	Flow	973	Trapezoid		35	2
A_103_R1	6822	0.0116	0.0250	Auto DX Auto DT	Flow	1109	Trapezoid		35	2
A_104_R1	3622	0.0130	0.0250	Auto DX Auto DT	Flow	605	Trapezoid		35	2
A_104_R2	2644	0.0109	0.0250	Auto DX Auto DT	Flow	1475	Trapezoid		75	2
A_104_R3	1252	0.0110	0.0250	Auto DX Auto DT	Flow	2037	Trapezoid		160	2
A_105_R1	10476	0.0104	0.0250	Auto DX Auto DT	Flow	2300	Trapezoid		120	2
A_106_R1	1818	0.0104	0.0250	Auto DX Auto DT	Flow	2892	Trapezoid		160	2
A_107_R1	4502	0.0093	0.0250	Auto DX Auto DT	Flow	3289	Trapezoid		130	2
A_108_R1	3970	0.0104	0.0250	Auto DX Auto DT	Flow	3279	Trapezoid		160	2
A_109_R1	2214	0.0110	0.0250	Auto DX Auto DT	Flow	3445	Trapezoid		160	2
A_110_R1	3693	0.0114	0.0250	Auto DX Auto DT	Flow	3914	Trapezoid		200	2
A_111_R1	8676	0.0118	0.0250	Auto DX Auto DT	Flow	4072	Trapezoid		100	2
A_112_R1	1905	0.0117	0.0250	Auto DX Auto DT	Flow	4343	Trapezoid		100	2
A_112_R2	4661	0.0120	0.0250	Auto DX Auto DT	Flow	4340	Trapezoid		130	2
A_113_R1	9037	0.0126	0.0250	Auto DX Auto DT	Flow	5210	Trapezoid		160	2
A_114_R1	4492	0.0127	0.0250	Auto DX Auto DT	Flow	6719	Trapezoid		170	2
A_115_R1	3834	0.0133	0.0250	Auto DX Auto DT	Flow	8300	Trapezoid		200	3
A_115_R2	2352	0.0250	0.0130	Auto DX Auto DT	Flow	268	Circle	8.5		
A_116_R1	5896	0.0147	0.0250	Auto DX Auto DT	Flow	8333	Trapezoid		120	3
A_116_R2	1186	0.0193	0.0250	Auto DX Auto DT	Flow	1024	Trapezoid		50	2
A_116_R3	1500	0.0190	0.0130	Auto DX Auto DT	Flow	53	Circle	5		
A_116_R4	1913	0.0208	0.0250	Auto DX Auto DT	Flow	1075	Trapezoid		50	2
B_102_R1	5430	0.0109	0.0300	Auto DX Auto DT	Flow	343	Trapezoid		20	3
B_103_R1	11067	0.0113	0.0300	Auto DX Auto DT	Flow	589	Trapezoid		20	3
B_104_R1	11374	0.0157	0.0300	Auto DX Auto DT	Flow	711	Trapezoid		25	3
B_105_R1	9612	0.0150	0.0300	Auto DX Auto DT	Flow	882	Trapezoid		20	3
B_105_R2	5002	0.0234	0.0300	Auto DX Auto DT	Flow	329	Trapezoid		20	3
B_105_R3	2535	0.0157	0.0300	Auto DX Auto DT	Flow	1200	Trapezoid		20	3
B_105_R4	7037	0.0141	0.0300	Auto DX Auto DT	Flow	218	Trapezoid		10	3
B_105_R5	2023	0.0141	0.0300	Auto DX Auto DT	Flow	1384	Trapezoid		40	3
B_202_R1	12869	0.0197	0.0300	Auto DX Auto DT	Flow	108	Trapezoid		25	3
C_102_R1	10369	0.0139	0.0300	Auto DX Auto DT	Flow	225	Trapezoid		25	3
C_103_R1	7188	0.0167	0.0300	Auto DX Auto DT	Flow	379	Trapezoid		20	3
C_104_R1	9606	0.0153	0.0300	Auto DX Auto DT	Flow	411	Trapezoid		15	3
D_102_R1	5627	0.0196	0.0300	Auto DX Auto DT	Flow	87	Trapezoid		15	3
D_103_R1	11299	0.0151	0.0350	Auto DX Auto DT	Flow	186	Trapezoid		40	6
D_104_R1	1848	0.0130	0.0300	Auto DX Auto DT	Flow	400	Trapezoid		15	3
D_104_R2	8834	0.0167	0.0250	Auto DX Auto DT	Flow	106	Trapezoid		30	3
D_104_R3	3936	0.0104	0.0350	Auto DX Auto DT	Flow	498	Trapezoid		10	3
F_102_R1	9867	0.0139	0.0350	Auto DX Auto DT	Flow	178	Trapezoid		20	3
F_103_R1	6712	0.0127	0.0350	Auto DX Auto DT	Flow	347	Trapezoid		30	3
G_102_R1	10267	0.0131	0.0250	Auto DX Auto DT	Flow	302	Trapezoid		40	4

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Routing Parameters

Reach	Length	Slope	Manning's n	Space-Time Method	Index Method	Index Flow *	Shape	Diamater	Width	Side Slope
	ft	ft/ft				cfs		ft	ft	xH : 1V
G_102_R2	8053	0.0155	0.0350	Auto DX Auto DT	Flow	106	Trapezoid		15	3
G_102_R3	2916	0.0122	0.0250	Auto DX Auto DT	Flow	395	Trapezoid		30	3
H_102_R1	6763	0.0135	0.0250	Auto DX Auto DT	Flow	333	Trapezoid		50	2
I_102_R1	9568	0.0145	0.0250	Auto DX Auto DT	Flow	283	Trapezoid		60	2
I_202_R1	4776	0.0174	0.0300	Auto DX Auto DT	Flow	188	Trapezoid		25	3
I_203_R1	2611	0.0167	0.0300	Auto DX Auto DT	Flow	211	Trapezoid		60	2
J_102_R1	8406	0.0147	0.0350	Auto DX Auto DT	Flow	242	Trapezoid		15	3
J_103_R1	8846	0.0162	0.0350	Auto DX Auto DT	Flow	313	Trapezoid		75	6
L_102_R1	3949	0.0149	0.0350	Auto DX Auto DT	Flow	162	Trapezoid		75	6
L_103_R1	7960	0.0145	0.0350	Auto DX Auto DT	Flow	337	Trapezoid		30	3
M_102_R1	5919	0.0132	0.0300	Auto DX Auto DT	Flow	272	Trapezoid		40	3
N_102_R1	9082	0.0141	0.0350	Auto DX Auto DT	Flow	106	Trapezoid		35	6
N_103_R1	7840	0.0115	0.0350	Auto DX Auto DT	Flow	229	Trapezoid		75	6
N_104_R1	3502	0.0113	0.0350	Auto DX Auto DT	Flow	274	Trapezoid		85	6
N_104_R2	4669	0.0134	0.0350	Auto DX Auto DT	Flow	164	Trapezoid		65	6
N_104_R3	5520	0.0108	0.0250	Auto DX Auto DT	Flow	434	Trapezoid		50	3
N_105_R1	10455	0.0103	0.0300	Auto DX Auto DT	Flow	504	Trapezoid		30	3
O_102_R1	9787	0.0138	0.0350	Auto DX Auto DT	Flow	53	Trapezoid		70	6
O_103_R1	9484	0.0134	0.0350	Auto DX Auto DT	Flow	158	Trapezoid		15	3
P_102_R1	7106	0.0114	0.0350	Auto DX Auto DT	Flow	92	Trapezoid		65	6
P_103a_R1	5267	0.0084	0.0350	Auto DX Auto DT	Flow	180	Trapezoid		55	6
P_103b_R1	1403	0.0098	0.0350	Auto DX Auto DT	Flow	51	Trapezoid		55	6
P_103c_R1	2490	0.0080	0.0130	Auto DX Auto DT	Flow	51	Circle	3.5		
P_103c_R2	1594	0.0131	0.0170	Auto DX Auto DT	Flow	14	Trapezoid		30	3
P_104_R1	8526	0.0100	0.0350	Auto DX Auto DT	Flow	208	Trapezoid		70	6
Q_102_R1	504	0.0165	0.0250	Auto DX Auto DT	Flow	174	Trapezoid		10	2
Q_102_R2	1858	0.0100	0.0130	Auto DX Auto DT	Flow	95	Circle	1.5		
Q_102_R3	4234	0.0124	0.0250	Auto DX Auto DT	Flow	259	Trapezoid		10	2
Q_102_R4	2503	0.0284	0.0250	Auto DX Auto DT	Flow	259	Trapezoid		25	3
Q_202_R1	1759	0.0110	0.0130	Auto DX Auto DT	Flow	55	Circle	2.5		
Q_301_R1	930	0.0100	0.0130	Auto DX Auto DT	Flow	66	Circle	2		
R_102_R1	3490	0.0126	0.0250	Auto DX Auto DT	Flow	64	Trapezoid		30	3
R_103_R1	4244	0.0123	0.0250	Auto DX Auto DT	Flow	176	Trapezoid		30	3
R_104a_R1	989	0.0027	0.0250	Auto DX Auto DT	Flow	67	Trapezoid		10	4
R_104b_R1	2358	0.0110	0.0300	Auto DX Auto DT	Flow	92	Trapezoid		30	4
R_105_R1	1246	0.0142	0.0350	Auto DX Auto DT	Flow	135	Trapezoid		15	10
R_106_R1	4469	0.0154	0.0350	Auto DX Auto DT	Flow	224	Trapezoid		15	10
R_107_R1	2044	0.0206	0.0250	Auto DX Auto DT	Flow	287	Trapezoid		10	2
R_107_R2	2043	0.0520	0.0130	Auto DX Auto DT	Flow	91	Circle	5.0		
T_106_R1	1750	0.0100	0.0130	Auto DX Auto DT	Flow	17	Circle	4.0		
T_106_R2	2625	0.0100	0.0130	Auto DX Auto DT	Flow	84	Circle	5.5		
U_101_R1	3240	0.0099	0.0300	Auto DX Auto DT	Flow	892	Trapezoid		40	4
U_102_R1	14798	0.0124	0.0250	Auto DX Auto DT	Flow	1157	Trapezoid		60	4

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Routing Parameters										
Reach	Length	Slope	Manning's n	Space-Time Method	Index Method	Index Flow *	Shape	Diamater	Width	Side Slope
	ft	ft/ft				cfs		ft	ft	xH : 1V
U_103_R1	5532	0.0139	0.0250	Auto DX Auto DT	Flow	1327	Trapezoid		60	4
U_104_R1	11542	0.0147	0.0250	Auto DX Auto DT	Flow	1509	Trapezoid		60	4
U_302_R1	2037	0.0122	0.0300	Auto DX Auto DT	Flow	328	Trapezoid		30	10
U_302_R2	1489	0.0105	0.0350	Auto DX Auto DT	Flow	133	Trapezoid		25	10
U_302_R3	6670	0.0107	0.0250	Auto DX Auto DT	Flow	460	Trapezoid		30	4
U_302_R4	6721	0.0145	0.0350	Auto DX Auto DT	Flow	74	Trapezoid		20	10
U_302_R5	3875	0.0092	0.0300	Auto DX Auto DT	Flow	511	Trapezoid		30	4
W_102_R1	8786	0.0125	0.0350	Auto DX Auto DT	Flow	304	Trapezoid		20	6
W_103_R1	13847	0.0179	0.0300	Auto DX Auto DT	Flow	462	Trapezoid		15	6
W_104_R1	10536	0.0140	0.0250	Auto DX Auto DT	Flow	916	Trapezoid		20	6
W_105_R1	2357	0.0164	0.0250	Auto DX Auto DT	Flow	1001	Trapezoid		25	3
W_202_R1	2480	0.0055	0.0250	Auto DX Auto DT	Flow	470	Trapezoid		25	3
W_203_R1	2250	0.0052	0.0300	Auto DX Auto DT	Flow	562	Trapezoid		35	4
W_203_R2	2237	0.0190	0.0130	Auto DX Auto DT	Flow	36	Circle	5.0		

* Based on 100-year model run, no depth-area reduction factor

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Transmission Loss Parameters

Reach	Rate (cfs/ac)
A_101_R1	1.5
A_102_R1	1.5
A_103_R1	1.5
A_104_R1	1.5
A_104_R2	1.5
A_104_R3	1.5
A_105_R1	1.5
A_106_R1	1.5
A_107_R1	1.5
A_108_R1	1.5
A_109_R1	1.5
A_110_R1	1.5
A_111_R1	1.5
A_112_R1	1.5
A_112_R2	1.5
A_113_R1	1.5
A_114_R1	1.5
A_115_R1	1.5
A_115_R2	1.5
A_116_R1	1.5
A_116_R2	1.5
A_116_R3	1.5
A_116_R4	1.5
B_102_R1	0.0
B_103_R1	1.5
B_104_R1	1.5
B_105_R1	1.5
B_105_R2	0.0
B_105_R3	1.5
B_105_R4	0.0
B_105_R5	1.5
B_202_R1	0.0
C_102_R1	1.5
C_103_R1	1.5
C_104_R1	1.5
D_102_R1	0.0
D_103_R1	0.0
D_104_R1	0.0
D_104_R2	0.0
D_104_R3	0.0
F_102_R1	1.5
F_103_R1	1.5

Reach	Rate (cfs/ac)
G_102_R1	1.5
G_102_R2	1.5
G_102_R3	0.0
H_102_R1	1.5
I_102_R1	1.5
I_202_R1	1.5
I_203_R1	1.5
J_102_R1	0.0
J_103_R1	1.5
L_102_R1	0.0
L_103_R1	1.5
M_102_R1	0.0
N_102_R1	0.0
N_103_R1	0.0
N_104_R1	0.0
N_104_R2	0.0
N_104_R3	1.5
N_105_R1	1.5
O_102_R1	0.0
O_103_R1	0.0
P_102_R1	0.0
P_103a_R1	0.0
P_103b_R1	0.0
P_103c_R1	0.0
P_103c_R2	0.0
P_104_R1	0.0
Q_102_R1	0.0
Q_102_R2	0.0
Q_102_R3	0.0
Q_102_R4	0.0
Q_202_R1	0.0
Q_301_R1	0.0
R_102_R1	0.0
R_103_R1	0.0
R_104a_R1	0.0
R_104b_R1	0.0
R_105_R1	0.0
R_106_R1	0.0
R_107_R1	0.0
R_107_R2	0.0
T_106_R1	0.0
T_106_R2	0.0

Reach	Rate (cfs/ac)
U_101_R1	1.5
U_102_R1	1.5
U_103_R1	1.5
U_104_R1	1.5
U_302_R1	0.0
U_302_R2	0.0
U_302_R3	0.0
U_302_R4	0.0
U_302_R5	1.5
W_102_R1	0.0
W_103_R1	1.5
W_104_R1	1.5
W_105_R1	1.5
W_202_R1	0.0
W_203_R1	0.0
W_203_R2	0.0

Draft

NOAA Atlas 14, Volume 1, Version 5
Location name: Rio Rancho, New Mexico, USA*
Latitude: 35.27°, Longitude: -106.7844°
Elevation: 5894 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	0.177 (0.152-0.206)	0.229 (0.197-0.266)	0.307 (0.263-0.358)	0.368 (0.314-0.427)	0.451 (0.383-0.523)	0.515 (0.436-0.597)	0.582 (0.489-0.675)	0.653 (0.546-0.757)	0.750 (0.620-0.870)	0.827 (0.680-0.960)
10-min	0.269 (0.231-0.313)	0.349 (0.299-0.406)	0.468 (0.400-0.545)	0.560 (0.478-0.650)	0.686 (0.583-0.796)	0.784 (0.663-0.909)	0.887 (0.745-1.03)	0.995 (0.831-1.15)	1.14 (0.944-1.32)	1.26 (1.04-1.46)
15-min	0.334 (0.287-0.388)	0.432 (0.371-0.503)	0.580 (0.496-0.676)	0.694 (0.593-0.806)	0.851 (0.723-0.987)	0.972 (0.822-1.13)	1.10 (0.924-1.27)	1.23 (1.03-1.43)	1.42 (1.17-1.64)	1.56 (1.28-1.81)
30-min	0.449 (0.387-0.523)	0.582 (0.500-0.677)	0.782 (0.669-0.911)	0.935 (0.798-1.09)	1.15 (0.973-1.33)	1.31 (1.11-1.52)	1.48 (1.24-1.72)	1.66 (1.39-1.92)	1.91 (1.58-2.21)	2.10 (1.73-2.44)
60-min	0.556 (0.478-0.647)	0.721 (0.618-0.838)	0.967 (0.828-1.13)	1.16 (0.988-1.34)	1.42 (1.20-1.64)	1.62 (1.37-1.88)	1.83 (1.54-2.12)	2.06 (1.72-2.38)	2.36 (1.95-2.74)	2.60 (2.14-3.02)
2-hr	0.651 (0.557-0.772)	0.835 (0.711-0.991)	1.10 (0.937-1.31)	1.32 (1.12-1.56)	1.62 (1.36-1.90)	1.86 (1.55-2.18)	2.11 (1.75-2.48)	2.38 (1.96-2.78)	2.75 (2.24-3.22)	3.06 (2.47-3.58)
3-hr	0.699 (0.602-0.824)	0.889 (0.764-1.05)	1.16 (1.00-1.37)	1.38 (1.18-1.62)	1.69 (1.43-1.98)	1.93 (1.63-2.26)	2.19 (1.84-2.56)	2.47 (2.05-2.88)	2.85 (2.34-3.32)	3.16 (2.58-3.69)
6-hr	0.806 (0.701-0.940)	1.02 (0.888-1.19)	1.31 (1.14-1.53)	1.54 (1.34-1.79)	1.86 (1.60-2.16)	2.11 (1.81-2.44)	2.37 (2.02-2.74)	2.64 (2.24-3.05)	3.01 (2.53-3.48)	3.31 (2.76-3.84)
12-hr	0.907 (0.798-1.04)	1.14 (1.01-1.31)	1.45 (1.27-1.65)	1.69 (1.48-1.93)	2.02 (1.76-2.29)	2.27 (1.97-2.58)	2.54 (2.18-2.88)	2.81 (2.40-3.19)	3.17 (2.69-3.61)	3.47 (2.92-3.95)
24-hr	1.06 (0.935-1.20)	1.33 (1.18-1.51)	1.67 (1.48-1.90)	1.94 (1.71-2.20)	2.31 (2.03-2.61)	2.59 (2.27-2.93)	2.88 (2.52-3.26)	3.19 (2.76-3.60)	3.59 (3.10-4.06)	3.91 (3.35-4.42)
2-day	1.13 (1.00-1.27)	1.42 (1.26-1.60)	1.79 (1.58-2.01)	2.08 (1.84-2.34)	2.47 (2.18-2.78)	2.78 (2.44-3.12)	3.10 (2.71-3.48)	3.43 (2.98-3.86)	3.87 (3.34-4.36)	4.22 (3.62-4.76)
3-day	1.27 (1.14-1.41)	1.59 (1.43-1.76)	1.98 (1.78-2.20)	2.29 (2.06-2.54)	2.71 (2.43-3.00)	3.03 (2.71-3.36)	3.36 (2.99-3.72)	3.70 (3.28-4.10)	4.15 (3.66-4.61)	4.51 (3.95-5.01)
4-day	1.41 (1.29-1.55)	1.76 (1.61-1.93)	2.17 (1.98-2.38)	2.50 (2.28-2.74)	2.94 (2.67-3.22)	3.28 (2.97-3.59)	3.62 (3.27-3.97)	3.97 (3.57-4.35)	4.44 (3.97-4.86)	4.79 (4.27-5.26)
7-day	1.64 (1.50-1.79)	2.04 (1.86-2.23)	2.50 (2.29-2.74)	2.86 (2.62-3.13)	3.34 (3.05-3.65)	3.71 (3.37-4.05)	4.08 (3.69-4.45)	4.44 (4.01-4.84)	4.92 (4.42-5.37)	5.28 (4.72-5.77)
10-day	1.83 (1.67-2.00)	2.28 (2.08-2.48)	2.81 (2.57-3.06)	3.22 (2.94-3.51)	3.78 (3.44-4.10)	4.20 (3.82-4.56)	4.63 (4.19-5.03)	5.06 (4.56-5.50)	5.62 (5.05-6.12)	6.05 (5.40-6.60)
20-day	2.35 (2.15-2.56)	2.92 (2.68-3.19)	3.57 (3.27-3.89)	4.05 (3.71-4.41)	4.68 (4.28-5.10)	5.14 (4.69-5.60)	5.59 (5.09-6.08)	6.03 (5.47-6.56)	6.58 (5.95-7.17)	6.99 (6.30-7.62)
30-day	2.84 (2.61-3.08)	3.54 (3.25-3.84)	4.28 (3.93-4.65)	4.84 (4.43-5.24)	5.54 (5.07-6.00)	6.05 (5.52-6.56)	6.54 (5.96-7.09)	7.01 (6.38-7.60)	7.59 (6.88-8.24)	8.01 (7.24-8.70)
45-day	3.49 (3.21-3.78)	4.33 (3.98-4.69)	5.18 (4.77-5.62)	5.81 (5.33-6.29)	6.58 (6.03-7.13)	7.12 (6.52-7.72)	7.63 (6.98-8.27)	8.10 (7.39-8.79)	8.68 (7.90-9.42)	9.08 (8.24-9.87)
60-day	4.02 (3.70-4.36)	5.00 (4.60-5.42)	5.99 (5.52-6.49)	6.70 (6.17-7.26)	7.57 (6.96-8.21)	8.18 (7.52-8.87)	8.75 (8.03-9.50)	9.28 (8.50-10.1)	9.91 (9.07-10.8)	10.4 (9.46-11.3)

[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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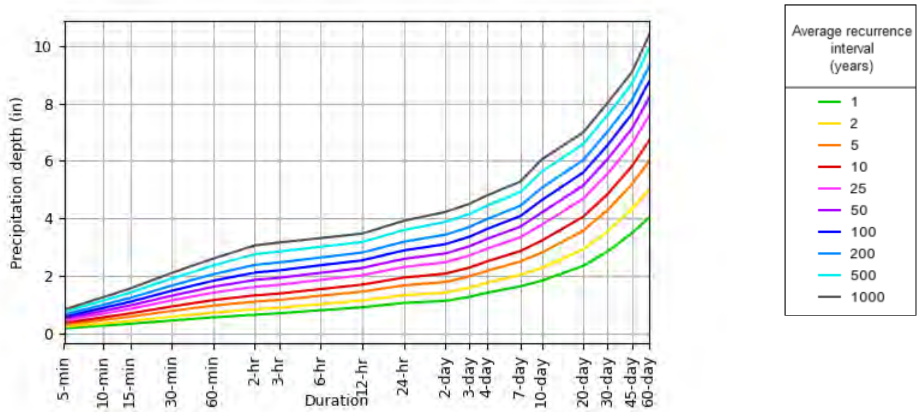
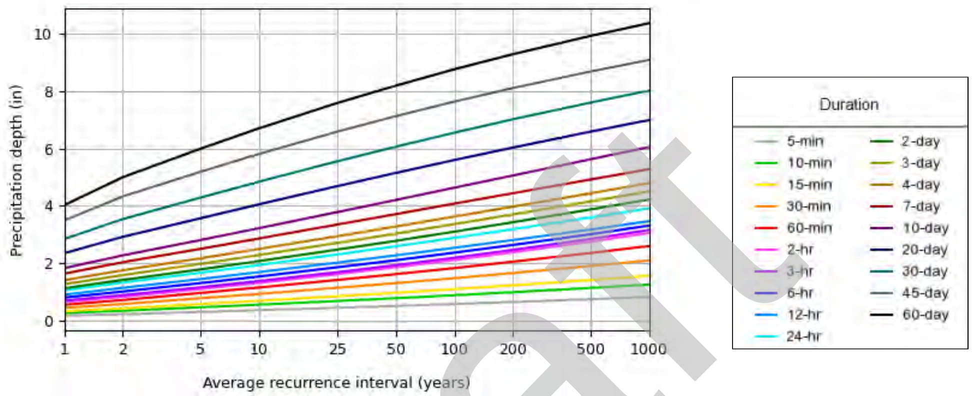
PF graphical

Draft

PDS-based depth-duration-frequency (DDF) curves
Latitude: 35.2700°, Longitude: -106.7844°





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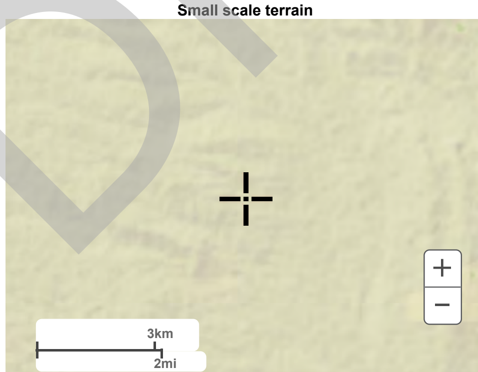
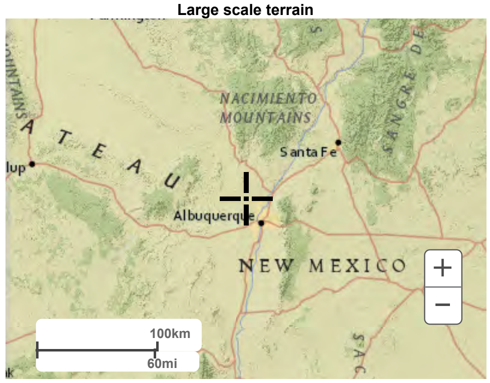
Maps & aerials

Small scale terrain



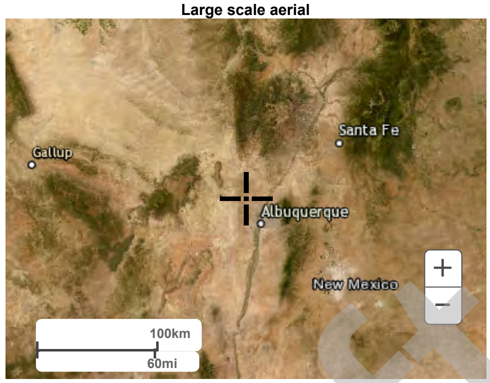
Large scale terrain



Large scale map

Draft

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

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Appendix B

Ponds

Draft

Hydro ID	*Name*	*Source*	Compiled by	*Date*	*Drainage area (mi^2)*	*Emergency spillway (ft)* [a]	*V_{EmSp} (ac-ft)*	*Top of embankment (ft)* [a]	*V_{TOP} (ac-ft)*	*Existing peak depth (ft)* [a]	*Depth-area reduction* [b]
R_103_Pond	Rainbow Pond	Memo, Rainbow Pond Ported Riser Design	SSCAFCA	Oct-18	0.79	8.5	49.1	9.9	59.8	5.1	None
P_103a_Pond	Cholla Pond	Cactus Dam Design Analysis Report	Stantec	Mar-19	1.79	8.0	46.7	11.0	77.2	8.0	TP40 TP49 (2 mi^2)
P_103b_Pond	Nopal Pond	Cactus Dam Design Analysis Report	Stantec	Mar-19	1.91	10.0	6.4	12.0	11.0	8.1	TP40 TP49 (2 mi^2)
P_201_Pond	Camino Crossings Pond	Drainage Report for Camino Crossings	Wilson & Company	Apr-07	0.05			6.0	1.6	5.8	None
S_101_Pond	Harley's Pond	Design Analysis Report for Harley's Pond	Respec	May-21	0.43	10.0	35.5	11.0	40.4	5.3	None
R_107_Pond	Los Diamantes Regional Pond	Los Diamantes Subdivision Regional Drainage Analysis Report	Mark Goodwin & Associates	Dec-20	1.66	16.3	59.1	18.0	71.3	10.7	TP40 TP49 (2 mi^2)
W_203_Pond	Las Ventanas Dam	Construction Plans for Las Ventanas Detention Dam	Bohannan Huston Inc.	Aug-98	1.72	9.8	164.8	13.0	323.1	8.4	TP40 TP49 (2 mi^2)
W_301_Pond	Little Window Dam	Construction Plans for Little Window Detention Dam	Bohannan Huston Inc.	Apr-98	0.15	7.5	8.4	10.0	13.7	6.9	None
Swinburne_Dam	Swinburne Dam	Construction Plans, Swinburne Dam	Wilson & Company	Jul-91	80.12	33.6	999.1			26.9	TP40 TP49 (80 mi^2)
Q_202_Pond	Redwood Pond	Drainage Report for Tierra del Sol	Isaacson & Arman	Sep-06	0.13			6.8	2.1	7.9	None

[a] Depth vaule relative to pond invert

[b] Depth-area reduction for pond analysis is based on the drainage area contributing to each pond

No concern

High concern

Draft

Hydro ID: **R_103_Pond**

Pond rating curve based on:
Memo, Rainbow Pond Ported Riser Design
SSCAFCA project number RA_P0001_01

	Depth ft	Volume ac-ft	Discharge cfs
Pond Invert	0.00	0.00	0.0
Culvert Invert	0.09	0.01	0.0
	0.43	0.02	0.0
Invert of Bottom Row of Ports	0.67	1.16	0.0
Top of Bottom Row of Ports	1.24	3.94	6.6
	1.43	4.91	8.0
Invert of Middle Row of Ports	1.82	6.89	10.3
Top of Middle Row of Ports	2.40	9.94	18.5
	2.43	10.12	18.8
Invert of Top Row of Ports	2.98	13.11	23.7
	3.43	15.65	31.6
Top of Top Row of Ports	3.55	16.33	33.6
Slated Top Grate Lowest EL (Top of Concrete)	3.94	18.60	38.9
	4.43	21.51	57.9
Top of Side Face Slopes for Grate	5.09	25.58	132.5
Slanted Top Grate Highest EL	5.30	26.90	144.9
	5.43	27.73	147.9
	6.43	34.25	167.8
	7.43	41.16	182.9
	8.33	47.61	194.7
	8.43	48.35	196.0
Emergency Spillway EL	8.53	49.09	197.5
	9.43	55.89	456.1
Top of Pond	9.93	59.78	696.6

Draft

SSCAFCA

Memo

To: Andres Sanchez, Design Services Director

From: Junko Boat, Drainage Engineer

Date: 10/3/2018

Re: Rainbow Pond Ported Riser Design

Draft

Due to anticipation for high sediment yield in the Rainbow Pond and the downstream culvert's likelihood for sediment issues (length approximately 200' and slope of 0.04%), a ported riser was considered for the pond.

Design criteria included:

- Likely square shaped ported riser to match the 2-cell 3' by 3' culverts.
- A few rows of reverse incline ports
- D = 6" ports
- A metal grate provided at the top. The top grate will be slanted for ease of maintenance.
- No low flow opening at the riser slab elevation (concern for sediment)

Based on these criteria and constructability for steel reinforcement in the walls, a rectangular ported riser with 3 rows of the reverse incline ports (ports at 30-degree angle from outside face to inside face) was designed.

<u>1. Storage-Stage-Elevation</u>

Storage-Stage-elevation relationship was developed using Civil3D elevation and contour area.

Elevation (ft)	Note
5670.57	Pond Invert
5670.66	Culvert Invert

Elevation (ft)	Note
5671.24	Invert of Bottom Row of Ports
5671.81	Top of Bottom Row of Ports
5672.39	Invert of Middle Row of Ports
5672.97	Top of Middle Row of Ports
5673.55	Invert of Top Row of Ports
5674.12	Top of Top Row of Ports
5674.51	Slanted Top Grate Lowest EL
5675.87	Slanted Top Grate Highest EL
5678.8	Original Emergency Spillway EL
5679.1	**Proposed** Emergency Spillway EL
5680.50	Top of Pond

Orifice equation was used for determining discharge through the ports, while weir equation was used for the top grate flow and emergency spillway flow. *Handbook of Hydraulics,* 6th Edition, by Brater and King was used to determine coefficients for orifice and weir conditions. The diameter of circular orifice being 0.5’ and anticipated head between 0.4 – 10’, a coefficient of discharge of 0.598 was selected using Table 4-3 Smith’s Coefficients of Discharge for Circular and Square Orifice with Full Contraction in aforementioned reference. Table 5-3 was used for two different cases of weir condition; assuming average head in the table, weir coefficients of 3.0 and 2.6 were chosen based on the weir breaths of 1.0’ and 12.0’ for the top grate and the emergency spillway, respectively.

Discharges from each row of orifices were computed, and the combined discharges from all rows of ports & the grate were compared with the box culvert discharge of the pond outfall. Once the outfall culvert is fully submerged, the pond discharge will be governed by the pond outlet CBC, not by the ported riser. Discharge from the emergency spillway (for incoming flows in excess of the 100-year recurrence interval storm) was added to the overall rating curve in order to ensure that the 500-year water surface elevation (WSEL) remains at or below the top of the pond embankment.

Elevation (ft)	Note	Cumulative Volume - conic (acre-ft)	Total Discharge Rating Curve (cfs)
5670.57	Pond Invert	0	0.0
5670.66	Culvert Invert	0.00	0.0
5671.00		0.02	0.0
5671.24	Invert of Bottom Row of Ports	1.16	0.0
5671.81	Top of Bottom Row of Ports	3.94	6.6
5672.00		4.91	8.0
5672.39	Invert of Middle Row of Ports	6.89	10.3
5672.97	Top of Middle Row of Ports	9.94	18.5
5673.00		10.12	18.8
5673.55	Invert of Top Row of Ports	13.11	23.7

Draft

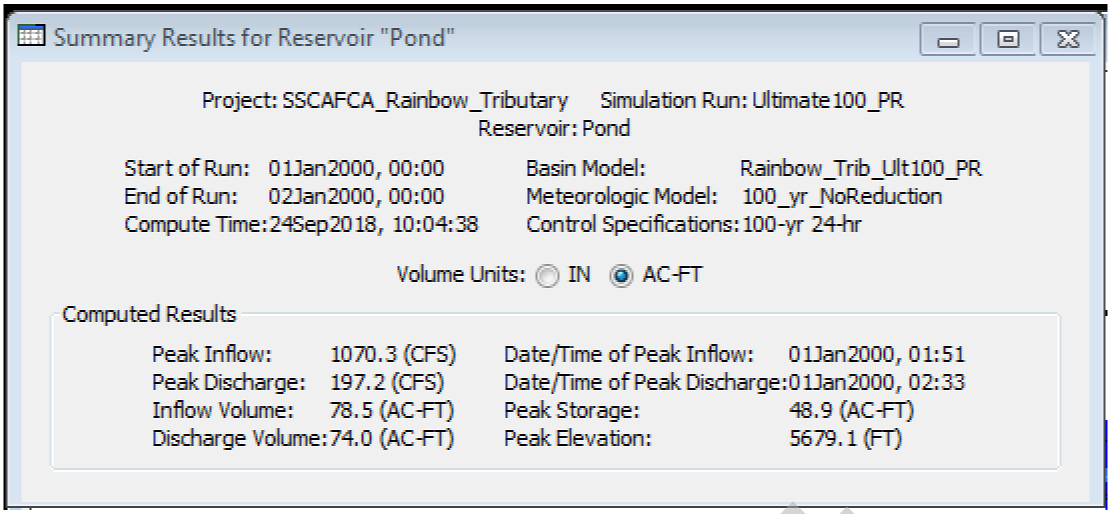
Elevation (ft)	Note	Cumulative Volume - conic (acre-ft)	Total Discharge Rating Curve (cfs)
5674.00		15.65	31.6
5674.12	Top of Top Row of Ports	16.33	33.6
5674.51	Slated Top Grate Lowest EL (Top of Concrete)	18.60	38.9
5675.00		21.51	57.9
5675.66	Top of Side Face Slopes for Grate	25.58	132.5
5675.87	Slanted Top Grate Highest EL	26.90	144.9
5676.00		27.73	147.9
5677.00		34.25	167.8
5678.00		41.16	182.9
5678.90		47.61	194.7
5679.00		48.35	196.0
5679.10	Emergency Spillway EL	49.09	197.5
5680.00		55.89	456.1
5680.50	Top of Pond	59.78	696.6

Draft

2. HEC-HMS 100-year Model

Basin Model: Rainbow_Trib_Ult100_PR
Method at Pond: Outflow Curve
Storage Method: Elevation-Storage-Discharge
Storage-Discharge Function: Ported_Riser
Elevation-Storage Function: Ported_Riser
Run: Ultimate100_PR

The rating information was input in HEC-HMS, specifically Elevation-Storage Function (Ported_Riser) and Storage-Discharge Function (Ported_Riser) and run to check the 100-year 24-hour WSEL. After running the HEC-HMS model, it was identified that the 100-year WSEL would exceed the original emergency spillway elevation of 5678.8’. In order to contain the 100-year peak flow without spilling over the emergency spillway, the pond emergency spillway elevation was raised from 5678.8’ to 5679.1’. This is 0.3’ increase over the elevation provided in the original construction plans. It should be also noted that during final design phase of the original construction plans, the pond footprint was slighted modified. We now know it resulted in changes to the originally calculated WSEL. We accounted for the (previously unknown) change in the pond footprint in addition to the ported riser hydraulic analysis during the ported riser design & hydraulic re-analysis of the pond.



3. HEC-HMS 500-year model

Basin name: RainbowTrib_Ult_rev2
Method at Pond: Outflow Structures
Pond Storage Method: Elevation-Storage
Elevation-Storage Function: Ported_Riser
Run: Ultimate500_rev2

Draft

Hydro ID: **P_103a_Pond**

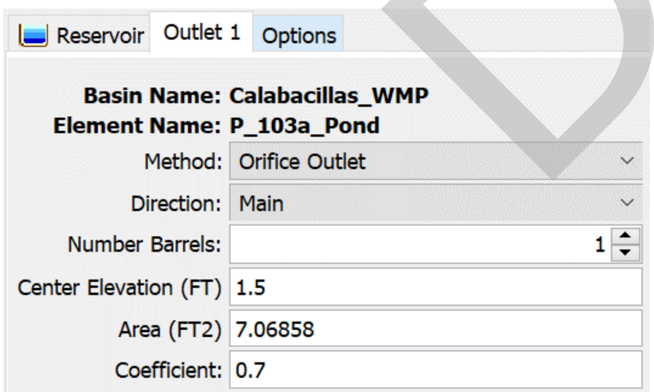
Pond rating curve based on:
Cactus Dam Design Analysis Report &
Construction Plans for Cactus Ponds Project
SSCAFCA project number CA_P0005

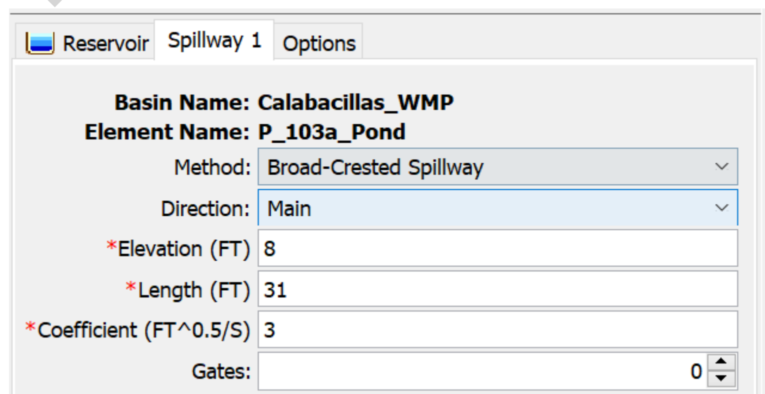
From DAR:

	Depth ft	Volume ac-ft	Depth ft	Elevation ft	Area ac	Inc. Volume* ac-ft	Cum. Volume ac-ft
Pond and Principal Spillway Invert	0.00	0.00	0.0	5779	0.679	0.000	0.000
	1.00	1.63	1.0	5780	2.578	1.628	1.628
	2.00	5.64	2.0	5781	5.437	4.008	5.636
	3.00	11.24	3.0	5782	5.767	5.602	11.238
	4.00	17.18	4.0	5783	6.110	5.938	17.176
	5.00	23.59	5.0	5784	6.727	6.418	23.594
	6.00	30.66	6.0	5785	7.409	7.068	30.662
	7.00	38.36	7.0	5786	7.991	7.700	38.362
Emergency Spillway EL	8.00	46.72	8.0	5787	8.722	8.356	46.718
	9.00	55.87	9.0	5788	9.590	9.156	55.874
	10.00	66.03	10.0	5789	10.714	10.152	66.027
Top of Pond	11.00	77.21	11.0	5790	11.644	11.179	77.206

* average end area method

Draft





Hydro ID: **P_103b_Pond**

Pond rating curve based on:
Cactus Dam Design Analysis Report &
Construction Plans for Cactus Ponds Project
SSCAFCA project number CA_P0005

	Depth ft	Volume ac-ft
Pond and Principlal Spillway Invert	0.00	0.00
	1.00	0.63
	2.00	1.30
	3.00	2.03
	4.00	2.80
	5.00	3.62
	6.00	4.50
	7.00	5.43
	8.00	6.42
	9.00	7.47
Emergency Spillway EL	10.00	8.57
	11.00	9.74
Top of Pond	12.00	10.97

From DAR:

Depth ft	Elevation ft	Area ac	Inc. Volume* ac-ft	Cum. Volume ac-ft
0.0	5752	0.605	0.000	0.000
1.0	5753	0.651	0.628	0.628
2.0	5754	0.698	0.675	1.303
3.0	5755	0.747	0.723	2.025
4.0	5756	0.798	0.773	2.798
5.0	5757	0.85	0.824	3.622
6.0	5758	0.904	0.877	4.499
7.0	5759	0.96	0.932	5.431
8.0	5760	1.017	0.989	6.419
9.0	5761	1.075	1.046	7.465
10.0	5762	1.136	1.106	8.571
11.0	5763	1.199	1.168	9.738
12.0	5764	1.268	1.234	10.972

* average end area method

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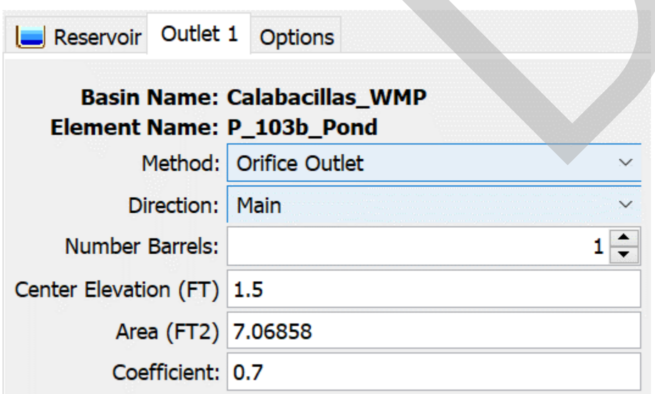

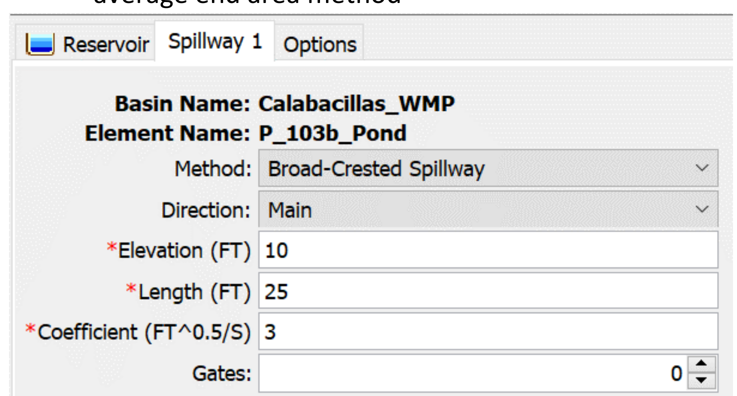

SOUTHERN SANDOVAL COUNTY ARROYO FLOOD CONTROL AUTHORITY

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CACTUS DAMS DESIGN ANALYSES REPORT

MARCH 2019 STANTEC

Engineer's Certification

I, Charles M. Easterling, NMPE # 6411 do hereby certify that this report and the design analyses summarized herein were prepared by me or under my supervision and that the contents are true and correct and were prepared in accordance with standards of care common in the State of New Mexico.

Draft

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Draft

Design Hydrology and Hydraulic Analyses for Cholla Dam, Nopal Pond and Associated Appurtenances

I. **Introduction** - The purpose of this brief report is to document the design intent and basis for design of the Cactus Ponds project.

II. **Hydrology –** Design Objective: provide 100-yr flood protection for the areas downstream of the proposed Cholla Dam and Nopal Pond to Northern Blvd.

A. Performed Hydrologic assessment using base model SSCFCA DevX v2.

B. Added future pond at the upstream of the project area as directed by SSCAFCA Staff.

C. HEC-HMS ver 4.2.1 used for modeling (CAWMP_DEVX_TribP.hms)

D. 100-yr, 24-hr storm used in the DevX v2 Model.

E. 500-yr, 24-hr storm used as check design of dam and spillways.

F. Future pond as constructed in the base model had to be modified by adding a 100 ft wide spillway (weir 3.0) to the dam model 1 ft below top of maximum volume of elevation-storage table to allow model to operate

G. Iteratively modeled Cholla Dam and Nopal Pond configurations to optimize reservoir storage/dam configuration/auxiliary spillway/principal spillway system in order to minimize downstream discharges and construction costs.

H. See HEC-HMS Summary Tables below:

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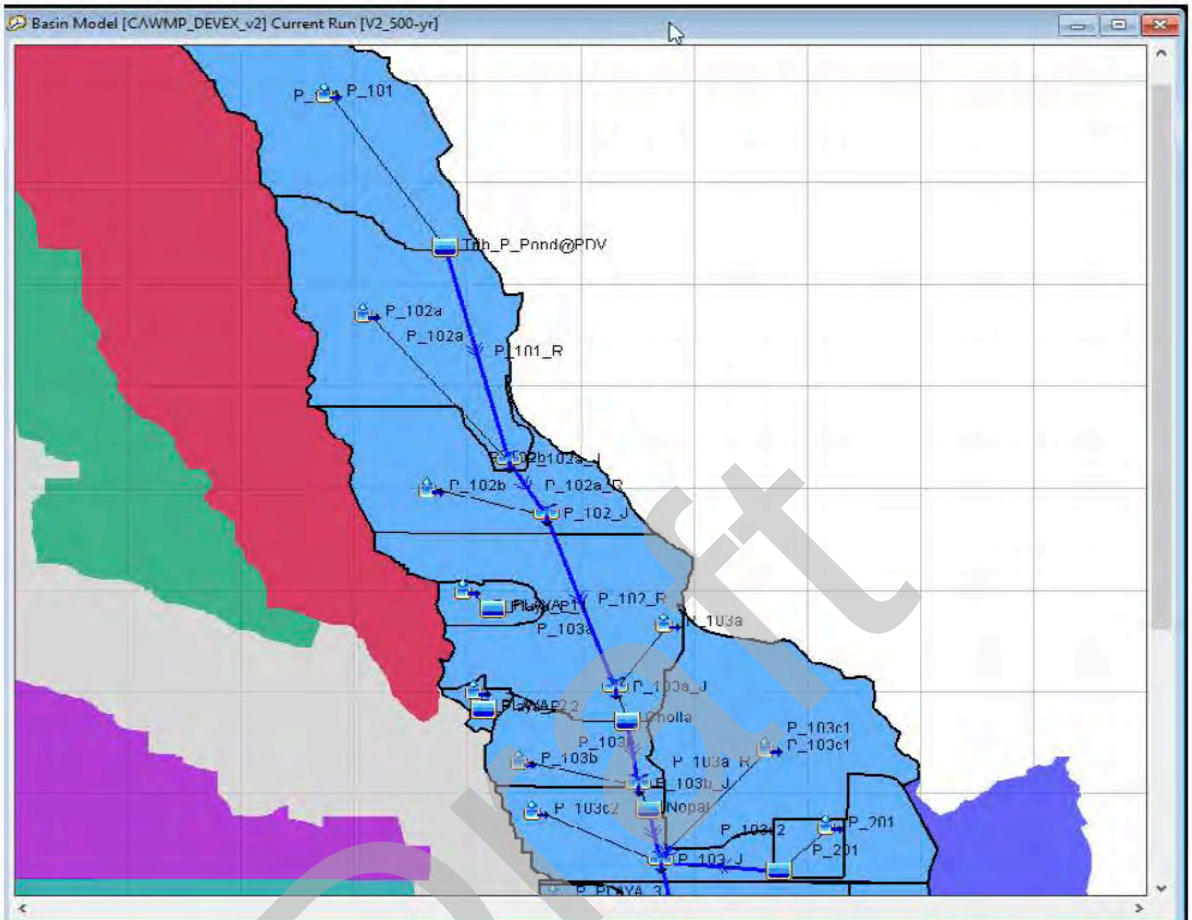

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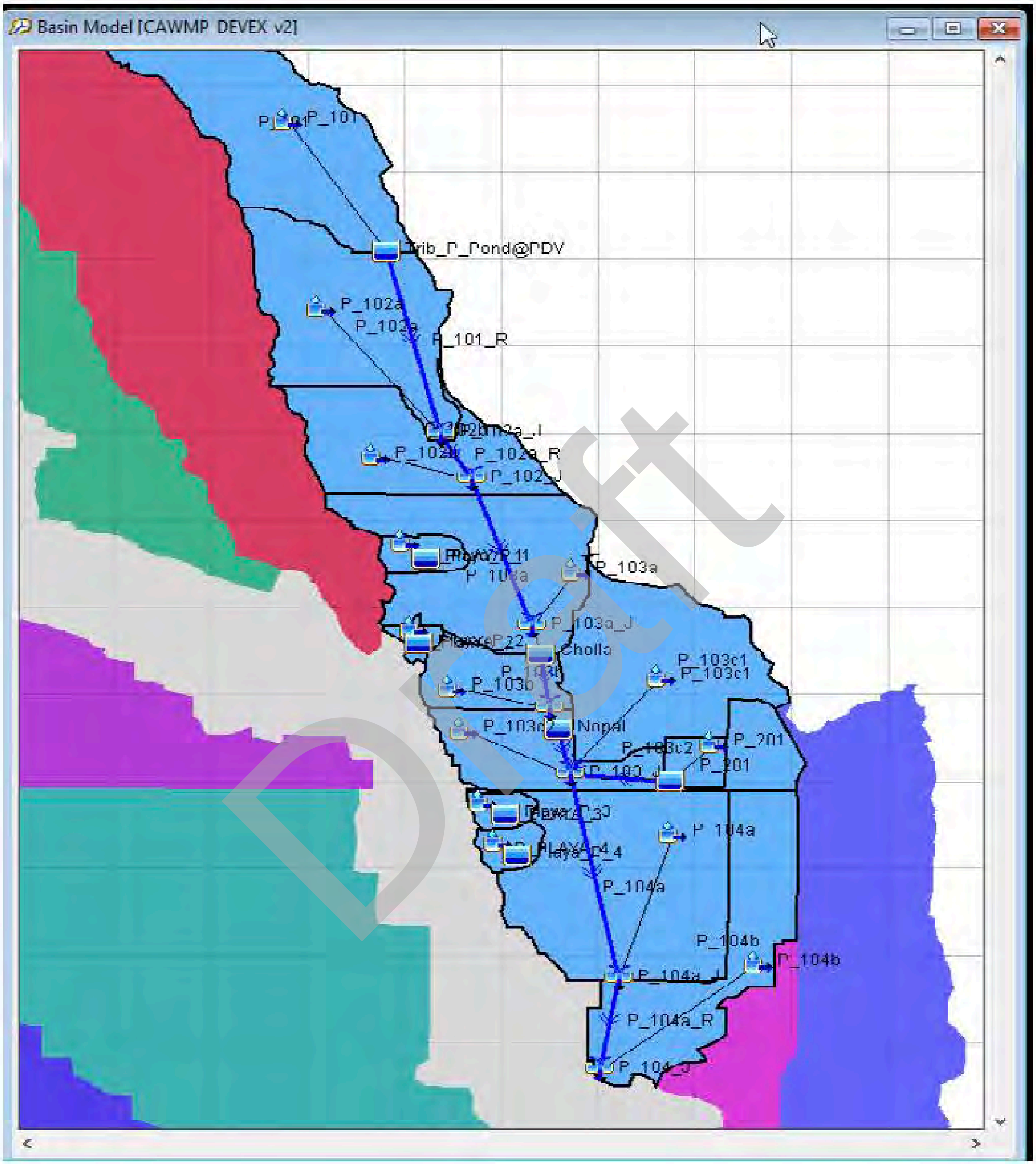
100 yr DevX V2 model	Peak Inflow (cfs)	Interving area flow (cfs)	Peak Outflow (cfs)	Peak Storage (ac-ft)	Peak Elevation (ft)	Outfall size (in)	Outfall Elevation	Spillway Crest (Elev)	Spillway Width	Top of Dam	Weir Coeff.
Cholla	1023		92	41.5	5786.4	36	5779	5787	50	5790	3
Nopal	236	210	95	6.3	5759.9	36	5752	5760	50	5763	3

500 yr DevX V2 model	Peak Inflow (cfs)	Interving area flow (cfs)	Peak Outflow (cfs)	Peak Storage (ac-ft)	Peak Elevation (ft)
Cholla	1686.5		386	61	5788.5
Nopal	400	303	396	8.1	5761.6


Basin Model [CAWMP DEVEX v2]
P_101
P_102a
P_101_R
P_102a_R
P_102_J
P_103a
P_103a_J
Cholla
P_103c1
P_103b
Nopal
P_201
P_104a
P_104b
P_104a_J
P_104a_R
P_104_J

Cactus Dams 100yr 24hr Storm

Hydro Element	Drainage Area (mi^2)	Peak Discharge (cfs)	Time of Peak	Volume (ac-ft)
P_101	0.56089	641.2	01Jan2000, 01:36	37.4
Trib_P_Pond@PDV	0.56089	30.2	01Jan2000, 02:45	34.5
P_101_R	0.56089	30.2	01Jan2000, 03:21	34.2
P_102a	0.45351	469.7	01Jan2000, 01:36	20.6
P_102a_J	1.0144	469.8	01Jan2000, 01:36	54.8
P_102a_R	1.0144	457.9	01Jan2000, 01:42	54.8
P_102b	0.31624	336.3	01Jan2000, 01:33	11.9
P_102_J	1.33064	725.1	01Jan2000, 01:39	66.7
P_102_R	1.33064	707	01Jan2000, 01:48	66.7
P_103a	0.44323	474.6	01Jan2000, 01:36	24.4
P_103a_J	1.77387	1022.7	01Jan2000, 01:48	91.1
Cholla	1.77387	92.4	01Jan2000, 02:42	91
P_103a_R	1.77387	92.4	01Jan2000, 02:48	90.9
P_103b	0.13586	215.8	01Jan2000, 01:33	10.2
P_103b_J	1.90973	236.3	01Jan2000, 01:33	101.1
Nopal	1.90973	94.8	01Jan2000, 03:09	101
P_103b_R	1.90973	94.8	01Jan2000, 03:18	100.9
P_103c1	0.45036	579.6	01Jan2000, 01:36	31
P_103c1_R	0.45036	573.2	01Jan2000, 01:36	31
P_103c2	0.30629	469.2	01Jan2000, 01:33	23.8
P_201	0.04777	121.8	01Jan2000, 01:30	6
POND_CaminoCrossing	0.04777	45.7	01Jan2000, 01:45	6
P_201_R	0.04777	45.5	01Jan2000, 01:51	6
P_103_J	2.71415	1090.2	01Jan2000, 01:36	161.6
P_103c2_R	2.71415	1052.7	01Jan2000, 01:48	161.4
P_104a	0.60455	770.2	01Jan2000, 01:36	39.9
P_104a_J	3.3187	1579.8	01Jan2000, 01:45	201.3
P_104a_R	3.3187	1553	01Jan2000, 01:51	201.3
P_104b	0.38684	487.3	01Jan2000, 01:36	29.4
P_104_J	3.70554	1873	01Jan2000, 01:48	230.7
P_PLAYA_1	0.04762	79	01Jan2000, 01:30	1.9
Playa_P_1	0.04762	0	01Jan2000, 00:00	0
P_PLAYA_4	0.03992	86.4	01Jan2000, 01:30	2.9
Playa_P_4	0.03992	0	01Jan2000, 00:00	0
P_PLAYA_3	0.03386	72	01Jan2000, 01:30	2.3
Playa_P_3	0.03386	0	01Jan2000, 00:00	0
P_PLAYA_2	0.02217	47.1	01Jan2000, 01:30	1.5
Playa_P_2	0.02217	0	01Jan2000, 00:00	0

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Cactus Dams 500yr 24hr Storm

Hydro Element	Drainage Area (mi^2)	Peak Discharge (cfs)	Time of Peak	Volume (ac-ft)
P_101	0.56089	949.2	01Jan2000, 01:36	53.8
Trib_P_Pond@PDV	0.56089	222.9	01Jan2000, 02:12	50.3
P_101_R	0.56089	221.2	01Jan2000, 02:30	50.2
P_102a	0.45351	720.6	01Jan2000, 01:36	32.2
P_102a_J	1.0144	721	01Jan2000, 01:36	82.4
P_102a_R	1.0144	702.1	01Jan2000, 01:42	82.4
P_102b	0.31624	529.4	01Jan2000, 01:33	19.8
P_102_J	1.33064	1157.9	01Jan2000, 01:39	102.2
P_102_R	1.33064	1129	01Jan2000, 01:48	102.2
P_103a	0.44323	706.9	01Jan2000, 01:36	36.3
P_103a_J	1.77387	1686.5	01Jan2000, 01:45	138.5
Cholla	1.77387	386.3	01Jan2000, 02:21	138.4
P_103a_R	1.77387	386	01Jan2000, 02:24	138.4
P_103b	0.13586	303	01Jan2000, 01:33	14.2
P_103b_J	1.90973	399.7	01Jan2000, 02:21	152.5
Nopal	1.90973	396.4	01Jan2000, 02:27	152.4
P_103b_R	1.90973	394.9	01Jan2000, 02:30	152.3
P_103c1	0.45036	828.1	01Jan2000, 01:36	43.6
P_103c1_R	0.45036	821	01Jan2000, 01:36	43.7
P_103c2	0.30629	658.4	01Jan2000, 01:33	33
P_201	0.04777	160.3	01Jan2000, 01:30	7.6
POND_CaminoCrossing	0.04777	77.4	01Jan2000, 01:42	7.6
P_201_R	0.04777	76.7	01Jan2000, 01:45	7.6
P_103_J	2.71415	1548.6	01Jan2000, 01:36	236.6
P_103c2_R	2.71415	1512.4	01Jan2000, 01:45	236.3
P_104a	0.60455	1108.5	01Jan2000, 01:36	56.4
P_104a_J	3.3187	2305.4	01Jan2000, 01:45	292.7
P_104a_R	3.3187	2297.7	01Jan2000, 01:48	292.6
P_104b	0.38684	688.7	01Jan2000, 01:36	40.7
P_104_J	3.70554	2806.1	01Jan2000, 01:48	333.3
P_PLAYA_1	0.04762	120.1	01Jan2000, 01:30	3.1
Playa_P_1	0.04762	0	01Jan2000, 00:00	0
P_PLAYA_4	0.03992	121.8	01Jan2000, 01:30	4.1
Playa_P_4	0.03992	0	01Jan2000, 00:00	0
P_PLAYA_3	0.03386	102.1	01Jan2000, 01:30	3.3
Playa_P_3	0.03386	0	01Jan2000, 00:00	0
P_PLAYA_2	0.02217	67	01Jan2000, 01:30	2.2
Playa_P_2	0.02217	0	01Jan2000, 00:00	0

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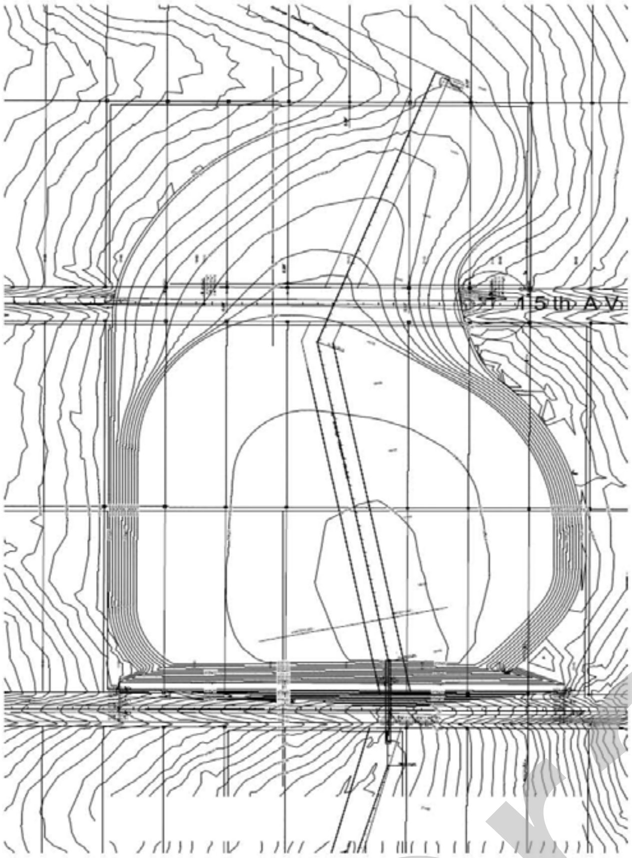
Stage/Area Tables for Cholla and Nopal Dams



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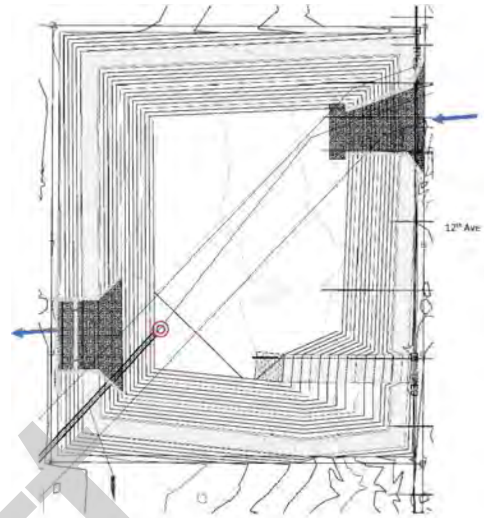

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Nopal Elevation Area	Date	1/31/2019
Elevation	Area (ft^2)	(acres)
5752		0.605
5753		0.651
5754		0.698
5755		0.747
5756		0.798
5757		0.850
5758		0.904
5759		0.960
5760		1.017
5761		1.075
5762		1.136
5763		1.199
5764		1.268

Cholla Elevation Area	Date	1/31/2019
Elevation	Area (ft^2)	(acres)
5779		0.679
5780		2.578
5781		5.437
5782		5.767
5783		6.110
5784		6.727
5785		7.409
5786		7.991
5787		8.722
5788		9.590
5789		10.714
5790		11.644

Hydro ID: **P_201_Pond**

Pond rating curve based on:
Drainage Report for Camino Crossings

	Depth ft	Volume ac-ft	Discharge cfs
Pond Invert, culvert invert	0.00	0.00	0.0
	1.00	0.08	15.4
	2.00	0.20	21.8
	3.00	0.39	25.0
	4.00	0.67	27.0
	5.00	1.07	27.2
Top of pond	6.00	1.60	27.4

Draft

Drainage Report

For

Camino Crossing

Rio Rancho, New Mexico

April 2007

Draft

I, Brigitte Fuller, P.E., do hereby certify that this report was prepared by me or under my direction and that I am a duly registered Professional Engineer under the laws of the State of New Mexico

---

Brigitte Fuller, P.E.
NMPE No. 15102

Date

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DOWNSTREAM CAPACITY ANALYSIS

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10YR.txt

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********************************************************************************
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**********
*S ROUTE THROUGH POND 1 (24" PIPE)
ROUTE RESERVOIR       ID=2    HYD=2    INFLOW ID=1   CODE=1

                      OUTFLOW(cfs)   STORAGE(AC FT)    ELEV(FT)
                       0                 0              0.0
                       15.38             0.0842         1.0
                       21.75             0.1991         2.0
                       25.00             0.3906         3.0
                       27.00             0.6704         4.0
                       27.20             1.0709         5.0
                       27.36             1.6026         6.0



PRINT HYD              ID=2       CODE=5
********************************************************************************
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FINISH
```

Hydro ID: **S_101_Pond**

Pond rating curve based on:
Design Analysis Report for Harley's Pond
SSCAFCA project number BL_P0019

	Depth ft	Volume ac-ft	Discharge cfs	Emergency spillway discharge cfs
	0.00	0.00	0.0	0.0
Pond invert	1.00	0.33	6.3	0.0
	2.00	1.91	12.6	0.0
	3.00	5.10	19.9	0.0
	4.00	9.07	28.0	0.0
Top of principal spillway grate	5.00	13.15	33.2	0.0
	6.00	17.36	36.4	0.0
	7.00	21.70	39.4	0.0
	8.00	26.16	42.1	0.0
	9.00	30.76	44.6	0.0
Emergency spillway invert	10.00	35.49	47.0	0.0
	10.25	36.69	63.9	16.3
	10.50	37.91	94.2	46.0
	10.75	39.13	133.2	84.4
Top pf pond	11.00	40.36	179.3	130.0

Inflow-diversion function, emergency spillway discharge

Inflow cfs	Diversion cfs
0.0	0.0
47.0	0.0
63.9	16.3
94.2	46.0
133.2	84.4
179.3	130.0

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DESIGN ANALYSIS REPORT FOR

HARLEY'S POND

Draft

PREPARED FOR
Southern Sandoval County Arroyo Flood Control Authority

PREPARED BY
RESPEC, Inc.
5971 Jefferson St. NE,
Suite 101
Albuquerque, NM 87109

MAY 2021

RESPEC Project Number: W0005.21001

CERTIFICATION

I, Edward C. Naidu, do hereby certify that this report was duly prepared by me or under my direction and that I am a duly registered Professional Engineer under the laws of the state of New Mexico.

Edward C. Naidu, P.E.
NMPE No. 22997

5/14/2021

Date

Draft

Table C.4
Elevation Storage Discharge Table
Harley's Pond

Contour Elevation NAD 1983	Depth	Contour Area	Incremental Volume	Incremental Volume	Cumulative Volume	1st Row of Reverse Incline Ports Discharge	2nd Row of Reverse Incline Ports Discharge	3rd Row of Reverse Incline Ports Discharge	4th Row of Reverse Incline Ports Discharge	Principal Spillway Grate Discharge	Principal Spillway Outfall Pipe Discharge	Total Principal Spillway / Outfall Pipe Discharge	Emergency Spillway Discharge	Total Discharge Rating Curve	Comment
		Principal Spillway Orifice Diameter (inches)				7.8	6	6	6		24				
		Number of Orifices				4	4	4	4		1				
(ft)		(sq ft)	(cu ft)	(ac-ft)	(ac-ft)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	
(d)						(a)	(a)	(a)	(a)	(b)	(a)	(e)	(b)		
5447	0.0	20	0	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Pond Invert
5448	1.0	29112	14566	0.33	0.33	6.3	0.0	0.0	0.0	0.0	7.4	6.3	0.0	6.3	
5449	2.0	107726	68419	1.57	1.91	8.9	3.7	0.0	0.0	0.0	21.0	12.6	0.0	12.6	
5450	3.0	170404	139065	3.19	5.10	10.9	5.3	3.7	0.0	0.0	25.8	19.9	0.0	19.9	
5451	4.0	175453	172928	3.97	9.07	12.6	6.4	5.3	3.7	0.0	29.7	28.0	0.0	28.0	
5452	5.0	180646	178049	4.09	13.15	14.1	7.4	6.4	5.3	0.0	33.3	33.2	0.0	33.2	Top of Principal Spillway Grate
5453	6.0	186017	183332	4.21	17.36	15.4	8.3	7.4	6.4	36.0	36.4	36.4	0.0	36.4	
5454	7.0	191549	188783	4.33	21.70	16.6	9.1	8.3	7.4	101.8	39.4	39.4	0.0	39.4	
5455	8.0	197252	194400	4.46	26.16	17.8	9.8	9.1	8.3	187.1	42.1	42.1	0.0	42.1	
5456	9.0	203132	200192	4.60	30.76	18.9	10.5	9.8	9.1	288.0	44.6	44.6	0.0	44.6	
5457	10.0	209177	206155	4.73	35.49	19.9	11.2	10.5	9.8	402.5	47.0	47.0	0.0	47.0	Invert of Emergency Spillway
5457.25	10.25	210669	52481	1.20	36.69	20.1	11.3	10.7	10.0	433.1	47.6	47.6	16.3	63.9	
5457.50	10.50	212165	52854	1.21	37.91	20.4	11.5	10.8	10.2	464.4	48.2	48.2	46.0	94.2	
5457.75	10.75	213665	53229	1.22	39.13	20.6	11.6	11.0	10.4	496.4	48.8	48.8	84.4	133.2	
5458	11.00	215402	53633	1.23	40.36	20.8	11.8	11.2	10.5	529.1	49.3	49.3	130.0	179.3	

Orifice equation and coefficient were obtained from Equation 4-10 and Table 4-3 from "Handbook of Hydraulics" Sixth Edition, by Brater & King, 1976.

$$Q = Ca\sqrt{2gh}$$

C = 0.590 g=32.2 ft/sec^2, a=area (sq ft) h=head (ft)

$$a = \pi D^2 / 4$$

(full area formula)

$$a = \frac{1}{2} r^2 \left\{ \left[2\cos^{-1}\left(\frac{r-d}{r}\right) \right] \frac{\pi}{180} - \sin\left[\left[2\cos^{-1}\left(\frac{r-d}{r}\right) \right] \frac{\pi}{180} \right] \right\}$$

(partial area formula)

Principal Spill. Pipe radius r in feet = 1.00

d = depth of water in the pipe in feet

Emergency Spillway flows were computed based on the following data used in the weir equation

Q = CLH^ 1.5 C = discharge coefficient, L = spillway length perp. to flow (ft), H = head (ft)

Emergency Spillway C =	2.60	L =	50	Emer. Spill. Elev.=	5457.00
Grate / Weir C =	3.00	L =	12	El. 4'x4' grate	5452.00

Data Source : Ground Survey 2020

(e) The combined discharge of the reverse incline ports and the grate (A), will govern the discharge until the principal spillway outfall pipe becomes fully submerged. When the sum of (A)s is greater than outfall pipe capacity then outfall pipe capacity governs the discharge

Weir equation and "C" coefficients were obtained from Equation 5-10 and Table 5-3 from "Handbook of Hydraulics" Sixth Edition, by Brater & King, 1976.

(f) Length assumed along top of pond embankment and elevations extended above emergency spillway to allow for rating curve to function if flow spills over top

Draft

Hydro ID: **R_107_Pond**

Pond rating curve based on:
Los Diamantes Subdivision Regional Drianage Analysis Report
SSCAFCA project number CA_P0007

	Elevation ft	Depth ft	Volume ac-ft	Discharge cfs
Pond/culvert invert	5490.00	0.00	0.00	0.0
First row invert	5490.58	0.58	0.01	0.0
	5491.00	1.00	0.08	5.0
First row top	5491.15	1.15	0.12	7.3
Second row invert	5491.73	1.73	0.30	12.8
	5492.00	2.00	0.41	14.7
Second row top	5492.31	2.31	0.57	22.7
Third row invert	5492.89	2.89	1.00	30.2
	5493.00	3.00	1.10	31.1
Third row top	5493.46	3.46	1.56	43.1
Slated top grate lowest elevation	5493.85	3.85	2.03	50.4
	5494.00	4.00	2.23	55.3
	5494.34	4.34	2.76	72.2
	5495.00	5.00	4.03	97.0
	5496.00	6.00	6.34	116.0
	5497.00	7.00	9.30	133.0
	5498.00	8.00	13.00	147.0
	5499.00	9.00	17.38	160.0
	5500.00	10.00	22.11	172.0
	5501.00	11.00	27.12	183.0
	5502.00	12.00	32.48	193.0
	5503.00	13.00	38.13	203.0
	5504.00	14.00	44.10	212.0
	5505.00	15.00	50.39	220.0
	5506.00	16.00	57.02	229.0
Emergency spillway crest	5506.25	16.25	59.07	231.0
	5507.00	17.00	64.02	605.0
Top of pond	5508.00	18.00	71.30	1558.0

Draft

LOS DIAMANTES SUBDIVISION
REGIONAL DRAINAGE
ANALYSIS REPORT

Draft

Prepared for:

AB Southwest, LLC
300 Drakes Landing Road, Suite 172
Greenbrae, CA 94904

Prepared by:

Mark Goodwin & Associates, PA
PO Box 90606
Albuquerque, NM 87199
(505) 828-2200

LOS DIAMANTES SUBDIVISION
REGIONAL DRAINAGE
ANALYSIS REPORT

APPROVALS

City of Rio Rancho	David Serrano (Digitally signed by David Serrano DN: C=US, E=dserrano@rrnm.gov, CN=David Serrano Date: 2021.05.12 08:25:23-06'00') *Development Services Engineering Division*	*Date*
SSCAFCA	Charles Thomas (Digitally signed by Charles Thomas DN: cn=Charles Thomas, o=SSCAFCA, ou=Executive Engineer, email=cthomas@sscafca.com, c=US Date: 2021.05.19 13:56:44 -06'00') *Executive Engineer*	*Date*
AMAFCA	*Development Review Engineer*	5/21/2021 *Date*

***This analysis has been reviewed for compliance as a result of the proposed connection to an AMAFCA facility. This signature does not infer approval or permissive use of AMAFCA facilities.**

I, Christopher R. Hittle, a New Mexico registered professional engineer, do hereby certify that the accompanying report was prepared by me or under my supervision and is true and correct to the best of my knowledge.

Registered Professional Engineer — 12/29/2020 *Date*

Draft

Pond Design

The Los Diamantes Regional Pond is designed to mitigate all of the upstream developed conditions 100-year discharge that would otherwise result from the development of the Los Diamantes Subdivision and the rest of Unit 10 that drains to the existing 102” Saltillo Outfall (CA_01S in the CAWMP) including the diverted 244 acres of the Black Arroyo. The Los Diamantes Regional Pond was modeled in HEC-HMS as a storage routing feature utilizing an Elevation-Storage-Discharge outflow curve. The Elevation-Storage curve was calculated based on the pond design using drafting software. The Storage-Discharge curve was calculated based on the proposed outlet structure, which consists of a ported riser box and 48” RCP outlet pipe. The discharge curve was calculated based on the three (3) rows of orifices on the ported riser and the weir located at the top of the riser box. The orifice equation was utilized to calculate the capacity of the orifices using an orifice coefficient of 0.598. The weir equation was utilized to calculate the capacity of the weir discharge at the top of the riser box using a weir coefficient of 3.0. The weir length for the riser box was calculated using the perimeter length around the top of the three-sided riser box. Near the top of the riser box elevation, the capacity of the riser box orifice and weir combination was compared to the capacity of the 48” RCP to determine the limiting discharge. It was determined that the riser box controls the pond outflow up to an elevation of 5495.00 at which point the 48” RCP becomes the limiting outflow. At this elevation, the 48” outlet pipe controls the outflow based on inlet control calculations using the Federal Highway Administration’s (FHWA) HY-8 culvert hydraulics software. The 48” RCP was modeled in HY-8 using the first section of pipe immediately downstream of the ported riser. This section has a proposed slope of approximately 0.034 ft/ft, a Manning’s n-value of 0.013, and a downstream tailwater condition set to a WSEL equal to the HGL located in the proposed manhole at Station 19+15.10. The weir equation was utilized to calculate the discharge through the emergency overflow spillway using a coefficient of 2.65. The spillway consists of a 214’ wide weir at an elevation of 5506.25. The overall rating curve utilized in the HEC-HMS model can be found below. Detailed calculations for the outlet can be found in Appendix F.

Draft

Table 3: Regional Detention Pond Rating Curve

Elevation (ft)	Notes	Cumulative Volume (ac-ft)	Discharge (cfs)	Methodology
5490.00	Pond / Culvert Invert	0	0	Outlet Calcs
5490.58	First row invert	0.00	0.0	
5491.00		0.08	5.0	
5491.15	First row top	0.12	7.3	
5491.73	Second row invert	0.30	12.8	
5492.00		0.41	14.7	
5492.31	Second row top	0.57	22.7	

5492.89	Third row invert	1.00	30.2	
5493.00		1.10	31.3	
5493.46	Third row top	1.56	43.1	
5493.85	Slated top grate lowest EL (top of concrete)	2.03	50.4	
5494.00		2.23	55.3	
5494.34		2.76	72.2	
5495.00	Top of Side face slopes for grate	4.03	97	
5496.00		6.34	116	
5497.00		9.30	133	
5498.00		13.00	147	
5499.00		17.38	160	
5500.00		22.11	172	
5501.00		27.12	183	HY-8
5502.00		32.48	193	
5503.00		38.13	203	
5504.00		44.10	212	
5505.00		50.39	220	
5506.00		57.02	229	
5506.25d	Emergency spillway crest	59.07	231	
5507.00		64.02	605	HY-8 + Outlet Calcs
5508.00	Top of pond	71.30	1558	

Draft

The pond was designed as a single storage area with a bottom elevation of 5490. A 214' wide spillway is provided to convey the 500-year ultimate conditions overflow discharge. The 214' wide emergency spillway crest is at elevation 5506.25 and the top of dam elevation is 5508.0. In ultimate conditions, the 100 year peak stage is 2.5' below the spillway crest and the 500 year peak stage is only approximately 0.85' above the spillway crest with approximately 476 cfs going through the spillway. The width of the emergency spillway is measured along the crest of the weir. According to the Rules and Regulation Governing Dam Design, Construction and Dam Safety (Bureau, 2010)Title 19, Chapter 25, Part 12, 19.25.12.7.D.(1)(a) defines a "Jurisdictional Dam" as being among other things "6' or greater in height". The height of this dam is about 2.0' measured from the crest, elevation 5506.25, to the downstream toe, elevation 5504.3. Therefore, this dam is defined as a "Non-Jurisdictional dam" according to19.25.12.7.D. (1)(b) since it does not meet the height requirement of a Jurisdictional dam. A scour calculation was prepared for the downstream toe of slope of the emergency spillway based on the 500-year storm event. The 500-year scour depth was calculated to be 2.2' based on Equation 3.57 of the SSCAFCA *Sediment and Erosion Design Guide*. A 4' deep toe wall is proposed at the downstream edge of the shotcrete spillway along with wire enclosed riprap to prevent erosion from occurring. The table below summarizes the proposed pond results.

Hydro ID: **W_203_Pond**

Pond rating curve based on:
Construction Plans for Las Ventanas Detention Dam
PMP Hydrologic Analysis for West Branch Calabacillas Arroyo

	Depth ft	Volume ac-ft	Discharge cfs
Pond/principal spillway invert	0.0	0.0	0.0
	1.0	0.1	5.4
	2.0	0.7	9.4
	3.0	2.2	12.2
	4.0	4.8	27.7
	5.0	10.1	43.0
	6.0	30.5	53.3
	7.0	58.2	65.1
	8.0	92.9	70.6
	9.0	132.2	75.7
Emergency spillway crest	9.8	164.8	79.3
	10.0	176.2	384.6
	11.0	223.3	3500.1
	12.0	272.0	9595.1
	13.0	323.1	17993.1

Draft

PMP Hydrologic Analysis Report for West Branch Calabacillas Arroyo

Swinburne Dam – Located in Bernalillo County, New Mexico

Draft

February 2014

Prepared for:

Prepared by:

Bohannan Huston
Engineering
Spatial Data
Advanced Technologies

PMP HYDROLOGIC ANALYSIS REPORT FOR WEST BRANCH CALABACILLAS ARROYO SWINBURNE DAM – LOCATED IN BERNALILLO COUNTY, NEW MEXICO

FEBRUARY 11, 2014

Draft

Prepared for:

AMAFCA
2600 PROSPECT NE
ALBUQUERQUE, NM 87107

Prepared by:

BOHANNAN HUSTON INC.
COURTYARD ONE
7500 JEFFERSON NE
ALBUQUERQUE, NM 87109

Prepared by: 2/11/14

Alandren Etlantus, P.E. Date

NM P. E. 19995

Reviewed by: 2/11/14

Craig W. Hoover, P.E. Date

NM P.E. 11848

Dam Name: Swinburne Dam

County Name: Bernalillo County, New Mexico

ENGINEER'S CERTIFICATE

State of New Mexico

County of Bernalillo

I, Alandren Etlantus, hereby certify that I am a professional engineer licensed in the State of New Mexico qualified in civil engineering; that the accompanying PMP Hydrologic Analysis Report for West Branch Calabacillas Arroyo was prepared by me or under my supervision; that the accompanying PMP Hydrology Analysis Report for West Branch Calabacillas Arroyo is in compliance with the Dam Design, Construction and Dam Safety Regulations (19.25.12 NMAC) and that the same are true and correct to the best of my knowledge and belief.

_______________ License number ___________ (SEAL)

ALANDREN ETLANTUS NEW MEXICO 19995 PROFESSIONAL ENGINEER

Engineer's Signature

Date submitted 2/11/14

Draft

STATE ENGINEER'S CERTIFICATE

State of New Mexico

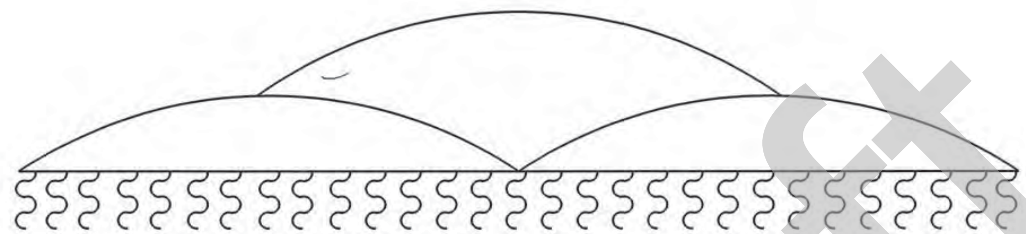
County of Santa Fe

I hereby certify that the accompanying PMP Hydrologic Analysis Report for West Branch Calabacillas Arroyo and appurtenant structures has been duly examined by me and accepted for filing on the _________ day of ___________, 20__.

____

State Engineer

ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY



Plans for construction of

LAS VENTANAS DETENTION DAM

Draft

APPLICATION NO. 471
RECEIVED
OFFICE OF STATE ENGINEER
SANTA FE, NEW MEXICO

UPDATE APPROVED FOR CONSTRUCTION

FRANK H. MARTINEZ — 8/7/98 — DATE
EXECUTIVE DIRECTOR, AMAFCA/OWNER

RECOMMENDED:

JOHN KELLY, P.E. — 8-7-98 — DATE
CHIEF ENGINEER, AMAFCA

APPROVED FOR CONSTRUCTION

LARRY A. BLAIR — November 30, 1997 — DATE
EXECUTIVE ENGINEER

ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

SHEET 1 OF 28

AAR-THE LARKIN GROUP, INC.
CONSULTING ENGINEERS AND SURVEYORS
ALBUQUERQUE 98-0014 NEW MEXICO

RECORD DRAWING 7/99

RICHARD LOVATO NEW MEXICO 6823 REGISTERED PROFESSIONAL ENGINEER 8/4/98

CRAIG W. HOOVER NEW MEXICO 11848 REGISTERED PROFESSIONAL ENGINEER 11/13/97

BOHANNAN-HUSTON INC.
ENGINEERS • PLANNERS • PHOTOGRAMMETRISTS • SURVEYORS • LANDSCAPE ARCHITECTS
ALBUQUERQUE LAS CRUCES SANTA FE

USERNAME: 95285A2100

LAS VENTANAS DETENTION DAM

ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

LOCATED IN BERNALILLO COUNTY, STATE OF NEW MEXICO

ALL COURSES STATE GRID NORTH – SCALE AS SHOWN

The undersigned, Albuquerque Metropolitan Arroyo Flood Control Authority, claimant, whose office address is 2600 Prospect Ave. N. E., Albuquerque 87107, County of Bernalillo, State of New Mexico, has caused to be drawn up by Bohannan–Huston Inc., the plans and specifications of the Las Ventanas Detention Dam, as hereafter described and indicated, hereby makes these several statements relative thereto, and offers those plans and statements for acceptance and filing in compliance with the laws of the State of New Mexico. No application is being made for use of water.

The reservoir inlet of the principal spillway is in the N.E. 1/4 of the S.W. 1/4 of the projected Section 10, T11N, R2E whose state plane coordinate (NM Central Zone) is x = 359,700.82, y = 1,527,332.07. The Reservoir will receive drainage from the Piedras Marcadas Watershed (via Tributary "A" and "B" of the North Branch Piedras Marcadas Channel) and the Calabacillas Watershed (via the West Branch Calabacillas Diversion Channel). Discharge from the principal spillway will be into the West Branch of the Arroyo de la Calabacillas north of Irving Boulevard. The Las Ventanas Detention Dam will be constructed of granular native soils present within and imported to the proposed reservoir area. Embankment materials will be placed in continuous horizontal lifts blended together to assume a homogeneous embankment. The section beneath the dam contains a cutoff trench keyed to existing basalt formations at or below existing ground to reduce the permeability of the foundation soils or rock. Slope stability analysis was performed and evaluated for side slopes of 3:1 (horizontal to vertical) for the upstream slope and 3:1 to 7.5:1 for the downstream slopes. Specifications for the construction of this dam will be "New Mexico State Highway Department Standard Specifications for Road and Bridge Construction, Edition of 1994" plus special provisions for embankment and soil cement construction, resulting from a comprehensive foundation and materials investigation.

The PROPOSED CONFIGURATION of the Las Ventanas Detention Dam is designed for the following conditions:

A. The principal spillway shall consist of a 42 inch diameter concrete cylinder pipe with a maximum discharge of 80 cubic feet per second passing through the principal spillway during the 100 year frequency flood for proposed development conditions upstream of the drainage facility.

B. The crest of the emergency spillway is at an elevation that will not be overtopped by the 100 year frequency flood, for proposed development conditions upstream of the drainage facility.

C. One–half the Probable Maximum Flood including the bankfull flow that can be carried by the two channels entering the drainage facility will not overtop the dam for proposed development conditions upstream of the detention dam.

D. The concrete cylinder pipe principal spillway will drain the dam, within 96 hours, to a storage volume of less than 10.0 acre feet following a flood that uses all available storage within 96 hours.

STATE OF NEW MEXICO)
) ss.
COUNTY OF BERNALILLO)

I, Craig W. Hoover, being first a duly sworn, upon my oath state that I am a registered professional engineer, qualified in civil engineering, and that the accompanying plans consisting of 28 sheets were prepared by me or under my direction, and are true and correct to the best of my knowledge and belief.

Craig W. Hoover 11/17/97
Craig W. Hoover, P.E.
N.M.P.E. No. 11848

Subscribed and sworn to before me this *17th* day of *November*, 1997.

Janet E. Speakman
Notary Public

My Commission Expires: *March 16, 1998* (SEAL)

[redacted] *3-16-98*

Las Ventanas Detention Dam Properties

Dam Hazard Classification	High
Drainage Basin Size	
100–year, Future	2.028 sq. mi.
PMF, Future	2.028 sq. mi.
Peak Inflow to Dam	
100–year, Future	2,871 cfs
PMF, Future	12,730 cfs
Peak Outflow from Dam	
100–year, Future	78.5 cfs
PMF, Future	9,662 cfs
Maximum Fill Height*	17–ft.
Length	5925–ft.
Crest Width	15–ft.
Slope of Embankment	3:1 (Max.)
Top of Dam Effective Elevation	5,408–ft.
Emergency Spillway Elevation	5,404.75–ft.
Principal Spillway Dia. (Concrete Pipe Cylinder)	42 in.
Principal Spillway Invert	5395.0 ft.
Orifice Plate Diameter	32.0 in.
Width of Emergency Spillway	1421.65–ft.
Spillway Crest Storage at 5404.75	172–ac. ft.
Top of Dam Storage	330–ac. ft.
Discharge Capacity at 5404.75	78.5 cfs
Discharge Capacity at 5408	17,590 cfs
Reservoir Sediment Allowance	20.0–ac. ft.
Representative Annual Sed. Vol.	2.0–ac. ft.
100–year Sediment Volume	8.8–ac. ft.
Floodpool Evacuation Time	30 hrs.
100–year Pool Elevation	5404.6–ft.
1/2 PMF Pool Elevation	5407.00–ft.
Freeboard	.95 ft.
Additional Buffer Storage	30–ac. ft.

* To effective top of Dam at 5408

STATE OF NEW MEXICO)
) ss.
COUNTY OF SANTA FE)

I hereby certify that the accompanying map(s) and statements (plans and statements consisting of 28 sheets) have been duly examined by me and are approved as to form and content, and were duly accepted for filing on this *13th* day of *January*, 199*8*.

Lawrence J. Ferns Jr., P.E.
State Engineer's Office
For D.T. Lopez, Chief, Technical Division

STATE OF NEW MEXICO)
) ss.
COUNTY OF BERNALILLO)

I, Larry A. Blair, on behalf of the Albuquerque Metropolitan Arroyo Flood Control Authority, being first duly sworn upon my oath, state that I have read and examined the accompanying map and statements (plans and statements consisting of 28 sheets) and know the contents thereof and representations thereon and state that the same are true to the best of my knowledge and belief.

Albuquerque Metropolitan Arroyo Flood Control Authority, Claimant

Larry A. Blair
Larry A. Blair
Executive Engineer

Subscribed and sworn to before me this *30* day of *November*, 1997.

Martin Eckert Jr.
Notary Public

My Commission Expires: *July 8, 2000* (SEAL)

OFFICIAL SEAL
Martin Eckert, Jr.
NOTARY PUBLIC
STATE OF NEW MEXICO
My Commission Expires: *July 8, 2000*

INDEX

As built information supplied by Walker Surveying for Salls Bros. Construction.

APPLICATION NO. 4711
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SANTA FE, NEW MEXICO

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BOHANNAN-HUSTON INC.
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ALBUQUERQUE LAS CRUCES SANTA FE

ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

LAS VENTANAS DETENTION DAM

FILING SHEET AND TABLE OF CONTENTS

△	8/4/98	AAR LARKIN UPDATE	RL

DRAWING NO. | MAP NO. B–10 | SHEET 2 OF 28

BHI JOB NO. 95285A2100

Draft

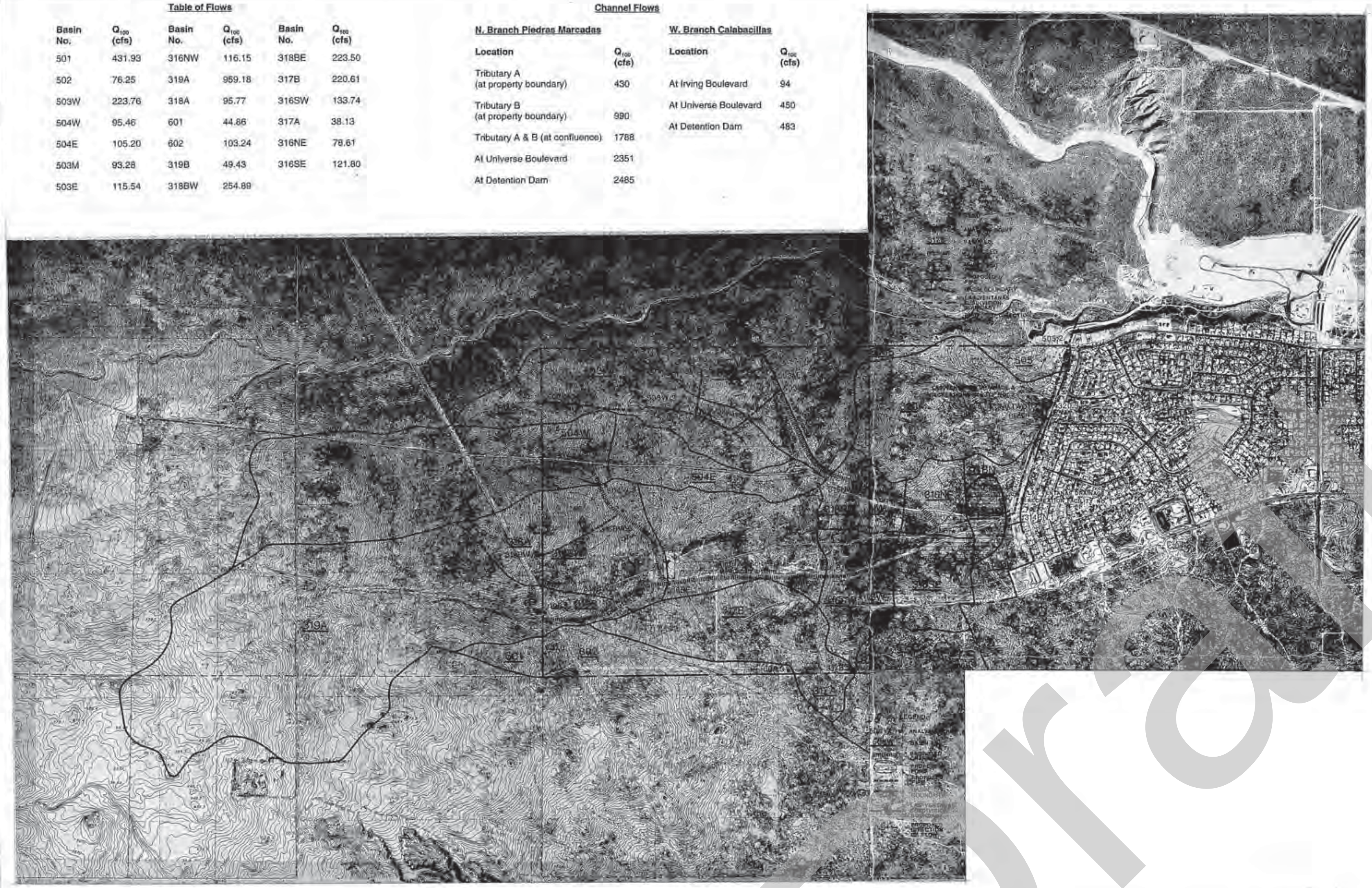


Table of Flows

Basin No.	Q_{100} (cfs)	Basin No.	Q_{100} (cfs)	Basin No.	Q_{100} (cfs)
501	431.93	316NW	116.15	318BE	223.50
502	76.25	319A	959.18	317B	220.61
503W	223.76	318A	95.77	316SW	133.74
504W	95.46	601	44.86	317A	38.13
504E	105.20	602	103.24	316NE	78.61
503M	93.28	319B	49.43	316SE	121.80
503E	115.54	318BW	254.89		

Channel Flows

N. Branch Piedras Marcadas

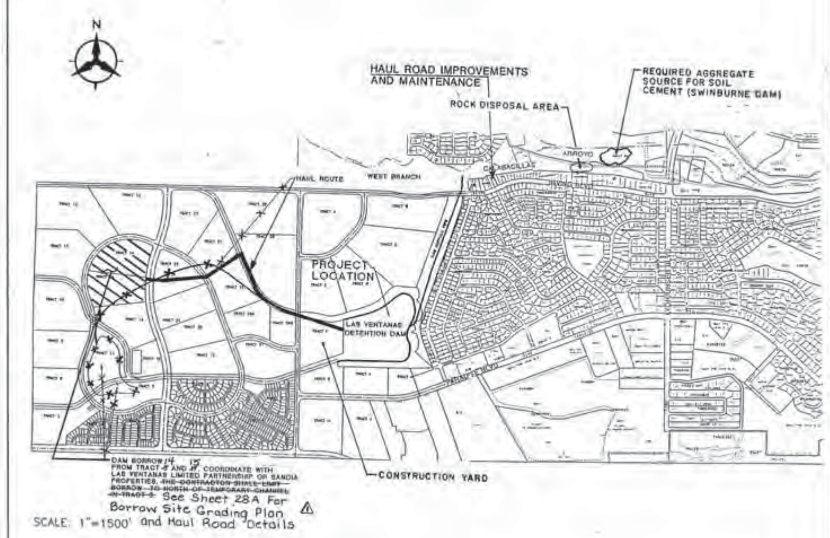
Location	Q_{100} (cfs)
Tributary A (at property boundary)	430
Tributary B (at property boundary)	990
Tributary A & B (at confluence)	1788
At Universe Boulevard	2351
At Detention Dam	2485

W. Branch Calabacillas

Location	Q_{100} (cfs)
At Irving Boulevard	94
At Universe Boulevard	450
At Detention Dam	483

DRAINAGE AREA MAP:

SCALE: 1" = 1000'



LOCATION MAP :

GENERAL NOTES :

1. New Mexico State Highway Department "Standard Specifications for Road and Bridge Construction, edition of 1994," and supplemental specifications and special provisions thereto shall govern construction of this project.
2. Elevations are shown in feet above mean sea level datum.
3. All stationing for the dam and channels refer to the measured horizontal distance. Left and right of centerline are looking in the direction of increasing station.
4. Where fence is shown along property lines, construct the centerline of the fence posts six (6) inches to the inside of the property line.
5. When coordinates are shown herein (N,E) they refer to the New Mexico State Plane Coordinate System. Coordinates are based on true ground distances and state grid bearings. Grid Distance = Field Distance x 0.9996593.
6. Additional construction at gates and walk gaps shall be considered incidental to the cost of the construction of the fence.
7. Right-of-way shown on the plans define "Limits of Work" for this project. The Contractor shall confine his operations to the construction limits of the project and will be held responsible for any agreements necessary or damage by his operation to public or private property including utilities.
8. Fill materials from excavation or borrow which requires more than one handling prior to final placement, including stockpiling and blending to meet gradation requirements or stockpiling for later disposal, will be considered incidental to the contract unit price for unclassified excavation. No separate payment shall be made for blending or multiple handling and final payment shall be made on the basis of quantities removed from the original location.
9. Contractors' yard, and any other disturbed areas not included on the plans, shall be treated with Class "A" seeding, and no measurement or payment will be made therefore.
10. Watering, as required for construction and dust control, shall be considered incidental to construction and no measurement or payment shall be made therefore. Construction areas shall be watered with equipment for dust pollution abatement as directed by the Engineer. The Contractor shall be responsible for locating and supplying water as required.
11. The Contractor will be responsible to replace at his own expense any and all property corners destroyed in the process of construction. All property corners must be set by a Registered Professional Surveyor.
12. No payment above the cost of excavation will be made for placement of surplus fill to any designated waste areas or the Contractor located disposal site.
13. Place strippings over dam slopes and other disturbed areas prior to seeding as directed by the Project Manager. Cost of this work shall be incidental to the cost of the item clearing and grabbing.
14. This project is constructed under the authority of the State Engineer, State of New Mexico. The State Engineer, or his designated agent, shall have full power regarding inspection during construction, and full power to act if specifications are not met.
15. Minor changes in elevations and slopes for excavation and fill may be made to suit field conditions, as approved by the Project Manager.

APPLICATION NO. RECEIVED
OFFICE OF STATE ENGINEER SANTA FE, NEW MEXICO

RECORD DRAWING 7/99

CRAIG W. ROOVER NEW MEXICO 11040 REGISTERED PROFESSIONAL ENGINEER

DETAIL OR SECTION IDENTIFICATION
SHEET NUMBER ON WHICH DETAIL IS DRAWN
SHEET NUMBER ON WHICH SECTION IS CUT

BOHANNAN-HUSTON INC.
ENGINEERS • PLANNERS • PHOTOGRAMMETRISTS • SURVEYORS • LANDSCAPE ARCHITECTS
ALBUQUERQUE LAS CRUCES SANTA FE

ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

TITLE: LAS VENTANAS DETENTION DAM

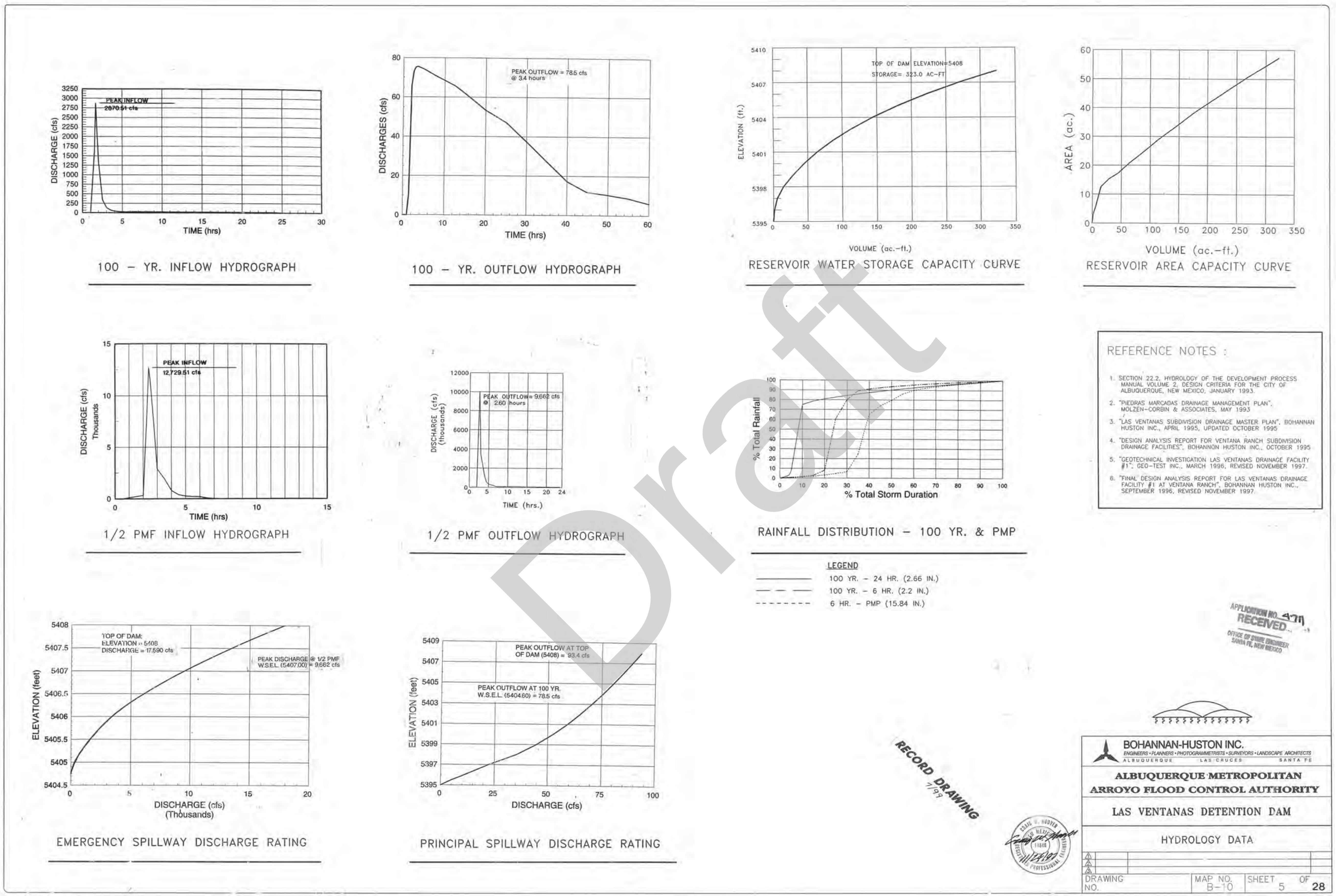
LOCATION MAP, DRAINAGE AREA MAP AND GENERAL NOTES

1	8/4/98	AAR LARKIN UPDATE	RL

DRAWING NO. B - 10 | MAP NO. | SHEET 3 OF 28

USERNAME: 9528523.ACAD

Draft



PEAK INFLOW 2870.51 cfs
DISCHARGE (cfs)
TIME (hrs)
100 – YR. INFLOW HYDROGRAPH
PEAK OUTFLOW = 78.5 cfs @ 3.4 hours
DISCHARGES (cfs)
TIME (hrs)
100 – YR. OUTFLOW HYDROGRAPH
TOP OF DAM ELEVATION=5408
STORAGE= 323.0 AC-FT
ELEVATION (ft.)
VOLUME (ac.-ft.)
RESERVOIR WATER STORAGE CAPACITY CURVE
AREA (ac.)
VOLUME (ac.-ft.)
RESERVOIR AREA CAPACITY CURVE
PEAK INFLOW 12,729.51 cfs
DISCHARGE (cfs) Thousands
TIME (hrs)
1/2 PMF INFLOW HYDROGRAPH
PEAK OUTFLOW= 9,662 cfs @ 2.60 hours
DISCHARGE (cfs) (thousands)
TIME (hrs.)
1/2 PMF OUTFLOW HYDROGRAPH
% Total Rainfall
% Total Storm Duration
RAINFALL DISTRIBUTION – 100 YR. & PMP
LEGEND
100 YR. – 24 HR. (2.66 IN.)
100 YR. – 6 HR. (2.2 IN.)
6 HR. – PMP (15.84 IN.)
REFERENCE NOTES :
1. SECTION 22.2, HYDROLOGY OF THE DEVELOPMENT PROCESS MANUAL VOLUME 2, DESIGN CRITERIA FOR THE CITY OF ALBUQUERQUE, NEW MEXICO, JANUARY 1993.
2. "PIEDRAS MARCADAS DRAINAGE MANAGEMENT PLAN", MOLZEN-CORBIN & ASSOCIATES, MAY 1993
3. "LAS VENTANAS SUBDIVISION DRAINAGE MASTER PLAN", BOHANNAN HUSTON INC., APRIL 1995, UPDATED OCTOBER 1995
4. "DESIGN ANALYSIS REPORT FOR VENTANA RANCH SUBDIVISION DRAINAGE FACILITIES", BOHANNON HUSTON INC., OCTOBER 1995
5. "GEOTECHNICAL INVESTIGATION LAS VENTANAS DRAINAGE FACILITY #1", GEO-TEST INC., MARCH 1996, REVISED NOVEMBER 1997.
6. "FINAL DESIGN ANALYSIS REPORT FOR LAS VENTANAS DRAINAGE FACILITY #1 AT VENTANA RANCH", BOHANNAN HUSTON INC., SEPTEMBER 1996, REVISED NOVEMBER 1997.
TOP OF DAM: ELEVATION = 5408 DISCHARGE = 17,590 cfs
PEAK DISCHARGE @ 1/2 PMF W.S.E.L. (5407.00) = 9,662 cfs
ELEVATION (feet)
DISCHARGE (cfs) (Thousands)
EMERGENCY SPILLWAY DISCHARGE RATING
PEAK OUTFLOW AT TOP OF DAM (5408) = 93.4 cfs
PEAK OUTFLOW AT 100 YR. W.S.E.L. (5404.60) = 78.5 cfs
ELEVATION (feet)
DISCHARGE (cfs)
PRINCIPAL SPILLWAY DISCHARGE RATING
RECORD DRAWING
BOHANNAN-HUSTON INC.
ENGINEERS • PLANNERS • PHOTOGRAMMETRISTS • SURVEYORS • LANDSCAPE ARCHITECTS
ALBUQUERQUE LAS CRUCES SANTA FE
ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY
LAS VENTANAS DETENTION DAM
HYDROLOGY DATA
DRAWING NO.
MAP NO. B-10
SHEET 5 OF 28
Draft

Hydro ID: **W_301_Pond**

Pond rating curve based on:
Construction Plans for Little Window Detention Dam
PMP Hydrologic Analysis for West Branch Calabacillas Arroyo

	Depth ft	Volume ac-ft	Discharge cfs
Pond/principal spillway invert	0.0	0.0	0.0
	1.5	0.8	16.0
	2.5	1.5	21.0
	3.5	2.5	24.0
	4.5	3.5	27.0
	5.5	5.0	29.0
	6.5	6.8	33.0
Emergency spillway crest	7.5	8.4	34.6
	8.5	10.0	61.0
	9.5	13.0	263.0
Top of pond	10	13.7	403.6

Draft

ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

Draft

Plans for construction of

LITTLE WINDOW DETENTION DAM

SHEET NUMBER	DESCRIPTION
1	TITLE SHEET
2	LOCATION MAP, GENERAL NOTES AND HYDROLOGY DATA
3	DAM EMBANKMENT PLAN PHASE I
4	DAM PROFILE WITH BORING AND TYPICAL DAM SECTION
5	PRINCIPLE SPILLWAY PLAN & PROFILE
6	PRINCIPLE SPILLWAY/OUTLET STRUCTURES DETAILS
7	EMERGENCY SPILLWAY DETAILS
8	DAM EMBANKMENT PLAN PHASE II

I, David C. Clausen, New Mexico Professional Land Surveyor No. 6547, do hereby certify that the as-built information shown hereon is the result of a field survey performed by me or under my direct supervision, and that the same is true and correct.

David C. Clausen N.M.L.S. # 6547

DAVID C. CLAUSEN NEW MEXICO 6547 PROFESSIONAL LAND SURVEYOR

APPROVED FOR CONSTRUCTION

JOHN KELLY, P.E. 4-2-98
CHIEF ENGINEER DATE

Bohannan ▲ Huston
Courtyard One 7500 JEFFERSON NE Albuquerque NEW MEXICO 87109
ENGINEERS PLANNERS PHOTOGRAMMETRISTS SURVEYORS SOFTWARE DEVELOPERS

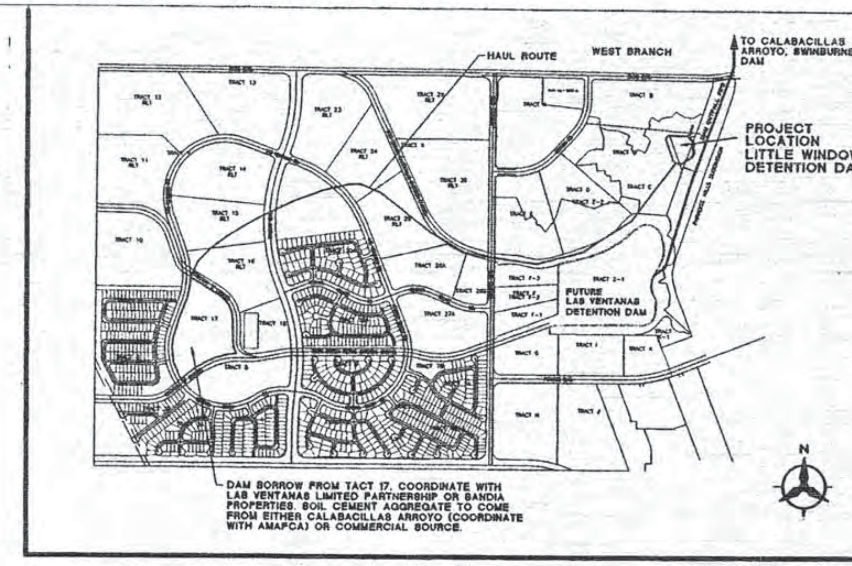
ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

SHEET 1 OF 8

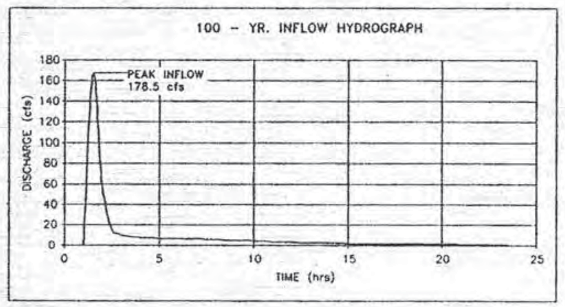
FILENAME: BHI-MAIN:[HGB130.HYDRO.DESIGN.EP]COVER.DWG

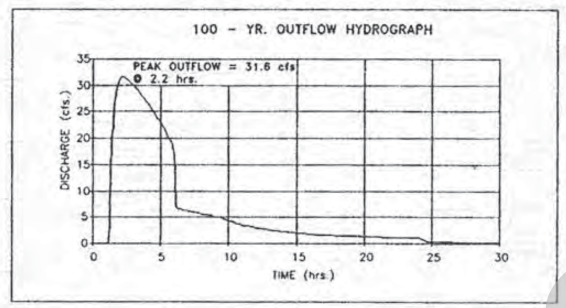
GENERAL NOTES :

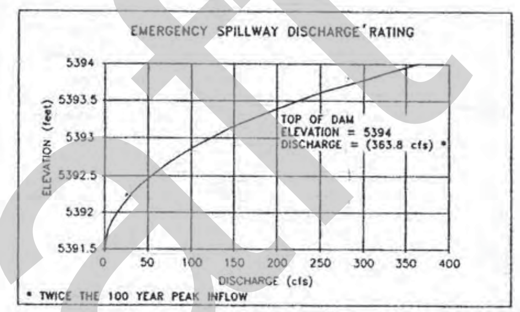
1. New Mexico State Highway Department "Standard Specifications for Road and Bridge Construction, edition of 1994," and supplemental specifications and special provisions thereto shall govern construction of this project.
2. Elevations are shown in feet above mean sea level datum.
3. All stationing for the dam and maintenance roads refer to the measured horizontal distance, left and right of centerline are looking in the direction of increasing station.
4. Contractor shall use basalt crusher fines for all maintenance roads, including those on the crest of the dam.
5. When coordinates are shown herein (N,E) they refer to the New Mexico State Plane Coordinate System. Coordinates are based on true ground distances and state grid bearings. Grid Distance = Field Distance x 0.9996593.
6. Right-of-way shown on the plans define "Limits of Work" for this project. The Contractor shall confine his operations to the construction limits of the project and will be held responsible for any agreements necessary or damage by his operation to public or private property including utilities.
7. Fill materials from excavation or borrow which requires more than one handling prior to final placement, including stockpiling and blending to meet gradation requirements or stockpiling for later disposal, will be considered incidental to the contract unit price for unclassified excavation. No separate payment shall be made for blending or multiple handling and final payment shall be made on the basis of quantities removed from the original location.
8. Contractors' yard, and any other disturbed areas not included on the plans, shall be treated with Class "A" seeding, and no measurement or payment will be made therefore.
9. The Air Pollution Control Regulations of the Albuquerque – Bernalillo County Air Quality Control Board limit emission of particulate matter and the use of cut back asphalt. It is the responsibility of the Contractor to clarify these restrictions with the Environmental Health Department prior to submittal of bids to avoid conflicts with regulations.
10. Watering, as required for construction and dust control, shall be considered incidental to construction and no measurement or payment shall be made therefore. Construction areas shall be watered with equipment for dust pollution abatement as directed by the Engineer. The Contractor shall be responsible for locating and supplying water as required.
11. The Contractor will be responsible to replace at his own expense any and all property corners destroyed in the process of construction. All property corners must be set by a Registered Professional Surveyor.
12. No payment above the cost of excavation will be made for placement of surplus fill to any designated waste areas or the Contractor located disposal site.
13. Place strippings over dam slopes and other disturbed areas prior to seeding as directed by the Project Manager. Cost of this work shall be incidental to the cost of the item clearing and grabbing.
14. Minor changes in elevations and slopes for excavation and fill may be made to suit field conditions, as approved by the Project Manager.

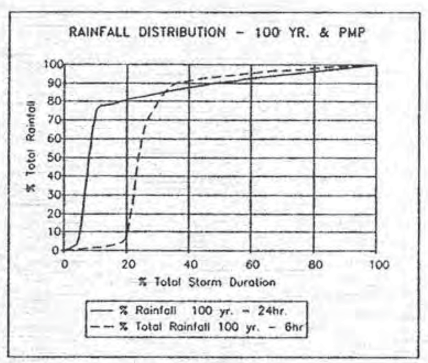


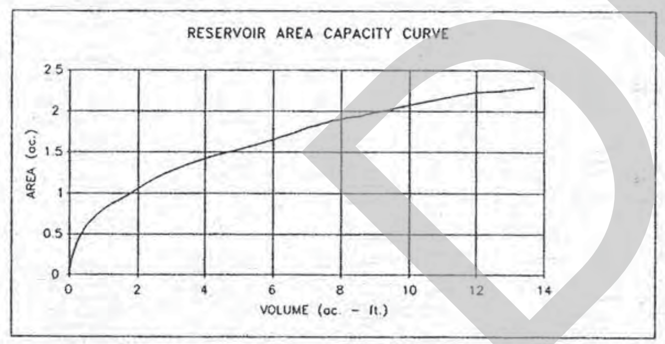
LOCATION MAP :

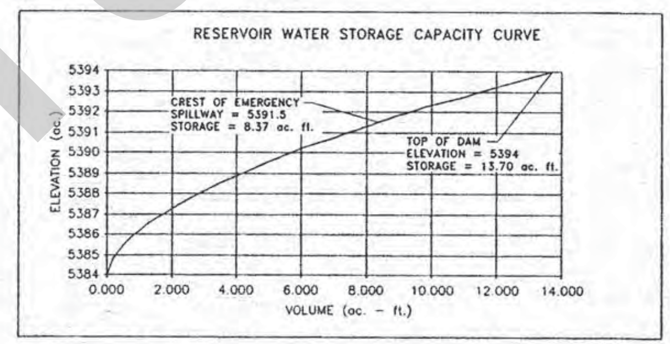


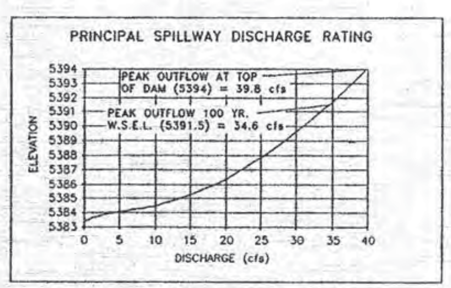


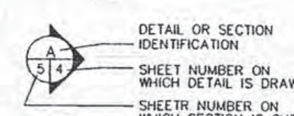












Bohannan ▲ Huston
Courtyard One 7500 JEFFERSON NE Albuquerque NEW MEXICO 87109
ENGINEERS PLANNERS PHOTOGRAMMETRISTS SURVEYORS SOFTWARE DEVELOPERS

ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

LITTLE WINDOW DETENTION DAM

LOCATION MAP, GENERAL NOTES AND HYDROLOGY DATA

DRAWING NO.	MAP NO. B–10	SHEET 2 OF 8

FILENAME: BHI-MAIN:[98130.HYDRO.DESIGN.EP]LOCATION.DWG

Draft

Hydro ID: **Swinburne_Dam**

Pond rating curve based on:
Construction Plans, Swinburne Dam

	Elevation ft	Depth ft	Volume* ac-ft	Discharge cfs
Pond/principal spillway invert	5254.0	0	0.0	0
	5260.0	6.0	12.2	400
	5265.0	11.0	69.7	1500
	5270.0	16.0	194.2	3000
	5275.0	21.0	373.2	4900
	5280.0	26.0	587.6	7990
	5285.0	31.0	844.3	12800
Emergency spillway crest	5287.6	33.6	999.1	15700
	5290.0	36.0	1154.0	19900
	5295.0	41.0	1514.1	46200
Top of pond	5298.0	44.0	1751.2	68000

* see record drawings, interim grading

Draft

NEW MEXICO STATE HIGHWAY & TRANSPORTATION DEPARTMENT

ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

CONSTRUCTION PLANS

SWINBURNE DAM

FORMERLY
(UNSER/CALABACILLAS DAM)

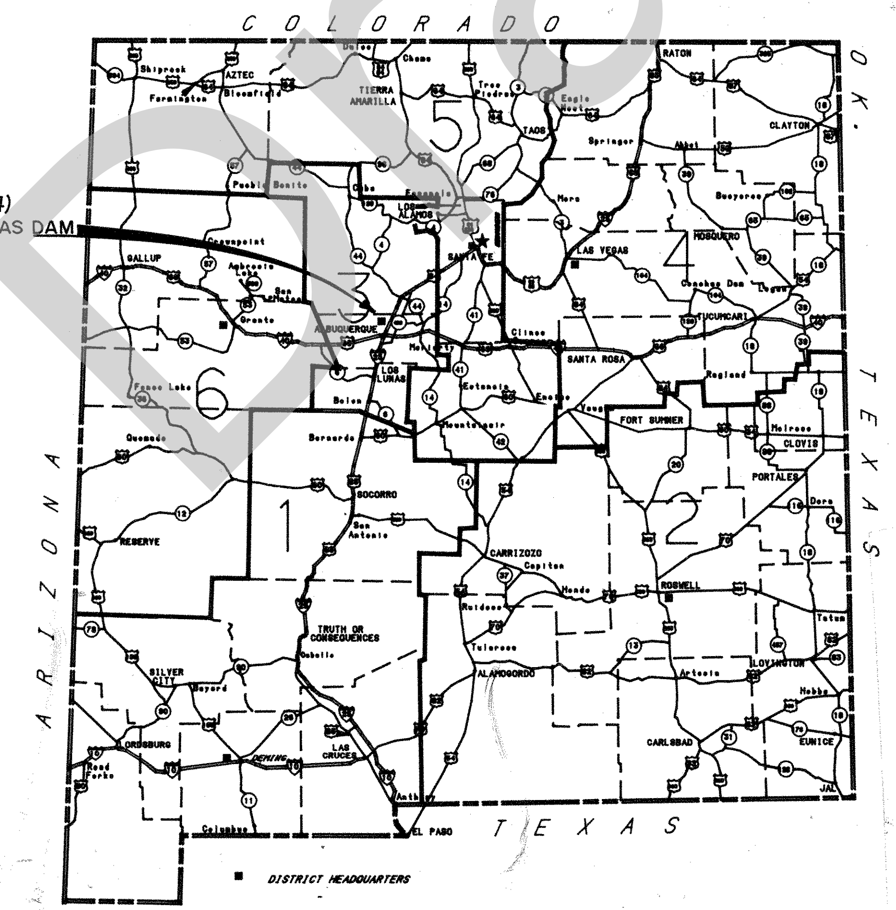
PROJECT NO. SP-(M)-4081(204)

BERNALILLO COUNTY

Draft

NMSHTD

SP-(M)-4081(204)
UNSER CALABACILLAS DAM
BRIDGE NO. 8806



GREAT SEAL OF THE STATE OF NEW MEXICO
1912

ALBUQUERQUE
SEAL
NEW MEXICO
1706

RECORD DRAWING
DATE 7/22/91

27 June 1990
EXECUTIVE ENGINEER AMAFCA

amafca

APPROVED: R. A. Ri[illegible] DATE: 7/5/90
DESIGN DIVISION DIRECTOR
P.E. NO. 5680

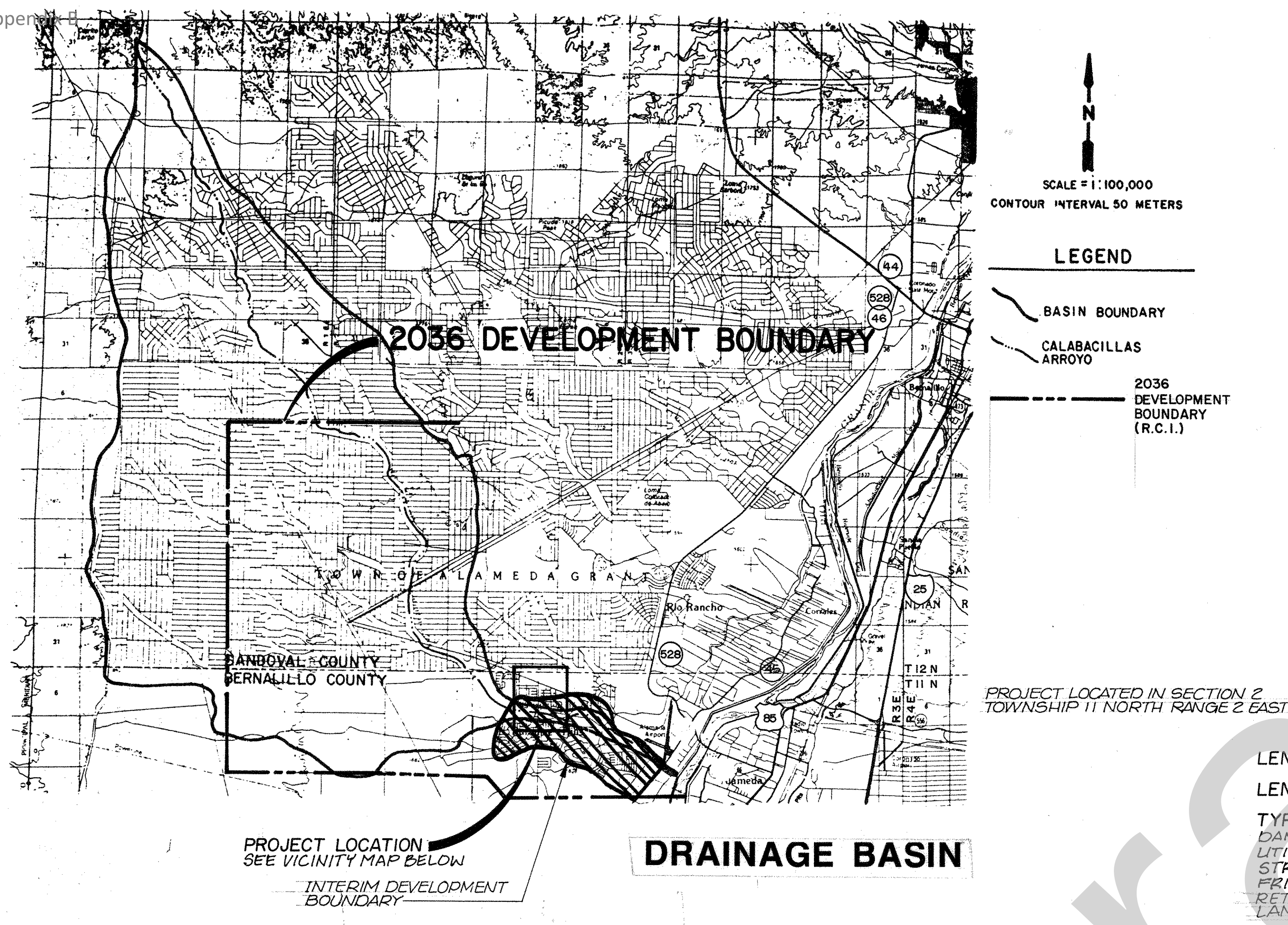
REGISTERED ENGINEER No. 5680 ROBERT G. RI[illegible]

CITY OF ALBUQUERQUE
PROJECT NO. 3885

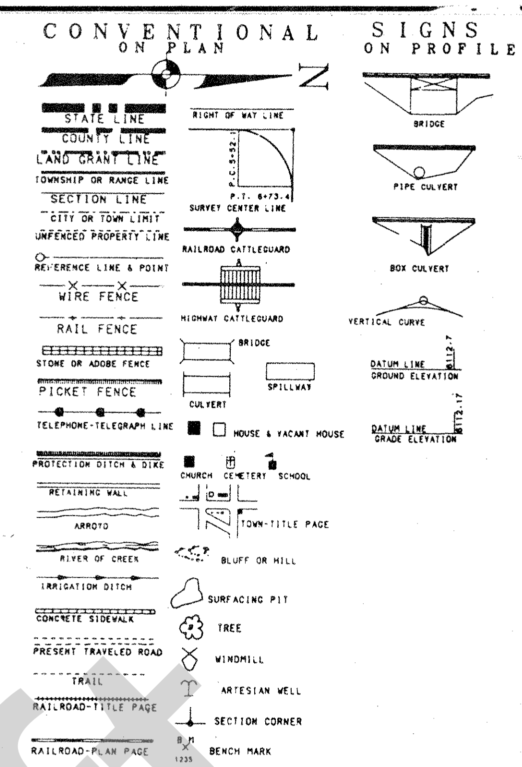
Russell B. [illegible] 6-20-90
CITY ENGINEER

ROBERT F. SYKES NEW MEXICO 5591 REGISTERED PROFESSIONAL ENGINEER

1-1



DRAINAGE BASIN



BOOK NUMBERS
WILSON & CO. ENGINEERS
FILE # 88-508 E, FIELD BOOK 1

SCALES { PLAN 1" = 100' / PROFILE / LAYOUT 1" = 20' }

LENGTH OF PROJECT 0.378 IN MILES

LENGTH OF R/W 0.378 IN MILES

TYPE OF CONSTRUCTION
DAM CONSTRUCTION CONSISTING OF FOUNDATION TREATMENT, UTILITY RELOCATIONS, DAM EMBANKMENT, SOIL CEMENT, DRAINAGE STRUCTURES, BASE COURSE, BITUMINOUS PAVEMENT, OPEN GRADED FRICTION COURSE, CURB AND GUTTER, BRIDGE (PRESTRESSED CONCRETE BEAMS, AUGER PRESSURE GROUTED PILES) SEEDING/ LANDSCAPING.

State of New Mexico)
County of Bernalillo) ss

I, Larry A. Blair, on behalf of the Albuquerque Metropolitan Arroyo Flood Control Authority, being first duly sworn upon my oath, state I have read and examined the accompanying map and statements (map and statements consisting of ______ sheets) and know the contents thereof and representations thereon and state that the same are true to the best of my knowledge and belief.

Albuquerque Metropolitan Arroyo Flood Control Authority, Claimant.

Larry A. Blair
Executive Engineer

Subscribed and sworn to before me this 5 day of March ~~1989~~ 1990.

Notary Public

My Commission expires: 24 May 1992

State of New Mexico)
County of Bernalillo) ss

I, Robert F. Sykes, being first duly sworn upon my oath, state that I am the registered professional engineer who made the maps of the Calabacillas Detention Dam. That such maps consisting of ______ sheets were prepared from field notes of actual surveys made by me or under my direction and that the same are true and correct to the best of my knowledge.

Robert F. Sykes
New Mexico Registered Professional Engineer No. 4591

Subscribed and sworn to before me this 5th day of March 1989.

Notary Public

My Commission expires: November 15, 1992

OFFICIAL SEAL
HILLARY E. NORTON
NOTARY PUBLIC - STATE OF NEW MEXICO
Notary Bond Filed With Secretary of State
My Commission Expires 11-15-92

State of New Mexico)
County of Santa Fe) ss

I hereby certify that the accompanying maps and statements have been examined by me and approved as to form and content, and were duly accepted for filing on the 13th day of MARCH 19~~89~~90

S.E. Reynolds, State Engineer

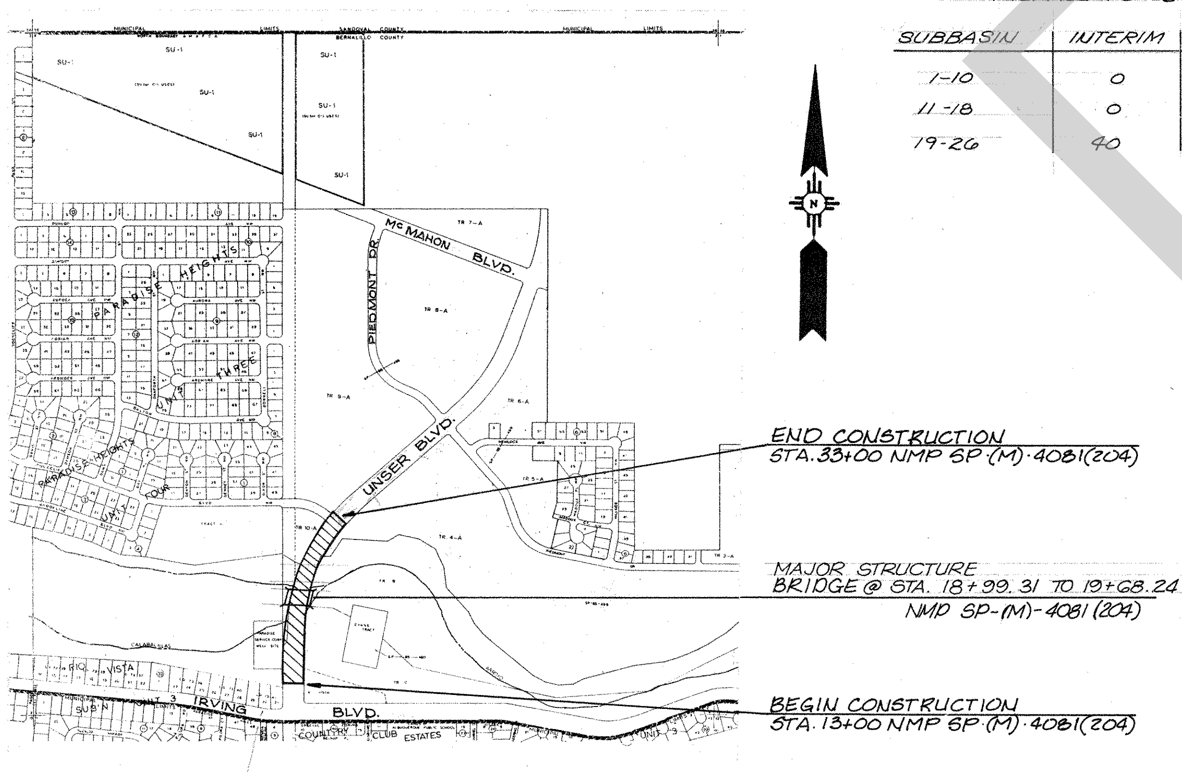
By: ______
S. E. Reynolds
State Engineer

CONDITION OF DEVELOPMENT
AVERAGE PERCENT IMPERVIOUS

SUBBASIN	INTERIM	2036	FULLY DEVELOPED
1-10	0	0	41.5
11-18	0	34.7	43.9
19-26	40	57.6	57.6

REFERENCES

1. CALABACILLAS ARROYO DRAINAGE MANAGEMENT PLAN; AMAFCA 1987.
2. UNSER BRIDGE/CALABACILLAS ARROYO DETENTION BASIN ALBUQUERQUE, NM; RESOURCE CONSULTANTS INC. 1989.
3. UNSER BOULEVARD NORTH CORRIDOR ANALYSIS REPORT - PARADISE HILLS BOULEVARD TO SANDOVAL COUNTY LINE; LEEDSHILL - HERKENHOFF; 1989.
4. GEOTECHNICAL ENGINEERING EVALUATION - CALABACILLAS DAM/UNSER CROSSING, ALBUQUERQUE, NM, WESTERN TECHNOLOGIES, INC. 1989
5. DRAINAGE REPORT - UNSER/CALABACILLAS DAM; WILSON AND COMPANY, ENGINEERS AND ARCHITECTS; 1989



VICINITY MAP

CONSTRUCTION OF PROJECT SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE N.M.S.H.T.D STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, EDITION 1984.

THE BORROW PIT FOR THIS PROJECT HAS BEEN DESIGNATED. SEE SHEET 2-7 FOR DETAILS.

THE PLANS WERE DESIGNED AND ASSEMBLED BY ROBERT F. SYKES PE #4591 (505) 345-5345
CONTACT PERSON SCOTT F. PERKINS PE #10272

RECORD DRAWING
DATE 7/22/91

File 4388

ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY
CALABACILLAS ARROYO DETENTION DAM

VICINITY MAP & CERTIFICATION

DESIGN	DRAWN	DATE:
RFS	JMT	5/89

ROBERT F. SYKES
NEW MEXICO
4591
REGISTERED PROFESSIONAL ENGINEER

WILSON & COMPANY
ALBUQUERQUE, NEW MEXICO

FILE No. 88-508E

1-2

NM PROJECT NO. SP-(M)-4081(204)

Draft

F.H.W.A. REGION NO.	STATE	N.M.P.	SHEET NO.	TOTAL SHEETS
6	NEW MEXICO	SP-(M)-4081(204)	1-3	

INDEX OF SHEETS

SHEET NO.	DESCRIPTION	REVISION DATE		SERIAL NO.
1-1	COVER SHEET			
1-2	VICINITY MAP & CERTIFICATION			
1-3	INDEX OF SHEETS			
1-4	HYDROLOGY & MISCELLANEOUS DATA			
1-5	GENERAL NOTES			
1-6	SPECIAL PROVISIONS AND SUPPLEMENTAL SPECIFICATIONS			
1-7, 1-8 & 1-9	SUMMARY OF QUANTITIES			
	SUBTOTAL 9 SHEETS			
2-1	TYPICAL SECTIONS			
2-2	DAM TYPICAL SECTIONS			
2-3	MISCELLANEOUS DETAILS			
2-4	SURFACING SCHEDULE			
2-5	ESTIMATED STRUCTURE QUANTITIES			
2-6	MISCELLANEOUS QUANTITIES			
2-7	SURFACING / BORROW PIT SHEET			
2-8 TO 2-16	LANDSCAPING/REVEGETATION/EROSION CONTROL PLAN			
2-17	CONCRETE WALL BARRIER TRANSITION			
2-18	PERMANENT BARRICADE DETAIL FOR "T" INTERSECTION			
(1) 2-13A & 2-14A	RECORD DRAWING IRRIGATION PLAN			
	SUBTOTAL ~~18~~ 20 (1) SHEETS			
3-1	ROADWAY PLAN AND PROFILE			
3-2	STORM DRAIN PLAN AND PROFILE			
3-3	BIKE PATH PLAN & PROFILE			
3-4 TO 3-6	PLAN SHEET CONTOURS			
3-4A	RECORD DRAWING CONTOURS			
	SUBTOTAL ~~6~~ 7 (1) SHEETS			
4-1	TURNOUT PROFILE & MISC. DETAILS			
	SUBTOTAL 1 SHEET			
5-1 TO 5-17	BRIDGE SHEETS			
5-6A	MISCELLANEOUS DETAILS			
	SUBTOTAL ~~17~~ 18 (1) SHEETS			
6-1 TO 6-4	CONSTRUCTION SIGNING			
	SUBTOTAL 4 SHEETS			
7-1	STRUCTURE PLACEMENT			
	SUBTOTAL 1 SHEET			

SHEET NO.	DESCRIPTION	REVISION DATE		SERIAL NO.
8-1	CROSS SECTION LAYOUT AND EARTHWORK SUMMARY			
8-2 to 8-18	CROSS SECTIONS			
	SUBTOTAL 18 SHEETS			
9-1 to 9-4	UTILITY SHEETS			
	SUBTOTAL 4 SHEETS			
10-1	DROP INLET FOR TYPE "B" CURBS	02/01/80		BDIC-003
10-2	DROP INLET FOR TYPE "B" CURBS	02/11/85		BDIC-004
10-3	EXCAVATION & BACKFILL FOR BRIDGES, WALLS & CBC'S	11/07/80		BEB-001
10-4	PREFORMED ELASTOMERIC COMPRESSION JOINT SEAL FOR BRIDGES	12/19/79		BJC-001
10-5	METAL BRIDGE RAILING GENERAL NOTES & TYPICAL DETAILS	04/19/85		BMR-001
10-6	METAL RAILING TYPE D	03/06/85		BMR-005
10-7	SLOPE PAVEMENT DETAILS AT BRIDGE	12/19/79		BSP-001
10-8	CHAIN LINK FENCES & GATES	02/27/78		CL-1
10-9	FILL HEIGHTS & BEDDING DETAILS FOR CONCRETE PIPE CULVERTS	09/09/74		M-IG-71
10-10	DROP INLETS FOR DEPRESSED MEDIAN TYPE I & II,	05/28/75	Sheet 1 of 2	MDI-1
10-11	DESIGN LOADS FOR SQUARE TUBING POSTS	05/14/81		SN-75-1
10-12	CURB & GUTTER	01/31/86		TCG-001
	SUBTOTAL 12 SHEETS			
	PROJECT TOTAL ~~90~~ 94 (1) SHEETS			

NO.	DESCRIPTION	DATE	BY
3			
2			
1	(1) Record Drawing	7/91	ELO

REVISIONS (OR CHANGE NOTICES)

RECORD DRAWING DATE 7/22/91

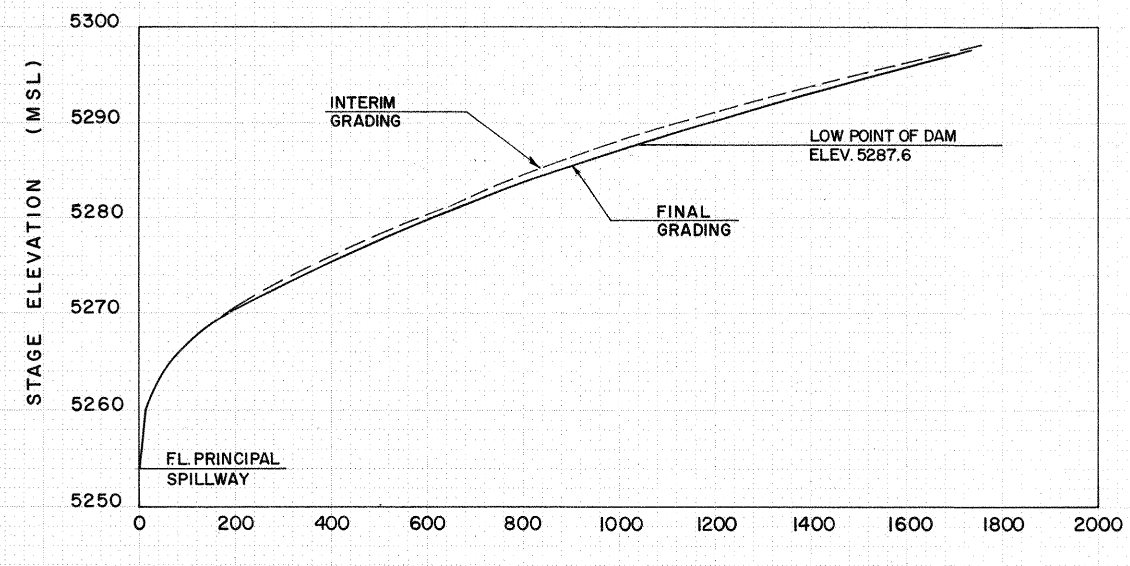
INDEX OF SHEETS

UNSER / CALABICILLAS DAM

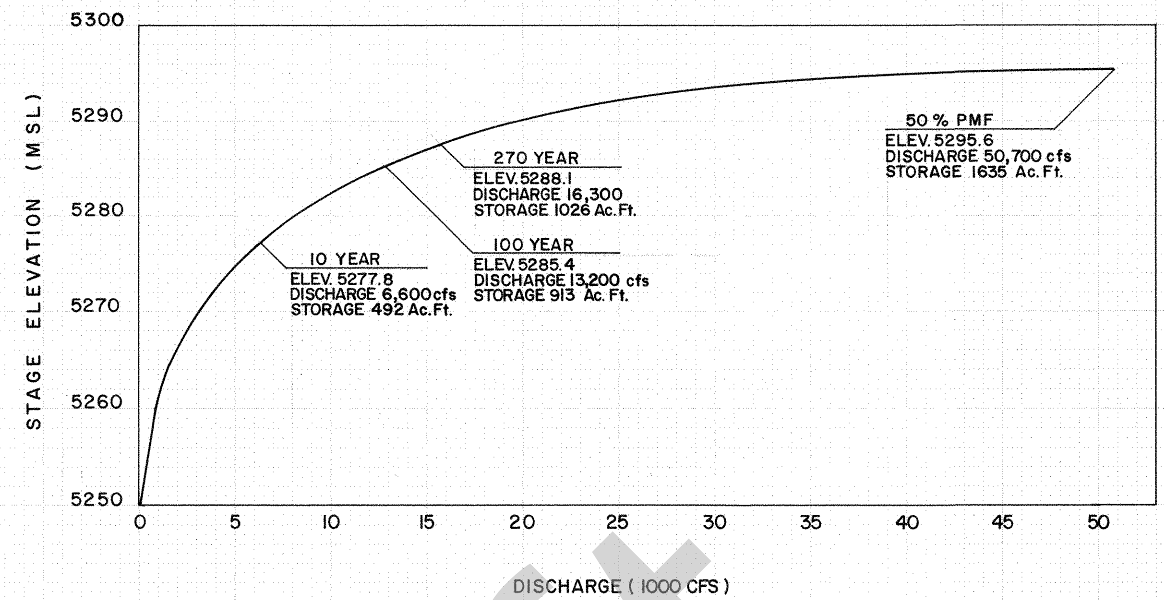
WILSON & COMPANY

N. M. PROJECT NO. SP-(M)-4081(204) SHEET NO. 1-3

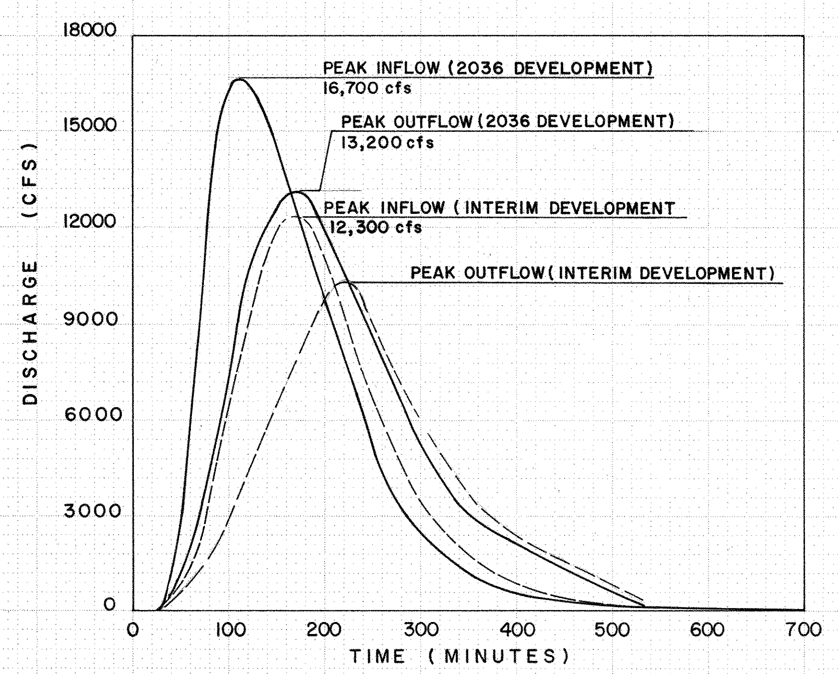
FHWA REGION NO.	STATE	PROJECT NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
6	NEW MEXICO	SP-(M)-4081(204)	19	1-4	



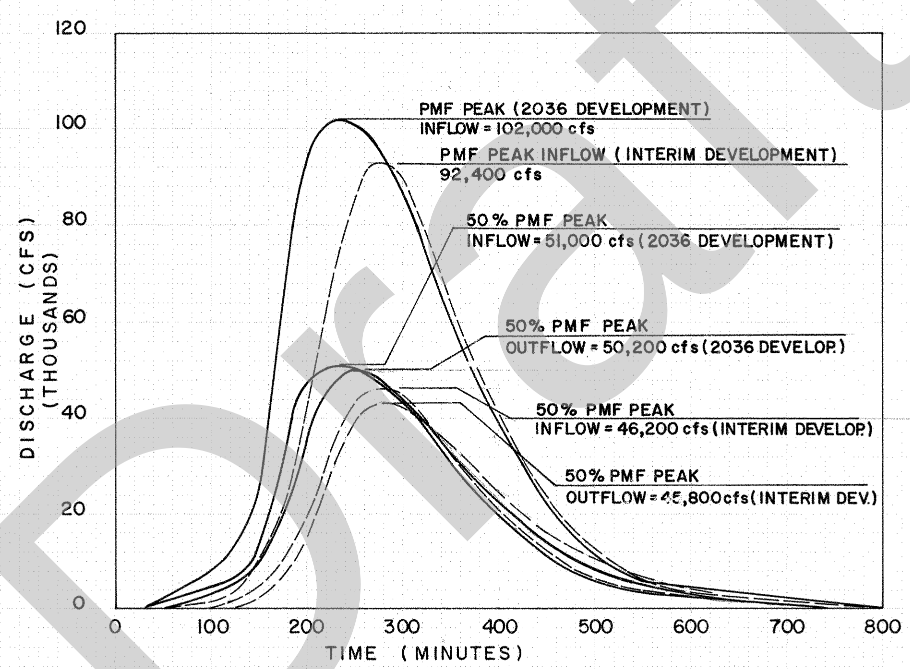
STORAGE CAPACITY CURVE



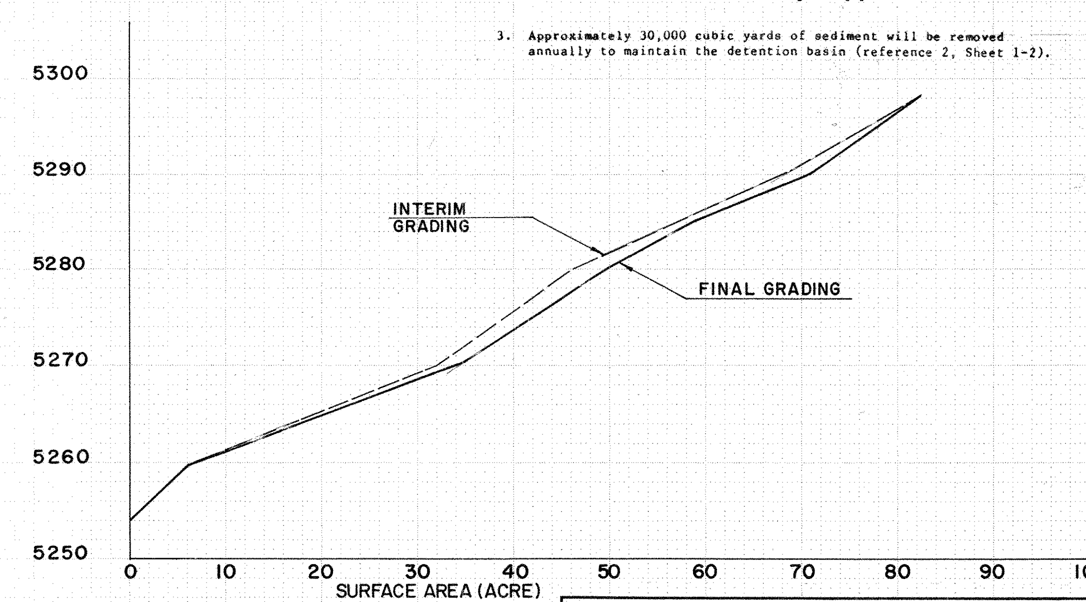
STAGE DISCHARGE CURVE
(2036 DEVELOPMENT & FINAL GRADING)



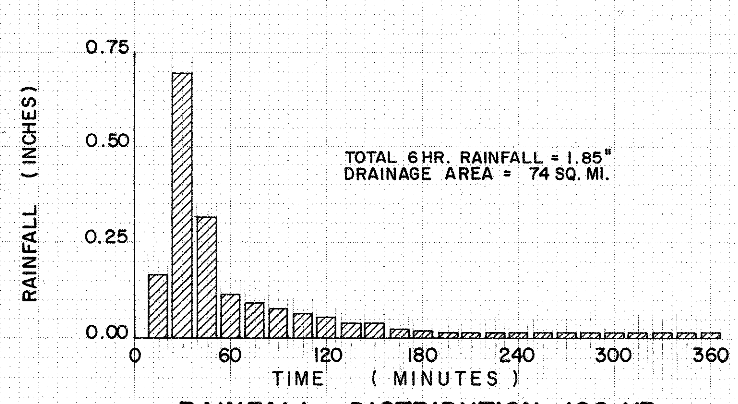
INFLOW HYDROGRAPH · 100 YR.



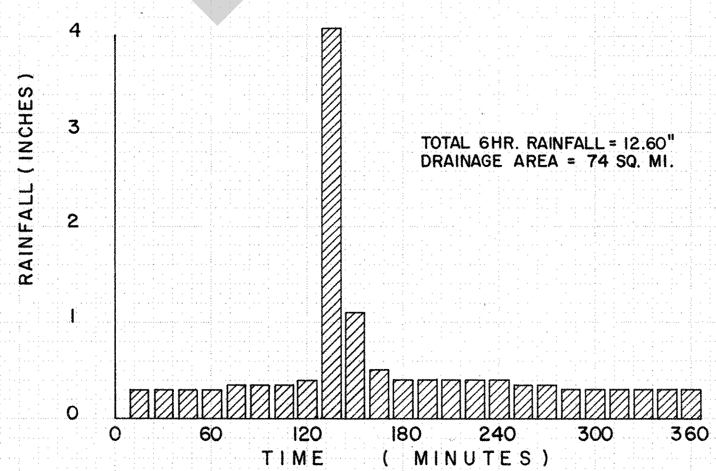
INFLOW HYDROGRAPH 50% PMF & PMF



STAGE AREA CURVE



RAINFALL DISTRIBUTION · 100 YR.



RAINFALL DISTRIBUTION · PMP

SUMMARY OF RECOMMENDATIONS:
MAP OF CALABACILLAS DETENTION DAM

Albuquerque Metropolitan Arroyo Flood Control Authority, applicant located in Bernalillo County, State of New Mexico. All courses true, scale of map = 1" = 100,000 feet. The undersigned, Albuquerque Metropolitan Arroyo Flood Control Authority, claimant, whose post office address is 2600 Prospect Avenue, NE, Albuquerque, County of Bernalillo, State of New Mexico, has caused to be located by a qualified registered professional engineer, the Calabacillas Detention Dam as hereinafter described and indicated, hereby makes these several statements relative thereto and offers this map and statements for acceptance and filling in compliance with the laws of the State of New Mexico.

The centerline of the principal spillway where it intersects with the centerline of the detention dam is situated in the Southwest Quarter, Section 2, Township 11 North, Range 2 East, NMPM at a point whose ground State Plane Coordinate is X = 364,957.26, Y = 1,530,961.96.

THE CALABACILLAS DETENTION DAM WILL HAVE THE FOLLOWING PROPERTIES:

Maximum height above the foundation at centerline....................34 ft.
Length..2,300 ft.
Maximum width at base....................................360 ft.
Crest width..144 ft.
Slope upstream face......................................3:1
Slope downstream face....................Variable 3:1 to 4:1
Elevation at crest of dam (low point)....................5287.6
Elevation of principal outlet (flowline at centerline of dam).........5254.0
Elevation of emergency spillway crest (low point)...................5287.6
Width of emergency spillway..............................720 ft.
Discharge capacity of emergency spillway
at elevation 5295.6......................................50,700 cfs
Outlet conduit size and type..............12 ft. Bottom Trapezoidal Channel
Outlet conduit capacity at elevation 5287.6....................15,700 cfs
Evacuation time 100 year flood...........................14 hrs.
Drainage area..74 sq. miles
PMP design rainfall......................12.60 in. in 6 hrs.
50% PMF peak inflow to dam...............................51,000 cfs
100 year design rainfall.................1.85 inn in 6 hrs.
100 year peak inflow to dam..............................16,700 cfs
Hazard classification (SCS definition)...................B

NOTE 1. The design flood for overlapping is 50% of the PMF.
2. Interim grading refers to the initial grading plan of storage pool. Final grading shall be completed prior to hydrologic conditions referenced as "2036 Development Conditions" (reference 2, Sheet 1-2). The final grading is referenced as "Future Grading" on Plan Sheet 3-6.

Interim Development: Existing upstream runoff was based on the present development condition and the interim grading plan.

2036 Development: Runoff was based on 2036 development conditions due to the increased urbanization and the final grading plan.

3. Approximately 30,000 cubic yards of sediment will be removed annually to maintain the detention basin (reference 2, Sheet 1-2).

Elevation	Interim Grading Area (Acres)	Interim Grading Storage (Ac. Ft.)	Final (Future) Grading Area (Acres)	Final (Future) Grading Storage (Ac. Ft.)
5254	0	0	0	0
5260	6.12	12.24	6.12	12.24
5265	17.85	69.72	17.85	69.72
5270	32.61	194.15	34.43	198.24
5275	39.05	373.15	41.43	387.50
5280	46.79	587.61	49.66	614.91
5285	56.02	844.27	59.39	887.30
5290	68.10	1154.02	71.03	1212.87
5295	75.97	1514.09	77.93	1584.98
5298	82.07	1751.19	82.07	1824.95

ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY
CALABACILLAS ARROYO DETENTION DAM

HYDROLOGY & MISCELLANEOUS DATA

DESIGN	DRAWN		DATE:
RFS	JMT	RECORD DRAWING DATE 7/22/91	5 / 89
		WILSON & COMPANY ALBUQUERQUE, NEW MEXICO	FILE NO. 88-508E
			SHEET NO. 4 OF 1-4

ROBERT F. SYKES NEW MEXICO 5591 REGISTERED PROFESSIONAL ENGINEER

NM PROJECT NO. SP-(M)-4081(204)

Hydro ID: **Q_202_Pond**

Pond rating curve based on:
Drainage Report for Tierra del Sol

Length (ft)	40
C	2.6

	Depth ft	Volume ac-ft	Discharge cfs	Principal spillway discharge cfs	Dam top discharge (broad-cresetd weir) cfs
Pond Invert, culvert invert	0.0	0.0	0.0	0.0	0.0
	1.0	0.1	1.5	1.5	0.0
	2.0	0.3	2.1	2.1	0.0
	3.0	0.6	2.6	2.6	0.0
	4.0	0.9	2.9	2.9	0.0
	5.0	1.2	3.3	3.3	0.0
	6.0	1.7	3.6	3.6	0.0
Top of pond	6.8	2.1	3.8	3.8	0.0
	7.0	2.2	13.2	3.9	9.3
	8.0	2.7	140.9	4.2	136.7

Draft

DRAINAGE REPORT

FOR

TIERRA DEL SOL

AN 83-LOT SINGLE FAMILY RESIDENTIAL SUBDIVISION

RIO RANCHO, NEW MEXICO SEPTEMBER 2006

Draft

Prepared by:

ISAACSON & ARFMAN, P.A.
128 Monroe Street NE
Albuquerque, NM 87108
(505) 268-8828

ÅSA M. NILSSON-WEBER
NEW MEXICO
17631
LICENSED PROFESSIONAL ENGINEER

9/5/06

Åsa M. Nilsson-Weber, PE **Date**

WATER DEPTH FEET	AVERAGE AREA SQ.FT.	FLOW RATE CFS	TRAVEL TIME HRS
1.563	2.635	15.27	.0648
1.668	2.799	16.23	.0647
1.772	2.943	16.92	.0653
1.876	3.061	17.21	.0668
2.000	3.142	17.21	.0686

ROUTE ID=56 HYD NO=560 INFLOW ID=28 DT=0.0
PRINT HYD ID=56 CODE=1

OUTFLOW HYDROGRAPH RESERVOIR 560.00

RUNOFF VOLUME = .87220 INCHES = .4815 ACRE-FEET
PEAK DISCHARGE RATE = 12.97 CFS AT 1.567 HOURS BASIN AREA = .0104 SQ. MI.

*S ADD SD FLOWS
ADD HYD ID=57 HYD NO=570 ID I=37 ID II=42
PRINT HYD ID=57 CODE=1

OUTFLOW HYDROGRAPH RESERVOIR 570.00

RUNOFF VOLUME = 1.39685 INCHES = 1.3024 ACRE-FEET
PEAK DISCHARGE RATE = 24.80 CFS AT 1.467 HOURS BASIN AREA = .0175 SQ. MI.

ADD HYD ID=58 HYD NO=580 ID I=57 ID II=49
PRINT HYD ID=58 CODE=1

OUTFLOW HYDROGRAPH RESERVOIR 580.00

RUNOFF VOLUME = 1.40233 INCHES = 1.7746 ACRE-FEET
PEAK DISCHARGE RATE = 32.60 CFS AT 1.467 HOURS BASIN AREA = .0237 SQ. MI.

ADD HYD ID=59 HYD NO=590 ID I=56 ID II=58
PRINT HYD ID=60 CODE=1

OUTFLOW HYDROGRAPH REACH .00

RUNOFF VOLUME = .00000 INCHES = .0000 ACRE-FEET
PEAK DISCHARGE RATE = .00 CFS AT 1.400 HOURS BASIN AREA = .0000 SQ. MI.

*S ADD BASIN PJ (POND AREA) TO SD FLOWS ENTERING POND
*S TOTAL FLOWS IN POND
*S * * * AP8 * * *
ADD HYD ID=61 HYD NO=610 ID I=20 ID II=59
PRINT HYD ID=61 CODE=1

HYDROGRAPH FROM AREA 610.00

RUNOFF VOLUME = 1.22461 INCHES = 2.3093 ACRE-FEET
PEAK DISCHARGE RATE = 47.29 CFS AT 1.567 HOURS BASIN AREA = .0354 SQ. MI.

*S ROUTE FLOWS THROUGH DETENTION POND
*S * * * AP9 * * *
ROUTE RESERVOIR ID=62 HYD NO=620 INFLOW ID=61 CODE=1

OUTFLOW(CFS)	STORAGE(AC FT)	ELEV(FT)
0.00	0.000	26.0
1.47	0.134	27.0
2.08	0.325	28.0
2.55	0.582	29.0
2.94	0.871	30.0
3.29	1.236	31.0
3.60	1.687	32.0
3.83	2.107	32.8

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TIME (HRS)	INFLOW (CFS)	ELEV (FEET)	VOLUME (AC-FT)	OUTFLOW (CFS)
.00	.00	26.00	.000	.00
.03	.00	26.00	.000	.00
.07	.00	26.00	.000	.00
.10	.00	26.00	.000	.00
.13	.00	26.00	.000	.00
.17	.00	26.00	.000	.00
.20	.00	26.00	.000	.00
.23	.00	26.00	.000	.00
.27	.00	26.00	.000	.00
.30	.00	26.00	.000	.00
.33	.00	26.00	.000	.00
.37	.00	26.00	.000	.00
.40	.00	26.00	.000	.00
.43	.00	26.00	.000	.00
.47	.00	26.00	.000	.00
.50	.00	26.00	.000	.00
.53	.00	26.00	.000	.00
.57	.00	26.00	.000	.00
.60	.00	26.00	.000	.00
.63	.00	26.00	.000	.00
.67	.00	26.00	.000	.00
.70	.00	26.00	.000	.00
.73	.00	26.00	.000	.00
.77	.04	26.00	.000	.00
.80	.14	26.00	.000	.00

TIME (HRS)	INFLOW (CFS)	ELEV (FEET)	VOLUME (AC-FT)	OUTFLOW (CFS)
.83	.30	26.01	.001	.01
.87	.48	26.01	.002	.02
.90	.67	26.03	.003	.04
.93	.83	26.04	.005	.06
.97	.99	26.06	.008	.08
1.00	1.16	26.08	.010	.11
1.03	1.35	26.10	.013	.15
1.07	1.49	26.13	.017	.19
1.10	1.56	26.15	.021	.23
1.13	1.56	26.18	.024	.26
1.17	1.59	26.21	.028	.30
1.20	1.85	26.24	.032	.35
1.23	2.52	26.27	.037	.40
1.27	3.72	26.33	.044	.48
1.30	5.67	26.41	.055	.61
1.33	8.94	26.55	.074	.81
1.37	14.30	26.77	.103	1.13
1.40	21.80	27.08	.149	1.52
1.43	30.71	27.43	.217	1.73
1.47	42.56	27.93	.312	2.04
1.50	45.52	28.40	.428	2.27
1.53	47.14	28.87	.549	2.49
1.57	47.29	29.31	.672	2.67
1.60	46.40	29.73	.793	2.84
1.63	44.98	30.11	.911	2.98
1.67	43.43	30.42	1.025	3.09

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Appendix C

Results

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Notes:

(1) Model results reported in this table are for the 100-year design storm without a depth-area reduction factor. **Please modify the storm area** in the HEC-HMS model for analyses with larger contributing areas.

(2) Q_p and V values for ponds correspond to peak outflow and outflow volume, respectively. For detailed pond routing including peak inflow, peak storage and peak elevation values, please consult the HEC-HMS model.

Existing Conditions				
HMS ID	Area	Q_p	Time of Peak	V
	(mi^2)	(cfs)		(ac-ft)
A_001	0.040	33	21 November 2023, 06:14	2.1
A_001_Playa	0.040	33	21 November 2023, 06:14	2.1
A_101	0.660	480	21 November 2023, 06:26	42.8
A_101_J1	2.700	1112	21 November 2023, 06:48	164.2
A_101_J2	4.220	1947	21 November 2023, 06:50	265.9
A_101_R1	2.040	890	21 November 2023, 06:53	121.5
A_102	0.340	173	21 November 2023, 06:30	17.8
A_102_J1	4.570	2016	21 November 2023, 06:56	271.4
A_102_J2	5.250	2219	21 November 2023, 06:56	307.0
A_102_R1	4.220	1932	21 November 2023, 06:56	253.6
A_103	0.320	189	21 November 2023, 06:25	16.9
A_103_J1	5.580	2258	21 November 2023, 07:01	313.4
A_103_J2	7.330	2949	21 November 2023, 07:03	402.0
A_103_R1	5.250	2204	21 November 2023, 07:01	296.5
A_104	0.190	144	21 November 2023, 06:17	10.1
A_104_J1	10.470	4073	21 November 2023, 07:04	534.5
A_104_J2	12.410	4600	21 November 2023, 07:03	622.7
A_104_R1	3.140	1203	21 November 2023, 06:55	140.5
A_104_R2	7.330	2940	21 November 2023, 07:05	394.1
A_104_R3	10.470	4066	21 November 2023, 07:05	526.3
A_105	0.600	289	21 November 2023, 06:33	31.6
A_105_J1	16.850	5785	21 November 2023, 07:11	783.5
A_105_R1	12.410	4545	21 November 2023, 07:12	575.7
A_106	0.140	118	21 November 2023, 06:14	7.5
A_106_J1	19.790	6580	21 November 2023, 07:12	911.0
A_106_R1	16.850	5772	21 November 2023, 07:13	770.7
A_107	0.140	97	21 November 2023, 06:19	7.4
A_107_J1	19.930	6562	21 November 2023, 07:15	895.4
A_107_R1	19.790	6552	21 November 2023, 07:15	888.0
A_108	0.050	41	21 November 2023, 06:13	2.5
A_108_J1	21.640	6895	21 November 2023, 07:18	962.1
A_108_R1	19.930	6535	21 November 2023, 07:19	870.2
A_109	0.060	50	21 November 2023, 06:13	3.1
A_109_J1	26.230	7842	21 November 2023, 07:20	1163.4
A_109_R1	21.640	6881	21 November 2023, 07:20	947.0
A_110	0.690	323	21 November 2023, 06:41	41.1
A_110_J1	27.910	8160	21 November 2023, 07:23	1231.1
A_110_R1	26.230	7813	21 November 2023, 07:23	1134.7
A_111	0.440	187	21 November 2023, 06:42	24.2

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Existing Conditions				
HMS ID	Area	Q_p	Time of Peak	V
	(mi^2)	(cfs)		(ac-ft)
A_111_J1	32.010	8706	21 November 2023, 07:27	1432.5
A_111_R1	27.910	8120	21 November 2023, 07:28	1194.2
A_112	0.810	401	21 November 2023, 06:45	54.0
A_112_J1	32.060	8701	21 November 2023, 07:28	1425.5
A_112_J2	40.530	10450	21 November 2023, 07:26	1837.3
A_112_R1	32.010	8698	21 November 2023, 07:28	1422.8
A_112_R2	32.060	8676	21 November 2023, 07:31	1399.5
A_113	1.060	498	21 November 2023, 06:38	59.4
A_113_J1	53.490	13477	21 November 2023, 07:30	2450.7
A_113_R1	40.530	10391	21 November 2023, 07:32	1774.2
A_114	0.520	232	21 November 2023, 06:36	27.2
A_114_J1	67.220	16645	21 November 2023, 07:32	3064.1
A_114_R1	53.490	13442	21 November 2023, 07:32	2414.8
A_115	0.530	476	21 November 2023, 06:25	42.7
A_115_J1	68.700	16714	21 November 2023, 07:34	3138.8
A_115_R1	67.220	16614	21 November 2023, 07:34	3027.1
A_115_R2	0.940	535	21 November 2023, 06:20	69.1
A_116	0.900	1147	21 November 2023, 06:17	79.0
A_116_J1	80.120	18588	21 November 2023, 07:36	3799.3
A_116_R1	68.700	16678	21 November 2023, 07:37	3101.8
A_116_R2	8.650	2056	21 November 2023, 07:11	446.1
A_116_R3	1.870	105	21 November 2023, 07:38	181.1
A_116_R4	10.520	2156	21 November 2023, 07:12	618.5
A_201	0.050	29	21 November 2023, 06:25	2.6
Black_Arroyo	0.000	0	20 November 2023, 24:00	0.0
B_101	1.680	686	21 November 2023, 06:44	92.5
B_102	1.500	493	21 November 2023, 06:54	78.3
B_102_J1	3.180	1177	21 November 2023, 06:52	170.8
B_102_R1	1.680	685	21 November 2023, 06:52	92.5
B_103	1.030	429	21 November 2023, 06:40	53.6
B_103_J1	4.210	1421	21 November 2023, 07:02	212.0
B_103_R1	3.180	1158	21 November 2023, 07:06	158.4
B_104	1.320	500	21 November 2023, 06:49	73.8
B_104_J1	5.530	1764	21 November 2023, 07:10	271.1
B_104_R1	4.210	1401	21 November 2023, 07:14	197.4
B_105	1.450	710	21 November 2023, 06:35	80.5
B_105_J1	10.740	2966	21 November 2023, 07:21	534.1
B_105_R1	5.530	1747	21 November 2023, 07:19	259.8
B_105_R2	2.400	657	21 November 2023, 07:24	131.6
B_105_R3	7.940	2394	21 November 2023, 07:22	387.8
B_105_R4	1.360	435	21 November 2023, 07:05	70.5
B_105_R5	9.290	2763	21 November 2023, 07:22	453.6
B_201	0.770	216	21 November 2023, 07:05	40.0
B_202	1.640	451	21 November 2023, 07:13	91.6
B_202_J1	2.400	657	21 November 2023, 07:19	131.6

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Existing Conditions				
HMS ID	Area	Q_p	Time of Peak	V
	(mi^2)	(cfs)		(ac-ft)
B_202_R1	0.770	216	21 November 2023, 07:25	40.0
B_301	1.360	435	21 November 2023, 06:55	70.4
C_101	1.560	450	21 November 2023, 07:03	81.3
C_102	1.530	669	21 November 2023, 06:37	79.9
C_102_J1	3.100	758	21 November 2023, 06:58	148.7
C_102_R1	1.560	436	21 November 2023, 07:18	68.7
C_103	0.500	314	21 November 2023, 06:22	26.0
C_103_J1	3.600	830	21 November 2023, 06:47	166.9
C_103_R1	3.100	749	21 November 2023, 07:06	140.8
C_104	0.820	364	21 November 2023, 06:41	46.0
C_104_J1	4.420	1115	21 November 2023, 06:52	203.8
C_104_R1	3.600	817	21 November 2023, 06:58	157.8
D_101	0.400	175	21 November 2023, 06:41	22.3
D_102	0.460	242	21 November 2023, 06:33	26.0
D_102_J1	0.870	373	21 November 2023, 06:40	48.3
D_102_R1	0.400	175	21 November 2023, 06:50	22.3
D_103	1.330	596	21 November 2023, 06:40	73.9
D_103_J1	2.200	801	21 November 2023, 06:55	122.3
D_103_R1	0.870	372	21 November 2023, 07:02	48.4
D_104	0.610	241	21 November 2023, 06:46	33.7
D_104_J1	3.240	1207	21 November 2023, 06:59	180.0
D_104_R1	2.200	800	21 November 2023, 06:57	122.3
D_104_R2	0.430	212	21 November 2023, 06:49	24.0
D_104_R3	2.630	998	21 November 2023, 07:00	146.3
D_201	0.430	212	21 November 2023, 06:35	24.0
E_101	0.990	357	21 November 2023, 06:53	55.3
F_101	0.980	357	21 November 2023, 06:47	51.1
F_102	0.960	413	21 November 2023, 06:45	55.5
F_102_J1	1.940	694	21 November 2023, 06:55	97.4
F_102_R1	0.980	345	21 November 2023, 07:04	41.8
F_103	0.860	401	21 November 2023, 06:34	44.6
F_103_J1	2.800	871	21 November 2023, 07:02	132.8
F_103_R1	1.940	682	21 November 2023, 07:05	88.2
G_101	1.740	605	21 November 2023, 06:50	90.5
G_102	1.470	535	21 November 2023, 06:47	76.3
G_102_J1	3.830	1220	21 November 2023, 07:01	176.1
G_102_R1	1.740	586	21 November 2023, 07:03	73.1
G_102_R2	0.620	206	21 November 2023, 07:06	26.6
G_102_R3	2.360	791	21 November 2023, 07:07	99.7
G_201	0.620	213	21 November 2023, 06:51	32.4
H_101	1.230	665	21 November 2023, 06:33	71.2
H_102	0.520	236	21 November 2023, 06:36	27.3
H_102_J1	1.750	880	21 November 2023, 06:40	86.2
H_102_R1	1.230	651	21 November 2023, 06:41	58.9
I_101	1.210	565	21 November 2023, 06:44	74.0

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Existing Conditions				
HMS ID	Area (mi^2)	Q_p (cfs)	Time of Peak	V (ac-ft)
I_102	0.720	312	21 November 2023, 06:38	37.8
I_102_J1	1.930	779	21 November 2023, 06:52	91.3
I_102_J2	3.140	1210	21 November 2023, 06:52	145.8
I_102_R1	1.210	543	21 November 2023, 06:57	53.5
I_201	0.940	376	21 November 2023, 06:46	51.9
I_202	0.190	103	21 November 2023, 06:27	9.9
I_202_J1	1.130	421	21 November 2023, 06:49	56.4
I_202_R1	0.940	370	21 November 2023, 06:52	46.5
I_203	0.080	50	21 November 2023, 06:22	4.1
I_203_J1	1.210	431	21 November 2023, 06:53	54.4
I_203_R1	1.130	415	21 November 2023, 06:54	50.3
J_101	0.780	483	21 November 2023, 06:46	63.3
J_102	0.460	189	21 November 2023, 06:40	23.9
J_102_J1	1.250	627	21 November 2023, 06:55	87.2
J_102_R1	0.780	482	21 November 2023, 06:59	63.3
J_103	0.510	204	21 November 2023, 06:41	26.3
J_103_J1	1.750	715	21 November 2023, 07:08	88.5
J_103_R1	1.250	599	21 November 2023, 07:11	62.2
K_101	0.690	204	21 November 2023, 07:00	35.7
L_101	0.520	324	21 November 2023, 06:40	38.9
L_102	0.550	392	21 November 2023, 06:36	42.7
L_102_J1	1.070	674	21 November 2023, 06:43	81.6
L_102_R1	0.520	323	21 November 2023, 06:50	38.9
L_103	0.460	290	21 November 2023, 06:32	30.1
L_103_J1	1.530	840	21 November 2023, 06:51	101.6
L_103_R1	1.070	660	21 November 2023, 06:54	71.5
M_101	1.160	545	21 November 2023, 06:48	75.9
M_102	0.880	570	21 November 2023, 06:31	57.6
M_102_J1	2.040	903	21 November 2023, 06:44	133.5
M_102_R1	1.160	544	21 November 2023, 06:56	75.9
N_101	0.580	211	21 November 2023, 06:47	30.2
N_102	0.810	287	21 November 2023, 06:49	42.1
N_102_J1	1.390	457	21 November 2023, 07:00	72.3
N_102_R1	0.580	211	21 November 2023, 07:08	30.2
N_103	0.500	233	21 November 2023, 06:38	27.7
N_103_J1	1.890	547	21 November 2023, 07:15	100.1
N_103_R1	1.390	456	21 November 2023, 07:17	72.4
N_104	0.940	347	21 November 2023, 06:47	49.3
N_104_J1	3.910	1007	21 November 2023, 07:27	195.8
N_104_R1	1.890	546	21 November 2023, 07:23	100.1
N_104_R2	1.070	328	21 November 2023, 07:14	59.2
N_104_R3	2.970	855	21 November 2023, 07:28	146.5
N_105	0.620	249	21 November 2023, 06:45	34.1
N_105_J1	4.530	1054	21 November 2023, 07:40	213.3
N_105_R1	3.910	985	21 November 2023, 07:41	179.2

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Existing Conditions				
HMS ID	Area	Q_p	Time of Peak	V
	(mi^2)	(cfs)		(ac-ft)
N_201	1.070	328	21 November 2023, 07:03	59.2
O_001	0.040	24	21 November 2023, 06:22	2.0
O_001_Playa	0.040	24	21 November 2023, 06:22	2.0
O_101	0.300	106	21 November 2023, 06:54	16.7
O_102	0.880	315	21 November 2023, 06:48	45.9
O_102_J1	1.180	315	21 November 2023, 06:48	62.7
O_102_R1	0.300	106	21 November 2023, 07:27	16.7
O_103	0.490	229	21 November 2023, 06:37	26.7
O_103_J1	1.660	447	21 November 2023, 06:58	89.4
O_103_R1	1.180	315	21 November 2023, 07:05	62.7
P_001	0.050	32	21 November 2023, 06:20	2.5
P_001_Playa	0.050	32	21 November 2023, 06:20	2.5
P_002	0.020	23	21 November 2023, 06:10	1.2
P_002_Playa	0.020	23	21 November 2023, 06:10	1.2
P_003	0.030	31	21 November 2023, 06:11	1.8
P_003_Playa	0.030	31	21 November 2023, 06:11	1.8
P_004	0.040	40	21 November 2023, 06:10	2.1
P_004_Playa	0.040	40	21 November 2023, 06:10	2.1
P_101	0.560	183	21 November 2023, 06:58	30.9
P_102	0.770	296	21 November 2023, 06:44	39.9
P_102_J1	1.330	360	21 November 2023, 07:04	70.8
P_102_R1	0.560	183	21 November 2023, 07:19	30.9
P_103a	0.460	211	21 November 2023, 06:38	25.3
P_103a_J1	1.790	454	21 November 2023, 06:52	96.1
P_103a_Pond	1.790	103	21 November 2023, 08:48	96.1
P_103a_R1	1.330	359	21 November 2023, 07:17	70.8
P_103b	0.120	42	21 November 2023, 07:02	7.3
P_103b_J1	1.910	116	21 November 2023, 07:25	103.5
P_103b_Pond	1.910	102	21 November 2023, 09:48	103.5
P_103b_R1	1.790	103	21 November 2023, 08:53	96.1
P_103c	0.720	345	21 November 2023, 06:49	49.4
P_103c_J1	2.670	416	21 November 2023, 06:51	158.2
P_103c_R1	1.910	102	21 November 2023, 09:51	103.5
P_103c_R2	0.050	27	21 November 2023, 06:44	5.3
P_104	0.990	431	21 November 2023, 06:42	55.9
P_104_J1	3.660	695	21 November 2023, 07:00	214.1
P_104_R1	2.670	415	21 November 2023, 07:12	158.2
P_201	0.050	78	21 November 2023, 06:17	5.3
P_201_Pond	0.050	27	21 November 2023, 06:39	5.3
Q_101	0.480	349	21 November 2023, 06:36	39.5
Q_102	0.460	308	21 November 2023, 06:23	26.4
Q_102_J1	0.690	519	21 November 2023, 06:33	56.6
Q_102_J2	1.150	715	21 November 2023, 06:37	83.0
Q_102_R1	0.480	349	21 November 2023, 06:36	39.5
Q_102_R2	0.210	180	21 November 2023, 06:30	17.0

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Existing Conditions				
HMS ID	Area	Q_p	Time of Peak	V
	(mi^2)	(cfs)		(ac-ft)
Q_102_R3	0.690	518	21 November 2023, 06:38	56.6
Q_102_R4	0.690	518	21 November 2023, 06:40	56.6
Q_201	0.100	109	21 November 2023, 06:17	7.4
Q_202	0.030	55	21 November 2023, 06:12	3.1
Q_202_J1	0.130	152	21 November 2023, 06:17	10.5
Q_202_Pond	0.130	131	21 November 2023, 06:23	10.5
Q_202_R1	0.100	109	21 November 2023, 06:19	7.4
Q_301	0.080	65	21 November 2023, 06:31	6.7
Q_301_J1	0.210	190	21 November 2023, 06:26	17.2
Q_301_R1	0.130	130	21 November 2023, 06:25	10.5
R_101	0.180	128	21 November 2023, 06:26	11.5
R_102	0.320	224	21 November 2023, 06:34	23.8
R_102_J1	0.500	351	21 November 2023, 06:33	35.3
R_102_R1	0.180	127	21 November 2023, 06:33	11.5
R_103	0.290	175	21 November 2023, 06:26	16.1
R_103_J1	0.790	484	21 November 2023, 06:36	51.4
R_103_Pond	0.790	135	21 November 2023, 07:22	51.3
R_103_R1	0.500	351	21 November 2023, 06:39	35.3
R_104a	0.280	143	21 November 2023, 06:37	16.7
R_104a_J1	1.070	185	21 November 2023, 07:14	68.1
R_104a_R1	0.790	135	21 November 2023, 07:26	51.3
R_104b	0.170	239	21 November 2023, 06:18	16.7
R_104b_J1	1.240	270	21 November 2023, 06:21	84.8
R_104b_R1	1.070	185	21 November 2023, 07:19	68.1
R_105	0.130	226	21 November 2023, 06:13	13.6
R_105_J1	1.370	447	21 November 2023, 06:18	98.4
R_105_R1	1.240	270	21 November 2023, 06:24	84.8
R_106	0.200	127	21 November 2023, 06:27	12.0
R_106_J1	1.570	573	21 November 2023, 06:27	110.4
R_106_R1	1.370	446	21 November 2023, 06:27	98.4
R_107	0.080	76	21 November 2023, 06:16	5.1
R_107_J1	1.660	621	21 November 2023, 06:28	115.5
R_107_Pond	1.660	181	21 November 2023, 07:59	115.5
R_107_R1	1.570	573	21 November 2023, 06:29	110.4
R_107_R2	1.660	181	21 November 2023, 08:00	115.5
Swinburne_Dam	80.120	13073	21 November 2023, 08:10	3799.3
S_101	0.430	372	21 November 2023, 06:18	27.0
S_101_div	0.430	34	21 November 2023, 07:16	27.0
S_101_J1	0.430	34	21 November 2023, 07:16	27.0
S_101_Pond	0.430	34	21 November 2023, 07:16	27.0
T_101	0.100	76	21 November 2023, 06:24	6.4
T_102	0.110	67	21 November 2023, 06:25	6.0
T_103	0.170	270	21 November 2023, 06:17	17.9
T_104	0.040	103	21 November 2023, 06:06	4.2
T_105	0.050	59	21 November 2023, 06:19	4.1

Draft

Existing Conditions				
HMS ID	Area	Q_p	Time of Peak	V
	(mi^2)	(cfs)		(ac-ft)
T_106	0.050	51	21 November 2023, 06:21	4.0
T_106_J1	0.640	167	21 November 2023, 06:26	39.4
T_106_J2	0.940	536	21 November 2023, 06:19	69.6
T_106_R1	0.430	34	21 November 2023, 07:19	27.0
T_106_R2	0.640	167	21 November 2023, 06:28	39.4
Upper_Calabacillas	80.120	13073	21 November 2023, 08:10	3799.3
U_101	1.740	573	21 November 2023, 06:54	91.1
U_101_J1	7.670	2316	21 November 2023, 07:03	392.0
U_101_R1	5.940	1775	21 November 2023, 07:05	300.9
U_102	1.770	666	21 November 2023, 06:46	92.7
U_102_J1	9.440	2659	21 November 2023, 07:14	443.4
U_102_R1	7.670	2272	21 November 2023, 07:17	350.7
U_103	1.460	441	21 November 2023, 07:00	76.5
U_103_J1	10.900	3023	21 November 2023, 07:17	504.5
U_103_R1	9.440	2642	21 November 2023, 07:18	428.0
U_104	0.650	329	21 November 2023, 06:31	34.3
U_104_J1	11.560	3047	21 November 2023, 07:26	506.7
U_104_R1	10.900	2987	21 November 2023, 07:26	472.4
U_201	1.140	494	21 November 2023, 06:37	59.0
U_301	1.750	655	21 November 2023, 06:50	96.6
U_302	1.720	585	21 November 2023, 06:51	89.2
U_302_J1	5.940	1784	21 November 2023, 07:02	307.9
U_302_R1	1.750	655	21 November 2023, 06:53	96.6
U_302_R2	0.780	266	21 November 2023, 06:55	40.4
U_302_R3	2.530	919	21 November 2023, 07:02	137.0
U_302_R4	0.550	148	21 November 2023, 07:27	29.0
U_302_R5	3.080	1013	21 November 2023, 07:11	159.7
U_401	0.780	266	21 November 2023, 06:51	40.4
U_501	0.550	148	21 November 2023, 07:09	29.0
W_101	2.090	608	21 November 2023, 07:03	109.7
W_102	1.280	573	21 November 2023, 06:42	74.1
W_102_J1	3.370	924	21 November 2023, 07:05	183.9
W_102_R1	2.090	607	21 November 2023, 07:18	109.8
W_103	3.530	1172	21 November 2023, 06:53	185.2
W_103_J1	6.910	1832	21 November 2023, 07:08	352.5
W_103_R1	3.370	900	21 November 2023, 07:22	167.3
W_104	1.320	729	21 November 2023, 06:31	76.2
W_104_J1	8.220	2012	21 November 2023, 07:09	412.3
W_104_R1	6.910	1807	21 November 2023, 07:18	336.2
W_105	0.430	615	21 November 2023, 06:16	40.9
W_105_J1	8.650	2059	21 November 2023, 07:10	449.2
W_105_R1	8.220	2008	21 November 2023, 07:11	408.2
W_201	0.950	939	21 November 2023, 06:26	85.5
W_202	0.230	210	21 November 2023, 06:40	25.5
W_202_J1	1.180	1124	21 November 2023, 06:30	110.9

Draft

Existing Conditions				
HMS ID	Area	Q_p	Time of Peak	V
	(mi^2)	(cfs)		(ac-ft)
W_202_R1	0.950	936	21 November 2023, 06:29	85.4
W_203	0.540	895	21 November 2023, 06:14	55.4
W_203_J1	1.720	1457	21 November 2023, 06:30	166.3
W_203_Pond	1.720	73	21 November 2023, 08:24	166.3
W_203_R1	1.180	1119	21 November 2023, 06:34	110.9
W_203_R2	1.720	73	21 November 2023, 08:26	166.3
W_301	0.150	163	21 November 2023, 06:28	15.7
W_301_J1	1.870	106	21 November 2023, 07:37	181.9
W_301_Pond	0.150	34	21 November 2023, 07:16	15.7

Draft

Appendix D

Structure Capacities

Draft

This document contains capacity analyses of culvert crossings in the Calabacillas watershed at locations where flows are expected to reach or exceed 500 cfs during the 100-year storm event. Please note that this analysis was performed for planning purposes only to establish approximate maximum allowable flow rates at each location. Culvert dimensions were measured during field visits in the winter of 2023/2024 and estimated in GIS using 2018 LiDAR-derived elevation data. Capacities were estimated using HY-8 software version 8. The analysis was based on the following assumptions:

- Culverts are free of sediment and debris unless otherwise noted in the data tables; actual capacities may be less than those reported due to sediment accumulation, vegetation, and debris caught at culvert entrances.
- For simplicity, downstream channels were assumed to be trapezoidal with a bottom width and slope equal to that of the culvert crossing and a Manning's n-value of 0.025.
- Overtopping of roadways was not modeled in HY-8. Maximum capacities correspond to maximum upstream water levels before flow starts overtopping the road or break out of the channel upstream of the crossing.

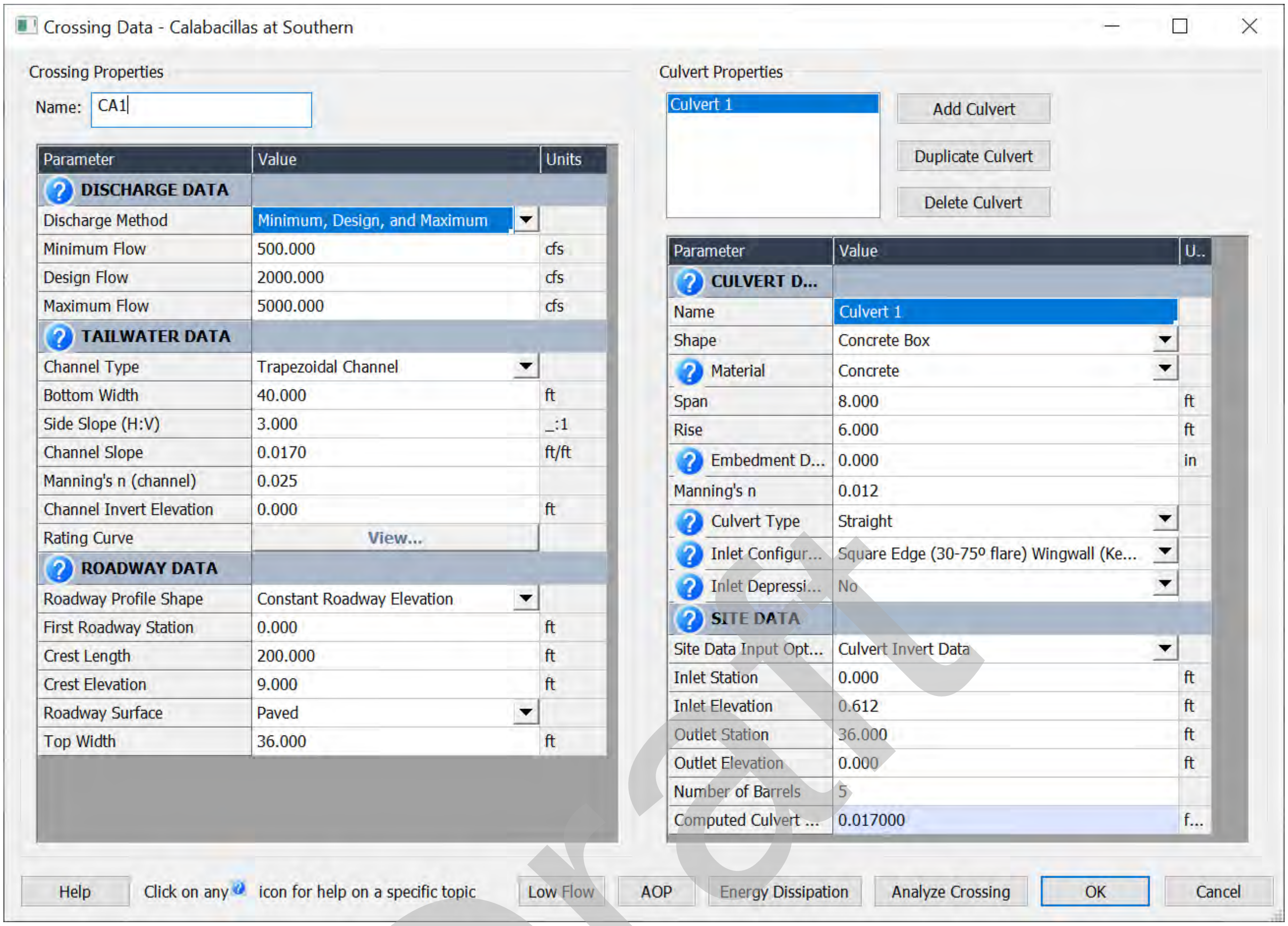
CA_01 (Calabacillas Arroyo & Southern Blvd.)

CA_01, upstream

CA_01, downstream

Number of barrels	Height (ft)	Width (ft)	Material	Entrance	Length (ft)	Slope (ft/ft)	Allowable headwater (ft)
5	6	8	CBC	Square edge, 30-75° wingwall	36	0.017	1

Draft



Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
3.17	500.00	500.00	0.00	1
4.57	950.00	950.00	0.00	1
5.77	1400.00	1400.00	0.00	1
7.33	2000.00	2000.00	0.00	1
8.19	2300.00	2300.00	0.00	1
9.30	2750.00	2649.27	100.64	7
9.78	3200.00	2785.00	414.94	5
10.16	3650.00	2891.09	758.88	5
10.50	4100.00	2981.98	1118.01	5
10.82	4550.00	3062.84	1487.03	4
11.11	5000.00	3136.79	1863.11	4
9.00	2557.92	2557.92	0.00	Overtopping

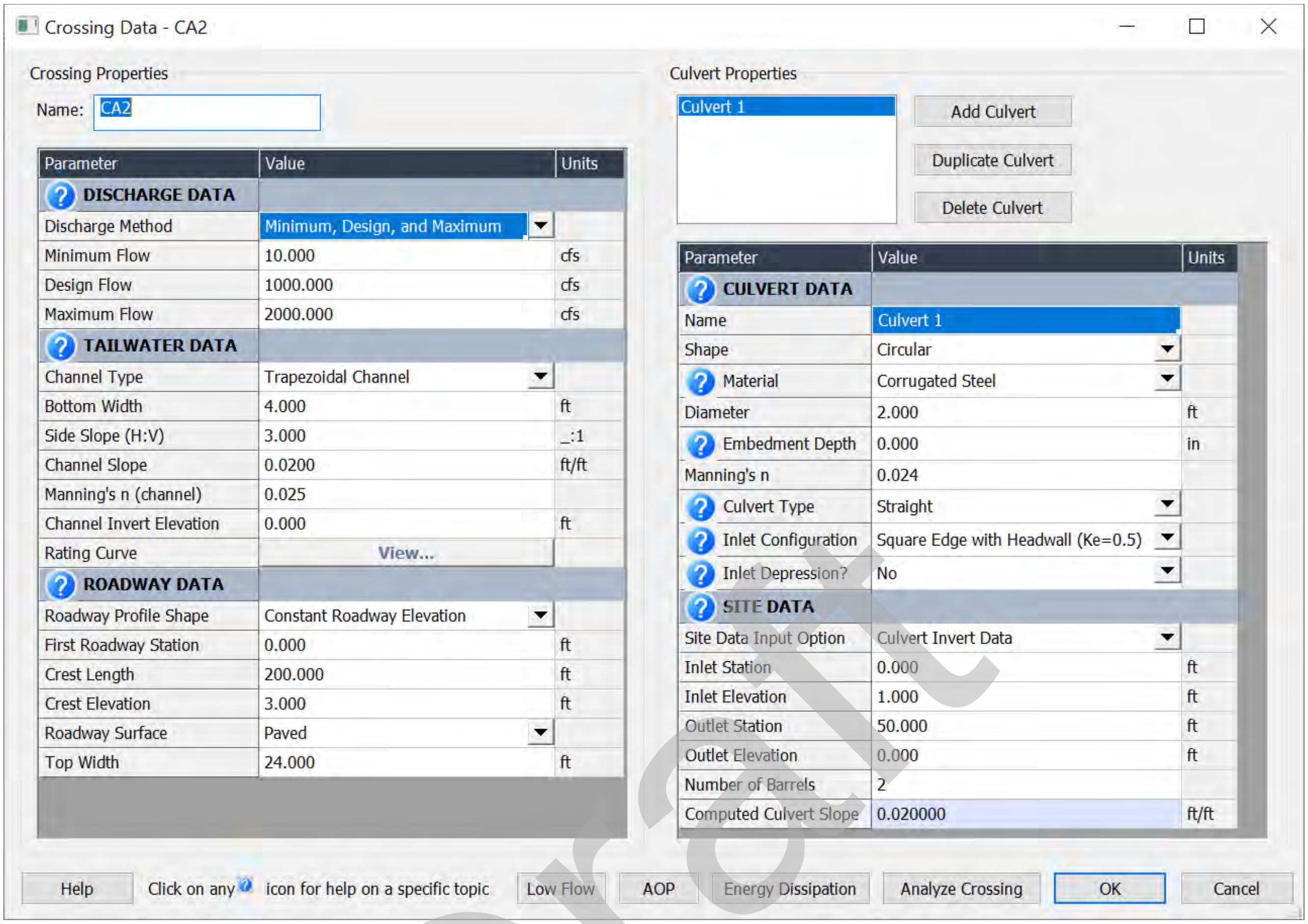
Draft

CA_02 (Tributary D & Southern Blvd.)

CA_02, upstream

CA_02, downstream

Number of barrels	Diameter (ft)	Material	Entrance	Length (ft)	Slope (ft/ft)	Allowable headwater (ft)
2	2	CMP	Square edge with headwall	50	0.02	1



Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2.08	10.00	10.00	0.00	1
3.44	209.00	31.14	177.82	8
3.74	408.00	25.31	382.64	6
3.98	607.00	20.76	586.11	5
4.19	806.00	16.55	789.38	5
4.40	1000.00	12.55	987.52	5
4.67	1204.00	10.49	1193.80	11
4.94	1403.00	9.59	1394.27	18
5.20	1602.00	9.02	1593.81	18
5.46	1801.00	9.01	1792.42	11
5.70	2000.00	9.08	1990.91	3
3.00	26.24	26.24	0.00	Overtopping

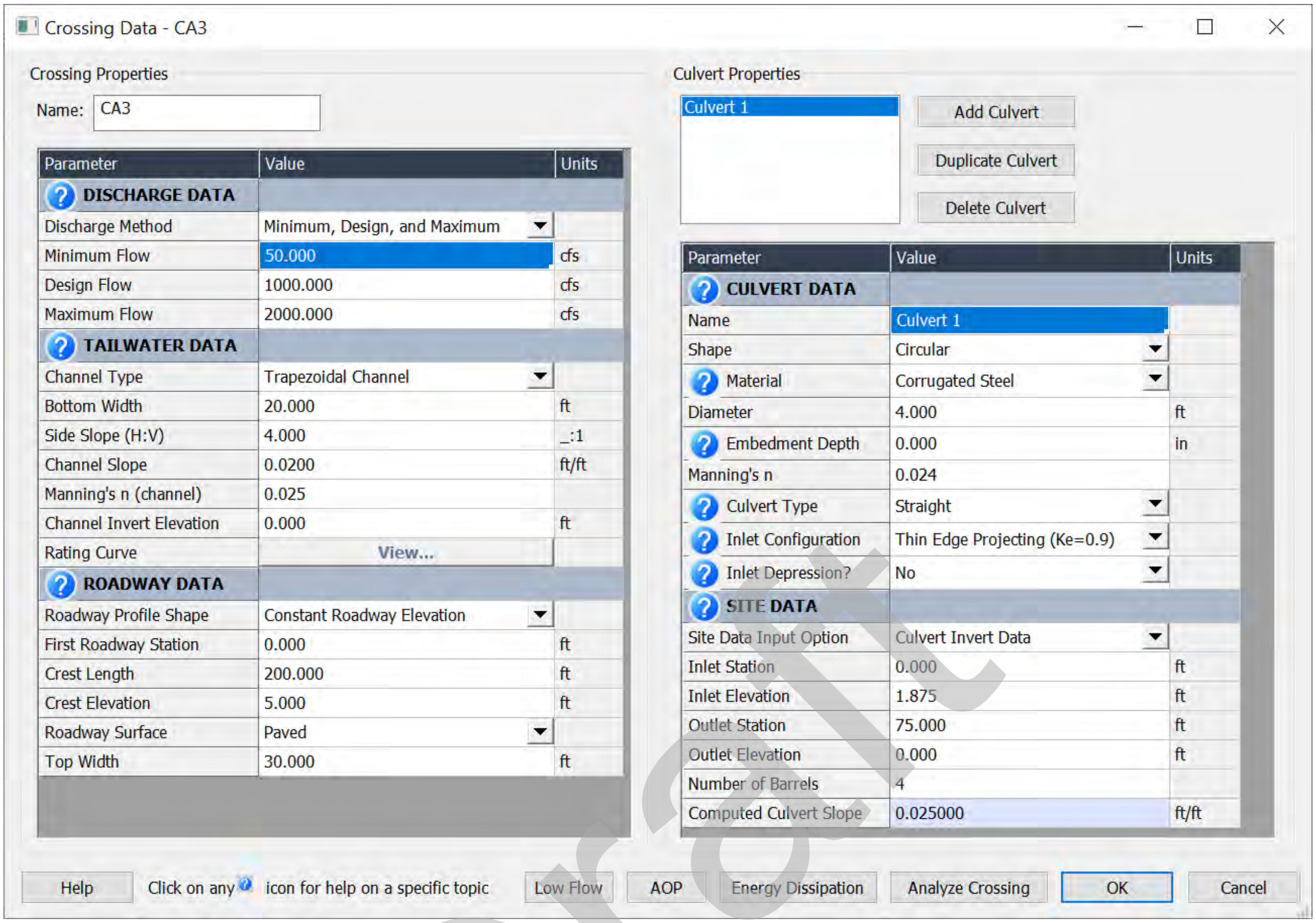
Draft

CA_03 (Tributary B & Southern Blvd.)

CA_03, upstream

CA_03, downstream

Number of barrels	Diameter (ft)	Material	Entrance	Length (ft)	Slope (ft/ft)	Allowable headwater (ft)
4	4	CMP	Thin edge projecting	75	0.02	1



Crossing Data - CA3

Crossing Properties

Name: CA3

Parameter	Value	Units
DISCHARGE DATA		
Discharge Method	Minimum, Design, and Maximum	
Minimum Flow	50.000	cfs
Design Flow	1000.000	cfs
Maximum Flow	2000.000	cfs
TAILWATER DATA		
Channel Type	Trapezoidal Channel	
Bottom Width	20.000	ft
Side Slope (H:V)	4.000	_:1
Channel Slope	0.0200	ft/ft
Manning's n (channel)	0.025	
Channel Invert Elevation	0.000	ft
Rating Curve	View...	
ROADWAY DATA		
Roadway Profile Shape	Constant Roadway Elevation	
First Roadway Station	0.000	ft
Crest Length	200.000	ft
Crest Elevation	5.000	ft
Roadway Surface	Paved	
Top Width	30.000	ft

Culvert Properties

Culvert 1

Add Culvert

Duplicate Culvert

Delete Culvert

Parameter	Value	Units
CULVERT DATA		
Name	Culvert 1	
Shape	Circular	
Material	Corrugated Steel	
Diameter	4.000	ft
Embedment Depth	0.000	in
Manning's n	0.024	
Culvert Type	Straight	
Inlet Configuration	Thin Edge Projecting (Ke=0.9)	
Inlet Depression?	No	
SITE DATA		
Site Data Input Option	Culvert Invert Data	
Inlet Station	0.000	ft
Inlet Elevation	1.875	ft
Outlet Station	75.000	ft
Outlet Elevation	0.000	ft
Number of Barrels	4	
Computed Culvert Slope	0.025000	ft/ft

Help | Click on any icon for help on a specific topic | Low Flow | AOP | Energy Dissipation | Analyze Crossing | OK | Cancel

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
3.37	50.00	50.00	0.00	1
5.18	245.00	198.72	46.24	8
5.50	440.00	226.96	212.95	6
5.74	635.00	248.09	386.89	6
5.95	830.00	266.08	563.83	5
6.12	1000.00	280.04	719.91	5
6.32	1220.00	296.34	923.63	5
6.49	1415.00	309.48	1105.50	5
6.65	1610.00	321.64	1288.30	4
6.81	1805.00	332.97	1472.01	4
6.95	2000.00	343.58	1656.41	4
5.00	182.29	182.29	0.00	Overtopping

Draft

Appendix E

Soils

Draft

Table E-1: Results from field soil assessments conducted in collaboration with the Ciudad Soil and Water Conservation District using the NRCS "Guide to Texture by Feel".

Site ID	Lat	Long	Predominant texture, 0-4 in	Depth	USDA texture	Depth	USDA texture
001-SS-1 *	35.2414	-106.7222	Sand	0-8 in	Sand	8-26 in	Sand
001-SS-2 *	35.2413	-106.7433	Loamy sand	0-8 in	Loamy sand	8-22 in	Loamy sand
001-SS-3 *	35.2413	-106.7611	Sandy loam	0-2 in	Loamy sand	2-22 in	Sandy loam
001-SS-4 *	35.2418	-106.7786	Sand	0-2 in	Sand	2-11 in	Sand
001-SS-5	35.2417	-106.7961	Loamy sand	0-12 in	Loamy sand		
001-SS-6	35.2417	-106.8122	Loamy sand	0-10 in	Loamy sand	10-24 in	Sandy loam
001-SS-7	35.2418	-106.8288	Loamy sand	0-33 in	Loamy sand		
001-SS-8	35.2417	-106.8466	Loamy sand	0-53 in	Loamy sand		
002-SS-1 *	35.2743	-106.7373	Loamy sand	0-4 in	Loamy sand	4-15 in	Sand
002-SS-2	35.2741	-106.7561	Sand	0-3 in	Sand	3-20 in	Sand
002-SS-3	35.2741	-106.7736	Loamy sand	0-4 in	Loamy sand	4-11 in	Loamy sand
002-SS-4	35.2742	-106.7904	Sand	0-4 in	Sand	4-30 in	Sand
002-SS-5	35.2742	-106.8086	Loamy sand	0-5 in	Loamy sand	5-16 in	Loamy sand
002-SS-6	35.2742	-106.8263	Loamy sand	0-6 in	Loamy sand	6-13 in	Loamy sand
002-SS-7	35.2740	-106.8446	Sand	0-13 in	Sand	13-30 in	Sand
002-SS-8	35.2742	-106.8625	Loamy sand	0-12 in	Loamy sand	12-22 in	Sandy loam
003-SS-1 *	35.3065	-106.7351	Loamy sand	0-19 in	Loamy sand	19-36 in	Sandy loam
003-SS-2 *	35.3061	-106.7445	Sand	0-19 in	Sand	19-29 in	Sand
003-SS-3 *	35.3068	-106.7611	Sandy clay loam	0-9 in	Sandy clay loam	9-29 in	Sandy clay loam
003-SS-4 *	35.3068	-106.7795	Sand	0-19 in	Sand	> 19 in	Sand
003-SS-5 *	35.3068	-106.7968	Loamy sand	0-12 in	Loamy sand	12-18 in	Loamy sand
003-SS-6 *	35.3072	-106.8146	Sand	0-9 in	Sand	9-14 in	Sand
003-SS-7 *	35.3068	-106.8311	Loamy sand	0-9 in	Loamy sand	9-20 in	Loamy sand
003-SS-8 *	35.3068	-106.8485	Loamy sand	0-14 in	Loamy sand	14-30 in	Loamy sand
004-SS-1 *	35.3188	-106.7318	Loamy sand	0-14 in	Loamy sand	14-26 in	Loamy sand
004-SS-2 *	35.3204	-106.7493	Loamy sand	0-8 in	Loamy sand	8-24 in	Sandy loam
004-SS-3 *	35.3204	-106.7665	Loamy sand	0-18 in	Loamy sand	18-32 in	Loamy sand
004-SS-4 *	35.3196	-106.7837	Loamy sand	0-16 in	Loamy sand	16-30 in	Sandy loam
004-SS-5 *	35.3195	-106.8015	Sandy loam	0-10 in	Sandy loam	10-20 in	Sandy loam
004-SS-6 *	35.3196	-106.8158	Sand	0-10 in	Sand	10-28 in	Sand
005-SS-1 *	35.3196	-106.8045	Loamy sand	0-16 in	Loamy sand	16-30 in	Sandy loam
005-SS-2 *	35.3336	-106.8069	Loamy sand	0-12 in	Loamy sand	12-24 in	Sandy loam
005-SS-3 *	35.3464	-106.8138	Loamy sand	0-9 in	Loamy sand	9-24 in	Sandy loam
005-SS-4 *	35.3592	-106.8231	Sandy loam	0-8 in	Sandy loam	8-13 in	Sandy loam
005-SS-5 *	35.3721	-106.8305	Sandy loam	0-13 in	Sandy loam	13-26 in	Sandy loam
005-SS-6 *	35.3864	-106.8387	Sandy loam	0-16 in	Sandy loam	16-30 in	Sandy clay loam

* Sample location approximate

Draft

Table E-2: Sample locations in and around the Calabacillas watershed where soil texture was determined by laboratory analysis based on a sample representative of the top four inches of the soil profile.

Site ID	Lat	Long	USDA texture, 0-4 in
3A	35.2386	-106.7051	Sand
4A	35.3177	-106.8086	Sand
5A	35.2494	-106.7558	Sand
6A	35.3482	-106.7583	Sandy loam
7A	35.2870	-106.7351	Sand
8A	35.3457	-106.7958	Sand
9A	35.3648	-106.7907	Loamy sand
10A	35.3753	-106.7964	Loamy sand
S1	35.3392	-106.7817	Sandy loam
S2	35.3443	-106.7726	Loamy sand
S3	35.3523	-106.7833	Loam
S4	35.3505	-106.7881	Sandy loam

Draft

Appendix F

Lateral Erosion Envelopes

Draft

Reach	EXISTING Q_{100} [a]	Dominant Discharge Q_d	Slope S_0	Critical Slope S_c	Maximum lateral erosion distance Δmax	Est. channel width W_D
	(cfs)	(cfs)	(ft/ft)	(ft/ft)	(ft)	(ft)
A_101_R1	890	178	0.013	0.019	99	39
A_102_R1	1,932	386	0.012	0.017	149	53
A_103_R1	2,204	441	0.012	0.016	161	56
A_104_R1	1,203	241	0.013	0.018	114	44
A_104_R2	2,940	588	0.011	0.016	189	63
A_104_R3	4,066	813	0.011	0.015	223	71
A_105_R1	4,545	909	0.010	0.015	239	75
A_106_R1	5,772	1,154	0.010	0.014	270	82
A_107_R1	6,552	1,310	0.009	0.014	294	87
A_108_R1	6,535	1,307	0.010	0.014	288	86
A_109_R1	6,881	1,376	0.011	0.014	292	86
A_110_R1	7,813	1,563	0.011	0.014	310	90
A_111_R1	8,120	1,624	0.012	0.014	314	91
A_112_R1	8,698	1,740	0.012	0.014	325	93
A_112_R2	8,676	1,735	0.012	0.014	323	93
A_113_R1	10,391	2,078	0.013	0.013	343	98
A_114_R1	13,442	2,688	0.013	0.013	378	108
B_102_R1	685	137	0.011	0.019	92	36
B_103_R1	1,158	232	0.011	0.018	114	44
B_104_R1	1,401	280	0.016	0.017	119	44
B_105_R1	1,747	349	0.015	0.017	135	49
B_105_R2	657	131	0.023	0.019	81	32
B_105_R3	2,394	479	0.016	0.016	159	54
B_105_R5	2,763	553	0.014	0.016	174	59
C_103_R1	749	150	0.017	0.019	88	35
C_104_R1	817	163	0.015	0.019	92	36
D_104_R1	800	160	0.013	0.019	94	37
D_104_R3	998	200	0.010	0.018	107	42
F_103_R1	682	136	0.013	0.019	89	35
G_102_R1	586	117	0.013	0.020	84	33
G_102_R3	791	158	0.012	0.019	95	38
H_102_R1	651	130	0.014	0.019	86	34
I_102_R1	543	109	0.015	0.020	80	32
J_103_R1	599	120	0.016	0.020	81	32
L_103_R1	660	132	0.015	0.019	86	34
M_102_R1	544	109	0.013	0.020	81	32
N_104_R1	546	109	0.011	0.020	84	33
N_104_R3	855	171	0.011	0.019	100	40
N_105_R1	985	197	0.010	0.018	106	42
Q_102_R3	518	104	0.012	0.020	81	32
Q_102_R4	518	104	0.028	0.020	74	29
U_101_R1	1,775	355	0.010	0.017	148	53
U_102_R1	2,272	454	0.012	0.016	161	56
U_103_R1	2,642	528	0.014	0.016	171	58
U_104_R1	2,987	597	0.015	0.016	180	60
U_302_R1	655	131	0.012	0.019	88	35
U_302_R3	919	184	0.011	0.018	103	41
U_302_R5	1,013	203	0.009	0.018	110	44

[a] Existing conditons (2024) urbanization and drainage infrastructure; flow rates without depth-area reduction

Draft

Appendix G

Review

Draft

External review: CobbFendley

No.	Page	Review Comment	SSCAFCA Response
1		When comparing the SSCAFCA's HEC-HMS model to the model excluding ARF's created by CobbFendley, [...] CobbFendley's model reports higher flow rates in a 100-year event compared to SSCAFCA's model. CobbFendley's independent analysis resulted in greater magnitude of peak flow but similar patterns, relationships, and ratios of flow between subbasins in the watershed.	After changing time of concentration calculations (see comment 5 below), lag times generally decreased and model results are closer to CobbFendley estimates. At model junction A_116_J1 (inflow into Swinburne Dam), the 100-year peak flow rate from CobbFendley's model (no depth-area-reduction) was 18,074 cfs. After lag time modifications, SSCAFCA's model results in a peak flow rate of 18,530 cfs at the same location.
2		Subbasin Map – label basin T_106.	Label for subbasin T_106 has been added to Figure 2.1.
3		Illustrate all sinks in the HEC-HMS model on the basin map or accompanying table.	Callouts identifying sinks (playa basins) have been added to Figure 2.1.
4		Include the elevation-storage-discharge values for ponds in the Appendix of the WMP.	Elevation-storage-discharge tables (or outlet structure parameters) have been included in Appendix B, along with source information.
5		Utilize 100-year event peak flows for Tc/Lag Time calculations.	Based on this comment, we have updated time of concentration calculations utilizing peak discharge values from the 100-year storm (instead of the 10-year storm) to estimate flow depth and hydraulic radius for channel flow segments. Resulting lag times now closely match estimates by CobbFendley (median lag time difference = -1.3%)

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6		Calibrate a second HEC-HMS model to account for area reduction factors.	After consideration of this recommendation, we opted not to include an additional model, for the following reason: Depending on the analysis point of interest, there is a large number of potential depth-area (D-A) reduction factors a model user might be interested in. For example, peak discharge at the King Blvd., Northern Blvd. and Southern Blvd. crossings of the Calabacillas Arroyo would require D-A reduction factors for 7, 28 and 40 square miles, respectively. Adding one additional model would not satisfy all possible analysis points. Adding a large number of models, each with a different D-A reduction factor, might lead to confusion. We therefore opted to only include one HEC-HMS model without D-A reduction; this represents the most conservative evaluation. Model users can easily update the storm area (under meteorological model) and re-run the simulation in accordance with their requirements.

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Agency review: SSCAFCA, AMAFCA, City of Rio Rancho, Sandoval County

Please note that comments related to grammar , spelling, as well as minor changes in sentence structure were corrected directly in the revised text and are not documented in the list below.

No.	Page	Review Comment	SSCAFCA Response
1	1-1	Suggest using another term, floodways could be construed to be a FEMA floodway, which has specific regulations and not the more general layperson definition of a flood water conveyance.	Changed "floodway" to "stormwater conveyance"
2	1-6	Ensure consistency between terminology "tributary" vs. "basin" in later sections	All instances of the term "tributary" have been reviewed. We use the term tributary to identify an area draining to the Calabacillas Arroyo via a distinct channel or storm drain pipe. Most tributaries are divided into smaller subbasins. A clarifying statement has been added to the revised text.
3	2-1	Was there a decision to not use the 2022 MRCOG orthophotography?	We did use 2022 orthoimagery, this typo has been corrected.
4	2-1	AMAFCA had identified various errors in the 2018 MRCOG Lidar data when used at a small (< ~40 ac) scale. This may not impact an analysis at the Watershed scale, but it is worth noting for SSCAFCA's awareness.	SSCAFCA is aware of potential discrepancies, but decided that since Lidar data was used solely for boundary delineations and estimation of some model parameters, effects were likely minor. Questionable boundaries were verified in the field.
5	2-1	What routing method was used in this modeling?	We used the Muskingum-Cunge method. The text has been revied accordingly.
6	2-1	Clarify - minor arroyos assumed to have 0 loss?	Yes - the following sentence has been added to the revised text: "Minor conveyances were assumed to have negligible transmission losses and were assigned a loss rate of 0 in/h."
7	Figure 2.1	Why are some of these basins so small? P_001, P_002, etc.	All small subbasins drain to playas and are internal sinks. Labels identifying each sink have been added to the revised Figure 2.1.
8	Figure 2.1	Does this boundary [between west branch and middle branch tributaries] generally match that of the Boca Negra Watershed?	Both the boundaries between the West and Middle Branch (SSCAFCA tributaries W and U, respectively), and between West Branch and Boca Negra match well (see screen shot at the end of this table). The only exception is a small discrepancy at the north-west corner of the Boca Negra watershed.

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9	Table 2.2	Need to add paved road to this table	A new row has been added to Table 2.2. Paved roads, driveways, paved parking etc. fall into the category "direly connected impervious area" (DCIA) and are not included in the composite CN calculation per SSCAFCA Criteria Manual. Instead, DCIA is modeled as "% impervious" in HEC-HMS. The model treats the specified impervious portion of each subbasin as absolutely impervious (no losses), and all precipitation falling onto that area becomes runoff.
10	2-6	Add discussion on model sinks and playas.	A short discussion of playas was included under section 2.7, along with a reference to the revised Figure 2.1, which now includes a callout for each playa basin.
11	2-7	Was there any consideration made for having multiple precipitation points due to the size of the watershed? Was there any variation in the rainfall across the watershed?	We did consider varying precipitation; in the original version of the plan, several precipitation zones were used. However, For consistency with SSCAFCA's other watershed management plans and Criteria Manual, we decided to use one point representing the approximate centroid of the basin.
12	2-7	For the evaluation of the regional drainage infrastructure, were the D-A reduction factors adjusted for each AP within the model and the model run iteratively for each structure? It's a little unclear in the narrative and the results. How did the model results with no D-A reduction factor compare to the APs that did? Upon review of the HMS model, it did not appear that there were D-A reductions used; in the model runs provided. AMAFCA recommends adding a section in the Hydrology section to further discuss how these were used in related to determining peak discharge at specific locations and how they impacted specific structures. Also, define the D-A reduction "TP40 TP49" referenced in the Appendix.	Good point. A detailed discussion of depth-area reduction with appropriate references has been added to the revised section 2.8.

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13	Figure 2.3	It would be helpful to identify the crossing structures on this figure, similar to the ponds.	Symbols for crossing structure locations have been added to Figure 2.3.
14	2-9	Does SSCAFCA have a threshold for analysis that identifies 500 cfs? Were smaller crossing structures analyzed for capacity?	Yes, SSCAFCA is in charge of regional drainage and will typically analyze systems with peak flows in excess of 500 cfs. Smaller crossing structures were not analyzed as part of this regional planning effort.
15	Table 2.5	Suggest not using this legend unless other crossing structures with varying levels of capacity are listed in the table.	The legend associated with Table 2.5 has been updated and now only includes two colors corresponding to the symbology used in Figure 2.3.
16	2-9	Suggest detailing the assumptions indicated in Appendix D here, where most readers will focus.	Assumptions have been added to the text.
17	2-10	Suggest adding a table with the pond results, the Figure does not indicate the names of the ponds	Labels with pond names have been added to Figure 2.3. A detailed table with results is included in Appendix B.
18	Figure 2.5	Were LEEs developed for the west branch of the Calabacillas? The discharge appears to be >500cfs.	We did not delineate LEEs for the West Branch, as this tributary falls entirely within AMAFCA jurisdiction. A clarifying statement has been added to the revised text.
19	Figure 2.6	This Figure is a little strange because of the use of red. FEMA floodplains typically have standardized symbology to ensure that the maps are universally understandable.	Figure symbology has been updated in accordance with FEMA's National Flood Hazard Layer Viewer.
20	3-14	For which storm event?	Up to the 100-year 24-hour event
21	3-18	Who is responsible for the regional drainage improvements? SSCAFCA? CoRR? Private development?	As development in the Calabacillas arroyo watershed occurs, determinations will be made as to the need and extent of regional drainage management facilities as well as who will be responsible for funding needed improvements. Funding of improvements could be a combination of SSCAFCA, CoRR, and/or private funds. The funding scenario will be situational.
22	3-18	For all of these potential drainage improvements, has SSCAFCA considered developing preliminary cost estimates?	We have moved away from including cost estimates in our regional planning documents. Cost estimates are developed in conjunction with conceptual design.
23	3-22	Might be helpful to list here what the potential flows are from these tributaries.	This is difficult to determine without a hydraulic model, since only a portion of the flows from tributaries B and C would be expected to reach this location.

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24	Figure 3.10	Add road label & culvert dimensions	Road label and culvert dimensions have been added.
25	Figure 3.11	Label placement	Label placement has been corrected.
26	3-23	Might be worth suggesting a higher standard of protection given the critical nature of this facility.	Good idea. This recommendation has been added to the report.
27	Figure 3.12	Add road label to figure	Road label has been added.
28	3-25	Does this include flood protection for the residential properties adjacent to the arroyo?	Yes - the wording of the text has been updated accordingly.
29	Figures 3.14 & 3.15	Is "footprint" in this case the actual footprint of the facility or the inundation limits of the proposed facility?	The blue lines in Figures 3.14 and 3.15 represent the approximate grading limit. Figure labels have been updated accordingly.
30	3-29	Is SSCAFCA planning on evaluating future flow conditions to aid in future facilities planning?	SSCAFCA has moved away from conducting future conditions analyses as part of regional planning because of the large uncertainty associated with predicting future urbanization. Instead, SSCAFA will update regional plans more frequently.
31	3-31	Recommend adding a conclusion/summary section to present the summarized findings of the WMP update.	In completing WMP documents, SSCAFCA follows a common format. The format currently doesn't include a conclusions section. Nevertheless, we like this recommendation and will consider adding a summary and conclusions section to the next round of WMP revisions.
32	Figures 2.1, 2.3-2.5	Rotate figures for better readability.	Figures have been rotated.
33	Figure 2.1	Add SSCAFCA jurisdictional boundary.	Jurisdictional boundary and label has been added to the figure.
34	2-4	Why were land use percentages adopted from the Barranca Watershed Management Plan?	The update of the Barranca Watershed Management Plan in 2022 included an effort to characterize typical land use percentages for different development densities. This entailed manual mapping of land use categories (building footprint, driveway, compared or disturbed areas, areas with natural vegetation, etc.) for a representative set of lots. Since urbanization characteristics across SSCAFCA's jurisdiction are comparable, we decided to adopted those values for the Calabacillas watershed.

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35	2-6	Why was the 10-year storm used for lag time calculations?	Based on this comment and comment 5 (external review), we have updated time of concentration calculations utilizing peak discharge values from the 100-year storm (instead of the 10-year storm) to estimate flow depth and hydraulic radius for channel flow segments.
36	2-6	Distinguish ponds within SSCAFCA vs. AMAFACA jurisdiction.	SSCAFCA's jurisdictional boundary has been added to Figure 2.3, which also shows pond locations. A reference to the figure has been added to the text.
37	2-7	Explain the term "underlying uncertainty" and why it applies here.	The corresponding paragraph has been modified as follows: "It is important to note that simulation results only provide a best estimate of the watershed runoff response from the design storm for current land use conditions. All hydrologic models are simplified representations of complex physical processes. Numerous factors contribute to model uncertainty, including choices related to model structure and methods used to simulate infiltration and overland flow, parameter estimation, as well as precipitation input. Model results are intended to be used for planning and design of flood control infrastructure but need to be interpreted with the underlying uncertainty in mind. "
38	Figure 2.3	The point indicating the location of Swinburne Dam is located at the Unser Blvd. crossing and should be moved to the west.	The point has been moved.
39	2-8	Missing figure 2.4? Are the crossing structures and pond usually on separate figures?	Crossing structures have been added to Figure 2.3. Due to the small number of ponds and crossings in the watershed, we have opted to display both on the same figure.
40	3-13	Include pond labels on Figure 2.3	Pond labels have been added.

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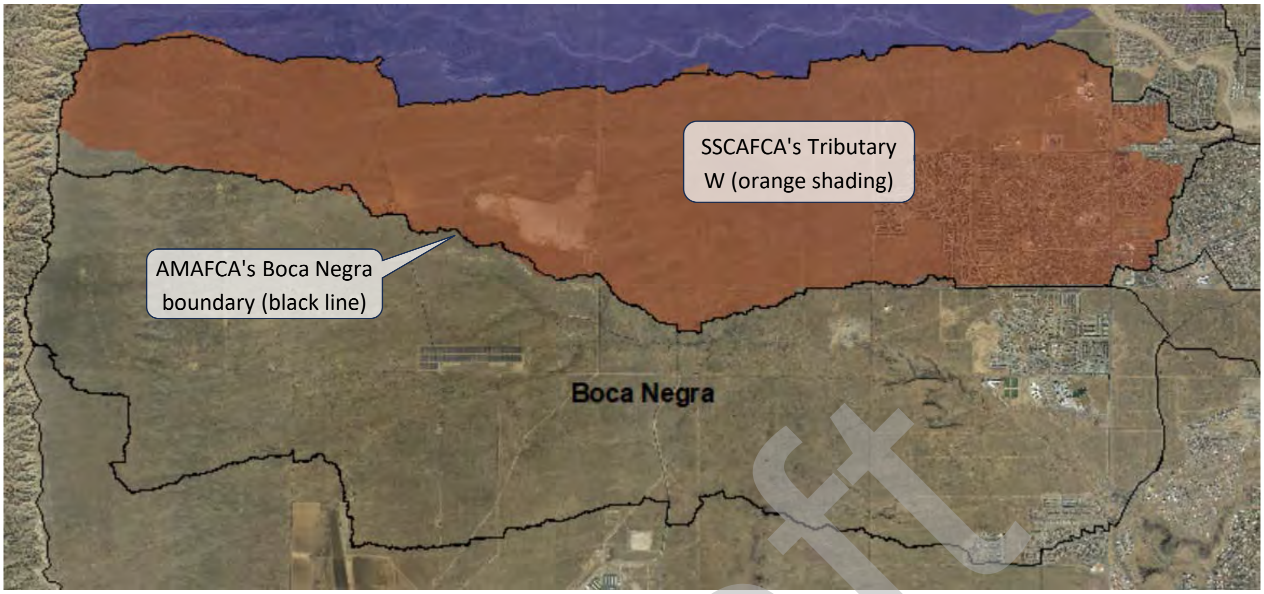

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