Appendix F:
Hydrology Supporting Information

F.1 - Preliminary Hydrology Study

PRELIMINARY HYDROLOGY STUDY

FOR

Villa Siena
PP 13-0089
Wildomar, CA

Prepared For:
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RCE 37356

August 2, 2013
Revised September 11, 2014

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Introduction

This preliminary report has been prepared as a part of the General Plan Amendment, Zone Change, Plot Plan and Tentative Parcel Map Submittal. This report includes hydrology calculations for the onsite storm drain systems. The systems will be designed in accordance with the City of Wildomar and County of Riverside Standards and Procedures.

The project consists of development of 35 apartment buildings, a pool/spa, and clubhouse on approximately 9.2 acres. The project is bounded by Prielipp on the south, Elizabeth Lane west, vacant land to the north and Jana Lane to the east.

The primary objective of this report is to demonstrate compliance with WQMP requirements that limit post-development condition flow rates for the 2 year 24 hour and 10 year 24 hour development conditions.

Undeveloped Condition

The site is primarily vacant with the exception of a residence at the southeast corner of the project site and another at the east midpoint of the north property line.

The topography of the site is rolling, with deeper valleys that collect surface runoff. There is a large area north of the project that drains into a valley area that carries collected runoff across the northeast corner of the site onto adjacent property to the east. The project will block this flow and a pipe system will be constructed to transmit flow to an outlet point on the adjacent property within the current drainage course.

Developed Condition

As previously described, the project will disrupt a natural drainage course at the northeast corner of the project site. The valley will be filled in order to provide for the proposed development. A pipe will be installed at the north property line, within the existing drainage course and will be designed to outlet beyond the project within the down stream portion of the existing drainage course. An outlet structure and rock rip-rap will be installed to control the outflow and disperse the resulting flows to control potential erosion and degradation of the natural drainage course.

Surface flows within the project will be collected in catch basins and pipe systems will transmit flow into underground storage/filtrations devices sized to meet the regulatory treatment requirements. From the storage/filtration devices, pipes will be installed and outlet onto adjacent properties to locations that historically forms the pre-development drainage courses. Outlet structures and rip-rap will be installed to control potential erosion and degradation.

Area A			
Event	Existing CF	Developed CF	Volume to be retained CF
2 year 24 hour	5,449	9,893	4,444
10 year 24 hour	18,816	23,369	4,553
85th percentile	-	-	4,757
Use	-	-	4,757
Area B			
Event	Existing CF	Developed CF	Volume to be retained CF
2 year 24 hour	3,628	9,333	5,705
10 year 24 hour	12,528	22,047	9,519
85th percentile	-	-	4,448
Use	-	-	9,519
Area C			
Event	Existing CF	Developed CF	Volume to be retained CF
2 year 24 hour	1,683	3,886	2,203
10 year 24 hour	5,812	9,181	3,369
85th percentile	-	-	1,869
Use	-	-	3,369

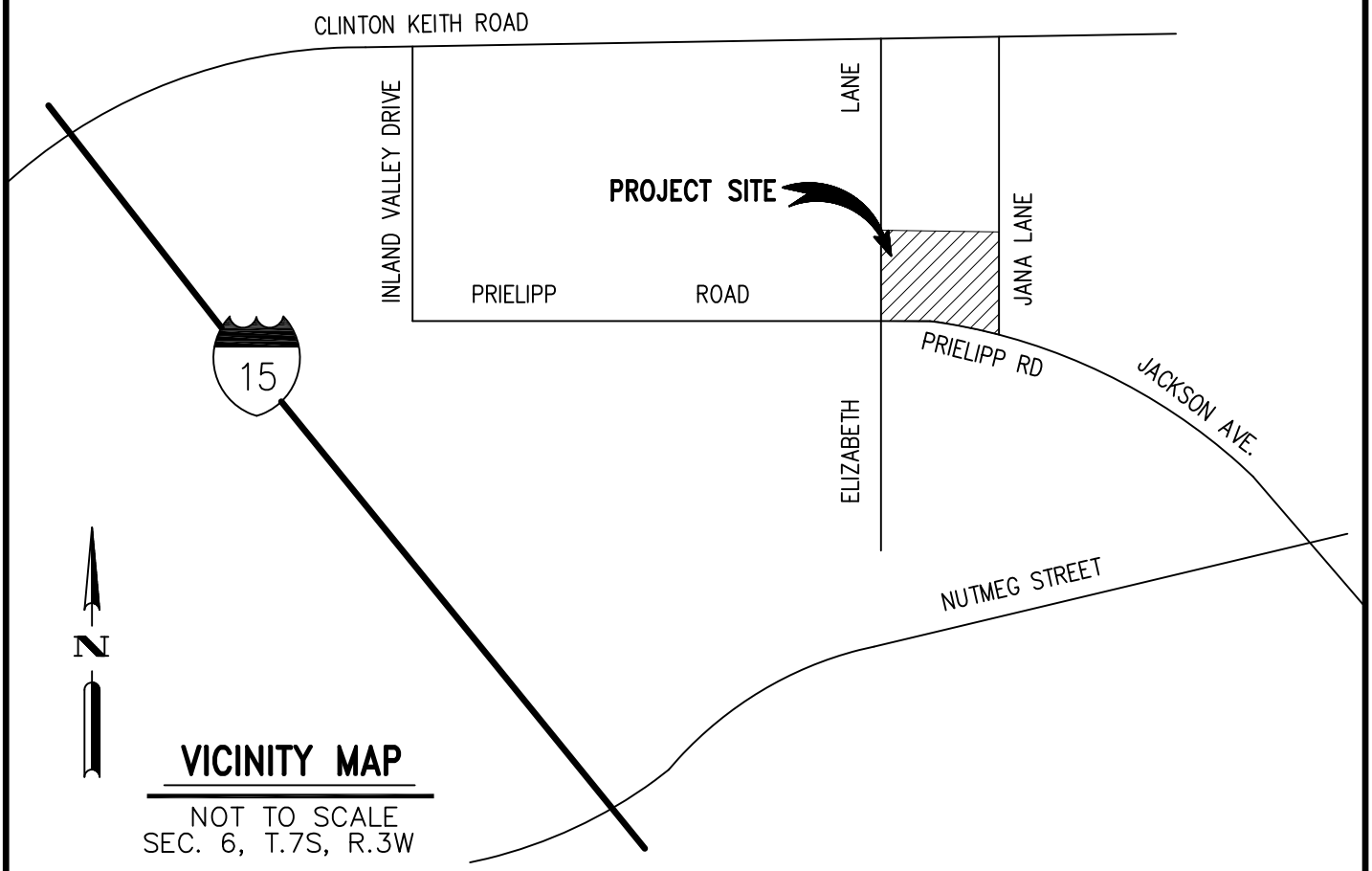
Hydrology

The volumes for the 2 year and 10 year rain fall events have been calculated using the Riverside County synthetic unit hydrograph method. As stated in the Riverside County Flood Control and Water Conservation District Hydrology Manual, the short cut synthetic hydrograph method is appropriate for areas of less than 100 to 200 acres and lag times less than 7 to 8 minutes. The project site acreage (9.2 acres) fits into this consideration and has been used in this study.

.

Exhibit 1

Vicinity Map



VICINITY MAP

NOT TO SCALE
SEC. 6, T.7S, R.3W

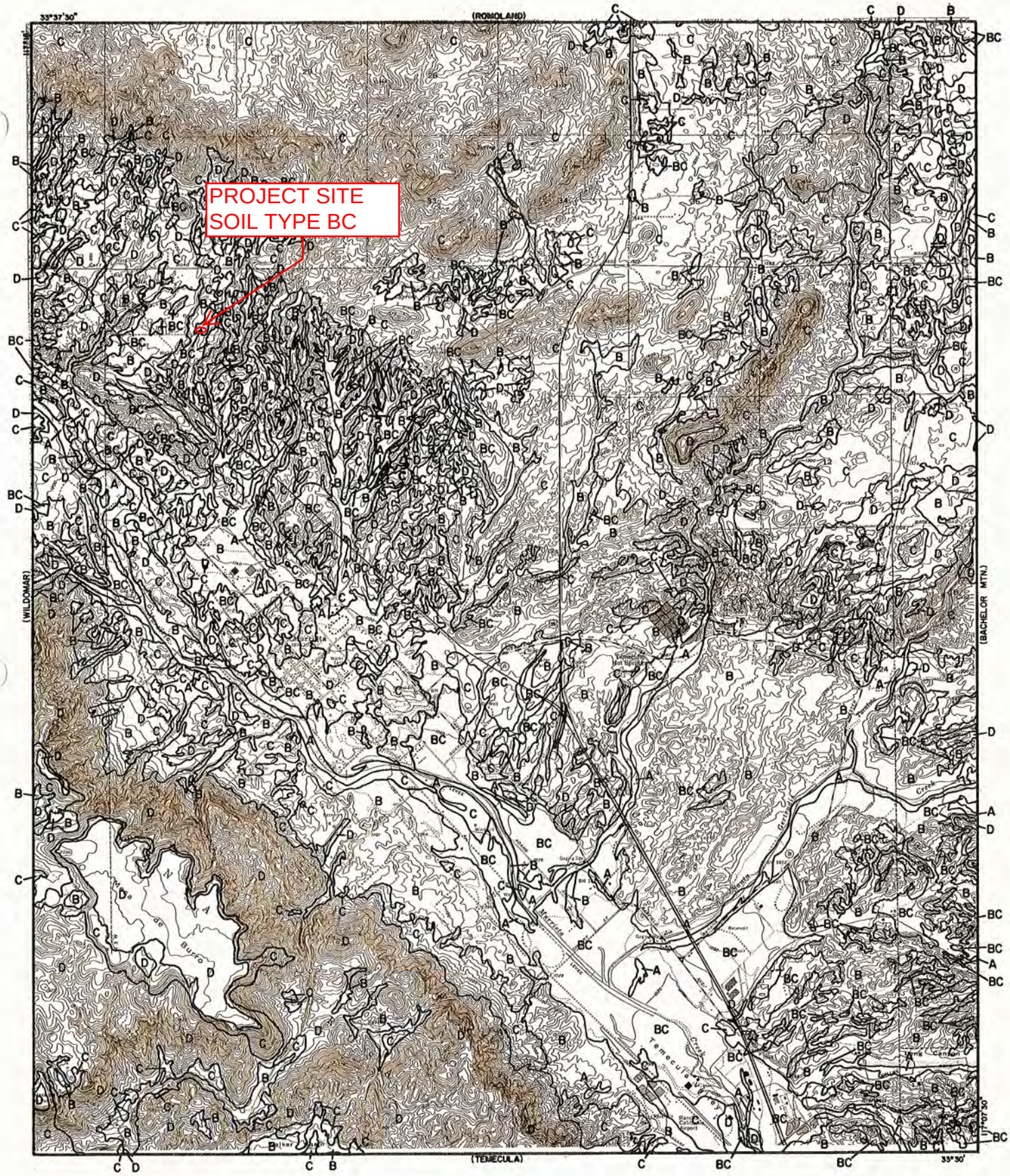
VILLA SIENA
WILDOMAR, CA
PA 13-0089

PACIFIC COAST LAND CONSULTANTS, Inc.
CIVIL ENGINEERING * LAND PLANNING * LAND SURVEYING
25096 JEFFERSON AVENUE SUITE "D"
MURRIETA, CALIFORNIA 92562
TEL. (951) 698-1350

S:\Land Projects 2004\27212 JANA 9\DWG\15-EXHIBITS\VICMAP-8X11.dwg 9-04-14 02:24:36 PM

Exhibit 2

Plates



LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC & WCD

HYDROLOGY MANUAL

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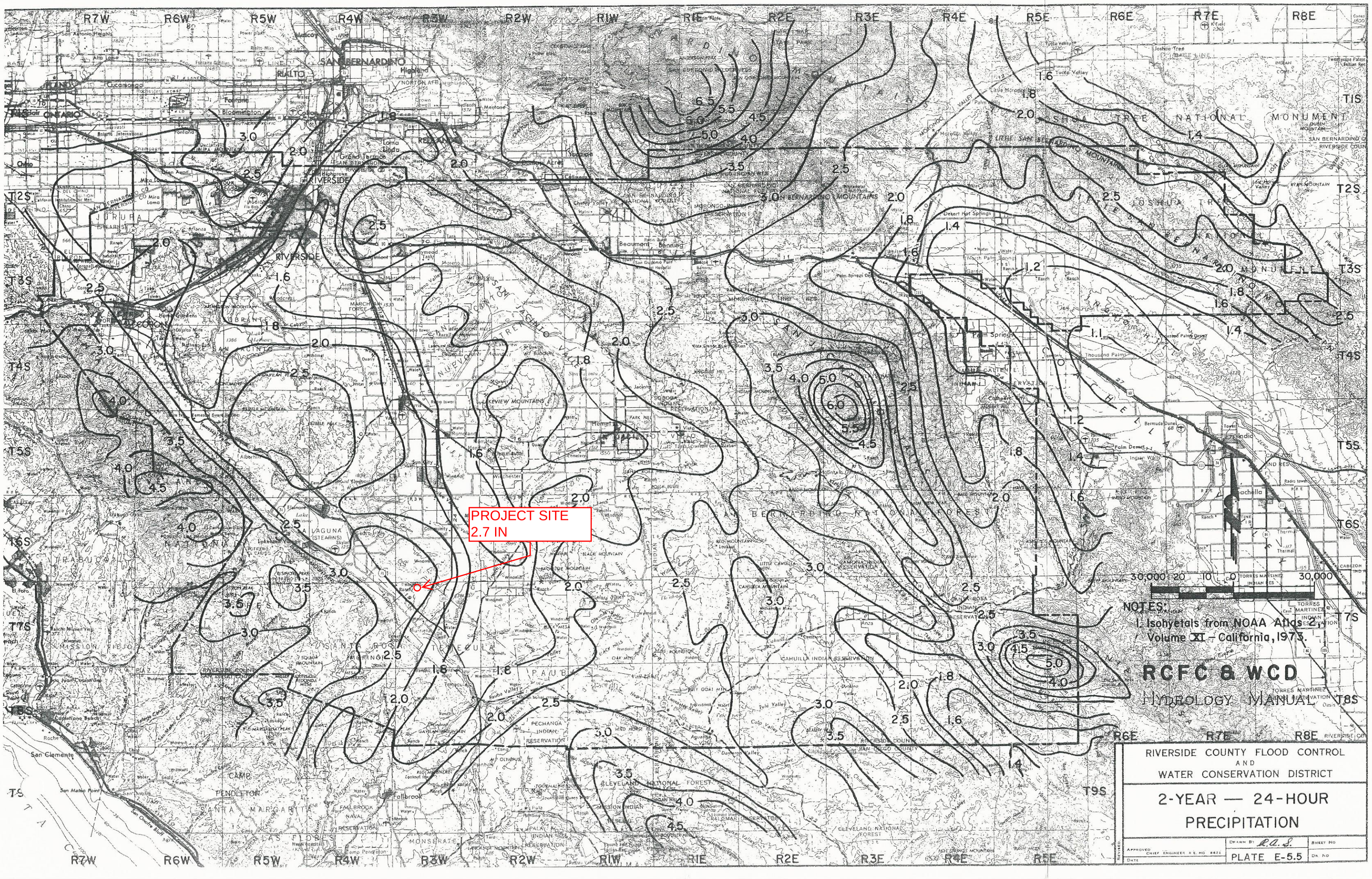
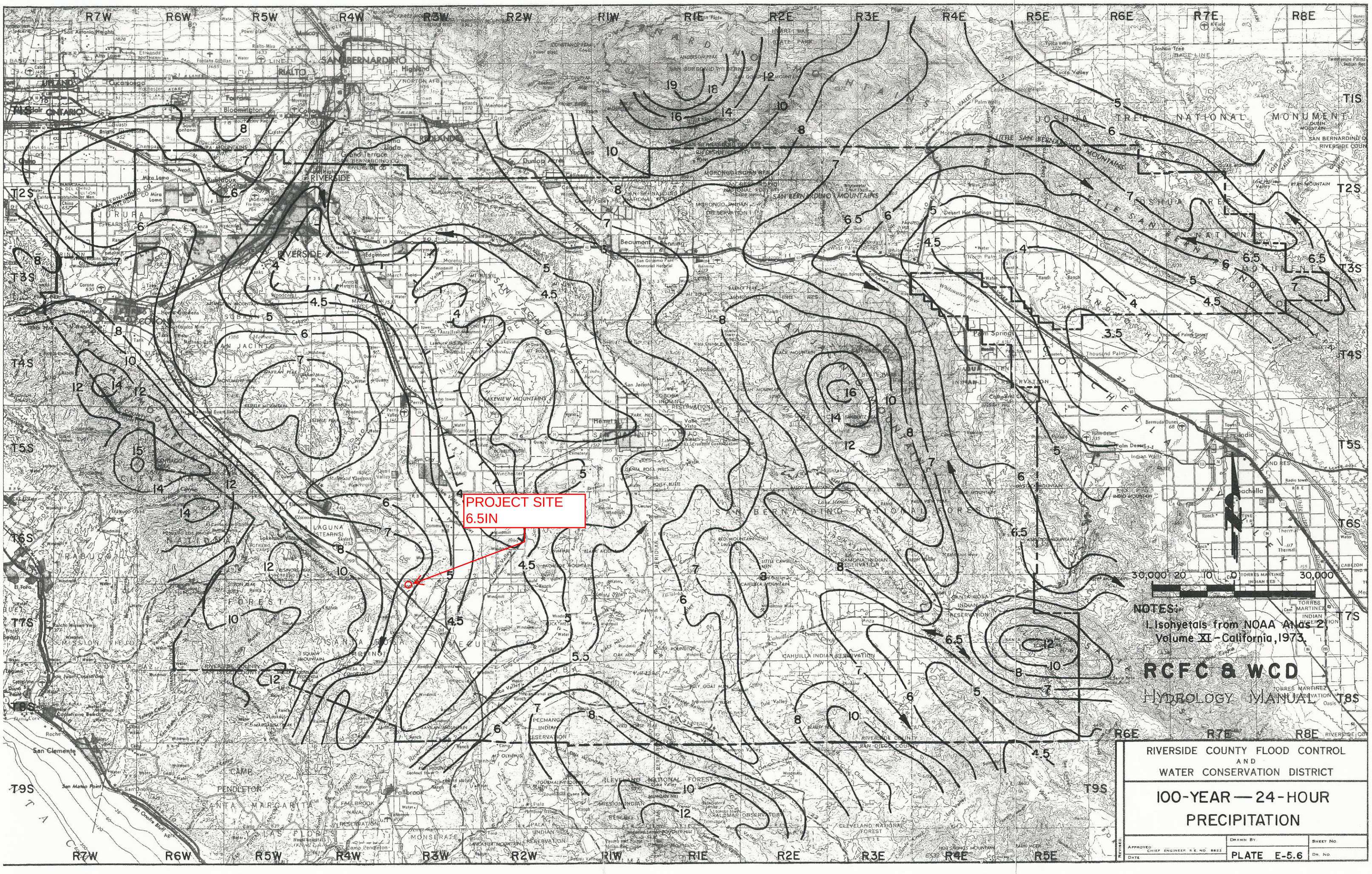
HYDROLOGIC SOILS GROUP MAP FOR MURRIETA

PLATE C-1.52


PROJECT SITE
2.7 IN
NOTES:
1. Isohyetals from NOAA Atlas 2, Volume XI - California, 1973.
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
2-YEAR — 24-HOUR
PRECIPITATION
PLATE E-5.5


PROJECT SITE
6.5IN
NOTES:
1. Isohyetals from NOAA Atlas 2, Volume XI - California, 1973.
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
100-YEAR — 24-HOUR
PRECIPITATION
PLATE E-5.6
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E
R3E
R4E
R5E
R6E
R7E
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T1S
T2S
T3S
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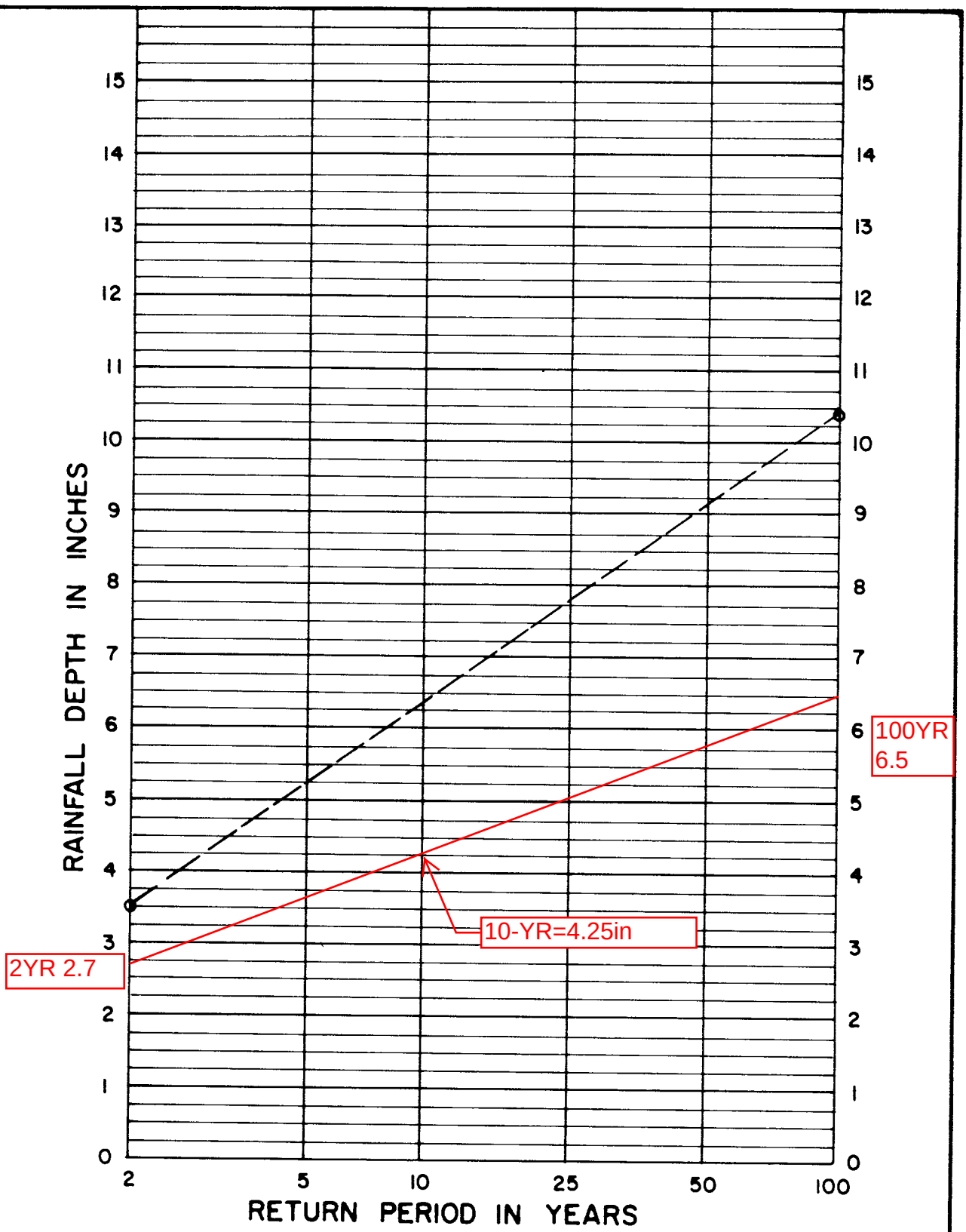
T5S
T6S
T7S
T8S
T9S



NOTE:

1. For intermediate return periods plot 2-year and 100-year values from maps for a specific duration, then connect points and read value for desired return period. For example given 2-year 24-hour = 3.50" and 100-year 24-hour = 10.40", 25-year 24-hour = 7.80"

Reference: NOAA Atlas 2, Volume XI - California, 1973.

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HYDROLOGY MANUAL

RAINFALL DEPTH VERSUS RETURN PERIOD FOR PARTIAL DURATION SERIES

RUNOFF INDEX NUMBERS OF HYDROLOGIC SOIL-COVER COMPLEXES FOR PERVIOUS AREAS-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
NATURAL COVERS -					
Barren (Rockland, eroded and graded land)		78	86	91	93
Chaparrel, Broadleaf (Manzonita, ceanothus and scrub oak)	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparrel, Narrowleaf (Chamise and redshank)	Poor	71	82	88	91
	Fair	55	72	81	86
Grass, Annual or Perennial	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Meadows or Cienegas (Areas with seasonally high water table, principal vegetation is sod forming grass)	Poor	63	77	85	88
	Fair	51	70	80	84
	Good	30	58	72	78
Open Brush (Soft wood shrubs - buckwheat, sage, etc.)	Poor	62	76	84	88
	Fair	46	66	77	83
	Good	41	63	75	81
Woodland (Coniferous or broadleaf trees predominate. Canopy density is at least 50 percent)	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	28	55	70	77
Woodland, Grass (Coniferous or broadleaf trees with canopy density from 20 to 50 percent)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
URBAN COVERS -					
Residential or Commercial Landscaping (Lawn, shrubs, etc.)	Good	32	56	69	75
Turf (Irrigated and mowed grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
AGRICULTURAL COVERS -					
Fallow (Land plowed but not tilled or seeded)		76	85	90	92

82

63

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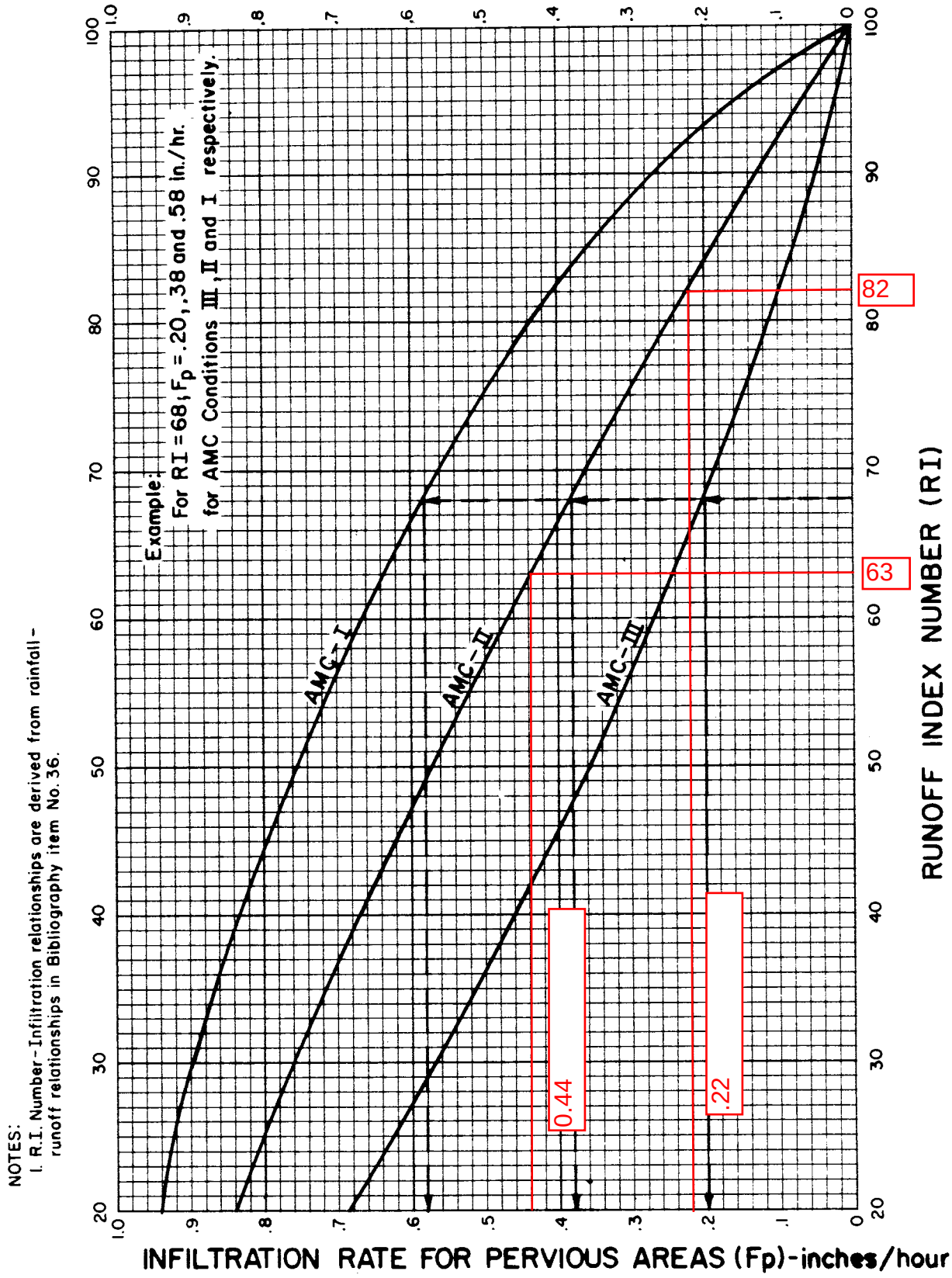
HYDROLOGY MANUAL

RUNOFF INDEX NUMBERS FOR PERVIOUS AREA



NOTES:
1. R.I. Number-Infiltration relationships are derived from rainfall-runoff relationships in Bibliography item No. 36.

RCFC & WCD

HYDROLOGY MANUAL

INFILTRATION RATE FOR PERVIOUS AREAS VERSUS RUNOFF INDEX NUMBERS

Section 1
Undeveloped Unit Hydrograph Studies

Villa Siena
Area A Undeveloped Condition

area	3.95	[3]		0.0000	L
unit time	15	[5]		0.0000	Lca
LOSS RATE=F				#DIV/0!	H
F=Fp(1.00-0.9Ai)			0.015		n
Fp	0.22			#DIV/0!	Lag
Ai	0			15 min	Use
F	0.2200	[13]			
24 HR 2 YR	2.7	[10]			
C	0.0020				
Fm	0.1100				

[15] UNIT TIME PERIOD	[20] PATTERN PERCENT	[21] STORM RAIN 60[10][20]/100[5]	[22] LOSS RATE	[23] EFFECTIVE RAIN IN/HR [21]-[22]	[24] FLOW CFS [3][23]
1	0.2	0.0216	0.3885	0.0000	0.0000
2	0.3	0.0324	0.3840	0.0000	0.0000
3	0.3	0.0324	0.3795	0.0000	0.0000
4	0.4	0.0432	0.3750	0.0000	0.0000
5	0.3	0.0324	0.3706	0.0000	0.0000
6	0.3	0.0324	0.3662	0.0000	0.0000
7	0.3	0.0324	0.3618	0.0000	0.0000
8	0.4	0.0432	0.3575	0.0000	0.0000
9	0.4	0.0432	0.3532	0.0000	0.0000
10	0.4	0.0432	0.3489	0.0000	0.0000
11	0.5	0.0540	0.3446	0.0000	0.0000
12	0.5	0.0540	0.3404	0.0000	0.0000
13	0.5	0.0540	0.3362	0.0000	0.0000
14	0.5	0.0540	0.3320	0.0000	0.0000
15	0.5	0.0540	0.3278	0.0000	0.0000
16	0.6	0.0648	0.3237	0.0000	0.0000
17	0.6	0.0648	0.3196	0.0000	0.0000
18	0.7	0.0756	0.3155	0.0000	0.0000
19	0.7	0.0756	0.3115	0.0000	0.0000
20	0.8	0.0864	0.3075	0.0000	0.0000
21	0.6	0.0648	0.3035	0.0000	0.0000
22	0.7	0.0756	0.2995	0.0000	0.0000
23	0.8	0.0864	0.2956	0.0000	0.0000
24	0.8	0.0864	0.2917	0.0000	0.0000
25	0.9	0.0972	0.2878	0.0000	0.0000
26	0.9	0.0972	0.2840	0.0000	0.0000
27	1.0	0.1080	0.2802	0.0000	0.0000
28	1.0	0.1080	0.2764	0.0000	0.0000
29	1.0	0.1080	0.2726	0.0000	0.0000
30	1.1	0.1188	0.2689	0.0000	0.0000
31	1.2	0.1296	0.2652	0.0000	0.0000
32	1.3	0.1404	0.2616	0.0000	0.0000
33	1.5	0.1620	0.2579	0.0000	0.0000
34	1.5	0.1620	0.2544	0.0000	0.0000
35	1.6	0.1728	0.2508	0.0000	0.0000

36	1.7	0.1836	0.2473	0.0000	0.0000
37	1.9	0.2052	0.2438	0.0000	0.0000
38	2.0	0.2160	0.2403	0.0000	0.0000
39	2.1	0.2268	0.2369	0.0000	0.0000
40	2.2	0.2376	0.2334	0.0042	0.0164
41	1.5	0.1620	0.2301	0.0000	0.0000
42	1.5	0.1620	0.2267	0.0000	0.0000
43	2.0	0.2160	0.2234	0.0000	0.0000
44	2.0	0.2160	0.2202	0.0000	0.0000
45	1.9	0.2052	0.2169	0.0000	0.0000
46	1.9	0.2052	0.2137	0.0000	0.0000
47	1.7	0.1836	0.2106	0.0000	0.0000
48	1.8	0.1944	0.2074	0.0000	0.0000
49	2.5	0.2700	0.2043	0.0657	0.2594
50	2.6	0.2808	0.2013	0.0795	0.3141
51	2.8	0.3024	0.1983	0.1041	0.4114
52	2.9	0.3132	0.1953	0.1179	0.4658
53	3.4	0.3672	0.1923	0.1749	0.6908
54	3.4	0.3672	0.1894	0.1778	0.7023
55	2.3	0.2484	0.1865	0.0619	0.2444
56	2.3	0.2484	0.1837	0.0647	0.2556
57	2.7	0.2916	0.1809	0.1107	0.4373
58	2.6	0.2808	0.1781	0.1027	0.4056
59	2.6	0.2808	0.1754	0.1054	0.4163
60	2.5	0.2700	0.1727	0.0973	0.3843
61	2.4	0.2592	0.1701	0.0891	0.3521
62	2.3	0.2484	0.1675	0.0809	0.3197
63	1.9	0.2052	0.1649	0.0403	0.1592
64	1.9	0.2052	0.1624	0.0428	0.1691
65	0.4	0.0432	0.1599	0.0000	0.0000
66	0.4	0.0432	0.1575	0.0000	0.0000
67	0.3	0.0324	0.1551	0.0000	0.0000
68	0.3	0.0324	0.1527	0.0000	0.0000
69	0.5	0.0540	0.1504	0.0000	0.0000
70	0.5	0.0540	0.1482	0.0000	0.0000
71	0.5	0.0540	0.1460	0.0000	0.0000
72	0.4	0.0432	0.1438	0.0000	0.0000
73	0.4	0.0432	0.1417	0.0000	0.0000
74	0.4	0.0432	0.1396	0.0000	0.0000
75	0.3	0.0324	0.1376	0.0000	0.0000
76	0.2	0.0216	0.1356	0.0000	0.0000
77	0.3	0.0324	0.1337	0.0000	0.0000
78	0.4	0.0432	0.1319	0.0000	0.0000
79	0.3	0.0324	0.1301	0.0000	0.0000
80	0.2	0.0216	0.1283	0.0000	0.0000
81	0.3	0.0324	0.1266	0.0000	0.0000
82	0.3	0.0324	0.1250	0.0000	0.0000
83	0.3	0.0324	0.1234	0.0000	0.0000
84	0.2	0.0216	0.1219	0.0000	0.0000
85	0.3	0.0324	0.1205	0.0000	0.0000
86	0.2	0.0216	0.1191	0.0000	0.0000
87	0.3	0.0324	0.1178	0.0000	0.0000

88	0.2	0.0216	0.1166	0.0000	0.0000
89	0.3	0.0324	0.1154	0.0000	0.0000
90	0.2	0.0216	0.1143	0.0000	0.0000
91	0.2	0.0216	0.1133	0.0000	0.0000
92	0.2	0.0216	0.1124	0.0000	0.0000
93	0.2	0.0216	0.1117	0.0000	0.0000
94	0.2	0.0216	0.1110	0.0000	0.0000
95	0.2	0.0216	0.1104	0.0000	0.0000
96	0.2	0.0216	0.1101	0.0000	0.0000
	100			1.5200	

EFFECTIVE RAIN 0.3800 IN/HR

VOLUME 0.1251 AF
5,449 CF

Villa Siena
Area A Undeveloped Condition

area	3.95	[3]		0.0000	L
unit time	15	[5]		0.0000	Lca
LOSS RATE=F				#DIV/0!	H
F=Fp(1.00-0.9Ai)			0.03		n
Fp	0.22			#DIV/0!	Lag
Ai	0			15 min	Use
F	0.2200	[13]			
24 HR 10 YR	4.25	[10]			
C	0.0020				
Fm	0.1100				

[15] UNIT TIME PERIOD	[20] PATTERN PERCENT	[21] STORM RAIN 60[10][20]/100[5]	[22] LOSS RATE	[23] EFFECTIVE RAIN IN/HR [21]-[22]	[24] FLOW CFS [3][23]
1	0.2	0.0340	0.3885	0.0000	0.0000
2	0.3	0.0510	0.3840	0.0000	0.0000
3	0.3	0.0510	0.3795	0.0000	0.0000
4	0.4	0.0680	0.3750	0.0000	0.0000
5	0.3	0.0510	0.3706	0.0000	0.0000
6	0.3	0.0510	0.3662	0.0000	0.0000
7	0.3	0.0510	0.3618	0.0000	0.0000
8	0.4	0.0680	0.3575	0.0000	0.0000
9	0.4	0.0680	0.3532	0.0000	0.0000
10	0.4	0.0680	0.3489	0.0000	0.0000
11	0.5	0.0850	0.3446	0.0000	0.0000
12	0.5	0.0850	0.3404	0.0000	0.0000
13	0.5	0.0850	0.3362	0.0000	0.0000
14	0.5	0.0850	0.3320	0.0000	0.0000
15	0.5	0.0850	0.3278	0.0000	0.0000
16	0.6	0.1020	0.3237	0.0000	0.0000
17	0.6	0.1020	0.3196	0.0000	0.0000
18	0.7	0.1190	0.3155	0.0000	0.0000
19	0.7	0.1190	0.3115	0.0000	0.0000
20	0.8	0.1360	0.3075	0.0000	0.0000
21	0.6	0.1020	0.3035	0.0000	0.0000
22	0.7	0.1190	0.2995	0.0000	0.0000
23	0.8	0.1360	0.2956	0.0000	0.0000
24	0.8	0.1360	0.2917	0.0000	0.0000
25	0.9	0.1530	0.2878	0.0000	0.0000
26	0.9	0.1530	0.2840	0.0000	0.0000
27	1.0	0.1700	0.2802	0.0000	0.0000
28	1.0	0.1700	0.2764	0.0000	0.0000
29	1.0	0.1700	0.2726	0.0000	0.0000
30	1.1	0.1870	0.2689	0.0000	0.0000
31	1.2	0.2040	0.2652	0.0000	0.0000
32	1.3	0.2210	0.2616	0.0000	0.0000
33	1.5	0.2550	0.2579	0.0000	0.0000
34	1.5	0.2550	0.2544	0.0006	0.0026
35	1.6	0.2720	0.2508	0.0212	0.0838

36	1.7	0.2890	0.2473	0.0417	0.1649
37	1.9	0.3230	0.2438	0.0792	0.3130
38	2.0	0.3400	0.2403	0.0997	0.3939
39	2.1	0.3570	0.2369	0.1201	0.4746
40	2.2	0.3740	0.2334	0.1406	0.5552
41	1.5	0.2550	0.2301	0.0249	0.0984
42	1.5	0.2550	0.2267	0.0283	0.1116
43	2.0	0.3400	0.2234	0.1166	0.4604
44	2.0	0.3400	0.2202	0.1198	0.4733
45	1.9	0.3230	0.2169	0.1061	0.4190
46	1.9	0.3230	0.2137	0.1093	0.4316
47	1.7	0.2890	0.2106	0.0784	0.3098
48	1.8	0.3060	0.2074	0.0986	0.3893
49	2.5	0.4250	0.2043	0.2207	0.8716
50	2.6	0.4420	0.2013	0.2407	0.9509
51	2.8	0.4760	0.1983	0.2777	1.0971
52	2.9	0.4930	0.1953	0.2977	1.1761
53	3.4	0.5780	0.1923	0.3857	1.5235
54	3.4	0.5780	0.1894	0.3886	1.5350
55	2.3	0.3910	0.1865	0.2045	0.8077
56	2.3	0.3910	0.1837	0.2073	0.8189
57	2.7	0.4590	0.1809	0.2781	1.0986
58	2.6	0.4420	0.1781	0.2639	1.0423
59	2.6	0.4420	0.1754	0.2666	1.0531
60	2.5	0.4250	0.1727	0.2523	0.9965
61	2.4	0.4080	0.1701	0.2379	0.9398
62	2.3	0.3910	0.1675	0.2235	0.8830
63	1.9	0.3230	0.1649	0.1581	0.6245
64	1.9	0.3230	0.1624	0.1606	0.6344
65	0.4	0.0680	0.1599	0.0000	0.0000
66	0.4	0.0680	0.1575	0.0000	0.0000
67	0.3	0.0510	0.1551	0.0000	0.0000
68	0.3	0.0510	0.1527	0.0000	0.0000
69	0.5	0.0850	0.1504	0.0000	0.0000
70	0.5	0.0850	0.1482	0.0000	0.0000
71	0.5	0.0850	0.1460	0.0000	0.0000
72	0.4	0.0680	0.1438	0.0000	0.0000
73	0.4	0.0680	0.1417	0.0000	0.0000
74	0.4	0.0680	0.1396	0.0000	0.0000
75	0.3	0.0510	0.1376	0.0000	0.0000
76	0.2	0.0340	0.1356	0.0000	0.0000
77	0.3	0.0510	0.1337	0.0000	0.0000
78	0.4	0.0680	0.1319	0.0000	0.0000
79	0.3	0.0510	0.1301	0.0000	0.0000
80	0.2	0.0340	0.1283	0.0000	0.0000
81	0.3	0.0510	0.1266	0.0000	0.0000
82	0.3	0.0510	0.1250	0.0000	0.0000
83	0.3	0.0510	0.1234	0.0000	0.0000
84	0.2	0.0340	0.1219	0.0000	0.0000
85	0.3	0.0510	0.1205	0.0000	0.0000
86	0.2	0.0340	0.1191	0.0000	0.0000
87	0.3	0.0510	0.1178	0.0000	0.0000

88	0.2	0.0340	0.1166	0.0000	0.0000
89	0.3	0.0510	0.1154	0.0000	0.0000
90	0.2	0.0340	0.1143	0.0000	0.0000
91	0.2	0.0340	0.1133	0.0000	0.0000
92	0.2	0.0340	0.1124	0.0000	0.0000
93	0.2	0.0340	0.1117	0.0000	0.0000
94	0.2	0.0340	0.1110	0.0000	0.0000
95	0.2	0.0340	0.1104	0.0000	0.0000
96	0.2	0.0340	0.1101	0.0000	0.0000
	100			5.2492	

EFFECTIVE RAIN 1.3123 IN/HR

VOLUME 0.4320 AF
18,816 CF

Villa Siena
Area B Undeveloped Condition

area	2.63	[3]		0.0000	L
unit time	15	[5]		0.0000	Lca
LOSS RATE=F				#DIV/0!	H
F=Fp(1.00-0.9Ai)			0.015		n
Fp	0.22			#DIV/0!	Lag
Ai	0			15 min	Use
F	0.2200	[13]			
24 HR 2 YR	2.7	[10]			
C	0.0020				
Fm	0.1100				

[15] UNIT TIME PERIOD	[20] PATTERN PERCENT	[21] STORM RAIN 60[10][20]/100[5]	[22] LOSS RATE	[23] EFFECTIVE RAIN IN/HR [21]-[22]	[24] FLOW CFS [3][23]
1	0.2	0.0216	0.3885	0.0000	0.0000
2	0.3	0.0324	0.3840	0.0000	0.0000
3	0.3	0.0324	0.3795	0.0000	0.0000
4	0.4	0.0432	0.3750	0.0000	0.0000
5	0.3	0.0324	0.3706	0.0000	0.0000
6	0.3	0.0324	0.3662	0.0000	0.0000
7	0.3	0.0324	0.3618	0.0000	0.0000
8	0.4	0.0432	0.3575	0.0000	0.0000
9	0.4	0.0432	0.3532	0.0000	0.0000
10	0.4	0.0432	0.3489	0.0000	0.0000
11	0.5	0.0540	0.3446	0.0000	0.0000
12	0.5	0.0540	0.3404	0.0000	0.0000
13	0.5	0.0540	0.3362	0.0000	0.0000
14	0.5	0.0540	0.3320	0.0000	0.0000
15	0.5	0.0540	0.3278	0.0000	0.0000
16	0.6	0.0648	0.3237	0.0000	0.0000
17	0.6	0.0648	0.3196	0.0000	0.0000
18	0.7	0.0756	0.3155	0.0000	0.0000
19	0.7	0.0756	0.3115	0.0000	0.0000
20	0.8	0.0864	0.3075	0.0000	0.0000
21	0.6	0.0648	0.3035	0.0000	0.0000
22	0.7	0.0756	0.2995	0.0000	0.0000
23	0.8	0.0864	0.2956	0.0000	0.0000
24	0.8	0.0864	0.2917	0.0000	0.0000
25	0.9	0.0972	0.2878	0.0000	0.0000
26	0.9	0.0972	0.2840	0.0000	0.0000
27	1.0	0.1080	0.2802	0.0000	0.0000
28	1.0	0.1080	0.2764	0.0000	0.0000
29	1.0	0.1080	0.2726	0.0000	0.0000
30	1.1	0.1188	0.2689	0.0000	0.0000
31	1.2	0.1296	0.2652	0.0000	0.0000
32	1.3	0.1404	0.2616	0.0000	0.0000
33	1.5	0.1620	0.2579	0.0000	0.0000
34	1.5	0.1620	0.2544	0.0000	0.0000
35	1.6	0.1728	0.2508	0.0000	0.0000

36	1.7	0.1836	0.2473	0.0000	0.0000
37	1.9	0.2052	0.2438	0.0000	0.0000
38	2.0	0.2160	0.2403	0.0000	0.0000
39	2.1	0.2268	0.2369	0.0000	0.0000
40	2.2	0.2376	0.2334	0.0042	0.0109
41	1.5	0.1620	0.2301	0.0000	0.0000
42	1.5	0.1620	0.2267	0.0000	0.0000
43	2.0	0.2160	0.2234	0.0000	0.0000
44	2.0	0.2160	0.2202	0.0000	0.0000
45	1.9	0.2052	0.2169	0.0000	0.0000
46	1.9	0.2052	0.2137	0.0000	0.0000
47	1.7	0.1836	0.2106	0.0000	0.0000
48	1.8	0.1944	0.2074	0.0000	0.0000
49	2.5	0.2700	0.2043	0.0657	0.1727
50	2.6	0.2808	0.2013	0.0795	0.2091
51	2.8	0.3024	0.1983	0.1041	0.2739
52	2.9	0.3132	0.1953	0.1179	0.3102
53	3.4	0.3672	0.1923	0.1749	0.4600
54	3.4	0.3672	0.1894	0.1778	0.4676
55	2.3	0.2484	0.1865	0.0619	0.1627
56	2.3	0.2484	0.1837	0.0647	0.1702
57	2.7	0.2916	0.1809	0.1107	0.2912
58	2.6	0.2808	0.1781	0.1027	0.2701
59	2.6	0.2808	0.1754	0.1054	0.2772
60	2.5	0.2700	0.1727	0.0973	0.2559
61	2.4	0.2592	0.1701	0.0891	0.2344
62	2.3	0.2484	0.1675	0.0809	0.2129
63	1.9	0.2052	0.1649	0.0403	0.1060
64	1.9	0.2052	0.1624	0.0428	0.1126
65	0.4	0.0432	0.1599	0.0000	0.0000
66	0.4	0.0432	0.1575	0.0000	0.0000
67	0.3	0.0324	0.1551	0.0000	0.0000
68	0.3	0.0324	0.1527	0.0000	0.0000
69	0.5	0.0540	0.1504	0.0000	0.0000
70	0.5	0.0540	0.1482	0.0000	0.0000
71	0.5	0.0540	0.1460	0.0000	0.0000
72	0.4	0.0432	0.1438	0.0000	0.0000
73	0.4	0.0432	0.1417	0.0000	0.0000
74	0.4	0.0432	0.1396	0.0000	0.0000
75	0.3	0.0324	0.1376	0.0000	0.0000
76	0.2	0.0216	0.1356	0.0000	0.0000
77	0.3	0.0324	0.1337	0.0000	0.0000
78	0.4	0.0432	0.1319	0.0000	0.0000
79	0.3	0.0324	0.1301	0.0000	0.0000
80	0.2	0.0216	0.1283	0.0000	0.0000
81	0.3	0.0324	0.1266	0.0000	0.0000
82	0.3	0.0324	0.1250	0.0000	0.0000
83	0.3	0.0324	0.1234	0.0000	0.0000
84	0.2	0.0216	0.1219	0.0000	0.0000
85	0.3	0.0324	0.1205	0.0000	0.0000
86	0.2	0.0216	0.1191	0.0000	0.0000
87	0.3	0.0324	0.1178	0.0000	0.0000

88	0.2	0.0216	0.1166	0.0000	0.0000
89	0.3	0.0324	0.1154	0.0000	0.0000
90	0.2	0.0216	0.1143	0.0000	0.0000
91	0.2	0.0216	0.1133	0.0000	0.0000
92	0.2	0.0216	0.1124	0.0000	0.0000
93	0.2	0.0216	0.1117	0.0000	0.0000
94	0.2	0.0216	0.1110	0.0000	0.0000
95	0.2	0.0216	0.1104	0.0000	0.0000
96	0.2	0.0216	0.1101	0.0000	0.0000
	100			1.5200	

EFFECTIVE RAIN 0.3800 IN/HR

VOLUME 0.0833 AF
3,628 CF

Villa Siena
Area B Undeveloped Condition

area	2.63	[3]		0.0000	L
unit time	15	[5]		0.0000	Lca
LOSS RATE=F				#DIV/0!	H
F=Fp(1.00-0.9Ai)			0.03		n
Fp	0.22			#DIV/0!	Lag
Ai	0			15 min	Use
F	0.2200	[13]			
24 HR 10 YR	4.25	[10]			
C	0.0020				
Fm	0.1100				

[15] UNIT TIME PERIOD	[20] PATTERN PERCENT	[21] STORM RAIN 60[10][20]/100[5]	[22] LOSS RATE	[23] EFFECTIVE RAIN IN/HR [21]-[22]	[24] FLOW CFS [3][23]
1	0.2	0.0340	0.3885	0.0000	0.0000
2	0.3	0.0510	0.3840	0.0000	0.0000
3	0.3	0.0510	0.3795	0.0000	0.0000
4	0.4	0.0680	0.3750	0.0000	0.0000
5	0.3	0.0510	0.3706	0.0000	0.0000
6	0.3	0.0510	0.3662	0.0000	0.0000
7	0.3	0.0510	0.3618	0.0000	0.0000
8	0.4	0.0680	0.3575	0.0000	0.0000
9	0.4	0.0680	0.3532	0.0000	0.0000
10	0.4	0.0680	0.3489	0.0000	0.0000
11	0.5	0.0850	0.3446	0.0000	0.0000
12	0.5	0.0850	0.3404	0.0000	0.0000
13	0.5	0.0850	0.3362	0.0000	0.0000
14	0.5	0.0850	0.3320	0.0000	0.0000
15	0.5	0.0850	0.3278	0.0000	0.0000
16	0.6	0.1020	0.3237	0.0000	0.0000
17	0.6	0.1020	0.3196	0.0000	0.0000
18	0.7	0.1190	0.3155	0.0000	0.0000
19	0.7	0.1190	0.3115	0.0000	0.0000
20	0.8	0.1360	0.3075	0.0000	0.0000
21	0.6	0.1020	0.3035	0.0000	0.0000
22	0.7	0.1190	0.2995	0.0000	0.0000
23	0.8	0.1360	0.2956	0.0000	0.0000
24	0.8	0.1360	0.2917	0.0000	0.0000
25	0.9	0.1530	0.2878	0.0000	0.0000
26	0.9	0.1530	0.2840	0.0000	0.0000
27	1.0	0.1700	0.2802	0.0000	0.0000
28	1.0	0.1700	0.2764	0.0000	0.0000
29	1.0	0.1700	0.2726	0.0000	0.0000
30	1.1	0.1870	0.2689	0.0000	0.0000
31	1.2	0.2040	0.2652	0.0000	0.0000
32	1.3	0.2210	0.2616	0.0000	0.0000
33	1.5	0.2550	0.2579	0.0000	0.0000
34	1.5	0.2550	0.2544	0.0006	0.0017
35	1.6	0.2720	0.2508	0.0212	0.0558
36	1.7	0.2890	0.2473	0.0417	0.1098
37	1.9	0.3230	0.2438	0.0792	0.2084
38	2.0	0.3400	0.2403	0.0997	0.2622

39	2.1	0.3570	0.2369	0.1201	0.3160
40	2.2	0.3740	0.2334	0.1406	0.3697
41	1.5	0.2550	0.2301	0.0249	0.0655
42	1.5	0.2550	0.2267	0.0283	0.0743
43	2.0	0.3400	0.2234	0.1166	0.3066
44	2.0	0.3400	0.2202	0.1198	0.3152
45	1.9	0.3230	0.2169	0.1061	0.2790
46	1.9	0.3230	0.2137	0.1093	0.2874
47	1.7	0.2890	0.2106	0.0784	0.2063
48	1.8	0.3060	0.2074	0.0986	0.2592
49	2.5	0.4250	0.2043	0.2207	0.5803
50	2.6	0.4420	0.2013	0.2407	0.6331
51	2.8	0.4760	0.1983	0.2777	0.7305
52	2.9	0.4930	0.1953	0.2977	0.7830
53	3.4	0.5780	0.1923	0.3857	1.0144
54	3.4	0.5780	0.1894	0.3886	1.0220
55	2.3	0.3910	0.1865	0.2045	0.5378
56	2.3	0.3910	0.1837	0.2073	0.5452
57	2.7	0.4590	0.1809	0.2781	0.7315
58	2.6	0.4420	0.1781	0.2639	0.6940
59	2.6	0.4420	0.1754	0.2666	0.7012
60	2.5	0.4250	0.1727	0.2523	0.6635
61	2.4	0.4080	0.1701	0.2379	0.6258
62	2.3	0.3910	0.1675	0.2235	0.5879
63	1.9	0.3230	0.1649	0.1581	0.4158
64	1.9	0.3230	0.1624	0.1606	0.4224
65	0.4	0.0680	0.1599	0.0000	0.0000
66	0.4	0.0680	0.1575	0.0000	0.0000
67	0.3	0.0510	0.1551	0.0000	0.0000
68	0.3	0.0510	0.1527	0.0000	0.0000
69	0.5	0.0850	0.1504	0.0000	0.0000
70	0.5	0.0850	0.1482	0.0000	0.0000
71	0.5	0.0850	0.1460	0.0000	0.0000
72	0.4	0.0680	0.1438	0.0000	0.0000
73	0.4	0.0680	0.1417	0.0000	0.0000
74	0.4	0.0680	0.1396	0.0000	0.0000
75	0.3	0.0510	0.1376	0.0000	0.0000
76	0.2	0.0340	0.1356	0.0000	0.0000
77	0.3	0.0510	0.1337	0.0000	0.0000
78	0.4	0.0680	0.1319	0.0000	0.0000
79	0.3	0.0510	0.1301	0.0000	0.0000
80	0.2	0.0340	0.1283	0.0000	0.0000
81	0.3	0.0510	0.1266	0.0000	0.0000
82	0.3	0.0510	0.1250	0.0000	0.0000
83	0.3	0.0510	0.1234	0.0000	0.0000
84	0.2	0.0340	0.1219	0.0000	0.0000
85	0.3	0.0510	0.1205	0.0000	0.0000
86	0.2	0.0340	0.1191	0.0000	0.0000
87	0.3	0.0510	0.1178	0.0000	0.0000
88	0.2	0.0340	0.1166	0.0000	0.0000
89	0.3	0.0510	0.1154	0.0000	0.0000
90	0.2	0.0340	0.1143	0.0000	0.0000
91	0.2	0.0340	0.1133	0.0000	0.0000
92	0.2	0.0340	0.1124	0.0000	0.0000
93	0.2	0.0340	0.1117	0.0000	0.0000

94	0.2	0.0340	0.1110	0.0000	0.0000
95	0.2	0.0340	0.1104	0.0000	0.0000
96	0.2	0.0340	0.1101	0.0000	0.0000
	100			5.2492	

EFFECTIVE RAIN 1.3123 IN/HR

VOLUME 0.2876 AF
12,528 CF

Villa Siena
Area C Undeveloped Condition

area	1.22	[3]		0.0000	L
unit time	15	[5]		0.0000	Lca
LOSS RATE=F				#DIV/0!	H
F=Fp(1.00-0.9Ai)			0.015		n
Fp	0.22			#DIV/0!	Lag
Ai	0			15 min	Use
F	0.2200	[13]			
24 HR 2 YR	2.7	[10]			
C	0.0020				
Fm	0.1100				

[15] UNIT TIME PERIOD	[20] PATTERN PERCENT	[21] STORM RAIN 60[10][20]/100[5]	[22] LOSS RATE	[23] EFFECTIVE RAIN IN/HR [21]-[22]	[24] FLOW CFS [3][23]
1	0.2	0.0216	0.3885	0.0000	0.0000
2	0.3	0.0324	0.3840	0.0000	0.0000
3	0.3	0.0324	0.3795	0.0000	0.0000
4	0.4	0.0432	0.3750	0.0000	0.0000
5	0.3	0.0324	0.3706	0.0000	0.0000
6	0.3	0.0324	0.3662	0.0000	0.0000
7	0.3	0.0324	0.3618	0.0000	0.0000
8	0.4	0.0432	0.3575	0.0000	0.0000
9	0.4	0.0432	0.3532	0.0000	0.0000
10	0.4	0.0432	0.3489	0.0000	0.0000
11	0.5	0.0540	0.3446	0.0000	0.0000
12	0.5	0.0540	0.3404	0.0000	0.0000
13	0.5	0.0540	0.3362	0.0000	0.0000
14	0.5	0.0540	0.3320	0.0000	0.0000
15	0.5	0.0540	0.3278	0.0000	0.0000
16	0.6	0.0648	0.3237	0.0000	0.0000
17	0.6	0.0648	0.3196	0.0000	0.0000
18	0.7	0.0756	0.3155	0.0000	0.0000
19	0.7	0.0756	0.3115	0.0000	0.0000
20	0.8	0.0864	0.3075	0.0000	0.0000
21	0.6	0.0648	0.3035	0.0000	0.0000
22	0.7	0.0756	0.2995	0.0000	0.0000
23	0.8	0.0864	0.2956	0.0000	0.0000
24	0.8	0.0864	0.2917	0.0000	0.0000
25	0.9	0.0972	0.2878	0.0000	0.0000
26	0.9	0.0972	0.2840	0.0000	0.0000
27	1.0	0.1080	0.2802	0.0000	0.0000
28	1.0	0.1080	0.2764	0.0000	0.0000
29	1.0	0.1080	0.2726	0.0000	0.0000
30	1.1	0.1188	0.2689	0.0000	0.0000
31	1.2	0.1296	0.2652	0.0000	0.0000
32	1.3	0.1404	0.2616	0.0000	0.0000
33	1.5	0.1620	0.2579	0.0000	0.0000
34	1.5	0.1620	0.2544	0.0000	0.0000
35	1.6	0.1728	0.2508	0.0000	0.0000
36	1.7	0.1836	0.2473	0.0000	0.0000
37	1.9	0.2052	0.2438	0.0000	0.0000
38	2.0	0.2160	0.2403	0.0000	0.0000

39	2.1	0.2268	0.2369	0.0000	0.0000
40	2.2	0.2376	0.2334	0.0042	0.0051
41	1.5	0.1620	0.2301	0.0000	0.0000
42	1.5	0.1620	0.2267	0.0000	0.0000
43	2.0	0.2160	0.2234	0.0000	0.0000
44	2.0	0.2160	0.2202	0.0000	0.0000
45	1.9	0.2052	0.2169	0.0000	0.0000
46	1.9	0.2052	0.2137	0.0000	0.0000
47	1.7	0.1836	0.2106	0.0000	0.0000
48	1.8	0.1944	0.2074	0.0000	0.0000
49	2.5	0.2700	0.2043	0.0657	0.0801
50	2.6	0.2808	0.2013	0.0795	0.0970
51	2.8	0.3024	0.1983	0.1041	0.1271
52	2.9	0.3132	0.1953	0.1179	0.1439
53	3.4	0.3672	0.1923	0.1749	0.2134
54	3.4	0.3672	0.1894	0.1778	0.2169
55	2.3	0.2484	0.1865	0.0619	0.0755
56	2.3	0.2484	0.1837	0.0647	0.0790
57	2.7	0.2916	0.1809	0.1107	0.1351
58	2.6	0.2808	0.1781	0.1027	0.1253
59	2.6	0.2808	0.1754	0.1054	0.1286
60	2.5	0.2700	0.1727	0.0973	0.1187
61	2.4	0.2592	0.1701	0.0891	0.1087
62	2.3	0.2484	0.1675	0.0809	0.0987
63	1.9	0.2052	0.1649	0.0403	0.0492
64	1.9	0.2052	0.1624	0.0428	0.0522
65	0.4	0.0432	0.1599	0.0000	0.0000
66	0.4	0.0432	0.1575	0.0000	0.0000
67	0.3	0.0324	0.1551	0.0000	0.0000
68	0.3	0.0324	0.1527	0.0000	0.0000
69	0.5	0.0540	0.1504	0.0000	0.0000
70	0.5	0.0540	0.1482	0.0000	0.0000
71	0.5	0.0540	0.1460	0.0000	0.0000
72	0.4	0.0432	0.1438	0.0000	0.0000
73	0.4	0.0432	0.1417	0.0000	0.0000
74	0.4	0.0432	0.1396	0.0000	0.0000
75	0.3	0.0324	0.1376	0.0000	0.0000
76	0.2	0.0216	0.1356	0.0000	0.0000
77	0.3	0.0324	0.1337	0.0000	0.0000
78	0.4	0.0432	0.1319	0.0000	0.0000
79	0.3	0.0324	0.1301	0.0000	0.0000
80	0.2	0.0216	0.1283	0.0000	0.0000
81	0.3	0.0324	0.1266	0.0000	0.0000
82	0.3	0.0324	0.1250	0.0000	0.0000
83	0.3	0.0324	0.1234	0.0000	0.0000
84	0.2	0.0216	0.1219	0.0000	0.0000
85	0.3	0.0324	0.1205	0.0000	0.0000
86	0.2	0.0216	0.1191	0.0000	0.0000
87	0.3	0.0324	0.1178	0.0000	0.0000
88	0.2	0.0216	0.1166	0.0000	0.0000
89	0.3	0.0324	0.1154	0.0000	0.0000
90	0.2	0.0216	0.1143	0.0000	0.0000
91	0.2	0.0216	0.1133	0.0000	0.0000
92	0.2	0.0216	0.1124	0.0000	0.0000
93	0.2	0.0216	0.1117	0.0000	0.0000

94	0.2	0.0216	0.1110	0.0000	0.0000
95	0.2	0.0216	0.1104	0.0000	0.0000
96	0.2	0.0216	0.1101	0.0000	0.0000
	100			1.5200	

EFFECTIVE RAIN 0.3800 IN/HR

VOLUME 0.0386 AF
1,683 CF

Villa Siena
Area C Undeveloped Condition

area	1.22	[3]		0.0000	L
unit time	15	[5]		0.0000	Lca
LOSS RATE=F				#DIV/0!	H
F=Fp(1.00-0.9Ai)			0.03		n
Fp	0.22			#DIV/0!	Lag
Ai	0			15 min	Use
F	0.2200	[13]			
24 HR 10 YR	4.25	[10]			
C	0.0020				
Fm	0.1100				

[15] UNIT TIME PERIOD	[20] PATTERN PERCENT	[21] STORM RAIN 60[10][20]/100[5]	[22] LOSS RATE	[23] EFFECTIVE RAIN IN/HR [21]-[22]	[24] FLOW CFS [3][23]
1	0.2	0.0340	0.3885	0.0000	0.0000
2	0.3	0.0510	0.3840	0.0000	0.0000
3	0.3	0.0510	0.3795	0.0000	0.0000
4	0.4	0.0680	0.3750	0.0000	0.0000
5	0.3	0.0510	0.3706	0.0000	0.0000
6	0.3	0.0510	0.3662	0.0000	0.0000
7	0.3	0.0510	0.3618	0.0000	0.0000
8	0.4	0.0680	0.3575	0.0000	0.0000
9	0.4	0.0680	0.3532	0.0000	0.0000
10	0.4	0.0680	0.3489	0.0000	0.0000
11	0.5	0.0850	0.3446	0.0000	0.0000
12	0.5	0.0850	0.3404	0.0000	0.0000
13	0.5	0.0850	0.3362	0.0000	0.0000
14	0.5	0.0850	0.3320	0.0000	0.0000
15	0.5	0.0850	0.3278	0.0000	0.0000
16	0.6	0.1020	0.3237	0.0000	0.0000
17	0.6	0.1020	0.3196	0.0000	0.0000
18	0.7	0.1190	0.3155	0.0000	0.0000
19	0.7	0.1190	0.3115	0.0000	0.0000
20	0.8	0.1360	0.3075	0.0000	0.0000
21	0.6	0.1020	0.3035	0.0000	0.0000
22	0.7	0.1190	0.2995	0.0000	0.0000
23	0.8	0.1360	0.2956	0.0000	0.0000
24	0.8	0.1360	0.2917	0.0000	0.0000
25	0.9	0.1530	0.2878	0.0000	0.0000
26	0.9	0.1530	0.2840	0.0000	0.0000
27	1.0	0.1700	0.2802	0.0000	0.0000
28	1.0	0.1700	0.2764	0.0000	0.0000
29	1.0	0.1700	0.2726	0.0000	0.0000
30	1.1	0.1870	0.2689	0.0000	0.0000
31	1.2	0.2040	0.2652	0.0000	0.0000
32	1.3	0.2210	0.2616	0.0000	0.0000
33	1.5	0.2550	0.2579	0.0000	0.0000
34	1.5	0.2550	0.2544	0.0006	0.0008
35	1.6	0.2720	0.2508	0.0212	0.0259
36	1.7	0.2890	0.2473	0.0417	0.0509
37	1.9	0.3230	0.2438	0.0792	0.0967
38	2.0	0.3400	0.2403	0.0997	0.1217

39	2.1	0.3570	0.2369	0.1201	0.1466
40	2.2	0.3740	0.2334	0.1406	0.1715
41	1.5	0.2550	0.2301	0.0249	0.0304
42	1.5	0.2550	0.2267	0.0283	0.0345
43	2.0	0.3400	0.2234	0.1166	0.1422
44	2.0	0.3400	0.2202	0.1198	0.1462
45	1.9	0.3230	0.2169	0.1061	0.1294
46	1.9	0.3230	0.2137	0.1093	0.1333
47	1.7	0.2890	0.2106	0.0784	0.0957
48	1.8	0.3060	0.2074	0.0986	0.1203
49	2.5	0.4250	0.2043	0.2207	0.2692
50	2.6	0.4420	0.2013	0.2407	0.2937
51	2.8	0.4760	0.1983	0.2777	0.3389
52	2.9	0.4930	0.1953	0.2977	0.3632
53	3.4	0.5780	0.1923	0.3857	0.4705
54	3.4	0.5780	0.1894	0.3886	0.4741
55	2.3	0.3910	0.1865	0.2045	0.2495
56	2.3	0.3910	0.1837	0.2073	0.2529
57	2.7	0.4590	0.1809	0.2781	0.3393
58	2.6	0.4420	0.1781	0.2639	0.3219
59	2.6	0.4420	0.1754	0.2666	0.3253
60	2.5	0.4250	0.1727	0.2523	0.3078
61	2.4	0.4080	0.1701	0.2379	0.2903
62	2.3	0.3910	0.1675	0.2235	0.2727
63	1.9	0.3230	0.1649	0.1581	0.1929
64	1.9	0.3230	0.1624	0.1606	0.1959
65	0.4	0.0680	0.1599	0.0000	0.0000
66	0.4	0.0680	0.1575	0.0000	0.0000
67	0.3	0.0510	0.1551	0.0000	0.0000
68	0.3	0.0510	0.1527	0.0000	0.0000
69	0.5	0.0850	0.1504	0.0000	0.0000
70	0.5	0.0850	0.1482	0.0000	0.0000
71	0.5	0.0850	0.1460	0.0000	0.0000
72	0.4	0.0680	0.1438	0.0000	0.0000
73	0.4	0.0680	0.1417	0.0000	0.0000
74	0.4	0.0680	0.1396	0.0000	0.0000
75	0.3	0.0510	0.1376	0.0000	0.0000
76	0.2	0.0340	0.1356	0.0000	0.0000
77	0.3	0.0510	0.1337	0.0000	0.0000
78	0.4	0.0680	0.1319	0.0000	0.0000
79	0.3	0.0510	0.1301	0.0000	0.0000
80	0.2	0.0340	0.1283	0.0000	0.0000
81	0.3	0.0510	0.1266	0.0000	0.0000
82	0.3	0.0510	0.1250	0.0000	0.0000
83	0.3	0.0510	0.1234	0.0000	0.0000
84	0.2	0.0340	0.1219	0.0000	0.0000
85	0.3	0.0510	0.1205	0.0000	0.0000
86	0.2	0.0340	0.1191	0.0000	0.0000
87	0.3	0.0510	0.1178	0.0000	0.0000
88	0.2	0.0340	0.1166	0.0000	0.0000
89	0.3	0.0510	0.1154	0.0000	0.0000
90	0.2	0.0340	0.1143	0.0000	0.0000
91	0.2	0.0340	0.1133	0.0000	0.0000
92	0.2	0.0340	0.1124	0.0000	0.0000
93	0.2	0.0340	0.1117	0.0000	0.0000

94	0.2	0.0340	0.1110	0.0000	0.0000
95	0.2	0.0340	0.1104	0.0000	0.0000
96	0.2	0.0340	0.1101	0.0000	0.0000
	100			5.2492	

EFFECTIVE RAIN 1.3123 IN/HR

VOLUME 0.1334 AF
5,812 CF

Section 2

Developed Hydrograph Studies

Villa Siena
Area A Developed Condition

area	3.36	[3]		0.0000	L
unit time	15	[5]		0.0000	Lca
LOSS RATE=F				#DIV/0!	H
F=Fp(1.00-0.9Ai)			0.015		n
Fp	0.44			#DIV/0!	Lag
Ai	0.75			15 min	Use
F	0.1430	[13]			
24 HR 2 YR	2.7	[10]			
C	0.0013				
Fm	0.0715				

[15] UNIT TIME PERIOD	[20] PATTERN PERCENT	[21] STORM RAIN 60[10][20]/100[5]	[22] LOSS RATE	[23] EFFECTIVE RAIN IN/HR [21]-[22]	[24] FLOW CFS [3][23]
1	0.2	0.0216	0.2525	0.0000	0.0000
2	0.3	0.0324	0.2496	0.0000	0.0000
3	0.3	0.0324	0.2467	0.0000	0.0000
4	0.4	0.0432	0.2438	0.0000	0.0000
5	0.3	0.0324	0.2409	0.0000	0.0000
6	0.3	0.0324	0.2380	0.0000	0.0000
7	0.3	0.0324	0.2352	0.0000	0.0000
8	0.4	0.0432	0.2324	0.0000	0.0000
9	0.4	0.0432	0.2296	0.0000	0.0000
10	0.4	0.0432	0.2268	0.0000	0.0000
11	0.5	0.0540	0.2240	0.0000	0.0000
12	0.5	0.0540	0.2212	0.0000	0.0000
13	0.5	0.0540	0.2185	0.0000	0.0000
14	0.5	0.0540	0.2158	0.0000	0.0000
15	0.5	0.0540	0.2131	0.0000	0.0000
16	0.6	0.0648	0.2104	0.0000	0.0000
17	0.6	0.0648	0.2077	0.0000	0.0000
18	0.7	0.0756	0.2051	0.0000	0.0000
19	0.7	0.0756	0.2025	0.0000	0.0000
20	0.8	0.0864	0.1998	0.0000	0.0000
21	0.6	0.0648	0.1973	0.0000	0.0000
22	0.7	0.0756	0.1947	0.0000	0.0000
23	0.8	0.0864	0.1921	0.0000	0.0000
24	0.8	0.0864	0.1896	0.0000	0.0000
25	0.9	0.0972	0.1871	0.0000	0.0000
26	0.9	0.0972	0.1846	0.0000	0.0000
27	1.0	0.1080	0.1821	0.0000	0.0000
28	1.0	0.1080	0.1797	0.0000	0.0000
29	1.0	0.1080	0.1772	0.0000	0.0000
30	1.1	0.1188	0.1748	0.0000	0.0000
31	1.2	0.1296	0.1724	0.0000	0.0000
32	1.3	0.1404	0.1700	0.0000	0.0000
33	1.5	0.1620	0.1677	0.0000	0.0000
34	1.5	0.1620	0.1653	0.0000	0.0000
35	1.6	0.1728	0.1630	0.0098	0.0329

36	1.7	0.1836	0.1607	0.0229	0.0769
37	1.9	0.2052	0.1584	0.0468	0.1571
38	2.0	0.2160	0.1562	0.0598	0.2010
39	2.1	0.2268	0.1540	0.0728	0.2448
40	2.2	0.2376	0.1517	0.0859	0.2885
41	1.5	0.1620	0.1496	0.0124	0.0418
42	1.5	0.1620	0.1474	0.0146	0.0491
43	2.0	0.2160	0.1452	0.0708	0.2378
44	2.0	0.2160	0.1431	0.0729	0.2449
45	1.9	0.2052	0.1410	0.0642	0.2157
46	1.9	0.2052	0.1389	0.0663	0.2227
47	1.7	0.1836	0.1369	0.0467	0.1570
48	1.8	0.1944	0.1348	0.0596	0.2002
49	2.5	0.2700	0.1328	0.1372	0.4609
50	2.6	0.2808	0.1308	0.1500	0.5039
51	2.8	0.3024	0.1289	0.1735	0.5831
52	2.9	0.3132	0.1269	0.1863	0.6259
53	3.4	0.3672	0.1250	0.2422	0.8138
54	3.4	0.3672	0.1231	0.2441	0.8201
55	2.3	0.2484	0.1212	0.1272	0.4273
56	2.3	0.2484	0.1194	0.1290	0.4335
57	2.7	0.2916	0.1176	0.1740	0.5847
58	2.6	0.2808	0.1158	0.1650	0.5545
59	2.6	0.2808	0.1140	0.1668	0.5604
60	2.5	0.2700	0.1123	0.1577	0.5300
61	2.4	0.2592	0.1105	0.1487	0.4995
62	2.3	0.2484	0.1089	0.1395	0.4689
63	1.9	0.2052	0.1072	0.0980	0.3293
64	1.9	0.2052	0.1056	0.0996	0.3348
65	0.4	0.0432	0.1039	0.0000	0.0000
66	0.4	0.0432	0.1024	0.0000	0.0000
67	0.3	0.0324	0.1008	0.0000	0.0000
68	0.3	0.0324	0.0993	0.0000	0.0000
69	0.5	0.0540	0.0978	0.0000	0.0000
70	0.5	0.0540	0.0963	0.0000	0.0000
71	0.5	0.0540	0.0949	0.0000	0.0000
72	0.4	0.0432	0.0935	0.0000	0.0000
73	0.4	0.0432	0.0921	0.0000	0.0000
74	0.4	0.0432	0.0908	0.0000	0.0000
75	0.3	0.0324	0.0894	0.0000	0.0000
76	0.2	0.0216	0.0882	0.0000	0.0000
77	0.3	0.0324	0.0869	0.0000	0.0000
78	0.4	0.0432	0.0857	0.0000	0.0000
79	0.3	0.0324	0.0845	0.0000	0.0000
80	0.2	0.0216	0.0834	0.0000	0.0000
81	0.3	0.0324	0.0823	0.0000	0.0000
82	0.3	0.0324	0.0812	0.0000	0.0000
83	0.3	0.0324	0.0802	0.0000	0.0000
84	0.2	0.0216	0.0792	0.0000	0.0000
85	0.3	0.0324	0.0783	0.0000	0.0000
86	0.2	0.0216	0.0774	0.0000	0.0000
87	0.3	0.0324	0.0766	0.0000	0.0000

88	0.2	0.0216	0.0758	0.0000	0.0000
89	0.3	0.0324	0.0750	0.0000	0.0000
90	0.2	0.0216	0.0743	0.0000	0.0000
91	0.2	0.0216	0.0737	0.0000	0.0000
92	0.2	0.0216	0.0731	0.0000	0.0000
93	0.2	0.0216	0.0726	0.0000	0.0000
94	0.2	0.0216	0.0721	0.0000	0.0000
95	0.2	0.0216	0.0718	0.0000	0.0000
96	0.2	0.0216	0.0716	0.0000	0.0000
	100			3.2443	

EFFECTIVE RAIN 0.8111 IN/HR

VOLUME 0.2271 AF
9,893 CF

Villa Siena
Area A Developed Condition

area	3.36	[3]		0.0000	L
unit time	15	[5]		0.0000	Lca
LOSS RATE=F				#DIV/0!	H
F=Fp(1.00-0.9Ai)			0.015		n
Fp	0.44			#DIV/0!	Lag
Ai	0.75			15 min	Use
F	0.1430	[13]			
24 HR 2 YR	4.25	[10]			
C	0.0013				
Fm	0.0715				

[15] UNIT TIME PERIOD	[20] PATTERN PERCENT	[21] STORM RAIN 60[10][20]/100[5]	[22] LOSS RATE	[23] EFFECTIVE RAIN IN/HR [21]-[22]	[24] FLOW CFS [3][23]
1	0.2	0.0340	0.2525	0.0000	0.0000
2	0.3	0.0510	0.2496	0.0000	0.0000
3	0.3	0.0510	0.2467	0.0000	0.0000
4	0.4	0.0680	0.2438	0.0000	0.0000
5	0.3	0.0510	0.2409	0.0000	0.0000
6	0.3	0.0510	0.2380	0.0000	0.0000
7	0.3	0.0510	0.2352	0.0000	0.0000
8	0.4	0.0680	0.2324	0.0000	0.0000
9	0.4	0.0680	0.2296	0.0000	0.0000
10	0.4	0.0680	0.2268	0.0000	0.0000
11	0.5	0.0850	0.2240	0.0000	0.0000
12	0.5	0.0850	0.2212	0.0000	0.0000
13	0.5	0.0850	0.2185	0.0000	0.0000
14	0.5	0.0850	0.2158	0.0000	0.0000
15	0.5	0.0850	0.2131	0.0000	0.0000
16	0.6	0.1020	0.2104	0.0000	0.0000
17	0.6	0.1020	0.2077	0.0000	0.0000
18	0.7	0.1190	0.2051	0.0000	0.0000
19	0.7	0.1190	0.2025	0.0000	0.0000
20	0.8	0.1360	0.1998	0.0000	0.0000
21	0.6	0.1020	0.1973	0.0000	0.0000
22	0.7	0.1190	0.1947	0.0000	0.0000
23	0.8	0.1360	0.1921	0.0000	0.0000
24	0.8	0.1360	0.1896	0.0000	0.0000
25	0.9	0.1530	0.1871	0.0000	0.0000
26	0.9	0.1530	0.1846	0.0000	0.0000
27	1.0	0.1700	0.1821	0.0000	0.0000
28	1.0	0.1700	0.1797	0.0000	0.0000
29	1.0	0.1700	0.1772	0.0000	0.0000
30	1.1	0.1870	0.1748	0.0122	0.0410
31	1.2	0.2040	0.1724	0.0316	0.1062
32	1.3	0.2210	0.1700	0.0510	0.1713
33	1.5	0.2550	0.1677	0.0873	0.2934
34	1.5	0.2550	0.1653	0.0897	0.3013

35	1.6	0.2720	0.1630	0.1090	0.3662
36	1.7	0.2890	0.1607	0.1283	0.4310
37	1.9	0.3230	0.1584	0.1646	0.5529
38	2.0	0.3400	0.1562	0.1838	0.6176
39	2.1	0.3570	0.1540	0.2030	0.6822
40	2.2	0.3740	0.1517	0.2223	0.7468
41	1.5	0.2550	0.1496	0.1054	0.3543
42	1.5	0.2550	0.1474	0.1076	0.3616
43	2.0	0.3400	0.1452	0.1948	0.6544
44	2.0	0.3400	0.1431	0.1969	0.6616
45	1.9	0.3230	0.1410	0.1820	0.6115
46	1.9	0.3230	0.1389	0.1841	0.6185
47	1.7	0.2890	0.1369	0.1521	0.5112
48	1.8	0.3060	0.1348	0.1712	0.5751
49	2.5	0.4250	0.1328	0.2922	0.9817
50	2.6	0.4420	0.1308	0.3112	1.0455
51	2.8	0.4760	0.1289	0.3471	1.1664
52	2.9	0.4930	0.1269	0.3661	1.2300
53	3.4	0.5780	0.1250	0.4530	1.5221
54	3.4	0.5780	0.1231	0.4549	1.5284
55	2.3	0.3910	0.1212	0.2698	0.9064
56	2.3	0.3910	0.1194	0.2716	0.9126
57	2.7	0.4590	0.1176	0.3414	1.1472
58	2.6	0.4420	0.1158	0.3262	1.0961
59	2.6	0.4420	0.1140	0.3280	1.1021
60	2.5	0.4250	0.1123	0.3127	1.0508
61	2.4	0.4080	0.1105	0.2975	0.9994
62	2.3	0.3910	0.1089	0.2821	0.9480
63	1.9	0.3230	0.1072	0.2158	0.7251
64	1.9	0.3230	0.1056	0.2174	0.7306
65	0.4	0.0680	0.1039	0.0000	0.0000
66	0.4	0.0680	0.1024	0.0000	0.0000
67	0.3	0.0510	0.1008	0.0000	0.0000
68	0.3	0.0510	0.0993	0.0000	0.0000
69	0.5	0.0850	0.0978	0.0000	0.0000
70	0.5	0.0850	0.0963	0.0000	0.0000
71	0.5	0.0850	0.0949	0.0000	0.0000
72	0.4	0.0680	0.0935	0.0000	0.0000
73	0.4	0.0680	0.0921	0.0000	0.0000
74	0.4	0.0680	0.0908	0.0000	0.0000
75	0.3	0.0510	0.0894	0.0000	0.0000
76	0.2	0.0340	0.0882	0.0000	0.0000
77	0.3	0.0510	0.0869	0.0000	0.0000
78	0.4	0.0680	0.0857	0.0000	0.0000
79	0.3	0.0510	0.0845	0.0000	0.0000
80	0.2	0.0340	0.0834	0.0000	0.0000
81	0.3	0.0510	0.0823	0.0000	0.0000
82	0.3	0.0510	0.0812	0.0000	0.0000
83	0.3	0.0510	0.0802	0.0000	0.0000
84	0.2	0.0340	0.0792	0.0000	0.0000
85	0.3	0.0510	0.0783	0.0000	0.0000

86	0.2	0.0340	0.0774	0.0000	0.0000
87	0.3	0.0510	0.0766	0.0000	0.0000
88	0.2	0.0340	0.0758	0.0000	0.0000
89	0.3	0.0510	0.0750	0.0000	0.0000
90	0.2	0.0340	0.0743	0.0000	0.0000
91	0.2	0.0340	0.0737	0.0000	0.0000
92	0.2	0.0340	0.0731	0.0000	0.0000
93	0.2	0.0340	0.0726	0.0000	0.0000
94	0.2	0.0340	0.0721	0.0000	0.0000
95	0.2	0.0340	0.0718	0.0000	0.0000
96	0.2	0.0340	0.0716	0.0000	0.0000
	100			7.6639	

EFFECTIVE RAIN 1.9160 IN/HR

VOLUME 0.5365 AF
23,369 CF

Villa Siena
Area B Developed Condition

area	3.17	[3]		0.0000	L
unit time	15	[5]		0.0000	Lca
LOSS RATE=F				#DIV/0!	H
F=Fp(1.00-0.9Ai)			0.015		n
Fp	0.44			#DIV/0!	Lag
Ai	0.75			15 min	Use
F	0.1430	[13]			
24 HR 2 YR	2.7	[10]			
C	0.0013				
Fm	0.0715				

[15] UNIT TIME PERIOD	[20] PATTERN PERCENT	[21] STORM RAIN 60[10][20]/100[5]	[22] LOSS RATE	[23] EFFECTIVE RAIN IN/HR [21]-[22]	[24] FLOW CFS [3][23]
1	0.2	0.0216	0.2525	0.0000	0.0000
2	0.3	0.0324	0.2496	0.0000	0.0000
3	0.3	0.0324	0.2467	0.0000	0.0000
4	0.4	0.0432	0.2438	0.0000	0.0000
5	0.3	0.0324	0.2409	0.0000	0.0000
6	0.3	0.0324	0.2380	0.0000	0.0000
7	0.3	0.0324	0.2352	0.0000	0.0000
8	0.4	0.0432	0.2324	0.0000	0.0000
9	0.4	0.0432	0.2296	0.0000	0.0000
10	0.4	0.0432	0.2268	0.0000	0.0000
11	0.5	0.0540	0.2240	0.0000	0.0000
12	0.5	0.0540	0.2212	0.0000	0.0000
13	0.5	0.0540	0.2185	0.0000	0.0000
14	0.5	0.0540	0.2158	0.0000	0.0000
15	0.5	0.0540	0.2131	0.0000	0.0000
16	0.6	0.0648	0.2104	0.0000	0.0000
17	0.6	0.0648	0.2077	0.0000	0.0000
18	0.7	0.0756	0.2051	0.0000	0.0000
19	0.7	0.0756	0.2025	0.0000	0.0000
20	0.8	0.0864	0.1998	0.0000	0.0000
21	0.6	0.0648	0.1973	0.0000	0.0000
22	0.7	0.0756	0.1947	0.0000	0.0000
23	0.8	0.0864	0.1921	0.0000	0.0000
24	0.8	0.0864	0.1896	0.0000	0.0000
25	0.9	0.0972	0.1871	0.0000	0.0000
26	0.9	0.0972	0.1846	0.0000	0.0000
27	1.0	0.1080	0.1821	0.0000	0.0000
28	1.0	0.1080	0.1797	0.0000	0.0000
29	1.0	0.1080	0.1772	0.0000	0.0000
30	1.1	0.1188	0.1748	0.0000	0.0000
31	1.2	0.1296	0.1724	0.0000	0.0000
32	1.3	0.1404	0.1700	0.0000	0.0000
33	1.5	0.1620	0.1677	0.0000	0.0000
34	1.5	0.1620	0.1653	0.0000	0.0000

35	1.6	0.1728	0.1630	0.0098	0.0310
36	1.7	0.1836	0.1607	0.0229	0.0725
37	1.9	0.2052	0.1584	0.0468	0.1482
38	2.0	0.2160	0.1562	0.0598	0.1896
39	2.1	0.2268	0.1540	0.0728	0.2309
40	2.2	0.2376	0.1517	0.0859	0.2722
41	1.5	0.1620	0.1496	0.0124	0.0395
42	1.5	0.1620	0.1474	0.0146	0.0463
43	2.0	0.2160	0.1452	0.0708	0.2243
44	2.0	0.2160	0.1431	0.0729	0.2311
45	1.9	0.2052	0.1410	0.0642	0.2035
46	1.9	0.2052	0.1389	0.0663	0.2101
47	1.7	0.1836	0.1369	0.0467	0.1481
48	1.8	0.1944	0.1348	0.0596	0.1888
49	2.5	0.2700	0.1328	0.1372	0.4349
50	2.6	0.2808	0.1308	0.1500	0.4754
51	2.8	0.3024	0.1289	0.1735	0.5501
52	2.9	0.3132	0.1269	0.1863	0.5905
53	3.4	0.3672	0.1250	0.2422	0.7678
54	3.4	0.3672	0.1231	0.2441	0.7738
55	2.3	0.2484	0.1212	0.1272	0.4031
56	2.3	0.2484	0.1194	0.1290	0.4090
57	2.7	0.2916	0.1176	0.1740	0.5517
58	2.6	0.2808	0.1158	0.1650	0.5231
59	2.6	0.2808	0.1140	0.1668	0.5287
60	2.5	0.2700	0.1123	0.1577	0.5000
61	2.4	0.2592	0.1105	0.1487	0.4712
62	2.3	0.2484	0.1089	0.1395	0.4424
63	1.9	0.2052	0.1072	0.0980	0.3107
64	1.9	0.2052	0.1056	0.0996	0.3159
65	0.4	0.0432	0.1039	0.0000	0.0000
66	0.4	0.0432	0.1024	0.0000	0.0000
67	0.3	0.0324	0.1008	0.0000	0.0000
68	0.3	0.0324	0.0993	0.0000	0.0000
69	0.5	0.0540	0.0978	0.0000	0.0000
70	0.5	0.0540	0.0963	0.0000	0.0000
71	0.5	0.0540	0.0949	0.0000	0.0000
72	0.4	0.0432	0.0935	0.0000	0.0000
73	0.4	0.0432	0.0921	0.0000	0.0000
74	0.4	0.0432	0.0908	0.0000	0.0000
75	0.3	0.0324	0.0894	0.0000	0.0000
76	0.2	0.0216	0.0882	0.0000	0.0000
77	0.3	0.0324	0.0869	0.0000	0.0000
78	0.4	0.0432	0.0857	0.0000	0.0000
79	0.3	0.0324	0.0845	0.0000	0.0000
80	0.2	0.0216	0.0834	0.0000	0.0000
81	0.3	0.0324	0.0823	0.0000	0.0000
82	0.3	0.0324	0.0812	0.0000	0.0000
83	0.3	0.0324	0.0802	0.0000	0.0000
84	0.2	0.0216	0.0792	0.0000	0.0000
85	0.3	0.0324	0.0783	0.0000	0.0000

86	0.2	0.0216	0.0774	0.0000	0.0000
87	0.3	0.0324	0.0766	0.0000	0.0000
88	0.2	0.0216	0.0758	0.0000	0.0000
89	0.3	0.0324	0.0750	0.0000	0.0000
90	0.2	0.0216	0.0743	0.0000	0.0000
91	0.2	0.0216	0.0737	0.0000	0.0000
92	0.2	0.0216	0.0731	0.0000	0.0000
93	0.2	0.0216	0.0726	0.0000	0.0000
94	0.2	0.0216	0.0721	0.0000	0.0000
95	0.2	0.0216	0.0718	0.0000	0.0000
96	0.2	0.0216	0.0716	0.0000	0.0000
	100			3.2443	

EFFECTIVE RAIN 0.8111 IN/HR

VOLUME 0.2143 AF
9,333 CF

Villa Siena
Area B Developed Condition

area	3.17	[3]		0.0000	L
unit time	15	[5]		0.0000	Lca
LOSS RATE=F				#DIV/0!	H
F=Fp(1.00-0.9Ai)			0.015		n
Fp	0.44			#DIV/0!	Lag
Ai	0.75			15 min	Use
F	0.1430	[13]			
24 HR 2 YR	4.25	[10]			
C	0.0013				
Fm	0.0715				

[15] UNIT TIME PERIOD	[20] PATTERN PERCENT	[21] STORM RAIN 60[10][20]/100[5]	[22] LOSS RATE	[23] EFFECTIVE RAIN IN/HR [21]-[22]	[24] FLOW CFS [3][23]
1	0.2	0.0340	0.2525	0.0000	0.0000
2	0.3	0.0510	0.2496	0.0000	0.0000
3	0.3	0.0510	0.2467	0.0000	0.0000
4	0.4	0.0680	0.2438	0.0000	0.0000
5	0.3	0.0510	0.2409	0.0000	0.0000
6	0.3	0.0510	0.2380	0.0000	0.0000
7	0.3	0.0510	0.2352	0.0000	0.0000
8	0.4	0.0680	0.2324	0.0000	0.0000
9	0.4	0.0680	0.2296	0.0000	0.0000
10	0.4	0.0680	0.2268	0.0000	0.0000
11	0.5	0.0850	0.2240	0.0000	0.0000
12	0.5	0.0850	0.2212	0.0000	0.0000
13	0.5	0.0850	0.2185	0.0000	0.0000
14	0.5	0.0850	0.2158	0.0000	0.0000
15	0.5	0.0850	0.2131	0.0000	0.0000
16	0.6	0.1020	0.2104	0.0000	0.0000
17	0.6	0.1020	0.2077	0.0000	0.0000
18	0.7	0.1190	0.2051	0.0000	0.0000
19	0.7	0.1190	0.2025	0.0000	0.0000
20	0.8	0.1360	0.1998	0.0000	0.0000
21	0.6	0.1020	0.1973	0.0000	0.0000
22	0.7	0.1190	0.1947	0.0000	0.0000
23	0.8	0.1360	0.1921	0.0000	0.0000
24	0.8	0.1360	0.1896	0.0000	0.0000
25	0.9	0.1530	0.1871	0.0000	0.0000
26	0.9	0.1530	0.1846	0.0000	0.0000
27	1.0	0.1700	0.1821	0.0000	0.0000
28	1.0	0.1700	0.1797	0.0000	0.0000
29	1.0	0.1700	0.1772	0.0000	0.0000
30	1.1	0.1870	0.1748	0.0122	0.0387
31	1.2	0.2040	0.1724	0.0316	0.1002
32	1.3	0.2210	0.1700	0.0510	0.1616
33	1.5	0.2550	0.1677	0.0873	0.2769
34	1.5	0.2550	0.1653	0.0897	0.2843
35	1.6	0.2720	0.1630	0.1090	0.3455
36	1.7	0.2890	0.1607	0.1283	0.4067
37	1.9	0.3230	0.1584	0.1646	0.5217

38	2.0	0.3400	0.1562	0.1838	0.5827
39	2.1	0.3570	0.1540	0.2030	0.6437
40	2.2	0.3740	0.1517	0.2223	0.7046
41	1.5	0.2550	0.1496	0.1054	0.3343
42	1.5	0.2550	0.1474	0.1076	0.3412
43	2.0	0.3400	0.1452	0.1948	0.6174
44	2.0	0.3400	0.1431	0.1969	0.6241
45	1.9	0.3230	0.1410	0.1820	0.5769
46	1.9	0.3230	0.1389	0.1841	0.5835
47	1.7	0.2890	0.1369	0.1521	0.4823
48	1.8	0.3060	0.1348	0.1712	0.5426
49	2.5	0.4250	0.1328	0.2922	0.9262
50	2.6	0.4420	0.1308	0.3112	0.9864
51	2.8	0.4760	0.1289	0.3471	1.1004
52	2.9	0.4930	0.1269	0.3661	1.1605
53	3.4	0.5780	0.1250	0.4530	1.4360
54	3.4	0.5780	0.1231	0.4549	1.4420
55	2.3	0.3910	0.1212	0.2698	0.8551
56	2.3	0.3910	0.1194	0.2716	0.8610
57	2.7	0.4590	0.1176	0.3414	1.0823
58	2.6	0.4420	0.1158	0.3262	1.0341
59	2.6	0.4420	0.1140	0.3280	1.0397
60	2.5	0.4250	0.1123	0.3127	0.9914
61	2.4	0.4080	0.1105	0.2975	0.9429
62	2.3	0.3910	0.1089	0.2821	0.8944
63	1.9	0.3230	0.1072	0.2158	0.6841
64	1.9	0.3230	0.1056	0.2174	0.6893
65	0.4	0.0680	0.1039	0.0000	0.0000
66	0.4	0.0680	0.1024	0.0000	0.0000
67	0.3	0.0510	0.1008	0.0000	0.0000
68	0.3	0.0510	0.0993	0.0000	0.0000
69	0.5	0.0850	0.0978	0.0000	0.0000
70	0.5	0.0850	0.0963	0.0000	0.0000
71	0.5	0.0850	0.0949	0.0000	0.0000
72	0.4	0.0680	0.0935	0.0000	0.0000
73	0.4	0.0680	0.0921	0.0000	0.0000
74	0.4	0.0680	0.0908	0.0000	0.0000
75	0.3	0.0510	0.0894	0.0000	0.0000
76	0.2	0.0340	0.0882	0.0000	0.0000
77	0.3	0.0510	0.0869	0.0000	0.0000
78	0.4	0.0680	0.0857	0.0000	0.0000
79	0.3	0.0510	0.0845	0.0000	0.0000
80	0.2	0.0340	0.0834	0.0000	0.0000
81	0.3	0.0510	0.0823	0.0000	0.0000
82	0.3	0.0510	0.0812	0.0000	0.0000
83	0.3	0.0510	0.0802	0.0000	0.0000
84	0.2	0.0340	0.0792	0.0000	0.0000
85	0.3	0.0510	0.0783	0.0000	0.0000
86	0.2	0.0340	0.0774	0.0000	0.0000
87	0.3	0.0510	0.0766	0.0000	0.0000
88	0.2	0.0340	0.0758	0.0000	0.0000
89	0.3	0.0510	0.0750	0.0000	0.0000
90	0.2	0.0340	0.0743	0.0000	0.0000
91	0.2	0.0340	0.0737	0.0000	0.0000

92	0.2	0.0340	0.0731	0.0000	0.0000
93	0.2	0.0340	0.0726	0.0000	0.0000
94	0.2	0.0340	0.0721	0.0000	0.0000
95	0.2	0.0340	0.0718	0.0000	0.0000
96	0.2	0.0340	0.0716	0.0000	0.0000
	100			7.6639	

EFFECTIVE RAIN 1.9160 IN/HR

VOLUME 0.5061 AF
22,047 CF

Villa Siena
Area C Developed Condition

area	1.32	[3]		0.0000	L
unit time	15	[5]		0.0000	Lca
LOSS RATE=F				#DIV/0!	H
F=Fp(1.00-0.9Ai)			0.015		n
Fp	0.44			#DIV/0!	Lag
Ai	0.75			15 min	Use
F	0.1430	[13]			
24 HR 2 YR	2.7	[10]			
C	0.0013				
Fm	0.0715				

[15] UNIT TIME PERIOD	[20] PATTERN PERCENT	[21] STORM RAIN 60[10][20]/100[5]	[22] LOSS RATE	[23] EFFECTIVE RAIN IN/HR [21]-[22]	[24] FLOW CFS [3][23]
1	0.2	0.0216	0.2525	0.0000	0.0000
2	0.3	0.0324	0.2496	0.0000	0.0000
3	0.3	0.0324	0.2467	0.0000	0.0000
4	0.4	0.0432	0.2438	0.0000	0.0000
5	0.3	0.0324	0.2409	0.0000	0.0000
6	0.3	0.0324	0.2380	0.0000	0.0000
7	0.3	0.0324	0.2352	0.0000	0.0000
8	0.4	0.0432	0.2324	0.0000	0.0000
9	0.4	0.0432	0.2296	0.0000	0.0000
10	0.4	0.0432	0.2268	0.0000	0.0000
11	0.5	0.0540	0.2240	0.0000	0.0000
12	0.5	0.0540	0.2212	0.0000	0.0000
13	0.5	0.0540	0.2185	0.0000	0.0000
14	0.5	0.0540	0.2158	0.0000	0.0000
15	0.5	0.0540	0.2131	0.0000	0.0000
16	0.6	0.0648	0.2104	0.0000	0.0000
17	0.6	0.0648	0.2077	0.0000	0.0000
18	0.7	0.0756	0.2051	0.0000	0.0000
19	0.7	0.0756	0.2025	0.0000	0.0000
20	0.8	0.0864	0.1998	0.0000	0.0000
21	0.6	0.0648	0.1973	0.0000	0.0000
22	0.7	0.0756	0.1947	0.0000	0.0000
23	0.8	0.0864	0.1921	0.0000	0.0000
24	0.8	0.0864	0.1896	0.0000	0.0000
25	0.9	0.0972	0.1871	0.0000	0.0000
26	0.9	0.0972	0.1846	0.0000	0.0000
27	1.0	0.1080	0.1821	0.0000	0.0000
28	1.0	0.1080	0.1797	0.0000	0.0000
29	1.0	0.1080	0.1772	0.0000	0.0000
30	1.1	0.1188	0.1748	0.0000	0.0000
31	1.2	0.1296	0.1724	0.0000	0.0000
32	1.3	0.1404	0.1700	0.0000	0.0000
33	1.5	0.1620	0.1677	0.0000	0.0000
34	1.5	0.1620	0.1653	0.0000	0.0000
35	1.6	0.1728	0.1630	0.0098	0.0129
36	1.7	0.1836	0.1607	0.0229	0.0302
37	1.9	0.2052	0.1584	0.0468	0.0617

38	2.0	0.2160	0.1562	0.0598	0.0790
39	2.1	0.2268	0.1540	0.0728	0.0962
40	2.2	0.2376	0.1517	0.0859	0.1133
41	1.5	0.1620	0.1496	0.0124	0.0164
42	1.5	0.1620	0.1474	0.0146	0.0193
43	2.0	0.2160	0.1452	0.0708	0.0934
44	2.0	0.2160	0.1431	0.0729	0.0962
45	1.9	0.2052	0.1410	0.0642	0.0847
46	1.9	0.2052	0.1389	0.0663	0.0875
47	1.7	0.1836	0.1369	0.0467	0.0617
48	1.8	0.1944	0.1348	0.0596	0.0786
49	2.5	0.2700	0.1328	0.1372	0.1811
50	2.6	0.2808	0.1308	0.1500	0.1980
51	2.8	0.3024	0.1289	0.1735	0.2291
52	2.9	0.3132	0.1269	0.1863	0.2459
53	3.4	0.3672	0.1250	0.2422	0.3197
54	3.4	0.3672	0.1231	0.2441	0.3222
55	2.3	0.2484	0.1212	0.1272	0.1679
56	2.3	0.2484	0.1194	0.1290	0.1703
57	2.7	0.2916	0.1176	0.1740	0.2297
58	2.6	0.2808	0.1158	0.1650	0.2178
59	2.6	0.2808	0.1140	0.1668	0.2202
60	2.5	0.2700	0.1123	0.1577	0.2082
61	2.4	0.2592	0.1105	0.1487	0.1962
62	2.3	0.2484	0.1089	0.1395	0.1842
63	1.9	0.2052	0.1072	0.0980	0.1294
64	1.9	0.2052	0.1056	0.0996	0.1315
65	0.4	0.0432	0.1039	0.0000	0.0000
66	0.4	0.0432	0.1024	0.0000	0.0000
67	0.3	0.0324	0.1008	0.0000	0.0000
68	0.3	0.0324	0.0993	0.0000	0.0000
69	0.5	0.0540	0.0978	0.0000	0.0000
70	0.5	0.0540	0.0963	0.0000	0.0000
71	0.5	0.0540	0.0949	0.0000	0.0000
72	0.4	0.0432	0.0935	0.0000	0.0000
73	0.4	0.0432	0.0921	0.0000	0.0000
74	0.4	0.0432	0.0908	0.0000	0.0000
75	0.3	0.0324	0.0894	0.0000	0.0000
76	0.2	0.0216	0.0882	0.0000	0.0000
77	0.3	0.0324	0.0869	0.0000	0.0000
78	0.4	0.0432	0.0857	0.0000	0.0000
79	0.3	0.0324	0.0845	0.0000	0.0000
80	0.2	0.0216	0.0834	0.0000	0.0000
81	0.3	0.0324	0.0823	0.0000	0.0000
82	0.3	0.0324	0.0812	0.0000	0.0000
83	0.3	0.0324	0.0802	0.0000	0.0000
84	0.2	0.0216	0.0792	0.0000	0.0000
85	0.3	0.0324	0.0783	0.0000	0.0000
86	0.2	0.0216	0.0774	0.0000	0.0000
87	0.3	0.0324	0.0766	0.0000	0.0000
88	0.2	0.0216	0.0758	0.0000	0.0000
89	0.3	0.0324	0.0750	0.0000	0.0000
90	0.2	0.0216	0.0743	0.0000	0.0000
91	0.2	0.0216	0.0737	0.0000	0.0000

92	0.2	0.0216	0.0731	0.0000	0.0000
93	0.2	0.0216	0.0726	0.0000	0.0000
94	0.2	0.0216	0.0721	0.0000	0.0000
95	0.2	0.0216	0.0718	0.0000	0.0000
96	0.2	0.0216	0.0716	0.0000	0.0000
	100			3.2443	

EFFECTIVE RAIN 0.8111 IN/HR

VOLUME 0.0892 AF
3,886 CF

Villa Siena
Area C Developed Condition

area	1.32	[3]		0.0000	L
unit time	15	[5]		0.0000	Lca
LOSS RATE=F				#DIV/0!	H
F=Fp(1.00-0.9Ai)			0.015		n
Fp	0.44			#DIV/0!	Lag
Ai	0.75			15 min	Use
F	0.1430	[13]			
24 HR 2 YR	4.25	[10]			
C	0.0013				
Fm	0.0715				

[15] UNIT TIME PERIOD	[20] PATTERN PERCENT	[21] STORM RAIN 60[10][20]/100[5]	[22] LOSS RATE	[23] EFFECTIVE RAIN IN/HR [21]-[22]	[24] FLOW CFS [3][23]
1	0.2	0.0340	0.2525	0.0000	0.0000
2	0.3	0.0510	0.2496	0.0000	0.0000
3	0.3	0.0510	0.2467	0.0000	0.0000
4	0.4	0.0680	0.2438	0.0000	0.0000
5	0.3	0.0510	0.2409	0.0000	0.0000
6	0.3	0.0510	0.2380	0.0000	0.0000
7	0.3	0.0510	0.2352	0.0000	0.0000
8	0.4	0.0680	0.2324	0.0000	0.0000
9	0.4	0.0680	0.2296	0.0000	0.0000
10	0.4	0.0680	0.2268	0.0000	0.0000
11	0.5	0.0850	0.2240	0.0000	0.0000
12	0.5	0.0850	0.2212	0.0000	0.0000
13	0.5	0.0850	0.2185	0.0000	0.0000
14	0.5	0.0850	0.2158	0.0000	0.0000
15	0.5	0.0850	0.2131	0.0000	0.0000
16	0.6	0.1020	0.2104	0.0000	0.0000
17	0.6	0.1020	0.2077	0.0000	0.0000
18	0.7	0.1190	0.2051	0.0000	0.0000
19	0.7	0.1190	0.2025	0.0000	0.0000
20	0.8	0.1360	0.1998	0.0000	0.0000
21	0.6	0.1020	0.1973	0.0000	0.0000
22	0.7	0.1190	0.1947	0.0000	0.0000
23	0.8	0.1360	0.1921	0.0000	0.0000
24	0.8	0.1360	0.1896	0.0000	0.0000
25	0.9	0.1530	0.1871	0.0000	0.0000
26	0.9	0.1530	0.1846	0.0000	0.0000
27	1.0	0.1700	0.1821	0.0000	0.0000
28	1.0	0.1700	0.1797	0.0000	0.0000
29	1.0	0.1700	0.1772	0.0000	0.0000
30	1.1	0.1870	0.1748	0.0122	0.0161
31	1.2	0.2040	0.1724	0.0316	0.0417
32	1.3	0.2210	0.1700	0.0510	0.0673
33	1.5	0.2550	0.1677	0.0873	0.1153
34	1.5	0.2550	0.1653	0.0897	0.1184
35	1.6	0.2720	0.1630	0.1090	0.1439
36	1.7	0.2890	0.1607	0.1283	0.1693
37	1.9	0.3230	0.1584	0.1646	0.2172
38	2.0	0.3400	0.1562	0.1838	0.2426

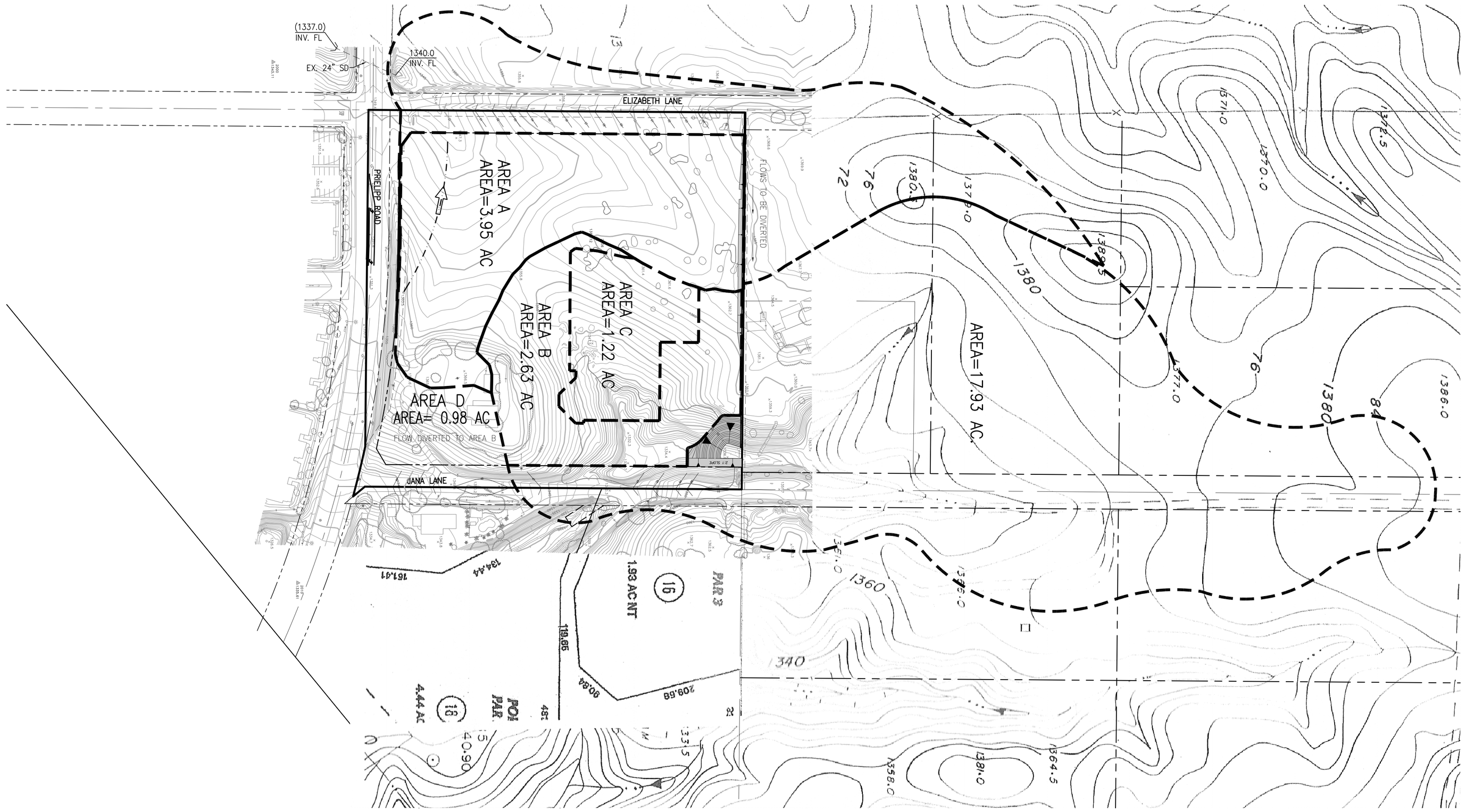
39	2.1	0.3570	0.1540	0.2030	0.2680
40	2.2	0.3740	0.1517	0.2223	0.2934
41	1.5	0.2550	0.1496	0.1054	0.1392
42	1.5	0.2550	0.1474	0.1076	0.1421
43	2.0	0.3400	0.1452	0.1948	0.2571
44	2.0	0.3400	0.1431	0.1969	0.2599
45	1.9	0.3230	0.1410	0.1820	0.2402
46	1.9	0.3230	0.1389	0.1841	0.2430
47	1.7	0.2890	0.1369	0.1521	0.2008
48	1.8	0.3060	0.1348	0.1712	0.2259
49	2.5	0.4250	0.1328	0.2922	0.3857
50	2.6	0.4420	0.1308	0.3112	0.4107
51	2.8	0.4760	0.1289	0.3471	0.4582
52	2.9	0.4930	0.1269	0.3661	0.4832
53	3.4	0.5780	0.1250	0.4530	0.5980
54	3.4	0.5780	0.1231	0.4549	0.6005
55	2.3	0.3910	0.1212	0.2698	0.3561
56	2.3	0.3910	0.1194	0.2716	0.3585
57	2.7	0.4590	0.1176	0.3414	0.4507
58	2.6	0.4420	0.1158	0.3262	0.4306
59	2.6	0.4420	0.1140	0.3280	0.4329
60	2.5	0.4250	0.1123	0.3127	0.4128
61	2.4	0.4080	0.1105	0.2975	0.3926
62	2.3	0.3910	0.1089	0.2821	0.3724
63	1.9	0.3230	0.1072	0.2158	0.2849
64	1.9	0.3230	0.1056	0.2174	0.2870
65	0.4	0.0680	0.1039	0.0000	0.0000
66	0.4	0.0680	0.1024	0.0000	0.0000
67	0.3	0.0510	0.1008	0.0000	0.0000
68	0.3	0.0510	0.0993	0.0000	0.0000
69	0.5	0.0850	0.0978	0.0000	0.0000
70	0.5	0.0850	0.0963	0.0000	0.0000
71	0.5	0.0850	0.0949	0.0000	0.0000
72	0.4	0.0680	0.0935	0.0000	0.0000
73	0.4	0.0680	0.0921	0.0000	0.0000
74	0.4	0.0680	0.0908	0.0000	0.0000
75	0.3	0.0510	0.0894	0.0000	0.0000
76	0.2	0.0340	0.0882	0.0000	0.0000
77	0.3	0.0510	0.0869	0.0000	0.0000
78	0.4	0.0680	0.0857	0.0000	0.0000
79	0.3	0.0510	0.0845	0.0000	0.0000
80	0.2	0.0340	0.0834	0.0000	0.0000
81	0.3	0.0510	0.0823	0.0000	0.0000
82	0.3	0.0510	0.0812	0.0000	0.0000
83	0.3	0.0510	0.0802	0.0000	0.0000
84	0.2	0.0340	0.0792	0.0000	0.0000
85	0.3	0.0510	0.0783	0.0000	0.0000
86	0.2	0.0340	0.0774	0.0000	0.0000
87	0.3	0.0510	0.0766	0.0000	0.0000
88	0.2	0.0340	0.0758	0.0000	0.0000
89	0.3	0.0510	0.0750	0.0000	0.0000
90	0.2	0.0340	0.0743	0.0000	0.0000
91	0.2	0.0340	0.0737	0.0000	0.0000
92	0.2	0.0340	0.0731	0.0000	0.0000
93	0.2	0.0340	0.0726	0.0000	0.0000

94	0.2	0.0340	0.0721	0.0000	0.0000
95	0.2	0.0340	0.0718	0.0000	0.0000
96	0.2	0.0340	0.0716	0.0000	0.0000
	100			7.6639	

EFFECTIVE RAIN 1.9160 IN/HR

VOLUME 0.2108 AF
9,181 CF

VILLA SIENA HYDROLOGY STUDY (UNDEVELOPED)



LEGEND:

DRAINAGE AREA BOUNDARY

WATERCOURSE

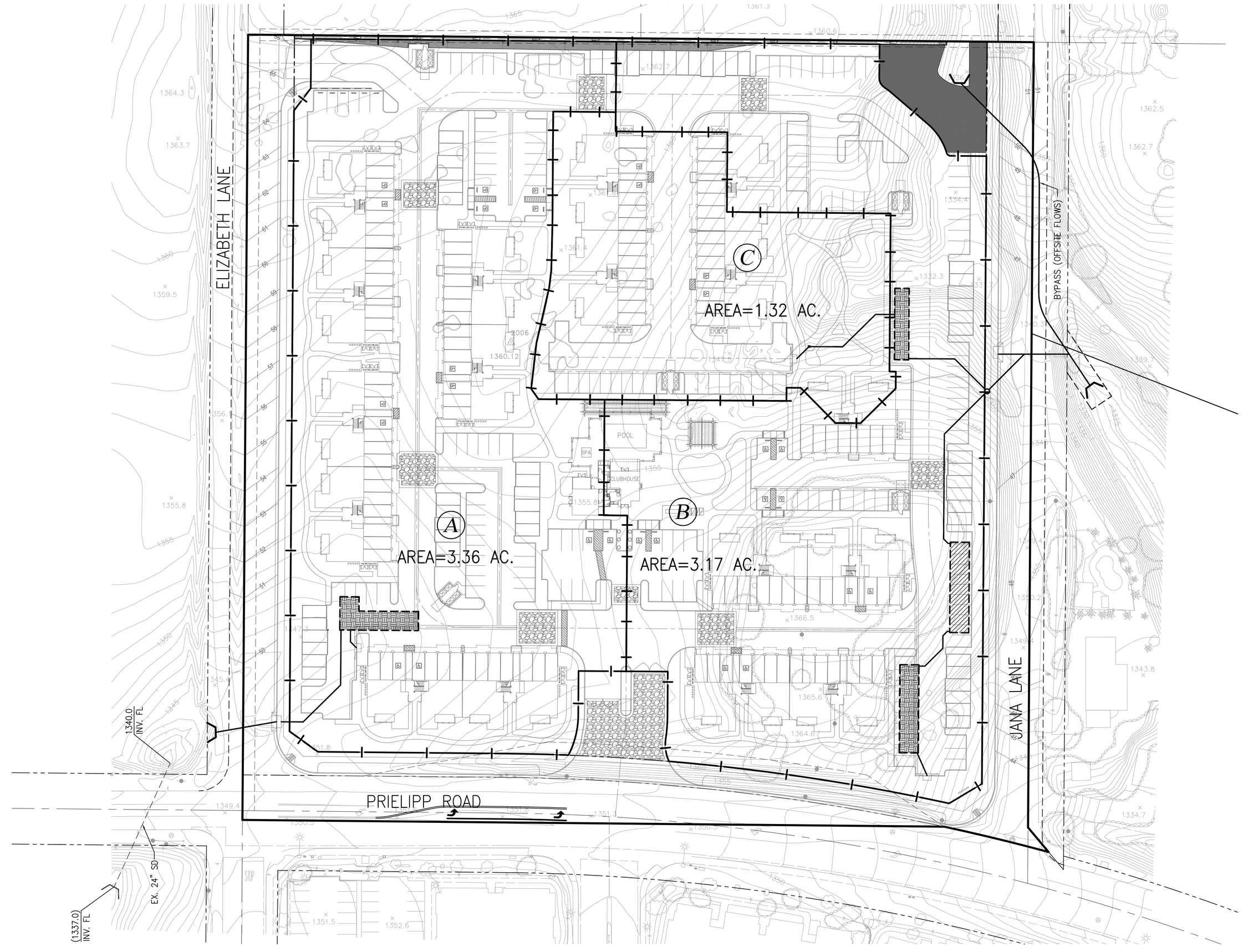
GRAPHIC SCALE

100 0 50 100 200 300

1 inch = 100 ft.

VILLA SIENA HYDROLOGY STUDY (DEVELOPED)

AREA A			
EVENT	EXISTING CF CF	DEVELOPED CF CF	VOLUME TO BE RETAINED CF
2 YEAR 24 HOUR	5,449	9,893	4,444
10 YEAR 24 HOUR	18,816	23,369	4,553
85th PERCENTILE	–	–	4,757
USE	–	–	4,757
AREA B			
EVENT	EXISTING CF CF	DEVELOPED CF CF	VOLUME TO BE RETAINED CF
2 YEAR 24 HOUR	3,628	9,333	5,705
10 YEAR 24 HOUR	12,528	22,047	9,519
85th PERCENTILE	–	–	4,448
USE	–	–	9,519
AREA C			
EVENT	EXISTING CF CF	DEVELOPED CF CF	VOLUME TO BE RETAINED CF
2 YEAR 24 HOUR	1,683	3,886	2,203
10 YEAR 24 HOUR	5,812	9,181	3,369
85th PERCENTILE	–	–	1,869
USE	–	–	3,369



LEGEND:

FILTRATION & DETENTION AREA

DETENTION AREA

STORM DRAIN

GRAPHIC SCALE

50 0 25 50 100 150

1 inch = 50 ft.

F.2 - Preliminary Water Quality Management Plan

Pacific Coast Land Consultants, Inc.

Civil Engineering • Land Planning • Land Surveying

PRELIMINARY
Water Quality Management Plan

FOR

Villa Siena
Plot Plan 13-0089
Wildomar, California

Prepared for:
GOLDEN EAGLE MULTI-FAMILY PROPERTIES, LLC
6201 OAK CANYON, SUITE 250
IRVINE, CALIFORNIA 92618
JIM KIECKHAFER
949-270-7800

Prepared by:
PACIFIC COAST LAND CONSULTANTS
25096 JEFFERSON AVE STE D
MURRIETA, CALIFORNIA 92562
951-698-1350
PREPARED BY TRAVIS P. VINCENT JR.
RCE 37356

WQMP PREPARATION DATE:
September 4, 2014

OWNER'S CERTIFICATION

This PRELIMINARY project- specific Water Quality Management Plan (WQMP) has been prepared for: **GOLDEN EAGLE MULTI FAMILY PROPERTIES, LLC** by Pacific Coast Land Consultants, Inc for the project known as **VILLA SIENA.** This PRELIMINARY-WQMP is intended to comply with the requirements of the City of Wildomar, which includes the requirement for the preparation and implementation of a project- specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity.

The undersigned is authorized to certify and to approve implementation of this PRELIMINARY WQMP. The undersigned is aware that implementation of this PRELIMINARY WQMP is enforceable under City of Wildomar Water Quality Ordinance (Municipal Code Section 13.12.060)

If the undersigned transfers its interest in the subject property/project, its successor in interest the undersigned shall notify the successor in interest of its responsibility to implement this PRELIMINARY WQMP.

"I certify under penalty of law that the provision of this PRELIMINARY WQMP have been reviewed and accepted and that the WQMP will be transferred to future successors in interest."

Owner's Signature	Date
JAMES C. KIECKHAFER	**MANAGING DIRECTOR**
Owner's Printed Name	Owner's Title/Position

GOLDEN EAGLE MULTI FAMILY PROPERTIES, LLC
6201 OAK CANYON, SUITE 250
Irvine, CA 92618
949-270-7800

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APPENDICES

A. CONDITIONS OF APPROVAL
B. VICINITY MAP AND SITE PLAN
C. SUPPORTING DETAIL RELATED TO HYDRAULIC CONDITIONS OF CONCERN
D. EDUCATIONAL MATERIALS
E. SOILS REPORT AND PERCOLATION TEST RESULTS
F. TREATMENT CONTROL BMP SIZING CALCULATIONS AND DESIGN DETAILS
G. AGREEMENTS – CC&RS, COVENANT AND AGREEMENTS AND OTHER MECHANISMS FOR ENSURING ONGOING OPERATION, MAINTENANCE, FUNDING AND TRANSFER OF REQUIREMENTS FOR THIS FINAL PROJECT- SPECIFIC WQMP
H. PHASE 1 ENVIRONMENTAL SITE ASSESSMENT – SUMMARY OF SITE REMEDIATION CONDUCTED AND USE RESTRICTIONS

I. Project Description

The project is located on approximately 9.2 acres of partially developed land. The project will construct 35 apartment units, surface parking, a swimming pool and clubhouse. Elizabeth Lane to the north, Jana Lane to the south and Prielippe Road to the west will all be constructed to City Standards along the project frontage.

There is a significantly deep natural drainage course in the southeast corner of the site that receives water from the adjacent property to the east, and terminates on the project site in a jump. This portion of the site will receive as much as 20' of fill and the offsite drainage will require interception and transmission to the natural offsite drainage course that currently accepts these flows.

In the southwest corner of the site, there is a residence and out building. These will be removed.

The onsite runoff will collected in a series of catch basins and transmitted to underground storage facilities on the northwest and southwest ends of the site. Treatment through filtration with underdrain will occur in the storage facilities, and then flows will be released to adjacent properties at their pre-developed rates and along the same drainage course as they currently follow.

Roof drains will be directed to landscape areas where practical. In areas where not practical, they will spill onto impervious surfaces and become part of the surface flows collected and treated in the storm drain system.

The development will generate trash and debris during and after construction is complete. All wastes generated on the site will be removed by a licensed collector.
(*See Appendix B – Site Plan*)

Appendix G contains a "Declaration of Water Quality Management Plan Restrictive Covenant" to ensure ongoing operation, maintenance, funding, transfer and implementation of this WQMP.

Project Owner: **GOLDEN EAGLE MULTI FAMILY PROPERTIES, LLC**
6201 OAK CANYON, SUITE 250
IRVINE, CALIFORNIA 92618
949-270-7800

WQMP Preparer: **PACIFIC COAST LAND CONSULTANTS**
25096 JEFFERSON AVE SUITE -D
MURRIETA CALIFORNIA 92562
951-698-1350 // FAX 951-698-8957
CONTACT: TRAVIS P. VINCENT JR., PE
PROJECT MANAGER

Project Site Address: Prielipp Road, Wildomar, CA 92595

Planning Area/ Community Name: Villa Siena

APN Number(s): 380-290-029

Thomas Bros. Map: Riverside County Pg 927-H1

Project Watershed: Santa Margarita River

Sub-watershed: Wildomar

Project Site Size: 10.2 acres

Standard Industrial Classification (SIC) Code: 6513

Formation of Home Owners' Association (HOA) or Property Owners Association (POA): NO

Additional Permits/Approvals required for the Project:

AGENCY	Permit required (yes or no)
State Department of Fish and Game, 1601 Streambed Alteration agreement	No
State Water Resources Control Board, Clean Water Act (CWA) section 401 Water Quality Certification	No
US Army Corps of Engineers, CWA section 404 permit	No
US Fish and Wildlife, Endangered Species Act section 7 biological opinion	No
Other State Water Resources Control Board General Construction Activities Stormwater Permit	Yes
City of Wildomar – Grading Permit	Yes
City of Wildomar – Building and Safety Permit	Yes

II. Site Characterization

Land Use Designation or Zoning: CO (Commercial)

Current Property/ Land Use: Vacant

Proposed Property / land Use: Apartments

Availability of Soils Report: Yes

Phase 1 Site Assessment: None Required

Receiving Waters for Urban Runoff from Site

Receiving Waters	303(d)List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
MURRIETA CREEK {SA 2.32}	CHLORPYRIFOS (PESTICIDES) IRON, COPPER (METALS) MANGANESE NITROGEN (NUTRIENTS) TOXICITY	MUN,AGR,IND,PROC, GWR, REC1,REC2,WARM, WILD	NOT A RARE WATER BODY {APPROX. 1 MILE FROM SITE}
SANTA MARGARITA RIVER – UPPER {HU2.22,2.21}	ENTEROCOCUS FECAL COLIFORM (BACTERIA) PHOSPHORUS, TOTAL NITROGEN (NUTRIENTS)	MUN, AGR, IND, PROC, REC1, REC2, WARM, COLD, WILD, RARE	A RARE WATER BODY {APPROX. 8 MILES FROM SITE}
SANTA MARGARITA RIVER – LOWER {HU2.11, 2.12, 2.13}	ENTEROCOCUS FECAL COLIFORM (BACTERIA) PHOSPHORUS, TOTAL NITROGEN (NUTRIENTS)	MUN, AGR, IND, PROC, REC1, REC2, WARM, COLD, WILD, RARE	A RARE WATER BODY {APPROX. 22.5 MILES FROM SITE}
SANTA MARGARITA LAGOON {HU-2.11}	EUTROPHIC {NUTRIENTS AND OXYGEN DEMANDING SUBSTANCES}	REC1, REC2, EST, WILD, RARE, MAR, MIGR, SPWN	A RARE WATER BODY {APPROX. 25 MILES FROM SITE}
PACIFIC OCEAN	NONE	IND, NAV, REC1, REC2, COMM, BIOL, WILD, RARE, MAR, AQUA, MIGR, SPWN, SHELL	A RARE WATER BODY {APPROX. 39 MILES FROM SITE}

III. Pollutants of Concern

Urban Runoff Pollutants: Sediments/Turbidity-P, Nutrients-P, Organic/Compounds-P, Trash & Debris-P, Oxygen Demanding Substances-P, Bacteria & Viruses-P, Oil & Grease-P, Pesticides-P, Metals-P
P-Potential, N-Not Expected

Site Specific Pollutants of Concern:

1. Nutrients
2. Oxygen Demanding Substances
3. Bacteria & Viruses
4. Pesticides
5. Metals

IV. Hydrologic Conditions of Concern

Impacts to the hydrologic regime resulting from the Project may include increased runoff volume and velocity; reduced infiltration; increased flow frequency, duration, and peaks; faster time to reach peak flow; and water quality degradation. Under certain circumstances, changes could also result in the reduction in the amount of available sediment for transport; storm flows could fill this sediment-carrying capacity by eroding the downstream channel. These changes have the potential to permanently impact downstream channels and habitat integrity. A change to the hydrologic regime of a Project's site would be considered a hydrologic condition of concern if the change would have a significant impact on downstream erosion compared to the pre-development condition or have significant impacts on stream habitat, alone or as part of a cumulative impact from development in the watershed.

This project- specific WQMP must address the issue of Hydrologic Conditions of Concern unless one of the following conditions is met:

- **Condition A:** Runoff from the Project is discharged directly to a publicly-owned, operated and maintained MS4; the discharge is in full compliance with Co-Permittee requirements for connections and discharges to the MS4 (including both quality and quantity requirements); the discharge would not significantly impact stream habitat in proximate Receiving Waters; and the discharge is authorized by the Co-Permittee.

- **Condition B:** The project disturbs less than 1 acre. The disturbed area calculation should include all disturbances associated with larger plans of development.

- **Condition C:** The project's runoff flow rate, volume, velocity and duration for the post-development condition do not exceed the pre-development condition for the 2-year, 24-hour and 10-year 24-hour rainfall events. This condition can be achieved by minimizing impervious area on a site and incorporating other site-design concepts that mimic pre-development conditions. This condition must be substantiated by hydrologic modeling methods acceptable to the Co-Permittee.

This Project meets the following condition: Condition C

The project meets Condition C of the Riverside County Water Quality Management Plan for urban runoff dated 10/22/12, as the greater of 2 year 24-hour or 10 year 24-hour storm event flows are mitigated on-site and reduced to below or near existing condition prior to release in the or storm drain system as required by the Copermitee.

A series of onsite storm drain systems will be constructed. Catch basins will be fitted with inserts designed to capture larger floatables and debris, as well as providing some filtration of hydrocarbons. Downstream manholes will be fitted with restrictor plates to limit outlet flows to no more than the pre-development condition. Underground storage chambers will be installed to provide additional filtration treatment. The soil characteristics are such that infiltration is too low to be utilized for infiltration so the structures will be founded on porous material containing under drains to direct filtered water to the storm drain system.

(*See Appendix C – Supporting Detail Related to Hydrologic Conditions of Concern*)

V. Best Management Practices

V.1 Site Design BMPs

Table 1. Site Design BMPs

Design Concept	Technique	Specific BMP	Included		
			Yes	No	N/A
Site Design Concept 1	*Minimize Urban Runoff*	1. Maximize the permeable area (See Section 4.5.1 of the WQMP).	(1)		
		Incorporate landscaped buffer areas between sidewalks and streets.	(2)		
		Maximize canopy interception and water conservation by preserving existing native trees and shrubs, and planting additional native or drought tolerant trees and large shrubs.	(3)		
		Use natural drainage systems.		(4)	
		Where soils conditions are suitable, use perforated pipe or gravel filtration pits for low flow infiltration.		(5)	
		Construct onsite ponding areas or retention facilities to increase opportunities for infiltration consistent with vector control objectives.		(5)	
		Other comparable and equally effective site design concepts as approved by the Co-Permittee (Note: Additional narrative required to describe BMP and how it addresses Site Design concept).	(6)		

(1) The site will incorporate landscaping percentage greater than the minimum required by the City Guidelines. All parking spaces are incorporating a two foot overhang to reduce paving area and increase landscape area. Minimum width meandering walkways are being used to increase the pervious landscape areas.

(2) Prielipp Road, Elizabeth Lane and Jana Lane will include a landscaped parkway adjacent to the curb and gutter and the right of way. A landscape buffer will be utilized onsite wherever possible.

(3) The site development will plant native/drought tolerant trees and shrubs as part of the site landscape concept. This site design concept can be achieved.

(4) The site will consist of developing the entire project acreage so all existing natural drainage systems will be altered.

(5) The project site does not meet minimum infiltration rates and is not suitable for infiltration, see Appendix E.

(6) The project proposes to use underground detention systems with underdrains.

Table 1. Site Design BMPs (Cont'd)

Design Concept	Technique	Specific BMP	Included		
			Yes	No	N/A
Site Design Concept 2	*Minimize Impervious Footprint*	Maximize the permeable area (See Section 4.5.1 of the WQMP).	(1)		
		Construct walkways, trails, patios, overflow parking lots, alleys, driveways, low-traffic streets and other low -traffic areas with open-jointed paving materials or permeable surfaces, such as pervious concrete, porous asphalt, unit pavers, and granular materials.	(2)		
		Construct streets, sidewalks and parking lot aisles to the minimum widths necessary, provided that public safety and a walk able environment for pedestrians are not compromised.	(3)		
		Reduce widths of street where off-street parking is available.		(4)	
		Minimize the use of impervious surfaces, such as decorative concrete, in the landscape design.	(5)		
Site Design Concept 3	*Conserve Natural Areas*	Other comparable and equally effective site design concepts as approved by the Co-Permittee (Note: Additional narrative required describing BMP and how it addresses Site Design concept).	(6)		
		Conserve natural areas (See WQMP Section 4.5.1).		(7)	
		Maximize canopy interception and water conservation by preserving existing native trees and shrubs, and planting additional native or drought tolerant trees and large shrubs.	(8)		
		Use natural drainage systems.		(7)	
		Other comparable and equally effective site design concepts as approved by the Co-Permittee (Note: Additional narrative required describing BMP and how it addresses Site Design concept).		(9)	

(1) The site will incorporate landscaping percentage greater than the minimum required by the City Guidelines. All parking spaces are incorporating a two foot overhang to reduce paving area and increase landscape area. Minimum width meandering walkways are being used to increase the pervious landscape areas.
(2) The project site does not meet minimum infiltration rates and is not suitable for infiltration, see Appendix E.
(3) The driveways will be constructed to minimum width as required by the City departments.
(4) Streets are to be constructed to the minimum City requirements.
(5) No decorative pavement proposed in landscape areas.
(6) On site retention/filtration systems is proposed for the appropriate treatment
(7) The site will consist of developing the entire project acreage so all existing natural drainage systems will be altered.
(8) The site development will plant native/drought tolerant trees and shrubs.
(9) None proposed.

Table 1 Site design BMPs (Cont'd)

Design Concept	Technique	Specific BMP	Included		
			Yes	No	N/A
Site Design Concept 4	*Minimize Directly Connected Impervious Areas (DCIAs)*	Residential and commercial sites must be designed to contain and infiltrate roof runoff, or direct roof runoff to vegetative swales or buffer areas, where feasible.	(1)		
		Where landscaping is proposed, drain impervious sidewalks, walkways, trails, and patios into adjacent landscaping.	(2)		
		Increase the use of vegetated drainage swales in lieu of underground piping or imperviously lined swales.	(3)		
		Rural swale system: street sheet flows to vegetated swale or gravel shoulder, curbs at street corners, culverts under driveways and street crossings.	(4)		
		Urban curb/swale system: street slopes to curb; periodic swale inlets drain to vegetated swale/biofilter.	(4)		
		Dual drainage system: First flush captured in street catch basins and discharged to adjacent vegetated swale or gravel shoulder, high flows connect directly to MS4s.	(4)		
		Design driveways with shared access, flared (single lane at street) or wheel strips (paving only under tires); or, drain into landscaping prior to discharging to the MS4.		(5)	
		Uncovered temporary or guest parking on private residential lots may be paved with a permeable surface, or designed to drain into landscaping prior to discharging to the MS4.		(4)	
		Where landscaping is proposed in parking areas, incorporate landscape areas into the drainage design.	(4)		
		Overflow parking (parking stalls provided in excess of the Co-Permittee's minimum parking requirements) may be constructed with permeable paving.		(6)	
		Other comparable and equally effective design concepts as approved by the Co-Permittee (Note: Additional narrative required describing BMP and how it addresses Site Design concept).		(6)	

(1) The project proposes to allow for the roof runoff thru Roof downspouts to be directed /treated on site to drain thru the perimeter landscape areas as the initial treatment but the waters will be directed to the onsite filtration systems.
(2) Interior walkways are designed to flow across landscape areas, where possible, prior to flowing to the onsite filtration systems.
(3) Underground piping will be used only where there is insufficient slope for swales.
(4) All flows are directed to the onsite filtration systems.
(5) Driveways are per City of Wildomar zoning requirements.
(6) None proposed.

V.2 Source Control BMPs

Table 2. Source Control BMPs

BMP Name	Check One		If not applicable, state brief reason
	Included	Not Applicable	
Non-Structural Source Control BMPs			
Education for Property Owners, Operators, Tenants, Occupants, or Employees	✷✷		
Activity Restrictions	✷✷		
Irrigation System and Landscape Maintenance	✷✷		
Common Area Litter Control	✷✷		
Street Sweeping Private Streets and Parking Lots	✷✷		
Drainage Facility Inspection and Maintenance	✷✷		
Structural Source Control BMPs			
MS4 Stenciling and Signage	✷✷		
Landscape and Irrigation System Design	✷✷		
Protect Slopes and Channels	✷✷		
Provide Community Car Wash Racks		✷✷	NOT A PART OF
Properly Design:			
Fueling Areas		✷✷	NOT A PART OF
Air/Water Supply Area Drainage		✷✷	NOT A PART OF
Trash Storage Areas	✷✷		
Loading Docks		✷✷	NOT A PART OF
Maintenance Bays		✷✷	NOT A PART OF
Vehicle and Equipment Wash Areas		✷✷	NOT A PART OF
Outdoor Material Storage Areas		✷✷	NOT A PART OF
Outdoor Work Areas or Processing Areas		✷✷	NOT A PART OF
Provide Wash Water Controls for Food Preparation Areas		✷✷	NOT A PART OF

Description of Source Control BMPs

Non-Structural Source Control BMPs:

Education/Training for Property Owners, Operators, Tenants, Occupants, or Employees
This property owner through its appropriate management personnel will annually provide environmental awareness education materials to responsible employees. These materials shall include general housekeeping practices that contribute to the protection of Urban Runoff quality and BMPs that eliminate or reduce pollution during subsequent property improvements. These materials or a resource list for obtaining these materials will be available through the City of Wildomar. The City may elect to recover printing costs for such materials. The property manager shall request these materials (in writing) at least 30 days prior to the intended distribution date.
This project will have people who will be employed or contracted to perform activities that may impact Urban Runoff. BMP training and education programs will be provided by the property manager to all new employees within 6 months of hire date and annually thereafter. Employees training materials may be derived from educational materials available in Appendix D of this WQMP, or through the City of Wildomar or other resources such as "Stormwater Best Management Practices Handbook for Industrial and Commercial" (CASQA, 2003). The most recent editions of the CASQA handbooks can be downloaded at www.cabmphandbooks.com.

Activity Restrictions
The owner shall prepare tenant rules for the purpose of Receiving Water quality protection. Alternatively, use restrictions are included in this WQMP. Examples of activity restrictions are:

- Prohibiting the blowing, sweeping, or hosing of debris (leaf litter, grass clippings, litter, etc.) into streets, storm drain inlets, or other conveyances.
- Require dumpster lids to be closed at all times.
- Prohibit vehicle washing, maintenance, or repair on the premises or restrict those activities to designated areas.

Irrigation System and Landscape Maintenance
Maintenance of irrigation systems and landscaping shall be consistent with the City's water conservation ordinance, which can be accessed through the City's website or obtained through the City's planning/permitting counter. Fertilizer and pesticide usage shall be consistent with the instructions contained on product labels and with regulations administered by California's Department of Pesticide Regulation. Pesticide use shall be at a minimum and should not be applied prior to rainfall events. Additionally, landscape maintenance shall include replacement of dead vegetation, repair of erosion rills, proper disposal of green waste, etc. Irrigation system maintenance will include periodic testing and observation of the irrigation system to detect overspray, broken sprinkler heads, and other system failures. The property manager will specify the frequency of irrigation system and landscape maintenance activities.

Common Area Litter Control
Trash receptacles will be provided in common areas. Emptying of trash receptacles, the frequency with which trash receptacles will be emptied, patrolling common areas and perimeter fences or walls to collect litter, noting trash disposal violations by tenants and reporting such observations to the property manager for investigation will be specified by the owner through its designated manager or agent.

Street Sweeping Private Street and Parking Lots
Parking lots shall be swept at least bi-weekly, including just prior to the start of the rainy season (October 1st) or as specified by the owner.

Drainage Facility Inspection and Maintenance

Routine maintenance of the onsite drainage facilities should take place quarterly and in the late summer or early fall prior to the start of the rainy season (October 1st). The drainage facilities must be cleaned of accumulated sediment/debris if any fills 25% or more of the sediment/debris storage capacity. The onsite drainage facilities shall be inspected annually and the cleaning frequency shall be assessed by the owner and modified as needed.

Structural Source Control BMPs

Stenciling and Signage

Stenciling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language (such as: "NO DUMPING ONLY RAIN IN THE DRAIN") and/or graphical icons to discourage illegal dumping will be provided.
The owner shall be responsible for maintaining the legibility of stencils and signs.

Landscape and Irrigation System Design

Rain shutoff devices shall be employed to prevent irrigation during and after precipitation events. Irrigation systems shall be designed to each landscape area's specific water requirements. Flow reducers or shutoff valves triggered by a pressure drop to control water loss due to broken sprinkler heads or lines shall be provided in the system design. Timing and application methods of irrigation water shall be designed to minimize the runoff of excess irrigation water. Other comparable, equally effective methods to reduce irrigation water runoff shall be employed. The project landscape plan shall be consistent with the City's water conservation ordinance. The site landscaping shall:

- Utilize plants with low irrigation requirements (for example, native or drought tolerant species)
- Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface infiltration.
- Use mulches (such as wood chips or shredded wood products) in planter areas without ground cover to minimize sediment in runoff.
- Install appropriate plant materials for the location, in accordance with amount of sunlight and climate, and use native plant material where possible and /or as recommended by the landscape architect.
- Utilize plants that minimize or eliminate the use of fertilizer or pesticides to sustain growth.
- Do not apply pesticides immediately prior to rainfall events.

.

Trash Storage Areas

All trash container areas shall meet the following requirements:

1. Paved with an impervious surface, designed not to allow run-on from adjoining areas, designed to divert drainage from adjoining roofs and pavements around the area, screened or walled to prevent off-site transport of trash.
2. Trash dumpsters (containers) shall be leak proof and have attached covers or lids, which are to remain closed.
3. Trash enclosures shall be on a concrete pad. The pad shall be a minimum of one foot larger all around than the trash bins and sloped to drain to the adjacent driveway.

V.3 Treatment Control BMPs

Description

Infiltration and Re-Use BMPs were considered and found to be infeasible. *(See Appendix F)* Therefore, the BMP Treatment will consist of three detention/sand filtration systems with underdrains. All storm flows will be directed to the treatment facilities. First flush flows will be treated in the treatment facilities and larger storm events will bypass at a mitigated rate and conveyed to offsite. The system will retain the incremental increase of a 2yr. storm event, 10 year storm event, or the BMP Design Volume, whichever is greater.

The onsite storm drain system will be located in drive aisles. Roof drains will be directed to landscape areas where practically all catch basins will be fitted with filter inserts.

Proprietary storage devices shall be used for storage of treatment and/or detention volumes. The device chosen for use of this project are manufactured by Kristar Enterprises and are sold under the trade name of CUDO. Detailed information for this product is contained in Appendix F. The existing soil conditions are not conducive to infiltration so a sand filter with underdrain will be placed underneath the CUDO structures to allow treatment by filtration.

The systems are designed and constructed to substantially treat the stormwaters and meet the criteria of medium to high efficiency for the removal of the expected pollutants.

Inspection and Maintenance

Routine maintenance of the onsite drainage facilities should take place quarterly and in the late summer or early fall prior to the start of the rainy season (October 1st), and as directed in section VI. Operation and Maintenance Responsibility for Treatment Control BMPs of this WQMP. The drainage facilities must be cleaned of accumulated sediment/debris if any fills 25% or more of the sediment/debris storage capacity. Catch basin inserts shall be cleaned quarterly, monthly during the rain season, and inspected after each rain.

Table 3: Treatment Control BMP Selection Matrix

Pollutant of Concern		Treatment Control BMP Categories[9]							
		Veg. Swale /Veg. Filter Strips [2]	**Detention Basins[2]**	**Infiltration Basins/ Trenches/Porous Pavement[3][10] [4}**	**Wet Ponds or Wetlands**	**Sand Filter or Filtration**	**Water Quality Inlets**	**Hydrodynamic Separator Systems [4]**	**Manufactured/ Proprietary Devices**
Sediment/Turbidity		H/M	M	H/M	H/M	H/M	L	H/M (L for turbidity)	U
Yes/No?	No								
Nutrients		L	M	H/M	H/M	L/M	L	L	U
Yes/No?	Yes					X			
Organic Compounds		U	U	U	U	H/M	L	L	U
Yes/No?	No								
Trash & Debris		L	M	U	U	H/M	M	H/M	U
Yes/No?	No								
Oxygen Demanding Substances		L	M	H/M	H/M	H/M	L	L	U
Yes/No?	Yes					X			
Bacteria & Viruses		U	U	H/M	U	H/M	L	L	U
Yes/No?	Yes					X			
Oils & Grease		H/M	M	U	U	H/M	M	L/M	U
Yes/No?	No								
Pesticides (non-soil bound)		U	U	U	U	U	L	L	U
Yes/No?	Yes					X			
Metals		H/M	M	H	H	H	L	L	U
Yes/No?	Yes					X			

[1] This represents the additional storage of the Design Volume below the proposed bioretention facilities, where the volume will infiltrate over time.

Abbreviations:
L: Low removal efficiency
H/M: High or medium removal efficiency U: Unknown removal efficiency
Notes:

(1) Periodic performance assessment and updating of the guidance provided by this table may be necessary.
(2) Includes grass swales, grass strips, wetland vegetation swales, and bioretention.
(3) Includes extended/dry detention basins with grass lining and extended/dry detention basins with impervious lining. Effectiveness based upon minimum 36-48-hour drawdown time.
(4) (4) Includes infiltration basins, filtration trenches, and porous pavements. {{ Underground Detention system }}
(5) Includes permanent pool wet ponds and constructed wetlands.
(6) Includes sand filters and media filters.
(7) Also known as hydrodynamic devices, baffle boxes, swirl concentrators, or cyclone separators.
(8) Includes proprietary stormwater treatment devices as listed in the CASQA Stormwater Best Management Practices Handbooks, other stormwater treatment BMPs not specifically listed in this WQMP, or newly developed/emerging stormwater treatment technologies.
(9) Project proponents should base BMP designs on the Riverside County Stormwater Quality Best Management Practice Design Handbook. However, project proponents may also wish to reference the California Stormwater BMP Handbook – New Development and Redevelopment (www.cabmphandbooks.com). The Handbook contains additional information on BMP operation and maintenance.
(10) Note: Projects that will utilize infiltration-based Treatment Control BMPs (e.g., Infiltration Basins, Filtration trenches, Porous Pavement) must include a copy of the property/project soils report as Appendix E to the FINAL project- specific WQMP. The selection of a Treatment Control BMP (or BMPs) for the project must specifically consider the effectiveness of the Treatment Control BMP for pollutants identified as causing an impairment of Receiving Waters to which the project will discharge Urban Runoff.

V.4 Equivalent Treatment Control Alternatives

NOT APPLICABLE

V.5 Regionally-Based Treatment Control BMPs

NOT APPLICABLE.

VI. Operation and Maintenance Responsibility for Treatment Control BMPs

The project proposes the use of an underground storm chamber system, which will be incorporated with the onsite storm water collection system as the primary treatment control BMPs. The systems will be maintained by the owner through its duly authorized manager, contractor or agent. A preliminary maintenance schedule is offered below. Records of BMP inspectors, maintenance and water quality monitoring will be kept on file with the property manager.

Treatment Control BMPs	Inspection Frequency	Maintenance
Fertilizers and Pesticides	Fertilizer and Pesticide usage shall be consistent with the instructions contained on product labels and with regulations administered by California's Department of Pesticide Regulation. Pesticide use shall be at a minimum and should not be applied prior to rainfall events	
Catch Basins with Inserts	Quarterly, monthly during the rain season and after all rain events	Clean trash and debris from insert, excavate, pump or vacuum sediments
Landscape grass/ vegetated swales	Weekly inspection and maintenance during construction. Quarterly inspection and weekly maintenance project completion	Requires inspection of sediment buildup. Mow, weed, trim and remove accumulation of trash and debris. Blow waste onto landscape areas and sweep up, do not blow into street or near drainage inlets.
Storm Drains	Annually	Excavate, pump or vacuum sediments
Underground Detention System	Quarterly and early fall prior to October 1	Jetvac sediments in chambers

The above schedule is preliminary in nature. Frequency of inspection and maintenance of the facilities can be altered to respond to rainstorm events, type and quantity of debris found in the system and to adjust to site specific needs or demands.

The owner will conduct visual inspections of the source control and treatment control BMPs in accordance with schedule set forth on above. Operations of the BMPs listed in this WQMP will commence at the start of, during and after construction. Once the project is completed and the BMPs implemented the measures set forth on this WQMP will continue perpetuity. Water quality monitoring is not proposed as part of this project.

The owner will conduct visual inspections of the source control and treatment control BMPs in accordance with the schedule set forth on the Table above. Water quality monitoring is not proposed as part of this project.

<u>Typical Inspection and Maintenance Procedures</u>

All inspection and maintenance procedures shall be conducted in a safe manner in conformance with all local, State and Federal laws and guidelines.

Catch Basins

1. Inspect catch basins and manholes upstream of infiltration chambers for sediment.
2. Remove grate or cover.
3. Remove trash and debris from catch basin insert.
4. Skim off oils and floatables.
5. Using a tape measure, measure the depth of sediment.
6. If sediment is at a depth greater than 6" proceed to step 7. If not proceed to step 8.
7. Vacuum or manually remove sediment.
8. Replace grate
9. Record depth and date and schedule next inspection.

Underground Detention System

Step 1 - Inspect for sediment

A) Inspection manholes
   - Remove lid from frame.
   - Using a flashlight and stadia rod, measure depth of sediment.
   - If sediment is at, or above 3 inch depth proceed to Step 2. If not proceed to Step 3.

B) Pipes
C) Remove cover from manhole at upstream end.
D) Using a flashlight, inspect pipelines.
E) Mirrors on poles or cameras may be used to avoid a confined space entry.
F) Follow OSHA regulations for confined space entry if entering manhole.
G) If sediment depth is greater than 25% of the pipe diameter, proceed to Step 2. If not, proceed to Step 3.

Step 2 - Clean out pipelines using the JetVac or similar process.

A) A fixed culvert cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable.
B) Apply multiple passes of JetVac until backflush water is clean.

Step 3 - Replace manhole lids.

Step 4 - Dispose of vacuumed waste at the appropriate City/County disposal site.

Maintenance Records

Records of inspection and maintenance of the onsite Treatment Control BMPs will be maintained by the owner/property manager. Records will be kept onsite at the property manager's office. Until the property manager is established, records will be maintained by the owner / property manager and shall maintain a minimum of a three year history.

The following is a sample of the appropriate guidelines for maintenance and serves as a record –keeping document and is the full responsibility and accountability of the Owner . See herein as attached / Inspection Checklist

Inspection and Maintenance Checklist

DATE OF INSPECTION: TIME DATE: AM/PM CIRCLE
INSPECTED BY:

PRINT NAME _____

SIGNATURE _____

The designated Site Inspector shall use the following guidelines, Section VI of the WQMP and sheets in Appendix D for maintenance, inspection, and repair of BMPs identified in the WQMP. Include any comments in the box to the right, including reparations made or needed. If reparations are needed, please provide a follow up date. The completed checklist shall be filed in order to keep a record of what was done.

BEST MANAGEMENT PRACTICE	INSPECTION FREQUENCY	MAINTENANCE FREQUENCY	OBSERVATIONS /COMMENTS
Educate Operators, Tenants, Contractors or Employees	Annually in September (before rainy season)	N/A	
Activity restrictions	Annually in September (before rainy season)	N/A	
Irrigation systems and landscape maintenance	monthly	As needed based on maintenance indicators	
Pesticides	Annually	N/A	Review application procedures with Landscape Maintenance Company
Common area litter control	n/a	Routine litter pick up	
Street sweeping of parking lots	N/A	Bi –monthly coordinate with the city street sweeping	
Protect slopes and channels	Annually in September before rainy season	As needed planting and removal of debris and silt accumulation and repair vegetation as needed in eroded areas	
Trash storage areas	- Weekly - As needed	Coordinate weekly trash pick-up; - Inspect dumpsters to be leak proof - keep lids closed	

BEST MANAGEMENT PRACTICE	INSPECTION FREQUENCY	MAINTENANCE FREQUENCY	OBSERVATIONS /COMMENTS
Catch Basins with Inserts	Quarterly and after all storm events	After each rain / major storm event; see that the outfall inlet is kept clear of debris. All CB inserts need to be maintained and either cleaned or replaced as necessary	
Underground Detention System	Quarterly and early fall prior to October 1	Ensure that water entering the system is not polluted with onsite debris that has been lying near the inlets. (see notes below)	

- Do not blow any grass clippings or any other waste into the areas of the inlet of the Underground Storm Chamber System
- A major storm event is any storm that results in 1.90 inches of rain or more in a 24 hour period; maintenance of the Underground Storm Chamber System needs to be addressed after these major events
- It is the full responsibility of the owner to see that all M/O for all BMPS are implemented to the satisfaction and full requirements of this WQMP
- The Developer / owner shall comply and follow the manufacturer's guidelines/ recommendations / procedures for the efficient and designed required maintenance of the underground storm chamber system. An Inspection and Maintenance Guideline from the manufacturer is included in Appendix D.

BMP TRAINING ACKNOWLEDGEMENT FORM

By signing this form, the undersigned certifies that he/she has received the listed materials and training to meet the requirements for the operation and maintenance of BMPS that he/she is responsible for. The undersigned also acknowledges that punitive actions may be imposed if he/she fails to comply. The punitive actions can be in terms of a monetary fine or termination of the contract or the rights that are contractually transferred to the undersigned. If necessary, the owner or public agencies may complete the corrective actions and bill the undersigned; if necessary the owner or public agencies may complete corrective actions and bill the undersigned

ITEM	TRAINING DESCRIPTION	RELATED BMPS	HANDOUT MATERIALS	COMMENTS

BUSINESS NAME _____ Title/position _____

Signature _____ Date _____

EDUCATIONAL LOG

NAME	DATE	WQMP MATERIALS PROVIDED

VII. Funding

The owner will privately fund the operation and maintenance for treatment control BMPs. The owner will advise a potential new property owner or tenant of the responsibility to maintain and operate Treatment Control BMPs listed in the Water Quality Management Plan.

Project Owner / Developer

JIM KIECKHAFER
GOLDEN EAGLE MULTI FAMILY PROPERTIES, LLC
6201 OAK CANYON, SUITE 250
IRVINE, CA 92618
949-270-7800

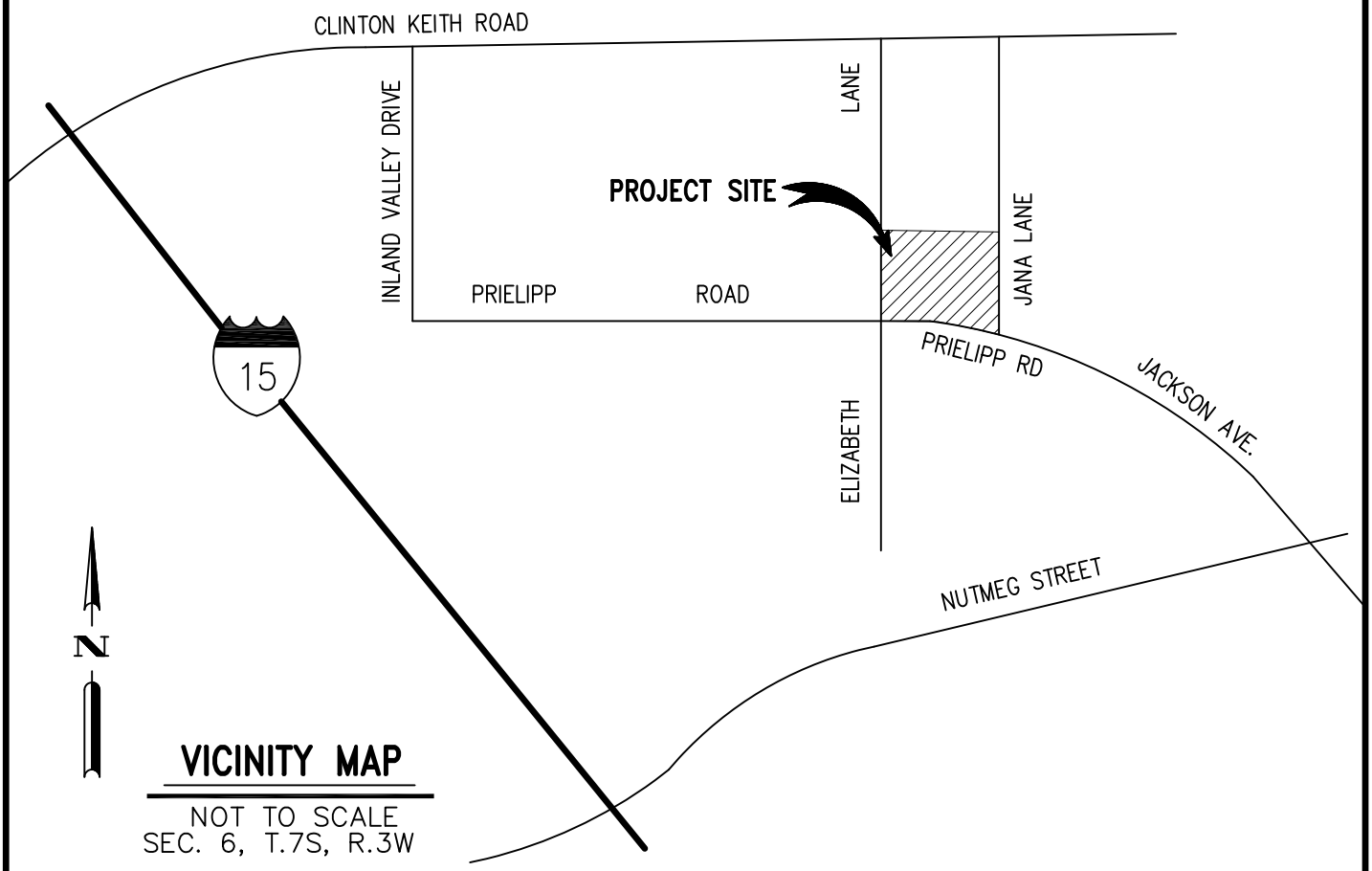
APPENDIX A

Conditions of Approval
(Preliminary – Not Available)

APPENDIX B

Vicinity Map

Site/ WQMP Plan



VICINITY MAP

NOT TO SCALE
SEC. 6, T.7S, R.3W

VILLA SIENA
WILDOMAR, CA
PA 13-0089

PACIFIC COAST LAND CONSULTANTS, Inc.
CIVIL ENGINEERING * LAND PLANNING * LAND SURVEYING
25096 JEFFERSON AVENUE SUITE "D"
MURRIETA, CALIFORNIA 92562
TEL. (951) 698-1350

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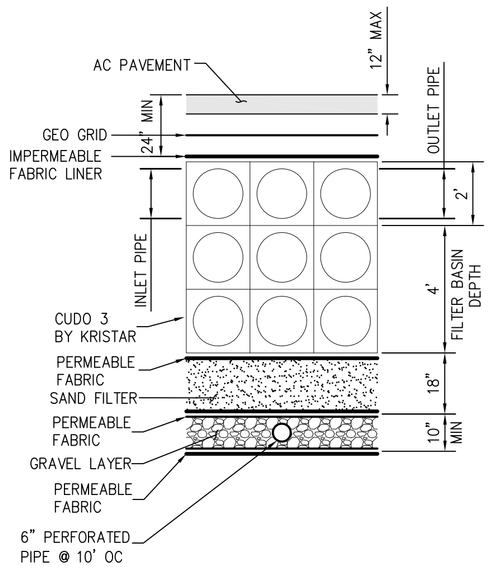
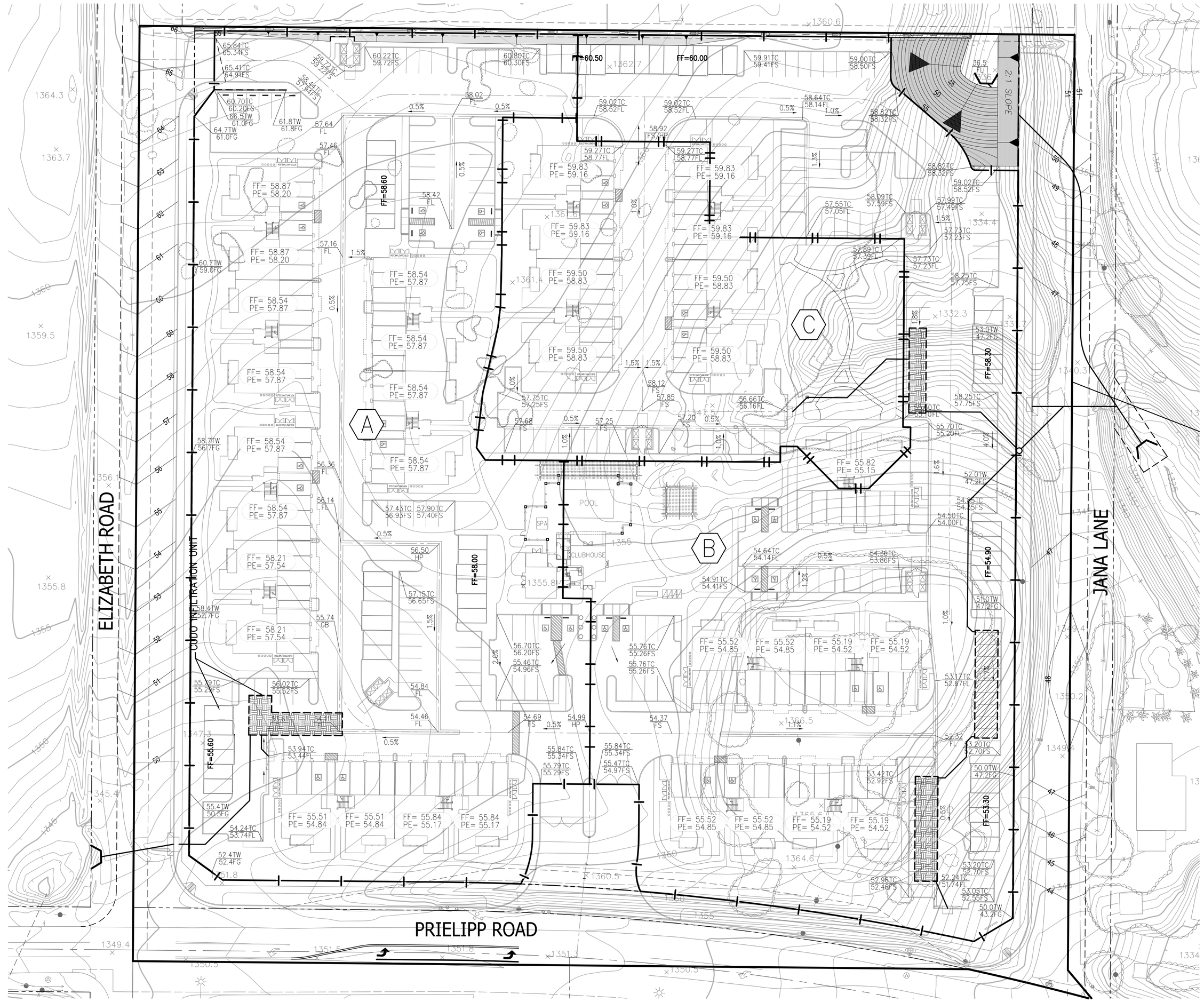


TYPICAL SECTION DETENTION / FILTRATION WITH UNDERDRAIN BMP

NOT TO SCALE

LEGEND:

- (A) DRAINAGE MANAGEMENT AREA
- DMA BOUNDARY
- FILTRATION & DETENTION AREA
- DETENTION AREA
- STORM DRAIN



N

GRAPHIC SCALE

40 0 20 40 80 120

1 inch = 40 ft.

DRAINAGE MGMT. AREA	IMPERVIOUS AREA–A_I (AC)	PERVIOUS AREA–A_P (AC)	TOTAL AREA–A_T (AC)	A_I %	A_P %	BMP VOLUME CF	SAND FILTER AREA REQ'D. SF	BMP PROVIDED SF	ADDITIONAL RETENTION REQ'D. CF	ADDITIONAL BMP PROVIDED CF
A	2.52	0.84	3.36	75	25	4,757	1,189	1,248	–	–
B	2.38	0.79	3.17	75	25	4,488	1,112	1,184	5,071	5,244
C	0.99	0.33	1.32	75	25	1,869	467	504	1,500	1,602

PP 13-0089

DIGALERT

DIAL BEFORE YOU DIG — TWO WORKING DAYS BEFORE YOU DIG

TOLL FREE 1-800-227-2600

A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

NOTE:
WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

The private engineer signing these plans is responsible for assuring the accuracy and acceptability of the design hereon. In the event of discrepancies arising after city acceptance or during construction, the private engineer shall be responsible for determining an acceptable solution and revising the plans for acceptance by the city

MARK	BY	DATE	REVISIONS	APPR.	DATE
ENGINEER				CITY	

CITY OF WILDOMAR
ACCEPTED BY:
Date:
TIM D'ZMURA, Director of Public Works
ACCEPTANCE AS TO CONFORMANCE WITH APPLICABLE CITY STANDARDS AND PRACTICES

SEAL–ENGINEER:
REGISTERED PROFESSIONAL ENGINEER — TRAVIS P. VINCENT JR. — No. 37356 Exp. 6/30/14 — CIVIL — STATE OF CALIFORNIA

PACIFIC COAST LAND CONSULTANTS, Inc.
CIVIL ENGINEERING • LAND PLANNING • LAND SURVEYING
25096 JEFFERSON AVENUE SUITE "D"
MURRIETA, CALIFORNIA 92562
TEL. (951) 698-1350

PREPARED BY: TRAVIS P. VINCENT JR.
R.C.E. No. 37356 EXP. 6-30-14

BENCHMARK:
Elevation = _____
Datum = _____
BENCHMARK # _____

THIS SURVEY WAS PERFORMED ON (date) BY (surveyor) L.S. (number), EXP. (date)

SCALE:
H: As Noted V: As Noted

CITY OF WILDOMAR
VILLA SIENA
PRELIMINARY WQMP SITE PLAN

SHEET No. 1 OF 1 SHTS

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APPENDIX C

Supporting Detail Related to Hydraulic Conditions of Concern

PRELIMINARY HYDROLOGY

The proposed BMP treatment and detention systems are designed to satisfy Condition C of the Hydrologic Conditions of Concern.

The volume to be detained and treated is determined by a comparison of the volumes in existing and developed conditions of 2 year and 10 year 24 hour rainfall events and the BMP volume for an 85th percentile rain event.

The volumes for the 2 year and 10 year rain fall events have been calculated using the Riverside County synthetic unit hydrograph method. As stated in the Riverside County Flood Control and Water Conservation District Hydrology Manual, the short cut synthetic hydrograph method is appropriate for areas of less than 100 to 200 acres and lag times less than 7 to 8 minutes. The project site acreage fits into this consideration and has been used in this study.

The treatment volume resulting from the 85th percentile event has been calculated using the worksheet supplied in the WQMP guidance document for projects within the Santa Margarita River Watershed.

The findings for the various events described above are summarized in the table below. The calculations that generated the tabled values follow.

ASSUMPTIONS

As recommended by Riverside County Flood Control District, a log time of 15 minutes is used for the shortcut method. Therefore, the only variable are Fp and Ai.

Soils Group BC per C-1.52

2 yr. 24 hours storm precipitation = 2.7 in/hr. per Plate E-5.5
100 yr. 24 hour storm precipitation = 6.5 in/hr. per Plate E-5.6
10 yr. 24 hour storm precipitation = 4.25 in/hr. per Plate E-5.7

RI undeveloped = 82 (Plate D-5.5 1 of 2)
RI developed = 63 (Plate D-5.5 1 of 2)
Fp undeveloped = 0.22 (Plate E-6.2)
Fp developed = 0.44 (Plate E-6.2)

The findings for the various events described above are summarized in the table below.

FINDINGS

Area A			
Event	Existing CF	Developed CF	Volume to be retained CF
2 year 24 hour	5,449	9,893	4,444
10 year 24 hour	18,816	23,369	4,553
85th percentile	-	-	4,757
Use	-	-	4,757

Area B			
Event	Existing CF	Developed CF	Volume to be retained CF
2 year 24 hour	3,628	9,333	5,705
10 year 24 hour	12,528	22,047	9,519
85th percentile	-	-	4,448
Use	-	-	9,519

Area C			
Event	Existing CF	Developed CF	Volume to be retained CF
2 year 24 hour	1,683	3,886	2,203
10 year 24 hour	5,812	9,181	3,369
85th percentile	-	-	1,869
Use	-	-	3,369

Since Area A volume to be detained is equal to the BMP volume, no further retention is required. Areas B and C will require additional detention basins down stream of their BMPs to retain the total volume required.

Detention Basin Design

Area B

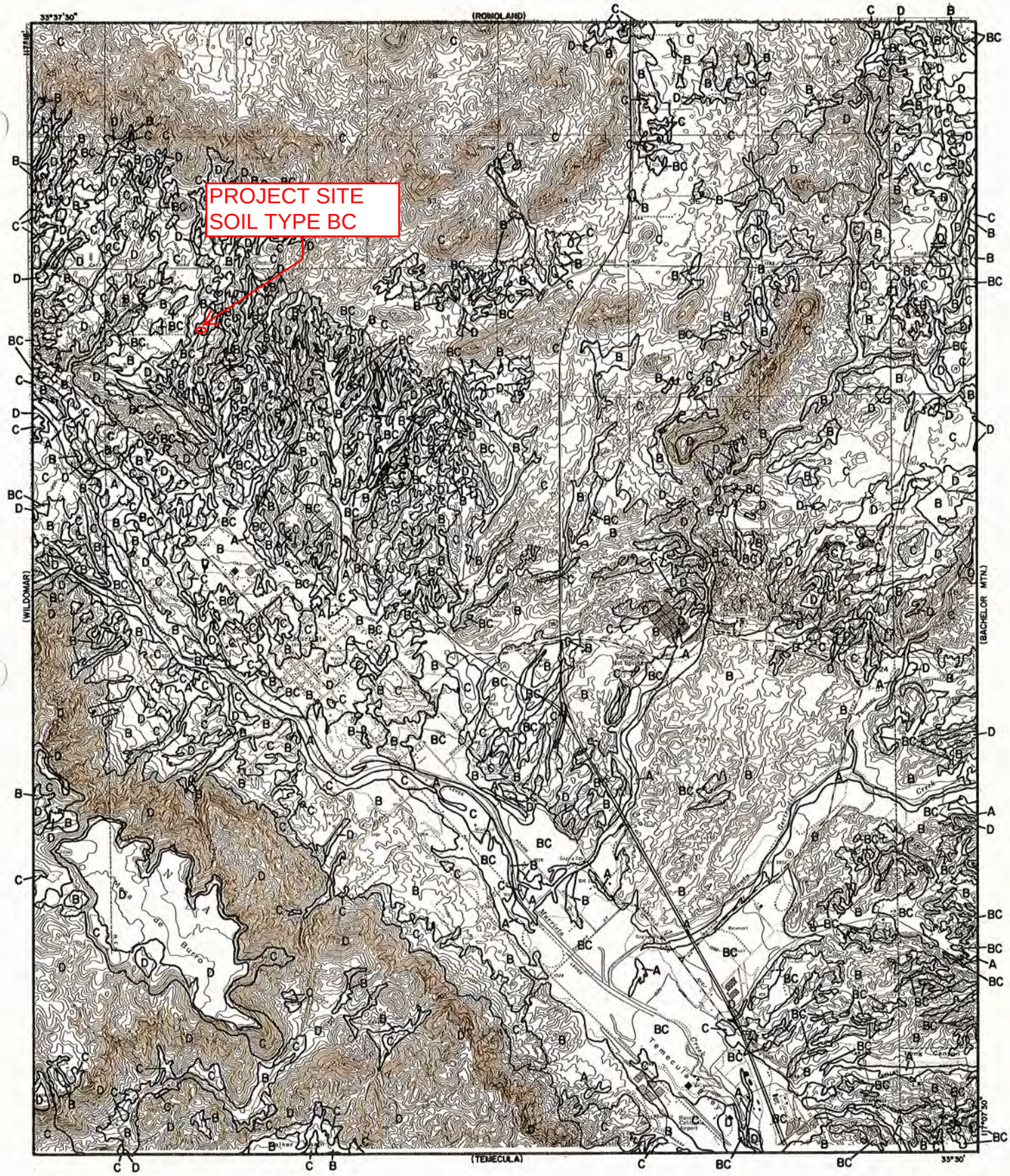
Total Volume = 9,519 CF
BMP Volume = 4,448 CF
Detention Basin Volume = 5,071 CF

No. of CUDO3 228 units @ 23 CF/Unit = 5,244 CF
Area of basin = 6 units wide X 38 units long
= 12' X 76'

Area C

Total Volume = 3,369 CF
BMP Volume = 1,869 CF
Detention Basin Volume = 1,500 CF

No. of CUDO2 units = 104 @ 15.4 CF/Unit = 1,602 CF
Area of basin = 8 units wide X 13 units long
= 16' X 26'



LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC & WCD

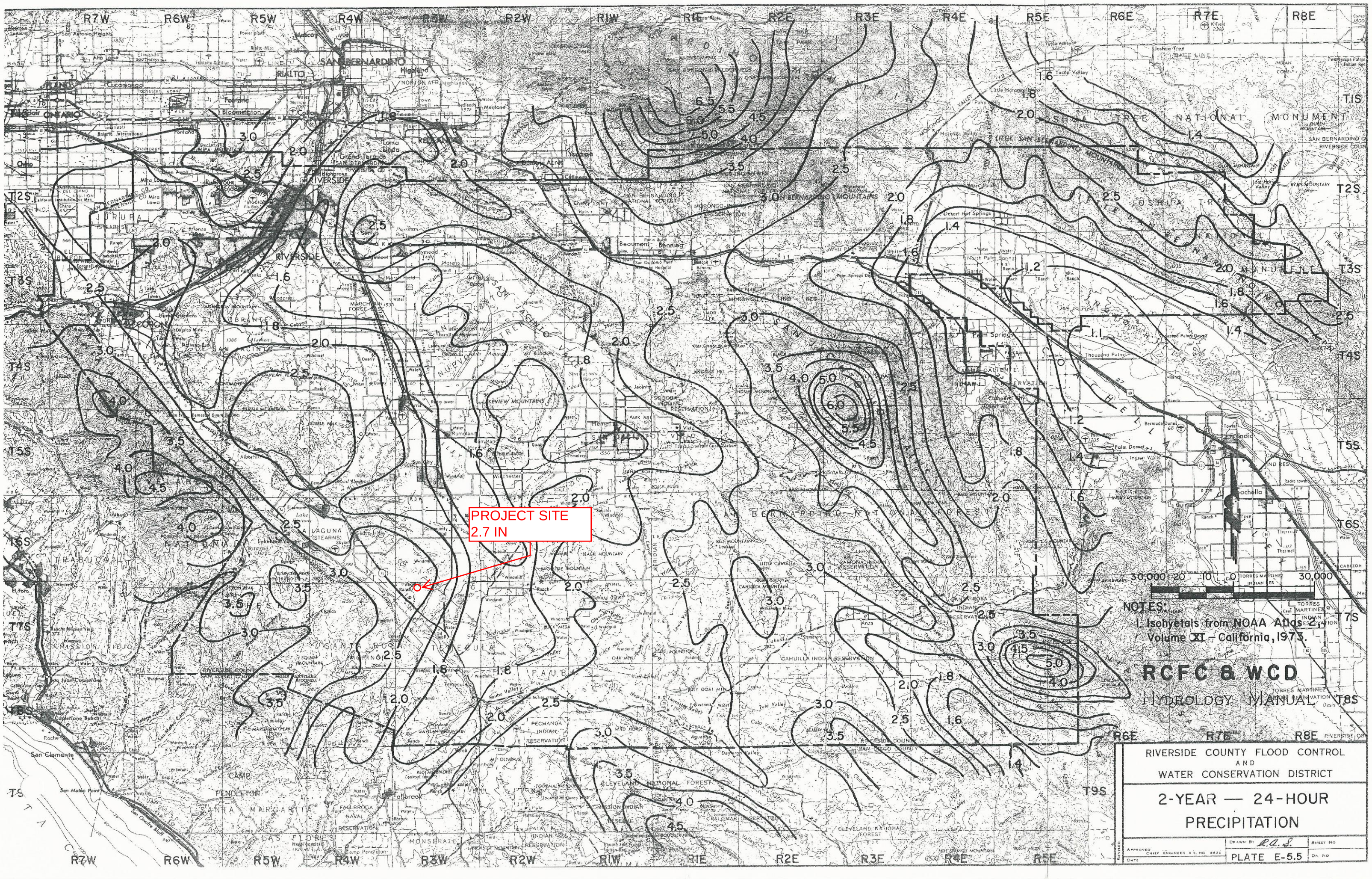
HYDROLOGY MANUAL

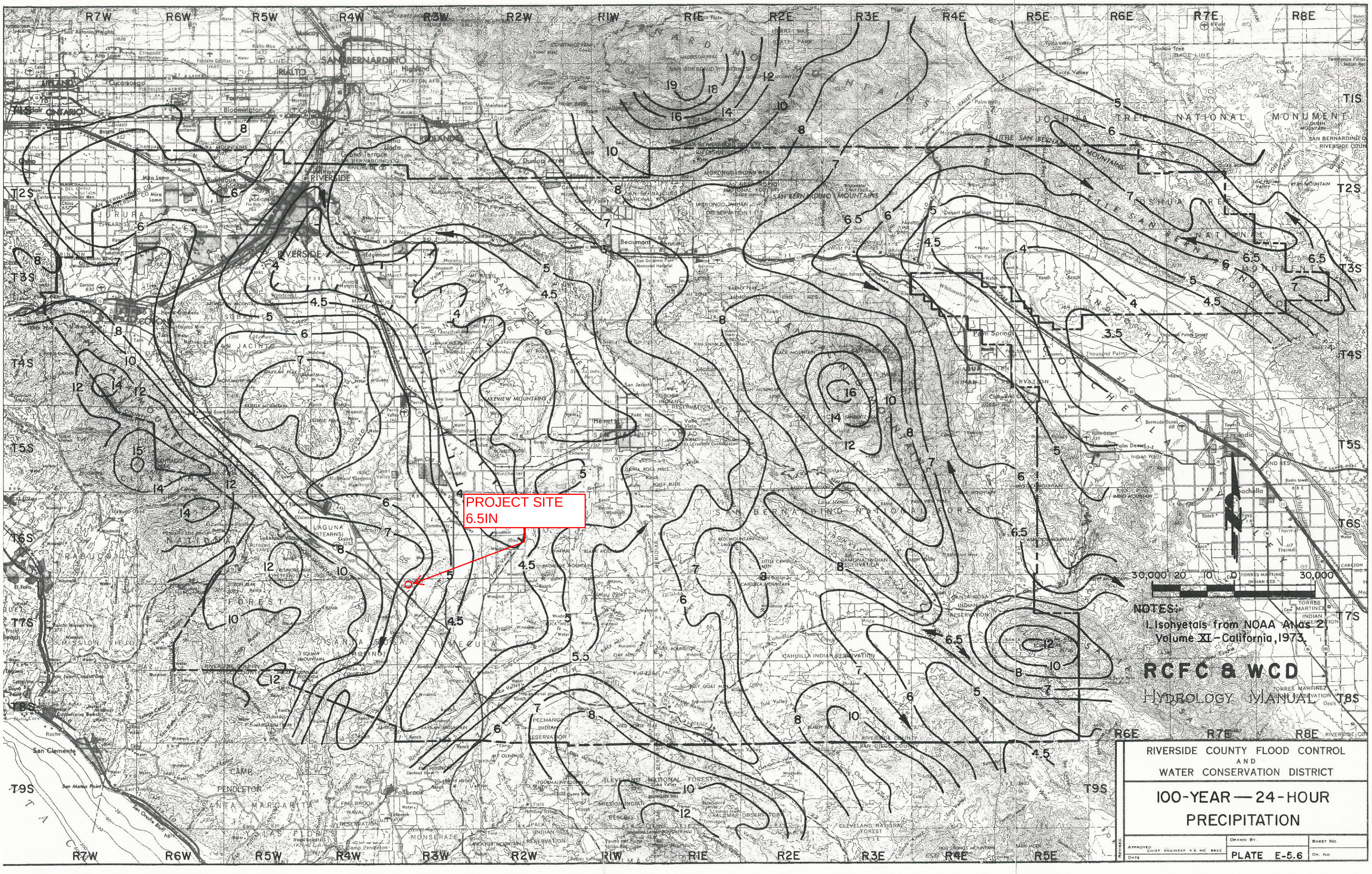
N

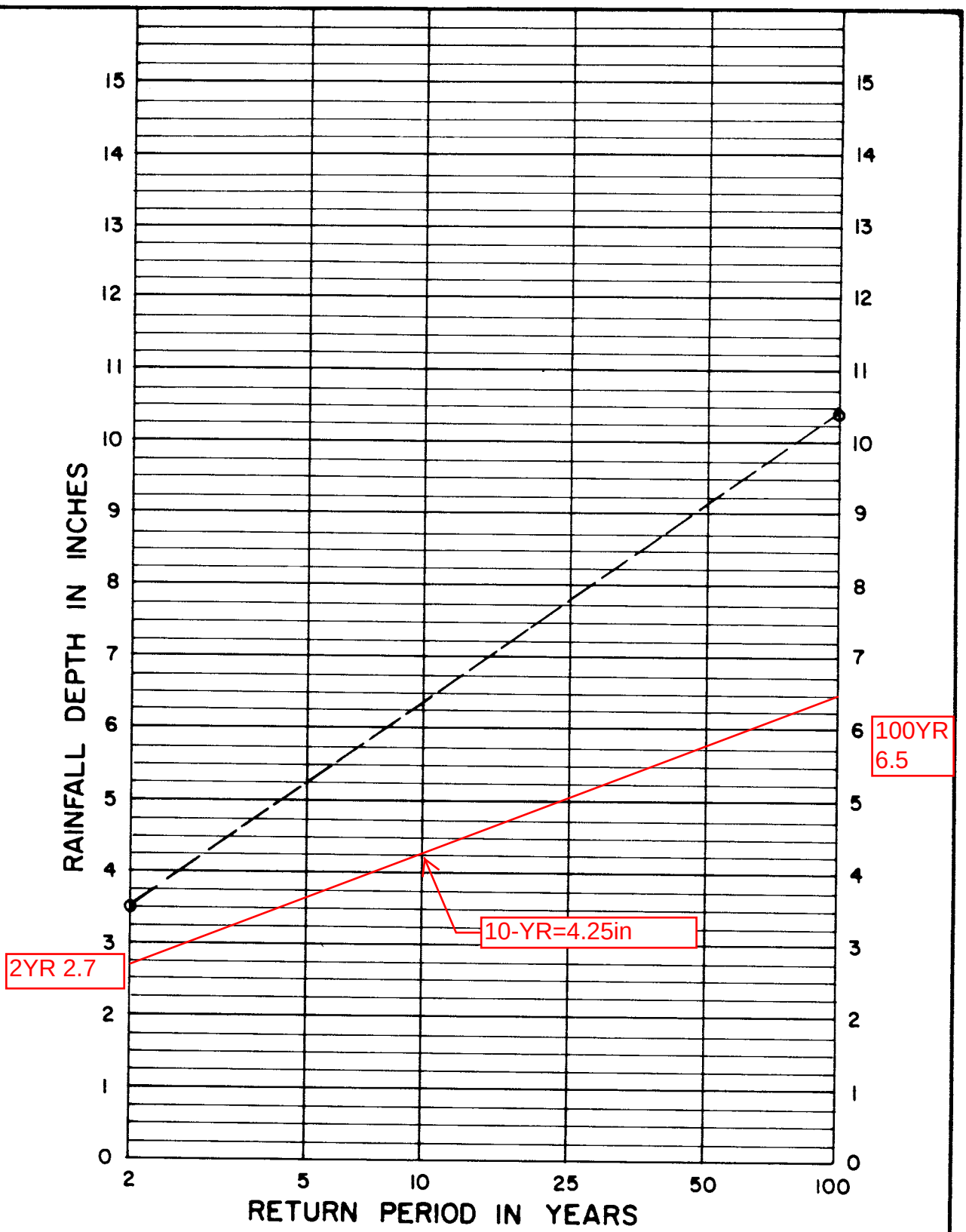
0 FEET 5000

HYDROLOGIC SOILS GROUP MAP FOR MURRIETA

PLATE C-1.52


PROJECT SITE
2.7 IN
NOTES:
1. Isohyetals from NOAA Atlas 2, Volume XI - California, 1973.
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
2-YEAR — 24-HOUR
PRECIPITATION
PLATE E-5.5


PROJECT SITE
6.5IN
NOTES:
1. Isohyetals from NOAA Atlas 2, Volume XI - California, 1973.
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
100-YEAR — 24-HOUR
PRECIPITATION
PLATE E-5.6
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E
R3E
R4E
R5E
R6E
R7E
R8E
T1S
T2S
T3S
T4S
T5S
T6S
T7S
T8S
T9S



NOTE:

1. For intermediate return periods plot 2-year and 100-year values from maps for a specific duration, then connect points and read value for desired return period. For example given 2-year 24-hour = 3.50" and 100-year 24-hour = 10.40", 25-year 24-hour = 7.80"

Reference: NOAA Atlas 2, Volume XI - California, 1973.

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HYDROLOGY MANUAL

RAINFALL DEPTH VERSUS RETURN PERIOD FOR PARTIAL DURATION SERIES

RUNOFF INDEX NUMBERS OF HYDROLOGIC SOIL-COVER COMPLEXES FOR PERVIOUS AREAS-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
NATURAL COVERS -					
Barren (Rockland, eroded and graded land)		78	86	91	93
Chaparrel, Broadleaf (Manzonita, ceanothus and scrub oak)	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparrel, Narrowleaf (Chamise and redshank)	Poor	71	82	88	91
	Fair	55	72	81	86
Grass, Annual or Perennial	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Meadows or Cienegas (Areas with seasonally high water table, principal vegetation is sod forming grass)	Poor	63	77	85	88
	Fair	51	70	80	84
	Good	30	58	72	78
Open Brush (Soft wood shrubs - buckwheat, sage, etc.)	Poor	62	76	84	88
	Fair	46	66	77	83
	Good	41	63	75	81
Woodland (Coniferous or broadleaf trees predominate. Canopy density is at least 50 percent)	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	28	55	70	77
Woodland, Grass (Coniferous or broadleaf trees with canopy density from 20 to 50 percent)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
URBAN COVERS -					
Residential or Commercial Landscaping (Lawn, shrubs, etc.)	Good	32	56	69	75
Turf (Irrigated and mowed grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
AGRICULTURAL COVERS -					
Fallow (Land plowed but not tilled or seeded)		76	85	90	92

82

63

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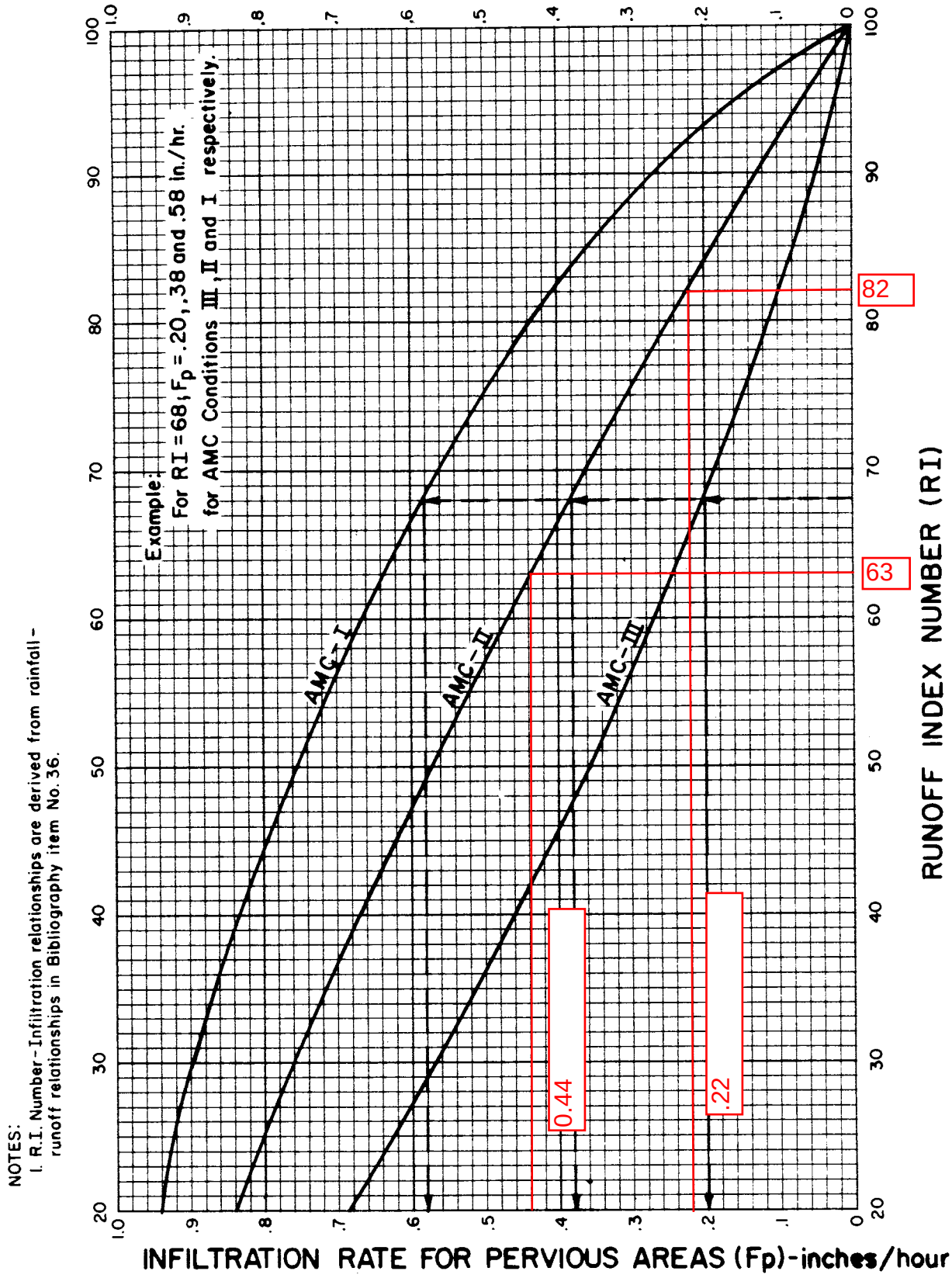
HYDROLOGY MANUAL

RUNOFF INDEX NUMBERS FOR PERVIOUS AREA



NOTES:
1. R.I. Number-Infiltration relationships are derived from rainfall-runoff relationships in Bibliography item No. 36.

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HYDROLOGY MANUAL

INFILTRATION RATE FOR PERVIOUS AREAS VERSUS RUNOFF INDEX NUMBERS

Villa Siena
Area A Undeveloped Condition

area	3.95	[3]		0.0000	L
unit time	15	[5]		0.0000	Lca
LOSS RATE=F				#DIV/0!	H
F=Fp(1.00-0.9Ai)			0.015		n
Fp	0.22			#DIV/0!	Lag
Ai	0			15 min	Use
F	0.2200	[13]			
24 HR 2 YR	2.7	[10]			
C	0.0020				
Fm	0.1100				

[15] UNIT TIME PERIOD	[20] PATTERN PERCENT	[21] STORM RAIN 60[10][20]/100[5]	[22] LOSS RATE	[23] EFFECTIVE RAIN IN/HR [21]-[22]	[24] FLOW CFS [3][23]
1	0.2	0.0216	0.3885	0.0000	0.0000
2	0.3	0.0324	0.3840	0.0000	0.0000
3	0.3	0.0324	0.3795	0.0000	0.0000
4	0.4	0.0432	0.3750	0.0000	0.0000
5	0.3	0.0324	0.3706	0.0000	0.0000
6	0.3	0.0324	0.3662	0.0000	0.0000
7	0.3	0.0324	0.3618	0.0000	0.0000
8	0.4	0.0432	0.3575	0.0000	0.0000
9	0.4	0.0432	0.3532	0.0000	0.0000
10	0.4	0.0432	0.3489	0.0000	0.0000
11	0.5	0.0540	0.3446	0.0000	0.0000
12	0.5	0.0540	0.3404	0.0000	0.0000
13	0.5	0.0540	0.3362	0.0000	0.0000
14	0.5	0.0540	0.3320	0.0000	0.0000
15	0.5	0.0540	0.3278	0.0000	0.0000
16	0.6	0.0648	0.3237	0.0000	0.0000
17	0.6	0.0648	0.3196	0.0000	0.0000
18	0.7	0.0756	0.3155	0.0000	0.0000
19	0.7	0.0756	0.3115	0.0000	0.0000
20	0.8	0.0864	0.3075	0.0000	0.0000
21	0.6	0.0648	0.3035	0.0000	0.0000
22	0.7	0.0756	0.2995	0.0000	0.0000
23	0.8	0.0864	0.2956	0.0000	0.0000
24	0.8	0.0864	0.2917	0.0000	0.0000
25	0.9	0.0972	0.2878	0.0000	0.0000
26	0.9	0.0972	0.2840	0.0000	0.0000
27	1.0	0.1080	0.2802	0.0000	0.0000
28	1.0	0.1080	0.2764	0.0000	0.0000
29	1.0	0.1080	0.2726	0.0000	0.0000
30	1.1	0.1188	0.2689	0.0000	0.0000
31	1.2	0.1296	0.2652	0.0000	0.0000
32	1.3	0.1404	0.2616	0.0000	0.0000
33	1.5	0.1620	0.2579	0.0000	0.0000
34	1.5	0.1620	0.2544	0.0000	0.0000
35	1.6	0.1728	0.2508	0.0000	0.0000

36	1.7	0.1836	0.2473	0.0000	0.0000
37	1.9	0.2052	0.2438	0.0000	0.0000
38	2.0	0.2160	0.2403	0.0000	0.0000
39	2.1	0.2268	0.2369	0.0000	0.0000
40	2.2	0.2376	0.2334	0.0042	0.0164
41	1.5	0.1620	0.2301	0.0000	0.0000
42	1.5	0.1620	0.2267	0.0000	0.0000
43	2.0	0.2160	0.2234	0.0000	0.0000
44	2.0	0.2160	0.2202	0.0000	0.0000
45	1.9	0.2052	0.2169	0.0000	0.0000
46	1.9	0.2052	0.2137	0.0000	0.0000
47	1.7	0.1836	0.2106	0.0000	0.0000
48	1.8	0.1944	0.2074	0.0000	0.0000
49	2.5	0.2700	0.2043	0.0657	0.2594
50	2.6	0.2808	0.2013	0.0795	0.3141
51	2.8	0.3024	0.1983	0.1041	0.4114
52	2.9	0.3132	0.1953	0.1179	0.4658
53	3.4	0.3672	0.1923	0.1749	0.6908
54	3.4	0.3672	0.1894	0.1778	0.7023
55	2.3	0.2484	0.1865	0.0619	0.2444
56	2.3	0.2484	0.1837	0.0647	0.2556
57	2.7	0.2916	0.1809	0.1107	0.4373
58	2.6	0.2808	0.1781	0.1027	0.4056
59	2.6	0.2808	0.1754	0.1054	0.4163
60	2.5	0.2700	0.1727	0.0973	0.3843
61	2.4	0.2592	0.1701	0.0891	0.3521
62	2.3	0.2484	0.1675	0.0809	0.3197
63	1.9	0.2052	0.1649	0.0403	0.1592
64	1.9	0.2052	0.1624	0.0428	0.1691
65	0.4	0.0432	0.1599	0.0000	0.0000
66	0.4	0.0432	0.1575	0.0000	0.0000
67	0.3	0.0324	0.1551	0.0000	0.0000
68	0.3	0.0324	0.1527	0.0000	0.0000
69	0.5	0.0540	0.1504	0.0000	0.0000
70	0.5	0.0540	0.1482	0.0000	0.0000
71	0.5	0.0540	0.1460	0.0000	0.0000
72	0.4	0.0432	0.1438	0.0000	0.0000
73	0.4	0.0432	0.1417	0.0000	0.0000
74	0.4	0.0432	0.1396	0.0000	0.0000
75	0.3	0.0324	0.1376	0.0000	0.0000
76	0.2	0.0216	0.1356	0.0000	0.0000
77	0.3	0.0324	0.1337	0.0000	0.0000
78	0.4	0.0432	0.1319	0.0000	0.0000
79	0.3	0.0324	0.1301	0.0000	0.0000
80	0.2	0.0216	0.1283	0.0000	0.0000
81	0.3	0.0324	0.1266	0.0000	0.0000
82	0.3	0.0324	0.1250	0.0000	0.0000
83	0.3	0.0324	0.1234	0.0000	0.0000
84	0.2	0.0216	0.1219	0.0000	0.0000
85	0.3	0.0324	0.1205	0.0000	0.0000
86	0.2	0.0216	0.1191	0.0000	0.0000
87	0.3	0.0324	0.1178	0.0000	0.0000

88	0.2	0.0216	0.1166	0.0000	0.0000
89	0.3	0.0324	0.1154	0.0000	0.0000
90	0.2	0.0216	0.1143	0.0000	0.0000
91	0.2	0.0216	0.1133	0.0000	0.0000
92	0.2	0.0216	0.1124	0.0000	0.0000
93	0.2	0.0216	0.1117	0.0000	0.0000
94	0.2	0.0216	0.1110	0.0000	0.0000
95	0.2	0.0216	0.1104	0.0000	0.0000
96	0.2	0.0216	0.1101	0.0000	0.0000
	100			1.5200	

EFFECTIVE RAIN 0.3800 IN/HR

VOLUME 0.1251 AF
5,449 CF

Villa Siena
Area A Undeveloped Condition

area	3.95	[3]		0.0000	L
unit time	15	[5]		0.0000	Lca
LOSS RATE=F				#DIV/0!	H
F=Fp(1.00-0.9Ai)			0.03		n
Fp	0.22			#DIV/0!	Lag
Ai	0			15 min	Use
F	0.2200	[13]			
24 HR 10 YR	4.25	[10]			
C	0.0020				
Fm	0.1100				

[15] UNIT TIME PERIOD	[20] PATTERN PERCENT	[21] STORM RAIN 60[10][20]/100[5]	[22] LOSS RATE	[23] EFFECTIVE RAIN IN/HR [21]-[22]	[24] FLOW CFS [3][23]
1	0.2	0.0340	0.3885	0.0000	0.0000
2	0.3	0.0510	0.3840	0.0000	0.0000
3	0.3	0.0510	0.3795	0.0000	0.0000
4	0.4	0.0680	0.3750	0.0000	0.0000
5	0.3	0.0510	0.3706	0.0000	0.0000
6	0.3	0.0510	0.3662	0.0000	0.0000
7	0.3	0.0510	0.3618	0.0000	0.0000
8	0.4	0.0680	0.3575	0.0000	0.0000
9	0.4	0.0680	0.3532	0.0000	0.0000
10	0.4	0.0680	0.3489	0.0000	0.0000
11	0.5	0.0850	0.3446	0.0000	0.0000
12	0.5	0.0850	0.3404	0.0000	0.0000
13	0.5	0.0850	0.3362	0.0000	0.0000
14	0.5	0.0850	0.3320	0.0000	0.0000
15	0.5	0.0850	0.3278	0.0000	0.0000
16	0.6	0.1020	0.3237	0.0000	0.0000
17	0.6	0.1020	0.3196	0.0000	0.0000
18	0.7	0.1190	0.3155	0.0000	0.0000
19	0.7	0.1190	0.3115	0.0000	0.0000
20	0.8	0.1360	0.3075	0.0000	0.0000
21	0.6	0.1020	0.3035	0.0000	0.0000
22	0.7	0.1190	0.2995	0.0000	0.0000
23	0.8	0.1360	0.2956	0.0000	0.0000
24	0.8	0.1360	0.2917	0.0000	0.0000
25	0.9	0.1530	0.2878	0.0000	0.0000
26	0.9	0.1530	0.2840	0.0000	0.0000
27	1.0	0.1700	0.2802	0.0000	0.0000
28	1.0	0.1700	0.2764	0.0000	0.0000
29	1.0	0.1700	0.2726	0.0000	0.0000
30	1.1	0.1870	0.2689	0.0000	0.0000
31	1.2	0.2040	0.2652	0.0000	0.0000
32	1.3	0.2210	0.2616	0.0000	0.0000
33	1.5	0.2550	0.2579	0.0000	0.0000
34	1.5	0.2550	0.2544	0.0006	0.0026
35	1.6	0.2720	0.2508	0.0212	0.0838

36	1.7	0.2890	0.2473	0.0417	0.1649
37	1.9	0.3230	0.2438	0.0792	0.3130
38	2.0	0.3400	0.2403	0.0997	0.3939
39	2.1	0.3570	0.2369	0.1201	0.4746
40	2.2	0.3740	0.2334	0.1406	0.5552
41	1.5	0.2550	0.2301	0.0249	0.0984
42	1.5	0.2550	0.2267	0.0283	0.1116
43	2.0	0.3400	0.2234	0.1166	0.4604
44	2.0	0.3400	0.2202	0.1198	0.4733
45	1.9	0.3230	0.2169	0.1061	0.4190
46	1.9	0.3230	0.2137	0.1093	0.4316
47	1.7	0.2890	0.2106	0.0784	0.3098
48	1.8	0.3060	0.2074	0.0986	0.3893
49	2.5	0.4250	0.2043	0.2207	0.8716
50	2.6	0.4420	0.2013	0.2407	0.9509
51	2.8	0.4760	0.1983	0.2777	1.0971
52	2.9	0.4930	0.1953	0.2977	1.1761
53	3.4	0.5780	0.1923	0.3857	1.5235
54	3.4	0.5780	0.1894	0.3886	1.5350
55	2.3	0.3910	0.1865	0.2045	0.8077
56	2.3	0.3910	0.1837	0.2073	0.8189
57	2.7	0.4590	0.1809	0.2781	1.0986
58	2.6	0.4420	0.1781	0.2639	1.0423
59	2.6	0.4420	0.1754	0.2666	1.0531
60	2.5	0.4250	0.1727	0.2523	0.9965
61	2.4	0.4080	0.1701	0.2379	0.9398
62	2.3	0.3910	0.1675	0.2235	0.8830
63	1.9	0.3230	0.1649	0.1581	0.6245
64	1.9	0.3230	0.1624	0.1606	0.6344
65	0.4	0.0680	0.1599	0.0000	0.0000
66	0.4	0.0680	0.1575	0.0000	0.0000
67	0.3	0.0510	0.1551	0.0000	0.0000
68	0.3	0.0510	0.1527	0.0000	0.0000
69	0.5	0.0850	0.1504	0.0000	0.0000
70	0.5	0.0850	0.1482	0.0000	0.0000
71	0.5	0.0850	0.1460	0.0000	0.0000
72	0.4	0.0680	0.1438	0.0000	0.0000
73	0.4	0.0680	0.1417	0.0000	0.0000
74	0.4	0.0680	0.1396	0.0000	0.0000
75	0.3	0.0510	0.1376	0.0000	0.0000
76	0.2	0.0340	0.1356	0.0000	0.0000
77	0.3	0.0510	0.1337	0.0000	0.0000
78	0.4	0.0680	0.1319	0.0000	0.0000
79	0.3	0.0510	0.1301	0.0000	0.0000
80	0.2	0.0340	0.1283	0.0000	0.0000
81	0.3	0.0510	0.1266	0.0000	0.0000
82	0.3	0.0510	0.1250	0.0000	0.0000
83	0.3	0.0510	0.1234	0.0000	0.0000
84	0.2	0.0340	0.1219	0.0000	0.0000
85	0.3	0.0510	0.1205	0.0000	0.0000
86	0.2	0.0340	0.1191	0.0000	0.0000
87	0.3	0.0510	0.1178	0.0000	0.0000

88	0.2	0.0340	0.1166	0.0000	0.0000
89	0.3	0.0510	0.1154	0.0000	0.0000
90	0.2	0.0340	0.1143	0.0000	0.0000
91	0.2	0.0340	0.1133	0.0000	0.0000
92	0.2	0.0340	0.1124	0.0000	0.0000
93	0.2	0.0340	0.1117	0.0000	0.0000
94	0.2	0.0340	0.1110	0.0000	0.0000
95	0.2	0.0340	0.1104	0.0000	0.0000
96	0.2	0.0340	0.1101	0.0000	0.0000
	100			5.2492	

EFFECTIVE RAIN 1.3123 IN/HR

VOLUME 0.4320 AF
18,816 CF

Villa Siena
Area B Undeveloped Condition

area	2.63	[3]		0.0000	L
unit time	15	[5]		0.0000	Lca
LOSS RATE=F				#DIV/0!	H
F=Fp(1.00-0.9Ai)			0.015		n
Fp	0.22			#DIV/0!	Lag
Ai	0			15 min	Use
F	0.2200	[13]			
24 HR 2 YR	2.7	[10]			
C	0.0020				
Fm	0.1100				

[15] UNIT TIME PERIOD	[20] PATTERN PERCENT	[21] STORM RAIN 60[10][20]/100[5]	[22] LOSS RATE	[23] EFFECTIVE RAIN IN/HR [21]-[22]	[24] FLOW CFS [3][23]
1	0.2	0.0216	0.3885	0.0000	0.0000
2	0.3	0.0324	0.3840	0.0000	0.0000
3	0.3	0.0324	0.3795	0.0000	0.0000
4	0.4	0.0432	0.3750	0.0000	0.0000
5	0.3	0.0324	0.3706	0.0000	0.0000
6	0.3	0.0324	0.3662	0.0000	0.0000
7	0.3	0.0324	0.3618	0.0000	0.0000
8	0.4	0.0432	0.3575	0.0000	0.0000
9	0.4	0.0432	0.3532	0.0000	0.0000
10	0.4	0.0432	0.3489	0.0000	0.0000
11	0.5	0.0540	0.3446	0.0000	0.0000
12	0.5	0.0540	0.3404	0.0000	0.0000
13	0.5	0.0540	0.3362	0.0000	0.0000
14	0.5	0.0540	0.3320	0.0000	0.0000
15	0.5	0.0540	0.3278	0.0000	0.0000
16	0.6	0.0648	0.3237	0.0000	0.0000
17	0.6	0.0648	0.3196	0.0000	0.0000
18	0.7	0.0756	0.3155	0.0000	0.0000
19	0.7	0.0756	0.3115	0.0000	0.0000
20	0.8	0.0864	0.3075	0.0000	0.0000
21	0.6	0.0648	0.3035	0.0000	0.0000
22	0.7	0.0756	0.2995	0.0000	0.0000
23	0.8	0.0864	0.2956	0.0000	0.0000
24	0.8	0.0864	0.2917	0.0000	0.0000
25	0.9	0.0972	0.2878	0.0000	0.0000
26	0.9	0.0972	0.2840	0.0000	0.0000
27	1.0	0.1080	0.2802	0.0000	0.0000
28	1.0	0.1080	0.2764	0.0000	0.0000
29	1.0	0.1080	0.2726	0.0000	0.0000
30	1.1	0.1188	0.2689	0.0000	0.0000
31	1.2	0.1296	0.2652	0.0000	0.0000
32	1.3	0.1404	0.2616	0.0000	0.0000
33	1.5	0.1620	0.2579	0.0000	0.0000
34	1.5	0.1620	0.2544	0.0000	0.0000
35	1.6	0.1728	0.2508	0.0000	0.0000

36	1.7	0.1836	0.2473	0.0000	0.0000
37	1.9	0.2052	0.2438	0.0000	0.0000
38	2.0	0.2160	0.2403	0.0000	0.0000
39	2.1	0.2268	0.2369	0.0000	0.0000
40	2.2	0.2376	0.2334	0.0042	0.0109
41	1.5	0.1620	0.2301	0.0000	0.0000
42	1.5	0.1620	0.2267	0.0000	0.0000
43	2.0	0.2160	0.2234	0.0000	0.0000
44	2.0	0.2160	0.2202	0.0000	0.0000
45	1.9	0.2052	0.2169	0.0000	0.0000
46	1.9	0.2052	0.2137	0.0000	0.0000
47	1.7	0.1836	0.2106	0.0000	0.0000
48	1.8	0.1944	0.2074	0.0000	0.0000
49	2.5	0.2700	0.2043	0.0657	0.1727
50	2.6	0.2808	0.2013	0.0795	0.2091
51	2.8	0.3024	0.1983	0.1041	0.2739
52	2.9	0.3132	0.1953	0.1179	0.3102
53	3.4	0.3672	0.1923	0.1749	0.4600
54	3.4	0.3672	0.1894	0.1778	0.4676
55	2.3	0.2484	0.1865	0.0619	0.1627
56	2.3	0.2484	0.1837	0.0647	0.1702
57	2.7	0.2916	0.1809	0.1107	0.2912
58	2.6	0.2808	0.1781	0.1027	0.2701
59	2.6	0.2808	0.1754	0.1054	0.2772
60	2.5	0.2700	0.1727	0.0973	0.2559
61	2.4	0.2592	0.1701	0.0891	0.2344
62	2.3	0.2484	0.1675	0.0809	0.2129
63	1.9	0.2052	0.1649	0.0403	0.1060
64	1.9	0.2052	0.1624	0.0428	0.1126
65	0.4	0.0432	0.1599	0.0000	0.0000
66	0.4	0.0432	0.1575	0.0000	0.0000
67	0.3	0.0324	0.1551	0.0000	0.0000
68	0.3	0.0324	0.1527	0.0000	0.0000
69	0.5	0.0540	0.1504	0.0000	0.0000
70	0.5	0.0540	0.1482	0.0000	0.0000
71	0.5	0.0540	0.1460	0.0000	0.0000
72	0.4	0.0432	0.1438	0.0000	0.0000
73	0.4	0.0432	0.1417	0.0000	0.0000
74	0.4	0.0432	0.1396	0.0000	0.0000
75	0.3	0.0324	0.1376	0.0000	0.0000
76	0.2	0.0216	0.1356	0.0000	0.0000
77	0.3	0.0324	0.1337	0.0000	0.0000
78	0.4	0.0432	0.1319	0.0000	0.0000
79	0.3	0.0324	0.1301	0.0000	0.0000
80	0.2	0.0216	0.1283	0.0000	0.0000
81	0.3	0.0324	0.1266	0.0000	0.0000
82	0.3	0.0324	0.1250	0.0000	0.0000
83	0.3	0.0324	0.1234	0.0000	0.0000
84	0.2	0.0216	0.1219	0.0000	0.0000
85	0.3	0.0324	0.1205	0.0000	0.0000
86	0.2	0.0216	0.1191	0.0000	0.0000
87	0.3	0.0324	0.1178	0.0000	0.0000

88	0.2	0.0216	0.1166	0.0000	0.0000
89	0.3	0.0324	0.1154	0.0000	0.0000
90	0.2	0.0216	0.1143	0.0000	0.0000
91	0.2	0.0216	0.1133	0.0000	0.0000
92	0.2	0.0216	0.1124	0.0000	0.0000
93	0.2	0.0216	0.1117	0.0000	0.0000
94	0.2	0.0216	0.1110	0.0000	0.0000
95	0.2	0.0216	0.1104	0.0000	0.0000
96	0.2	0.0216	0.1101	0.0000	0.0000
	100			1.5200	

EFFECTIVE RAIN 0.3800 IN/HR

VOLUME 0.0833 AF
3,628 CF

Villa Siena
Area B Undeveloped Condition

area	2.63	[3]		0.0000	L
unit time	15	[5]		0.0000	Lca
LOSS RATE=F				#DIV/0!	H
F=Fp(1.00-0.9Ai)			0.03		n
Fp	0.22			#DIV/0!	Lag
Ai	0			15 min	Use
F	0.2200	[13]			
24 HR 10 YR	4.25	[10]			
C	0.0020				
Fm	0.1100				

[15] UNIT TIME PERIOD	[20] PATTERN PERCENT	[21] STORM RAIN 60[10][20]/100[5]	[22] LOSS RATE	[23] EFFECTIVE RAIN IN/HR [21]-[22]	[24] FLOW CFS [3][23]
1	0.2	0.0340	0.3885	0.0000	0.0000
2	0.3	0.0510	0.3840	0.0000	0.0000
3	0.3	0.0510	0.3795	0.0000	0.0000
4	0.4	0.0680	0.3750	0.0000	0.0000
5	0.3	0.0510	0.3706	0.0000	0.0000
6	0.3	0.0510	0.3662	0.0000	0.0000
7	0.3	0.0510	0.3618	0.0000	0.0000
8	0.4	0.0680	0.3575	0.0000	0.0000
9	0.4	0.0680	0.3532	0.0000	0.0000
10	0.4	0.0680	0.3489	0.0000	0.0000
11	0.5	0.0850	0.3446	0.0000	0.0000
12	0.5	0.0850	0.3404	0.0000	0.0000
13	0.5	0.0850	0.3362	0.0000	0.0000
14	0.5	0.0850	0.3320	0.0000	0.0000
15	0.5	0.0850	0.3278	0.0000	0.0000
16	0.6	0.1020	0.3237	0.0000	0.0000
17	0.6	0.1020	0.3196	0.0000	0.0000
18	0.7	0.1190	0.3155	0.0000	0.0000
19	0.7	0.1190	0.3115	0.0000	0.0000
20	0.8	0.1360	0.3075	0.0000	0.0000
21	0.6	0.1020	0.3035	0.0000	0.0000
22	0.7	0.1190	0.2995	0.0000	0.0000
23	0.8	0.1360	0.2956	0.0000	0.0000
24	0.8	0.1360	0.2917	0.0000	0.0000
25	0.9	0.1530	0.2878	0.0000	0.0000
26	0.9	0.1530	0.2840	0.0000	0.0000
27	1.0	0.1700	0.2802	0.0000	0.0000
28	1.0	0.1700	0.2764	0.0000	0.0000
29	1.0	0.1700	0.2726	0.0000	0.0000
30	1.1	0.1870	0.2689	0.0000	0.0000
31	1.2	0.2040	0.2652	0.0000	0.0000
32	1.3	0.2210	0.2616	0.0000	0.0000
33	1.5	0.2550	0.2579	0.0000	0.0000
34	1.5	0.2550	0.2544	0.0006	0.0017
35	1.6	0.2720	0.2508	0.0212	0.0558
36	1.7	0.2890	0.2473	0.0417	0.1098
37	1.9	0.3230	0.2438	0.0792	0.2084
38	2.0	0.3400	0.2403	0.0997	0.2622

39	2.1	0.3570	0.2369	0.1201	0.3160
40	2.2	0.3740	0.2334	0.1406	0.3697
41	1.5	0.2550	0.2301	0.0249	0.0655
42	1.5	0.2550	0.2267	0.0283	0.0743
43	2.0	0.3400	0.2234	0.1166	0.3066
44	2.0	0.3400	0.2202	0.1198	0.3152
45	1.9	0.3230	0.2169	0.1061	0.2790
46	1.9	0.3230	0.2137	0.1093	0.2874
47	1.7	0.2890	0.2106	0.0784	0.2063
48	1.8	0.3060	0.2074	0.0986	0.2592
49	2.5	0.4250	0.2043	0.2207	0.5803
50	2.6	0.4420	0.2013	0.2407	0.6331
51	2.8	0.4760	0.1983	0.2777	0.7305
52	2.9	0.4930	0.1953	0.2977	0.7830
53	3.4	0.5780	0.1923	0.3857	1.0144
54	3.4	0.5780	0.1894	0.3886	1.0220
55	2.3	0.3910	0.1865	0.2045	0.5378
56	2.3	0.3910	0.1837	0.2073	0.5452
57	2.7	0.4590	0.1809	0.2781	0.7315
58	2.6	0.4420	0.1781	0.2639	0.6940
59	2.6	0.4420	0.1754	0.2666	0.7012
60	2.5	0.4250	0.1727	0.2523	0.6635
61	2.4	0.4080	0.1701	0.2379	0.6258
62	2.3	0.3910	0.1675	0.2235	0.5879
63	1.9	0.3230	0.1649	0.1581	0.4158
64	1.9	0.3230	0.1624	0.1606	0.4224
65	0.4	0.0680	0.1599	0.0000	0.0000
66	0.4	0.0680	0.1575	0.0000	0.0000
67	0.3	0.0510	0.1551	0.0000	0.0000
68	0.3	0.0510	0.1527	0.0000	0.0000
69	0.5	0.0850	0.1504	0.0000	0.0000
70	0.5	0.0850	0.1482	0.0000	0.0000
71	0.5	0.0850	0.1460	0.0000	0.0000
72	0.4	0.0680	0.1438	0.0000	0.0000
73	0.4	0.0680	0.1417	0.0000	0.0000
74	0.4	0.0680	0.1396	0.0000	0.0000
75	0.3	0.0510	0.1376	0.0000	0.0000
76	0.2	0.0340	0.1356	0.0000	0.0000
77	0.3	0.0510	0.1337	0.0000	0.0000
78	0.4	0.0680	0.1319	0.0000	0.0000
79	0.3	0.0510	0.1301	0.0000	0.0000
80	0.2	0.0340	0.1283	0.0000	0.0000
81	0.3	0.0510	0.1266	0.0000	0.0000
82	0.3	0.0510	0.1250	0.0000	0.0000
83	0.3	0.0510	0.1234	0.0000	0.0000
84	0.2	0.0340	0.1219	0.0000	0.0000
85	0.3	0.0510	0.1205	0.0000	0.0000
86	0.2	0.0340	0.1191	0.0000	0.0000
87	0.3	0.0510	0.1178	0.0000	0.0000
88	0.2	0.0340	0.1166	0.0000	0.0000
89	0.3	0.0510	0.1154	0.0000	0.0000
90	0.2	0.0340	0.1143	0.0000	0.0000
91	0.2	0.0340	0.1133	0.0000	0.0000
92	0.2	0.0340	0.1124	0.0000	0.0000
93	0.2	0.0340	0.1117	0.0000	0.0000

94	0.2	0.0340	0.1110	0.0000	0.0000
95	0.2	0.0340	0.1104	0.0000	0.0000
96	0.2	0.0340	0.1101	0.0000	0.0000
	100			5.2492	

EFFECTIVE RAIN 1.3123 IN/HR

VOLUME 0.2876 AF
12,528 CF

Villa Siena
Area C Undeveloped Condition

area	1.22	[3]		0.0000	L
unit time	15	[5]		0.0000	Lca
LOSS RATE=F				#DIV/0!	H
F=Fp(1.00-0.9Ai)			0.015		n
Fp	0.22			#DIV/0!	Lag
Ai	0			15 min	Use
F	0.2200	[13]			
24 HR 2 YR	2.7	[10]			
C	0.0020				
Fm	0.1100				

[15] UNIT TIME PERIOD	[20] PATTERN PERCENT	[21] STORM RAIN 60[10][20]/100[5]	[22] LOSS RATE	[23] EFFECTIVE RAIN IN/HR [21]-[22]	[24] FLOW CFS [3][23]
1	0.2	0.0216	0.3885	0.0000	0.0000
2	0.3	0.0324	0.3840	0.0000	0.0000
3	0.3	0.0324	0.3795	0.0000	0.0000
4	0.4	0.0432	0.3750	0.0000	0.0000
5	0.3	0.0324	0.3706	0.0000	0.0000
6	0.3	0.0324	0.3662	0.0000	0.0000
7	0.3	0.0324	0.3618	0.0000	0.0000
8	0.4	0.0432	0.3575	0.0000	0.0000
9	0.4	0.0432	0.3532	0.0000	0.0000
10	0.4	0.0432	0.3489	0.0000	0.0000
11	0.5	0.0540	0.3446	0.0000	0.0000
12	0.5	0.0540	0.3404	0.0000	0.0000
13	0.5	0.0540	0.3362	0.0000	0.0000
14	0.5	0.0540	0.3320	0.0000	0.0000
15	0.5	0.0540	0.3278	0.0000	0.0000
16	0.6	0.0648	0.3237	0.0000	0.0000
17	0.6	0.0648	0.3196	0.0000	0.0000
18	0.7	0.0756	0.3155	0.0000	0.0000
19	0.7	0.0756	0.3115	0.0000	0.0000
20	0.8	0.0864	0.3075	0.0000	0.0000
21	0.6	0.0648	0.3035	0.0000	0.0000
22	0.7	0.0756	0.2995	0.0000	0.0000
23	0.8	0.0864	0.2956	0.0000	0.0000
24	0.8	0.0864	0.2917	0.0000	0.0000
25	0.9	0.0972	0.2878	0.0000	0.0000
26	0.9	0.0972	0.2840	0.0000	0.0000
27	1.0	0.1080	0.2802	0.0000	0.0000
28	1.0	0.1080	0.2764	0.0000	0.0000
29	1.0	0.1080	0.2726	0.0000	0.0000
30	1.1	0.1188	0.2689	0.0000	0.0000
31	1.2	0.1296	0.2652	0.0000	0.0000
32	1.3	0.1404	0.2616	0.0000	0.0000
33	1.5	0.1620	0.2579	0.0000	0.0000
34	1.5	0.1620	0.2544	0.0000	0.0000
35	1.6	0.1728	0.2508	0.0000	0.0000
36	1.7	0.1836	0.2473	0.0000	0.0000
37	1.9	0.2052	0.2438	0.0000	0.0000
38	2.0	0.2160	0.2403	0.0000	0.0000

39	2.1	0.2268	0.2369	0.0000	0.0000
40	2.2	0.2376	0.2334	0.0042	0.0051
41	1.5	0.1620	0.2301	0.0000	0.0000
42	1.5	0.1620	0.2267	0.0000	0.0000
43	2.0	0.2160	0.2234	0.0000	0.0000
44	2.0	0.2160	0.2202	0.0000	0.0000
45	1.9	0.2052	0.2169	0.0000	0.0000
46	1.9	0.2052	0.2137	0.0000	0.0000
47	1.7	0.1836	0.2106	0.0000	0.0000
48	1.8	0.1944	0.2074	0.0000	0.0000
49	2.5	0.2700	0.2043	0.0657	0.0801
50	2.6	0.2808	0.2013	0.0795	0.0970
51	2.8	0.3024	0.1983	0.1041	0.1271
52	2.9	0.3132	0.1953	0.1179	0.1439
53	3.4	0.3672	0.1923	0.1749	0.2134
54	3.4	0.3672	0.1894	0.1778	0.2169
55	2.3	0.2484	0.1865	0.0619	0.0755
56	2.3	0.2484	0.1837	0.0647	0.0790
57	2.7	0.2916	0.1809	0.1107	0.1351
58	2.6	0.2808	0.1781	0.1027	0.1253
59	2.6	0.2808	0.1754	0.1054	0.1286
60	2.5	0.2700	0.1727	0.0973	0.1187
61	2.4	0.2592	0.1701	0.0891	0.1087
62	2.3	0.2484	0.1675	0.0809	0.0987
63	1.9	0.2052	0.1649	0.0403	0.0492
64	1.9	0.2052	0.1624	0.0428	0.0522
65	0.4	0.0432	0.1599	0.0000	0.0000
66	0.4	0.0432	0.1575	0.0000	0.0000
67	0.3	0.0324	0.1551	0.0000	0.0000
68	0.3	0.0324	0.1527	0.0000	0.0000
69	0.5	0.0540	0.1504	0.0000	0.0000
70	0.5	0.0540	0.1482	0.0000	0.0000
71	0.5	0.0540	0.1460	0.0000	0.0000
72	0.4	0.0432	0.1438	0.0000	0.0000
73	0.4	0.0432	0.1417	0.0000	0.0000
74	0.4	0.0432	0.1396	0.0000	0.0000
75	0.3	0.0324	0.1376	0.0000	0.0000
76	0.2	0.0216	0.1356	0.0000	0.0000
77	0.3	0.0324	0.1337	0.0000	0.0000
78	0.4	0.0432	0.1319	0.0000	0.0000
79	0.3	0.0324	0.1301	0.0000	0.0000
80	0.2	0.0216	0.1283	0.0000	0.0000
81	0.3	0.0324	0.1266	0.0000	0.0000
82	0.3	0.0324	0.1250	0.0000	0.0000
83	0.3	0.0324	0.1234	0.0000	0.0000
84	0.2	0.0216	0.1219	0.0000	0.0000
85	0.3	0.0324	0.1205	0.0000	0.0000
86	0.2	0.0216	0.1191	0.0000	0.0000
87	0.3	0.0324	0.1178	0.0000	0.0000
88	0.2	0.0216	0.1166	0.0000	0.0000
89	0.3	0.0324	0.1154	0.0000	0.0000
90	0.2	0.0216	0.1143	0.0000	0.0000
91	0.2	0.0216	0.1133	0.0000	0.0000
92	0.2	0.0216	0.1124	0.0000	0.0000
93	0.2	0.0216	0.1117	0.0000	0.0000

94	0.2	0.0216	0.1110	0.0000	0.0000
95	0.2	0.0216	0.1104	0.0000	0.0000
96	0.2	0.0216	0.1101	0.0000	0.0000
	100			1.5200	

EFFECTIVE RAIN 0.3800 IN/HR

VOLUME 0.0386 AF
1,683 CF

Villa Siena
Area C Undeveloped Condition

area	1.22	[3]		0.0000	L
unit time	15	[5]		0.0000	Lca
LOSS RATE=F				#DIV/0!	H
F=Fp(1.00-0.9Ai)			0.03		n
Fp	0.22			#DIV/0!	Lag
Ai	0			15 min	Use
F	0.2200	[13]			
24 HR 10 YR	4.25	[10]			
C	0.0020				
Fm	0.1100				

[15] UNIT TIME PERIOD	[20] PATTERN PERCENT	[21] STORM RAIN 60[10][20]/100[5]	[22] LOSS RATE	[23] EFFECTIVE RAIN IN/HR [21]-[22]	[24] FLOW CFS [3][23]
1	0.2	0.0340	0.3885	0.0000	0.0000
2	0.3	0.0510	0.3840	0.0000	0.0000
3	0.3	0.0510	0.3795	0.0000	0.0000
4	0.4	0.0680	0.3750	0.0000	0.0000
5	0.3	0.0510	0.3706	0.0000	0.0000
6	0.3	0.0510	0.3662	0.0000	0.0000
7	0.3	0.0510	0.3618	0.0000	0.0000
8	0.4	0.0680	0.3575	0.0000	0.0000
9	0.4	0.0680	0.3532	0.0000	0.0000
10	0.4	0.0680	0.3489	0.0000	0.0000
11	0.5	0.0850	0.3446	0.0000	0.0000
12	0.5	0.0850	0.3404	0.0000	0.0000
13	0.5	0.0850	0.3362	0.0000	0.0000
14	0.5	0.0850	0.3320	0.0000	0.0000
15	0.5	0.0850	0.3278	0.0000	0.0000
16	0.6	0.1020	0.3237	0.0000	0.0000
17	0.6	0.1020	0.3196	0.0000	0.0000
18	0.7	0.1190	0.3155	0.0000	0.0000
19	0.7	0.1190	0.3115	0.0000	0.0000
20	0.8	0.1360	0.3075	0.0000	0.0000
21	0.6	0.1020	0.3035	0.0000	0.0000
22	0.7	0.1190	0.2995	0.0000	0.0000
23	0.8	0.1360	0.2956	0.0000	0.0000
24	0.8	0.1360	0.2917	0.0000	0.0000
25	0.9	0.1530	0.2878	0.0000	0.0000
26	0.9	0.1530	0.2840	0.0000	0.0000
27	1.0	0.1700	0.2802	0.0000	0.0000
28	1.0	0.1700	0.2764	0.0000	0.0000
29	1.0	0.1700	0.2726	0.0000	0.0000
30	1.1	0.1870	0.2689	0.0000	0.0000
31	1.2	0.2040	0.2652	0.0000	0.0000
32	1.3	0.2210	0.2616	0.0000	0.0000
33	1.5	0.2550	0.2579	0.0000	0.0000
34	1.5	0.2550	0.2544	0.0006	0.0008
35	1.6	0.2720	0.2508	0.0212	0.0259
36	1.7	0.2890	0.2473	0.0417	0.0509
37	1.9	0.3230	0.2438	0.0792	0.0967
38	2.0	0.3400	0.2403	0.0997	0.1217

39	2.1	0.3570	0.2369	0.1201	0.1466
40	2.2	0.3740	0.2334	0.1406	0.1715
41	1.5	0.2550	0.2301	0.0249	0.0304
42	1.5	0.2550	0.2267	0.0283	0.0345
43	2.0	0.3400	0.2234	0.1166	0.1422
44	2.0	0.3400	0.2202	0.1198	0.1462
45	1.9	0.3230	0.2169	0.1061	0.1294
46	1.9	0.3230	0.2137	0.1093	0.1333
47	1.7	0.2890	0.2106	0.0784	0.0957
48	1.8	0.3060	0.2074	0.0986	0.1203
49	2.5	0.4250	0.2043	0.2207	0.2692
50	2.6	0.4420	0.2013	0.2407	0.2937
51	2.8	0.4760	0.1983	0.2777	0.3389
52	2.9	0.4930	0.1953	0.2977	0.3632
53	3.4	0.5780	0.1923	0.3857	0.4705
54	3.4	0.5780	0.1894	0.3886	0.4741
55	2.3	0.3910	0.1865	0.2045	0.2495
56	2.3	0.3910	0.1837	0.2073	0.2529
57	2.7	0.4590	0.1809	0.2781	0.3393
58	2.6	0.4420	0.1781	0.2639	0.3219
59	2.6	0.4420	0.1754	0.2666	0.3253
60	2.5	0.4250	0.1727	0.2523	0.3078
61	2.4	0.4080	0.1701	0.2379	0.2903
62	2.3	0.3910	0.1675	0.2235	0.2727
63	1.9	0.3230	0.1649	0.1581	0.1929
64	1.9	0.3230	0.1624	0.1606	0.1959
65	0.4	0.0680	0.1599	0.0000	0.0000
66	0.4	0.0680	0.1575	0.0000	0.0000
67	0.3	0.0510	0.1551	0.0000	0.0000
68	0.3	0.0510	0.1527	0.0000	0.0000
69	0.5	0.0850	0.1504	0.0000	0.0000
70	0.5	0.0850	0.1482	0.0000	0.0000
71	0.5	0.0850	0.1460	0.0000	0.0000
72	0.4	0.0680	0.1438	0.0000	0.0000
73	0.4	0.0680	0.1417	0.0000	0.0000
74	0.4	0.0680	0.1396	0.0000	0.0000
75	0.3	0.0510	0.1376	0.0000	0.0000
76	0.2	0.0340	0.1356	0.0000	0.0000
77	0.3	0.0510	0.1337	0.0000	0.0000
78	0.4	0.0680	0.1319	0.0000	0.0000
79	0.3	0.0510	0.1301	0.0000	0.0000
80	0.2	0.0340	0.1283	0.0000	0.0000
81	0.3	0.0510	0.1266	0.0000	0.0000
82	0.3	0.0510	0.1250	0.0000	0.0000
83	0.3	0.0510	0.1234	0.0000	0.0000
84	0.2	0.0340	0.1219	0.0000	0.0000
85	0.3	0.0510	0.1205	0.0000	0.0000
86	0.2	0.0340	0.1191	0.0000	0.0000
87	0.3	0.0510	0.1178	0.0000	0.0000
88	0.2	0.0340	0.1166	0.0000	0.0000
89	0.3	0.0510	0.1154	0.0000	0.0000
90	0.2	0.0340	0.1143	0.0000	0.0000
91	0.2	0.0340	0.1133	0.0000	0.0000
92	0.2	0.0340	0.1124	0.0000	0.0000
93	0.2	0.0340	0.1117	0.0000	0.0000

94	0.2	0.0340	0.1110	0.0000	0.0000
95	0.2	0.0340	0.1104	0.0000	0.0000
96	0.2	0.0340	0.1101	0.0000	0.0000
	100			5.2492	

EFFECTIVE RAIN 1.3123 IN/HR

VOLUME 0.1334 AF
5,812 CF

Villa Siena
Area A Developed Condition

area	3.36	[3]		0.0000	L
unit time	15	[5]		0.0000	Lca
LOSS RATE=F				#DIV/0!	H
F=Fp(1.00-0.9Ai)			0.015		n
Fp	0.44			#DIV/0!	Lag
Ai	0.75			15 min	Use
F	0.1430	[13]			
24 HR 2 YR	2.7	[10]			
C	0.0013				
Fm	0.0715				

[15] UNIT TIME PERIOD	[20] PATTERN PERCENT	[21] STORM RAIN 60[10][20]/100[5]	[22] LOSS RATE	[23] EFFECTIVE RAIN IN/HR [21]-[22]	[24] FLOW CFS [3][23]
1	0.2	0.0216	0.2525	0.0000	0.0000
2	0.3	0.0324	0.2496	0.0000	0.0000
3	0.3	0.0324	0.2467	0.0000	0.0000
4	0.4	0.0432	0.2438	0.0000	0.0000
5	0.3	0.0324	0.2409	0.0000	0.0000
6	0.3	0.0324	0.2380	0.0000	0.0000
7	0.3	0.0324	0.2352	0.0000	0.0000
8	0.4	0.0432	0.2324	0.0000	0.0000
9	0.4	0.0432	0.2296	0.0000	0.0000
10	0.4	0.0432	0.2268	0.0000	0.0000
11	0.5	0.0540	0.2240	0.0000	0.0000
12	0.5	0.0540	0.2212	0.0000	0.0000
13	0.5	0.0540	0.2185	0.0000	0.0000
14	0.5	0.0540	0.2158	0.0000	0.0000
15	0.5	0.0540	0.2131	0.0000	0.0000
16	0.6	0.0648	0.2104	0.0000	0.0000
17	0.6	0.0648	0.2077	0.0000	0.0000
18	0.7	0.0756	0.2051	0.0000	0.0000
19	0.7	0.0756	0.2025	0.0000	0.0000
20	0.8	0.0864	0.1998	0.0000	0.0000
21	0.6	0.0648	0.1973	0.0000	0.0000
22	0.7	0.0756	0.1947	0.0000	0.0000
23	0.8	0.0864	0.1921	0.0000	0.0000
24	0.8	0.0864	0.1896	0.0000	0.0000
25	0.9	0.0972	0.1871	0.0000	0.0000
26	0.9	0.0972	0.1846	0.0000	0.0000
27	1.0	0.1080	0.1821	0.0000	0.0000
28	1.0	0.1080	0.1797	0.0000	0.0000
29	1.0	0.1080	0.1772	0.0000	0.0000
30	1.1	0.1188	0.1748	0.0000	0.0000
31	1.2	0.1296	0.1724	0.0000	0.0000
32	1.3	0.1404	0.1700	0.0000	0.0000
33	1.5	0.1620	0.1677	0.0000	0.0000
34	1.5	0.1620	0.1653	0.0000	0.0000
35	1.6	0.1728	0.1630	0.0098	0.0329

36	1.7	0.1836	0.1607	0.0229	0.0769
37	1.9	0.2052	0.1584	0.0468	0.1571
38	2.0	0.2160	0.1562	0.0598	0.2010
39	2.1	0.2268	0.1540	0.0728	0.2448
40	2.2	0.2376	0.1517	0.0859	0.2885
41	1.5	0.1620	0.1496	0.0124	0.0418
42	1.5	0.1620	0.1474	0.0146	0.0491
43	2.0	0.2160	0.1452	0.0708	0.2378
44	2.0	0.2160	0.1431	0.0729	0.2449
45	1.9	0.2052	0.1410	0.0642	0.2157
46	1.9	0.2052	0.1389	0.0663	0.2227
47	1.7	0.1836	0.1369	0.0467	0.1570
48	1.8	0.1944	0.1348	0.0596	0.2002
49	2.5	0.2700	0.1328	0.1372	0.4609
50	2.6	0.2808	0.1308	0.1500	0.5039
51	2.8	0.3024	0.1289	0.1735	0.5831
52	2.9	0.3132	0.1269	0.1863	0.6259
53	3.4	0.3672	0.1250	0.2422	0.8138
54	3.4	0.3672	0.1231	0.2441	0.8201
55	2.3	0.2484	0.1212	0.1272	0.4273
56	2.3	0.2484	0.1194	0.1290	0.4335
57	2.7	0.2916	0.1176	0.1740	0.5847
58	2.6	0.2808	0.1158	0.1650	0.5545
59	2.6	0.2808	0.1140	0.1668	0.5604
60	2.5	0.2700	0.1123	0.1577	0.5300
61	2.4	0.2592	0.1105	0.1487	0.4995
62	2.3	0.2484	0.1089	0.1395	0.4689
63	1.9	0.2052	0.1072	0.0980	0.3293
64	1.9	0.2052	0.1056	0.0996	0.3348
65	0.4	0.0432	0.1039	0.0000	0.0000
66	0.4	0.0432	0.1024	0.0000	0.0000
67	0.3	0.0324	0.1008	0.0000	0.0000
68	0.3	0.0324	0.0993	0.0000	0.0000
69	0.5	0.0540	0.0978	0.0000	0.0000
70	0.5	0.0540	0.0963	0.0000	0.0000
71	0.5	0.0540	0.0949	0.0000	0.0000
72	0.4	0.0432	0.0935	0.0000	0.0000
73	0.4	0.0432	0.0921	0.0000	0.0000
74	0.4	0.0432	0.0908	0.0000	0.0000
75	0.3	0.0324	0.0894	0.0000	0.0000
76	0.2	0.0216	0.0882	0.0000	0.0000
77	0.3	0.0324	0.0869	0.0000	0.0000
78	0.4	0.0432	0.0857	0.0000	0.0000
79	0.3	0.0324	0.0845	0.0000	0.0000
80	0.2	0.0216	0.0834	0.0000	0.0000
81	0.3	0.0324	0.0823	0.0000	0.0000
82	0.3	0.0324	0.0812	0.0000	0.0000
83	0.3	0.0324	0.0802	0.0000	0.0000
84	0.2	0.0216	0.0792	0.0000	0.0000
85	0.3	0.0324	0.0783	0.0000	0.0000
86	0.2	0.0216	0.0774	0.0000	0.0000
87	0.3	0.0324	0.0766	0.0000	0.0000

88	0.2	0.0216	0.0758	0.0000	0.0000
89	0.3	0.0324	0.0750	0.0000	0.0000
90	0.2	0.0216	0.0743	0.0000	0.0000
91	0.2	0.0216	0.0737	0.0000	0.0000
92	0.2	0.0216	0.0731	0.0000	0.0000
93	0.2	0.0216	0.0726	0.0000	0.0000
94	0.2	0.0216	0.0721	0.0000	0.0000
95	0.2	0.0216	0.0718	0.0000	0.0000
96	0.2	0.0216	0.0716	0.0000	0.0000
	100			3.2443	

EFFECTIVE RAIN 0.8111 IN/HR

VOLUME 0.2271 AF
9,893 CF

Villa Siena
Area A Developed Condition

area	3.36	[3]		0.0000	L
unit time	15	[5]		0.0000	Lca
LOSS RATE=F				#DIV/0!	H
F=Fp(1.00-0.9Ai)			0.015		n
Fp	0.44			#DIV/0!	Lag
Ai	0.75			15 min	Use
F	0.1430	[13]			
24 HR 2 YR	4.25	[10]			
C	0.0013				
Fm	0.0715				

[15] UNIT TIME PERIOD	[20] PATTERN PERCENT	[21] STORM RAIN 60[10][20]/100[5]	[22] LOSS RATE	[23] EFFECTIVE RAIN IN/HR [21]-[22]	[24] FLOW CFS [3][23]
1	0.2	0.0340	0.2525	0.0000	0.0000
2	0.3	0.0510	0.2496	0.0000	0.0000
3	0.3	0.0510	0.2467	0.0000	0.0000
4	0.4	0.0680	0.2438	0.0000	0.0000
5	0.3	0.0510	0.2409	0.0000	0.0000
6	0.3	0.0510	0.2380	0.0000	0.0000
7	0.3	0.0510	0.2352	0.0000	0.0000
8	0.4	0.0680	0.2324	0.0000	0.0000
9	0.4	0.0680	0.2296	0.0000	0.0000
10	0.4	0.0680	0.2268	0.0000	0.0000
11	0.5	0.0850	0.2240	0.0000	0.0000
12	0.5	0.0850	0.2212	0.0000	0.0000
13	0.5	0.0850	0.2185	0.0000	0.0000
14	0.5	0.0850	0.2158	0.0000	0.0000
15	0.5	0.0850	0.2131	0.0000	0.0000
16	0.6	0.1020	0.2104	0.0000	0.0000
17	0.6	0.1020	0.2077	0.0000	0.0000
18	0.7	0.1190	0.2051	0.0000	0.0000
19	0.7	0.1190	0.2025	0.0000	0.0000
20	0.8	0.1360	0.1998	0.0000	0.0000
21	0.6	0.1020	0.1973	0.0000	0.0000
22	0.7	0.1190	0.1947	0.0000	0.0000
23	0.8	0.1360	0.1921	0.0000	0.0000
24	0.8	0.1360	0.1896	0.0000	0.0000
25	0.9	0.1530	0.1871	0.0000	0.0000
26	0.9	0.1530	0.1846	0.0000	0.0000
27	1.0	0.1700	0.1821	0.0000	0.0000
28	1.0	0.1700	0.1797	0.0000	0.0000
29	1.0	0.1700	0.1772	0.0000	0.0000
30	1.1	0.1870	0.1748	0.0122	0.0410
31	1.2	0.2040	0.1724	0.0316	0.1062
32	1.3	0.2210	0.1700	0.0510	0.1713
33	1.5	0.2550	0.1677	0.0873	0.2934
34	1.5	0.2550	0.1653	0.0897	0.3013

35	1.6	0.2720	0.1630	0.1090	0.3662
36	1.7	0.2890	0.1607	0.1283	0.4310
37	1.9	0.3230	0.1584	0.1646	0.5529
38	2.0	0.3400	0.1562	0.1838	0.6176
39	2.1	0.3570	0.1540	0.2030	0.6822
40	2.2	0.3740	0.1517	0.2223	0.7468
41	1.5	0.2550	0.1496	0.1054	0.3543
42	1.5	0.2550	0.1474	0.1076	0.3616
43	2.0	0.3400	0.1452	0.1948	0.6544
44	2.0	0.3400	0.1431	0.1969	0.6616
45	1.9	0.3230	0.1410	0.1820	0.6115
46	1.9	0.3230	0.1389	0.1841	0.6185
47	1.7	0.2890	0.1369	0.1521	0.5112
48	1.8	0.3060	0.1348	0.1712	0.5751
49	2.5	0.4250	0.1328	0.2922	0.9817
50	2.6	0.4420	0.1308	0.3112	1.0455
51	2.8	0.4760	0.1289	0.3471	1.1664
52	2.9	0.4930	0.1269	0.3661	1.2300
53	3.4	0.5780	0.1250	0.4530	1.5221
54	3.4	0.5780	0.1231	0.4549	1.5284
55	2.3	0.3910	0.1212	0.2698	0.9064
56	2.3	0.3910	0.1194	0.2716	0.9126
57	2.7	0.4590	0.1176	0.3414	1.1472
58	2.6	0.4420	0.1158	0.3262	1.0961
59	2.6	0.4420	0.1140	0.3280	1.1021
60	2.5	0.4250	0.1123	0.3127	1.0508
61	2.4	0.4080	0.1105	0.2975	0.9994
62	2.3	0.3910	0.1089	0.2821	0.9480
63	1.9	0.3230	0.1072	0.2158	0.7251
64	1.9	0.3230	0.1056	0.2174	0.7306
65	0.4	0.0680	0.1039	0.0000	0.0000
66	0.4	0.0680	0.1024	0.0000	0.0000
67	0.3	0.0510	0.1008	0.0000	0.0000
68	0.3	0.0510	0.0993	0.0000	0.0000
69	0.5	0.0850	0.0978	0.0000	0.0000
70	0.5	0.0850	0.0963	0.0000	0.0000
71	0.5	0.0850	0.0949	0.0000	0.0000
72	0.4	0.0680	0.0935	0.0000	0.0000
73	0.4	0.0680	0.0921	0.0000	0.0000
74	0.4	0.0680	0.0908	0.0000	0.0000
75	0.3	0.0510	0.0894	0.0000	0.0000
76	0.2	0.0340	0.0882	0.0000	0.0000
77	0.3	0.0510	0.0869	0.0000	0.0000
78	0.4	0.0680	0.0857	0.0000	0.0000
79	0.3	0.0510	0.0845	0.0000	0.0000
80	0.2	0.0340	0.0834	0.0000	0.0000
81	0.3	0.0510	0.0823	0.0000	0.0000
82	0.3	0.0510	0.0812	0.0000	0.0000
83	0.3	0.0510	0.0802	0.0000	0.0000
84	0.2	0.0340	0.0792	0.0000	0.0000
85	0.3	0.0510	0.0783	0.0000	0.0000

86	0.2	0.0340	0.0774	0.0000	0.0000
87	0.3	0.0510	0.0766	0.0000	0.0000
88	0.2	0.0340	0.0758	0.0000	0.0000
89	0.3	0.0510	0.0750	0.0000	0.0000
90	0.2	0.0340	0.0743	0.0000	0.0000
91	0.2	0.0340	0.0737	0.0000	0.0000
92	0.2	0.0340	0.0731	0.0000	0.0000
93	0.2	0.0340	0.0726	0.0000	0.0000
94	0.2	0.0340	0.0721	0.0000	0.0000
95	0.2	0.0340	0.0718	0.0000	0.0000
96	0.2	0.0340	0.0716	0.0000	0.0000
	100			7.6639	

EFFECTIVE RAIN 1.9160 IN/HR

VOLUME 0.5365 AF
23,369 CF

Villa Siena
Area B Developed Condition

area	3.17	[3]		0.0000	L
unit time	15	[5]		0.0000	Lca
LOSS RATE=F				#DIV/0!	H
F=Fp(1.00-0.9Ai)			0.015		n
Fp	0.44			#DIV/0!	Lag
Ai	0.75			15 min	Use
F	0.1430	[13]			
24 HR 2 YR	2.7	[10]			
C	0.0013				
Fm	0.0715				

[15] UNIT TIME PERIOD	[20] PATTERN PERCENT	[21] STORM RAIN 60[10][20]/100[5]	[22] LOSS RATE	[23] EFFECTIVE RAIN IN/HR [21]-[22]	[24] FLOW CFS [3][23]
1	0.2	0.0216	0.2525	0.0000	0.0000
2	0.3	0.0324	0.2496	0.0000	0.0000
3	0.3	0.0324	0.2467	0.0000	0.0000
4	0.4	0.0432	0.2438	0.0000	0.0000
5	0.3	0.0324	0.2409	0.0000	0.0000
6	0.3	0.0324	0.2380	0.0000	0.0000
7	0.3	0.0324	0.2352	0.0000	0.0000
8	0.4	0.0432	0.2324	0.0000	0.0000
9	0.4	0.0432	0.2296	0.0000	0.0000
10	0.4	0.0432	0.2268	0.0000	0.0000
11	0.5	0.0540	0.2240	0.0000	0.0000
12	0.5	0.0540	0.2212	0.0000	0.0000
13	0.5	0.0540	0.2185	0.0000	0.0000
14	0.5	0.0540	0.2158	0.0000	0.0000
15	0.5	0.0540	0.2131	0.0000	0.0000
16	0.6	0.0648	0.2104	0.0000	0.0000
17	0.6	0.0648	0.2077	0.0000	0.0000
18	0.7	0.0756	0.2051	0.0000	0.0000
19	0.7	0.0756	0.2025	0.0000	0.0000
20	0.8	0.0864	0.1998	0.0000	0.0000
21	0.6	0.0648	0.1973	0.0000	0.0000
22	0.7	0.0756	0.1947	0.0000	0.0000
23	0.8	0.0864	0.1921	0.0000	0.0000
24	0.8	0.0864	0.1896	0.0000	0.0000
25	0.9	0.0972	0.1871	0.0000	0.0000
26	0.9	0.0972	0.1846	0.0000	0.0000
27	1.0	0.1080	0.1821	0.0000	0.0000
28	1.0	0.1080	0.1797	0.0000	0.0000
29	1.0	0.1080	0.1772	0.0000	0.0000
30	1.1	0.1188	0.1748	0.0000	0.0000
31	1.2	0.1296	0.1724	0.0000	0.0000
32	1.3	0.1404	0.1700	0.0000	0.0000
33	1.5	0.1620	0.1677	0.0000	0.0000
34	1.5	0.1620	0.1653	0.0000	0.0000

35	1.6	0.1728	0.1630	0.0098	0.0310
36	1.7	0.1836	0.1607	0.0229	0.0725
37	1.9	0.2052	0.1584	0.0468	0.1482
38	2.0	0.2160	0.1562	0.0598	0.1896
39	2.1	0.2268	0.1540	0.0728	0.2309
40	2.2	0.2376	0.1517	0.0859	0.2722
41	1.5	0.1620	0.1496	0.0124	0.0395
42	1.5	0.1620	0.1474	0.0146	0.0463
43	2.0	0.2160	0.1452	0.0708	0.2243
44	2.0	0.2160	0.1431	0.0729	0.2311
45	1.9	0.2052	0.1410	0.0642	0.2035
46	1.9	0.2052	0.1389	0.0663	0.2101
47	1.7	0.1836	0.1369	0.0467	0.1481
48	1.8	0.1944	0.1348	0.0596	0.1888
49	2.5	0.2700	0.1328	0.1372	0.4349
50	2.6	0.2808	0.1308	0.1500	0.4754
51	2.8	0.3024	0.1289	0.1735	0.5501
52	2.9	0.3132	0.1269	0.1863	0.5905
53	3.4	0.3672	0.1250	0.2422	0.7678
54	3.4	0.3672	0.1231	0.2441	0.7738
55	2.3	0.2484	0.1212	0.1272	0.4031
56	2.3	0.2484	0.1194	0.1290	0.4090
57	2.7	0.2916	0.1176	0.1740	0.5517
58	2.6	0.2808	0.1158	0.1650	0.5231
59	2.6	0.2808	0.1140	0.1668	0.5287
60	2.5	0.2700	0.1123	0.1577	0.5000
61	2.4	0.2592	0.1105	0.1487	0.4712
62	2.3	0.2484	0.1089	0.1395	0.4424
63	1.9	0.2052	0.1072	0.0980	0.3107
64	1.9	0.2052	0.1056	0.0996	0.3159
65	0.4	0.0432	0.1039	0.0000	0.0000
66	0.4	0.0432	0.1024	0.0000	0.0000
67	0.3	0.0324	0.1008	0.0000	0.0000
68	0.3	0.0324	0.0993	0.0000	0.0000
69	0.5	0.0540	0.0978	0.0000	0.0000
70	0.5	0.0540	0.0963	0.0000	0.0000
71	0.5	0.0540	0.0949	0.0000	0.0000
72	0.4	0.0432	0.0935	0.0000	0.0000
73	0.4	0.0432	0.0921	0.0000	0.0000
74	0.4	0.0432	0.0908	0.0000	0.0000
75	0.3	0.0324	0.0894	0.0000	0.0000
76	0.2	0.0216	0.0882	0.0000	0.0000
77	0.3	0.0324	0.0869	0.0000	0.0000
78	0.4	0.0432	0.0857	0.0000	0.0000
79	0.3	0.0324	0.0845	0.0000	0.0000
80	0.2	0.0216	0.0834	0.0000	0.0000
81	0.3	0.0324	0.0823	0.0000	0.0000
82	0.3	0.0324	0.0812	0.0000	0.0000
83	0.3	0.0324	0.0802	0.0000	0.0000
84	0.2	0.0216	0.0792	0.0000	0.0000
85	0.3	0.0324	0.0783	0.0000	0.0000

86	0.2	0.0216	0.0774	0.0000	0.0000
87	0.3	0.0324	0.0766	0.0000	0.0000
88	0.2	0.0216	0.0758	0.0000	0.0000
89	0.3	0.0324	0.0750	0.0000	0.0000
90	0.2	0.0216	0.0743	0.0000	0.0000
91	0.2	0.0216	0.0737	0.0000	0.0000
92	0.2	0.0216	0.0731	0.0000	0.0000
93	0.2	0.0216	0.0726	0.0000	0.0000
94	0.2	0.0216	0.0721	0.0000	0.0000
95	0.2	0.0216	0.0718	0.0000	0.0000
96	0.2	0.0216	0.0716	0.0000	0.0000
	100			3.2443	

EFFECTIVE RAIN 0.8111 IN/HR

VOLUME 0.2143 AF
9,333 CF

Villa Siena
Area B Developed Condition

area	3.17	[3]		0.0000	L
unit time	15	[5]		0.0000	Lca
LOSS RATE=F				#DIV/0!	H
F=Fp(1.00-0.9Ai)			0.015		n
Fp	0.44			#DIV/0!	Lag
Ai	0.75			15 min	Use
F	0.1430	[13]			
24 HR 2 YR	4.25	[10]			
C	0.0013				
Fm	0.0715				

[15] UNIT TIME PERIOD	[20] PATTERN PERCENT	[21] STORM RAIN 60[10][20]/100[5]	[22] LOSS RATE	[23] EFFECTIVE RAIN IN/HR [21]-[22]	[24] FLOW CFS [3][23]
1	0.2	0.0340	0.2525	0.0000	0.0000
2	0.3	0.0510	0.2496	0.0000	0.0000
3	0.3	0.0510	0.2467	0.0000	0.0000
4	0.4	0.0680	0.2438	0.0000	0.0000
5	0.3	0.0510	0.2409	0.0000	0.0000
6	0.3	0.0510	0.2380	0.0000	0.0000
7	0.3	0.0510	0.2352	0.0000	0.0000
8	0.4	0.0680	0.2324	0.0000	0.0000
9	0.4	0.0680	0.2296	0.0000	0.0000
10	0.4	0.0680	0.2268	0.0000	0.0000
11	0.5	0.0850	0.2240	0.0000	0.0000
12	0.5	0.0850	0.2212	0.0000	0.0000
13	0.5	0.0850	0.2185	0.0000	0.0000
14	0.5	0.0850	0.2158	0.0000	0.0000
15	0.5	0.0850	0.2131	0.0000	0.0000
16	0.6	0.1020	0.2104	0.0000	0.0000
17	0.6	0.1020	0.2077	0.0000	0.0000
18	0.7	0.1190	0.2051	0.0000	0.0000
19	0.7	0.1190	0.2025	0.0000	0.0000
20	0.8	0.1360	0.1998	0.0000	0.0000
21	0.6	0.1020	0.1973	0.0000	0.0000
22	0.7	0.1190	0.1947	0.0000	0.0000
23	0.8	0.1360	0.1921	0.0000	0.0000
24	0.8	0.1360	0.1896	0.0000	0.0000
25	0.9	0.1530	0.1871	0.0000	0.0000
26	0.9	0.1530	0.1846	0.0000	0.0000
27	1.0	0.1700	0.1821	0.0000	0.0000
28	1.0	0.1700	0.1797	0.0000	0.0000
29	1.0	0.1700	0.1772	0.0000	0.0000
30	1.1	0.1870	0.1748	0.0122	0.0387
31	1.2	0.2040	0.1724	0.0316	0.1002
32	1.3	0.2210	0.1700	0.0510	0.1616
33	1.5	0.2550	0.1677	0.0873	0.2769
34	1.5	0.2550	0.1653	0.0897	0.2843
35	1.6	0.2720	0.1630	0.1090	0.3455
36	1.7	0.2890	0.1607	0.1283	0.4067
37	1.9	0.3230	0.1584	0.1646	0.5217

38	2.0	0.3400	0.1562	0.1838	0.5827
39	2.1	0.3570	0.1540	0.2030	0.6437
40	2.2	0.3740	0.1517	0.2223	0.7046
41	1.5	0.2550	0.1496	0.1054	0.3343
42	1.5	0.2550	0.1474	0.1076	0.3412
43	2.0	0.3400	0.1452	0.1948	0.6174
44	2.0	0.3400	0.1431	0.1969	0.6241
45	1.9	0.3230	0.1410	0.1820	0.5769
46	1.9	0.3230	0.1389	0.1841	0.5835
47	1.7	0.2890	0.1369	0.1521	0.4823
48	1.8	0.3060	0.1348	0.1712	0.5426
49	2.5	0.4250	0.1328	0.2922	0.9262
50	2.6	0.4420	0.1308	0.3112	0.9864
51	2.8	0.4760	0.1289	0.3471	1.1004
52	2.9	0.4930	0.1269	0.3661	1.1605
53	3.4	0.5780	0.1250	0.4530	1.4360
54	3.4	0.5780	0.1231	0.4549	1.4420
55	2.3	0.3910	0.1212	0.2698	0.8551
56	2.3	0.3910	0.1194	0.2716	0.8610
57	2.7	0.4590	0.1176	0.3414	1.0823
58	2.6	0.4420	0.1158	0.3262	1.0341
59	2.6	0.4420	0.1140	0.3280	1.0397
60	2.5	0.4250	0.1123	0.3127	0.9914
61	2.4	0.4080	0.1105	0.2975	0.9429
62	2.3	0.3910	0.1089	0.2821	0.8944
63	1.9	0.3230	0.1072	0.2158	0.6841
64	1.9	0.3230	0.1056	0.2174	0.6893
65	0.4	0.0680	0.1039	0.0000	0.0000
66	0.4	0.0680	0.1024	0.0000	0.0000
67	0.3	0.0510	0.1008	0.0000	0.0000
68	0.3	0.0510	0.0993	0.0000	0.0000
69	0.5	0.0850	0.0978	0.0000	0.0000
70	0.5	0.0850	0.0963	0.0000	0.0000
71	0.5	0.0850	0.0949	0.0000	0.0000
72	0.4	0.0680	0.0935	0.0000	0.0000
73	0.4	0.0680	0.0921	0.0000	0.0000
74	0.4	0.0680	0.0908	0.0000	0.0000
75	0.3	0.0510	0.0894	0.0000	0.0000
76	0.2	0.0340	0.0882	0.0000	0.0000
77	0.3	0.0510	0.0869	0.0000	0.0000
78	0.4	0.0680	0.0857	0.0000	0.0000
79	0.3	0.0510	0.0845	0.0000	0.0000
80	0.2	0.0340	0.0834	0.0000	0.0000
81	0.3	0.0510	0.0823	0.0000	0.0000
82	0.3	0.0510	0.0812	0.0000	0.0000
83	0.3	0.0510	0.0802	0.0000	0.0000
84	0.2	0.0340	0.0792	0.0000	0.0000
85	0.3	0.0510	0.0783	0.0000	0.0000
86	0.2	0.0340	0.0774	0.0000	0.0000
87	0.3	0.0510	0.0766	0.0000	0.0000
88	0.2	0.0340	0.0758	0.0000	0.0000
89	0.3	0.0510	0.0750	0.0000	0.0000
90	0.2	0.0340	0.0743	0.0000	0.0000
91	0.2	0.0340	0.0737	0.0000	0.0000

92	0.2	0.0340	0.0731	0.0000	0.0000
93	0.2	0.0340	0.0726	0.0000	0.0000
94	0.2	0.0340	0.0721	0.0000	0.0000
95	0.2	0.0340	0.0718	0.0000	0.0000
96	0.2	0.0340	0.0716	0.0000	0.0000
	100			7.6639	

EFFECTIVE RAIN 1.9160 IN/HR

VOLUME 0.5061 AF
22,047 CF

Villa Siena
Area C Developed Condition

area	1.32	[3]		0.0000	L
unit time	15	[5]		0.0000	Lca
LOSS RATE=F				#DIV/0!	H
F=Fp(1.00-0.9Ai)			0.015		n
Fp	0.44			#DIV/0!	Lag
Ai	0.75			15 min	Use
F	0.1430	[13]			
24 HR 2 YR	2.7	[10]			
C	0.0013				
Fm	0.0715				

[15] UNIT TIME PERIOD	[20] PATTERN PERCENT	[21] STORM RAIN 60[10][20]/100[5]	[22] LOSS RATE	[23] EFFECTIVE RAIN IN/HR [21]-[22]	[24] FLOW CFS [3][23]
1	0.2	0.0216	0.2525	0.0000	0.0000
2	0.3	0.0324	0.2496	0.0000	0.0000
3	0.3	0.0324	0.2467	0.0000	0.0000
4	0.4	0.0432	0.2438	0.0000	0.0000
5	0.3	0.0324	0.2409	0.0000	0.0000
6	0.3	0.0324	0.2380	0.0000	0.0000
7	0.3	0.0324	0.2352	0.0000	0.0000
8	0.4	0.0432	0.2324	0.0000	0.0000
9	0.4	0.0432	0.2296	0.0000	0.0000
10	0.4	0.0432	0.2268	0.0000	0.0000
11	0.5	0.0540	0.2240	0.0000	0.0000
12	0.5	0.0540	0.2212	0.0000	0.0000
13	0.5	0.0540	0.2185	0.0000	0.0000
14	0.5	0.0540	0.2158	0.0000	0.0000
15	0.5	0.0540	0.2131	0.0000	0.0000
16	0.6	0.0648	0.2104	0.0000	0.0000
17	0.6	0.0648	0.2077	0.0000	0.0000
18	0.7	0.0756	0.2051	0.0000	0.0000
19	0.7	0.0756	0.2025	0.0000	0.0000
20	0.8	0.0864	0.1998	0.0000	0.0000
21	0.6	0.0648	0.1973	0.0000	0.0000
22	0.7	0.0756	0.1947	0.0000	0.0000
23	0.8	0.0864	0.1921	0.0000	0.0000
24	0.8	0.0864	0.1896	0.0000	0.0000
25	0.9	0.0972	0.1871	0.0000	0.0000
26	0.9	0.0972	0.1846	0.0000	0.0000
27	1.0	0.1080	0.1821	0.0000	0.0000
28	1.0	0.1080	0.1797	0.0000	0.0000
29	1.0	0.1080	0.1772	0.0000	0.0000
30	1.1	0.1188	0.1748	0.0000	0.0000
31	1.2	0.1296	0.1724	0.0000	0.0000
32	1.3	0.1404	0.1700	0.0000	0.0000
33	1.5	0.1620	0.1677	0.0000	0.0000
34	1.5	0.1620	0.1653	0.0000	0.0000
35	1.6	0.1728	0.1630	0.0098	0.0129
36	1.7	0.1836	0.1607	0.0229	0.0302
37	1.9	0.2052	0.1584	0.0468	0.0617

38	2.0	0.2160	0.1562	0.0598	0.0790
39	2.1	0.2268	0.1540	0.0728	0.0962
40	2.2	0.2376	0.1517	0.0859	0.1133
41	1.5	0.1620	0.1496	0.0124	0.0164
42	1.5	0.1620	0.1474	0.0146	0.0193
43	2.0	0.2160	0.1452	0.0708	0.0934
44	2.0	0.2160	0.1431	0.0729	0.0962
45	1.9	0.2052	0.1410	0.0642	0.0847
46	1.9	0.2052	0.1389	0.0663	0.0875
47	1.7	0.1836	0.1369	0.0467	0.0617
48	1.8	0.1944	0.1348	0.0596	0.0786
49	2.5	0.2700	0.1328	0.1372	0.1811
50	2.6	0.2808	0.1308	0.1500	0.1980
51	2.8	0.3024	0.1289	0.1735	0.2291
52	2.9	0.3132	0.1269	0.1863	0.2459
53	3.4	0.3672	0.1250	0.2422	0.3197
54	3.4	0.3672	0.1231	0.2441	0.3222
55	2.3	0.2484	0.1212	0.1272	0.1679
56	2.3	0.2484	0.1194	0.1290	0.1703
57	2.7	0.2916	0.1176	0.1740	0.2297
58	2.6	0.2808	0.1158	0.1650	0.2178
59	2.6	0.2808	0.1140	0.1668	0.2202
60	2.5	0.2700	0.1123	0.1577	0.2082
61	2.4	0.2592	0.1105	0.1487	0.1962
62	2.3	0.2484	0.1089	0.1395	0.1842
63	1.9	0.2052	0.1072	0.0980	0.1294
64	1.9	0.2052	0.1056	0.0996	0.1315
65	0.4	0.0432	0.1039	0.0000	0.0000
66	0.4	0.0432	0.1024	0.0000	0.0000
67	0.3	0.0324	0.1008	0.0000	0.0000
68	0.3	0.0324	0.0993	0.0000	0.0000
69	0.5	0.0540	0.0978	0.0000	0.0000
70	0.5	0.0540	0.0963	0.0000	0.0000
71	0.5	0.0540	0.0949	0.0000	0.0000
72	0.4	0.0432	0.0935	0.0000	0.0000
73	0.4	0.0432	0.0921	0.0000	0.0000
74	0.4	0.0432	0.0908	0.0000	0.0000
75	0.3	0.0324	0.0894	0.0000	0.0000
76	0.2	0.0216	0.0882	0.0000	0.0000
77	0.3	0.0324	0.0869	0.0000	0.0000
78	0.4	0.0432	0.0857	0.0000	0.0000
79	0.3	0.0324	0.0845	0.0000	0.0000
80	0.2	0.0216	0.0834	0.0000	0.0000
81	0.3	0.0324	0.0823	0.0000	0.0000
82	0.3	0.0324	0.0812	0.0000	0.0000
83	0.3	0.0324	0.0802	0.0000	0.0000
84	0.2	0.0216	0.0792	0.0000	0.0000
85	0.3	0.0324	0.0783	0.0000	0.0000
86	0.2	0.0216	0.0774	0.0000	0.0000
87	0.3	0.0324	0.0766	0.0000	0.0000
88	0.2	0.0216	0.0758	0.0000	0.0000
89	0.3	0.0324	0.0750	0.0000	0.0000
90	0.2	0.0216	0.0743	0.0000	0.0000
91	0.2	0.0216	0.0737	0.0000	0.0000

92	0.2	0.0216	0.0731	0.0000	0.0000
93	0.2	0.0216	0.0726	0.0000	0.0000
94	0.2	0.0216	0.0721	0.0000	0.0000
95	0.2	0.0216	0.0718	0.0000	0.0000
96	0.2	0.0216	0.0716	0.0000	0.0000
	100			3.2443	

EFFECTIVE RAIN 0.8111 IN/HR

VOLUME 0.0892 AF
3,886 CF

Villa Siena
Area C Developed Condition

area	1.32	[3]		0.0000	L
unit time	15	[5]		0.0000	Lca
LOSS RATE=F				#DIV/0!	H
F=Fp(1.00-0.9Ai)			0.015		n
Fp	0.44			#DIV/0!	Lag
Ai	0.75			15 min	Use
F	0.1430	[13]			
24 HR 2 YR	4.25	[10]			
C	0.0013				
Fm	0.0715				

[15] UNIT TIME PERIOD	[20] PATTERN PERCENT	[21] STORM RAIN 60[10][20]/100[5]	[22] LOSS RATE	[23] EFFECTIVE RAIN IN/HR [21]-[22]	[24] FLOW CFS [3][23]
1	0.2	0.0340	0.2525	0.0000	0.0000
2	0.3	0.0510	0.2496	0.0000	0.0000
3	0.3	0.0510	0.2467	0.0000	0.0000
4	0.4	0.0680	0.2438	0.0000	0.0000
5	0.3	0.0510	0.2409	0.0000	0.0000
6	0.3	0.0510	0.2380	0.0000	0.0000
7	0.3	0.0510	0.2352	0.0000	0.0000
8	0.4	0.0680	0.2324	0.0000	0.0000
9	0.4	0.0680	0.2296	0.0000	0.0000
10	0.4	0.0680	0.2268	0.0000	0.0000
11	0.5	0.0850	0.2240	0.0000	0.0000
12	0.5	0.0850	0.2212	0.0000	0.0000
13	0.5	0.0850	0.2185	0.0000	0.0000
14	0.5	0.0850	0.2158	0.0000	0.0000
15	0.5	0.0850	0.2131	0.0000	0.0000
16	0.6	0.1020	0.2104	0.0000	0.0000
17	0.6	0.1020	0.2077	0.0000	0.0000
18	0.7	0.1190	0.2051	0.0000	0.0000
19	0.7	0.1190	0.2025	0.0000	0.0000
20	0.8	0.1360	0.1998	0.0000	0.0000
21	0.6	0.1020	0.1973	0.0000	0.0000
22	0.7	0.1190	0.1947	0.0000	0.0000
23	0.8	0.1360	0.1921	0.0000	0.0000
24	0.8	0.1360	0.1896	0.0000	0.0000
25	0.9	0.1530	0.1871	0.0000	0.0000
26	0.9	0.1530	0.1846	0.0000	0.0000
27	1.0	0.1700	0.1821	0.0000	0.0000
28	1.0	0.1700	0.1797	0.0000	0.0000
29	1.0	0.1700	0.1772	0.0000	0.0000
30	1.1	0.1870	0.1748	0.0122	0.0161
31	1.2	0.2040	0.1724	0.0316	0.0417
32	1.3	0.2210	0.1700	0.0510	0.0673
33	1.5	0.2550	0.1677	0.0873	0.1153
34	1.5	0.2550	0.1653	0.0897	0.1184
35	1.6	0.2720	0.1630	0.1090	0.1439
36	1.7	0.2890	0.1607	0.1283	0.1693
37	1.9	0.3230	0.1584	0.1646	0.2172
38	2.0	0.3400	0.1562	0.1838	0.2426

39	2.1	0.3570	0.1540	0.2030	0.2680
40	2.2	0.3740	0.1517	0.2223	0.2934
41	1.5	0.2550	0.1496	0.1054	0.1392
42	1.5	0.2550	0.1474	0.1076	0.1421
43	2.0	0.3400	0.1452	0.1948	0.2571
44	2.0	0.3400	0.1431	0.1969	0.2599
45	1.9	0.3230	0.1410	0.1820	0.2402
46	1.9	0.3230	0.1389	0.1841	0.2430
47	1.7	0.2890	0.1369	0.1521	0.2008
48	1.8	0.3060	0.1348	0.1712	0.2259
49	2.5	0.4250	0.1328	0.2922	0.3857
50	2.6	0.4420	0.1308	0.3112	0.4107
51	2.8	0.4760	0.1289	0.3471	0.4582
52	2.9	0.4930	0.1269	0.3661	0.4832
53	3.4	0.5780	0.1250	0.4530	0.5980
54	3.4	0.5780	0.1231	0.4549	0.6005
55	2.3	0.3910	0.1212	0.2698	0.3561
56	2.3	0.3910	0.1194	0.2716	0.3585
57	2.7	0.4590	0.1176	0.3414	0.4507
58	2.6	0.4420	0.1158	0.3262	0.4306
59	2.6	0.4420	0.1140	0.3280	0.4329
60	2.5	0.4250	0.1123	0.3127	0.4128
61	2.4	0.4080	0.1105	0.2975	0.3926
62	2.3	0.3910	0.1089	0.2821	0.3724
63	1.9	0.3230	0.1072	0.2158	0.2849
64	1.9	0.3230	0.1056	0.2174	0.2870
65	0.4	0.0680	0.1039	0.0000	0.0000
66	0.4	0.0680	0.1024	0.0000	0.0000
67	0.3	0.0510	0.1008	0.0000	0.0000
68	0.3	0.0510	0.0993	0.0000	0.0000
69	0.5	0.0850	0.0978	0.0000	0.0000
70	0.5	0.0850	0.0963	0.0000	0.0000
71	0.5	0.0850	0.0949	0.0000	0.0000
72	0.4	0.0680	0.0935	0.0000	0.0000
73	0.4	0.0680	0.0921	0.0000	0.0000
74	0.4	0.0680	0.0908	0.0000	0.0000
75	0.3	0.0510	0.0894	0.0000	0.0000
76	0.2	0.0340	0.0882	0.0000	0.0000
77	0.3	0.0510	0.0869	0.0000	0.0000
78	0.4	0.0680	0.0857	0.0000	0.0000
79	0.3	0.0510	0.0845	0.0000	0.0000
80	0.2	0.0340	0.0834	0.0000	0.0000
81	0.3	0.0510	0.0823	0.0000	0.0000
82	0.3	0.0510	0.0812	0.0000	0.0000
83	0.3	0.0510	0.0802	0.0000	0.0000
84	0.2	0.0340	0.0792	0.0000	0.0000
85	0.3	0.0510	0.0783	0.0000	0.0000
86	0.2	0.0340	0.0774	0.0000	0.0000
87	0.3	0.0510	0.0766	0.0000	0.0000
88	0.2	0.0340	0.0758	0.0000	0.0000
89	0.3	0.0510	0.0750	0.0000	0.0000
90	0.2	0.0340	0.0743	0.0000	0.0000
91	0.2	0.0340	0.0737	0.0000	0.0000
92	0.2	0.0340	0.0731	0.0000	0.0000
93	0.2	0.0340	0.0726	0.0000	0.0000

94	0.2	0.0340	0.0721	0.0000	0.0000
95	0.2	0.0340	0.0718	0.0000	0.0000
96	0.2	0.0340	0.0716	0.0000	0.0000
	100			7.6639	

EFFECTIVE RAIN 1.9160 IN/HR

VOLUME 0.2108 AF
9,181 CF

APPENDIX D

Educational Materials

To be a part of the Final WQMP
(Pools and Fountains to be included)

APPENDIX E

Soils Report / Percolation test results report

Interpretive Report for Infiltration Design
Proposed Apartment Complex Project No. 13350-11A
September 4, 2013

Preliminary Geotechnical Interpretive Report
Proposed Apartment Complex Project No. 13350-10A
September 4, 2013
(To be included in Final WQMP)

Earth - Strata, Inc.

Geotechnical, Environmental and Materials Testing Consultants

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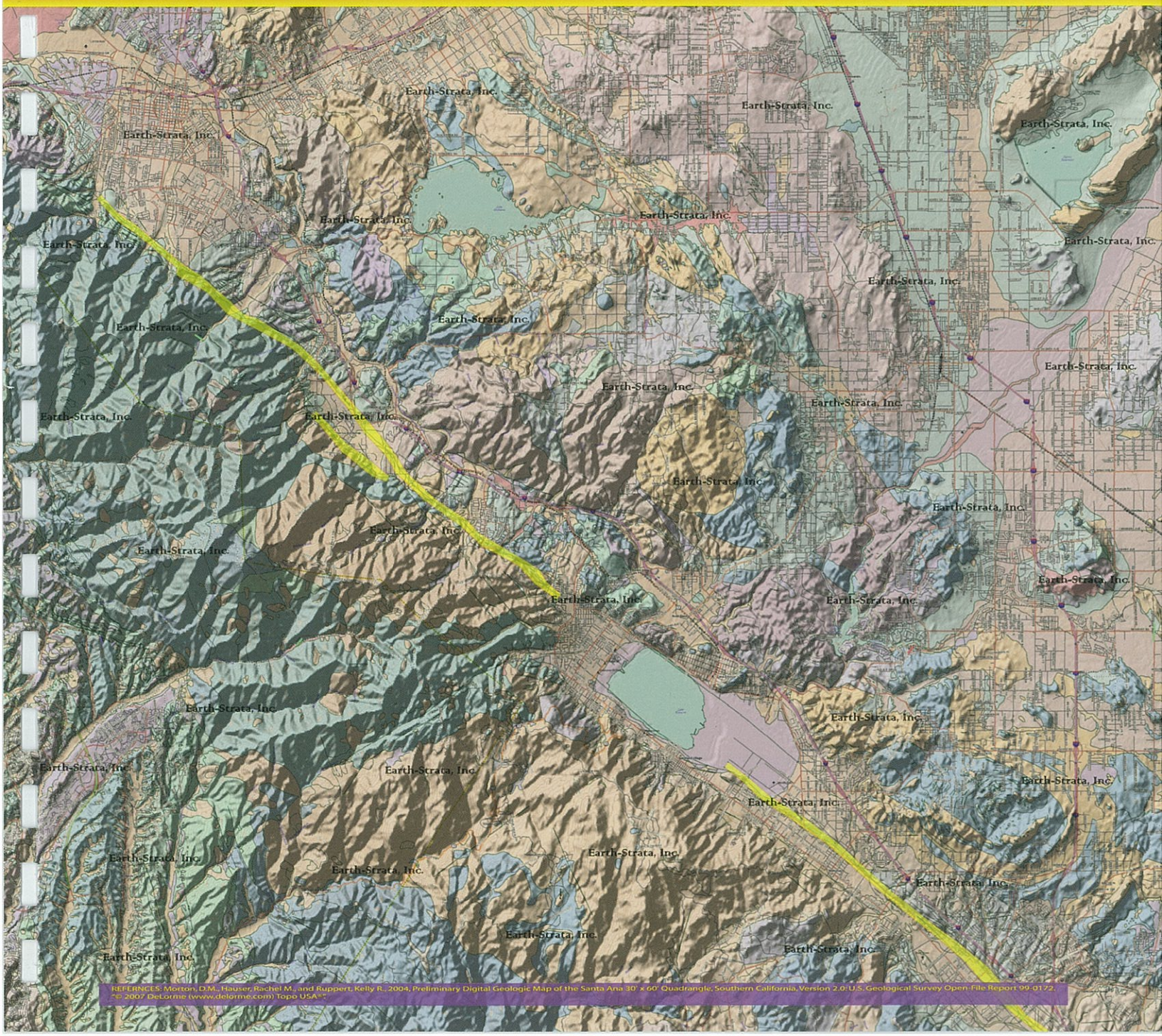
INTERPRETIVE REPORT

FOR INFILTRATION SYSTEM DESIGN, PROPOSED APARTMENT COMPLEX, ASSESSOR'S PARCEL NUMBER 380-290-029, LOCATED AT THE NORTHWEST CORNER OF JANA LANE AND PRIELIPP ROAD, CITY OF WILDOMAR, RIVERSIDE COUNTY, CALIFORNIA

PROJECT NO. 13350-11A

ISSUED: SEPTEMBER 4, 2013



September 4, 2013

Project No. 13350-11A

Mr. James Kieckhafer
GOLDEN EAGLE MULTI FAMILY PROPERTIES, LLC.
6201 Oak Canyon, Suite 200
Irvine, CA 92618

Subject: **Interpretive Report for Infiltration System Design, Proposed Apartment Complex, Assessor's Parcel Number 380-290-029, Located at the Northwest Corner of Jana Lane and Prielipp Road, City of Wildomar, Riverside County, California**

Reference: Earth-Strata, Inc., 2013, *Preliminary Geotechnical Interpretive Report, Proposed Apartment Complex, Assessor's Parcel Number 380-290-029, Located at the Northwest Corner of Jana Lane and Prielipp Road, City of Wildomar, Riverside County, California,* dated September 4.

Earth-Strata, Inc. is pleased to present this interpretive report for the proposed apartment complex, Assessor's Parcel Number 380-290-029, located at the northwest corner of Jana Lane and Prielipp Road, in the City of Wildomar, Riverside County, California. The purpose of our study was to determine the infiltration rates and physical characteristics of the subsurface earth materials within the proposed development. We have provided guidelines for the design of onsite bio swale retention systems, where applicable. This study is intended to provide onsite infiltration rates for the earth materials at the approximate depth near the proposed retention basins.

PROPERTY DESCRIPTION

The subject property is located in the City of Wildomar, Riverside County, California (see Figure 1). The subject property consists of an undeveloped parcel of land except for one existing single family residence with relatively hilly and flat terrain. The subject property is underlain by alluvium and Pauba Formation bedrock.

PROPOSED CONSTRUCTION

Based on information provided by you, the proposed development will consists of numerous buildings which includes interior driveways, utilities and three or more on-site retention basins located along the perimeter of the proposed development.

SUBSURFACE EXPLORATION AND PERCOLATION TESTING

SUBSURFACE EXPLORATION

Subsurface exploration of the subject site consisted of 3 exploratory excavations to a depth of 3 feet, conducted in August 30, 2013. The exploratory holes were excavated to evaluate insitu infiltration rates. The boring logs from the referenced Geotechnical Report are presented in Appendix A. The approximate location of the exploratory excavations are shown on the attached Infiltration Location Map, Plate 1.

EARTH MATERIALS

A general description of the earth materials observed on site is provided below.

Quaternary Pauba Sandstone (Qps): Quaternary Pauba Sandstone was encountered below the alluvium to a maximum depth of explored. This bedrock unit consists predominately of interbedded gray to medium brown, fine to medium grained silty sand, fine to coarse grained sandstone, with occasional siltstone and claystone layers.

GROUNDWATER

Groundwater was not observed within the exploratory excavations.

PERCOLATION TESTING

The continuous presoak test method was utilized to perform a total of three (3) infiltration tests on August 30, 2013 to evaluate near surface infiltration rates in order to estimate the amount of storm water runoff that can percolate into the onsite bio swale retention basins. The infiltration tests were performed in general accordance with the requirements of insitu percolation testing.

The percolation tests were performed within 8 inch holes, 2.5 to 3 feet deep. The locations of the percolation test holes are indicated on the attached Infiltration Location Map, Plate 1. The percolation test holes were located by property boundary measurement on the site plan and by using geographic features. For the continuous presoak testing method, the pipe was filled with water and allowed to stand.

After the presoak, testing was performed by adjusting the water level to near the top of the pipe. The drop in water level was measured from a fixed initial reference point for more reliable readings, with measurements having an accuracy of 1/8-inch. After each measurement, the water level was brought up to the original test level. Percolation test data recorded in the field is summarized in the following table and is included within Appendix A.

PERCOLATION TEST SUMMARY

TEST NUMBER	PERCOLATION HOLE DEPTH (ft.)	PERCOLATION RATE (mpi)	DESCRIPTION
P-1	2.5	Failed	Clayey Sand
P-2	3	60	Clayey Sand
P-3	3	40	Clayey Sand

The percolation test rates ranged from 40 to 60 minutes per inch (mpi).

CONCLUSIONS AND RECOMMENDATIONS

Based on the data presented in this report and the recommendations set forth herein, it is the opinion of Earth-Strata that the retention basins can be designed for the infiltration rates measured from 60 mpi for the P-2 area (southwest portion of the site) and from 40 mpi for the P-3 area (southwest portion of the site).

GRADING PLAN REVIEW AND CONSTRUCTION SERVICES

This report has been prepared for the exclusive use of **GOLDEN EAGLE MULTI FAMILY PROPERTIES, LLC** and their authorized representative. It likely does not contain sufficient information for other parties or other uses. Earth-Strata should be engaged to review the final design plans and specifications prior to construction. This is to verify that the recommendations contained in this report have been properly incorporated into the project plans and specifications. Should Earth-Strata not be accorded the opportunity to review the project plans and specifications, we are not responsibility for misinterpretation of our recommendations.

Earth-Strata should be retained to provide observations during construction to validate this report. In order to allow for design changes in the event that the subsurface conditions differ from those anticipated prior to construction.

Earth-Strata should review any changes in the project and modify and approve in writing the conclusions and recommendations of this report. This report and the drawings contained within are intended for design input purposes only and are not intended to act as construction drawings or specifications. In the event that conditions encountered during grading or construction operations appear to be different than those indicated in this report, this office should be notified immediately, as revisions may be required.

REPORT LIMITATIONS

Our services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable soils engineers and geologists, practicing at the time and location this report was prepared. No other warranty, expressed or implied, is made as to the conclusions and professional advice included in this report.

Earth materials vary in type, strength, and other geotechnical properties between points of observation and exploration. Groundwater and moisture conditions can also vary due to natural processes or the works of man on this or adjacent properties. As a result, we do not and cannot have complete knowledge of the subsurface conditions beneath the subject property. No practical study can completely eliminate uncertainty with regard to the anticipated geotechnical conditions in connection with a subject property. The conclusions and recommendations within this report are based upon the findings at the points of observation and are subject to confirmation by Earth-Strata during construction. This report is considered valid for a period of one year from the time the report was issued.

This report was prepared with the understanding that it is the responsibility of the owner or their representative, to ensure that the conclusions and recommendations contained herein are brought to the attention of the other project consultants and are incorporated into the plans and specifications. The owners' contractor should properly implement the conclusions and recommendations during grading and construction, and notify the owner if they consider any of the recommendations presented herein to be unsafe or unsuitable.

Respectfully submitted,

EARTH-STRATA, INC.

Stephen M. Poole, PE 40219
President
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
STEPHEN MICHAEL POOLE
No. 40219
Exp.
CIVIL
STATE OF CALIFORNIA

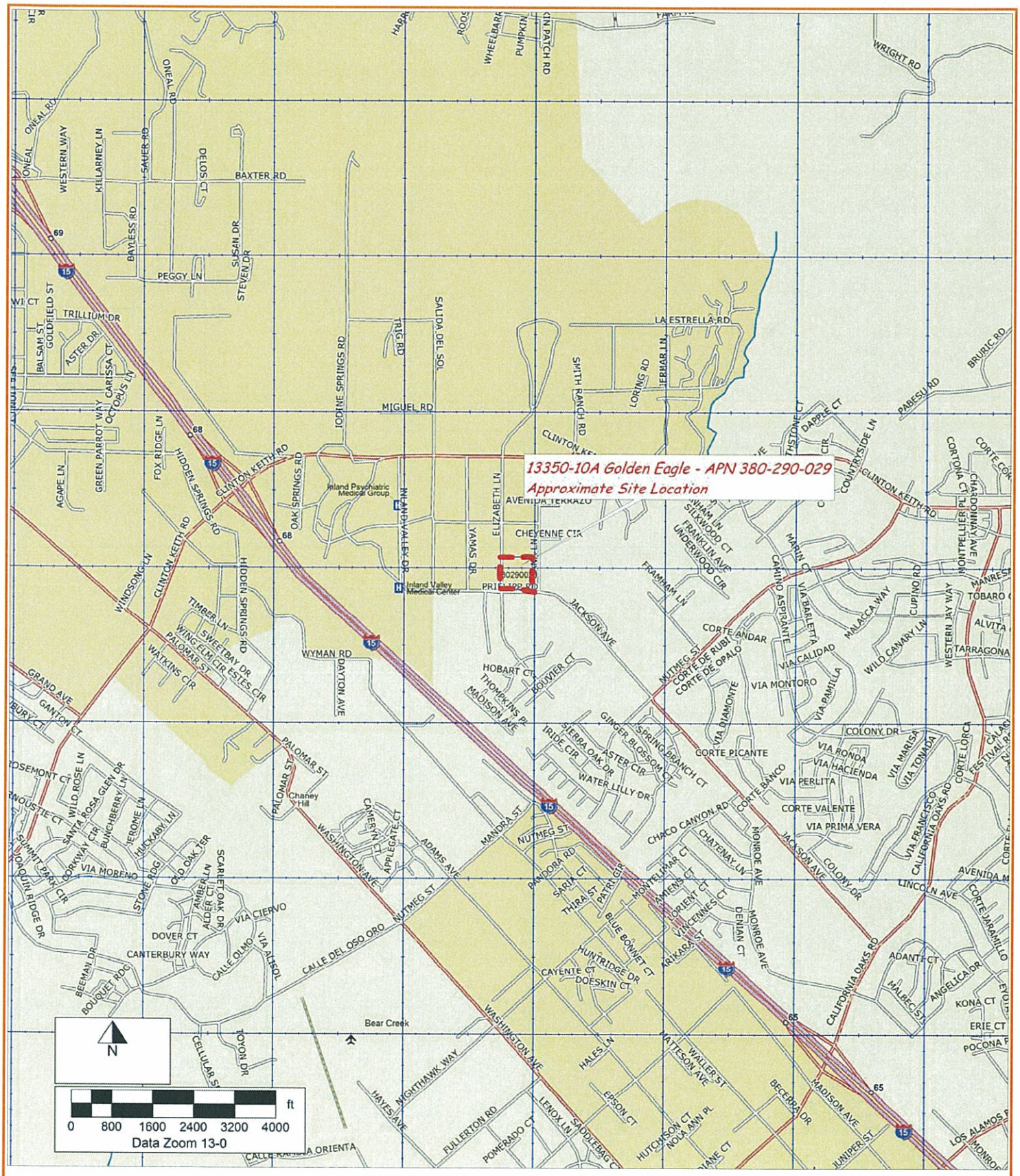
SMP/am

Distribution: (4) Addressee

Attachments: Figure 1 – Vicinity Map *(Rear of Text)*
Appendix A – Exploratory Logs *(Rear of Text)*
Appendix B – Percolation Test Sheets *(Rear of Text)*
Plate 1 – Infiltration Location Map *(Rear of Text)*

FIGURE 1

VICINITY MAP



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GOLDEN EAGLE - APN 380-290-029	13350-10A
VICINITY MAP	SEE BAR SCALE
	JULY 2013 / FIGURE 1

APPENDIX A

EXPLORATORY LOGS

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SYMBOLS AND TERMS USED ON LOGS

The No. 200 Standard Sieve is about the smallest particle visible to the naked eye.

Coarse-grained Soils >½ of materials larger than #200 sieve	**GRAVELS** Higher percentage of coarse fraction is larger than #4 sieve	Clean Gravels (less than 5% fines)		GW	Well-graded gravels, little or no fines
				GP	Poorly-graded gravels, little or no fines
		5 – 12% fines		GW-GM	Well-graded gravel with silt
				GW-GC	Well-graded gravel with clay
				GP-GM	Poorly-graded gravel with silt
				GP-GC	Poorly-graded gravel with clay
		Gravels with fines	PI < 4	GM	Silty Gravels
			PI > 7	GC	Clayey Gravels
	SANDS Higher percentage of coarse fraction is smaller than #4 sieve	Clean Sands (less than 5% fines)		SW	Well-graded sands, little or no fines
				SP	Poorly-graded sands, little or no fines
		5 – 12% fines		SW-SM	Well-graded sand with silt
				SW-SC	Well-graded sand with clay
				SP-SM	Poorly-graded sand with silt
				SP-SC	Poorly-graded sand with clay
		Sands with fines	PI < 4	SM	Silty Sands
			PI > 7	SC	Clayey Sands
			PI 4-7	SC-SM	Silty clayey sands
Fine-grained Soils ≥½ of materials smaller than #200 sieve	**SILTS & CLAYS** Liquid Limit Less Than 50		PI < 4	ML	Inorganic silts & sandy silts
			PI > 7	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, lean clays
			PI 4-7	ML-CL	Silts & clays of low plasticity, sandy silty clay, silty clay
	SILTS & CLAYS Liquid Limit Greater Than 50			MH	Inorganic silts, micaceous or diatomaceous silt, sandy silt
				CH	Inorganic clays of high plasticity, fat clays, sandy clays, gravelly clays
				OH	Organic silts and clays of medium-to-high plasticity
Highly Organic Soils				PT	Peat, humus swamp soils with higher organic content

Symbols	
	Ring Sample
	SPT Sample
NR	No Recovery
▽	Groundwater

Grain Size

Description		Sieve Size	Grain Size	Approximate Size
Boulders		>12"	>12"	Larger than basketball-sized
Cobbles		3-12"	3-12"	Fist-sized to basketball-sized
Gravel	Coarse	¾-3"	¾-3"	Thumb-sized to fist-sized
	Fine	#4-¾"	0.19-0.75"	Pea-sized to thumb-sized
Sand	Coarse	#10-#4	0.079-0.19"	Rock salt-sized to pea-sized
	Medium	#40-#10	0.017-0.079"	Sugar-sized to rock salt-sized
	Fine	#200-#40	0.0029-0.017"	Flour-sized to sugar-sized
Fines		Passing #200	<0.0029"	Flour-sized and smaller

Moisture Content
Slightly Moist
Moist
Very Moist
Wet

Consistency – Fine Grained Soils

Apparent Density	SPT (# blows/foot)	Modified CA Sampler (# blows/foot)	Field Test
Very Soft	<1	<2	Easily penetrated by thumb; exudes between thumb and fingers when squeezed in hand
Soft	2-3	3-6	Easily penetrated one inch by thumb; molded by light finger pressure
Medium Stiff	4-6	7-12	Penetrated over ½ inch by thumb with moderate effort; molded by strong finger pressure
Stiff	7-10	13-15	Indented about ½ inch by thumb but penetrated only with great effort
Very Stiff	11-20	16-30	Readily indented thumbnail
Hard	>20	>30	Indented with difficulty by thumbnail

Relative Density – Coarse Grained Soils

Apparent Density	SPT (# blows/foot)	Modified CA Sampler (# blows/foot)	Field Test
Very Loose	<2	<4	Easily penetrated with ½ inch reinforcing rod pushed by hand
Loose	3-5	4-10	Easily penetrated with ½ inch reinforcing rod pushed by hand
Medium Dense	6-15	11-30	Easily penetrated 1-foot with ½ inch reinforcing rod driven with a 5-lb hammer
Dense	16-25	31-50	Difficult to penetrate 1-foot with ½ inch reinforcing rod driven with a 5-lb hammer
Very Dense	>25	>50	Penetrated only a few inches with ½ inch reinforcing rod driven with a 5-lb hammer

Geotechnical Boring Log B-1

Date: August 2, 2013	Project Name: Apartment Complex - Wildomar — Page: 1 of 1
Project Number: 13350-10A	Logged By: MWG
Drilling Company: Cal Pac	Type of Rig: B61
Drive Weight (lbs): 140	Drop (in): 30 — Hole Diameter (in): 8
Top of Hole Elevation (ft):	Hole Location: See Geotechnical Map

Depth (ft)	Blow Count Per Foot	Sample Number	Dry Density (pcf)	Moisture (%)	ASTM Symbol	MATERIAL DESCRIPTION
0						***Quaternary Pauba Formation, (Qpsf):***
					SC	Clayey SAND; dark reddish brown, moist, very dense
	58	1	127.3	2.9		
5	82/10"	2	118.8	11.8		dry, slightly moist, very dense, fine to coarse sand, Refusal @ 6 feet
						E.O.B. @ 6 Feet
						No Groundwater
10						
15						
20						
25						
30						

Geotechnical Boring Log B-2

Date: August 2, 2013	Project Name: Apartment Complex - Wildomar — Page: 1 of 1
Project Number: 13350-10A	Logged By: MWG
Drilling Company: Cal Pac	Type of Rig: B61
Drive Weight (lbs): 140	Drop (in): 30 — Hole Diameter (in): 8
Top of Hole Elevation (ft):	Hole Location: See Geotechnical Map

Depth (ft)	Blow Count Per Foot	Sample Number	Dry Density (pcf)	Moisture (%)	ASTM Symbol	MATERIAL DESCRIPTION
0						***Quaternary Pauba Formation, (Qpsf):***
					SC	Clayey SAND; reddish brown, slightly moist, very dense
	62	1	115.1	6.7		
5	59	2	117.5	2.0	SM	Silty SAND; reddish brown, dry, very dense
	50/5"	3	116.3	3.2	SC	Clayey SAND; light brown, moist, very dense
10	50/5"	4	111.2	5.9		refusal @ 10.5 feet
						E.O.B. @ 10.5 Feet
						No Groundwater
15						
20						
25						
30						

Geotechnical Boring Log B-3

Date: August 2, 2013	Project Name: Apartment Complex - Wildomar — Page: 1 of 1
Project Number: 13350-10A	Logged By: MWG
Drilling Company: Cal Pac	Type of Rig: B61
Drive Weight (lbs): 140	Drop (in): 30 — Hole Diameter (in): 8
Top of Hole Elevation (ft):	Hole Location: See Geotechnical Map

Depth (ft)	Blow Count Per Foot	Sample Number	Dry Density (pcf)	Moisture (%)	ASTM Symbol	MATERIAL DESCRIPTION
0						***Quaternary Pauba Formation, (Qpsf):***
					SC	Clayey SAND; reddish brown, slighlty moist, dense
	45	1	119.6	7.2		
5	19	2	113.8	3.8	SM	Silty SAND; brown, slightly moist, medium dense
	38	3	116.6	4.2		dense 8 to 12 feet
10	49	4	117.8	3.2		
						very dense below 12 feet
15	65	5	124.9	8.7		
						E.O.B. @ 16.5 Feet
						No Groundwater
20						
25						
30						

Geotechnical Boring Log B-4

Date: August 2, 2013	Project Name: Apartment Complex - Wildomar — Page: 1 of 1
Project Number: 13350-10A	Logged By: MWG
Drilling Company: Cal Pac	Type of Rig: B61
Drive Weight (lbs): 140	Drop (in): 30 — Hole Diameter (in): 8
Top of Hole Elevation (ft):	Hole Location: See Geotechnical Map

Depth (ft)	Blow Count Per Foot	Sample Number	Dry Density (pcf)	Moisture (%)	ASTM Symbol	MATERIAL DESCRIPTION
0						***Quaternary Pauba Formation, (Qpsf):***
					SC	Clayey SAND; reddish brown, slighty mosit, very dense
	54	1	127.3	4.7		
5	53	2	125.8	4.9		
	28	3	116.1	7.4		
10	32	4	118.4	11.3		
					CL	Silty CLAY; brown, moist, hard
15	25	5	108.1	20.2		
20	50/5"	6	120.5	9.2		Refusal @ 12 feet, with sand and weathered bedrock
						E.O.B. @ 21 Feet
						No Groundwater
25						
30						

Geotechnical Boring Log B-5

Date: August 15, 2013	Project Name: Apartment Complex - Wildomar — Page: 1 of 1
Project Number: 13350-10A	Logged By: MWG
Drilling Company: Cal Pac	Type of Rig: B61
Drive Weight (lbs): 140	Drop (in): 30 — Hole Diameter (in): 8
Top of Hole Elevation (ft):	Hole Location: See Geotechnical Map

Depth (ft)	Blow Count Per Foot	Sample Number	Dry Density (pcf)	Moisture (%)	ASTM Symbol	MATERIAL DESCRIPTION
0						***Quaternary Pauba Formation, (Qpsf):***
					SC	Clayey SAND; reddish brown, moist, very dense
	71	1	127.4	7.1		
5	54	2	121.1	8.0		
	48	3	124.1	5.1	SM	Silty SAND; reddish brown, slightly moist, dense
10	49	4	-	4.2	SM	Silty SAND, reddish brown, moist, fine to coarse with weathered bedrock, dense
15	58	5	125.2	8.0		
						E.O.B. @ 16.5 Feet
						No Groundwater
20						
25						
30						

Geotechnical Boring Log B-6

Date: August 15, 2013	Project Name: Apartment Complex - Wildomar
Project Number: 13350-10A	Logged By: MWG
Drilling Company: Cal Pac	Type of Rig: B61
Drive Weight (lbs): 140	Drop (in): 30 Hole Diameter (in): 8
Top of Hole Elevation (ft):	Hole Location: See Geotechnical Map

Depth (ft)	Blow Count Per Foot	Sample Number	Dry Density (pcf)	Moisture (%)	ASTM Symbol	MATERIAL DESCRIPTION
0						***Quaternary Pauba Formation, (Qpsf):***
					SC	Clayey SAND; light brown, moist, very dense
	58	1	117.2	6.9		
5	48	2	117.8	9.0		
10	37	3	116.6	7.3		
15	60	4	112.9	10.3		
						E.O.B. @ 16.5 Feet
						No Groundwater
20						
25						
30						

Geotechnical Boring Log B-7

Date: August 2, 2013	Project Name: Apartment Complex - Wildomar — Page: 1 of 1
Project Number: 13350-10A	Logged By: MWG
Drilling Company: Cal Pac	Type of Rig: B61
Drive Weight (lbs): 140	Drop (in): 30 — Hole Diameter (in): 8
Top of Hole Elevation (ft):	Hole Location: See Geotechnical Map

Depth (ft)	Blow Count Per Foot	Sample Number	Dry Density (pcf)	Moisture (%)	ASTM Symbol	MATERIAL DESCRIPTION
0						***Quaternary Pauba Formation, (Qpsf):***
					SC	Clayey SAND; light brown and orange, very dense, moist, fine to medium
	50/6"	1	107.9	10.7		
5	50/6"	2	113.8	7.2		
10	76	3	125.9	7.8		with fine to coarse sand below 10 feet
15	74	4	121.6	8.8		
20	73	120.9	7.8			
						E.O.B. @ 21.5 Feet
						No Groundwater
25						
30						

APPENDIX B

PERCOLATION TEST SHEETS

PERCOLATION SHEET

Job Number: 13350-11A

Tested By: SMP

Project No.: Wildomar Apartments

Test Hole Number: P-1

Test Hole Diameter (inches): 8'

Soil Classification: Clayey SAND

Date Excavated: 8/15/2013

Depth of Test Hole (ft): 2.5

Date Tested: 8/30/2013

	Date / Time	Presoak Period	Amount of Water Used / Comments
Start	8/30/13 9:00	Time Interval of Presoak	5 gallons
Stop	8/30/13 10:30	24 HOURS	

Time	*Time Interval (min.)*	*Time Elapsed (min.)*	*Initial Water Level (Inches)*	*Final Water Level (Inches)*	*Water Level Drop (Inches)*	*Percolation Rate (Min./Inch)*
9:00 9:30	30	30	15	14.5	0.50	60.0
9:30 10:00	30	60	14.5	14.5	0.00	---
10:00 10:30	30	90	14.5	14.5	0.00	---

PERCOLATION SHEET

Job Number: 13350-11A
Project No.: Wildomar Apartments
Test Hole Number: P-2
Soil Classification: Clayey SAND
Depth of Test Hole (ft): 3

Tested By: SMP
Test Hole Diameter (inches): 8'
Date Excavated: 8/15/2013
Date Tested: 8/30/2013

	Date / Time	Presoak Period	Amount of Water Used / Comments
Start	8/30/13 9:05	Time Interval of Presoak	5 gallons
Stop	8/30/13 15:05	24 HOURS	

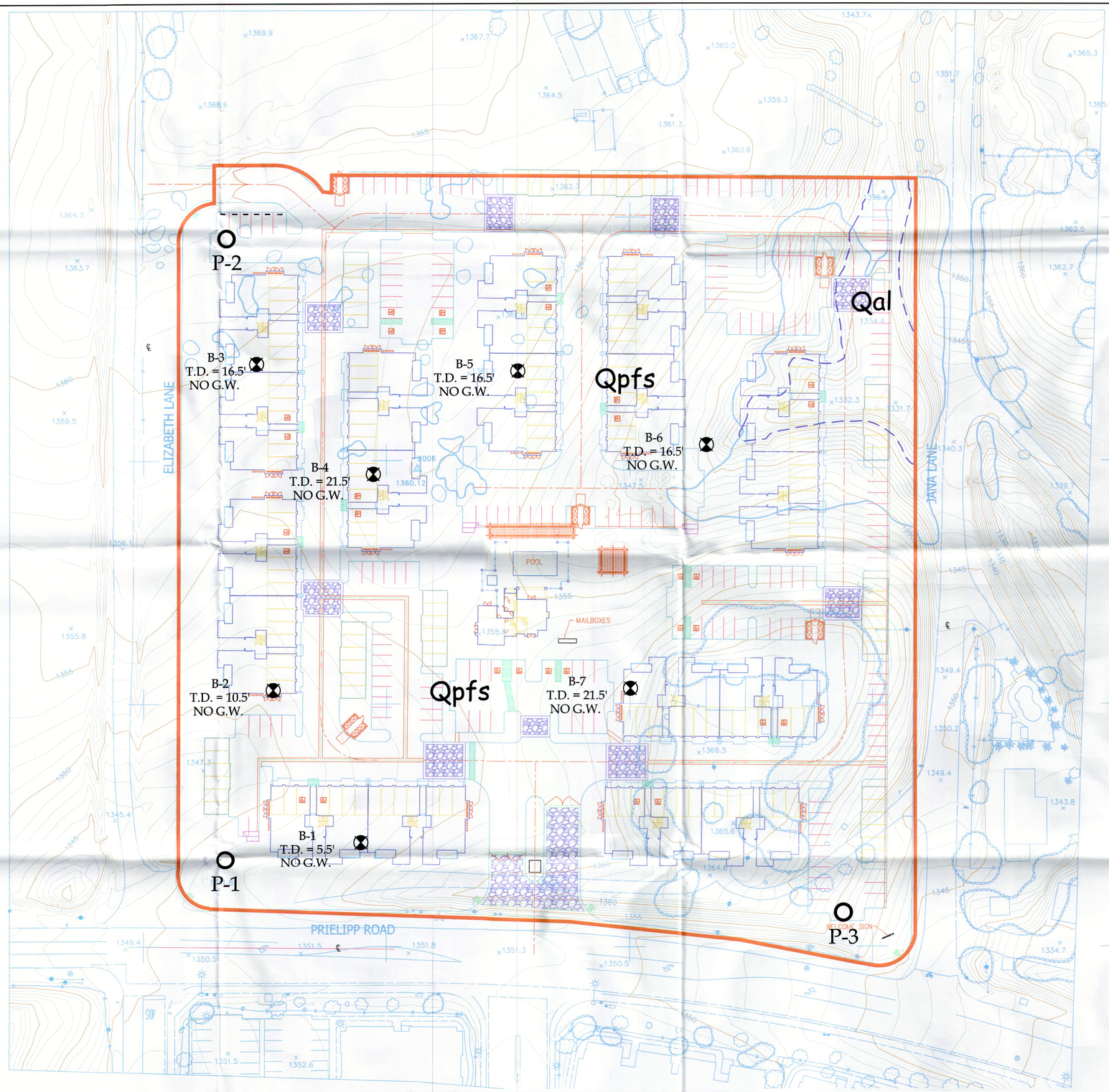
Time	Time Interval (min.)	Time Elapsed (min.)	Initial Water Level (Inches)	Final Water Level (Inches)	Water Level Drop (Inches)	Percolation Rate (Min./Inch)
9:05 9:35	30	30	16	15	1.00	30.0
9:35 10:05	30	60	15	14.25	0.75	40.0
10:05 10:35	30	90	14.25	13.50	0.75	40.0
10:35 11:05	30	120	13.5	12.50	1.00	30.0
11:05 11:35	30	150	12.5	11.75	0.75	40.0
11:35 12:05	30	180	18	17.25	0.75	40.0
12:05 12:35	30	210	17.25	16.25	1.00	30.0
12:35 13:05	30	240	16.25	15.5	0.75	40.0
13:05 13:35	30	270	15.5	14.875	0.63	48.0
13:35 14:05	30	300	14.875	14.25	0.63	48.0
14:05 14:35	30	330	14.25	13.75	0.50	60.0
14:35 15:05	30	360	13.75	13.25	0.50	60.0

PERCOLATION SHEET

Job Number: 13350-11A
Tested By: SMP
Project No.: Wildomar Apartments
Test Hole Number: P-3
Test Hole Diameter (inches): 8'
Soil Classification: Clayey SAND
Date Excavated: 8/15/2013
Depth of Test Hole (ft): 3
Date Tested: 8/30/2013

	Date / Time	Presoak Period	Amount of Water Used / Comments
Start	8/30/13 9:10	Time Interval of Presoak	5 gallons
Stop	8/30/13 15:10	24 HOURS	

Time	Time Interval (min.)	Time Elapsed (min.)	Initial Water Level (Inches)	Final Water Level (Inches)	Water Level Drop (Inches)	Percolation Rate (Min./Inch)
9:10 9:40	30	30	18	16	2.00	15.0
9:40 10:10	30	60	16	14.25	1.75	17.2
10:10 10:40	30	90	14.25	13.5	0.75	40.0
10:40 11:10	30	120	13.5	12.5	1.00	30.0
11:10 11:40	30	150	18	16.5	1.50	20.0
11:40 12:10	30	180	16.5	16.25	0.25	120.0
12:10 12:40	30	210	15.25	14.25	1.00	30.0
12:40 13:10	30	240	14.25	13.25	1.00	30.0
13:10 13:40	30	270	13.25	12.5	0.75	40.0
13:40 14:10	30	300	12.5	11.75	0.75	40.0
14:10 14:30	20	320	16	15	1.00	20.0
14:30 15:10	40	360	15	14.25	0.75	53.4



LEGEND

Locations are Approximate

Geologic Units

Qal - Quaternary Alluvium

Qpfs - Pauba Formation

Symbols

- Limits of Report

B-7 T.D. = 21.5' NO G.W. - Boring Location Including Total Depth and Depth to Groundwater

P-3 - Infiltration Test Location

NORTH

INFILTRATION LOCATION MAP

APN 380-290-029

WILDOMAR, CA

RIVERSIDE COUNTY, CALIFORNIA

PROJECT	WILDOMAR APARTMENT COMPLEX		
CLIENT	GOLDEN EAGLE MULTI-FAMILY PROPERTIES,LLC.		
PROJECT NO.	13350-10A		
DATE	AUG. 2013		
SCALE	1:40		
DWG XREFS	XREF		
REVISION			
DRAWN BY	GWG	PLATE	1

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APPENDIX F

Treatment Control BMP Sizing Calculations and Design Details

BMP Treatment Design

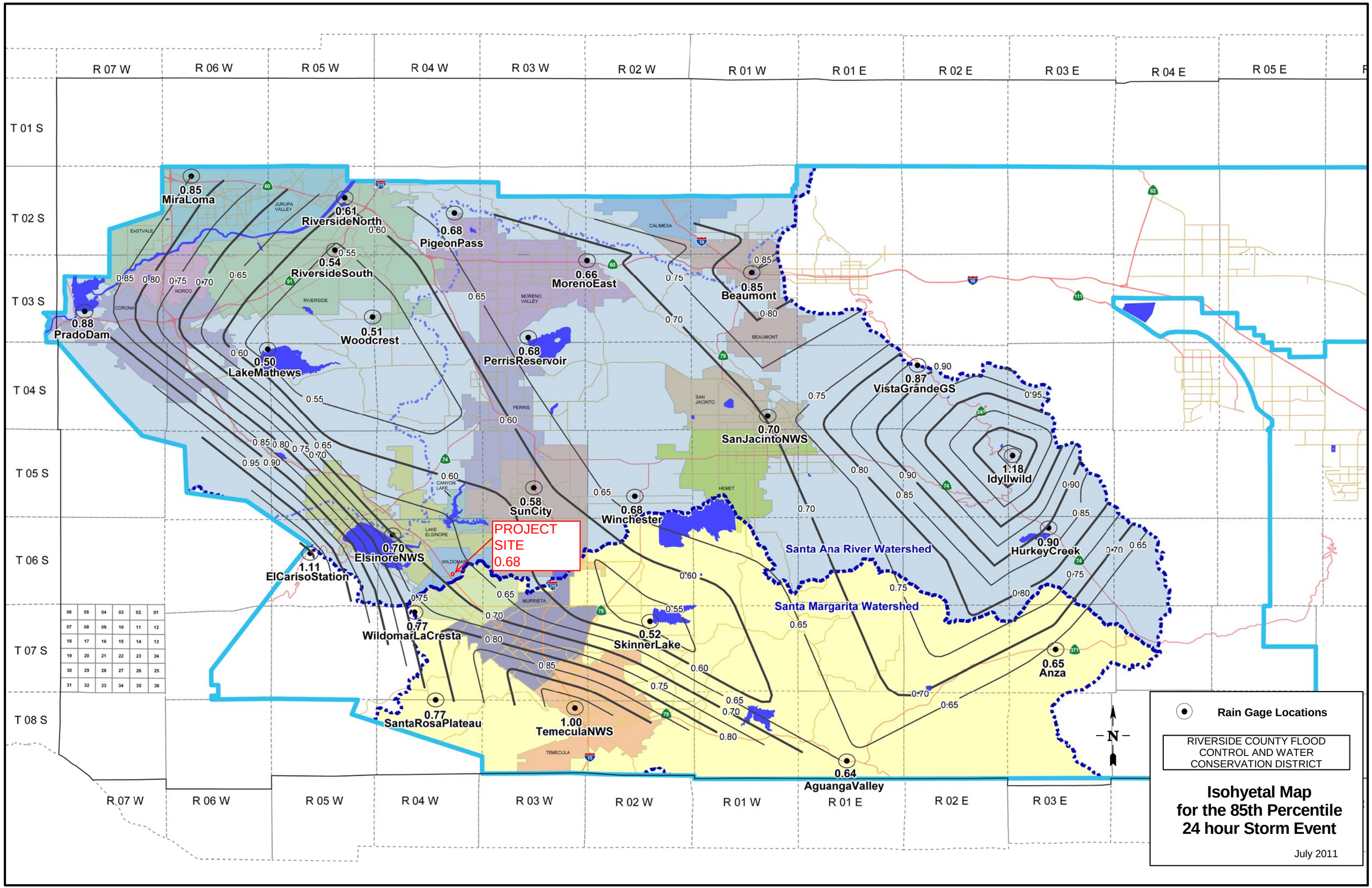
The site is unable to utilize infiltration as a BMP since the infiltration rates are less than 0.5 inches per hour, see Infiltration System Design Interpretive Report in Appendix E. The infiltration rate is 0.10 in/hr.

The site does not meet the minimum demands for Harvest and Use BMPs based upon the following calculations from the "Draft Santa Margarita WQMP" from Riverside County:

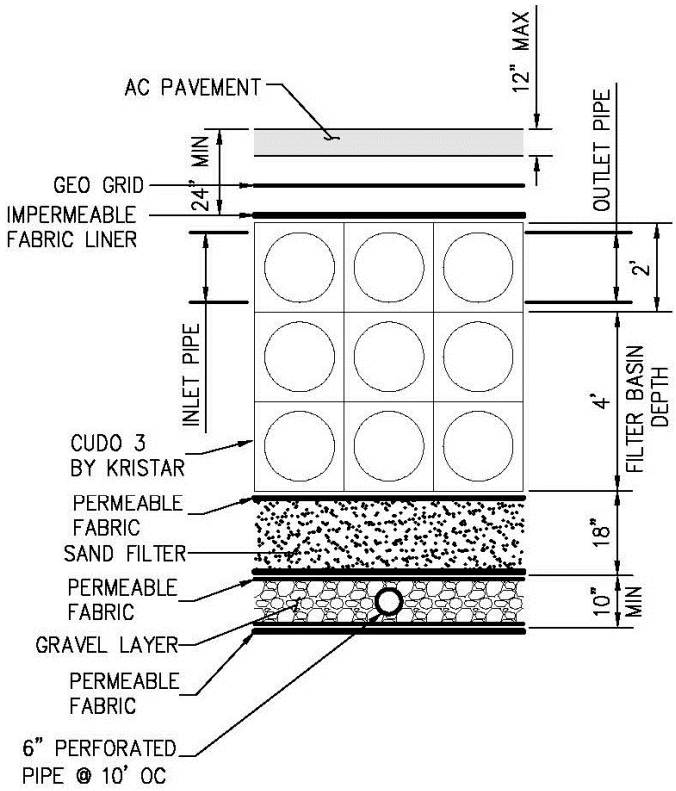
Design Capture Storm Depth (0.68 in)	Required Minimum Toilet Users per Acre (tu/ac)	Actual Residential Toilet Users per Acres (tu/ac)
Villa Siena	113	75

Design Capture Storm Depth (0.68 in)	Minimum Irrigated Area per Tributary Impervious Area (ac/ac)	Actual Irrigated Area per Tributary Impervious Area (ac/ac)
Villa Siena	1.21	0.33

Since the infiltration or Harvest and Use are not feasible, the required design volume is calculated using the 85th percentile rain even in the Riverside County Water Quality Management Plan. Treatment will be underground sand filtration systems, utilizing CUDO Modules by Kristar Enterprises for volume storage and underdrain by a sand filter with underdrain. The following pages show typical sections and sizing calculation. We have also included proprietary information for the CUDO storage system.


R 07 W
R 06 W
R 05 W
R 04 W
R 03 W
R 02 W
R 01 W
R 01 E
R 02 E
R 03 E
R 04 E
R 05 E
T 01 S
T 02 S
T 03 S
T 04 S
T 05 S
T 06 S
T 07 S
T 08 S
0.85 MiraLoma
0.61 RiversideNorth
0.68 PigeonPass
0.54 RiversideSouth
0.66 MorenoEast
0.85 Beaumont
0.88 PradoDam
0.51 Woodcrest
0.50 LakeMathews
0.68 PerrisReservoir
0.87 VistaGrandeGS
0.70 SanJacintoNWS
1.18 Idyllwild
0.58 SunCity
0.68 Winchester
0.90 HurkeyCreek
1.11 ElCarisoStation
0.70 ElsinoreNWS
PROJECT SITE 0.68
0.77 WildomarLaCresta
0.52 SkinnerLake
0.65 Anza
0.77 SantaRosaPlateau
1.00 TemeculaNWS
0.64 AguangaValley
Santa Ana River Watershed
Santa Margarita Watershed
EASTVALE
JURUPA VALLEY
CORONA
NORCO
RIVERSIDE
MORENO VALLEY
CALIMESA
BEAUMONT
SAN JACINTO
PERRIS
HEMET
CANYON LAKE
LAKE ELSINORE
WILDOMAR
MURRIETA
TEMECULA
N
Rain Gage Locations
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
Isohyetal Map for the 85th Percentile 24 hour Storm Event
July 2011

BMP FOR AREA A



TYPICAL SECTION DETENTION / FILTRATION WITH UNDERDRAIN BMP
NOT TO SCALE

A CUDO3 system for storage is proposed, however, only CUDO2 values for volume are considered.

SEE SAND FILTER (SFR) – DESIGN PROCEDURE WORKSHEET

Volume per CUDO2 unit = 15.4 CF/unit
Sand Filter Area = 16' X 78' = 1,248 SF > 1,189 SF req'd
No. of CUDO2 over sand filter = 8 units wide X 39 units long = 312 units
312 units @ 15.4 CF/unit = 4,805 CF > 4,757 req'd

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

Legend: Required Entries / Calculated Cells

(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)

Company Name	PCLC	Date	9/5/2014
Designed by	Travis Vincent	County/City Case No	PA13-0089
Company Project Number/Name	Villa Siena		
Drainage Area Number/Name	Developed Area A		

Enter the Area Tributary to this Feature A_T = 3.36 acres

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township 6

Range 4

Section 36

Enter the 85th Percentile, 24-hour Rainfall Depth D_{85} = 0.68

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Mixed Surface Types

Effective Impervious Fraction I_f = 0.78

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.58

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ V_u = 0.39 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

V_{BMP} = 4,757 ft^3

Notes:

$I_f=[(A_i \times 1.0)+(A_p \times 0.1)]/A_T$

$I_f=[(2.52 \times 1.0)+(0.84 \times 0.1)]/3.54$

$I_f=0.78$

Sand Filter Basin (SFB) - Design Procedure	BMP ID	Legend:	Required Entries
	A		Calculated Cells

Company Name:	PCLC	Date:	9/5/2014
Designed by:	HOPPER	County/City Case No.:	13-0089

Design Volume

Total Tributary area	A_{TRIB} =	3.36	ac
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	4,757	ft^3

Basin Geometry

Basin side slopes (no steeper than 4:1)	Slope no steeper than 4:1	z =	0	:1
Proposed basin depth (see Figure 1)		d_B =	4	ft
Depth of freeboard (if used)		d_{fb} =	0	ft
Minimum bottom surface area of basin (As = V_{BMP}/d_B)		A_s =	1189.25	ft^2
Minimum total depth required (includes freeboard, filter media and subdrains)		d_{req} =	6.17	ft
Proposed Surface Area			1,284	ft^2

Forebay

Forebay volume (minimum 0.5% V_{BMP})	Volume =	23.785	ft^3
Forebay depth (height of berm/splashwall. 1 foot min.)	Depth =		ft
Forebay surface area (minimum)	Area =		ft^2
Full height notch-type weir	Width (W) =		in

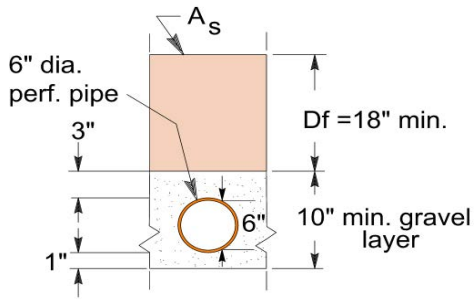
Filter Media

Description of filter media

_____ Sand (ASTM C-33)

_____ Other (Clarify in "Notes" below)

Media depth, df = _____ inches

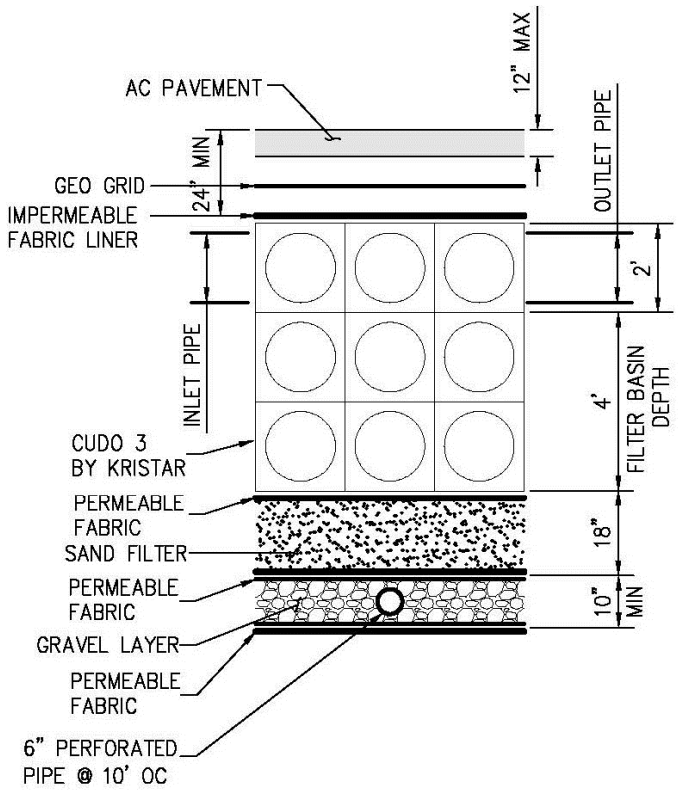


Underdrains

Diameter of perforated underdrain			in
Spacing of underdrains (maximum 20 feet on center)	OK		ft

Notes:

BMP for Area B



TYPICAL SECTION DETENTION / FILTRATION WITH UNDERDRAIN BMP
NOT TO SCALE

A CUDO3 system for storage is proposed, however, only CUDO2 values for volume are considered.

SEE SAND FILTER (SFR) – DESIGN PROCEDURE WORKSHEET

Volume per CUDO2 unit = 15.4 CF/unit
Sand Filter Area = 16' X 74' = 1,184 SF > 1,112 SF req'd
No. of CUDO2 units over sand filter = 8 units wide X 37 units long = 296 units
296 units @ 15.4 CF/unit = 4,558 CF > 4,448 CF req'd

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

Legend: Required Entries / Calculated Cells

(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)

Company Name	PCLC	Date	9/5/2014
Designed by	Travis Vincent	County/City Case No	PA13-0089
Company Project Number/Name	Villa Siena		
Drainage Area Number/Name	Developed Area B		

Enter the Area Tributary to this Feature A_T = 3.17 acres

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township 6

Range 4

Section 36

Enter the 85th Percentile, 24-hour Rainfall Depth D_{85} = 0.68

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Mixed Surface Types

Effective Impervious Fraction I_f = 0.78

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.58

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ V_u = 0.39 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

V_{BMP} = 4,488 ft^3

Notes:

$I_f=[(A_i \times 1.0)+(A_p \times 0.1)]/A_T$

$I_f=[(2.38 \times 1.0)+(0.79 \times 0.1)]/3.17$

$I_f=0.78$

Sand Filter Basin (SFB) - Design Procedure	BMP ID B	Legend:	Required Entries Calculated Cells

Company Name:	PCLC	Date:	9/5/2014
Designed by:	HOPPER	County/City Case No.:	13-0089

Design Volume

Total Tributary area	A_{TRIB} =	3.17	ac
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	4,448	ft^3

Basin Geometry

Basin side slopes (no steeper than 4:1)	Slope no steeper than 4:1	z =	0	:1
Proposed basin depth (see Figure 1)		d_B =	4	ft
Depth of freeboard (if used)		d_{fb} =	0	ft
Minimum bottom surface area of basin (As = V_{BMP}/d_B)		A_s =	1112	ft^2
Minimum total depth required (includes freeboard, filter media and subdrains)		d_{req} =	6.17	ft
Proposed Surface Area			1,184	ft^2

Forebay

Forebay volume (minimum 0.5% V_{BMP})	Volume =	22.24	ft^3
Forebay depth (height of berm/splashwall. 1 foot min.)	Depth =		ft
Forebay surface area (minimum)	Area =		ft^2
Full height notch-type weir	Width (W) =		in

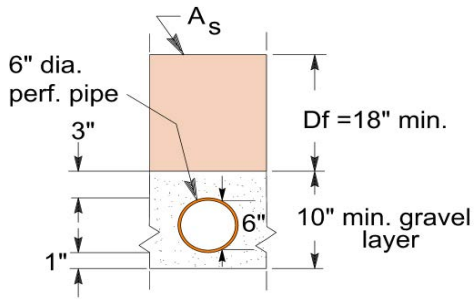
Filter Media

Description of filter media

_____ Sand (ASTM C-33)

_____ Other (Clarify in "Notes" below)

Media depth, df = _____ inches

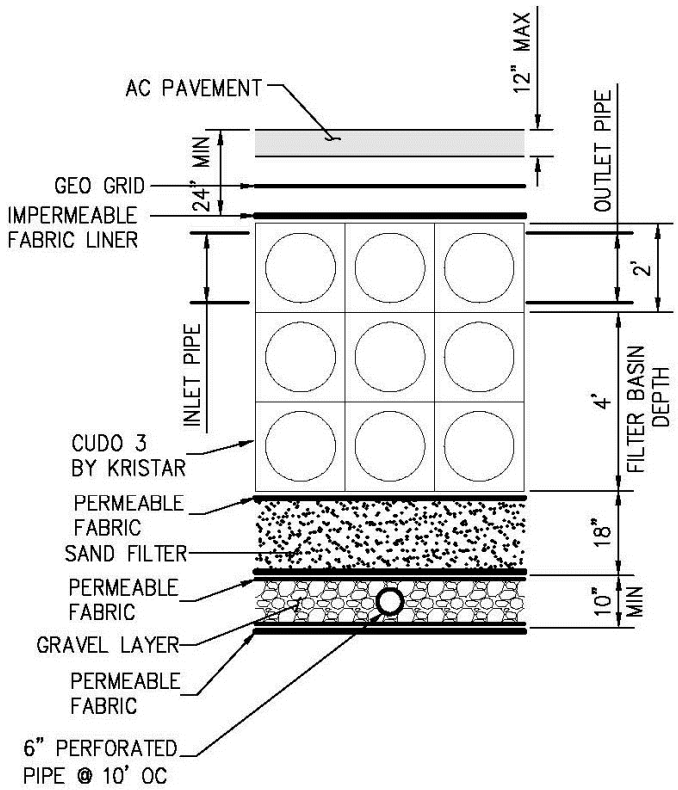


Underdrains

Diameter of perforated underdrain			in
Spacing of underdrains (maximum 20 feet on center)	OK		ft

Notes:

BMP for Area C



TYPICAL SECTION DETENTION / FILTRATION WITH UNDERDRAIN BMP
NOT TO SCALE

A CUDO3 system for storage is proposed, however, only CUDO2 values for volume are considered.

SEE SAND FILTER (SFR) – DESIGN PROCEDURE WORKSHEET

Volume per CUDO2 unit = 15.4 CF/unit
Sand Filter Area = 12' X 42' = 504 SF > 467 SF req'd
No. of CUDO2 units over sand filter = 6 units wide X 21 units long = 126 units
296 units @ 15.4 CF/unit = 1,940 CF > 1,869 CF req'd

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

Legend: Required Entries / Calculated Cells

(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)

Company Name	PCLC	Date	9/5/2014
Designed by	Travis Vincent	County/City Case No	PA13-0089
Company Project Number/Name	Villa Siena		
Drainage Area Number/Name	Developed Area C		

Enter the Area Tributary to this Feature A_T = 1.32 acres

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township 6

Range 4

Section 36

Enter the 85th Percentile, 24-hour Rainfall Depth D_{85} = 0.68

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Mixed Surface Types

Effective Impervious Fraction I_f = 0.78

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.58

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ V_u = 0.39 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

V_{BMP} = 1,869 ft^3

Notes:

$I_f=[(A_i \times 1.0)+(A_p \times 0.1)]/A_T$

$I_f=[(0.99 \times 1.0)+(0.33 \times 0.1)]/1.32$

$I_f=0.78$

Sand Filter Basin (SFB) - Design Procedure	BMP ID	Legend:	Required Entries
	C		Calculated Cells

Company Name:	PCLC	Date:	9/5/2014
Designed by:	HOPPER	County/City Case No.:	13-0089

Design Volume

Total Tributary area	A_{TRIB} =	1.32	ac
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	1,869	ft^3

Basin Geometry

Basin side slopes (no steeper than 4:1)	Slope no steeper than 4:1	z =	0	:1
Proposed basin depth (see Figure 1)		d_B =	4	ft
Depth of freeboard (if used)		d_{fb} =	0	ft
Minimum bottom surface area of basin (As = V_{BMP}/d_B)		A_s =	467.25	ft^2
Minimum total depth required (includes freeboard, filter media and subdrains)		d_{req} =	6.17	ft
Proposed Surface Area			504	ft^2

Forebay

Forebay volume (minimum 0.5% V_{BMP})	Volume =	9.345	ft^3
Forebay depth (height of berm/splashwall. 1 foot min.)	Depth =		ft
Forebay surface area (minimum)	Area =		ft^2
Full height notch-type weir	Width (W) =		in

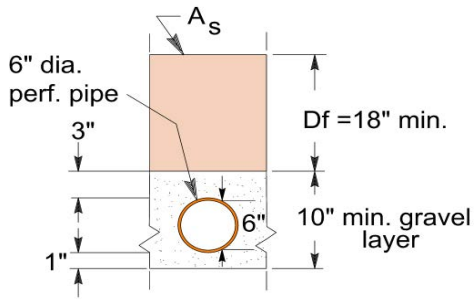
Filter Media

Description of filter media

_____ Sand (ASTM C-33)

_____ Other (Clarify in "Notes" below)

Media depth, df = _____ inches



Underdrains

Diameter of perforated underdrain			in
Spacing of underdrains (maximum 20 feet on center)	OK		ft

Notes:

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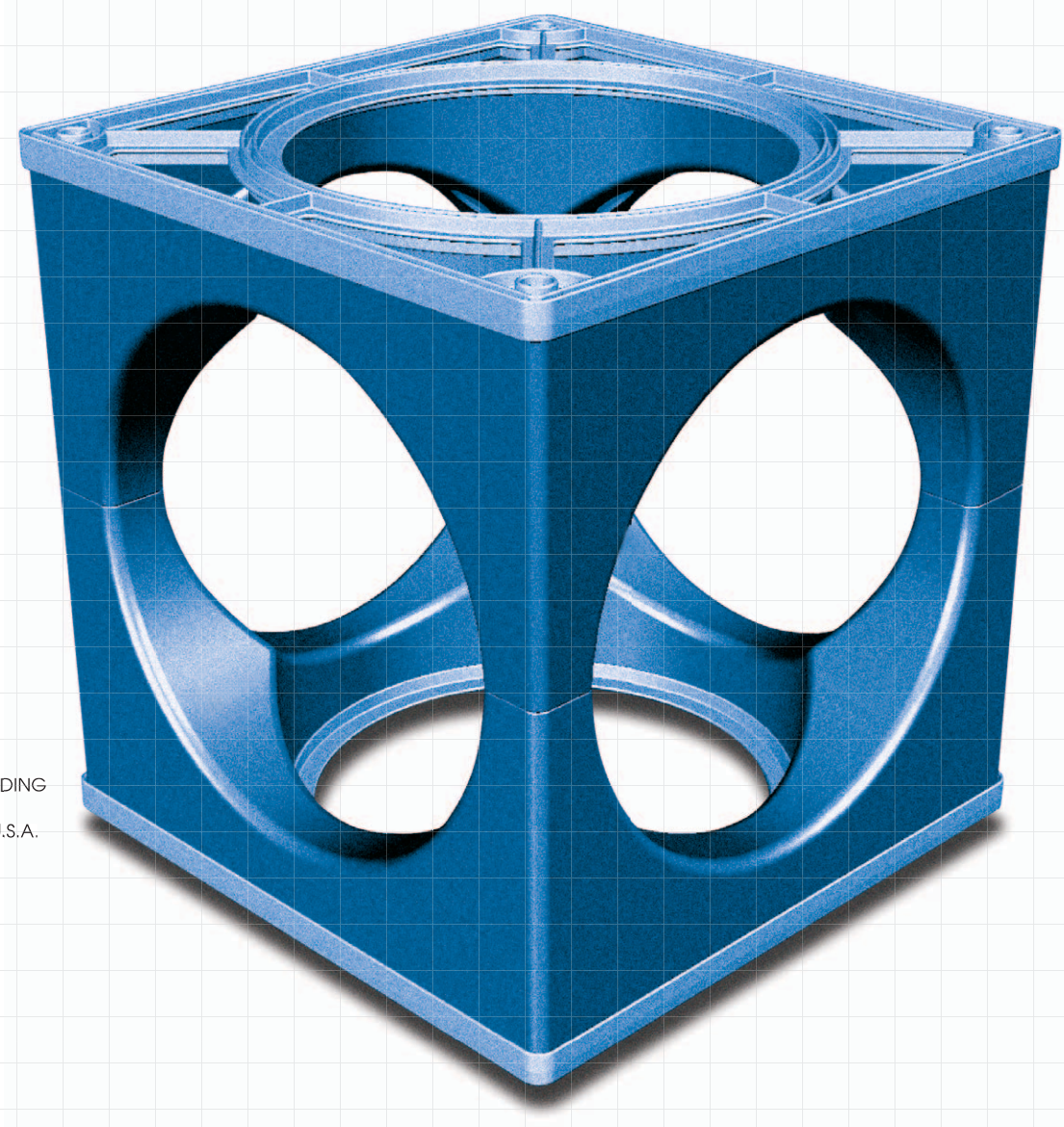

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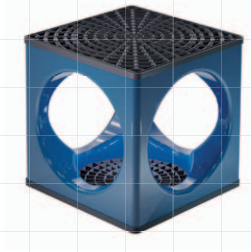
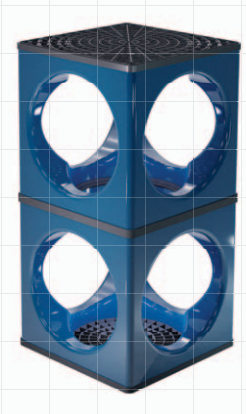
MORE CAPACITY – EIGHT CUBIC FEET AT A TIME

HOW WE STACK UP

Each CUDO® module measures a large eight cubic feet, with 95% storage capacity. Cubic foot vs. cubic foot, we beat other systems.



2 ft. x 2 ft. x 2 ft.



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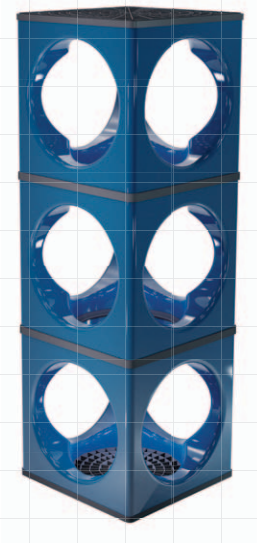
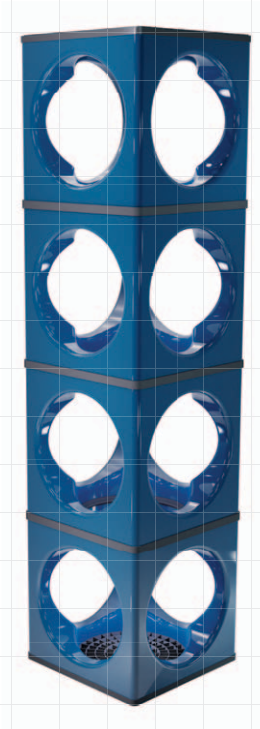


2 ft. x 2 ft. x 6 ft.



2 ft. x 2 ft. x 8 ft.

MORE CAPACITY PER CUBIC FOOT

CUDO ASSEMBLY	UNIT WEIGHT (LBS.)	STORAGE (CUBIC FT.)	CAPACITY (GALLONS – 95%)
CUDO 1	21	7.7	57
CUDO 2	41	15.4	115
CUDO 3	62	23.0	172
CUDO 4	86	30.6	229

US PATENT PENDING

MADE IN THE U.S.A.

ALL DIMENSIONAL MEASUREMENTS ARE NOMINAL

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CA 95407
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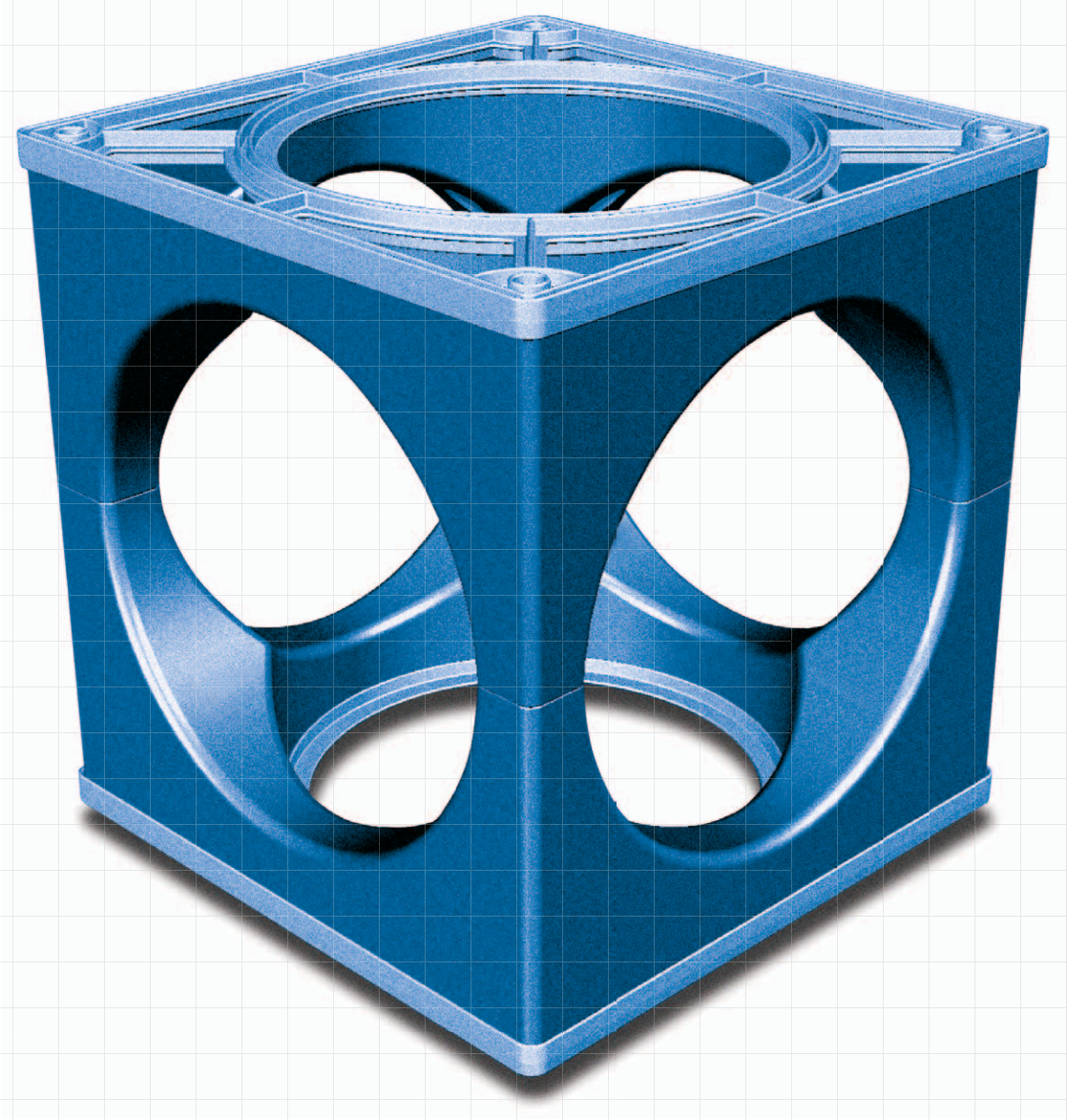
CUDO®
WATER STORAGE SYSTEM

SHAPING THE FUTURE OF WATER QUALITY™



A new approach to underground stormwater storage, infiltration, treatment, rainwater harvesting, or other stormwater management needs.

KRISTAR

CUDO®

C U D O
WATER STORAGE SYSTEM

US PATENT PENDING

MADE IN THE U.S.A

The French Connection

Derived from the French "Cube d'eau", meaning "cube of water", the CUDO® is a modular plastic cube used to construct underground water storage systems.

The unique cube incorporates an arched design that adds structural integrity, increased water storage and enhanced access for inspection and maintenance. CUDO sets the new standard for storm-water management by incorporating features that are not available with other systems currently on the market.

CUDO is made in the U.S.A. using injection molded, polypropylene plastic. A single CUDO assembly requires just two modules and two end caps.

The CUDO may be installed as a single-level system, or connected vertically, to form a CUDO stack, increasing storage capacity. Formed stacks can be easily moved about a construction site.

Per application, either a filter fabric or plastic liner is placed beneath and around the CUDO modules, forming an envelope around the entire system. Geo-grid or other structural enhancement may be incorporated into the CUDO installation, depending on the loading requirements.

Features and Benefits of the Standard CUDO

- large interior openings offer ease of access for inspection and maintenance
- high water storage capacity (95%)
- CUDO size (24" x 24" x 24") offers ease of handling and installation
- unique shape offers superior strength
- minimum number of components required for assembly

Added Components, Features and Benefits

- built-in gross pollutant filter (GPF) or media filter devices (RMF, VMF) eliminate the need for separate pre-treatment systems and reduce or eliminate related piping
- integral "metered outlet" device eliminates the need for separate outlet and flow control structure
- BLUE (color) CUDO identifies the location of filter devices, simplifying assembly, installation and system maintenance
- CUDO flow-through bypass feature forms a virtual pipeline through the system, reducing or eliminating separate bypass piping. The use of BLUE CUDO offers ease of assembly and installation by identifying the location and direction of virtual flow channels.
- potential LEED® NC credits for Sustainable Sites (6.1, 6.2) Materials & Resources (4, 5 in CA, AZ, NV, OR, UT) and Water Efficiency (1, 3) [1]

Other Applications for CUDO

- downspout sand filter device
- individual drain inlet sand filter device
- modular sand filter system

CUDO Modular Bio-retention System

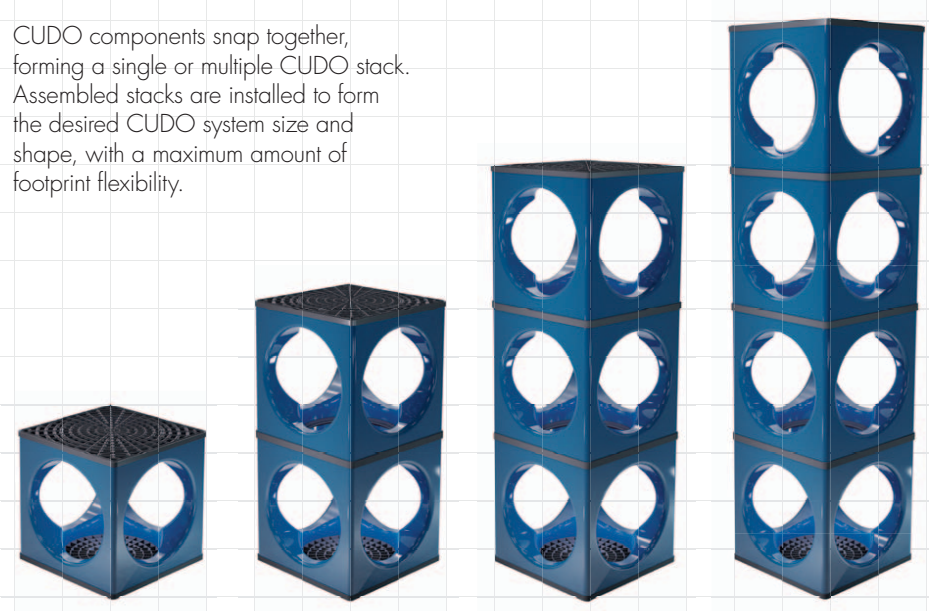
- CUDO may be integrated into bio-retention systems (rain gardens) replacing drain pipe and aggregate with a highly porous matrix
- additional storage volume enhances retention
- more opportunity for on-site rain water reuse through passive or active irrigation
- mitigates temperature increase typical of surface storage

The Concrete CUDO

CUDO water storage systems are also available in pre-cast concrete designs to address many problematic applications. Contact your local CUDO distributor for availability of concrete CUDO in your area.

- severe loading conditions – shallow or deep burial depths, heavy loading areas
- high water tables – anti-floatation features
- enhanced maintenance access – the larger CUDO allows full access for equipment and personnel
- plastic filter CUDO devices may be used in conjunction with concrete CUDO to offer integral pre-filter capabilites

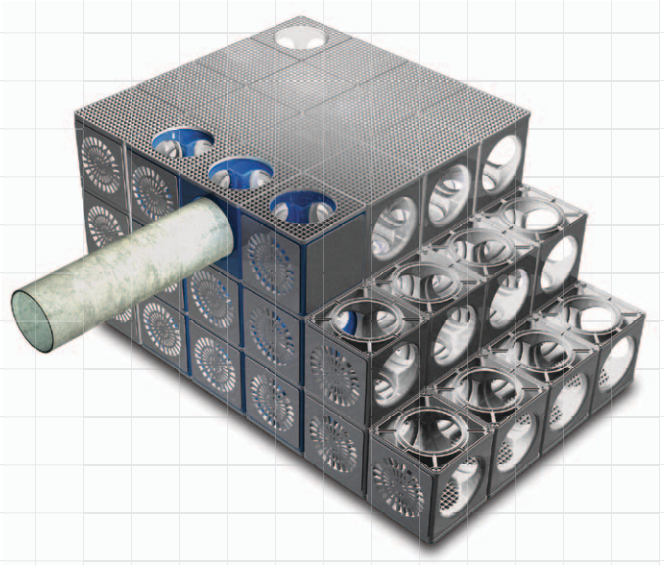
CUDO components snap together, forming a single or multiple CUDO stack. Assembled stacks are installed to form the desired CUDO system size and shape, with a maximum amount of footprint flexibility.



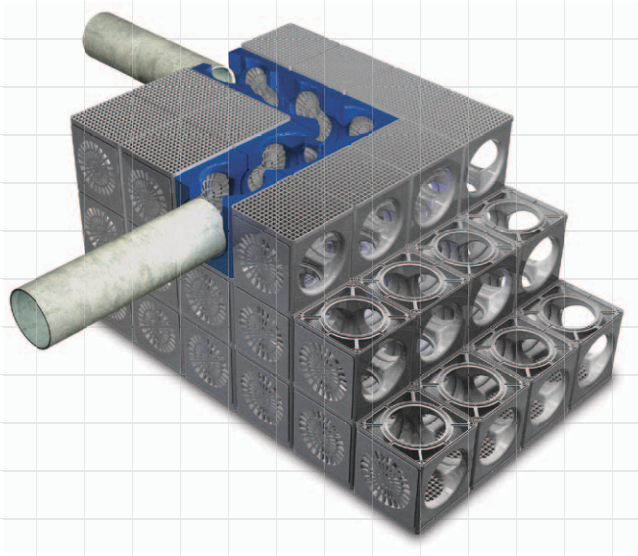
CUDO 1 **CUDO 2** **CUDO 3** **CUDO 4**

[1] LEED® for New Construction and Major Renovation, US Green Building Council, v2.2, October 2005

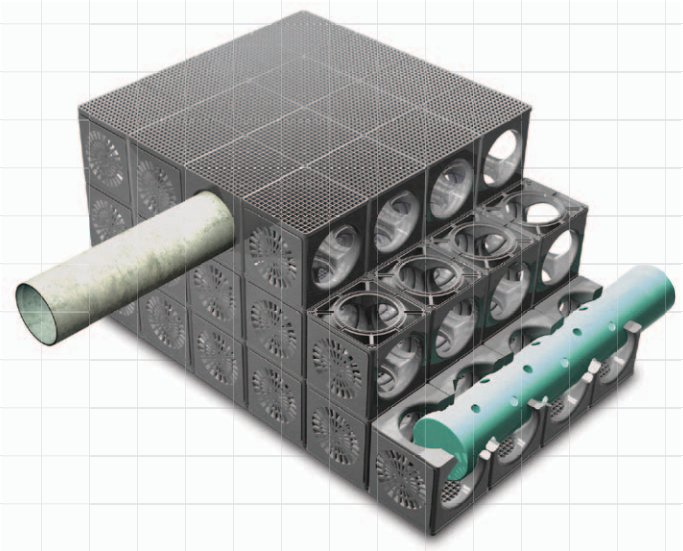
CUDO SYSTEMS DESIGN



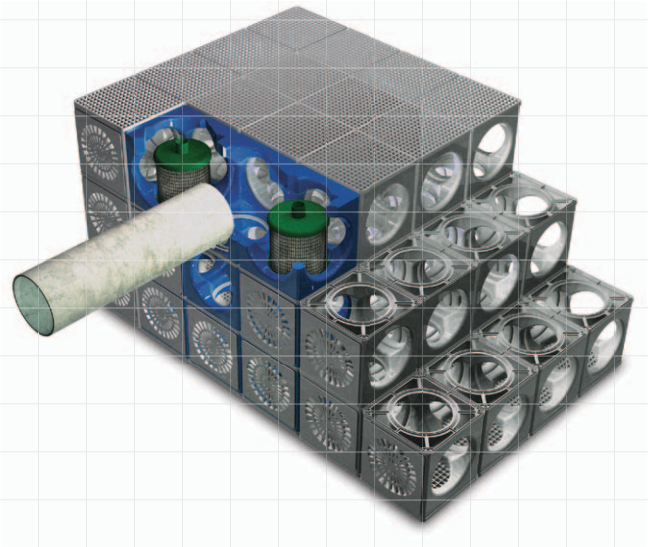
Maintenance Access



Flow-Through Bypass



Outlet Control

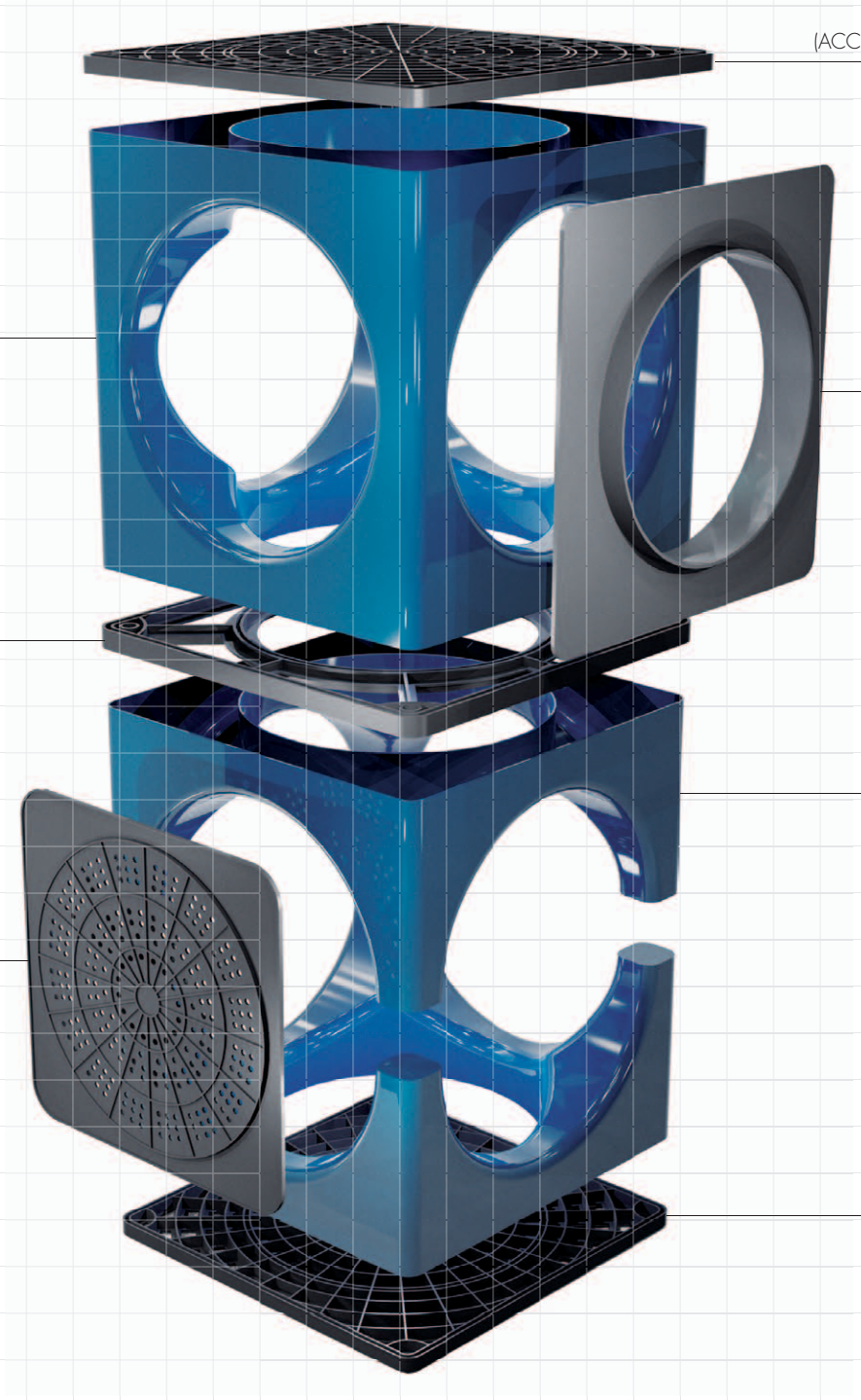


Media Filtration

Assemble CUDO® to build water storage systems with virtualy unlimited sizes and shapes. CUDO dimensions (2 ft. x 2 ft.) offers ease of installation, while a high 95% void ratio allows for a reduced system footprint. Specialty CUDO components allow the construction of systems with features and benefits simply not possible with any other water management product.

CUDO ASSEMBLY IS A SNAP!

CUDO components snap together, making assembly easy, and assuring a precise fit with solid construction.



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CUDO®
C U D O
WATER STORAGE SYSTEM

CUDO™ Stormwater Cube

(Underground Retention / Detention / Infiltration / Water Reuse Systems)

Operations and Maintenance Manual

Version 1.01 – July 08, 2009

CUDO™ Stormwater Cube – Modular Stormwater Systems

Description / Basic Function
CUDO™ is a modular stormwater system comprised of a grouping of modular polypropylene or concrete cubes that when constructed form an underground storage area for stormwater. This system can be used for infiltration, retention, detention or water reuse. CUDO™ can help achieve runoff detainment and storage to help attenuate the peak flow to pre-construction levels and can help conform to current Low Impact Development requirements.

Infiltration
The purpose of a CUDO™ infiltration system is to capture stormwater runoff, store the runoff, and then allow it to percolate into the ground via the open space area of the cubes and perforations in the side wall. The system is backfilled with a Class I material defined by ASTM D2321 as a cleaned open graded rock or a Class II permeable sand. The rock or sand provide additional storage capacity but also allow for a percolation interface with the native material. The ground water is "recharged" with this type of system.

Detention
The purpose of a CUDO™ detention system is to capture stormwater runoff, store the runoff, and then allow it to be released at a controlled rate through an appropriately sized orifice control. A detention system helps attenuate the peak flow from the site assuring that pre-development runoff flows are not exceeded as a result of the development. A CUDO™ detention requires the cubes to be encapsulated with an impermeable liner for the polypropylene system or the seams of the concrete system to be sealed with a water proof mastic.

Retention
A CUDO™ retention system is a hybrid system. It is a combination of a detention system and an infiltration system. A retention system is utilized to attenuate peak flow as well as promote groundwater re-charge. A retention system is outfitted with an overflow pipe at the top of the system which allows the system to fill for infiltration but also outlet if the ground is saturated.

Water Reuse
The purpose of a water-reuse CUDO™ system is to capture and store water for future use. The system is constructed in a similar fashion to a detention system but instead of a controlled outlet the system is constructed with an emergency overflow. A water reuse system is a LID device that helps attenuate peak flows as well as conserve water. Water may be reused through an active pump system or passive irrigation.

Inspection/Cleanout Ports
Inspection and cleanout ports are 18-inch diameter vertical risers connected to the uppermost polypropylene CUDO™ cubes or up to 30-inch manhole access connected to the concrete CUDO™. They are used for entrance into the system, or for access to place vacuum truck hoses or water-jetting devices or CCTV equipment. Ports are strategically located near inlet and outlet pipes and in other areas or probable deposition in the system. It is recommended to keep surface level access lids sealed and bolted at all times when the system is in service.

Inlet Bay
Some systems are configured so that pretreatment of the stormwater occurs within the CUDO™ system. In this case the CUDO™ system will house an inlet bay. The inlet bay is separated from the rest of the CUDO™ system by sidewall plugs and is intended to separate gross pollutants, trash and debris and floatables from the CUDO™ system and pre-treatment device. The bay contains its own sump area and unique access ports.

Maintenance Overview for CUDO

State and Local regulations require that stormwater storage systems be maintained and serviced on a recurring basis. The purpose of maintaining a clean and obstruction free CUDO™ system is to ensure the system performs the intended function of the primary design. Trash and debris, floatables, gross pollutants and sediment can build up in the CUDO™ leading to clogging of the native soil interface or blockage of the inlet or outlet pipes. This can cause the system to function improperly by limiting storage volume, limiting the design percolation rates or impeding flow in and out of the system. Downstream and upstream, areas could run the risk of flooding and deleterious environmental impact.

Recommended Frequency of Service

It is recommended that the CUDO™ stormwater systems be serviced on a regularly occurring basis. Ultimately the frequency depends on the amount of runoff, pollutant loading, and interference from trash, debris and gross pollutants as well as proper maintenance of upstream pretreatment devices. However, it is recommended that each installation be inspected at least two times per year to assess service needs.

Recommended Timing of Service

Guidelines for the timing of service are as follows:

1. For areas with a definite rainy season the system should be serviced prior to and following the rainy season.
2. For areas subject to year-round rainfall service should occur on a regularly occurring basis. (A minimum of two times per year.)
3. For areas with winter snow and summer rain the system should be serviced prior to and after the snow season.
4. For installed devices that are subject to dry weather flows only (i.e. wash racks, parking garages, etc…) the unit should be serviced on a regularly occurring basis. (A minimum of two times per year.)

Inspection

An inspection should be performed when the system is new. This allows the owner to establish a baseline condition for comparison to future inspections. Sediment build up can typically be monitored without entering the system. (No confined space entry.) Initial and subsequent inspection data should be recorded and filed for reference. Some regulatory agencies require that the results of the inspections be documented and reported. Inspection reports should comply with regulatory requirements and be submitted as required.

Inspection Procedures

1. Locate the inspection, cleanout and access ports. Inspection and cleanout ports are typically 18-inch diameter. Access ports are typically 24-inch or 30-inch diameter. Pictures should be taken to document the location or a site map should be generated to detail the as-built locations of the ports.
2. Unbolt and remove the access port lids.
3. Insert a measuring device into the opening making note of a point of reference to determine the quantity of sediment and other accumulated material. If access is required to measure, ensure only certified confined space entry personnel having appropriate equipment are allowed to enter the system.
4. In addition, for accessible concrete CUDO™ systems personnel should utilize appropriate confined space entry procedures to enter the system and photograph its condition.
5. Inspect inlet and outlet locations for obstructions. Obstructions should be removed at this time.
6. Inspect the structural components of the system.
7. Fill in the CUDO™ Inspection/Maintenance Data Sheet and send a copy to the regulatory agency if necessary.

Disinfection of Water Reuse System

Periodic disinfection of water held for reuse may be required to abate bacteria and algae growth. This may be done using calcium hypochlorite tablets or by the addition of an ozone generator in a small recirculation system.

Maintenance
Cleanout of the CUDO™ system should be considered if there is sediment buildup of two or more inches at over 50% of the inspection ports. Cleaning shall be performed if sediment buildup is two inches or more over 75% of the system floor. In the event of a spill of a foreign substance, cleanout of the system should be considered.

Maintenance Procedures

1. Locate the inspection, cleanout and access ports. Inspection and cleanout ports are typically 18-inch diameter. Access ports are typically 24-inch or 30-inch diameter. Pictures should be taken to document the location or a site map should be generated to detail the as-built locations of the ports.
2. Unbolt and remove the access port lids.
3. Measure the sediment buildup at each port. If access is required to measure ensure only certified confined space entry personnel having appropriate equipment are allowed to enter the system.
4. A thorough cleaning of the system (inlets, outlets, ports, and inlet bays) shall be performed by either a vacuum truck or by manual methods.
5. Inspect inlet and outlet locations for obstructions. Obstructions should be removed at this time.
6. Inspect the structural components of the system.
7. Fill in the CUDO™ Inspection/Maintenance Data Sheet and send a copy to the regulatory agency if necessary.

Inspection / Maintenance Requirements
Listed below are some recommendations for equipment and training for personnel to inspect and maintain a CUDO™ system.

Personnel – OSHA Confined Space Entry Training is a prerequisite for entrance into a system. In the state of California personnel should be CalOSHA certified.

Equipment – Record Taking (pen, paper, voice recorder)
Proper Clothing (appropriate footwear, gloves, hardhat, safety glasses, etc.)
Flashlight
Tape Measure
Measuring Stick
Pry Bar
Traffic Control (Flagging, barricades, signage, cones, etc.)
First aid materials
Debris and Contaminant collectors
Debris and Contaminant containers
Vacuum Truck

Disposal of Gross Pollutants, Hydrocarbons, and Sediment
The collected gross pollutants, hydrocarbons, and sediment shall be offloaded from the vacuum truck into DOT approved containers for disposal. Once in the container the maintenance contractor has possession and is responsible for disposal in accordance with local, state and federal agency requirements.

Note: As the generator, the landowner is ultimately responsible for the proper disposal of the collected materials. Because the material likely contains petroleum hydrocarbons, heavy metals, and other harmful pollutants, the materials must be treated as EPA class 2 Hazardous Waste. Proper disposal is required.

DESIGN COMPUTATIONS FOR:
CUDO® WATER STORAGE SYSTEM

PREPARED FOR:

CUDO® Stormwater Products, Inc.

Doug Allard

P.O. Box 497

Occidental, California 95406

PREPARED BY:

Terrain Engineering, Inc.

3609 Maidu Place

Davis, California 95618

Voice: (916) 952-0704

Fax: (530) 792-1008

email: cwgilley@sbcglobal.net

OBJECTIVE:

Determine the distributed load acting on the CUDO Water Storage Cube per AASHTO LRFD for live loads and earth loads and recommended minimum and maximum cover heights.

OVERVIEW:

The CUDO Water Storage Cube is manufactured from polypropylene by an injection molding process. The cubes consist of two halves that join together at the spring line of the circular opening of the cube, as well as a top and bottom grate. The cubes will be assembled and installed in rows and columns with no spacing between units.

Our evaluation included review of third party compressive test data, live and earth load calculations, and finite element analysis of the expected cube performance when subjected to live loads in a minimum cover scenario. Structural performance of the cube was assessed using current AASHTO procedures for design of thermoplastic culverts.

LABORATORY TESTING:

CUDO Stormwater Products, Inc. retained Testing Engineers, inc. of San Leandro, CA to perform a compressive test on three 24-in X 24-in x 24-in CUDO cubes. The testing was performed in general conformance with ASTM D2412, Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel Plate Loading. (A copy of this test report is included for reference.) It should be noted at the time this testing was completed there was/is no ASTM test uniquely tailored for modular filtration systems such as the CUDO and it was determined that this test is the most appropriate available test procedure.

The average ultimate load was determined to be 14,036.7lbs (14.0 K) for the 24-in x 24-in x 24-in CUDO cube. The load reference for this laboratory test is approximately 3,500lbs/sq-ft (3.5K/sq-ft).

LIVE LOAD AND EARTH LOAD CALCULATIONS:

Reference AASHTO Section 12-2006

Assumptions:

Load Factors:	Earth Load (EL) – 1.0 Live Load (LL) – 1.75 or As Required
Cover Height:	H = Total Cover Height H_S = Surface Treatment Cover Height H_F = Fill Cover Height
Soil Weight:	Surface = 145pcf Fill = 120pcf
Impact Factor:	IM = 1.3(1-0.125H) where H is cover height in feet
Earth Load:	$EL_S = H_S$ X 145pcf $EL_f = H_f$ X 120pcf
Live Load (HS20-44):	LL = 16,000lbs
Wheel Contact Area:	Length (l) = 20-inches Width (w) = 10-inches
Live Load Distribution Factor:	= 1.75
Geogrid Distribution Factor:	= 2.60
Earth Load:	= (SF_{DL}) X (Unit Weight Surface) X (H_S) + (SF_{DL}) X (Unit Weight Fill) X (H_F)
Live Load:	= (IM) X (SF_{LL}) X (Live Load) / Distributed Load Area
Total Load:	= EL + LL

LIVE LOAD AND EARTH LOAD CALCULATIONS (CONTINUED):

The ultimate loading was calculated and then compared to the laboratory test results for ultimate loading of the cubes. The calculations for loading include both live load and earth loads. Although the earth load at minimum cover heights is very minimal in comparison to the live load, the earth loads have been included. The live load and earth load use assumptions as listed above and are in general conformance with AASHTO LRFD. In these calculations it was assumed that the HS20-44 live load is a point load at surface with no wheel contact area. The load is distributed downward and outward with a distribution factor of 1.75. This is a conservative approach and considers that surface loads are not distributed over the footprint of the wheel contact area. Results of the calculations are found in Table 1.

Cover Height (H) in (in)	Impact Factor (IM)	Live Load Distribution (1.75) sq-in	H20 Live Load Transferred to cube (psi)	Earth Load Transferred to cube (psi)	Total Load Transferred to cube (psi)	Factor of Safety*
0	1.33	0	21280.0	0.0	21280.0	0.00
6	1.31	110	190.0	0.5	190.5	0.13
12	1.29	441	46.8	1.0	47.8	0.51
18	1.27	992	20.4	1.5	22.0	1.11
24	1.25	1764	11.3	2.0	13.3	1.82
30	1.23	2756	7.1	2.5	9.6	2.52
36	1.21	3969	4.9	3.0	7.9	3.08
42	1.19	5402	3.5	3.5	7.0	3.45
48	1.17	7056	2.6	4.0	6.7	3.64
54	1.14	8930	2.1	4.5	6.6	3.69
60	1.12	11025	1.6	5.0	6.7	3.65
66	1.10	13340	1.3	5.5	6.9	3.54
72	1.08	15876	1.1	6.0	7.1	3.41
78	1.06	18632	0.9	6.5	7.5	3.26
84	1.04	21609	0.8	7.0	7.8	3.11
90	1.02	24806	0.7	7.6	8.2	2.96
96	1.00	28224	0.6	8.1	8.6	2.82

*For design situations exceeding 60-inches of cover please contact the manufacturer for additional analysis.

Table 1

LIVE LOAD AND EARTH LOAD CALCULATIONS (CONTINUED):

Additional analysis was performed to determine the benefit of utilizing a geo-grid layer between the live load and the cubes. Using a program called Spectra Pave3 Version 1.0 developed by Tensar International Corporation it was found that when based on poor quality soil material (CBR 1 or R factor 5+/-) the spread factor is 2.60. This result is based on using Tensar geo-grid BX1200 or equal. The new load distribution factor was incorporated into the calculations and the results can be found in Table 2.

Cover Height (H) in (in)	Impact Factor (IM)	Live Load Distribution (2.6) sq-in	H20 Live Load Transferred to cube (psi)	Earth Load Transferred to cube (psi)	Total Load Transferred to cube (psi)	Factor of Safety*
0	1.33	0	21280.0	0.0	21280.0	0.00
6	1.31	243	86.1	0.5	86.6	0.28
12	1.29	973	21.2	1.0	22.2	1.10
18	1.27	2190	9.3	1.5	10.8	2.26
24	1.25	3894	5.1	2.0	7.1	3.40
30	1.23	6084	3.2	2.5	5.7	4.23
36	1.21	8761	2.2	3.0	5.2	4.65
42	1.19	11925	1.6	3.5	5.1	4.75
48	1.17	15575	1.2	4.0	5.2	4.65
54	1.14	19712	0.9	4.5	5.5	4.45
60	1.12	24336	0.7	5.0	5.8	4.21
66	1.10	29447	0.6	5.5	6.1	3.96
72	1.08	35044	0.5	6.0	6.5	3.72
78	1.06	41128	0.4	6.5	7.0	3.49
84	1.04	47699	0.3	7.0	7.4	3.28
90	1.02	54756	0.3	7.6	7.9	3.10
96	1.00	62300	0.3	8.1	8.3	2.92

*For design situations exceeding 60-inches of cover please contact the manufacturer for additional analysis.

Table 2

FINITE ELEMENT ANALYSIS:

A finite element analysis for the CUDO cube was performed using a finite element program, Visual Analysis ver5.5, by Integrated Engineering Software (www.iesweb.com). The model is 3-D with 2-D plate elements incorporating material stiffness with HS20-44 truck live loading, earth load, dead load and soil lateral loading.

For this analysis the following loadings and assumptions were utilized:

Live Load (LL) is H20-44 impacted for 2 ft cover, but applied at 3 ft cover

Earth Load (EL_V) is applied vertically at 130pcf for cover weight

Earth Load (EL_L) is applied laterally at 120pcf using an active lateral earth pressure coefficient (k_a) = 0.33

Dead Load (DL) is the weight of the CUDO cube itself. This number is relatively small in comparison to the earth load and live load and is left at zero for this analysis.

Material Stiffness = 75 ksi

Tensile Strength = 3.5 ksi

Material Thickness = 0.170 inch

The results of the analysis indicate that the greatest tensile stress for the 3 ft cover to finished grade is 1.25 ksi located near the point of joining the top and bottom half cubes. This allows for a Safety factor of 2.8 when compared to industry reported tensile strength of 3.5 ksi. The greatest tensile stress for 5 ft of cover to finished grade is 1.51 ksi. This results in a Safety Factor of 2.3 when compared to the industry reported tensile strength of 3.5 ksi.

CONCLUSION:

The CUDO cube can be installed with a minimum of 2ft of cover measured from the finished grade to the top of the cube with a geo-grid, Tensar BX1200 or equivalent, placed in the cover in accordance with the manufacturer's recommendations. Calculations indicate that the addition of the geo-grid helps to reduce point loads and live loads on the cube allowing for a safety factor of 3.4 at this depth. The analysis additionally supports the installation of the CUDO cube to a depth of 5ft measured from the top of the cube to finished grade. Backfill material shall be constructed per project geotechnical engineer requirements. Backfill construction equipment shall not apply loading greater than the design loading of 0.97K/sq-ft. For desired installation depths shallower or in excess of these recommendations the manufacturer should be contacted.

APPENDIX G

AGREEMENTS – CC&RS, COVENANT AND AGREEMENTS AND/OR OTHER MECHANISMS FOR ENSURING ONGOING OPERATION, MAINTENANCE, FUNDING AND TRANSFER OF REQUIREMENTS FOR THIS FINAL PROJECT- SPECIFIC WQMP

CONTAINS:
DECLARATION OF WATER QUALITY MANAGEMENT PLAN RESTRICTIVE COVENANT

(TO BE INCLUDED IN FINAL WQMP)

APPENDIX H

PHASE 1 ENVIRONMENTAL SITE ASSESSMENT – SUMMARY OF SITE REMEDIATION CONDUCTED AND USE RESTRICTIONS

(TO BE INCLUDED IN FINAL WQMP)