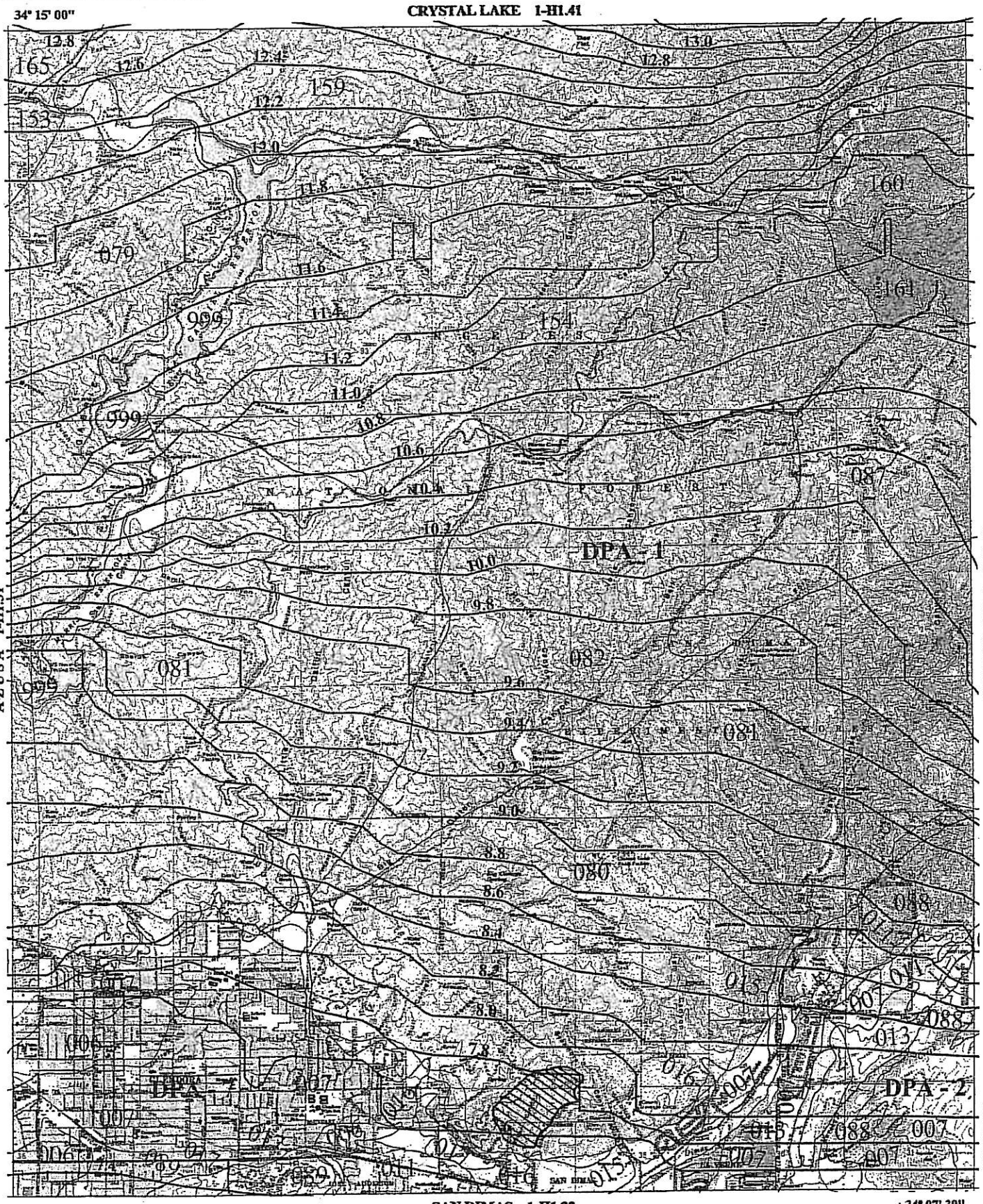
LADPW REFERENCE MAPS & TABLES



016 SOIL CLASSIFICATION AREA

7.2 INCHES OF RAINFALL

DPA - 6 DEBRIS POTENTIAL AREA

N W E S

25-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.878
10-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.714

GLENDORA
50-YEAR 24-HOUR ISOHYET

1-H1.32

LOS ANGELES COUNTY PUBLIC WORKS Public Service That Works

DEBRIS BASIN DETENTION CAPACITY

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TRACT 62872.gpw

Hydraflow Hydrographs by Intelisolve

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Pond Report 6

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	Mod. Rational	—	—	—	—	—	—	—	219.38	—	1A
2	Reservoir	1	—	—	—	—	—	—	83.99	—	BASIN

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	Mod. Rational	219.38	1	19	250,091	---	----	----	1A
2	Reservoir	83.99	1	31	250,090	1	1063.88	126,778	BASIN

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Tuesday, Aug 1 2006, 4:3 PM

Hyd. No. 1

1A

Hydrograph type	= Mod. Rational	Peak discharge	= 219.38 cfs
Storm frequency	= 50 yrs	Time interval	= 1 min
Drainage area	= 134.9 ac	Runoff coeff.	= 0.63
Intensity	= 2.582 in/hr	Tc by User	= 19 min
IDF Curve	= TR62872.IDF	Storm duration	= 1 x Tc

Hydrograph Volume = 250,091 cuft

(Printed values >= 1% of Qp.)

Hydrograph Discharge Table

Time -- Outflow (min cfs)		Time -- Outflow (min cfs)	
1	11.55	35	34.64
2	23.09	36	23.09
3	34.64	37	11.55
4	46.18		
5	57.73		
6	69.28	*...End*	
7	80.82		
8	92.37		
9	103.92		
10	115.46		
11	127.01		
12	138.55		
13	150.10		
14	161.65		
15	173.19		
16	184.74		
17	196.29		
18	207.83		
19	219.38 <<		
20	207.83		
21	196.29		
22	184.74		
23	173.19		
24	161.65		
25	150.10		
26	138.55		
27	127.01		
28	115.46		
29	103.92		
30	92.37		
31	80.82		
32	69.28		
33	57.73		
34	46.18		

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Tuesday, Aug 1 2006, 4:3 PM

Hyd. No. 2

BASIN

Hydrograph type	= Reservoir	Peak discharge	= 83.99 cfs
Storm frequency	= 50 yrs	Time interval	= 1 min
Inflow hyd. No.	= 1	Reservoir name	= BASIN
Max. Elevation	= 1063.88 ft	Max. Storage	= 126,778 cuft

Storage Indication method used.

Outflow hydrograph volume = 250,090 cuft

(Printed values >= 1% of Qp.)

Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
2	23.09	1050.47	1.58	----	----	----	----	----	----	----	----	1.58
3	34.64	1051.00	6.28	----	----	----	----	----	----	----	----	6.28
4	46.18	1051.64	14.94	----	----	----	----	----	----	----	----	14.94
5	57.73	1052.33	24.37	----	----	----	----	----	----	----	----	24.37
6	69.28	1053.09	32.01	----	----	----	----	----	----	----	----	32.01
7	80.82	1053.94	38.73	----	----	----	----	----	----	----	----	38.73
8	92.37	1054.90	45.10	----	----	----	----	----	----	----	----	45.10
9	103.92	1055.32	47.67	----	----	----	----	----	----	----	----	47.67
10	115.46	1055.74	50.06	----	----	----	----	----	----	----	----	50.06
11	127.01	1056.22	52.68	----	----	----	----	----	----	----	----	52.68
12	138.55	1056.76	55.48	----	----	----	----	----	----	----	----	55.48
13	150.10	1057.37	58.43	----	----	----	----	----	----	----	----	58.43
14	161.65	1058.03	61.51	----	----	----	----	----	----	----	----	61.51
15	173.19	1058.74	64.68	----	----	----	----	----	----	----	----	64.68
16	184.74	1059.52	67.95	----	----	----	----	----	----	----	----	67.95
17	196.29	1060.17	70.59	----	----	----	----	----	----	----	----	70.59
18	207.83	1060.61	72.31	----	----	----	----	----	----	----	----	72.31
19	219.38 <<	1061.09	74.11	----	----	----	----	----	----	----	----	74.11
20	207.83	1061.55	75.85	----	----	----	----	----	----	----	----	75.85
21	196.29	1061.97	77.39	----	----	----	----	----	----	----	----	77.39
22	184.74	1062.35	78.74	----	----	----	----	----	----	----	----	78.74
23	173.19	1062.69	79.92	----	----	----	----	----	----	----	----	79.92
24	161.65	1062.98	80.94	----	----	----	----	----	----	----	----	80.94
25	150.10	1063.23	81.80	----	----	----	----	----	----	----	----	81.80
26	138.55	1063.44	82.51	----	----	----	----	----	----	----	----	82.51
27	127.01	1063.61	83.08	----	----	----	----	----	----	----	----	83.08
28	115.46	1063.74	83.50	----	----	----	----	----	----	----	----	83.50
29	103.92	1063.82	83.80	----	----	----	----	----	----	----	----	83.80
30	92.37	1063.87	83.96	----	----	----	----	----	----	----	----	83.96
31	80.82	1063.88 <<	83.99	----	----	----	----	----	----	----	----	83.99 <<
32	69.28	1063.85	83.89	----	----	----	----	----	----	----	----	83.89
33	57.73	1063.78	83.66	----	----	----	----	----	----	----	----	83.66
34	46.18	1063.68	83.30	----	----	----	----	----	----	----	----	83.30
35	34.64	1063.53	82.82	----	----	----	----	----	----	----	----	82.82
36	23.09	1063.35	82.21	----	----	----	----	----	----	----	----	82.21
37	11.55	1063.14	81.47	----	----	----	----	----	----	----	----	81.47
38	0.00	1062.88	80.60	----	----	----	----	----	----	----	----	80.60
39	0.00	1062.61	79.66	----	----	----	----	----	----	----	----	79.66

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BASIN

Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
40	0.00	1062.35	78.72	----	----	----	----	----	----	----	----	78.72
41	0.00	1062.08	77.78	----	----	----	----	----	----	----	----	77.78
42	0.00	1061.82	76.84	----	----	----	----	----	----	----	----	76.84
43	0.00	1061.57	75.90	----	----	----	----	----	----	----	----	75.90
44	0.00	1061.31	74.95	----	----	----	----	----	----	----	----	74.96
45	0.00	1061.06	74.02	----	----	----	----	----	----	----	----	74.02
46	0.00	1060.81	73.08	----	----	----	----	----	----	----	----	73.07
47	0.00	1060.57	72.14	----	----	----	----	----	----	----	----	72.14
48	0.00	1060.33	71.20	----	----	----	----	----	----	----	----	71.20
49	0.00	1060.09	70.26	----	----	----	----	----	----	----	----	70.26
50	0.00	1059.70	68.71	----	----	----	----	----	----	----	----	68.71
51	0.00	1059.24	66.78	----	----	----	----	----	----	----	----	66.78
52	0.00	1058.79	64.86	----	----	----	----	----	----	----	----	64.86
53	0.00	1058.35	62.94	----	----	----	----	----	----	----	----	62.94
54	0.00	1057.92	61.02	----	----	----	----	----	----	----	----	61.02
55	0.00	1057.51	59.11	----	----	----	----	----	----	----	----	59.11
56	0.00	1057.11	57.18	----	----	----	----	----	----	----	----	57.18
57	0.00	1056.72	55.25	----	----	----	----	----	----	----	----	55.25
58	0.00	1056.35	53.33	----	----	----	----	----	----	----	----	53.33
59	0.00	1055.98	51.42	----	----	----	----	----	----	----	----	51.42
60	0.00	1055.64	49.48	----	----	----	----	----	----	----	----	49.48
61	0.00	1055.30	47.56	----	----	----	----	----	----	----	----	47.56
62	0.00	1054.95	45.43	----	----	----	----	----	----	----	----	45.43
63	0.00	1054.04	39.45	----	----	----	----	----	----	----	----	39.45
64	0.00	1053.26	33.42	----	----	----	----	----	----	----	----	33.42
65	0.00	1052.61	27.45	----	----	----	----	----	----	----	----	27.45
66	0.00	1052.08	21.31	----	----	----	----	----	----	----	----	21.31
67	0.00	1051.69	15.64	----	----	----	----	----	----	----	----	15.64
68	0.00	1051.40	11.50	----	----	----	----	----	----	----	----	11.49
69	0.00	1051.18	8.65	----	----	----	----	----	----	----	----	8.65
70	0.00	1051.02	6.51	----	----	----	----	----	----	----	----	6.51
71	0.00	1050.89	5.28	----	----	----	----	----	----	----	----	5.28
72	0.00	1050.79	4.34	----	----	----	----	----	----	----	----	4.34
73	0.00	1050.71	3.57	----	----	----	----	----	----	----	----	3.57
74	0.00	1050.64	2.93	----	----	----	----	----	----	----	----	2.93
75	0.00	1050.58	2.41	----	----	----	----	----	----	----	----	2.41
76	0.00	1050.53	1.98	----	----	----	----	----	----	----	----	1.98
77	0.00	1050.49	1.66	----	----	----	----	----	----	----	----	1.67
78	0.00	1050.46	1.55	----	----	----	----	----	----	----	----	1.55
79	0.00	1050.43	1.44	----	----	----	----	----	----	----	----	1.44
80	0.00	1050.40	1.34	----	----	----	----	----	----	----	----	1.34
81	0.00	1050.37	1.25	----	----	----	----	----	----	----	----	1.25
82	0.00	1050.34	1.16	----	----	----	----	----	----	----	----	1.16
83	0.00	1050.32	1.08	----	----	----	----	----	----	----	----	1.08
84	0.00	1050.30	1.00	----	----	----	----	----	----	----	----	1.00
85	0.00	1050.28	0.93	----	----	----	----	----	----	----	----	0.93
86	0.00	1050.26	0.87	----	----	----	----	----	----	----	----	0.87

...End

Pond Report

Hydraflow Hydrographs by Intelisolve

Tuesday, Aug 1 2006, 4:3 PM

Pond No. 1 - BASIN

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1050.00	953	0	0
5.00	1055.00	4,651	14,010	14,010
10.00	1060.00	12,785	43,590	57,600
15.00	1065.00	22,869	89,135	146,735
20.00	1070.00	34,031	142,250	288,985
25.00	1075.00	48,558	206,473	495,458
30.00	1080.00	63,751	280,773	776,230

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise (in)	= 30.00	0.00	0.00	0.00
Span (in)	= 30.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 1050.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	0.00
N-Value	= .013	.013	.013	.013
Orif. Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 20.00	0.00	0.00	0.00
Crest El. (ft)	= 1080.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	0.00	0.00	0.00
Weir Type	= Rect	—	—	—
Multi-Stage	= No	No	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	1050.00	0.00	—	—	—	0.00	—	—	—	—	0.00
0.50	1,401	1050.50	1.69	—	—	—	0.00	—	—	—	—	1.69
1.00	2,802	1051.00	6.25	—	—	—	0.00	—	—	—	—	6.25
1.50	4,203	1051.50	12.84	—	—	—	0.00	—	—	—	—	12.84
2.00	5,604	1052.00	20.28	—	—	—	0.00	—	—	—	—	20.28
2.50	7,005	1052.50	26.42	—	—	—	0.00	—	—	—	—	26.42
3.00	8,406	1053.00	31.26	—	—	—	0.00	—	—	—	—	31.26
3.50	9,807	1053.50	35.45	—	—	—	0.00	—	—	—	—	35.45
4.00	11,208	1054.00	39.19	—	—	—	0.00	—	—	—	—	39.19
4.50	12,609	1054.50	42.60	—	—	—	0.00	—	—	—	—	42.60
5.00	14,010	1055.00	45.76	—	—	—	0.00	—	—	—	—	45.76
5.50	18,369	1055.50	48.72	—	—	—	0.00	—	—	—	—	48.72
6.00	22,728	1056.00	51.51	—	—	—	0.00	—	—	—	—	51.51
6.50	27,087	1056.50	54.15	—	—	—	0.00	—	—	—	—	54.15
7.00	31,446	1057.00	56.67	—	—	—	0.00	—	—	—	—	56.67
7.50	35,805	1057.50	59.08	—	—	—	0.00	—	—	—	—	59.08
8.00	40,164	1058.00	61.40	—	—	—	0.00	—	—	—	—	61.40
8.50	44,523	1058.50	63.63	—	—	—	0.00	—	—	—	—	63.63
9.00	48,882	1059.00	65.79	—	—	—	0.00	—	—	—	—	65.79
9.50	53,241	1059.50	67.88	—	—	—	0.00	—	—	—	—	67.88
10.00	57,600	1060.00	69.91	—	—	—	0.00	—	—	—	—	69.91
10.50	66,514	1060.50	71.88	—	—	—	0.00	—	—	—	—	71.88
11.00	75,427	1061.00	73.79	—	—	—	0.00	—	—	—	—	73.79
11.50	84,341	1061.50	75.66	—	—	—	0.00	—	—	—	—	75.66
12.00	93,254	1062.00	77.48	—	—	—	0.00	—	—	—	—	77.48
12.50	102,168	1062.50	79.27	—	—	—	0.00	—	—	—	—	79.27
13.00	111,081	1063.00	81.01	—	—	—	0.00	—	—	—	—	81.01
13.50	119,995	1063.50	82.71	—	—	—	0.00	—	—	—	—	82.71
14.00	128,908	1064.00	84.38	—	—	—	0.00	—	—	—	—	84.38
14.50	137,822	1064.50	86.02	—	—	—	0.00	—	—	—	—	86.02
15.00	146,735	1065.00	87.63	—	—	—	0.00	—	—	—	—	87.63

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BASIN

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
15.50	160,960	1065.50	89.21	—	—	—	0.00	—	—	—	—	89.21
16.00	175,185	1066.00	90.76	—	—	—	0.00	—	—	—	—	90.76
16.50	189,410	1066.50	92.29	—	—	—	0.00	—	—	—	—	92.29
17.00	203,635	1067.00	93.79	—	—	—	0.00	—	—	—	—	93.79
17.50	217,860	1067.50	95.27	—	—	—	0.00	—	—	—	—	95.27
18.00	232,085	1068.00	96.72	—	—	—	0.00	—	—	—	—	96.72
18.50	246,310	1068.50	98.15	—	—	—	0.00	—	—	—	—	98.15
19.00	260,535	1069.00	99.57	—	—	—	0.00	—	—	—	—	99.57
19.50	274,760	1069.50	100.96	—	—	—	0.00	—	—	—	—	100.96
20.00	288,985	1070.00	102.33	—	—	—	0.00	—	—	—	—	102.33
20.50	309,632	1070.50	103.69	—	—	—	0.00	—	—	—	—	103.69
21.00	330,280	1071.00	105.03	—	—	—	0.00	—	—	—	—	105.03
21.50	350,927	1071.50	106.35	—	—	—	0.00	—	—	—	—	106.35
22.00	371,574	1072.00	107.65	—	—	—	0.00	—	—	—	—	107.65
22.50	392,221	1072.50	108.94	—	—	—	0.00	—	—	—	—	108.94
23.00	412,869	1073.00	110.21	—	—	—	0.00	—	—	—	—	110.21
23.50	433,516	1073.50	111.47	—	—	—	0.00	—	—	—	—	111.47
24.00	454,163	1074.00	112.72	—	—	—	0.00	—	—	—	—	112.72
24.50	474,810	1074.50	113.95	—	—	—	0.00	—	—	—	—	113.95
25.00	495,458	1075.00	115.17	—	—	—	0.00	—	—	—	—	115.17
25.50	523,535	1075.50	116.38	—	—	—	0.00	—	—	—	—	116.38
26.00	551,612	1076.00	117.57	—	—	—	0.00	—	—	—	—	117.57
26.50	579,689	1076.50	118.75	—	—	—	0.00	—	—	—	—	118.75
27.00	607,767	1077.00	119.92	—	—	—	0.00	—	—	—	—	119.92
27.50	635,844	1077.50	121.08	—	—	—	0.00	—	—	—	—	121.08
28.00	663,921	1078.00	122.23	—	—	—	0.00	—	—	—	—	122.23
28.50	691,998	1078.50	123.37	—	—	—	0.00	—	—	—	—	123.37
29.00	720,076	1079.00	124.49	—	—	—	0.00	—	—	—	—	124.49
29.50	748,153	1079.50	125.61	—	—	—	0.00	—	—	—	—	125.61
30.00	776,230	1080.00	126.72	—	—	—	0.00	—	—	—	—	126.72

...End

HYDRAULIC & BASIN CALCULATIONS

HYDRAULIC CALCULATIONS

DETERMINE CAPACITY OF 42" RCP AT 5.0% MIN. GRADE:

Given Input Data:

Shape	Circular
Solving for	Depth of Flow
Diameter	3.5000 ft
Flowrate	208.9400 cfs
Slope	0.0500 ft/ft
Manning's n	0.0130

Computed Results:

Depth	2.6675 ft
Area	9.6211 ft2
Wetted Area	7.8678 ft2
Wetted Perimeter	7.4293 ft
Perimeter	10.9956 ft
Velocity	26.5562 fps
Hydraulic Radius	1.0590 ft
Percent Full	76.2132 %
Full flow Flowrate	224.9703 cfs
Full flow velocity	23.3829 fps

DETERMINE CAPACITY OF 48" RCP AT 2.4% MIN. GRADE:

Given Input Data:

Shape	Circular
Solving for	Depth of Flow
Diameter	4.0000 ft
Flowrate	208.9400 cfs
Slope	0.0240 ft/ft
Manning's n	0.0130

Computed Results:

Depth	3.0786 ft
Area	12.5664 ft2
Wetted Area	10.3784 ft2
Wetted Perimeter	8.5617 ft
Perimeter	12.5664 ft
Velocity	20.1323 fps
Hydraulic Radius	1.2122 ft
Percent Full	76.9660 %
Full flow Flowrate	222.5312 cfs
Full flow velocity	17.7085 fps

DEBRIS BASIN CALCULATIONS

DETERMINE THE DESIGN DEBRIS EVENT (DDE):

DPA Zone 1 (per hydrologic map)

Tributary Area = 134.88 AC. = 0.21 sq. mi.

Debris Production Rate = 177,000 C.Y. (per appx. P-1)

DDE = 177,000 X 0.21 = 37,170 C.Y.

DETERMINE THE DEBRIS SLOPE FOR THE BASIN:

Elevation of spillway crest (EL_s) = 1076.0 ft

Natural ground below spillway (EL_g) = 1044.5 ft

Height of spillway above natural ground (H_s) = EL_s - EL_g = 1076.0 – 1044.5 = 31.5 ft

Elevation Difference (H_c) = 2 H_s = 2 (31.5) = 63.0 ft

Upstream cone elevation = EL_g + H_c = 1044.5 + 63.0 = 1107.5 ft

Horizontal distance from spillway crest to upstream cone (L) = 840.0 ft

Natural Slope (S_N) = H_C / L = 63.0 / 840.0 = 0.0750

Debris Cone Slope (S_D) = 0.5 x S_N = 0.5 (0.0750) = 0.0375 = 3.75%

DEBRIS BASIN DETENTION CAPACITY
AFTER FULL OF DEBRIS

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50 - Year

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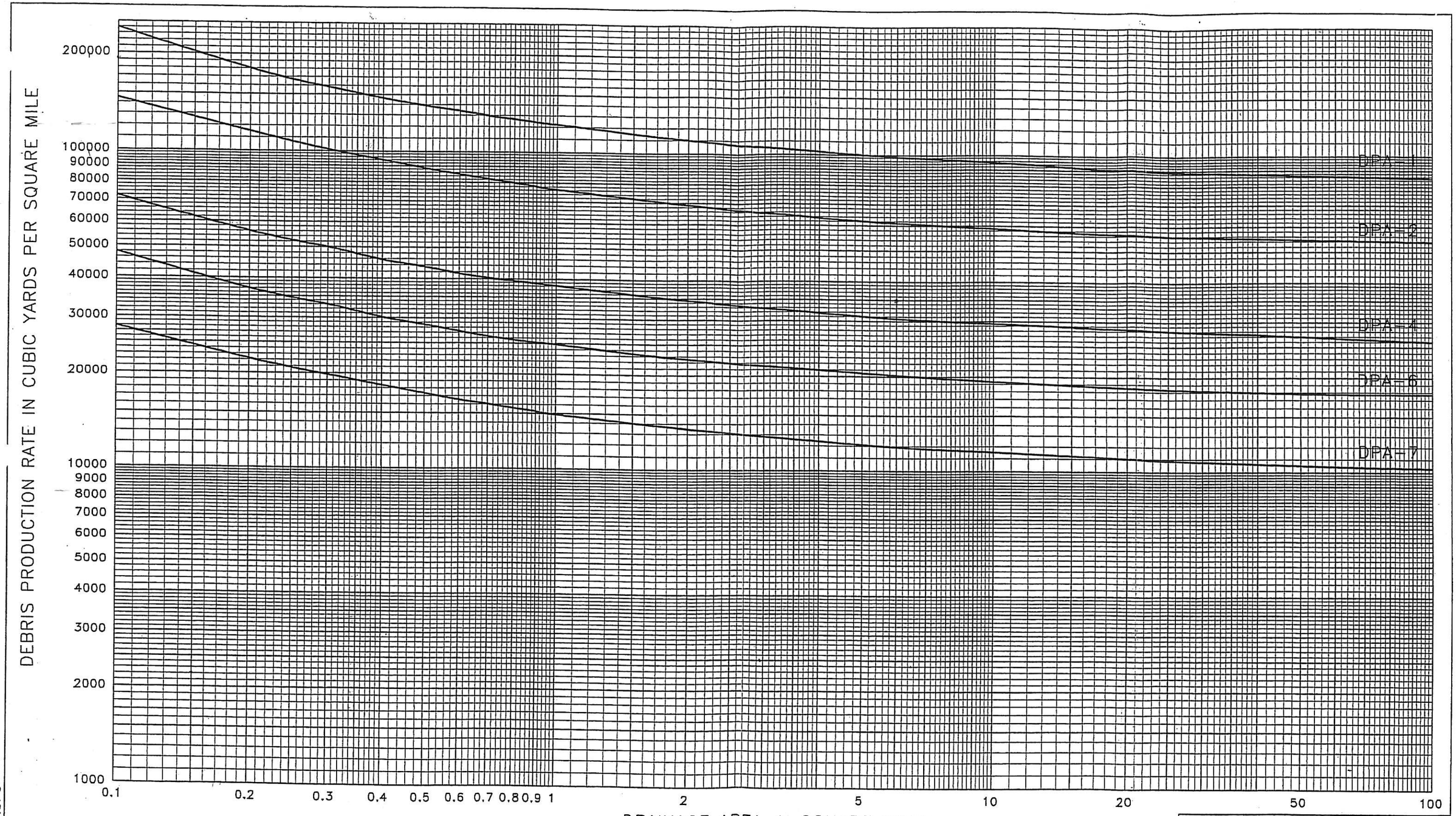
Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	Mod. Rational	——	——	——	——	——	——	——	219.38	——	1A
2	Reservoir	1	——	——	——	——	——	——	185.85	——	BASIN



Los Angeles County
Department of Public Works

DEBRIS PRODUCTION RATES
for Los Angeles Basin

JH1.SPG

DP

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	Mod. Rational	219.38	1	19	250,091	—	—	—	1A
2	Reservoir	185.85	1	22	242,113	1	1079.00	61,942	BASIN

Hydrograph Report

Hydraflow Hydrographs by Intelisolve

Thursday, Aug 10 2006, 4:19 PM

Hyd. No. 2

BASIN

Hydrograph type	= Reservoir	Peak discharge	= 185.85 cfs
Storm frequency	= 50 yrs	Time interval	= 1 min
Inflow hyd. No.	= 1	Reservoir name	= BASIN
Max. Elevation	= 1079.00 ft	Max. Storage	= 61,942 cuft

Storage Indication method used.

Outflow hydrograph volume = 242,113 cuft

(Printed values >= 1% of Qp.)

Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
6	69.28	1076.77	250.51	----	----	----	6.55	----	----	----	----	6.55
7	80.82	1077.00	250.51	----	----	----	16.82	----	----	----	----	16.81
8	92.37	1077.19	250.51	----	----	----	27.05	----	----	----	----	27.05
9	103.92	1077.38	250.51	----	----	----	38.90	----	----	----	----	38.90
10	115.46	1077.57	250.51	----	----	----	51.90	----	----	----	----	51.91
11	127.01	1077.75	250.51	----	----	----	65.68	----	----	----	----	65.68
12	138.55	1077.93	250.51	----	----	----	79.88	----	----	----	----	79.88
13	150.10	1078.08	250.51	----	----	----	92.94	----	----	----	----	92.94
14	161.65	1078.21	250.51	----	----	----	105.09	----	----	----	----	105.10
15	173.19	1078.34	250.51	----	----	----	117.59	----	----	----	----	117.60
16	184.74	1078.47	250.51	----	----	----	130.28	----	----	----	----	130.28
17	196.29	1078.60	250.51	----	----	----	143.10	----	----	----	----	143.09
18	207.83	1078.73	250.51	----	----	----	156.02	----	----	----	----	156.01
19	219.38 <<	1078.85	250.51	----	----	----	168.94	----	----	----	----	168.93
20	207.83	1078.94	250.51	----	----	----	179.17	----	----	----	----	179.16
21	196.29	1078.99	250.51	----	----	----	184.47	----	----	----	----	184.47
22	184.74	1079.00 <<	250.51	----	----	----	185.83	0.02	----	----	----	185.85 <<
23	173.19	1078.99	250.51	----	----	----	184.27	----	----	----	----	184.27
24	161.65	1078.95	250.51	----	----	----	180.36	----	----	----	----	180.37
25	150.10	1078.90	250.51	----	----	----	174.70	----	----	----	----	174.69
26	138.55	1078.84	250.51	----	----	----	167.80	----	----	----	----	167.80
27	127.01	1078.76	250.51	----	----	----	159.93	----	----	----	----	159.93
28	115.46	1078.68	250.51	----	----	----	151.36	----	----	----	----	151.35
29	103.92	1078.59	250.51	----	----	----	142.28	----	----	----	----	142.28
30	92.37	1078.50	250.51	----	----	----	132.85	----	----	----	----	132.85
31	80.82	1078.40	250.51	----	----	----	123.19	----	----	----	----	123.19
32	69.28	1078.30	250.51	----	----	----	113.37	----	----	----	----	113.37
33	57.73	1078.19	250.51	----	----	----	103.46	----	----	----	----	103.46
34	46.18	1078.08	250.51	----	----	----	93.53	----	----	----	----	93.53
35	34.64	1077.96	250.51	----	----	----	83.07	----	----	----	----	83.07
36	23.09	1077.82	250.51	----	----	----	71.37	----	----	----	----	71.36
37	11.55	1077.68	250.51	----	----	----	60.25	----	----	----	----	60.25
38	0.00	1077.54	250.51	----	----	----	49.67	----	----	----	----	49.66
39	0.00	1077.41	250.51	----	----	----	40.53	----	----	----	----	40.53
40	0.00	1077.30	250.51	----	----	----	33.52	----	----	----	----	33.52
41	0.00	1077.21	250.51	----	----	----	28.06	----	----	----	----	28.06
42	0.00	1077.13	250.51	----	----	----	23.75	----	----	----	----	23.74
43	0.00	1077.07	250.51	----	----	----	20.25	----	----	----	----	20.25

Continues on next page...

BASIN

Hydrograph Discharge Table

Time (min)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
44	0.00	1077.02	250.51	----	----	----	17.39	----	----	----	----	17.39
45	0.00	1076.96	250.51	----	----	----	14.68	----	----	----	----	14.67
46	0.00	1076.91	250.51	----	----	----	12.28	----	----	----	----	12.28
47	0.00	1076.87	250.51	----	----	----	10.45	----	----	----	----	10.45
48	0.00	1076.83	250.51	----	----	----	8.93	----	----	----	----	8.93
49	0.00	1076.80	250.51	----	----	----	7.65	----	----	----	----	7.65
50	0.00	1076.77	250.51	----	----	----	6.70	----	----	----	----	6.70
51	0.00	1076.75	250.51	----	----	----	5.87	----	----	----	----	5.87
52	0.00	1076.73	250.51	----	----	----	5.14	----	----	----	----	5.14
53	0.00	1076.71	250.51	----	----	----	4.50	----	----	----	----	4.50
54	0.00	1076.69	250.51	----	----	----	4.00	----	----	----	----	4.00
55	0.00	1076.68	250.51	----	----	----	3.61	----	----	----	----	3.61
56	0.00	1076.67	250.51	----	----	----	3.26	----	----	----	----	3.26
57	0.00	1076.65	250.51	----	----	----	2.95	----	----	----	----	2.94
58	0.00	1076.64	250.51	----	----	----	2.66	----	----	----	----	2.66
59	0.00	1076.63	250.51	----	----	----	2.40	----	----	----	----	2.40
60	0.00	1076.63	250.51	----	----	----	2.17	----	----	----	----	2.17
61	0.00	1076.62	250.51	----	----	----	1.96	----	----	----	----	1.96

...End

Pond Report

Hydraflow Hydrographs by Intelisolve — Thursday, Aug 10 2006, 4:19 PM

Pond No. 1 - BASIN

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1076.00	13,618	0	0
1.00	1077.00	18,290	15,954	15,954
2.00	1078.00	22,963	20,627	36,581
3.00	1079.00	27,635	25,299	61,880
4.00	1080.00	32,307	29,971	91,851

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise (in)	= 42.00	0.00	0.00	0.00
Span (in)	= 42.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 1045.00	0.00	0.00	0.00
Length (ft)	= 100.00	0.00	0.00	0.00
Slope (%)	= 5.00	0.00	0.00	0.00
N-Value	= .013	.013	.013	.013
Orif. Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 14.10	10.00	0.00	0.00
Crest El. (ft)	= 1076.50	1079.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	0.00	0.00
Weir Type	= Riser	Rect	—	—
Multi-Stage	= Yes	No	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	1076.00	0.00	—	—	—	0.00	0.00	—	—	—	0.00
0.10	1,595	1076.10	250.51	—	—	—	0.00	0.00	—	—	—	0.00
0.20	3,191	1076.20	250.51	—	—	—	0.00	0.00	—	—	—	0.00
0.30	4,786	1076.30	250.51	—	—	—	0.00	0.00	—	—	—	0.00
0.40	6,382	1076.40	250.51	—	—	—	0.00	0.00	—	—	—	0.00
0.50	7,977	1076.50	250.51	—	—	—	0.00	0.00	—	—	—	0.00
0.60	9,572	1076.60	250.51	—	—	—	1.48	0.00	—	—	—	1.48
0.70	11,168	1076.70	250.51	—	—	—	4.19	0.00	—	—	—	4.19
0.80	12,763	1076.80	250.51	—	—	—	7.71	0.00	—	—	—	7.71
0.90	14,359	1076.90	250.51	—	—	—	11.87	0.00	—	—	—	11.87
1.00	15,954	1077.00	250.51	—	—	—	16.60	0.00	—	—	—	16.60
1.10	18,017	1077.10	250.51	—	—	—	21.82	0.00	—	—	—	21.82
1.20	20,079	1077.20	250.51	—	—	—	27.50	0.00	—	—	—	27.50
1.30	22,142	1077.30	250.51	—	—	—	33.59	0.00	—	—	—	33.59
1.40	24,205	1077.40	250.51	—	—	—	40.08	0.00	—	—	—	40.08
1.50	26,267	1077.50	250.51	—	—	—	46.94	0.00	—	—	—	46.94
1.60	28,330	1077.60	250.51	—	—	—	54.16	0.00	—	—	—	54.16
1.70	30,393	1077.70	250.51	—	—	—	61.71	0.00	—	—	—	61.71
1.80	32,455	1077.80	250.51	—	—	—	69.58	0.00	—	—	—	69.58
1.90	34,518	1077.90	250.51	—	—	—	77.76	0.00	—	—	—	77.76
2.00	36,581	1078.00	250.51	—	—	—	86.26	0.00	—	—	—	86.26
2.10	39,110	1078.10	250.51	—	—	—	95.02	0.00	—	—	—	95.02
2.20	41,640	1078.20	250.51	—	—	—	104.07	0.00	—	—	—	104.07
2.30	44,170	1078.30	250.51	—	—	—	113.38	0.00	—	—	—	113.38
2.40	46,700	1078.40	250.51	—	—	—	122.96	0.00	—	—	—	122.96
2.50	49,230	1078.50	250.51	—	—	—	132.79	0.00	—	—	—	132.79
2.60	51,760	1078.60	250.51	—	—	—	142.87	0.00	—	—	—	142.87
2.70	54,290	1078.70	250.51	—	—	—	153.20	0.00	—	—	—	153.20
2.80	56,820	1078.80	250.51	—	—	—	163.76	0.00	—	—	—	163.76
2.90	59,350	1078.90	250.51	—	—	—	174.55	0.00	—	—	—	174.55
3.00	61,880	1079.00	250.51	—	—	—	185.60	0.00	—	—	—	185.60
3.10	64,877	1079.10	250.51	—	—	—	196.84	1.05	—	—	—	197.89
3.20	67,874	1079.20	250.51	—	—	—	208.30	2.98	—	—	—	211.28

Continues on next page...

BASIN

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
3.30	70,871	1079.30	250.51	—	—	—	219.98	5.47	—	—	—	225.45
3.40	73,868	1079.40	250.51	—	—	—	231.87	8.42	—	—	—	240.29
3.50	76,865	1079.50	250.51	—	—	—	243.96	11.77	—	—	—	255.73
3.60	79,862	1079.60	253.77	—	—	—	253.77	15.47	—	—	—	269.24
3.70	82,859	1079.70	255.92	—	—	—	255.92	19.50	—	—	—	275.41
3.80	85,856	1079.80	257.49	—	—	—	257.49	23.82	—	—	—	281.31
3.90	88,853	1079.90	258.81	—	—	—	258.81	28.42	—	—	—	287.23
4.00	91,851	1080.00	259.96	—	—	—	259.96	33.30	—	—	—	293.26

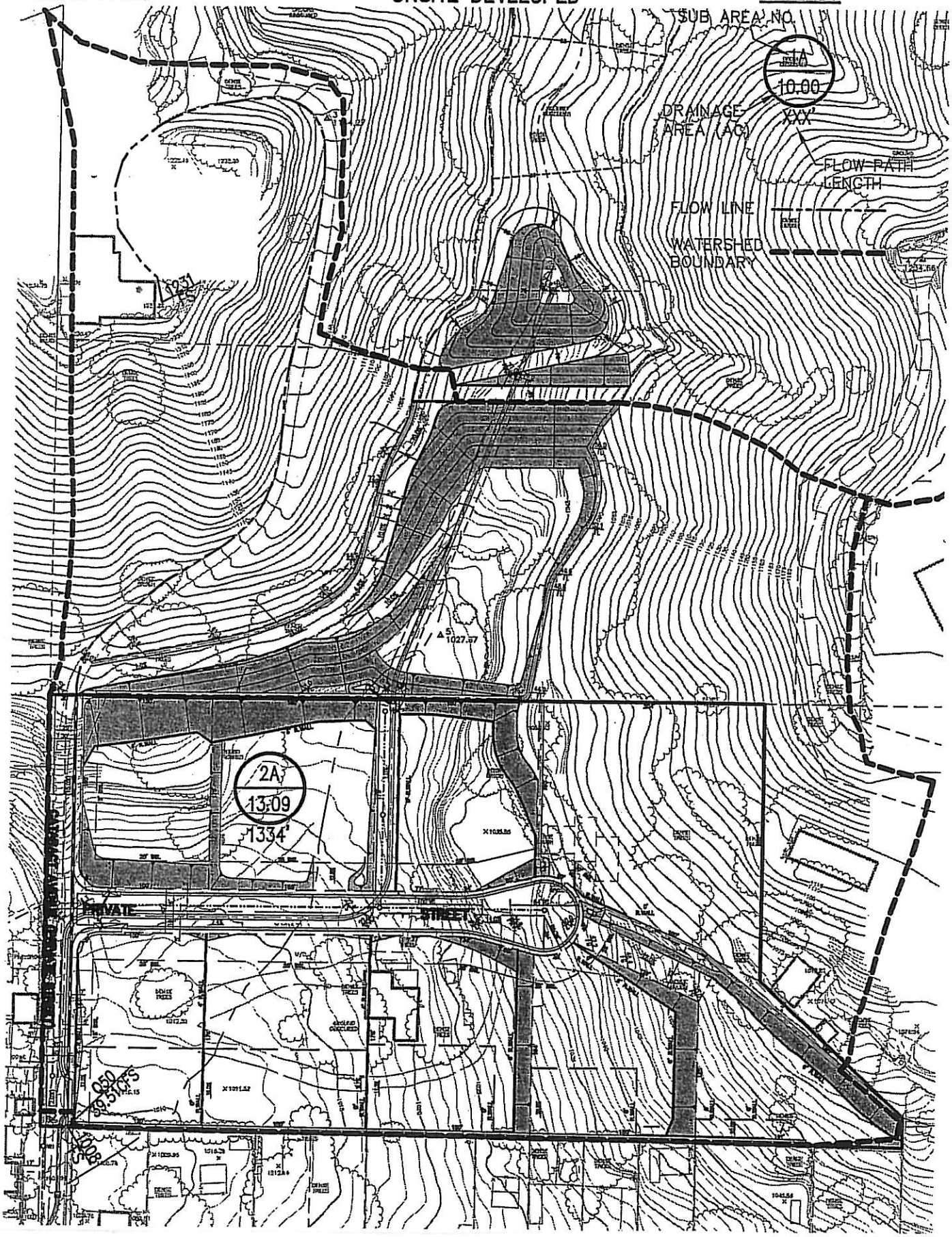
...End

DRAINAGE AREA MAPS

DRAINAGE AREA MAP
TRACT NO. 62872

SCALE: 1"=120'

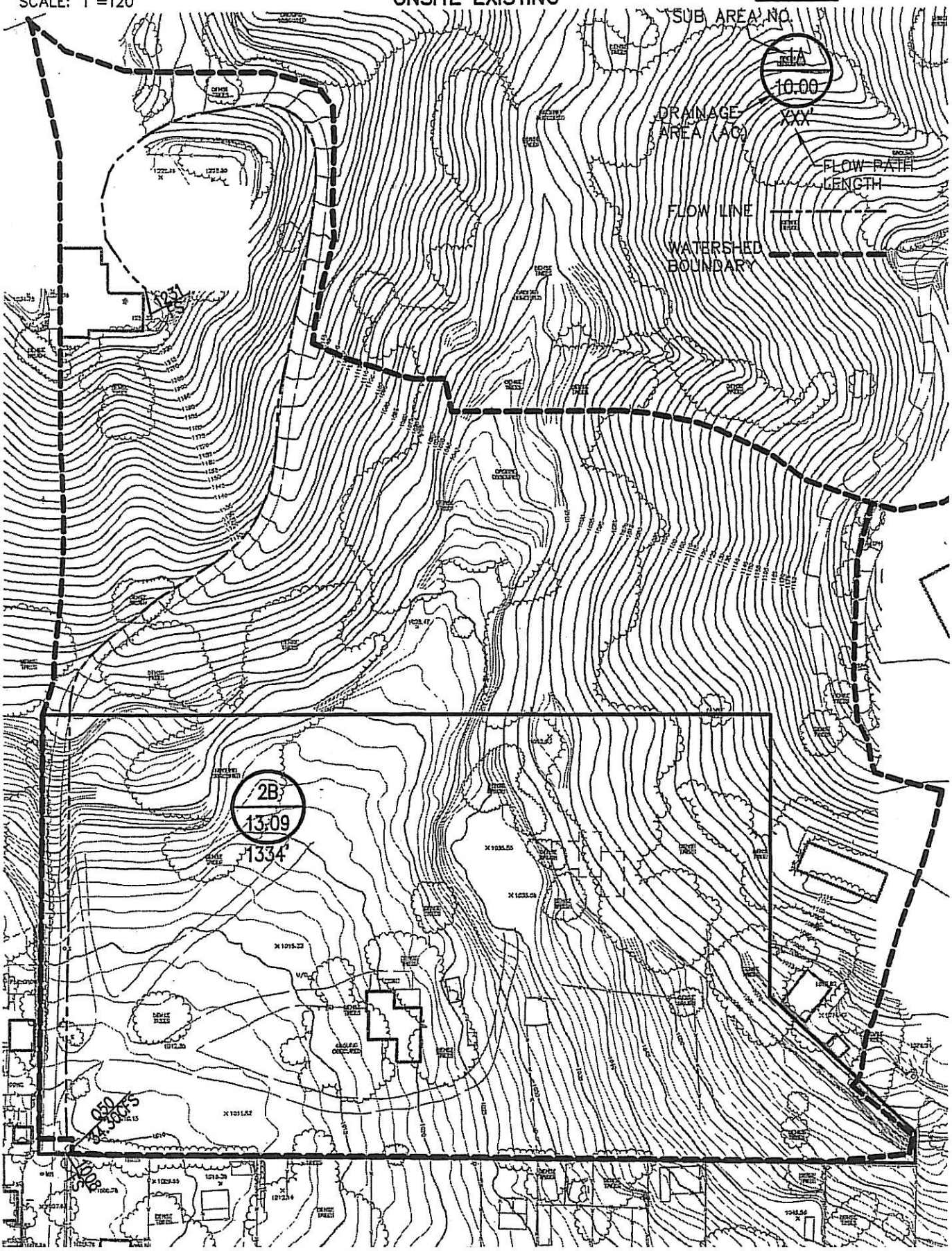
ONSITE DEVELOPED



DRAINAGE AREA MAP
TRACT NO. 62872

SCALE: 1"=120'

ONSITE EXISTING



Appendix H

BUD WHEELER DRAINAGE STUDY

INCLUDES CAPACITY OF EXISTING CATCH BASINS

Bud Wheeler, 2658 Country Club Drive, Glendora
Catch Basin/Storm Drain Hydraulic Calculations
Final Design - January 24, 2001

Background: The discharge from the two existing catch basins on Cataract Avenue into the Wheeler's property is controlled by a 36" diameter outlet (limiting orifice) as designed by San Dimas. It was decided during our discussions with Glendora that we would design a new pipe to convey storm water under the Wheeler's property that would not impede the maximum capacity flow of the existing 36" outlet.

Design Goal: To ensure that the proposed private drain does not impede the upstream flow from the existing 36" catch basin outlet on Cataract Street.

Step 1: **Calculate the capacity of the existing catch basins.**

The capacity of the inlet of each catch basin was analyzed using Haestad Methods Quick HEC 12. The streets were assumed to be flowing full and the peak discharge into each catch basin is calculated. See Appendix A for the HEC output.

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North Catch Basin = 44 cfs
South Catch Basin = 49 cfs
Total Flow = 93 cfs

The calculated capacity of the 36" diameter catch basin outlet is about 94 cfs.

Step 2: **Calculate the size of the proposed storm drain**

The HY8 – FHWA Culvert Analysis Program was used to run various scenarios to determine the design size. A 42" Corrugated Plastic Pipe (CPP) was selected. See Appendix B for final culvert analysis. At the maximum catch basin capacity (93cfs) normal flow was achieved throughout the length of the pipe and no impedance of flow was calculated.

Step 3: **Specify a new catch basin along Country Club Drive.**

A new catch basin will be constructed on Country Club Drive in order act as both a structure to connect the new 42" CPP private drain and the existing dual 30" Corrugated Metal Pipe drains, and to accommodate for surface flow. The existing curb return

INTEGRATED ENGINEERING SOLUTIONS, Inc.
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Bud Wheeler, 2658 Country Club Drive, Glendora
Catch Basin/Storm Drain Hydraulic Calculations
Final Design - January 24, 2001

that allows surface flow from the street is approximately 4' wide and 8" tall. The proposed catch basin curb face opening has been sized to handle the surface flow historically taken in by the existing opening. The proposed opening is also intended to act as an overflow in the event that the two 30" lines underneath Country Club Drive were to become blocked. In addition the driveway has been designed to act as a surface overflow channel to further relieve any congested flow from Cataract Avenue to Country Club Drive.

Private Drain Maintenance

The new private drain system will have two access points for maintenance purposes. One access point is located at the existing catch basin on Cataract Avenue and the second will be at the new catch basin on Country Club Dive. The two access points are approximately 190' apart. Los Angeles County typically requires storm drain manholes a distance of 500' apart. The 42" pipe is large enough to provide easy access inside for maintenance purposes.

Respectfully submitted,
Integrated Engineering Solutions, Inc.

Bart Sperry, P.E.

REGISTERED PROFESSIONAL ENGINEER
BART SPERRY
No. 53865
Exp. 6/30/03
CIVIL
STATE OF CALIFORNIA
2/9/02

INTEGRATED ENGINEERING SOLUTIONS, Inc.
(626)331-9970 Covina, CA

Appendix A

Catch Basin/Storm Drain Hydraulic Calculations

Bud Wheeler
2658 Country Club Drive, Glendora
7/23/2001

INLET NUMBER LENGTH 10.0 STATION

TOTAL PEAK DISCHARGE = 44.00 (cfs)

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0200 FT/FT

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 22.00 (cfs) IS 35.21 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX

P EFFEC. LENGTH (ft) = 12.70 H (ft) = 1.000

DEPTH OF WATER (ft) = 1.17 SPREAD (ft) = 58.48

INLET NUMBER LENGTH 14.0 STATION

TOTAL PEAK DISCHARGE = 49.00 (cfs)

GUTTER SLOPE = 0.0010 FT/FT PAVEMENT CROSS SLOPE = 0.0200 FT/FT

SPREAD AT A SLOPE OF .001 (ft./ft.) AND 24.50 (cfs) IS 36.68 (ft.)

XXXXXXXXXX CURB INLET IN A SUMP XXXXXXXXXX

P EFFEC. LENGTH (ft) = 16.70 H (ft) = 1.000

DEPTH OF WATER (ft) = 1.18 SPREAD (ft) = 58.82

Appendix B

Catch Basin/Storm Drain Hydraulic Calculations

Bud Wheeler
2658 Country Club Drive, Glendora
7/23/2001

CURRENT DATE: 01-24-2002
CURRENT TIME: 14:48:42

FILE DATE: 01-24-2002
FILE NAME: WHEELER

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.0

CULV NO.	SITE DATA			CULVERT SHAPE, MATERIAL, INLET				
	INLET ELEV. (ft)	OUTLET ELEV. (ft)	CULVERT LENGTH (ft)	BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	1005.00	995.75	188.23	1 RCP	3.50	3.50	.010	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (cfs) FILE: WHEELER DATE: 01-24-2002

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
1005.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1006.09	9.3	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1006.76	18.6	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1007.29	27.9	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1007.75	37.2	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1008.18	46.5	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1008.62	55.8	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1009.10	65.1	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1009.64	74.4	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1010.25	83.7	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1010.94	93.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: WHEELER DATE: 01-24-2002

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
1005.00	0.000	0.00	0.00	0.00
1006.09	0.000	9.30	0.00	0.00
1006.76	0.000	18.60	0.00	0.00
1007.29	0.000	27.90	0.00	0.00
1007.75	0.000	37.20	0.00	0.00
1008.18	0.000	46.50	0.00	0.00
1008.62	0.000	55.80	0.00	0.00
1009.10	0.000	65.10	0.00	0.00
1009.64	0.000	74.40	0.00	0.00
1010.25	0.000	83.70	0.00	0.00
1010.94	0.000	93.00	0.00	0.00

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 01-24-2002
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PERFORMANCE CURVE FOR CULVERT 1 - 1(3.50 (ft) BY 3.50 (ft)) RCP

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	1005.00	0.00	-6.40	0-NF	0.00	0.00	0.00	2.85	0.00	0.00
9.30	1006.09	1.09	1.09	1-S1f	0.41	0.91	1.10	3.53	3.58	3.73
18.60	1006.76	1.76	1.76	1-S1f	0.58	1.31	1.50	3.86	4.72	4.58
27.90	1007.29	2.29	2.29	1-S1f	0.73	1.62	1.80	4.12	5.60	5.14
37.20	1007.75	2.75	2.75	1-S1f	0.83	1.89	2.00	4.34	6.55	5.57
46.50	1008.18	3.18	3.18	1-S1f	0.93	2.13	2.30	4.53	6.95	5.91
55.80	1008.62	3.62	3.62	1-S1f	1.04	2.33	2.50	4.70	7.60	6.21
65.10	1009.10	4.10	4.10	1-S1f	1.12	2.52	2.70	4.86	8.19	6.47
74.40	1009.64	4.64	4.64	1-S1f	1.20	2.69	2.80	5.01	9.02	6.69
83.70	1010.25	5.25	5.25	1-S1f	1.28	2.84	3.00	5.14	9.57	6.90
93.00	1010.94	5.94	5.94	1-S1f	1.36	2.96	3.10	5.27	10.34	7.09

El. inlet face invert 1005.00 ft El. outlet invert 995.75 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION	1.00 ft
INLET ELEVATION	1005.00 ft
OUTLET STATION	189.00 ft
OUTLET ELEVATION	995.75 ft
NUMBER OF BARRELS	1
SLOPE (V/H)	0.0492
CULVERT LENGTH ALONG SLOPE	188.23 ft

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	CIRCULAR
BARREL DIAMETER	3.50 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.010
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE WITH HEADWALL
INLET DEPRESSION	NONE

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TAILWATER

******* REGULAR CHANNEL CROSS SECTION **********

BOTTOM WIDTH	3.00 ft
SIDE SLOPE H/V (X:1)	1.0
CHANNEL SLOPE V/H (ft/ft)	0.047
MANNING'S n (.01-0.1)	0.055
*CHANNEL INVERT ELEVATION	998.60 ft
CULVERT NO.1 OUTLET INVERT ELEVATION	995.75 ft

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
0.00	998.60	0.000	0.00	0.00	0.00
9.30	999.28	0.797	0.68	3.73	1.99
18.60	999.61	0.803	1.01	4.58	2.97
27.90	999.87	0.804	1.27	5.14	3.73
37.20	1000.09	0.804	1.49	5.57	4.37
46.50	1000.28	0.804	1.68	5.91	4.93
55.80	1000.45	0.804	1.85	6.21	5.43
65.10	1000.61	0.804	2.01	6.47	5.89
74.40	1000.76	0.803	2.16	6.69	6.32
83.70	1000.89	0.803	2.29	6.90	6.72
93.00	1001.02	0.803	2.42	7.09	7.10

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	15.00 ft
CREST LENGTH	15.00 ft
OVERTOPPING CREST ELEVATION	1010.58 ft