1016.29

Rosewood Wash Detention Basin
McCarran Blvd

Hydrology Report

Prepared by:

Codega & Fricke, Inc.
3690 Grant Drive/Suite J
Reno, Nevada 89509
(702) 837-8833

November 1989

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Location

The Rosewood Wash Detention Basin at McCarran Boulevard is located in the south east portion of Section 28, T.19N.,R.19E., within the Caughlin Ranch in Reno, Nevada. The detention basin is located on the south side of McCarran where the Rosewood Wash channel crosses McCarran Boulevard. Adjacent developments include the proposed Eastgate apartments to the west and the Eastridge Subdivisions to the east.

Detention Basin Parameters

The detention basin is to be built adjacent to McCarran Boulevard. The basin will have a maximum depth of 9' with the size of the basin approximately 1 acre (plan view). The total volume of the pond is roughly 7 acre feet. The sides of the basin will have 2:1 slopes and will be hydro seeded per the erosion control notes as stated on the plans. The west bank of the basin is approximately 90' high with benches every 30'.

Detention Basic Concept

With the construction of McCarran Boulevard, the material generated will fill the Rosewood Wash Channel. The channel will be relocated above the fill in a 2' flat bottom ditch. The ditch will have 2:1 sides and be rip rapped. With future development, the ditch will include some ponds and basins.

The proposed Rosewood Wash Detention Basin plan will intercept the flow of the relocated channel at the top of the fill slope using a City of Reno's trash rack structure. The structure also has a built in emergency overflow manhole orifice adjacent to the structure. The water will be transported to the bottom of the slope via a 30" RCP pipe. At the bottom of the slope is a drop structure to dissipate the energy of the water. The water then enters the basin and works its way to the basin's outlet structure.

The outlet structure consist of a 2 stage outlet structure. The first stage is a 12" pipe located at the bottom of the basin. This provides for positive drainage after each storm without any standing water. The 12" pipe restricts the outflow to a maximum flow and then the pond begins to fill. The second stage is a pair of 30" pipes located 3.5' above the 12" pipe. Both pipes work together in metering the outflow. If one pipe becomes plugged, the second 30" pipe would be able to handle most of the flow of the 100 year storm. The basin will overtop its banks if a 30" pipe becomes plugged. Water will flow down McCarran Boulevard to Skyline Boulevard.

Once the water exits the pond, it is transported through a 48" pipe to the inlet of an existing storm drain inlet located in the Eastridge Unit One Subdivision at the rear of the Grand Teton Court.

The detention basin is provided with a 10' access road from McCarran Boulevard to the bottom of the basin. The City of Reno will maintain the basin, and inlet, outlet structures. The necessary easements will be provided to the City of Reno for its maintenance.

Existing Conditions

The existing watershed for the Rosewood Wash located above the detention basin consists of approximately 134 acres, (see map #1 for existing drainage area). The Rosewood Wash consists of area #1 - culvert A on the attached map. The land is steep with a fair amount of rocks and minimal but mature vegetation coverage. The existing peak flow for the 5 year and 100 year storms are as follows:

Area	C	TC (min)	I5 (in/hr)	I100 (in/hr)	Area (acres)	Q5 (cfs)	Q100 (cfs)
1	.55	26.3	.75	2.0	134	56.0	147.4

Detention Basin Design

The design of the detention basin is documented in the computer print out located in the appendix A. An inflow hydrography for the existing 5 year and 100 year storms has been prepared. Given the pond data relating to the size and volume of the pond, along with the outlet structure, the hydrography was run through the basin and peak outflows were generated.

The peak flows for the existing conditions (no development) for the 5 year and 100 year storms are as follows:

	Q5	Q100
Existing	36.0cfs	145.0cfs
W/detention basin	10.2cfs	69.8cfs

The maximum depth of the pond during the 100 year storm is 6.26 deep leaving 2.73' of headboard.

Proposed developments which will contributed to the Rosewood Wash are Eastgate apartments, South Pointe, an RV site and open space. Refer to Map #2, Proposed Developments, for the location of the above projects.

At the present time, it is impossible to predict the runoff's from the proposed projects but an attempt will be made to provide an accurate as possible prediction of the future runoffs. Eastgate apartments will contain the relocated Rosewood Wash. It has been suggested that the project will provide detention basins in the project and will relocate the drainage ditch to better accommodate the project as well as provided some landscaping features. It will be assumed that the time of concentration will be 30 minutes through the project (this should be conservative). The time of concentration for the existing channel is 26.3 minutes, thus it seems reasonable.

The following table suggests the predicted peak flows for the 5 year and 100 year storms for the proposed projects.

Proposed Area	C	TC (min)	I5 (in/hr)	I100 (in/hr)	Area (acres)	Q5 (cfs)	Q100 (cfs)
Open Space	.50	40	.55	1.5	61.8	17.0	46.4
RV Site	.90	35	.60	1.6	8.6	4.6	12.4
SSPCo	.55	40	.55	1.5	9.5	2.9	7.8
South Pointe	.55	20	.9	2.4	32.4	16.0	42.8
Eastgate	.70	20	.9	2.4	46.5	29.3	78.1
					159 acres	70cfs	188cfs

As can be seen above the C valve for the open space was reduced from its existing valve of .55. This is because some of the open spaces will be intensely landscaped (e.g. along the SPPCo area) as the common areas in the Caughlin Ranch are presently. The other factor is the steep rocky areas will have been deleted (filled) and the remainder areas are flatter with more vegetation and better soil.

The proposed peak flows have increased approx 28% over the present conditions. The computer print outs for the proposed conditions are in appendix B. The pond decreases peak flows as follows:

	Q5	Q100
Proposed	70	188
W/detention basin	30.3	115

As can be seen, the 100 year peak flow has been reduced for the existing condition of 145 cfs to the proposed conditions of 115 cfs.

A drop structure has been proposed at the basin to dissipate the energey from the flow descending the slope. Calculations for the structure are in appendix C.

Conclusion

As can be seen from the data presented, the proposed Rosewood Wash Detention Basin at McCarran Boulevard decreases peak flows for both the 5 year and 100 year storms. Not only does the basin decrease flows in it existing conditions but with the proposed developments, the peak flows will be decreased. Downstream users benefit greatly from the proposed basin because the existing down stream storm drain systems are inadequate in providing for the 100 year storms.

Appendix A

Existing Conditions

```
**********************************************************************
*                                                                    *
*   ROSEWOOD WASH AT McCARRAN BLVD - EXISTING CONDITIONS - 5 YEAR    *
*                        CODEGA & FRICKE, INC                        *
*                     1016.10    2 - 30" PIPES                       *
*                       GMP   NOVEMBER 1989                          *
*                                                                    *
**********************************************************************
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EXECUTED 11-10-1989 09:30:23
Disk Files: C:MCPOND .PND ; C:MCPOND5 .HYD

INITIAL CONDITIONS
Elevation = 41.00 ft
Outflow = 0.0 cfs

GIVEN POND DATA			COMPUTATIONS	
ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)	2S/t (cfs)	2S/t + O (cfs)
41.00	0.0	0.02	4.8	4.8
42.00	1.4	0.16	38.7	40.1
43.00	5.9	0.50	121.0	126.9
44.00	8.2	1.07	258.9	267.1
45.00	12.6	1.84	445.3	457.9
46.00	30.5	2.75	665.5	696.0
47.00	60.7	3.75	907.5	968.2
48.00	95.5	4.81	1164.0	1259.5
49.00	123.7	5.92	1432.6	1556.3

Time increment (t) = 0.100 hrs.

Pond File: C:MCPOND .PND EXECUTED: 11-10-1989
Inflow Hydrograph: C:MCPOND5 .HYD 09:30:23
Outflow Hydrograph: C:NULL .HYD

INFLOW HYDROGRAPH

ROUTING COMPUTATIONS

TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
11.000	1.0	------	4.8	4.8	0.0	41.00
11.100	1.0	2.0	6.7	6.8	0.1	41.06
11.200	1.0	2.0	8.4	8.7	0.2	41.11
11.300	1.0	2.0	9.9	10.4	0.2	41.16
11.400	1.0	2.0	11.4	11.9	0.3	41.20
11.500	1.0	2.0	12.7	13.4	0.3	41.24
11.600	1.0	2.0	13.9	14.7	0.4	41.28
11.700	2.0	3.0	16.0	16.9	0.5	41.34
11.800	2.0	4.0	18.8	20.0	0.6	41.43
11.900	3.0	5.0	22.3	23.8	0.8	41.54
12.000	5.0	8.0	28.2	30.3	1.0	41.72
12.100	10.0	15.0	40.1	43.2	1.6	42.04
12.200	19.0	29.0	63.3	69.1	2.9	42.33
12.300	30.0	49.0	102.0	112.3	5.1	42.83
12.400	36.0	66.0	154.9	168.0	6.6	43.29
12.500	35.0	71.0	210.8	225.9	7.5	43.71
12.600	30.0	65.0	259.0	275.8	8.4	44.05
12.700	24.0	54.0	294.5	313.0	9.3	44.24
12.800	18.0	42.0	316.9	336.5	9.8	44.36
12.900	14.0	32.0	328.7	348.9	10.1	44.43
13.000	11.0	25.0	333.3	353.7	10.2	44.45
13.100	9.0	20.0	333.0	353.3	10.2	44.45
13.200	7.0	16.0	328.8	349.0	10.1	44.43
13.300	6.0	13.0	321.9	341.8	9.9	44.39
13.400	5.0	11.0	313.5	332.9	9.7	44.34
13.500	5.0	10.0	304.5	323.5	9.5	44.30
13.600	5.0	10.0	295.9	314.5	9.3	44.25
13.700	4.0	9.0	286.8	304.9	9.1	44.20
13.800	4.0	8.0	277.1	294.8	8.8	44.14
13.900	4.0	8.0	267.9	285.1	8.6	44.09
14.000	4.0	8.0	259.1	275.9	8.4	44.05
14.100	4.0	8.0	250.7	267.1	8.2	44.00
14.200	4.0	8.0	242.6	258.7	8.1	43.94
14.300	4.0	8.0	234.7	250.6	7.9	43.88
14.400	4.0	8.0	227.1	242.7	7.8	43.83
14.500	3.0	7.0	218.8	234.1	7.7	43.76
14.600	3.0	6.0	209.8	224.8	7.5	43.70
14.700	3.0	6.0	201.1	215.8	7.4	43.63
14.800	2.0	5.0	191.7	206.1	7.2	43.56
14.900	2.0	4.0	181.6	195.7	7.0	43.49
15.000	2.0	4.0	171.9	185.6	6.9	43.42
15.100	2.0	4.0	162.5	175.9	6.7	43.35
15.200	2.0	4.0	153.4	166.5	6.5	43.28
15.300	2.0	4.0	144.6	157.4	6.4	43.22
15.400	2.0	4.0	136.1	148.6	6.3	43.15

Pond File: C:MCPOND .PND EXECUTED: 11-10-1989
Inflow Hydrograph: C:MCPOND5 .HYD 09:30:23
Outflow Hydrograph: C:NULL .HYD

INFLOW HYDROGRAPH

ROUTING COMPUTATIONS

TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
15.500	2.0	4.0	127.8	140.1	6.1	43.09
15.600	2.0	4.0	119.9	131.8	6.0	43.04
15.700	2.0	4.0	112.4	123.9	5.7	42.97
15.800	2.0	4.0	105.7	116.4	5.4	42.88
15.900	2.0	4.0	99.7	109.7	5.0	42.80
16.000	2.0	4.0	94.3	103.7	4.7	42.73
16.100	2.0	4.0	89.4	98.3	4.4	42.67
16.200	2.0	4.0	85.1	93.4	4.2	42.61
16.300	1.0	3.0	80.3	88.1	3.9	42.55
16.400	1.0	2.0	75.2	82.3	3.6	42.49
16.500	1.0	2.0	70.5	77.2	3.3	42.43
16.600	1.0	2.0	66.4	72.5	3.1	42.37
16.700	1.0	2.0	62.6	68.4	2.9	42.33
16.800	1.0	2.0	59.3	64.6	2.7	42.28
16.900	1.0	2.0	56.3	61.3	2.5	42.24
17.000	1.0	2.0	53.6	58.3	2.3	42.21
17.100	1.0	2.0	51.2	55.6	2.2	42.18
17.200	1.0	2.0	49.0	53.2	2.1	42.15
17.300	1.0	2.0	47.1	51.0	2.0	42.13
17.400	1.0	2.0	45.4	49.1	1.9	42.10
17.500	1.0	2.0	43.8	47.4	1.8	42.08
17.600	1.0	2.0	42.4	45.8	1.7	42.07
17.700	1.0	2.0	41.2	44.4	1.6	42.05
17.800	1.0	2.0	40.1	43.2	1.6	42.04
17.900	1.0	2.0	39.1	42.1	1.5	42.02
18.000	1.0	2.0	38.2	41.1	1.4	42.01
18.100	1.0	2.0	37.4	40.2	1.4	42.00
18.200	1.0	2.0	36.6	39.4	1.4	41.98
18.300	1.0	2.0	35.9	38.6	1.3	41.96
18.400	1.0	2.0	35.3	37.9	1.3	41.94
18.500	1.0	2.0	34.7	37.3	1.3	41.92
18.600	1.0	2.0	34.2	36.7	1.3	41.90
18.700	1.0	2.0	33.7	36.2	1.2	41.89
18.800	1.0	2.0	33.3	35.7	1.2	41.88
18.900	1.0	2.0	32.9	35.3	1.2	41.86
19.000	1.0	2.0	32.5	34.9	1.2	41.85
19.100	1.0	2.0	32.1	34.5	1.2	41.84
19.200	1.0	2.0	31.8	34.1	1.2	41.83
19.300	1.0	2.0	31.5	33.8	1.1	41.82
19.400	1.0	2.0	31.2	33.5	1.1	41.81
19.500	1.0	2.0	31.0	33.2	1.1	41.80
19.600	1.0	2.0	30.7	33.0	1.1	41.80
19.700	1.0	2.0	30.5	32.7	1.1	41.79
19.800	1.0	2.0	30.3	32.5	1.1	41.78
19.900	1.0	2.0	30.1	32.3	1.1	41.78
20.000	1.0	2.0	30.0	32.1	1.1	41.77

Pond File: C:MCPOND .PND EXECUTED: 11-10-1989
Inflow Hydrograph: C:MCPOND5 .HYD 09:30:23
Outflow Hydrograph: C:NULL .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
20.100	1.0	2.0	29.8	32.0	1.1	41.77
20.200	1.0	2.0	29.7	31.8	1.1	41.76
20.300	1.0	2.0	29.6	31.7	1.1	41.76
20.400	1.0	2.0	29.4	31.6	1.1	41.76
20.500	1.0	2.0	29.3	31.4	1.1	41.75
20.600	1.0	2.0	29.2	31.3	1.1	41.75
20.700	1.0	2.0	29.1	31.2	1.0	41.75
20.800	1.0	2.0	29.0	31.1	1.0	41.75
20.900	1.0	2.0	29.0	31.0	1.0	41.74
21.000	1.0	2.0	28.9	31.0	1.0	41.74
21.100	1.0	2.0	28.8	30.9	1.0	41.74
21.200	1.0	2.0	28.8	30.8	1.0	41.74
21.300	1.0	2.0	28.7	30.8	1.0	41.73
21.400	1.0	2.0	28.6	30.7	1.0	41.73
21.500	1.0	2.0	28.6	30.6	1.0	41.73
21.600	1.0	2.0	28.6	30.6	1.0	41.73
21.700	1.0	2.0	28.5	30.6	1.0	41.73
21.800	1.0	2.0	28.5	30.5	1.0	41.73
21.900	1.0	2.0	28.4	30.5	1.0	41.73
22.000	1.0	2.0	28.4	30.4	1.0	41.73
22.100	1.0	2.0	28.4	30.4	1.0	41.72
22.200	1.0	2.0	28.4	30.4	1.0	41.72
22.300	1.0	2.0	28.3	30.4	1.0	41.72
22.400	1.0	2.0	28.3	30.3	1.0	41.72
22.500	1.0	2.0	28.3	30.3	1.0	41.72
22.600	1.0	2.0	28.3	30.3	1.0	41.72
22.700	1.0	2.0	28.2	30.3	1.0	41.72
22.800	1.0	2.0	28.2	30.2	1.0	41.72
22.900	1.0	2.0	28.2	30.2	1.0	41.72
23.000	1.0	2.0	28.2	30.2	1.0	41.72
23.100	1.0	2.0	28.2	30.2	1.0	41.72
23.200	1.0	2.0	28.2	30.2	1.0	41.72
23.300	1.0	2.0	28.2	30.2	1.0	41.72
23.400	1.0	2.0	28.2	30.2	1.0	41.72
23.500	1.0	2.0	28.1	30.2	1.0	41.72
23.600	1.0	2.0	28.1	30.1	1.0	41.72
23.700	1.0	2.0	28.1	30.1	1.0	41.72
23.800	1.0	2.0	28.1	30.1	1.0	41.72
23.900	1.0	2.0	28.1	30.1	1.0	41.72
24.000	0.0	1.0	27.2	29.1	1.0	41.69
24.100	0.0	0.0	25.4	27.2	0.9	41.63
24.200	0.0	0.0	23.8	25.4	0.8	41.58
24.300	0.0	0.0	22.3	23.8	0.8	41.54
24.400	0.0	0.0	20.9	22.3	0.7	41.49
24.500	0.0	0.0	19.6	20.9	0.6	41.46
24.600	0.0	0.0	18.4	19.6	0.6	41.42

Pond File: C:MCPOND .PND EXECUTED: 11-10-1989
Inflow Hydrograph: C:MCPOND5 .HYD 09:30:23
Outflow Hydrograph: C:NULL .HYD

INFLOW HYDROGRAPH

TIME (hrs)	INFLOW (cfs)
24.700	0.0
24.800	0.0
24.900	0.0
25.000	0.0
25.100	0.0
25.200	0.0
25.300	0.0
25.400	0.0
25.500	0.0
25.600	0.0
25.700	0.0
25.800	0.0
25.900	0.0

ROUTING COMPUTATIONS

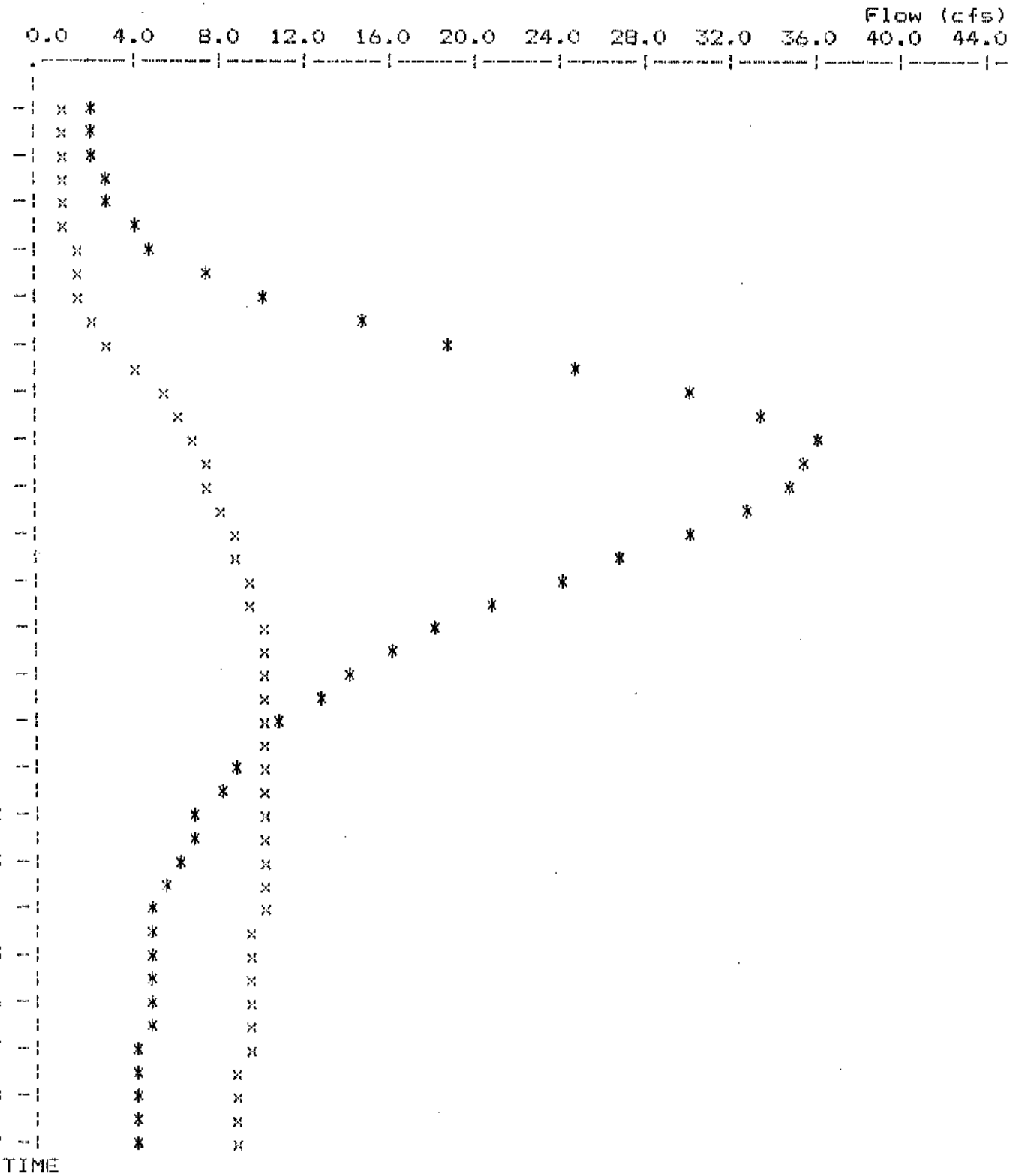
I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
0.0	17.4	18.4	0.5	41.39
0.0	16.4	17.4	0.5	41.36
0.0	15.5	16.4	0.5	41.33
0.0	14.6	15.5	0.4	41.30
0.0	13.8	14.6	0.4	41.28
0.0	13.1	13.8	0.4	41.26
0.0	12.5	13.1	0.3	41.23
0.0	11.9	12.5	0.3	41.22
0.0	11.3	11.9	0.3	41.20
0.0	10.8	11.3	0.3	41.18
0.0	10.3	10.8	0.2	41.17
0.0	9.9	10.3	0.2	41.16
0.0	9.5	9.9	0.2	41.14

Peak Inflow = 36.0 cfs
Peak Outflow = 10.2 cfs
Peak Elevation = 44.45 ft

Pond File: C:MCPOND .PND
Inflow Hydrograph: C:MCPOND5 .HYD
Outflow Hydrograph: C:NULL .HYD

EXECUTED: 11-10-1989
09:30:23

Peak Inflow = 36.0 cfs
Peak Outflow = 10.2 cfs
Peak Elevation = 44.45 ft



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*
* ROSEWOOD WASH AT McCARRAN BLVD - EXISTING CONDITIONS - 100 YEAR *
* CODEGA & FRICKE, INC *
* 1016.10 2 - 30" PIPES *
* GMP NOVEMBER 1989 *
*
****

EXECUTED 11-10-1989 09:32:38
Disk Files: C:MCPOND .PND ; C:MCPONDC .HYD

INITIAL CONDITIONS
Elevation = 41.00 ft
Outflow = 0.0 cfs

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)
41.00	0.0	0.02
42.00	1.4	0.16
43.00	5.9	0.50
44.00	8.2	1.07
45.00	12.6	1.84
46.00	30.5	2.75
47.00	60.7	3.75
48.00	95.5	4.81
49.00	123.7	5.92

COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
4.8	4.8
38.7	40.1
121.0	126.9
258.9	267.1
445.3	457.9
665.5	696.0
907.5	968.2
1164.0	1259.5
1432.6	1556.3

Time increment (t) = 0.100 hrs.

Pond File: C:MCPOND .PND EXECUTED: 11-10-1989
Inflow Hydrograph: C:MCPONDC .HYD 09:32:38
Outflow Hydrograph: C:NULL .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
11.000	3.0	------	4.8	4.8	0.0	41.00
11.100	4.0	7.0	11.3	11.8	0.3	41.20
11.200	5.0	9.0	19.1	20.3	0.6	41.44
11.300	6.0	11.0	28.1	30.1	1.0	41.71
11.400	7.0	13.0	38.2	41.1	1.4	42.01
11.500	8.0	15.0	49.0	53.2	2.1	42.15
11.600	9.0	17.0	60.5	66.0	2.7	42.30
11.700	12.0	21.0	74.4	81.5	3.5	42.48
11.800	14.0	26.0	91.4	100.4	4.5	42.69
11.900	17.0	31.0	111.0	122.4	5.7	42.95
12.000	32.0	49.0	147.2	160.0	6.4	43.24
12.100	62.0	94.0	225.6	241.2	7.8	43.81
12.200	112.0	174.0	377.1	399.6	11.3	44.69
12.300	145.0	257.0	582.4	634.1	25.8	45.74
12.400	137.0	282.0	766.0	864.4	49.2	46.62
12.500	101.0	238.0	874.1	1004.0	65.0	47.12
12.600	69.0	170.0	904.5	1044.1	69.8	47.26
12.700	51.0	120.0	889.7	1024.5	67.4	47.19
12.800	37.0	88.0	854.0	977.7	61.8	47.03
12.900	30.0	67.0	810.1	921.0	55.5	46.83
13.000	23.0	53.0	765.0	863.1	49.0	46.61
13.100	20.0	43.0	722.2	808.0	42.9	46.41
13.200	18.0	38.0	684.9	760.2	37.6	46.24
13.300	16.0	34.0	652.8	718.9	33.0	46.08
13.400	15.0	31.0	624.7	683.8	29.6	45.95
13.500	14.0	29.0	599.0	653.7	27.3	45.82
13.600	13.0	27.0	575.5	626.0	25.2	45.71
13.700	12.0	25.0	553.9	600.5	23.3	45.60
13.800	12.0	24.0	534.7	577.9	21.6	45.50
13.900	11.0	23.0	517.5	557.7	20.1	45.42
14.000	10.0	21.0	501.1	538.5	18.7	45.34
14.100	9.0	19.0	485.6	520.1	17.3	45.26
14.200	9.0	18.0	471.5	503.6	16.0	45.19
14.300	8.0	17.0	458.7	488.5	14.9	45.13
14.400	8.0	16.0	447.0	474.7	13.9	45.07
14.500	8.0	16.0	437.0	463.0	13.0	45.02
14.600	8.0	16.0	428.0	453.0	12.5	44.97
14.700	8.0	16.0	419.5	444.0	12.3	44.93
14.800	8.0	16.0	411.3	435.5	12.1	44.88
14.900	7.0	15.0	402.6	426.3	11.9	44.83
15.000	7.0	14.0	393.3	416.6	11.6	44.78
15.100	7.0	14.0	384.4	407.3	11.4	44.73
15.200	7.0	14.0	375.9	398.4	11.2	44.69
15.300	7.0	14.0	367.9	389.9	11.0	44.64
15.400	7.0	14.0	360.2	381.9	10.8	44.60

Pond File: C:MCPOND .PND EXECUTED: 11-10-1989
Inflow Hydrograph: C:MCPONDC .HYD 09:32:38
Outflow Hydrograph: C:NULL .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
15.500	7.0	14.0	352.8	374.2	10.7	44.56
15.600	7.0	14.0	345.8	366.8	10.5	44.52
15.700	7.0	14.0	339.2	359.8	10.3	44.49
15.800	6.0	13.0	331.8	352.2	10.2	44.45
15.900	6.0	12.0	323.9	343.8	10.0	44.40
16.000	6.0	12.0	316.3	335.9	9.8	44.36
16.100	6.0	12.0	309.1	328.3	9.6	44.32
16.200	6.0	12.0	302.2	321.1	9.4	44.28
16.300	5.0	11.0	294.7	313.2	9.3	44.24
16.400	5.0	10.0	286.6	304.7	9.1	44.20
16.500	5.0	10.0	278.8	296.6	8.9	44.15
16.600	5.0	10.0	271.4	288.8	8.7	44.11
16.700	5.0	10.0	264.3	281.4	8.5	44.07
16.800	5.0	10.0	257.6	274.3	8.4	44.04
16.900	5.0	10.0	251.2	267.6	8.2	44.00
17.000	5.0	10.0	245.0	261.2	8.1	43.96
17.100	5.0	10.0	239.0	255.0	8.0	43.91
17.200	5.0	10.0	233.2	249.0	7.9	43.87
17.300	5.0	10.0	227.6	243.2	7.8	43.83
17.400	5.0	10.0	222.1	237.6	7.7	43.79
17.500	5.0	10.0	216.9	232.1	7.6	43.75
17.600	5.0	10.0	211.8	226.9	7.5	43.71
17.700	5.0	10.0	206.9	221.8	7.5	43.68
17.800	4.0	9.0	201.2	215.9	7.4	43.63
17.900	4.0	8.0	194.7	209.2	7.2	43.59
18.000	4.0	8.0	188.4	202.7	7.1	43.54
18.100	4.0	8.0	182.3	196.4	7.0	43.50
18.200	4.0	8.0	176.4	190.3	6.9	43.45
18.300	4.0	8.0	170.7	184.4	6.8	43.41
18.400	4.0	8.0	165.2	178.7	6.8	43.37
18.500	4.0	8.0	159.9	173.2	6.7	43.33
18.600	3.0	7.0	153.8	166.9	6.6	43.29
18.700	3.0	6.0	146.9	159.8	6.4	43.23
18.800	3.0	6.0	140.3	152.9	6.3	43.19
18.900	3.0	6.0	133.8	146.3	6.2	43.14
19.000	3.0	6.0	127.6	139.8	6.1	43.09
19.100	3.0	6.0	121.6	133.6	6.0	43.05
19.200	3.0	6.0	115.8	127.6	5.9	43.00
19.300	3.0	6.0	110.5	121.8	5.6	42.94
19.400	3.0	6.0	105.8	116.5	5.4	42.88
19.500	3.0	6.0	101.6	111.8	5.1	42.83
19.600	3.0	6.0	97.8	107.6	4.9	42.78
19.700	3.0	6.0	94.4	103.8	4.7	42.73
19.800	3.0	6.0	91.3	100.4	4.5	42.69
19.900	3.0	6.0	88.6	97.3	4.4	42.66
20.000	3.0	6.0	86.1	94.6	4.2	42.63

Pond File: C:MCPOND .PND EXECUTED: 11-10-1989
Inflow Hydrograph: C:MCPONDC .HYD 09:32:38
Outflow Hydrograph: C:NULL .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
20.100	3.0	6.0	83.9	92.1	4.1	42.60
20.200	3.0	6.0	82.0	89.9	4.0	42.57
20.300	3.0	6.0	80.2	88.0	3.9	42.55
20.400	3.0	6.0	78.6	86.2	3.8	42.53
20.500	3.0	6.0	77.2	84.6	3.7	42.51
20.600	3.0	6.0	75.9	83.2	3.6	42.50
20.700	3.0	6.0	74.8	81.9	3.6	42.48
20.800	3.0	6.0	73.8	80.8	3.5	42.47
20.900	3.0	6.0	72.9	79.8	3.5	42.46
21.000	3.0	6.0	72.1	78.9	3.4	42.45
21.100	3.0	6.0	71.3	78.1	3.4	42.44
21.200	3.0	6.0	70.7	77.3	3.3	42.43
21.300	3.0	6.0	70.1	76.7	3.3	42.42
21.400	3.0	6.0	69.5	76.1	3.3	42.41
21.500	3.0	6.0	69.1	75.5	3.2	42.41
21.600	3.0	6.0	68.6	75.1	3.2	42.40
21.700	3.0	6.0	68.3	74.6	3.2	42.40
21.800	3.0	6.0	67.9	74.3	3.2	42.39
21.900	3.0	6.0	67.6	73.9	3.2	42.39
22.000	3.0	6.0	67.3	73.6	3.1	42.39
22.100	3.0	6.0	67.1	73.3	3.1	42.38
22.200	3.0	6.0	66.9	73.1	3.1	42.38
22.300	3.0	6.0	66.7	72.9	3.1	42.38
22.400	3.0	6.0	66.5	72.7	3.1	42.38
22.500	3.0	6.0	66.3	72.5	3.1	42.37
22.600	3.0	6.0	66.2	72.3	3.1	42.37
22.700	2.0	5.0	65.2	71.2	3.0	42.36
22.800	2.0	4.0	63.4	69.2	2.9	42.33
22.900	2.0	4.0	61.7	67.4	2.8	42.31
23.000	2.0	4.0	60.3	65.7	2.7	42.30
23.100	2.0	4.0	59.0	64.3	2.7	42.28
23.200	2.0	4.0	57.8	63.0	2.6	42.26
23.300	2.0	4.0	56.8	61.8	2.5	42.25
23.400	2.0	4.0	55.8	60.8	2.5	42.24
23.500	2.0	4.0	55.0	59.8	2.4	42.23
23.600	2.0	4.0	54.2	59.0	2.4	42.22
23.700	2.0	4.0	53.5	58.2	2.3	42.21
23.800	2.0	4.0	52.9	57.5	2.3	42.20
23.900	2.0	4.0	52.4	56.9	2.3	42.19
24.000	2.0	4.0	51.9	56.4	2.2	42.19
24.100	1.0	3.0	50.6	54.9	2.2	42.17
24.200	1.0	2.0	48.5	52.6	2.0	42.14
24.300	1.0	2.0	46.6	50.5	1.9	42.12
24.400	1.0	2.0	44.9	48.6	1.8	42.10
24.500	1.0	2.0	43.4	46.9	1.8	42.08
24.600	1.0	2.0	42.1	45.4	1.7	42.06

Pond File: C:MCPOND .PND EXECUTED: 11-10-1989
Inflow Hydrograph: C:MCPONDC .HYD 09:32:38
Outflow Hydrograph: C:NULL .HYD

INFLOW HYDROGRAPH

TIME (hrs)	INFLOW (cfs)
24.700	1.0
24.800	1.0
24.900	1.0
25.000	1.0
25.100	1.0
25.200	1.0
25.300	1.0
25.400	0.0
25.500	0.0
25.600	0.0
25.700	0.0
25.800	0.0
25.900	0.0

ROUTING COMPUTATIONS

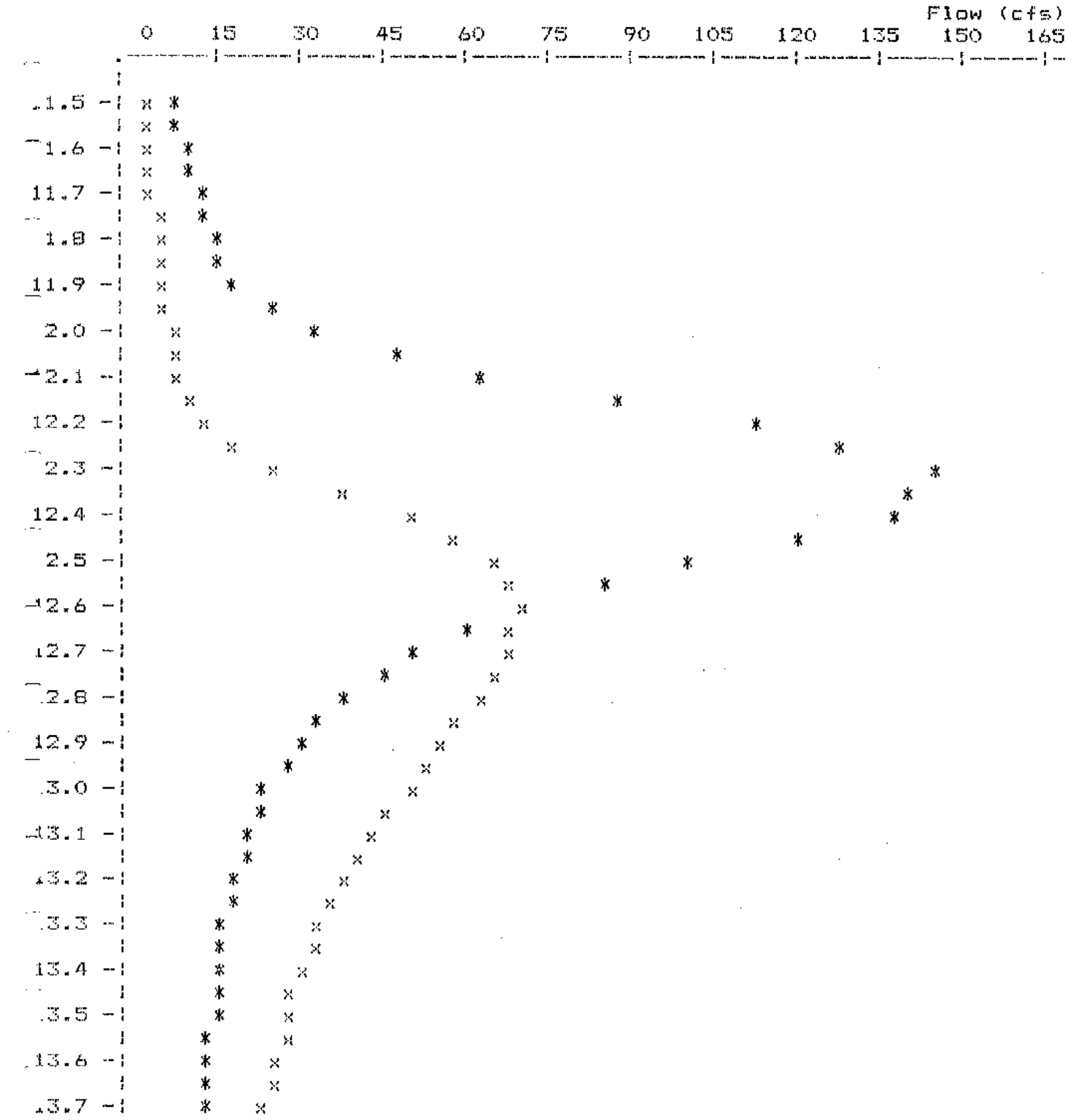
I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
2.0	40.9	44.1	1.6	42.05
2.0	39.8	42.9	1.5	42.03
2.0	38.8	41.8	1.5	42.02
2.0	37.9	40.8	1.4	42.01
2.0	37.1	39.9	1.4	41.99
2.0	36.4	39.1	1.4	41.97
2.0	35.8	38.4	1.3	41.95
1.0	34.2	36.8	1.3	41.90
0.0	31.9	34.2	1.2	41.83
0.0	29.7	31.9	1.1	41.77
0.0	27.8	29.7	1.0	41.71
0.0	26.0	27.8	0.9	41.65
0.0	24.3	26.0	0.8	41.60

Peak Inflow = 145.0 cfs
Peak Outflow = 69.8 cfs
Peak Elevation = 47.26 ft

Pond File: C:MCPOND .PND
Inflow Hydrograph: C:MCPONDC .HYD
Outflow Hydrograph: C:NULL .HYD

EXECUTED: 11-10-1989
09:32:38

Peak Inflow = 145.0 cfs
Peak Outflow = 69.8 cfs
Peak Elevation = 47.26 ft



Appendix B

Proposed Conditions

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*
* ROSEWOOD WASH AT McCARRAN BLVD - PROPOSED CONDITIONS - 5 YEAR *
* CODEGA & FRICKE, INC
* 1016.10 2 - 30" PIPES
* GMP NOVEMBER 1989
*
****

EXECUTED 11-10-1989 09:24:10
Disk Files: C:MCPOND .PND ; C:MCPONDSP.HYD

INITIAL CONDITIONS
Elevation = 41.00 ft
Outflow = 0.0 cfs

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)
41.00	0.0	0.02
42.00	1.4	0.16
43.00	5.9	0.50
44.00	8.2	1.07
45.00	12.6	1.84
46.00	30.5	2.75
47.00	60.7	3.75
48.00	95.5	4.81
49.00	123.7	5.92

COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
4.8	4.8
38.7	40.1
121.0	126.9
258.9	267.1
445.3	457.9
665.5	696.0
907.5	968.2
1164.0	1259.5
1432.6	1556.3

Time increment (t) = 0.100 hrs.

Pond File: C:MCPOND .PND EXECUTED: 11-10-1989
Inflow Hydrograph: C:MCPOND5P.HYD 09:24:10
Outflow Hydrograph: C:NULL .HYD

INFLOW HYDROGRAPH

ROUTING COMPUTATIONS

TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
11.000	1.0	-----	4.8	4.8	0.0	41.00
11.100	1.0	2.0	6.7	6.8	0.1	41.06
11.200	2.0	3.0	9.3	9.7	0.2	41.14
11.300	2.0	4.0	12.6	13.3	0.3	41.24
11.400	2.0	4.0	15.7	16.6	0.5	41.33
11.500	3.0	5.0	19.4	20.7	0.6	41.45
11.600	3.0	6.0	23.8	25.4	0.8	41.58
11.700	4.0	7.0	28.7	30.8	1.0	41.74
11.800	4.0	8.0	34.2	36.7	1.3	41.90
11.900	5.0	9.0	40.1	43.2	1.6	42.04
12.000	7.0	12.0	48.0	52.1	2.0	42.14
12.100	11.0	18.0	60.6	66.0	2.7	42.30
12.200	21.0	32.0	84.3	92.6	4.1	42.60
12.300	40.0	61.0	132.9	145.3	6.2	43.13
12.400	61.0	101.0	218.6	233.9	7.7	43.76
12.500	70.0	131.0	329.4	349.6	10.1	44.43
12.600	70.0	140.0	442.5	469.4	13.5	45.05
12.700	62.0	132.0	531.7	574.5	21.4	45.49
12.800	51.0	113.0	591.4	644.7	26.6	45.78
12.900	40.0	91.0	623.5	682.4	29.5	45.94
13.000	30.0	70.0	632.9	693.5	30.3	45.99
13.100	24.0	54.0	627.2	686.9	29.8	45.96
13.200	19.0	43.0	613.1	670.2	28.6	45.89
13.300	16.0	35.0	594.3	648.1	26.9	45.80
13.400	14.0	30.0	574.1	624.3	25.1	45.70
13.500	13.0	27.0	554.4	601.1	23.4	45.60
13.600	11.0	24.0	535.0	578.4	21.7	45.51
13.700	10.0	21.0	516.1	556.0	20.0	45.41
13.800	9.0	19.0	498.3	535.1	18.4	45.32
13.900	9.0	18.0	482.3	516.3	17.0	45.25
14.000	9.0	18.0	468.7	500.3	15.8	45.18
14.100	8.0	17.0	456.3	485.7	14.7	45.12
14.200	7.0	15.0	444.1	471.3	13.6	45.06
14.300	6.0	13.0	431.9	457.1	12.6	45.00
14.400	6.0	12.0	419.4	443.9	12.3	44.93
14.500	6.0	12.0	407.4	431.4	12.0	44.86
14.600	6.0	12.0	396.0	419.4	11.7	44.80
14.700	6.0	12.0	385.1	408.0	11.4	44.74
14.800	6.0	12.0	374.7	397.1	11.2	44.68
14.900	6.0	12.0	364.8	386.7	11.0	44.63
15.000	6.0	12.0	355.3	376.8	10.7	44.57
15.100	6.0	12.0	346.3	367.3	10.5	44.53
15.200	6.0	12.0	337.7	358.3	10.3	44.48
15.300	6.0	12.0	329.5	349.7	10.1	44.43
15.400	6.0	12.0	321.7	341.5	9.9	44.39

Pond File: C:MCPOND .PND EXECUTED: 11-10-1989
Inflow Hydrograph: C:MCPOND5P.HYD 09:24:10
Outflow Hydrograph: C:NULL .HYD

INFLOW HYDROGRAPH — ROUTING COMPUTATIONS

TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
15.500	6.0	12.0	314.2	333.7	9.7	44.35
15.600	6.0	12.0	307.1	326.2	9.6	44.31
15.700	6.0	12.0	300.3	319.1	9.4	44.27
15.800	5.0	11.0	292.8	311.3	9.2	44.23
15.900	5.0	10.0	284.8	302.8	9.0	44.19
16.000	5.0	10.0	277.1	294.8	8.8	44.14
16.100	5.0	10.0	269.8	287.1	8.7	44.10
16.200	4.0	9.0	261.8	278.8	8.5	44.06
16.300	4.0	8.0	253.3	269.8	8.3	44.01
16.400	3.0	7.0	244.1	260.3	8.1	43.95
16.500	3.0	6.0	234.3	250.1	7.9	43.88
16.600	3.0	6.0	224.8	240.3	7.8	43.81
16.700	3.0	6.0	215.6	230.8	7.6	43.74
16.800	3.0	6.0	206.7	221.6	7.5	43.68
16.900	3.0	6.0	198.1	212.7	7.3	43.61
17.000	3.0	6.0	189.7	204.1	7.2	43.55
17.100	3.0	6.0	181.7	195.7	7.0	43.49
17.200	3.0	6.0	173.9	187.7	6.9	43.43
17.300	3.0	6.0	166.3	179.9	6.8	43.38
17.400	3.0	6.0	159.0	172.3	6.6	43.32
17.500	3.0	6.0	152.0	165.0	6.5	43.27
17.600	3.0	6.0	145.2	158.0	6.4	43.22
17.700	3.0	6.0	138.6	151.2	6.3	43.17
17.800	3.0	6.0	132.2	144.6	6.2	43.13
17.900	3.0	6.0	126.0	138.2	6.1	43.08
18.000	3.0	6.0	120.1	132.0	6.0	43.04
18.100	3.0	6.0	114.3	126.1	5.9	42.99
18.200	3.0	6.0	109.2	120.3	5.6	42.92
18.300	3.0	6.0	104.6	115.2	5.3	42.87
18.400	3.0	6.0	100.5	110.6	5.1	42.81
18.500	3.0	6.0	96.8	106.5	4.8	42.77
18.600	3.0	6.0	93.5	102.8	4.7	42.72
18.700	3.0	6.0	90.6	99.5	4.5	42.68
18.800	3.0	6.0	87.9	96.6	4.3	42.65
18.900	3.0	6.0	85.5	93.9	4.2	42.62
19.000	3.0	6.0	83.4	91.5	4.1	42.59
19.100	3.0	6.0	81.5	89.4	4.0	42.57
19.200	3.0	6.0	79.8	87.5	3.9	42.55
19.300	3.0	6.0	78.2	85.8	3.8	42.53
19.400	3.0	6.0	76.9	84.2	3.7	42.51
19.500	2.0	5.0	74.7	81.9	3.6	42.48
19.600	2.0	4.0	71.9	78.7	3.4	42.45
19.700	2.0	4.0	69.4	75.9	3.3	42.41
19.800	2.0	4.0	67.2	73.4	3.1	42.38
19.900	2.0	4.0	65.1	71.2	3.0	42.36
20.000	2.0	4.0	63.3	69.1	2.9	42.33

Pond File: C:MCPOND .PND EXECUTED: 11-10-1989
Inflow Hydrograph: C:MCPOND5P.HYD 09:24:10
Outflow Hydrograph: C:NULL .HYD

INFLOW HYDROGRAPH — ROUTING COMPUTATIONS

TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
20.100	2.0	4.0	61.7	67.3	2.8	42.31
20.200	2.0	4.0	60.3	65.7	2.7	42.29
20.300	2.0	4.0	59.0	64.3	2.7	42.28
20.400	2.0	4.0	57.8	63.0	2.6	42.26
20.500	2.0	4.0	56.7	61.8	2.5	42.25
20.600	2.0	4.0	55.8	60.7	2.5	42.24
20.700	2.0	4.0	55.0	59.8	2.4	42.23
20.800	2.0	4.0	54.2	59.0	2.4	42.22
20.900	2.0	4.0	53.5	58.2	2.3	42.21
21.000	2.0	4.0	52.9	57.5	2.3	42.20
21.100	2.0	4.0	52.4	56.9	2.3	42.19
21.200	2.0	4.0	51.9	56.4	2.2	42.19
21.300	2.0	4.0	51.5	55.9	2.2	42.18
21.400	2.0	4.0	51.1	55.5	2.2	42.18
21.500	2.0	4.0	50.7	55.1	2.2	42.17
21.600	2.0	4.0	50.4	54.7	2.2	42.17
21.700	2.0	4.0	50.1	54.4	2.1	42.16
21.800	2.0	4.0	49.9	54.1	2.1	42.16
21.900	2.0	4.0	49.6	53.9	2.1	42.16
22.000	2.0	4.0	49.4	53.6	2.1	42.16
22.100	2.0	4.0	49.3	53.4	2.1	42.15
22.200	2.0	4.0	49.1	53.3	2.1	42.15
22.300	2.0	4.0	49.0	53.1	2.1	42.15
22.400	2.0	4.0	48.8	53.0	2.1	42.15
22.500	2.0	4.0	48.7	52.8	2.1	42.15
22.600	2.0	4.0	48.6	52.7	2.1	42.15
22.700	2.0	4.0	48.5	52.6	2.0	42.14
22.800	2.0	4.0	48.4	52.5	2.0	42.14
22.900	2.0	4.0	48.3	52.4	2.0	42.14
23.000	2.0	4.0	48.3	52.3	2.0	42.14
23.100	1.0	3.0	47.3	51.3	2.0	42.13
23.200	1.0	2.0	45.6	49.3	1.9	42.11
23.300	1.0	2.0	44.0	47.6	1.8	42.09
23.400	1.0	2.0	42.6	46.0	1.7	42.07
23.500	1.0	2.0	41.3	44.6	1.6	42.05
23.600	1.0	2.0	40.2	43.3	1.6	42.04
23.700	1.0	2.0	39.2	42.2	1.5	42.02
23.800	1.0	2.0	38.3	41.2	1.5	42.01
23.900	1.0	2.0	37.5	40.3	1.4	42.00
24.000	1.0	2.0	36.7	39.5	1.4	41.98
24.100	1.0	2.0	36.0	38.7	1.3	41.96
24.200	1.0	2.0	35.4	38.0	1.3	41.94
24.300	1.0	2.0	34.8	37.4	1.3	41.92
24.400	1.0	2.0	34.3	36.8	1.3	41.91
24.500	1.0	2.0	33.8	36.3	1.2	41.89
24.600	1.0	2.0	33.3	35.8	1.2	41.88

Pond File: C:MCPOND .PND EXECUTED: 11-10-1989
Inflow Hydrograph: C:MCPOND5P.HYD 09:24:10
Outflow Hydrograph: C:NULL .HYD

INFLOW HYDROGRAPH

ROUTING COMPUTATIONS

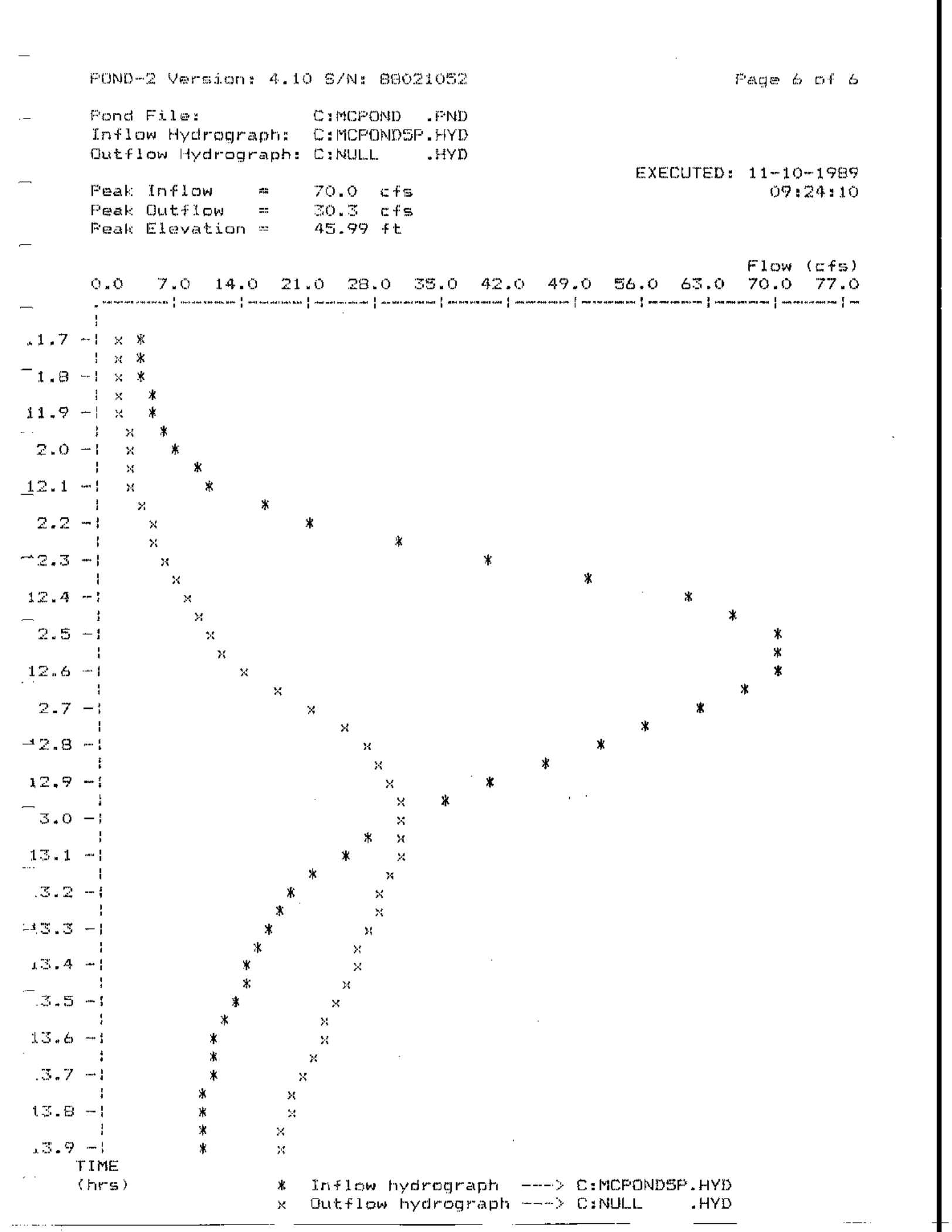
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
24.700	1.0	2.0	32.9	35.3	1.2	41.86
24.800	1.0	2.0	32.5	34.9	1.2	41.85
24.900	1.0	2.0	32.2	34.5	1.2	41.84
25.000	0.0	1.0	30.9	33.2	1.1	41.80
25.100	0.0	0.0	28.8	30.9	1.0	41.74
25.200	0.0	0.0	26.9	28.8	1.0	41.68
25.300	0.0	0.0	25.2	26.9	0.9	41.63
25.400	0.0	0.0	23.6	25.2	0.8	41.58
25.500	0.0	0.0	22.1	23.6	0.7	41.53
25.600	0.0	0.0	20.7	22.1	0.7	41.49
25.700	0.0	0.0	19.5	20.7	0.6	41.45
25.800	0.0	0.0	18.3	19.5	0.6	41.41
25.900	0.0	0.0	17.2	18.3	0.5	41.38

Peak Inflow = 70.0 cfs
Peak Outflow = 30.3 cfs
Peak Elevation = 45.99 ft

Pond File: C:MCPOND .PND
Inflow Hydrograph: C:MCPONDSP.HYD
Outflow Hydrograph: C:NULL .HYD

EXECUTED: 11-10-1989
09:24:10

Peak Inflow = 70.0 cfs
Peak Outflow = 30.3 cfs
Peak Elevation = 45.99 ft



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*
* ROSEWOOD WASH AT McCARRAN BLVD - PROPOSED CONDITIONS - 100 YEAR *
* CODEGA & FRICKE, INC *
* 1016.10 2 - 30" PIPES *
* GMP NOVEMBER 1989 *
*
****

EXECUTED 11-10-1989 09:27:21
Disk Files: C:MCPOND .PND ; C:MCPONDCP.HYD

INITIAL CONDITIONS
Elevation = 41.00 ft
Outflow = 0.0 cfs

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)
41.00	0.0	0.02
42.00	1.4	0.16
43.00	5.9	0.50
44.00	8.2	1.07
45.00	12.6	1.84
46.00	30.5	2.75
47.00	60.7	3.75
48.00	95.5	4.81
49.00	123.7	5.92

COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
4.8	4.8
38.7	40.1
121.0	126.9
258.9	267.1
445.3	457.9
665.5	696.0
907.5	968.2
1164.0	1259.5
1432.6	1556.3

Time increment (t) = 0.100 hrs.

Pond File: C:MCPOND .PND EXECUTED: 11-10-1989
Inflow Hydrograph: C:MCPONDCP.HYD 09:27:21
Outflow Hydrograph: C:NULL .HYD

INFLOW HYDROGRAPH — ROUTING COMPUTATIONS

TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
11.000	4.0	------	4.8	4.8	0.0	41.00
11.100	5.0	9.0	13.1	13.8	0.4	41.26
11.200	7.0	12.0	23.5	25.1	0.8	41.57
11.300	8.0	15.0	35.8	38.5	1.3	41.95
11.400	9.0	17.0	48.7	52.8	2.1	42.15
11.500	9.0	18.0	61.2	66.7	2.8	42.31
11.600	10.0	19.0	73.2	80.2	3.5	42.46
11.700	12.0	22.0	86.7	95.2	4.3	42.63
11.800	14.0	26.0	102.4	112.7	5.2	42.84
11.900	16.0	30.0	120.4	132.4	6.0	43.04
12.000	20.0	36.0	143.6	156.4	6.4	43.21
12.100	32.0	52.0	181.6	195.6	7.0	43.49
12.200	57.0	89.0	254.0	270.6	8.3	44.02
12.300	102.0	159.0	389.9	413.0	11.6	44.76
12.400	157.0	259.0	595.0	648.9	27.0	45.80
12.500	188.0	345.0	824.8	940.0	57.6	46.90
12.600	185.0	373.0	1021.6	1197.8	88.1	47.79
12.700	162.0	347.0	1156.8	1368.6	105.9	48.37
12.800	132.0	294.0	1223.5	1450.8	113.7	48.64
12.900	106.0	238.0	1232.1	1461.5	114.7	48.68
13.000	79.0	185.0	1196.2	1417.1	110.5	48.53
13.100	63.0	142.0	1132.2	1338.2	103.0	48.26
13.200	47.0	110.0	1055.4	1242.2	93.4	47.94
13.300	39.0	86.0	978.6	1141.4	81.4	47.59
13.400	32.0	71.0	908.7	1049.6	70.4	47.28
13.500	29.0	61.0	848.0	969.7	60.9	47.01
13.600	26.0	55.0	796.0	903.0	53.5	46.76
13.700	24.0	50.0	751.8	846.0	47.1	46.55
13.800	22.0	46.0	714.2	797.8	41.8	46.37
13.900	20.0	42.0	681.8	756.2	37.2	46.22
14.000	19.0	39.0	654.3	720.8	33.3	46.09
14.100	18.0	37.0	631.0	691.3	30.1	45.98
14.200	18.0	36.0	610.4	667.0	28.3	45.88
14.300	17.0	35.0	592.0	645.4	26.7	45.79
14.400	16.0	33.0	574.7	625.0	25.2	45.70
14.500	15.0	31.0	558.2	605.7	23.7	45.62
14.600	14.0	29.0	542.6	587.2	22.3	45.54
14.700	14.0	28.0	528.4	570.6	21.1	45.47
14.800	14.0	28.0	516.4	556.4	20.0	45.41
14.900	13.0	27.0	505.4	543.4	19.0	45.36
15.000	13.0	26.0	495.1	531.4	18.1	45.31
15.100	13.0	26.0	486.4	521.1	17.4	45.27
15.200	12.0	25.0	478.2	511.4	16.6	45.22
15.300	12.0	24.0	470.3	502.2	15.9	45.19
15.400	11.0	23.0	462.8	493.3	15.3	45.15

Pond File: C:MCPOND .PND EXECUTED: 11-10-1989
Inflow Hydrograph: C:MCPONDCP.HYD 09:27:21
Outflow Hydrograph: C:NULL .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
15.500	11.0	22.0	455.5	484.8	14.6	45.11
15.600	11.0	22.0	449.4	477.5	14.1	45.08
15.700	11.0	22.0	444.2	471.4	13.6	45.06
15.800	10.0	21.0	438.9	465.2	13.1	45.03
15.900	10.0	20.0	433.5	458.9	12.7	45.00
16.000	10.0	20.0	428.5	453.5	12.5	44.98
16.100	10.0	20.0	423.7	448.5	12.4	44.95
16.200	10.0	20.0	419.2	443.7	12.3	44.93
16.300	9.0	19.0	413.9	438.2	12.1	44.90
16.400	9.0	18.0	407.9	431.9	12.0	44.86
16.500	9.0	18.0	402.2	425.9	11.9	44.83
16.600	9.0	18.0	396.7	420.2	11.7	44.80
16.700	9.0	18.0	391.5	414.7	11.6	44.77
16.800	8.0	17.0	385.6	408.5	11.5	44.74
16.900	8.0	16.0	379.0	401.6	11.3	44.70
17.000	8.0	16.0	372.7	395.0	11.1	44.67
17.100	8.0	16.0	366.7	388.7	11.0	44.64
17.200	8.0	16.0	360.9	382.7	10.9	44.61
17.300	8.0	16.0	355.5	376.9	10.7	44.58
17.400	8.0	16.0	350.3	371.5	10.6	44.55
17.500	8.0	16.0	345.3	366.3	10.5	44.52
17.600	8.0	16.0	340.6	361.3	10.4	44.49
17.700	8.0	16.0	336.0	356.6	10.3	44.47
17.800	8.0	16.0	331.7	352.0	10.2	44.45
17.900	8.0	16.0	327.6	347.7	10.1	44.42
18.000	8.0	16.0	323.7	343.6	10.0	44.40
18.100	8.0	16.0	319.9	339.7	9.9	44.38
18.200	8.0	16.0	316.3	335.9	9.8	44.36
18.300	7.0	15.0	312.0	331.3	9.7	44.34
18.400	7.0	14.0	306.9	326.0	9.6	44.31
18.500	7.0	14.0	302.0	320.9	9.4	44.28
18.600	7.0	14.0	297.3	316.0	9.3	44.26
18.700	7.0	14.0	292.9	311.3	9.2	44.23
18.800	6.0	13.0	287.7	305.9	9.1	44.20
18.900	6.0	12.0	281.8	299.7	9.0	44.17
19.000	6.0	12.0	276.2	293.8	8.8	44.14
19.100	6.0	12.0	270.8	288.2	8.7	44.11
19.200	6.0	12.0	265.7	282.8	8.6	44.08
19.300	6.0	12.0	260.8	277.7	8.4	44.06
19.400	6.0	12.0	256.1	272.8	8.3	44.03
19.500	6.0	12.0	251.7	268.1	8.2	44.01
19.600	6.0	12.0	247.4	263.7	8.1	43.98
19.700	6.0	12.0	243.3	259.4	8.1	43.94
19.800	6.0	12.0	239.2	255.3	8.0	43.92
19.900	6.0	12.0	235.4	251.2	7.9	43.89
20.000	6.0	12.0	231.6	247.4	7.9	43.86

Pond File: C:MCPOND .PND EXECUTED: 11-10-1989
Inflow Hydrograph: C:MCPONDCP.HYD 09:27:21
Outflow Hydrograph: C:NULL .HYD

INFLOW HYDROGRAPH

ROUTING COMPUTATIONS

TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
20.100	6.0	12.0	228.0	243.6	7.8	43.83
20.200	6.0	12.0	224.5	240.0	7.8	43.81
20.300	6.0	12.0	221.1	236.5	7.7	43.78
20.400	6.0	12.0	217.8	233.1	7.6	43.76
20.500	6.0	12.0	214.6	229.8	7.6	43.73
20.600	5.0	11.0	210.6	225.6	7.5	43.70
20.700	5.0	10.0	205.7	220.6	7.4	43.67
20.800	5.0	10.0	201.0	215.7	7.4	43.63
20.900	5.0	10.0	196.4	211.0	7.3	43.60
21.000	5.0	10.0	192.0	206.4	7.2	43.57
21.100	5.0	10.0	187.8	202.0	7.1	43.54
21.200	5.0	10.0	183.6	197.8	7.1	43.51
21.300	5.0	10.0	179.7	193.6	7.0	43.48
21.400	5.0	10.0	175.8	189.7	6.9	43.45
21.500	4.0	9.0	171.1	184.8	6.8	43.41
21.600	4.0	8.0	165.6	179.1	6.8	43.37
21.700	4.0	8.0	160.3	173.6	6.7	43.33
21.800	4.0	8.0	155.1	168.3	6.6	43.29
21.900	4.0	8.0	150.1	163.1	6.5	43.26
22.000	4.0	8.0	145.3	158.1	6.4	43.22
22.100	4.0	8.0	140.6	153.3	6.3	43.19
22.200	4.0	8.0	136.1	148.6	6.3	43.15
22.300	4.0	8.0	131.7	144.1	6.2	43.12
22.400	4.0	8.0	127.5	139.7	6.1	43.09
22.500	4.0	8.0	123.4	135.5	6.0	43.06
22.600	3.0	7.0	118.5	130.4	6.0	43.03
22.700	3.0	6.0	113.0	124.5	5.8	42.97
22.800	3.0	6.0	108.0	119.0	5.5	42.91
22.900	3.0	6.0	103.5	114.0	5.2	42.85
23.000	3.0	6.0	99.5	109.5	5.0	42.80
23.100	3.0	6.0	95.9	105.5	4.8	42.75
23.200	3.0	6.0	92.7	101.9	4.6	42.71
23.300	3.0	6.0	89.9	98.7	4.4	42.68
23.400	3.0	6.0	87.3	95.9	4.3	42.64
23.500	2.0	5.0	84.1	92.3	4.1	42.60
23.600	2.0	4.0	80.3	88.1	3.9	42.55
23.700	2.0	4.0	76.9	84.3	3.7	42.51
23.800	2.0	4.0	73.9	80.9	3.5	42.47
23.900	2.0	4.0	71.2	77.9	3.4	42.44
24.000	2.0	4.0	68.7	75.2	3.2	42.40
24.100	2.0	4.0	66.5	72.7	3.1	42.38
24.200	2.0	4.0	64.6	70.5	3.0	42.35
24.300	2.0	4.0	62.8	68.6	2.9	42.33
24.400	2.0	4.0	61.3	66.8	2.8	42.31
24.500	2.0	4.0	59.9	65.3	2.7	42.29
24.600	1.0	3.0	57.7	62.9	2.6	42.26

Pond File: C:MCPOND .PND EXECUTED: 11-10-1989
Inflow Hydrograph: C:MCPONDCF.HYD 09:27:21
Outflow Hydrograph: C:NULL .HYD

INFLOW HYDROGRAPH

ROUTING COMPUTATIONS

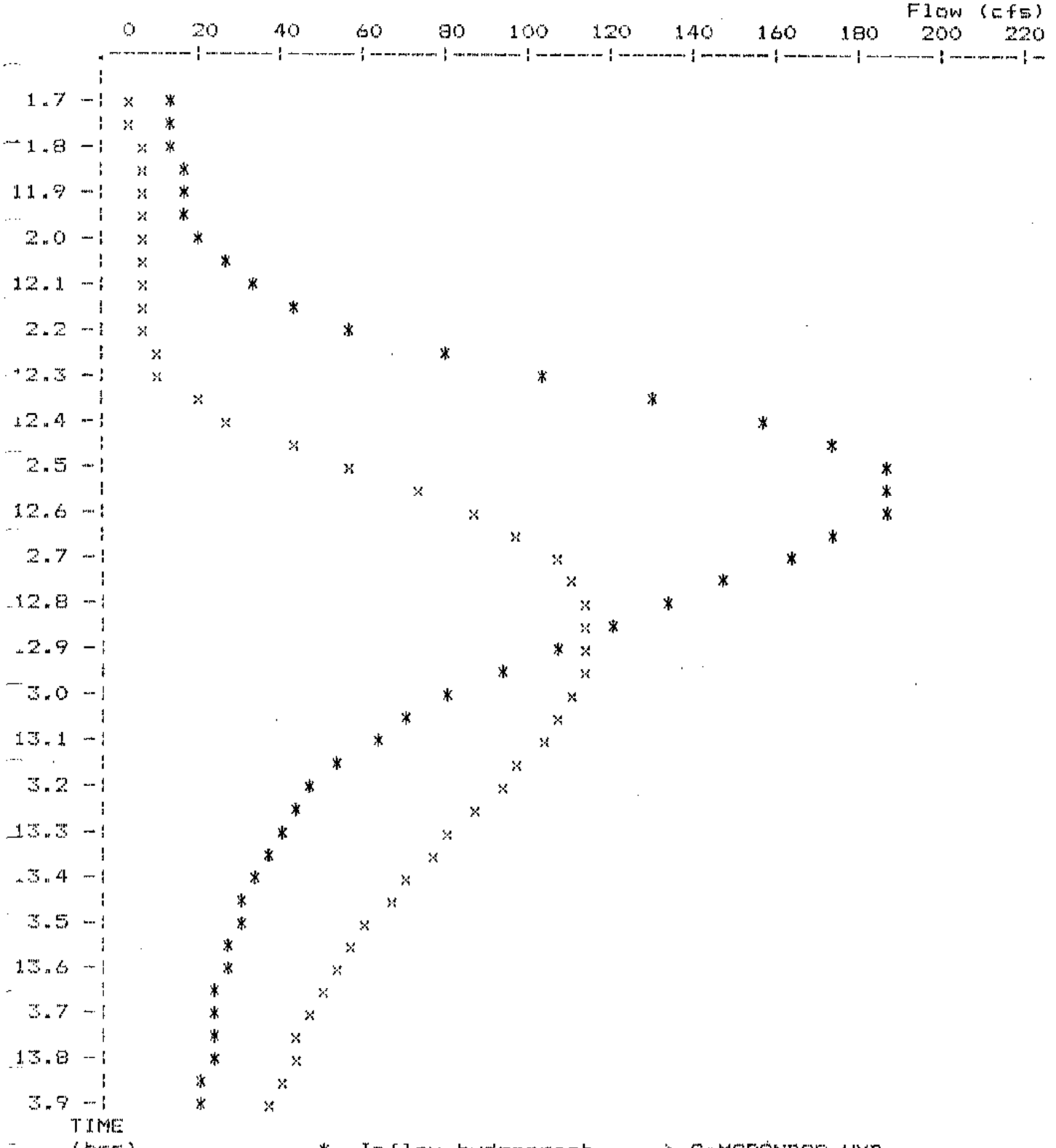
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
24.700	1.0	2.0	54.9	59.7	2.4	42.23
24.800	1.0	2.0	52.3	56.9	2.3	42.19
24.900	1.0	2.0	50.1	54.3	2.1	42.16
25.000	1.0	2.0	48.0	52.1	2.0	42.14
25.100	1.0	2.0	46.2	50.0	1.9	42.11
25.200	1.0	2.0	44.6	48.2	1.8	42.09
25.300	1.0	2.0	43.1	46.6	1.7	42.07
25.400	1.0	2.0	41.8	45.1	1.7	42.06
25.500	0.0	1.0	39.7	42.8	1.5	42.03
25.600	0.0	0.0	36.9	39.7	1.4	41.99
25.700	0.0	0.0	34.4	36.9	1.3	41.91
25.800	0.0	0.0	32.0	34.4	1.2	41.84
25.900	0.0	0.0	29.9	32.0	1.1	41.77

Peak Inflow = 188.0 cfs
Peak Outflow = 114.7 cfs
Peak Elevation = 48.68 ft

Pond File: C:MCPOND .PND
Inflow Hydrograph: C:MCPONDCP.HYD
Outflow Hydrograph: C:NULL .HYD

EXECUTED: 11-10-1989
09:27:21

Peak Inflow = 188.0 cfs
Peak Outflow = 114.7 cfs
Peak Elevation = 48.68 ft



Appendix C

Design of Drop Spillway

DESIGN OF DROP SPILLWAY

$\Delta z = 6.0'$ $Y_c = 4.0$ - top of pipe

$$\frac{Y_1}{\Delta z} = 0.54\left(\frac{Y_c}{\Delta z}\right)^{1.275} \qquad \frac{Y_1}{6} = .54\left(\frac{4}{6}\right)^{1.275} \qquad Y_1 = 1.93$$

SAME

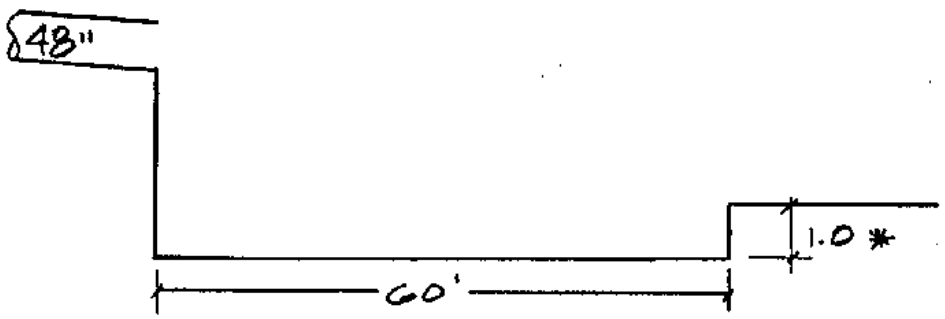
$$\frac{Y_1}{Y_c} = .54\left(\frac{Y_c}{\Delta z}\right)^{.275} \qquad \frac{Y_1}{4} = .54\left(\frac{4}{6}\right)^{.275} \qquad Y_1 = 1.93$$

$$\frac{Y_2}{\Delta z} = 1.66\left(\frac{Y_c}{\Delta z}\right)^{.81} \qquad \frac{Y_2}{6} = 1.66\left(\frac{4}{6}\right)^{.81} \qquad Y_2 = 7.17$$

$$\frac{L_d}{\Delta z} = 4.30\left(\frac{Y_c}{\Delta z}\right)^{0.09} \qquad \frac{L_d}{6} = 4.30\left(\frac{4}{6}\right)^{0.09} \qquad L_d = 24.88$$

$$L_j = 6.9\,(Y_2 - Y_1) \qquad L_j = 6.9\,(7.17 - 1.93) = \qquad L_j = 36.16$$

$$\frac{Y_2}{6} = \frac{7.17}{6} = 1.20'$$



Y_2 is considered to be the depth exiting the structure. The structure is 20' wide or roughly 5 times wider than the entrance channel (48" pipe). Thus $Y_2 = 7.17/5 \approx 1.4'$. (*: Make $Y_2 = 1.0'$)

Richard H. French

OPEN-CHANNEL HYDRAULICS

McGraw-Hill Book Company
New York St. Louis San Francisco Auckland Bogotá
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New Delhi Panama Paris São Paulo Singapore Sydney
Tokyo Toronto

length of the stilling basin is assumed to be equal to the length of a hydraulic jump in a horizontal stilling basin with no appurtenances. Figure 3.8 can be used to estimate this length. It should be noted that USBR Basin IV is applicable only to channels of rectangular cross section.

9.4 DROP SPILLWAYS

The drop spillway is commonly used in small drainage structures to dissipate energy. An aerated, free-falling nappe in a straight-drop spillway will reverse its curvature and result in a supercritical flow on the apron which will, in turn, result in a hydraulic jump (Fig. 9.34). If it is assumed that the depth of flow at the free overfall is critical, then Rand (1955) has demonstrated by analyzing experimental data that

$$\frac{y_1}{\Delta z} = 0.54\left(\frac{y_c}{\Delta z}\right)^{1.275} \tag{9.4.1}$$

$$\frac{y_1}{y_c} = 0.54\left(\frac{y_c}{\Delta z}\right)^{0.275} \tag{9.4.2}$$

$$\frac{y_2}{\Delta z} = 1.66\left(\frac{y_c}{\Delta z}\right)^{0.81} \tag{9.4.3}$$

$$\frac{L_d}{\Delta z} = 4.30\left(\frac{y_c}{\Delta z}\right)^{0.09} \tag{9.4.4}$$

$$L_j = 6.9\,(y_2 - y_1) \tag{9.4.5}$$

where y_c = critical depth and all other variables are defined in Fig. 9.34. The sill or upward step of $y_2/6$ at the end of the structure serves to locate the jump in the immediate vicinity of the drop structure. Equations (9.4.1) to (9.4.5) and Fig. 9.34 are completely satisfactory for proportioning a simple drop structure. Rand (1955) noted that the equations given above fitted the data with errors of 5 percent or less.

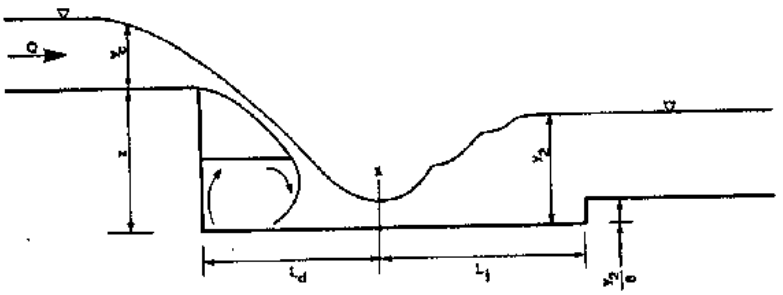

FIGURE 9.34 Schematic of the drop structure.

Appendix D

Outlet Structure

Outlet Structure File: MCPOND .STR

POND-2 Version: 4.10 S/N: 88021052
Date Executed: 11-10-1989 Time Executed: 09:35:09

****
MCCARRAN BLVD DETENTION POND - ROSEWOOD WASH
CODEGA & FRICKE, INC
1016.10
GMP
****

***** COMPOSITE OUTFLOW SUMMARY ****

Elevation (ft)	Q (cfs)	Contributing Structures
41.00	0.0	1
42.00	1.4	1
43.00	5.9	1
44.00	8.2	1
45.00	12.6	1 +2 +3
46.00	30.5	1 +2 +3
47.00	60.7	1 +2 +3
48.00	95.5	1 +2 +3
49.00	123.7	1 +2 +3
50.00	0.0	

Outlet Structure File: MCPOND .STR

POND-2 Version: 4.10 S/N: 88021052
Date Executed: 11-10-1989 Time Executed: 09:35:09

****
MCCARRAN BLVD DETENTION POND - ROSEWOOD WASH
CODEGA & FRICKE, INC
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GMP
****

Outlet Structure File: C:MCPOND .STR
Planimeter Input File: C:MCPOND .VOL
Rating Table Output File: C:MCPOND .PND

Min. Elev.(ft) = 41 Max. Elev.(ft) = 50 Incr.(ft) = 1

Additional elevations (ft) to be included in table:
* *

****
SYSTEM CONNECTIVITY
****

Structure	No.	Q Table		Q Table
CULVERT-CR	1		->	1
CULVERT-CR	2		->	2
CULVERT-CR	3		->	3

Outflow rating table summary was stored in file C:MCPOND .PND

Outlet Structure File: MCPOND .STR

POND-2 Version: 4.10 S/N: 88021052
Date Executed: 11-10-1989 Time Executed: 09:35:09

****
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****

>>>>>> Structure No. 1 <<<<<<
(Input Data)

CULVERT-CR
Circular Culvert (With Inlet Control)

E1 elev.(ft)?	41.00
E2 elev.(ft)?	50.00
Diam. (ft)?	1.00
Inv. el.(ft)?	41.00
Slope (ft/ft)?	.020
T1 ratio?	.9
T2 ratio?	1.5
K Coeff.?	.534
M Coeff.?	.555
c Coeff.?	.0196
Y Coeff.?	.89
Form 1 or 2?	2
Slope factor?	-.5

Outlet Structure File: MCPOND .STR

POND-2 Version: 4.10 S/N: 88021052
Date Executed: 11-10-1989 Time Executed: 09:35:09

****
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****

>>>>>> Structure No. 2 <<<<<<
(Input Data)

CULVERT-CR
Circular Culvert (With Inlet Control)

E1 elev.(ft)?	44.50
E2 elev.(ft)?	50.00
Diam. (ft)?	2.50
Inv. el.(ft)?	44.50
Slope (ft/ft)?	.100
T1 ratio?	.9
T2 ratio?	1.5
K Coeff.?	.534
M Coeff.?	.555
c Coeff.?	.0196
Y Coeff.?	.89
Form 1 or 2?	2
Slope factor?	-.5

Outlet Structure File: MCPOND .STR

POND-2 Version: 4.10 S/N: 88021052
Date Executed: 11-10-1989 Time Executed: 09:35:09

****
MCCARRAN BLVD DETENTION POND - ROSEWOOD WASH
CODEGA & FRICKE, INC
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****

>>>>>> Structure No. 3 <<<<<<
(Input Data)

CULVERT-CR
Circular Culvert (With Inlet Control)

E1 elev.(ft)?	44.50
E2 elev.(ft)?	50.00
Diam. (ft)?	2.50
Inv. el.(ft)?	44.50
Slope (ft/ft)?	.100
T1 ratio?	.9
T2 ratio?	1.5
K Coeff.?	.534
M Coeff.?	.555
c Coeff.?	.0196
Y Coeff.?	.89
Form 1 or 2?	2
Slope factor?	-.5

Outlet Structure File: MCPOND .STR

POND-2 Version: 4.10 S/N: 88021052
Date Executed: 11-10-1989 Time Executed: 09:35:09

****
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GMP
****

Outflow Rating Table for Structure #1
CULVERT-CR Circular Culvert (With Inlet Control)

***** INLET CONTROL ASSUMED *****

Elevation (ft)	Q (cfs)	Computation Messages
41.00	0.0	Unsubmerged (2): HW = 0.0
42.00	1.4	Transition flow: HW = 1.0
43.00	5.9	Submerged Flow: HW = 2.0
44.00	8.2	Submerged Flow: HW = 3.0
45.00	9.9	Submerged Flow: HW = 4.0
46.00	11.4	Submerged Flow: HW = 5.0
47.00	12.7	Submerged Flow: HW = 6.0
48.00	13.9	Submerged Flow: HW = 7.0
49.00	15.0	Submerged Flow: HW = 8.0
50.00	0.0	E = or > E2=50.00

Used Unsubmerged Equ. Form (2) for elev. less than 41.9 ft
Used Submerged Equation for elevations greater than 42.5 ft

Transition flows interpolated from the following values:
E1= 41.9 ft; Q1= .763 cfs; E2= 42.5 ft; Q2= 4.387 cfs

Outlet Structure File: MCPOND .STR

POND-2 Version: 4.10 S/N: 88021052
Date Executed: 11-10-1989 Time Executed: 09:35:09

****
MCCARRAN BLVD DETENTION POND - ROSEWOOD WASH
CODEGA & FRICKE, INC
1016.10
GMP
****

Outflow Rating Table for Structure #2
CULVERT-CR Circular Culvert (With Inlet Control)

***** INLET CONTROL ASSUMED *****

Elevation (ft)	Q (cfs)	Computation Messages
41.00	0.0	E < Inv.El.= 44.5
42.00	0.0	E < Inv.El.= 44.5
43.00	0.0	E < Inv.El.= 44.5
44.00	0.0	E < Inv.El.= 44.5
45.00	1.3	Unsubmerged (2): HW = .5
46.00	9.5	Unsubmerged (2): HW = 1.5
47.00	24.0	Transition flow: HW = 2.5
48.00	40.8	Transition flow: HW = 3.5
49.00	54.4	Submerged Flow: HW = 4.5
50.00	0.0	E = or > E2=50.00

Used Unsubmerged Equ. Form (2) for elev. less than 46.75 ft
Used Submerged Equation for elevations greater than 48.25 ft

Transition flows interpolated from the following values:
E1= 46.75 ft; Q1= 19.836 cfs; E2= 48.25 ft; Q2= 45.013 cfs

Outlet Structure File: MCPOND .STR

POND-2 Version: 4.10 S/N: 880210S2
Date Executed: 11-10-1989 Time Executed: 09:35:09

****
MCCARRAN BLVD DETENTION POND - ROSEWOOD WASH
CODEGA & FRICKE, INC
1016.10
BMP
****

Outflow Rating Table for Structure #3
CULVERT-CR Circular Culvert (With Inlet Control)

***** INLET CONTROL ASSUMED *****

Elevation (ft)	Q (cfs)	Computation Messages
41.00	0.0	E < Inv.El.= 44.5
42.00	0.0	E < Inv.El.= 44.5
43.00	0.0	E < Inv.El.= 44.5
44.00	0.0	E < Inv.El.= 44.5
45.00	1.3	Unsubmerged (2): HW = .5
46.00	9.5	Unsubmerged (2): HW = 1.5
47.00	24.0	Transition flow: HW = 2.5
48.00	40.8	Transition flow: HW = 3.5
49.00	54.4	Submerged Flow: HW = 4.5
50.00	0.0	E = or > E2=50.00

Used Unsubmerged Equ. Form (2) for elev. less than 46.75 ft
Used Submerged Equation for elevations greater than 48.25 ft

Transition flows interpolated from the following values:
E1= 46.75 ft; Q1= 19.836 cfs; E2= 48.25 ft; Q2= 45.013 cfs

Appendix E

Pond Data

PRINTER OFF
** PRINTER HAS BEEN TURNED OFF
POND-2 Version: 4.10
S/N: 88021052

MCCARRAN BLVD DETENTION BASIN - ROSEWOOD WASH
CODEGA & FRICKE, INC
1016.10
GMP/ECT

CALCULATED 11-10-1989 15:35:12
DISK FILE : C:MCPOND .VOL

Planimeter scale: 1 inch = 40 ft.

Elevation (ft)	Planimeter (sq.in.)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	* Volume (acre-ft)	Volume Sum (acre-ft)
40.00	0.00	0.00	0.00	0.00	0.00
42.00	6.68	0.25	0.25	0.16	0.16
44.00	19.16	0.70	1.36	0.91	1.07
46.00	26.64	0.98	2.51	1.67	2.75
50.00	32.55	1.20	3.26	4.34	7.09

$$IA = (sq.rt(Area1) + ((Ei-E1)/(E2-E1))*(sq.rt(Area2)-sq.rt(Area1)))^2$$

where: E1, E2 = Closest two elevations with planimeter data
Ei = Elevation at which to interpolate area
Area1,Area2 = Areas computed for E1, E2, respectively
IA = Interpolated area for Ei

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

P A R T I A L L Y F U L L P I P E

Manning's Equation for flow capacity in a circular pipe.

ROSEWOOD WASH - 48" RCP

Input variables:		Output variables:	
		Capacity at d	555.70 cfs
Normal depth, d	45 in	Normal velocity	45.40 fps
Pipe slope	0.1500 ft/ft	Critical depth	98.64 in
Pipe diameter	48 in	Critical velocity	ERR fps
Manning's n	0.014	Critical slope	ERR ft/ft

P A R T I A L L Y F U L L P I P E

Manning's Equation for flow capacity in a circular pipe.

ROSEWOOD WASH - 30" RCP

Input variables:		Output variables:	
		Capacity at d	231.73 cfs
Normal depth, d	28 in	Normal velocity	48.60 fps
Pipe slope	0.3200 ft/ft	Critical depth	75.03 in
Pipe diameter	30 in	Critical velocity	ERR fps
Manning's n	0.014	Critical slope	ERR ft/ft

P A R T I A L L Y F U L L P I P E

Manning's Equation for flow capacity in a circular pipe.

ROSEWOOD WASH - 48" RCP

Input variables:		Output variables:	
		Capacity at d	453.39 cfs
Normal depth, d	45.5 in	Normal velocity	36.81 fps
Pipe slope	0.1000 ft/ft	Critical depth	86.69 in
Pipe diameter	48 in	Critical velocity	ERR fps
Manning's n	0.014	Critical slope	ERR ft/ft

P A R T I A L L Y F U L L P I P E

Manning's Equation for flow capacity in a circular pipe.

ROSEWOOD WASH - AFTER POND - 48" RCP

Input variables:		Output variables:	
Normal depth, d	45.5 in	Capacity at d	703.85 cfs
Pipe slope	0.2410 ft/ft	Normal velocity	57.15 fps
Pipe diameter	48 in	Critical depth	114.70 in
Manning's n	0.014	Critical velocity	ERR fps
		Critical slope	ERR ft/ft

P A R T I A L L Y F U L L P I P E

Manning's Equation for flow capacity in a circular pipe.

ROSEWOOD WASH - AFTER POND - 30" RCP

Input variables:		Output variables:	
Normal depth, d	28 in	Capacity at d	129.54 cfs
Pipe slope	0.1000 ft/ft	Normal velocity	27.17 fps
Pipe diameter	30 in	Critical depth	51.93 in
Manning's n	0.014	Critical velocity	ERR fps
		Critical slope	ERR ft/ft

T R A P E Z O I D A L C H A N N E L

Normal depth and critical depth parameters

ROSEWOOD WASH - TRASH RACK INLET STRUCTURE

Input variables:		Output variables:	
Discharge	188 cfs	Normal depth	2.18 ft
Channel slope	0.04500 ft/ft	Normal velocity	21.56 fps
Manning's n	0.015	Froude number	2.57
Bottom width	4 ft	Critical depth	4.10 ft
Left side slope	0 H:1	Critical velocity	11.46 fps
Right side slope	0 H:1	Critical slope	0.002

T R A P E Z O I D A L C H A N N E L

Normal depth and critical depth parameters

ROSEWOOD WASH RELOCATED 2' FLAT BOTTOM DITCH **100 YEAR**

Input variables:			Output variables:	
Discharge	147 cfs		Normal depth	2.10 ft
Channel slope	0.06000 ft/ft		Normal velocity	11.29 fps
Manning's n	0.035		Froude number	1.78
Bottom width	2 ft		Critical depth	2.75 ft
Left side slope	2 H:1		Critical velocity	7.13 fps
Right side slope	2 H:1		Critical slope	0.015

T R A P E Z O I D A L C H A N N E L

Normal depth and critical depth parameters

ROSEWOOD WASH RELOCATED 2' FLAT BOTTOM DITCH **5 YEAR**

Input variables:			Output variables:	
Discharge	56 cfs		Normal depth	1.35 ft
Channel slope	0.06000 ft/ft		Normal velocity	8.83 fps
Manning's n	0.035		Froude number	1.68
Bottom width	2 ft		Critical depth	1.75 ft
Left side slope	2 H:1		Critical velocity	5.82 fps
Right side slope	2 H:1		Critical slope	0.017

ALUM CREEK

ALUM CREEK

SPECC MT ROSE SUB- STATION

AREA 1
CULVERT A

AREA 2
CULVERT B

AREA 3
CULVERT C

AREA 4
CULVERT D

CULVERT E
AREA 5

ROSEWOOD WASH

McCARRAN BLVD.

1"=200'

JULY 1988

Codega & Fricke, I
engineers + planne

MAP 1

EXISTING DRAINAGE AR

OPEN SPACE

RVSITE

OPEN SPACE

S P P Co

VILLAGE GREEN

UNIT ONE

PARK

SOUTH POINTE

EASTGATE

VILLAGE GREEN

UNIT TWO

VILLAGE GREEN PARKWAY

PARKWAY

SHOPPING

CENTER

CAUGHLIN

OPEN

SPACE

DETENTION BASIN

McCARRAN BLVD

ROSEWOOD WASH

ROSEWOOD WASH DETENTION BASIN

NOVEMBER 1984

Codega & Fricke, inc.

engineers + planners

MAP #2

PROPOSED DEVELOPMENT

OPEN SPACE

RVSITE

OPEN SPACE

S P P Co

VILLAGE GREEN

UNIT ONE

PARK

SOUTH POINTE

EASTGATE

VILLAGE GREEN

UNIT TWO

VILLAGE GREEN PARKWAY

PARKWAY

SHOPPING

CENTER

CAUGHLIN

OPEN

SPACE

DETENTION BASIN

McCARRAN BLVD

ROSEWOOD WASH

NOVEMBER 1989

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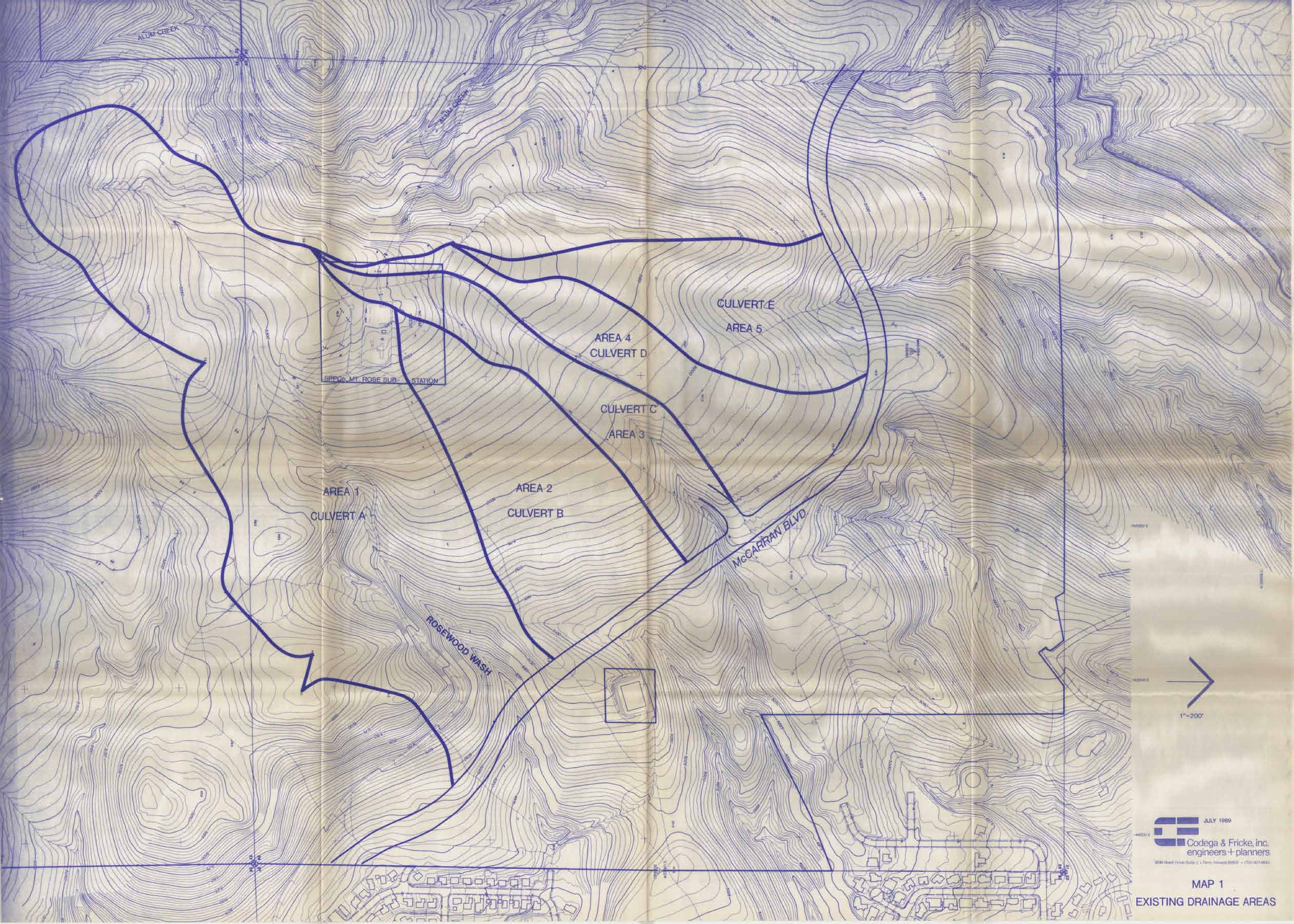
MAP #2
PROPOSED DEVELOPMENT



JULY 1989

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MAP 1

EXISTING DRAINAGE AREAS