JR Engineering, Ltd.
4935 North 30th Street
Colorado Springs, Colorado 80919
(719) 593-2593 • FAX (719) 528-6613
www.jreng.com

FINAL DRAINAGE REPORT
FOR
AUSTIN BLUFFS BRIDGE
AT COTTONWOOD CREEK

August 1997

Prepared For:

LA PLATA INVESTMENTS, LLC
7150 Campus Drive, Suite 365
Colorado Springs, CO 80920
(719) 260-7477

Prepared By:

JR ENGINEERING, LTD.
4935 North 30th Street
Colorado Springs, CO 80919
(719) 593-2593

Job No. 8715.71

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DRAINAGE REPORT STATEMENT

ENGINEER'S STATEMENT:
The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the City for drainage reports and said report is in conformity with the master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors, or omissions on my part in preparing this report.

COLORADO KYLE R. CAMPBELL 29794 REGISTERED PROFESSIONAL ENGINEER

Kyle R. Campbell, Colorado P.E. #29794
For and On Behalf of JR Engineering, Ltd.

9/6/97
Date

DEVELOPER'S STATEMENT:
I, the developer, have read and will comply with all of the requirements specified in this drainage report and plan.

Business Name: LP47, LLC dba La Plata Investments, LLC

By: _____
Bob Ingels

Title: _____

Address: 7150 Campus Drive, Suite 365

Colorado Springs, CO 80920

CITY OF COLORADO SPRINGS ONLY:
Filed in accordance with Section 15-3-906 of the Code of the City of Colorado Springs, 1980, as amended.

_____
City Engineer

Sept 12, 1997
Date

Conditions:

FINAL DRAINAGE REPORT
FOR AUSTIN BLUFFS BRIDGE AT COTTONWOOD CREEK

TABLE OF CONTENTS

APPENDIX

FINAL DRAINAGE REPORT
FOR AUSTIN BLUFFS BRIDGE AT COTTONWOOD CREEK

PURPOSE

This document is the Final Drainage Report for the proposed Austin Bluffs Bridge over Cottonwood Creek. The purpose of this report is analyze the effects that the proposed bridge and associated erosion protection improvements will have on the flows within Cottonwood Creek and to propose erosion protection improvements to Cottonwood Creek at the proposed bridge.

GENERAL DESCRIPTION

The proposed Austin Bluffs Bridge at Cottonwood Creek is located in Section 2, Township 13 South, Range 66 West of the Sixth Principal Meridian in the City of Colorado Springs, County of El Paso. The site is located directly north of Woodmen Road and east of the Woodmen Road bridge over Cottonwood Creek.

The proposed improvements include construction of an approximately 140-foot long by 49-foot wide single span structural concrete bridge, limited regrading and rip rap side slope protection in the Cottonwood Creek Channel in the immediate vicinity of the proposed bridge.

HYDROLOGY

The Cottonwood Creek Drainage Basin has been recently studied by Ayres Associates in preparation of "Cottonwood Creek Drainage Basin Planning Study", dated October 1996. This study has not yet been approved by the City, however the City Engineer has approved using the Ayers HEC I hydrology model prepared for the study to determine peak flow rates for the subject project.

The Ayers HEC I model was modified slightly for the subject project. The modifications were limited to changing the order of hydrograph calculations and hydrograph addition to obtain peak flow rates upstream and downstream of the Austin Bluffs Bridge. Adjusted design storm rainfall depths as shown in Table 2.6 of the Ayers Study and utilized in the associated HEC I model were utilized in the current analysis.

The peak flow rates as predicted by the model are Q_{100} = 4458 cfs and Q_5 = 1510 cfs immediately upstream of the proposed bridge with flows increasing to Q_{100} = 4803 cfs and Q_5 = 1639 cfs at a confluence with a tributary located approximately 200-feet downstream of the proposed bridge.

A copy of the modified HEC I input and output data is contained in the Appendix of this report.

Subsequent to the initial review submittal of this report, it was discovered that a diversion of additional flow to Cottonwood Creek upstream of the Austin Bluffs Parkway Bridge from south of Woodmen Road was being considered. In order to look at the potential impact of this diversion on the subject project, data regarding the diversion was obtained from Rockwell-Minchow consultants, Inc. and the HEC I Model was modified to simulate this condition. The model indicated that the effect of the diversion on the 100-year peak flow rate in Cottonwood Creek at the subject project will be negligible (approximately 1.6% increase). It was not considered to be worthwhile to revise the remainder of this report and associated calculations to adjust for this negligible potential increase in peak flow rate. However, a section regarding the analysis done to look at the impact of this diversion has been added to the Appendix of this report.

HYDRAULICS

To analyze the flow characteristics of the existing and modified Cottonwood Creek Channel, JR Engineering, Ltd. used HEC-RAS (River Analysis System), Version 1.2, developed by the US Army Corp of Engineers. Model runs were made for the 5-year and 100-year design storms.

Topography information used to determine cross sections to be used in the model was obtained from the City BIS Department in the form of a digital FIMS map as updated in 1995. This data was supplemented with site visits to make general observations about conditions in the channel. Site

visits revealed that a meandering low flow channel approximately 1 to 2 feet deep and approximately 20 to 30 feet wide exists throughout the studied reach. This low flow channel is relatively free of vegetation, but it is flanked by areas containing relatively heavy vegetation made up of native shrubs and small trees averaging 4 to 5 feet in height through much of the reach.

The Mannings roughness coefficient used in the model was 0.040 as used in the HEC II model prepared for Ayers Study. Given the changes in channel sections, vegetation conditions, and sinuosity contained within the study reach 0.040 appears to be a conservatively low value as compared with values suggested in several generally accepted texts.

The results of the HEC-RAS analysis are included in the appendix. The model predicts maximum proposed condition velocities in the vicinity of the bridge of V_{100} = 13 fps and V_5 = 10 fps. The model indicates the flow to be near critical in both the 100-year and 5-year events. The model indicates there will not be an appreciable increase in the water surface elevation due to the proposed improvements. The maximum water surface elevation predicted at the bridge is 6692.73 (section 180). The bottom side of the lowest beam to be constructed transverse of the channel for the bridge will be at elevation 6704.10. This will provide a clearance of over 11-feet between the 100-year water surface and the bridge.

The proposed and existing condition water surface elevations are approximately 3-feet deeper than the water surface elevations shown on FEMA FIRM Community Panel Number 08041C0528, dated March 17, 1987. It should be noted that this condition is present in both the existing and the proposed condition and is not a result of the improvements proposed for this project. Cottonwood Creek Channel is in excess of 20-feet deep through most of the study area. The predicted flow depths of approximately 7.5-feet deep are far from danger of overtopping the creek banks.

PROPOSED EROSION PROTECTION OF CHANNEL SIDE SLOPES

The City Engineers office has requested erosion protection be placed on the side slopes of the channel through the bridge section to preserve the integrity of the bridge foundation. Site visits have revealed the following conditions. The north side of the channel is an exposed bedrock face. This

bedrock is composed primarily of a relatively hard sandstone. Near the base of the slope is a layer of shale that is eroding back under the overlying sandstone due to its softer composition and the frequent or continuous presence of small flows in the channel. The side slopes on the south side of the channel do not appear to contain bedrock.

The recommended treatment for the north side slopes is to construct a dumped Type VH rip-rap blanket over Type II granular bedding at a side slope of 2:1 and extending 5-feet vertical above the existing invert of the channel as shown on the cross sections contained in the appendix. This treatment is not intended to contain the large infrequent flows as the existing bedrock is capable of doing this with little potential for erosion during the short duration that the large flows will exist. The treatment is proposed to protect the softer shale layer near the base of the side slope from the frequent flow.

The recommended treatment for the south side slope is to construct a dumped Type H rip-rap blanket over Type II granular bedding at side slopes varying from 2:1 to 2.5:1 and extending 8.5-feet vertical above the existing invert of the channel. This protection is designed to contain the 100-year flow with 1-feet of freeboard as the underlying side slope will consist of constructed fill and existing material that appears to be unconsolidated.

The rip-rap type for the south slope was chosen based on the parameter of VS^0.17/(Ss-1)^0.66 and Table 10-6 of the City Drainage Criteria Manual. The rip-rap for the north slope was upsized one size range per the Criteria Manual due to it's location on the outside of a bend having a ratio of radius to top width of approximately 2. The criteria manual suggests that table 10-6 is only valid for Froude numbers less than 0.80 which is slightly less than the Froude numbers in the subject reach. The results of using the criteria manual method look reasonable when compared with other sizing methods.

Rip-rap slope protection of both north and south sides of the channel is to be toed in a minimum of the rip-rap thickness (3-feet on the south, 3.5-feet on the north) below the invert of the adjacent low flow channel. If the foundation material that the toe of the rip-rap will be placed on is not bedrock,

the thickness will be increased by 1.5-feet. It is anticipated that a grade control structure will be placed in the channel downstream of the Austin Bluff Parkway Bridge in the near future. This grade control structure will limit the potential for bed lowering in the reach of the channel in which the rip-rap will be placed.

RECOMMENDATIONS

As a result of this study, our analysis indicates that the construction of the bridge at Austin Bluffs will not adversely effect the surrounding properties. The 100-year storm event is passed through the bridge, revised grading and associated slope protection without any significant change in the water surface or flow velocities. The proposed rip-rap slope protection will provide adequate protection of the channel slopes at the bridge and thus protect the integrity of the proposed bridge foundations. It is therefore determined that the construction of the Austin Bluffs Bridge at Cottonwood Creek will not adversely effect surrounding developments.

MAINTENANCE

The proposed bridge is to be maintained by the City, along with the necessary improvements for the road deck.

PREPARED BY:

Vance Fossinger.
Project Engineer
For and On Behalf of JR Engineering, Ltd.

/vb/871571/bridgedr.rpt

REFERENCES

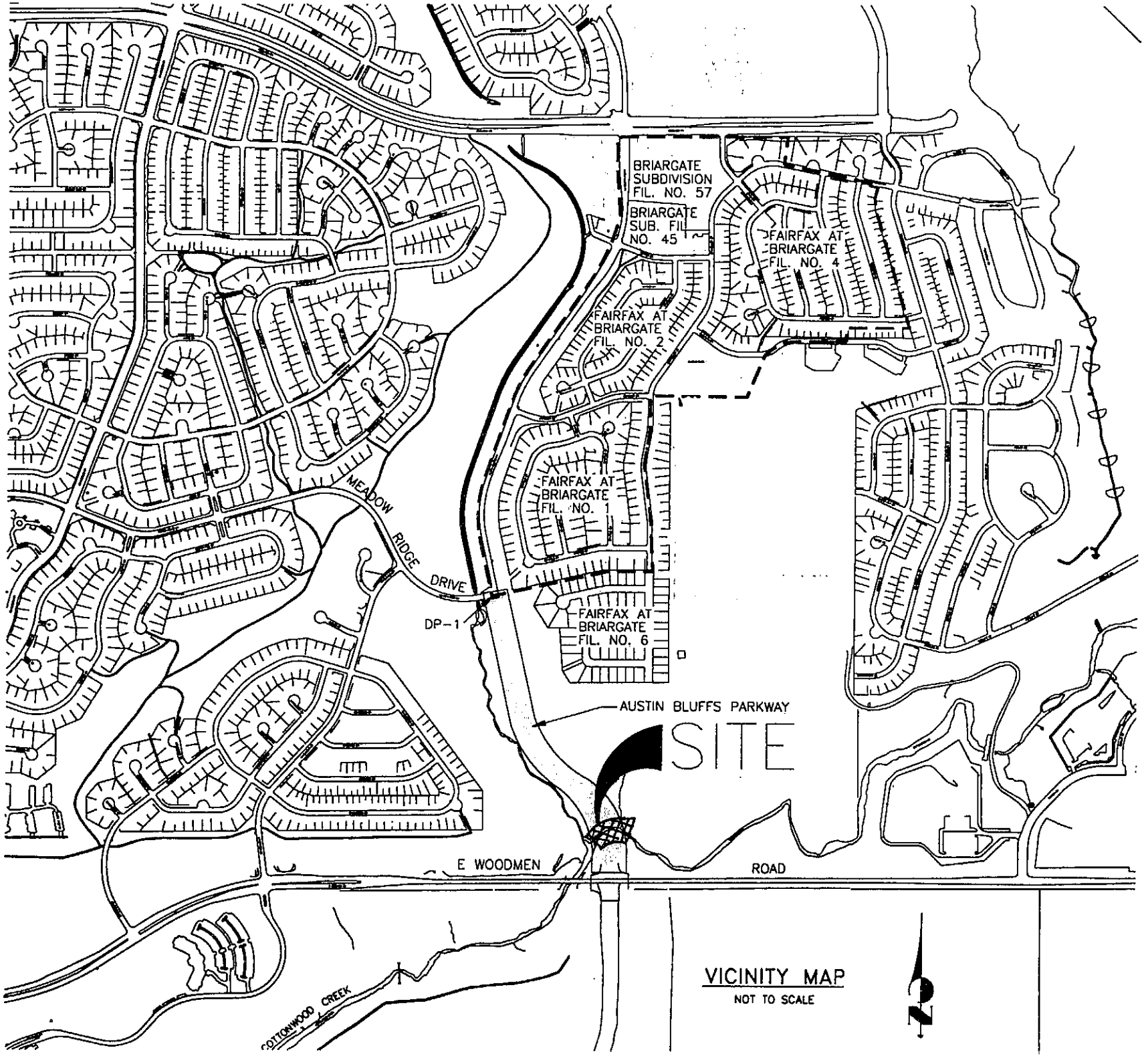
1. "Cottonwood Creek Drainage Basin Planning Study," URS Consultants, Inc., dated June 1994.

2. City of Colorado Springs/County of El Paso Drainage Criteria Manual, dated October, 1991.

3. "Cottonwood Creek Drainage Basin Planning Study", Ayres Associates, dated October 1996 (not yet approved).

APPENDIX

VICINITY MAP



VICINITY MAP

NOT TO SCALE

FLOODPLAIN MAP

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 528 OF 1300
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS: COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0528	F
EL PASO COUNTY, UNINCORPORATED AREAS	080059	0528	F

MAP NUMBER
08041C0528 F

EFFECTIVE DATE:
MARCH 17, 1997

Federal Emergency Management Agency

AVENS CIRCLE
SCOTCH PINE DRIVE
MEADOW RIDGE DRIVE
AUSTIN BLUFFS PARKWAY
CAMFIELD CIRCLE
SANGER DRIVE
HAVENWOOD DRIVE
RAMBLE WOOD DRIVE
GRACEWOOD DRIVE
BASSWOOD DRIVE
ARCH WOOD DRIVE
YELLOW WOOD COURT
HICKORYWOOD DRIVE
WEST WOODMEN ROAD

CITY OF COLORADO SPRINGS
080060

EL PASO C
UNINCORPORAT
08005

ZONE X
APPROXIMATE PROJECT LOCATION
699
6710
6706
6702
6685
6680
6675
6670
6665
6660
6656
ZONE X
ZONE AE
ZONE X
ZONE X
Cottonwood Creek
11
2

38°56'15"
104°45'00"

SUMMARY TABLES

HEC-RAS Plan: Plan 01 Reach: Cottonwood 8/1/97 3:08:50 PM

River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
220	4458.00	6701.00	6706.72	6706.72	6708.66	0.015026	11.17	399.03	101.62	0.99
220	1510.00	6701.00	6704.50	6704.50	6705.53	0.019087	8.15	185.26	91.33	1.05
215	4458.00	6698.60	6705.16		6706.46	0.008633	9.15	487.16	110.93	0.77
215	1510.00	6698.60	6702.62		6703.30	0.009663	6.62	228.25	92.47	0.74
210	4458.00	6696.00	6702.78	6702.78	6704.70	0.015619	11.12	401.01	105.74	1.01
210	1510.00	6696.00	6700.42		6701.47	0.015095	8.22	183.77	74.07	0.92
205	4458.00	6694.50	6699.63	6700.08	6701.91	0.023670	12.14	367.28	115.09	1.20
205	1510.00	6694.50	6698.06	6698.06	6698.99	0.018925	7.74	195.09	102.02	1.04
200	4458.00	6692.00	6697.89	6697.89	6699.87	0.015699	11.28	395.12	101.46	1.01
200	1510.00	6692.00	6696.00		6696.75	0.010540	6.94	217.46	85.89	0.77
195	4458.00	6689.50	6695.54	6695.56	6697.30	0.015842	10.66	418.21	118.16	1.00
195	1510.00	6689.50	6693.49	6693.49	6694.48	0.019656	8.01	188.54	96.44	1.01
190	4458.00	6687.60	6695.72		6696.16	0.002021	5.30	841.08	145.41	0.39
190	1510.00	6687.60	6691.97		6692.30	0.004582	4.63	326.19	128.88	0.51
180	4458.00	6685.50	6692.70	6692.70	6695.30	0.014901	12.92	345.14	67.63	1.01
180	1510.00	6685.50	6689.77		6691.07	0.014955	9.14	165.18	55.10	0.93
165	4458.00	6682.70	6689.75	6689.96	6692.58	0.016547	13.50	330.15	66.18	1.07
165	1510.00	6682.70	6686.81	6686.81	6688.28	0.017409	9.75	154.82	53.09	1.01
160	4803.00	6680.00	6685.60	6686.69	6689.51	0.034100	15.87	302.70	82.39	1.46
160	1639.00	6680.00	6683.59	6684.00	6685.39	0.029517	10.78	152.01	66.40	1.26
150	4803.00	6679.00	6685.25	6685.25	6687.56	0.015027	12.20	393.58	85.95	1.00
150	1639.00	6679.00	6682.42	6682.42	6683.77	0.017610	9.32	175.85	65.73	1.00

HEC-RAS Plan: Plan 01 Reach: Cottonwood 8/1/97 3:08:50 PM

River Sta.	E.G. Elev. (ft)	W.S. Elev. (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
220	6708.66	6706.72	1.94	1.73	0.19		4458.00		101.62
220	6705.53	6704.50	1.03				1510.00		91.33
215	6706.46	6705.16	1.30	1.70	0.06		4458.00		110.93
215	6703.30	6702.62	0.68	1.79	0.04		1510.00		92.47
210	6704.70	6702.78	1.92	1.90	0.15		4458.00		105.74
210	6701.47	6700.42	1.05	2.46	0.04		1510.00		74.07
205	6701.91	6699.63	2.29	2.75	0.04		4458.00		115.09
205	6698.99	6698.06	0.93				1510.00		102.02
200	6699.87	6697.89	1.98				4458.00		101.46
200	6696.75	6696.00	0.75	2.23	0.03		1510.00		85.89
195	6697.30	6695.54	1.76	2.51	0.07		4458.00		118.16
195	6694.48	6693.49	1.00	1.26	0.20		1510.00		96.44
190	6696.16	6695.72	0.44	0.65	0.22		4458.00		145.41
190	6692.30	6691.97	0.33	1.14	0.10		1510.00		128.88
180	6695.30	6692.70	2.59	2.54	0.00		4458.00		67.63
180	6691.07	6689.77	1.30	2.76	0.02		1510.00		55.10
165	6692.58	6689.75	2.83	2.69	0.03		4458.00		66.18
165	6688.28	6686.81	1.48	1.81	0.15		1510.00		53.09
160	6689.51	6685.60	3.91	2.96	0.11		4803.00		82.39
160	6685.39	6683.59	1.81	2.86	0.03		1639.00		66.40
150	6687.56	6685.25	2.31	0.00	0.00		4803.00		85.95
150	6683.77	6682.42	1.35	0.00	0.00		1639.00		65.73

HEC-RAS Plan: Plan 02 Reach: Cottonwood 7/30/97 5:33:16 PM

River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
220	4458.00	6701.00	6706.72	6706.72	6708.66	0.015026	11.17	399.03	101.62	0.99
220	1510.00	6701.00	6704.50	6704.50	6705.53	0.019117	8.15	185.17	91.33	1.07
215	4458.00	6698.60	6705.16		6706.46	0.008642	9.15	487.00	110.92	0.77
215	1510.00	6698.60	6702.67		6703.32	0.009083	6.48	232.91	92.84	0.72
210	4458.00	6696.00	6702.78	6702.78	6704.70	0.015601	11.11	401.17	105.75	1.01
210	1510.00	6696.00	6700.32	6700.24	6701.46	0.016841	8.57	176.23	72.38	0.97
205	4458.00	6694.50	6700.55		6701.87	0.009997	9.22	483.51	119.46	0.81
205	1510.00	6694.50	6698.04	6697.96	6698.92	0.017094	7.51	201.00	101.85	0.94
200	4458.00	6692.00	6698.00	6698.00	6699.96	0.015620	11.23	397.06	102.32	1.00
200	1510.00	6692.00	6696.06		6696.83	0.011206	7.06	214.01	86.40	0.79
195	4458.00	6689.50	6695.71		6697.31	0.013650	10.17	438.52	118.92	0.93
195	1510.00	6689.50	6693.49	6693.49	6694.48	0.019656	8.01	188.54	96.44	1.01
190	4458.00	6687.60	6695.06		6696.02	0.004519	7.83	569.44	98.60	0.57
190	1510.00	6687.60	6691.63		6692.20	0.006853	6.07	248.94	88.22	0.64
180	4458.00	6685.40	6692.73		6694.86	0.011786	11.73	380.13	73.46	0.91
180	1510.00	6685.40	6689.71		6690.81	0.012215	8.41	179.59	59.37	0.85
165	4458.00	6682.70	6689.96	6689.96	6692.56	0.014648	12.94	344.60	67.13	1.01
165	1510.00	6682.70	6686.81	6686.81	6688.28	0.017409	9.75	154.82	53.09	1.01
160	4803.00	6680.00	6685.63	6686.77	6689.62	0.035449	16.03	299.55	82.63	1.48
160	1639.00	6680.00	6683.71	6684.09	6685.46	0.028589	10.60	154.67	67.71	1.24
150	4803.00	6679.00	6685.25	6685.25	6687.56	0.015027	12.20	393.58	85.95	1.00
150	1639.00	6679.00	6682.42	6682.42	6683.77	0.017628	9.32	175.79	65.73	1.00

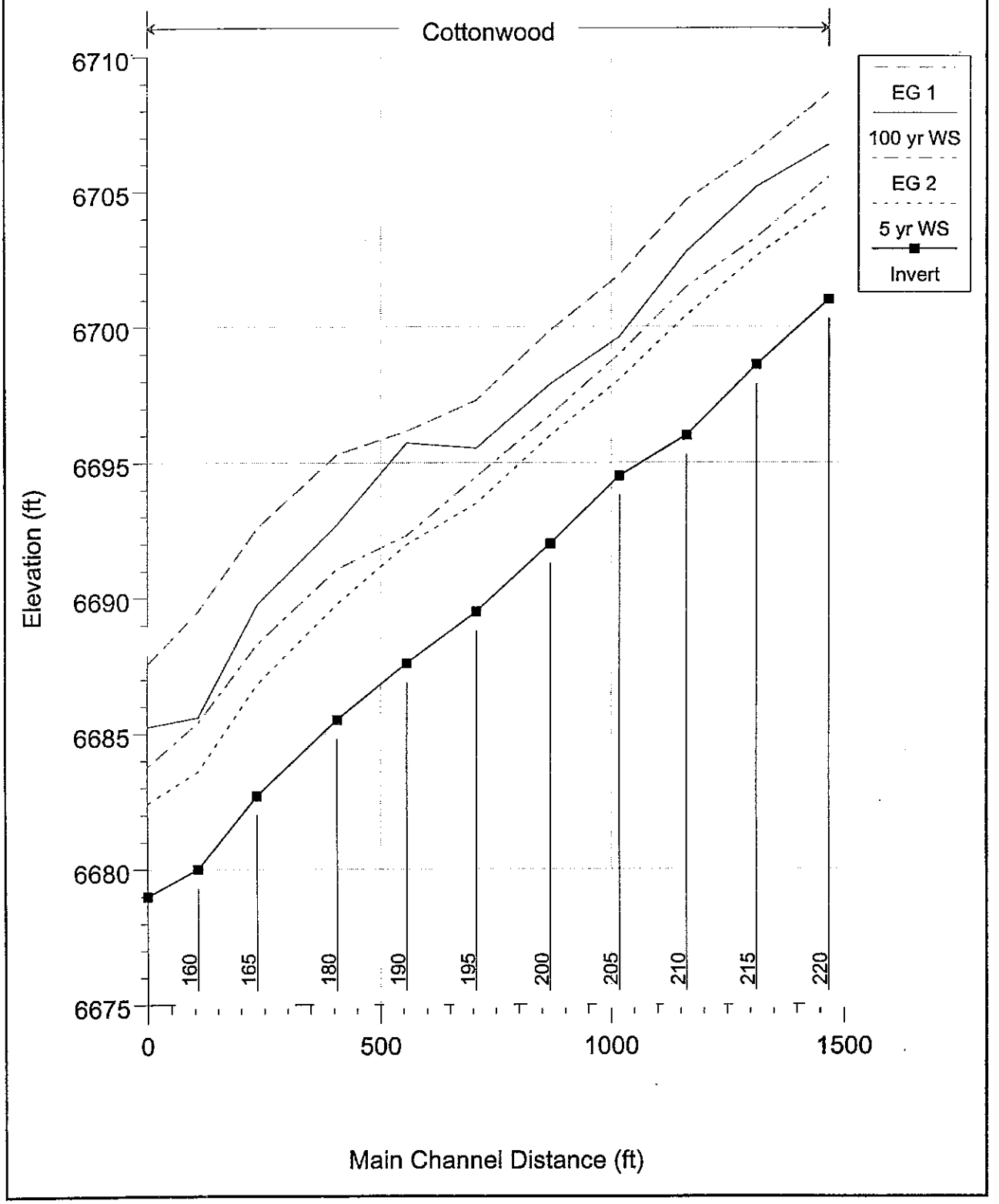
HEC-RAS Plan: Plan 02 Reach: Cottonwood 7/30/97 5:33:16 PM

River Sta	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
220	6708.66	6706.72	1.94	1.73	0.19		4458.00		101.62
220	6705.53	6704.50	1.03				1510.00		91.33
215	6706.46	6705.16	1.30	1.70	0.06		4458.00		110.92
215	6703.32	6702.67	0.65	1.81	0.05		1510.00		92.84
210	6704.70	6702.78	1.92	1.79	0.18		4458.00		105.75
210	6701.46	6700.32	1.14	2.47	0.08		1510.00		72.38
205	6701.87	6700.55	1.32	1.85	0.06		4458.00		119.46
205	6698.92	6698.04	0.88	2.05	0.03		1510.00		101.85
200	6699.96	6698.00	1.96	2.33	0.11		4458.00		102.32
200	6696.83	6696.06	0.77	2.33	0.02		1510.00		86.40
195	6697.31	6695.71	1.60	1.10	0.20		4458.00		118.92
195	6694.48	6693.49	1.00	1.64	0.13		1510.00		96.44
190	6696.02	6695.06	0.95	1.03	0.12		4458.00		98.60
190	6692.20	6691.63	0.57	1.34	0.05		1510.00		88.22
180	6694.86	6692.73	2.14	2.25	0.05		4458.00		73.46
180	6690.81	6689.71	1.10	2.49	0.04		1510.00		59.37
165	6692.56	6689.96	2.60	1.72	0.17		4458.00		67.13
165	6688.28	6686.81	1.48	1.89	0.14		1510.00		53.09
160	6689.62	6685.63	3.99	2.80	0.14		4803.00		82.63
160	6685.46	6683.71	1.74	2.81	0.03		1639.00		67.71
150	6687.56	6685.25	2.31	0.00	0.00		4803.00		85.95
150	6683.77	6682.42	1.35	0.00	0.00		1639.00		65.73

PROFILES

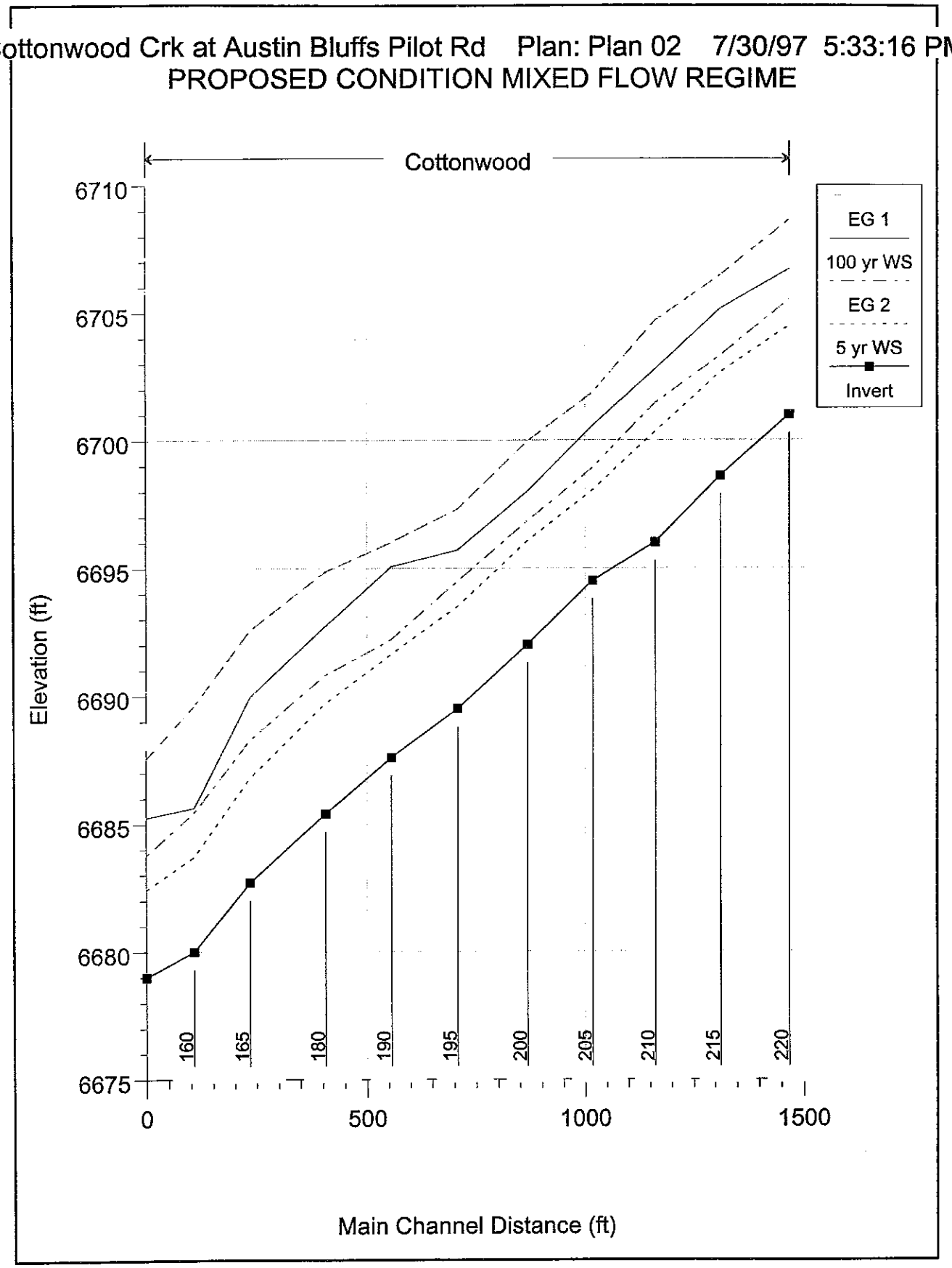
Cottonwood Crk at Austin Bluffs Pilot Rd Plan: Plan 01 8/1/97 3:08:50 PM

EXISTING CONDITION MIXED FLOW REGIME



Cottonwood Crk at Austin Bluffs Pilot Rd Plan: Plan 02 7/30/97 5:33:16 PM

PROPOSED CONDITION MIXED FLOW REGIME



CROSS-SECTIONS

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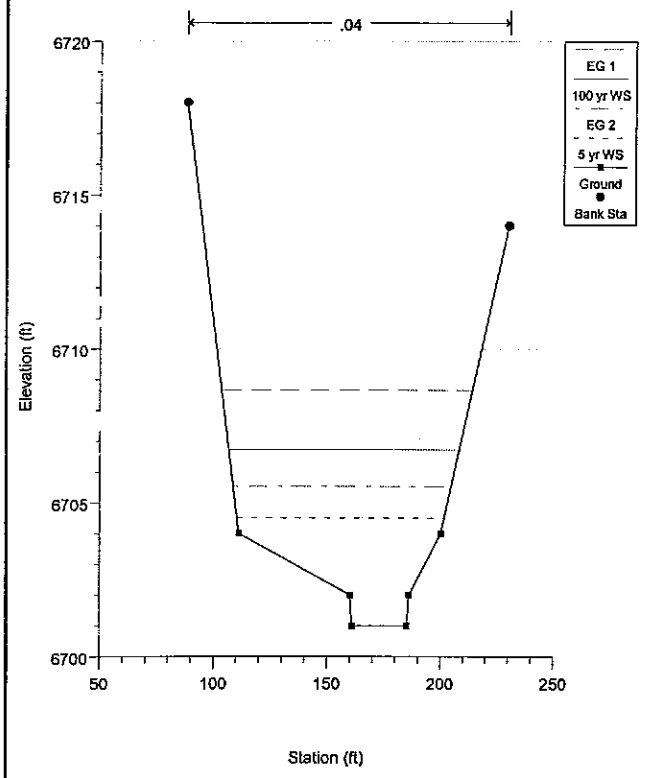

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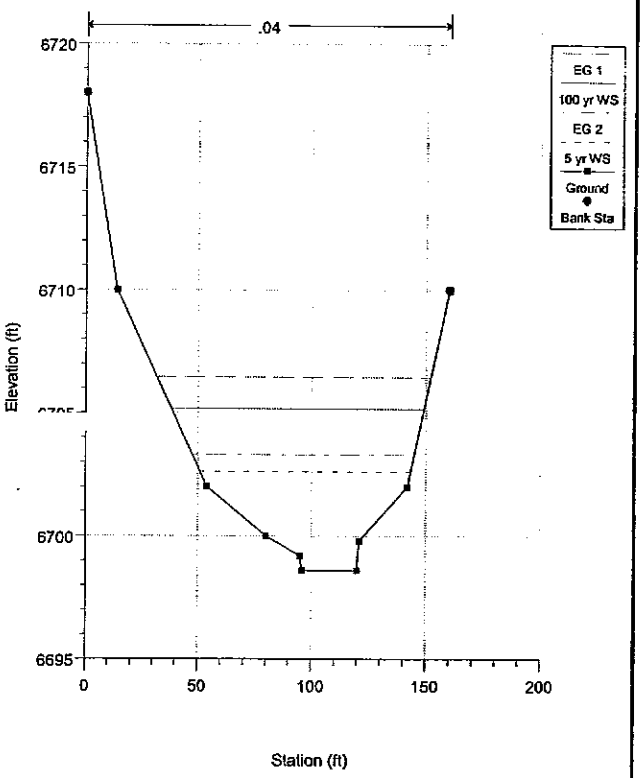
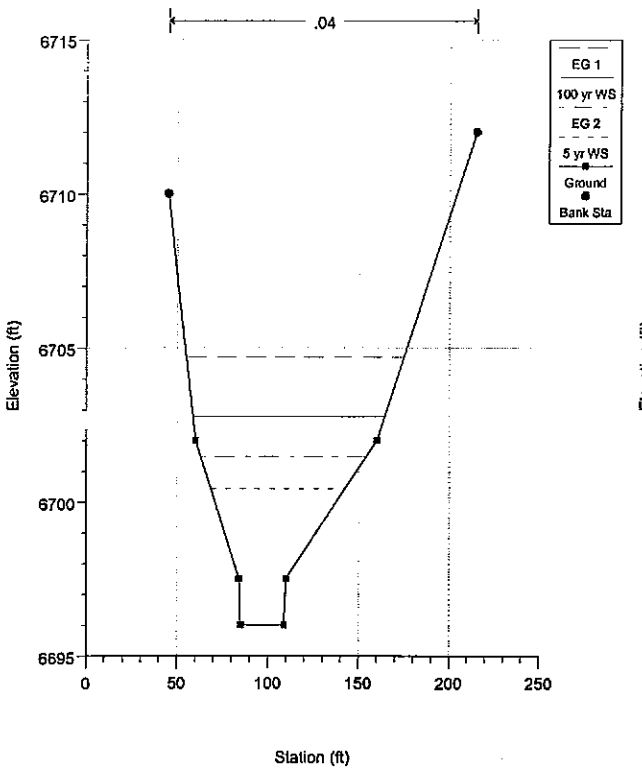
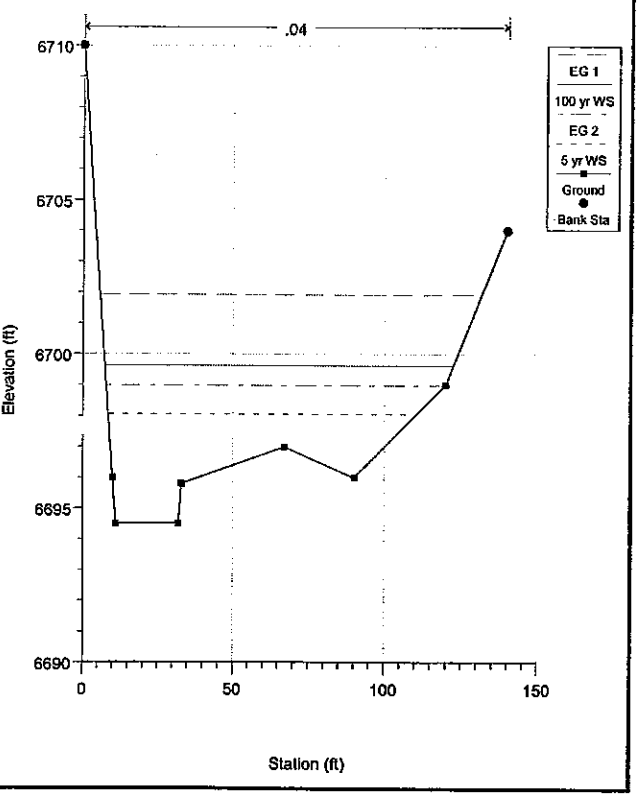
215 Riv Sta = 215 EXISTING CONDITION MIXED FLOW REGIME



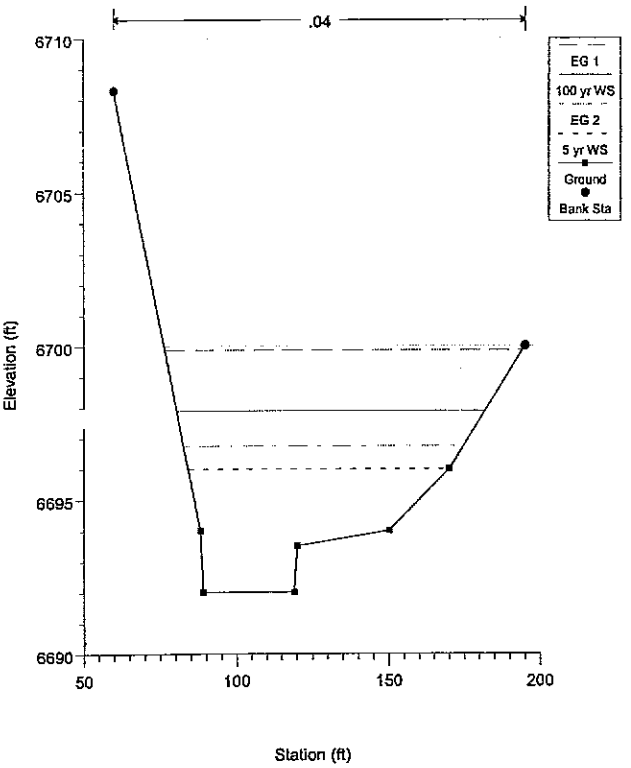
Cottonwood Crk at Austin Bluffs Pilot Rd Plan: Plan 01 8/1/97 3:08:50 P
210 Riv Sta = 210 EXISTING CONDITION MIXED FLOW REGIME



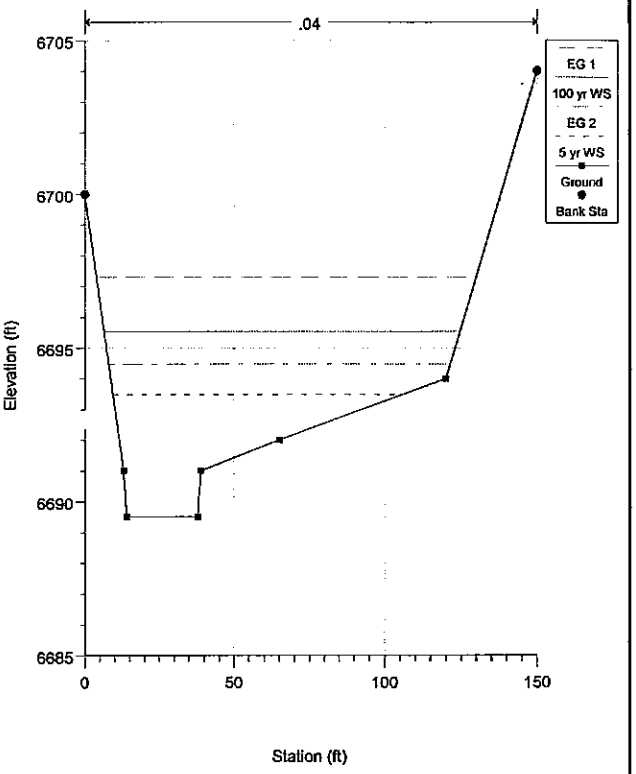
Cottonwood Crk at Austin Bluffs Pilot Rd Plan: Plan 01 8/1/97 3:08:50 PM
205 Riv Sta = 205 EXISTING CONDITION MIXED FLOW REGIME



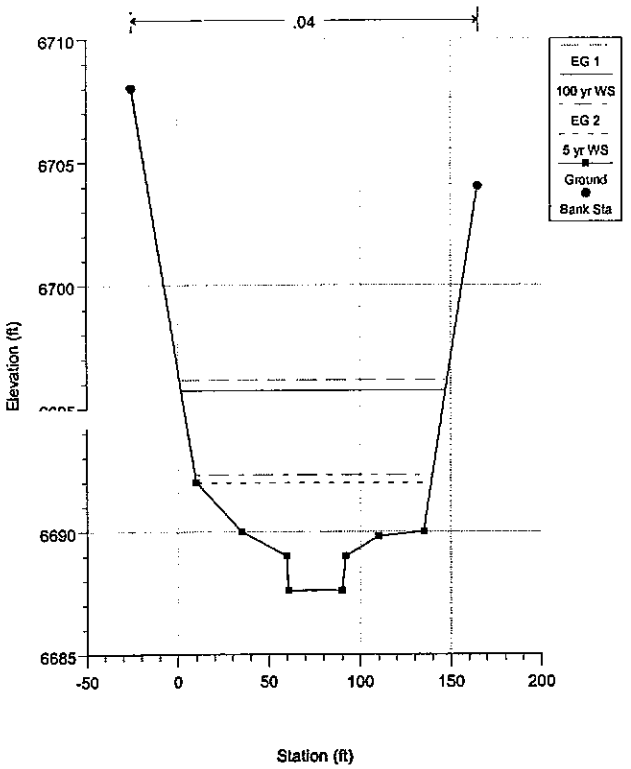
Cottonwood Crk at Austin Bluffs Pilot Rd Plan: Plan 01 8/1/97 3:08:50 P
200 Riv Sta = 200 EXISTING CONDITION MIXED FLOW REGIME



Cottonwood Crk at Austin Bluffs Pilot Rd Plan: Plan 01 8/1/97 3:08:50 PM
195 Riv Sta = 195 EXISTING CONDITION MIXED FLOW REGIME

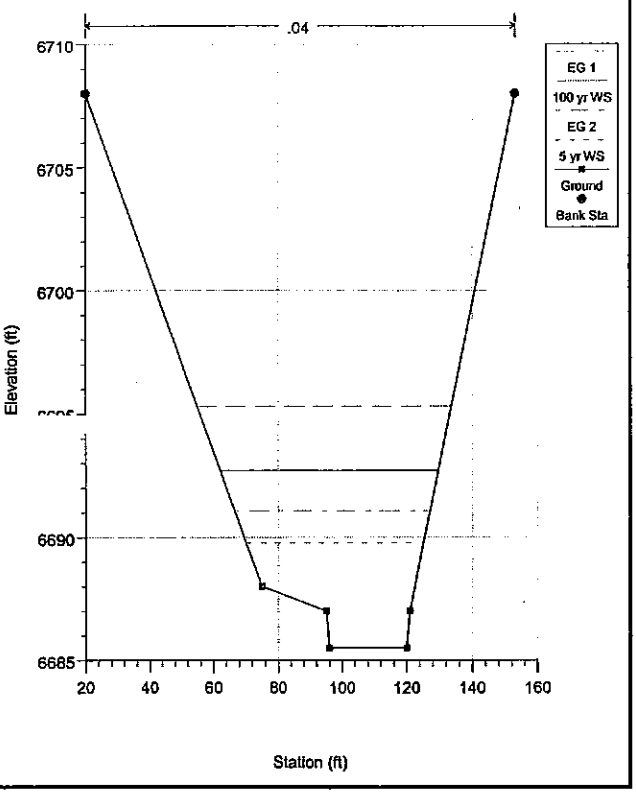


Cottonwood Crk at Austin Bluffs Pilot Rd Plan: Plan 01 8/1/97 3:08:50 P
190 Riv Sta = 190 EXISTING CONDITION MIXED FLOW

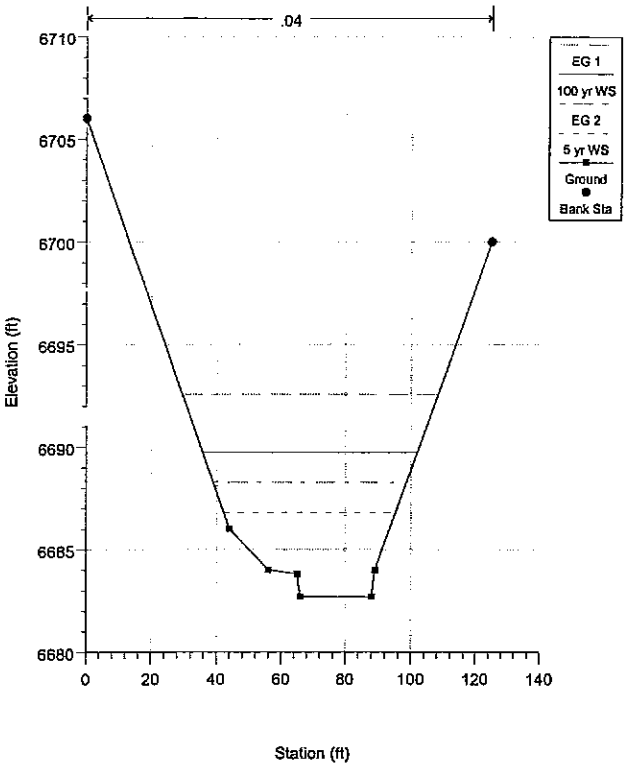


Midpoint of Austin Bluffs Bridge

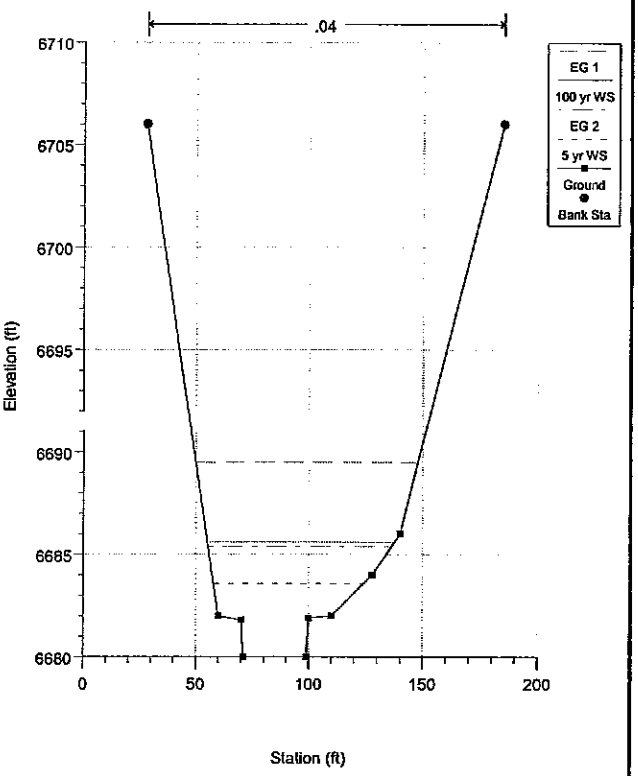
Cottonwood Crk at Austin Bluffs Pilot Rd Plan: Plan 01 8/1/97 3:08:50 PM
180 Riv Sta = 180 EXISTING CONDITION MIXED FLOW REGIME



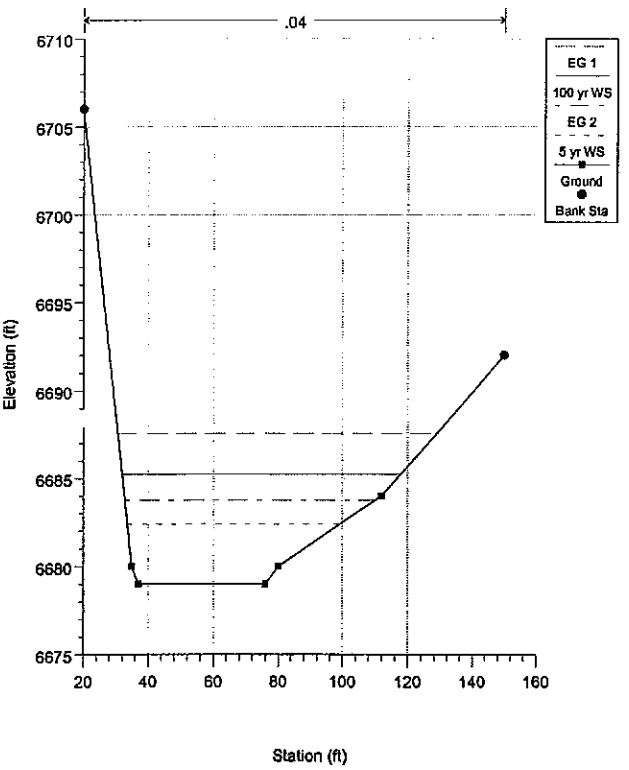
Cottonwood Crk at Austin Bluffs Pilot Rd Plan: Plan 01 8/1/97 3:08:50 P
165 Riv Sta = 165 EXISTING CONDITION MIXED FLOW REGIME



Cottonwood Crk at Austin Bluffs Pilot Rd Plan: Plan 01 8/1/97 3:08:50 PM
160 Riv Sta = 160 EXISTING CONDITION MIXED FLOW REGIME



Cottonwood Crk at Austin Bluffs Pilot Rd Plan: Plan 01 8/1/97 3:08:50 PM
150 Riv Sta = 150 EXISTING CONDITION MIXED FLOW REGIME



Plan: Plan 01 Reach: Cottonwood Riv Sta: 220 Profile: 1 8/1/97 3:08:50 PM

W.S. Elev (ft)	6706.72	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.94	Wt. n-Val.		0.040	
E.G. Elev (ft)	6708.66	Reach Len. (ft)	155.00	155.00	155.00
E.G. Slope (ft/ft)	0.015026	Flow Area (sq ft)		399.03	
Q Total (cfs)	4458.00	Flow (cfs)		4458.00	
Top Width (ft)	101.62	Top Width (ft)		101.62	
Vel Total (ft/s)	11.17	Avg. Vel. (ft/s)		11.17	
Max Chl Dpth (ft)	5.72	Hydr. Depth (ft)		3.93	
Crit W.S. (ft)	6706.72	Wetted Per. (ft)		103.83	
Conv. Total (cfs)	36368.0	Conv. (cfs)		36368.0	

Plan: Plan 01 Reach: Cottonwood Riv Sta: 215 Profile: 1 8/1/97 3:08:50 PM

W.S. Elev (ft)	6705.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.30	Wt. n-Val.		0.040	
E.G. Elev (ft)	6706.46	Reach Len. (ft)	150.00	150.00	140.00
E.G. Slope (ft/ft)	0.008633	Flow Area (sq ft)		487.16	
Q Total (cfs)	4458.00	Flow (cfs)		4458.00	
Top Width (ft)	110.93	Top Width (ft)		110.93	
Vel Total (ft/s)	9.15	Avg. Vel. (ft/s)		9.15	
Max Chl Dpth (ft)	6.56	Hydr. Depth (ft)		4.39	
Crit W.S. (ft)		Wetted Per. (ft)		112.85	
Conv. Total (cfs)	47978.7	Conv. (cfs)		47978.7	

Plan: Plan 01 Reach: Cottonwood Riv Sta: 210 Profile: 1 8/1/97 3:08:50 PM

W.S. Elev (ft)	6702.78	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.92	Wt. n-Val.		0.040	
E.G. Elev (ft)	6704.70	Reach Len. (ft)	155.00	145.00	120.00
E.G. Slope (ft/ft)	0.015619	Flow Area (sq ft)		401.01	
Q Total (cfs)	4458.00	Flow (cfs)		4458.00	
Top Width (ft)	105.74	Top Width (ft)		105.74	
Vel Total (ft/s)	11.12	Avg. Vel. (ft/s)		11.12	
Max Chl Dpth (ft)	6.78	Hydr. Depth (ft)		3.79	
Crit W.S. (ft)	6702.78	Wetted Per. (ft)		108.23	
Conv. Total (cfs)	35670.7	Conv. (cfs)		35670.7	

Plan: Plan 01 Reach: Cottonwood Riv Sta: 205 Profile: 1 8/1/97 3:08:50 PM

W.S. Elev (ft)	6699.63	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.29	Wt. n-Val.		0.040	
E.G. Elev (ft)	6701.91	Reach Len. (ft)	160.00	150.00	130.00
E.G. Slope (ft/ft)	0.023670	Flow Area (sq ft)		367.28	
Q Total (cfs)	4458.00	Flow (cfs)		4458.00	
Top Width (ft)	115.09	Top Width (ft)		115.09	
Vel Total (ft/s)	12.14	Avg. Vel. (ft/s)		12.14	
Max Chl Dpth (ft)	5.13	Hydr. Depth (ft)		3.19	
Crit W.S. (ft)	6700.08	Wetted Per. (ft)		118.67	
Conv. Total (cfs)	28976.5	Conv. (cfs)		28976.5	

Plan: Plan 01 Reach: Cottonwood Riv Sta: 200 Profile: 1 8/1/97 3:08:50 PM

W.S. Elev (ft)	6697.89	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.98	Wt. n-Val.		0.040	
E.G. Elev (ft)	6699.87	Reach Len. (ft)	158.00	160.00	150.00
E.G. Slope (ft/ft)	0.015699	Flow Area (sq ft)		395.12	
Q Total (cfs)	4458.00	Flow (cfs)		4458.00	
Top Width (ft)	101.46	Top Width (ft)		101.46	
Vel Total (ft/s)	11.28	Avg. Vel. (ft/s)		11.28	
Max Chl Dpth (ft)	5.89	Hydr. Depth (ft)		3.89	
Crit W.S. (ft)	6697.89	Wetted Per. (ft)		104.69	
Conv. Total (cfs)	35579.7	Conv. (cfs)		35579.7	

Plan: Plan 01 Reach: Cottonwood Riv Sta: 195 Profile: 1 8/1/97 3:08:50 PM

W.S. Elev (ft)	6695.54	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.76	Wt. n-Val.		0.040	
E.G. Elev (ft)	6697.30	Reach Len. (ft)	158.00	151.00	158.00
E.G. Slope (ft/ft)	0.015842	Flow Area (sq ft)		418.21	
Q Total (cfs)	4458.00	Flow (cfs)		4458.00	
Top Width (ft)	118.16	Top Width (ft)		118.16	
Vel Total (ft/s)	10.66	Avg. Vel. (ft/s)		10.66	
Max Chl Dpth (ft)	6.04	Hydr. Depth (ft)		3.54	
Crit W.S. (ft)	6695.56	Wetted Per. (ft)		121.49	
Conv. Total (cfs)	35419.4	Conv. (cfs)		35419.4	

Plan: Plan 01 Reach: Cottonwood Riv Sta: 190 Profile: 1 8/1/97 3:08:50 PM

W.S. Elev (ft)	6695.72	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.44	Wt. n-Val.		0.040	
E.G. Elev (ft)	6696.16	Reach Len. (ft)	130.00	150.00	150.00
E.G. Slope (ft/ft)	0.002021	Flow Area (sq ft)		841.08	
Q Total (cfs)	4458.00	Flow (cfs)		4458.00	
Top Width (ft)	145.41	Top Width (ft)		145.41	
Vel Total (ft/s)	5.30	Avg. Vel. (ft/s)		5.30	
Max Chl Dpth (ft)	8.12	Hydr. Depth (ft)		5.78	
Crit W.S. (ft)		Wetted Per. (ft)		148.77	
Conv. Total (cfs)	99157.7	Conv. (cfs)		99157.7	

Plan: Plan 01 Reach: Cottonwood Riv Sta: 180 Profile: 1 8/1/97 3:08:50 PM

W.S. Elev (ft)	6692.70	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.59	Wt. n-Val.		0.040	
E.G. Elev (ft)	6695.30	Reach Len. (ft)	150.00	172.00	183.00
E.G. Slope (ft/ft)	0.014901	Flow Area (sq ft)		345.14	
Q Total (cfs)	4458.00	Flow (cfs)		4458.00	
Top Width (ft)	67.63	Top Width (ft)		67.63	
Vel Total (ft/s)	12.92	Avg. Vel. (ft/s)		12.92	
Max Chl Dpth (ft)	7.20	Hydr. Depth (ft)		5.10	
Crit W.S. (ft)	6692.70	Wetted Per. (ft)		71.79	
Conv. Total (cfs)	36520.0	Conv. (cfs)		36520.0	

Plan: Plan 01 Reach: Cottonwood Riv Sta: 165 Profile: 1 8/1/97 3:08:50 PM

W.S. Elev (ft)	6689.75	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.83	Wt. n-Val.		0.040	
E.G. Elev (ft)	6692.58	Reach Len. (ft)	122.00	127.00	130.00
E.G. Slope (ft/ft)	0.016547	Flow Area (sq ft)		330.15	
Q Total (cfs)	4458.00	Flow (cfs)		4458.00	
Top Width (ft)	66.18	Top Width (ft)		66.18	
Vel Total (ft/s)	13.50	Avg. Vel. (ft/s)		13.50	
Max Chl Dpth (ft)	7.05	Hydr. Depth (ft)		4.99	
Crit W.S. (ft)	6689.96	Wetted Per. (ft)		69.50	
Conv. Total (cfs)	34656.6	Conv. (cfs)		34656.6	

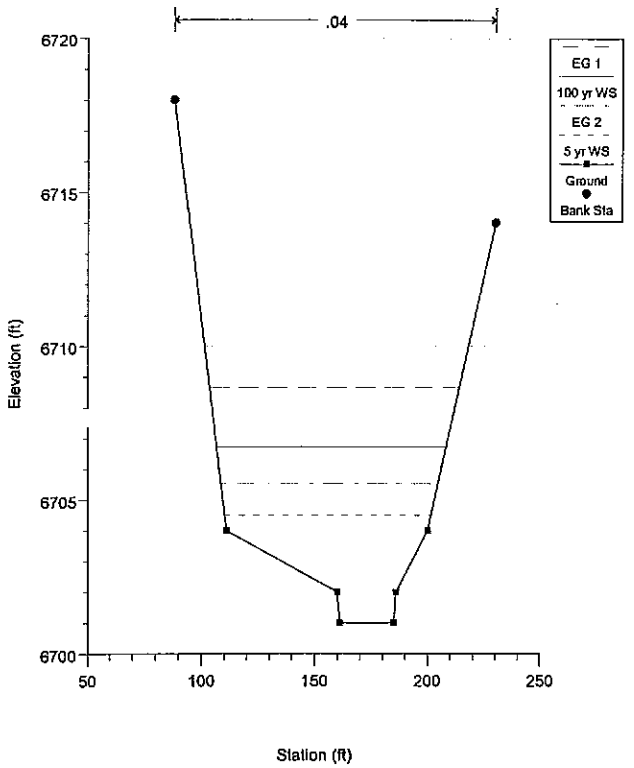
Plan: Plan 01 Reach: Cottonwood Riv Sta: 160 Profile: 1 8/1/97 3:08:50 PM

W.S. Elev (ft)	6685.60	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.91	Wt. n-Val.		0.040	
E.G. Elev (ft)	6689.51	Reach Len. (ft)	108.00	107.00	106.00
E.G. Slope (ft/ft)	0.034100	Flow Area (sq ft)		302.70	
Q Total (cfs)	4803.00	Flow (cfs)		4803.00	
Top Width (ft)	82.39	Top Width (ft)		82.39	
Vel Total (ft/s)	15.87	Avg. Vel. (ft/s)		15.87	
Max Chl Dpth (ft)	5.60	Hydr. Depth (ft)		3.67	
Crit W.S. (ft)	6686.69	Wetted Per. (ft)		86.04	
Conv. Total (cfs)	26009.8	Conv. (cfs)		26009.8	

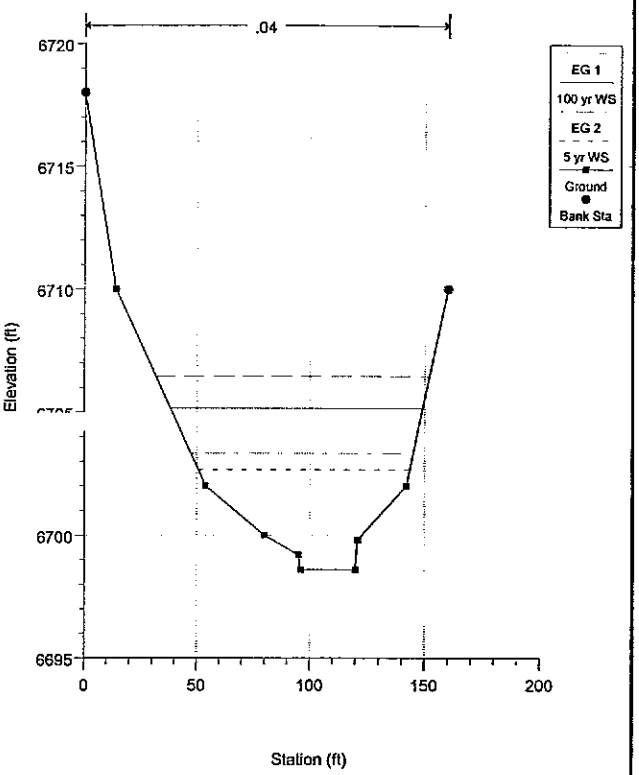
Plan: Plan 01 Reach: Cottonwood Riv Sta: 150 Profile: 1 8/1/97 3:08:50 PM

W.S. Elev (ft)	6685.25	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.31	Wt. n-Val.		0.040	
E.G. Elev (ft)	6687.56	Reach Len. (ft)			
E.G. Slope (ft/ft)	0.015027	Flow Area (sq ft)		393.58	
Q Total (cfs)	4803.00	Flow (cfs)		4803.00	
Top Width (ft)	85.95	Top Width (ft)		85.95	
Vel Total (ft/s)	12.20	Avg. Vel. (ft/s)		12.20	
Max Chl Dpth (ft)	6.25	Hydr. Depth (ft)		4.58	
Crit W.S. (ft)	6685.25	Wetted Per. (ft)		89.71	
Conv. Total (cfs)	39181.2	Conv. (cfs)		39181.2	

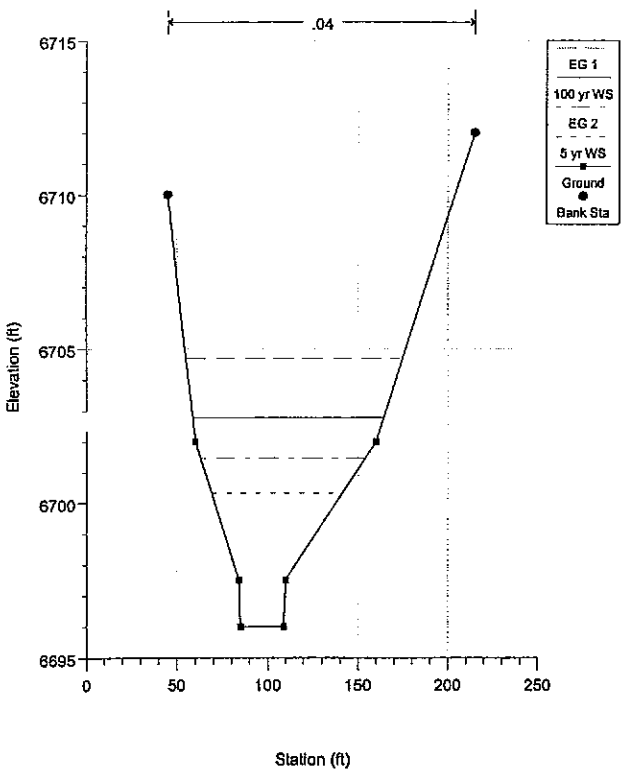
Cottonwood Crk at Austin Bluffs Pilot Rd Plan: Plan 02 7/30/97 5:33:16 PM
220 Riv Sta = 220 PROPOSED CONDITION MIXED FLOW REGIME



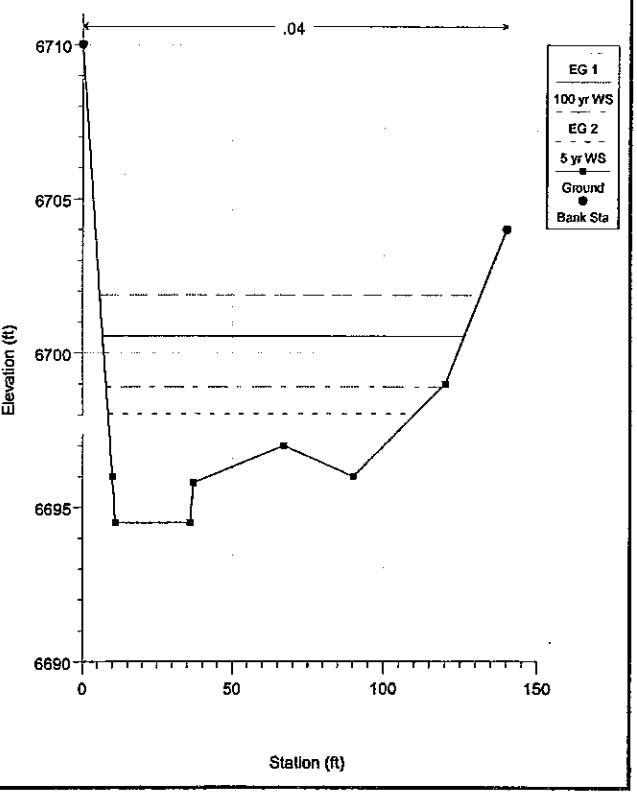
Cottonwood Crk at Austin Bluffs Pilot Rd Plan: Plan 02 7/30/97 5:33:16 PM
215 Riv Sta = 215 PROPOSED CONDITION MIXED FLOW REGIME



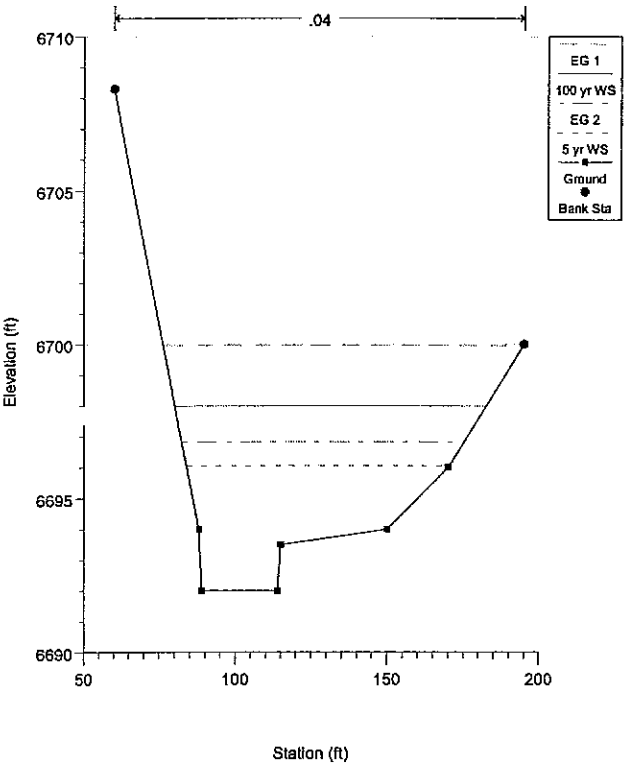
Cottonwood Crk at Austin Bluffs Pilot Rd Plan: Plan 02 7/30/97 5:33:16 PM
210 Riv Sta = 210 PROPOSED CONDITION MIXED FLOW REGIME



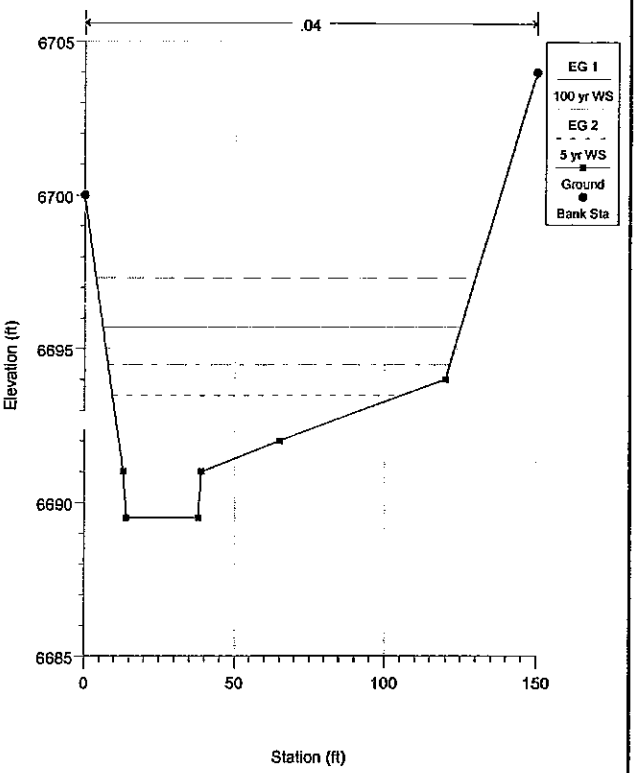
Cottonwood Crk at Austin Bluffs Pilot Rd Plan: Plan 02 7/30/97 5:33:16 PM
205 Riv Sta = 205 PROPOSED CONDITION MIXED FLOW REGIME



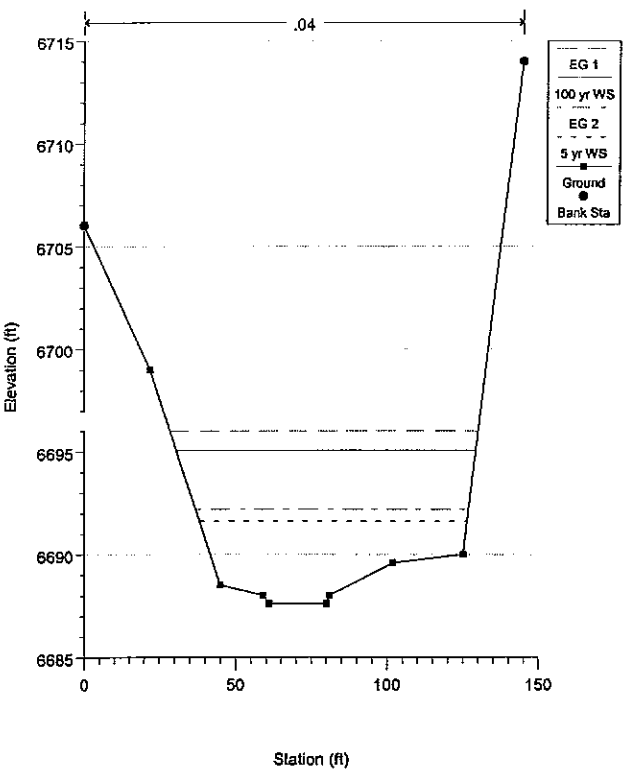
Cottonwood Crk at Austin Bluffs Pilot Rd Plan: Plan 02 7/30/97 5:33:16 PM
200 Riv Sta = 200 PROPOSED CONDITION MIXED FLOW REGIME



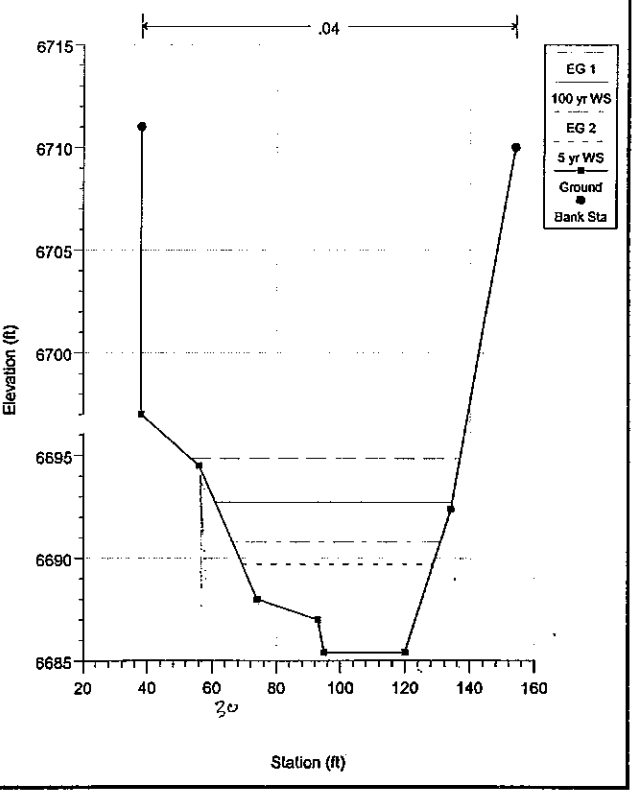
Cottonwood Crk at Austin Bluffs Pilot Rd Plan: Plan 02 7/30/97 5:33:16 PM
195 Riv Sta = 195 PROPOSED CONDITION MIXED FLOW REGIME



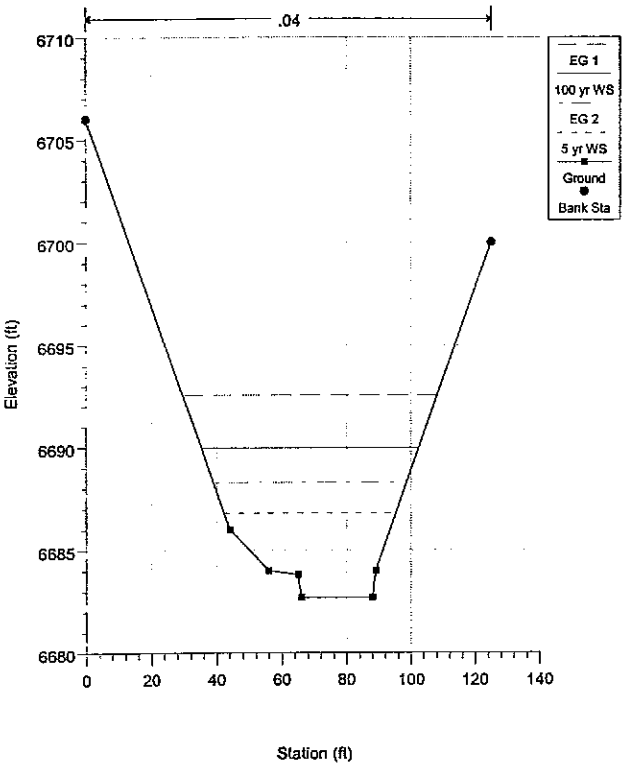
Cottonwood Crk at Austin Bluffs Pilot Rd Plan: Plan 02 7/30/97 5:33:16 PM
190 Riv Sta = 190 PROPOSED CONDITION MIXED FLC



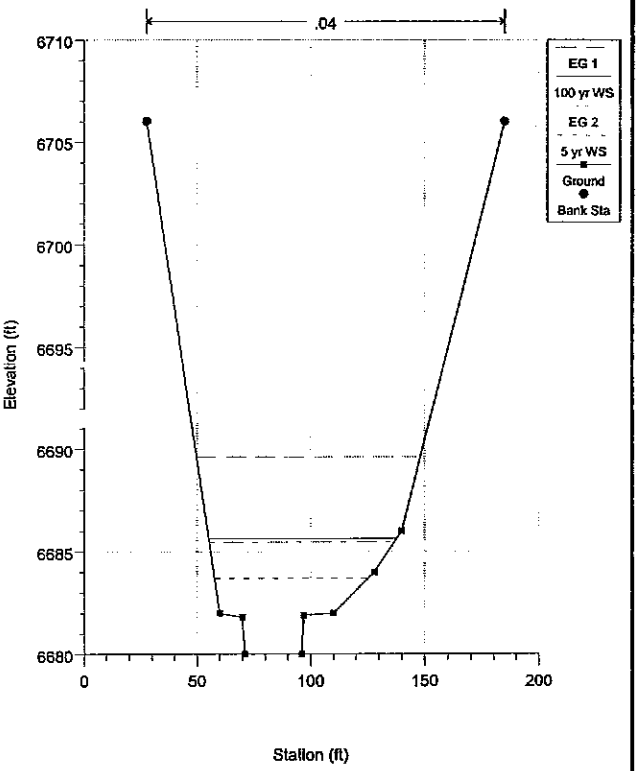
Midpoint of Austin Bluffs Bridge Riv Sta = 180 PROPOSED CONDITION MIXED FLOW REGIME



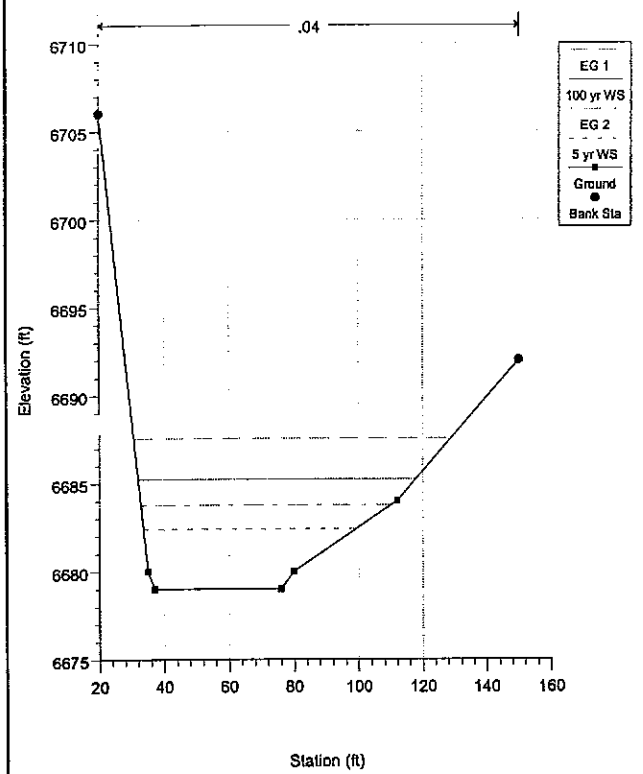
Cottonwood Crk at Austin Bluffs Pilot Rd Plan: Plan 02 7/30/97 5:33:16 PM
165 Riv Sta = 165 PROPOSED CONDITION MIXED FLOW REGIME



Cottonwood Crk at Austin Bluffs Pilot Rd Plan: Plan 02 7/30/97 5:33:16 PM
160 Riv Sta = 160 PROPOSED CONDITION MIXED FLOW REGIME



Cottonwood Crk at Austin Bluffs Pilot Rd Plan: Plan 02 7/30/97 5:33:16 PM
150 Riv Sta = 150 PROPOSED CONDITION MIXED FLOW REGIME



Plan: Plan 02 Reach: Cottonwood Riv Sta: 220 Profile: 1 7/30/97 5:33:16 PM

W.S. Elev (ft)	6706.72	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.94	Wt. n-Val.		0.040	
E.G. Elev (ft)	6708.66	Reach Len. (ft)	155.00	155.00	155.00
E.G. Slope (ft/ft)	0.015026	Flow Area (sq ft)		399.03	
Q Total (cfs)	4458.00	Flow (cfs)		4458.00	
Top Width (ft)	101.62	Top Width (ft)		101.62	
Vel Total (ft/s)	11.17	Avg. Vel. (ft/s)		11.17	
Max Chl Dpth (ft)	5.72	Hydr. Depth (ft)		3.93	
Crit W.S. (ft)	6706.72	Wetted Per. (ft)		103.83	
Conv. Total (cfs)	36368.0	Conv. (cfs)		36368.0	

Plan: Plan 02 Reach: Cottonwood Riv Sta: 215 Profile: 1 7/30/97 5:33:16 PM

W.S. Elev (ft)	6705.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.30	Wt. n-Val.		0.040	
E.G. Elev (ft)	6706.46	Reach Len. (ft)	150.00	150.00	140.00
E.G. Slope (ft/ft)	0.008642	Flow Area (sq ft)		487.00	
Q Total (cfs)	4458.00	Flow (cfs)		4458.00	
Top Width (ft)	110.92	Top Width (ft)		110.92	
Vel Total (ft/s)	9.15	Avg. Vel. (ft/s)		9.15	
Max Chl Dpth (ft)	6.56	Hydr. Depth (ft)		4.39	
Crit W.S. (ft)		Wetted Per. (ft)		112.84	
Conv. Total (cfs)	47955.2	Conv. (cfs)		47955.2	

Plan: Plan 02 Reach: Cottonwood Riv Sta: 210 Profile: 1 7/30/97 5:33:16 PM

W.S. Elev (ft)	6702.78	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.92	Wt. n-Val.		0.040	
E.G. Elev (ft)	6704.70	Reach Len. (ft)	155.00	145.00	120.00
E.G. Slope (ft/ft)	0.015601	Flow Area (sq ft)		401.17	
Q Total (cfs)	4458.00	Flow (cfs)		4458.00	
Top Width (ft)	105.75	Top Width (ft)		105.75	
Vel Total (ft/s)	11.11	Avg. Vel. (ft/s)		11.11	
Max Chl Dpth (ft)	6.78	Hydr. Depth (ft)		3.79	
Crit W.S. (ft)	6702.78	Wetted Per. (ft)		108.24	
Conv. Total (cfs)	35691.1	Conv. (cfs)		35691.1	

Plan: Plan 02 Reach: Cottonwood Riv Sta: 205 Profile: 1 7/30/97 5:33:16 PM

W.S. Elev (ft)	6700.55	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.32	Wt. n-Val.		0.040	
E.G. Elev (ft)	6701.87	Reach Len. (ft)	160.00	150.00	130.00
E.G. Slope (ft/ft)	0.009997	Flow Area (sq ft)		483.51	
Q Total (cfs)	4458.00	Flow (cfs)		4458.00	
Top Width (ft)	119.46	Top Width (ft)		119.46	
Vel Total (ft/s)	9.22	Avg. Vel. (ft/s)		9.22	
Max Chl Dpth (ft)	6.05	Hydr. Depth (ft)		4.05	
Crit W.S. (ft)		Wetted Per. (ft)		123.63	
Conv. Total (cfs)	44586.0	Conv. (cfs)		44586.0	

Plan: Plan 02 Reach: Cottonwood Riv Sta: 200 Profile: 1 7/30/97 5:33:16 PM

W.S. Elev (ft)	6698.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.96	Wt. n-Val.		0.040	
E.G. Elev (ft)	6699.96	Reach Len. (ft)	158.00	160.00	150.00
E.G. Slope (ft/ft)	0.015620	Flow Area (sq ft)		397.06	
Q Total (cfs)	4458.00	Flow (cfs)		4458.00	
Top Width (ft)	102.32	Top Width (ft)		102.32	
Vel Total (ft/s)	11.23	Avg. Vel. (ft/s)		11.23	
Max Chl Dpth (ft)	6.00	Hydr. Depth (ft)		3.88	
Crit W.S. (ft)	6698.00	Wetted Per. (ft)		105.59	
Conv. Total (cfs)	35669.4	Conv. (cfs)		35669.4	

Plan: Plan 02 Reach: Cottonwood Riv Sta: 195 Profile: 1 7/30/97 5:33:16 PM

W.S. Elev (ft)	6695.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.60	Wt. n-Val.		0.040	
E.G. Elev (ft)	6697.31	Reach Len. (ft)	158.00	151.00	158.00
E.G. Slope (ft/ft)	0.013650	Flow Area (sq ft)		438.52	
Q Total (cfs)	4458.00	Flow (cfs)		4458.00	
Top Width (ft)	118.92	Top Width (ft)		118.92	
Vel Total (ft/s)	10.17	Avg. Vel. (ft/s)		10.17	
Max Chl Dpth (ft)	6.21	Hydr. Depth (ft)		3.69	
Crit W.S. (ft)		Wetted Per. (ft)		122.33	
Conv. Total (cfs)	38156.9	Conv. (cfs)		38156.9	

Plan: Plan 02 Reach: Cottonwood Riv Sta: 190 Profile: 1 7/30/97 5:33:16 PM

W.S. Elev (ft)	6695.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.95	Wt. n-Val.		0.040	
E.G. Elev (ft)	6696.02	Reach Len. (ft)	130.00	150.00	150.00
E.G. Slope (ft/ft)	0.004519	Flow Area (sq ft)		569.44	
Q Total (cfs)	4458.00	Flow (cfs)		4458.00	
Top Width (ft)	98.60	Top Width (ft)		98.60	
Vel Total (ft/s)	7.83	Avg. Vel. (ft/s)		7.83	
Max Chl Dpth (ft)	7.46	Hydr. Depth (ft)		5.78	
Crit W.S. (ft)		Wetted Per. (ft)		102.59	
Conv. Total (cfs)	66316.7	Conv. (cfs)		66316.7	

Plan: Plan 02 Reach: Cottonwood Riv Sta: 180 Profile: 1 7/30/97 5:33:16 PM

W.S. Elev (ft)	6692.73	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.14	Wt. n-Val.		0.040	
E.G. Elev (ft)	6694.86	Reach Len. (ft)	150.00	172.00	183.00
E.G. Slope (ft/ft)	0.011786	Flow Area (sq ft)		380.13	
Q Total (cfs)	4458.00	Flow (cfs)		4458.00	
Top Width (ft)	73.46	Top Width (ft)		73.46	
Vel Total (ft/s)	11.73	Avg. Vel. (ft/s)		11.73	
Max Chl Dpth (ft)	7.33	Hydr. Depth (ft)		5.17	
Crit W.S. (ft)		Wetted Per. (ft)		76.65	
Conv. Total (cfs)	41064.2	Conv. (cfs)		41064.2	

Plan: Plan 02 Reach: Cottonwood Riv Sta: 165 Profile: 1 7/30/97 5:33:16 PM

W.S. Elev (ft)	6689.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.60	Wt. n-Val.		0.040	
E.G. Elev (ft)	6692.56	Reach Len. (ft)	122.00	127.00	130.00
E.G. Slope (ft/ft)	0.014648	Flow Area (sq ft)		344.50	
Q Total (cfs)	4458.00	Flow (cfs)		4458.00	
Top Width (ft)	67.13	Top Width (ft)		67.13	
Vel Total (ft/s)	12.94	Avg. Vel. (ft/s)		12.94	
Max Chl Dpth (ft)	7.26	Hydr. Depth (ft)		5.13	
Crit W.S. (ft)	6689.96	Wetted Per. (ft)		70.55	
Conv. Total (cfs)	36833.7	Conv. (cfs)		36833.7	

Plan: Plan 02 Reach: Cottonwood Riv Sta: 160 Profile: 1 7/30/97 5:33:16 PM

W.S. Elev (ft)	6685.63	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.99	Wt. n-Val.		0.040	
E.G. Elev (ft)	6689.62	Reach Len. (ft)	108.00	107.00	106.00
E.G. Slope (ft/ft)	0.035449	Flow Area (sq ft)		299.55	
Q Total (cfs)	4803.00	Flow (cfs)		4803.00	
Top Width (ft)	82.63	Top Width (ft)		82.63	
Vel Total (ft/s)	16.03	Avg. Vel. (ft/s)		16.03	
Max Chl Dpth (ft)	5.63	Hydr. Depth (ft)		3.63	
Crit W.S. (ft)	6686.77	Wetted Per. (ft)		86.30	
Conv. Total (cfs)	25510.2	Conv. (cfs)		25510.2	

Plan: Plan 02 Reach: Cottonwood Riv Sta: 150 Profile: 1 7/30/97 5:33:16 PM

W.S. Elev (ft)	6685.25	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.31	Wt. n-Val.		0.040	
E.G. Elev (ft)	6687.56	Reach Len. (ft)			
E.G. Slope (ft/ft)	0.015027	Flow Area (sq ft)		393.58	
Q Total (cfs)	4803.00	Flow (cfs)		4803.00	
Top Width (ft)	85.95	Top Width (ft)		85.95	
Vel Total (ft/s)	12.20	Avg. Vel. (ft/s)		12.20	
Max Chl Dpth (ft)	6.25	Hydr. Depth (ft)		4.58	
Crit W.S. (ft)	6685.25	Wetted Per. (ft)		89.71	
Conv. Total (cfs)	39181.2	Conv. (cfs)		39181.2	

HEC-I
INPUT/OUTPUT REPORT
FOR 100-YEAR AND 5-YEAR EVENTS

HEC1 S/N: 1343000062 HMVersion: 6.33 Data File: X:\871571\HYDRO\HEC1\CCAB100.DAT

```
*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             MAY  1991                 *
*          VERSION 4.0.1E               *
*                                       *
*  RUN DATE  08/29/1997  TIME  14:54:56 *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```

```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X        XX
X     X  X        X                X
XXXXXXX  XXXX     X        XXXXX   X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX           XXX
```

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:::::::::::::::::::::::::::::::::::::::::::::
:::::::::::::::::::::::::::::::::::::::::::::
:::                                       :::
:::  Full Microcomputer Implementation    :::
:::              by                       :::
:::        Haestad Methods, Inc.          :::
:::                                       :::
:::::::::::::::::::::::::::::::::::::::::::::
:::::::::::::::::::::::::::::::::::::::::::::
```

37 Brookside Road * Waterbury, Connecticut 06708 * (203) 755-1666

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

100 YEAR

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

   1      ID    COTTONWOOD CREEK AYERS DBPS MODEL REVISED TO PROVIDE  HYROGRAPHS AT
   2      ID    A POINT IMEDIATELY UPSTREAM OF AUSTIN BLUFFS PARKWAY AND IMEDIATELY
   3      ID    DOWNSTREAM OF THE CONFLUENCE WITH THE AUSTIN BLUFFS TRIBUTARY.
   4      ID    ALSO REVISED SOME REACHES TO PIPE CONVEYENCES IN THE AUSTIN BLUFFS
   5      ID    TRIBUTARY. REVISED BY JR ENGINEERING, VANCE FOSSINGER ON 7-29-97
   6      ID
   7      ID    REVISED SOME KM CARDS ON 8-18-97 FOR CLEARIFICATION
   8      ID
   9      ID    100 YR 24 HR STORM
  10      ID
  11      ID    COTTONWOOD CREEK DBPS AYRES PROJECT NO. 34-0330.00
  12      ID    FUTURE CONDITIONS - INPUT FILE 100FDREV.INP
  13      ID    CN AND LAGS REVISED BASED UPON SEPTEMBER 4TH, 1996 MEETING WITH
  14      ID    CITY OF COLORADO SPRINGS ENGINEERING STAFF
  15      ID    100 YEAR 24 HOUR STORM - RUN DATE 10-08-96
          *DIAGRAM
  16      IT       5 01SEP89     800     300
  17      IO       5

  18      KK      A1
  19      KM     RUNOFF FROM  A1
  20      BA   0.188
  21      LS        0    61.0
  22      UD   0.450
  23      KM     DESIGN POINT 1
  24      IN       15
  25      PB   4.136
  26      PC   .0000   .0005   .0015   .0030   .0045   .0060   .0080   .0100   .0120   .0143
  27      PC   .0165   .0188   .0210   .0233   .0255   .0278   .0320   .0390   .0460   .0530
  28      PC   .0600   .0750   .1000   .4000   .7000   .7250   .7500   .7650   .7800   .7900
  29      PC   .8000   .8100   .8200   .8250   .8300   .8350   .8400   .8450   .8500   .8550
  30      PC   .8600   .8638   .8675   .8713   .8750   .8788   .8825   .8863   .8900   .8938
  31      PC   .8975   .9013   .9050   .9083   .9115   .9148   .9180   .9210   .9240   .9270
  32      PC   .9300   .9325   .9350   .9375   .9400   .9425   .9450   .9475   .9500   .9525
  33      PC   .9550   .9575   .9600   .9625   .9650   .9675   .9700   .9725   .9750   .9775
  34      PC   .9800   .9813   .9825   .9838   .9850   .9863   .9875   .9888   .9900   .9913
  35      PC   .9925   .9938   .9950   .9963   .9975   .9988  1.000

  36      KK     1-2
  37      KM     ROUTE TO DESIGN POINT 2
  38      RD    2300    .033    .060       0    TRAP       5      15

  39      KK      A3
  40      KM     RUNOFF FROM  A3
  41      BA   0.162
  42      LS        0    61.0
  43      UD   0.380

  44      KK       2
  45      KM     COMBINE 1-2 AND A3
  46      HC       2
```

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  47      KK     2-3
  48      KM     ROUTE TO DESIGN POINT 3
  49      RD    3500    .020    .060       0    TRAP       8      15

  50      KK      A2
  51      KM     RUNOFF FROM  A2
  52      BA   0.210
  53      LS        0    61.0
  54      UD   0.530

  55      KK      A4
  56      KM     RUNOFF FROM  A4
  57      BA   0.254
  58      LS        0    61.0
  59      UD   0.460

  60      KK      A5
  61      KM     RUNOFF FROM  A5
  62      BA   0.210
  63      LS        0    61.0
  64      UD   0.410

  65      KK       3
  66      KM     COMBINE 2-3,A2,A4,A5
  67      HC       4

  68      KK     3-4
  69      KM     ROUTE TO DESIGN POINT 4
  70      RD    3500    .030    .060       0    TRAP      10      15

  71      KK      A8
  72      KM     RUNOFF FROM  A8
  73      BA   0.240
  74      LS        0    61.0
  75      UD   0.450

  76      KK      A9
  77      KM     RUNOFF FROM  A9
  78      BA   0.197
  79      LS        0    61.0
  80      UD   0.330

  81      KK       4
  82      KM     COMBINE 3-4,A8,A9
  83      HC       3

  84      KK     4-5
  85      KM     ROUTE TO DESIGN POINT 5
  86      RD    2000    .025    .060       0    TRAP      15      15
```

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  87          KK      A6
  88          KM     RUNOFF FROM  A6
  89          BA   0.141
  90          LS        0    61.0
  91          UD   0.400

  92          KK      A7
  93          KM     RUNOFF FROM  A7
  94          BA   0.137
  95          LS        0    61.0
  96          UD   0.400

  97          KK      5A
  98          KM     COMBINE A6,A7
  99          HC       2

 100          KK     5A-5
 101          KM     ROUTE TO DESIGN POINT 5
 102          RD    3900    .031    .060       0    TRAP       5      15

 103          KK     A10
 104          KM     RUNOFF FROM  A10
 105          BA   0.169
 106          LS        0    61.0
 107          UD   0.340

 108          KK     A11
 109          KM     RUNOFF FROM  A11
 110          BA   0.119
 111          LS        0    61.0
 112          UD   0.420

 113          KK     A12
 114          KM     RUNOFF FROM  A12
 115          BA   0.119
 116          LS        0    61.0
 117          UD   0.290

 118          KK     A13
 119          KM     RUNOFF FROM  A13
 120          BA   0.161
 121          LS        0    61.0
 122          UD   0.460

 123          KK      B1
 124          KM     RUNOFF FROM  B1
 125          BA   0.192
 126          LS        0    62.7
 127          UD   0.190
```

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  128     KK       5
  129     KM     COMBINE 4-5,5A-5,A10,A11,A12,A13,B1
  130     HC       7

  131     KK     5-6
  132     KM     ROUTE TO DESIGN POINT 6
  133     RD    6000     .015     .035        0    TRAP       20       15

  134     KK      B2
  135     KM     RUNOFF FROM  B2
  136     BA   0.107
  137     LS       0     78.0
  138     UD   0.160

  139     KK   B2-6A
  140     KM     ROUTE TO DESIGN POINT 6A
  141     RD    3000     .035     .060        0    TRAP        5       15

  142     KK      B6
  143     KM     RUNOFF FROM  B6
  144     BA   0.183
  145     LS       0     78.8
  146     UD   0.410

  147     KK      6A
  148     KM     COMBINE B2-6A,B6
  149     HC       2

  150     KK      B3
  151     KM     RUNOFF FROM  B3
  152     BA   0.146
  153     LS       0     74.9
  154     UD   0.220

  155     KK      B4
  156     KM     RUNOFF FROM  B4
  157     BA   0.104
  158     LS       0     74.3
  159     UD   0.220

  160     KK       6
  161     KM     COMBINE 5-6,6A,B3,B4
  162     HC       4

  163     KK     6-7
  164     KM     ROUTE TO DESIGN POINT 7
  165     RD    5500     .018     .035        0    TRAP       20       15

  166     KK      B8
  167     KM     RUNOFF FROM  B8
  168     BA   0.159
  169     LS       0     81.6
  170     UD   0.410
```

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  171     KK       7
  172     KM     COMBINE 6-7,B8
  173     HC       2

  174     KK     7-8
  175     KM     ROUTE TO DESIGN POINT 8
  176     RD
  177     RC    .040    .035    .040    3500    .018
  178     RX       0      76      83     138     144     189     214     291
  179     RY    6940    6930    6920    6914    6914    6920    6930    6940

  180     KK      C2
  181     KM     RUNOFF FROM  C2
  182     BA    0.154
  183     LS        0    61.0
  184     UD    0.130

  185     KK    C2-8A
  186     KM      ROUTE TO DESIGN POINT 8A
  187     RD     3000    .035    .060       0    TRAP       5      15

  188     KK      C3
  189     KM     RUNOFF FROM  C3
  190     BA    0.162
  191     LS        0    63.7
  192     UD    0.230

  193     KK      8A
  194     KM     COMBINE C2-8A,C3
  195     HC       2

  196     KK    8A-8B
  197     KM      ROUTE 8A TO DESIGN POINT 8B
  198     RD     4000    .030    .060       0    TRAP       8      15

  199     KK      C4
  200     KM     RUNOFF FROM  C4
  201     BA    0.224
  202     LS        0    65.9
  203     UD    0.220

  204     KK    C4-8B
  205     KM      ROUTE C4 TO DESIGN POINT 8B
  206     RD     3000    .030    .060       0    TRAP       5      15

  207     KK      C7
  208     KM     RUNOFF FROM  C7
  209     BA    0.156
  210     LS        0    78.3
  211     UD    0.280
```

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  212     KK      8B
  213     KM     COMBINE 8A-8B,C4-8B,C7
  214     HC       3

  215     KK      C1
  216     KM     RUNOFF FROM  C1
  217     BA   0.165
  218     LS      0    67.5
  219     UD   0.180

  220     KK     C13
  221     KM     RUNOFF FROM  C13
  222     BA   0.125
  223     LS      0    69.8
  224     UD   0.130

  225     KK      8C
  226     KM     COMBINE C1,C13
  227     HC       2

  228     KK   8C-8D
  229     KM     ROUTE 8C TO DESIGN POINT 8D
  230     RD    4500    .027    .060       0    TRAP       5      15

  231     KK      C6
  232     KM     RUNOFF FROM  C6
  233     BA   0.107
  234     LS      0    79.6
  235     UD   0.230

  236     KK      8D
  237     KM     COMBINE 8C-8D,C6
  238     HC       2

  239     KK      8E
  240     KM     COMBINE 8B,8D
  241     HC       2

  242     KK   8E-8G
  243     KM     ROUTE 8E TO DESIGN POINT 8G
  244     RD    3000    .018    .035       0    TRAP      10      15

  245     KK      C5
  246     KM     RUNOFF FROM  C5
  247     BA   0.227
  248     LS      0    68.5
  249     UD   0.240

  250     KK   C5-8F
  251     KM     ROUTE C5 TO DESIGN POINT 8F
  252     RD    6300    .030    .060       0    TRAP       5      15
```

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  253     KK      C8
  254     KM     RUNOFF FROM  C8
  255     BA   0.171
  256     LS       0    79.8
  257     UD   0.370

  258     KK      8F
  259     KM     COMBINE C5-8F,C8
  260     HC       2

  261     KK      C9
  262     KM     RUNOFF FROM  C9
  263     BA   0.206
  264     LS       0    78.0
  265     UD   0.360

  266     KK     C10
  267     KM     RUNOFF FROM  C10
  268     BA   0.106
  269     LS       0    76.1
  270     UD   0.420

  271     KK     C11
  272     KM     RUNOFF FROM  C11
  273     BA   0.125
  274     LS       0    80.5
  275     UD   0.270

  276     KK      8G
  277     KM     COMBINE 8E-8G,8F,C9,C10,C11
  278     HC       5

  279     KK    8G-8
  280     KM     ROUTE 8G TO DESIGN POINT 8
  281     RD    4000    .028    .035       0    TRAP      15      15

  282     KK      B5
  283     KM     RUNOFF FROM  B5
  284     BA   0.107
  285     LS       0    82.3
  286     UD   0.200

  287     KK   B5-8H
  288     KM     ROUTE B5 TO DESIGN POINT 8H
  289     RD    4800    .035    .060       0    TRAP       5      15

  290     KK      B7
  291     KM     RUNOFF FROM  B7
  292     BA   0.297
  293     LS       0    77.2
  294     UD   0.290
```

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  295     KK      8H
  296     KM     COMBINE B5-8H,B7
  297     HC       2

  298     KK      B9
  299     KM     RUNOFF FROM  B9
  300     BA   0.169
  301     LS      0    81.7
  302     UD   0.330

  303     KK      8
  304     KM     COMBINE 7-8,8G-8,8H,B9
  305     HC       4

  306     KK     8-9
  307     KM     ROUTE 8 TO DESIGN POINT 9
  308     RD
  309     RC    .040    .040    .040    3000    .015
  310     RX      23      69      90     115     149     197     209     254
  311     RY    6910    6899    6886    6880    6880    6892    6890    6907

  312     KK     C14
  313     KM     RUNOFF FROM  C14
  314     BA   0.104
  315     LS      0    75.0
  316     UD   0.170

  317     KK  C14-9A
  318     KM     ROUTE C14 TO DESIGN POINT 9A
  319     RD    2500    .032    .060       0    TRAP       5      15

  320     KK     C15
  321     KM     RUNOFF FROM  C15
  322     BA   0.085
  323     LS      0    76.3
  324     UD   0.170

  325     KK      9A
  326     KM     COMBINE C14-9A,C15
  327     HC       2

  328     KK   9A-9B
  329     KM     ROUTE 9A TO DESIGN POINT 9B
  330     RD    6800    .030    .060       0    TRAP       8      15

  331     KK     C17
  332     KM     RUNOFF FROM  C17
  333     BA   0.088
  334     LS      0    77.1
  335     UD   0.320
```

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  336         KK     C18
  337         KM     RUNOFF FROM  C18
  338         BA   0.201
  339         LS       0    75.1
  340         UD   0.410

  341         KK      9B
  342         KM     COMBINE 9A-9B,C17,C18
  343         HC       3

  344         KK     C12
  345         KM     RUNOFF FROM  C12
  346         BA   0.112
  347         LS       0    81.2
  348         UD   0.200

  349         KK      D1
  350         KM     RUNOFF FROM  D1
  351         BA   0.165
  352         LS       0    83.0
  353         UD   0.290

  354         KK      D2
  355         KM     RUNOFF FROM  D2
  356         BA   0.199
  357         LS       0    84.7
  358         UD   0.320

  359         KK       9
  360         KM     COMBINE 8-9,9B,C12,D1,D2
  361         HC       5

  362         KK    9-10
  363         KM     ROUTE 9 TO DESIGN POINT 10
  364         RD
  365         RC    .040    .040    .040    1800    .017
  366         RX       0     108     121     125     159     205     230     276
  367         RY    6840    6826    6810    6808    6808    6812    6824    6840

  368         KK     C19
  369         KM     RUNOFF FROM  C19
  370         BA   0.112
  371         LS       0    75.9
  372         UD   0.320

  373         KK      D4
  374         KM     RUNOFF FROM  D4
  375         BA   0.118
  376         LS       0    86.6
  377         UD   0.330
```

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 378          KK      10
 379          KM     COMBINE 9-10,C19,D4
 380          HC       3

 381          KK   10-11
 382          KM     ROUTE 10 TO DESIGN POINT 11
 383          RD
 384          RC    .040    .040    .040    1100    .018
 385          RX       0       9      15      48      82     117     135     140
 386          RY    6800    6790    6788    6786    6786    6788    6796    6800

 387          KK      E1
 388          KM     RUNOFF FROM  E1
 389          BA   0.093
 390          LS       0    73.0
 391          UD   0.160

 392          KK  E1-11A
 393          KM     ROUTE E1 TO DESIGN POINT 11A
 394          RD    3000    .035    .060       0    TRAP       5      15

 395          KK      E3
 396          KM     RUNOFF FROM  E3
 397          BA   0.146
 398          LS       0    84.7
 399          UD   0.200

 400          KK     11A
 401          KM     COMBINE E1-11A,E3
 402          HC       2

 403          KK  11A11B
 404          KM     ROUTE 11A TO DESIGN POINT 11B
 405          RD    3300    .030    .060       0    TRAP       8      15

 406          KK      E5
 407          KM     RUNOFF FROM  E5
 408          BA   0.127
 409          LS       0    84.9
 410          UD   0.320

 411          KK     11B
 412          KM     COMBINE 11A11B,E5
 413          HC       2

 414          KK      E2
 415          KM     RUNOFF FROM  E2
 416          BA   0.090
 417          LS       0    89.5
 418          UD   0.190
```

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 419      KK  E2-11C
 420      KM     ROUTE E2 TO DESIGN POINT 11C
 421      RD    3300    .030    .060       0    TRAP       5      15

 422      KK      E4
 423      KM     RUNOFF FROM  E4
 424      BA   0.154
 425      LS       0    78.0
 426      UD   0.400

 427      KK     11C
 428      KM     COMBINE E2-11C,E4
 429      HC       2

 430      KK     11D
 431      KM     COMBINE 11B,11C
 432      HC       2

 433      KK  11D11F
 434      KM     ROUTE 11D TO DESIGN POINT 11F
 435      RD    2000    .036    .035       0    TRAP       8      15

 436      KK      E6
 437      KM     RUNOFF FROM  E6
 438      BA   0.045
 439      LS       0    73.5
 440      UD   0.300

 441      KK  E6-11E
 442      KM     ROUTE E6 TO DESIGN POINT 11E
 443      RD    4000    .030    .060       0    TRAP       5      15

 444      KK      E8
 445      KM     RUNOFF FROM  E8
 446      BA   0.124
 447      LS       0    84.5
 448      UD   0.240

 449      KK     11E
 450      KM     COMBINE E6-11E,E8
 451      HC       2

 452      KK      E7
 453      KM     RUNOFF FROM  E7
 454      BA   0.118
 455      LS       0    82.4
 456      UD   0.320

 457      KK     11F
 458      KM     COMBINE 11D11F,11E,E7
 459      HC       3
```

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  460     KK  11F11P
  461     KM     ROUTE 11F TO DESIGN POINT 11P
  462     KO       0
  463     RD    3300     .028     .035        0    TRAP       10       15

  464     KK       E9
  465     KM     RUNOFF FROM  E9
  466     BA    0.112
  467     LS        0    77.0
  468     UD    0.120

  469     KK      E10
  470     KM     RUNOFF FROM  E10
  471     BA    0.103
  472     LS        0    76.1
  473     UD    0.120

  474     KK    11CP
  475     KM     COMBINE 11F11P,E9,E10
  476     HC       3

  477     KK     11P
  478     KM    FAIRFAX POND BY JR ENGINEERING - AS BUILT
  479     SV        0     9.0    21.1    38.0    60.0    88.2    96.0   104.8   108.0   115.2
  480     SE     6788    6800    6804    6808    6812    6816    6817    6818    6819    6820
  481     SQ        0     190     225     260     290     320     805    1666    2771    4076
  482     RS        1    ELEV    6788

  483     KK  11P-11
  484     KM     ROUTE 11P TO DESIGN POINT 11
  485     RD     800     .026     .035        0    TRAP       10       15

  486     KK     E11
  487     KM     RUNOFF FROM  E11
  488     BA    0.100
  489     LS        0    75.7
  490     UD    0.300

  491     KK   11P11
  492     KM     COMBINE 11P-11,E11
  493     HC       2

  494     KK     C16
  495     KM     RUNOFF FROM  C16
  496     BA    0.141
  497     LS        0    76.2
  498     UD    0.250

  499     KK  C1611G
  500     KM     ROUTE C16 TO DESIGN POINT 11G
  501     RD    4800     .030     .060        0    TRAP        5       15
```

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  502         KK     C20
  503         KM     RUNOFF FROM  C20
  504         BA   0.113
  505         LS       0    79.6
  506         UD   0.360

  507         KK     11G
  508         KM     COMBINE C16-11G,C20
  509         HC       2

  510         KK      11
  511         KM     COMBINE 10-11,11P11P,11G
  512         HC       3

  513         KK  11-12E
  514         KM     ROUTE 11 TO DESIGN POINT 12E
  515         RD
  516         RC    .040    .040    .040    4500    .018
  517         RX      68      96     138     158     206     207     244     268
  518         RY    6752    6730    6730    6728    6728    6730    6738    6752

  519         KK      D3
  520         KM     RUNOFF FROM  D3
  521         BA   0.127
  522         LS       0    93.0
  523         UD   0.320

  524         KK  D3-12E
  525         KM     ROUTE D3 TO DESIGN POINT 12E
  526         RD    2300    .037    .035       0    TRAP       5       4

  527         KK      D5
  528         KM     RUNOFF FROM  D5
  529         BA   0.128
  530         LS       0    91.8
  531         UD   0.210

  532         KK    12E1
  533         KM     COMBINE D3-12E,D5
  534         HC       2

  535         KK      F1
  536         KM     RUNOFF FROM  F1
  537         BA   0.137
  538         LS       0    79.7
  539         UD   0.480

  540         KK      G7
  541         KM     RUNOFF FROM  G7
  542         BA   0.171
  543         LS       0    77.4
  544         UD   0.290
```

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  545         KK     H21
  546         KM     RUNOFF FROM  H21
  547         BA   0.081
  548         LS       0    92.0
  549         UD   0.220

  550         KK     12E
  551         KM     COMBINE 11-12E,12E1,F1,H-21 AND G7 FOR TOTAL FLOW ABOVE ASTN. BLFFS PKWY
  552         HC       5

  553         KK      G1
  554         KM     RUNOFF FROM  G1
  555         BA   0.180
  556         LS       0    81.7
  557         UD   0.180

  558         KK  G1-12A
  559         KM     ROUTE G1 TO DESIGN POINT 12A
  560         RD    2400    .023    .013       0    CIRC     5.5

  561         KK      G3
  562         KM     RUNOFF FROM  G3
  563         BA   0.183
  564         LS       0    79.4
  565         UD   0.270

  566         KK     12A
  567         KM     COMBINE G1-12A,G3
  568         HC       2

  569         KK      G2
  570         KM     RUNOFF FROM  G2
  571         BA   0.107
  572         LS       0    75.3
  573         UD   0.150

  574         KK  G2-12B
  575         KM     ROUTE G2 TO DESIGN POINT 12B
  576         RD    2900    .042    .035       0    TRAP       5       8

  577         KK      G4
  578         KM     RUNOFF FROM  G4
  579         BA   0.132
  580         LS       0    87.0
  581         UD   0.230

  582         KK     12B
  583         KM     COMBINE 12A,G2-12B,G4
  584         HC       3
```

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  585     KK  12B12C
  586     KM     ROUTE 12B TO DESIGN POINT 12C
  587     KO       0
  588     RD    2500     .025     .015        0     TRAP       10        5

  589     KK      G5
  590     KM     RUNOFF FROM  G5
  591     BA   0.118
  592     LS       0     76.3
  593     UD   0.190

  594     KK      G6
  595     KM     RUNOFF FROM  G6
  596     BA   0.139
  597     LS       0     78.1
  598     UD   0.200

  599     KK     12C
  600     KM     COMBINE 12B-12C,G5,G6 FOR TOTAL FLOW AT MEADOW RIDGE
  601     HC       3

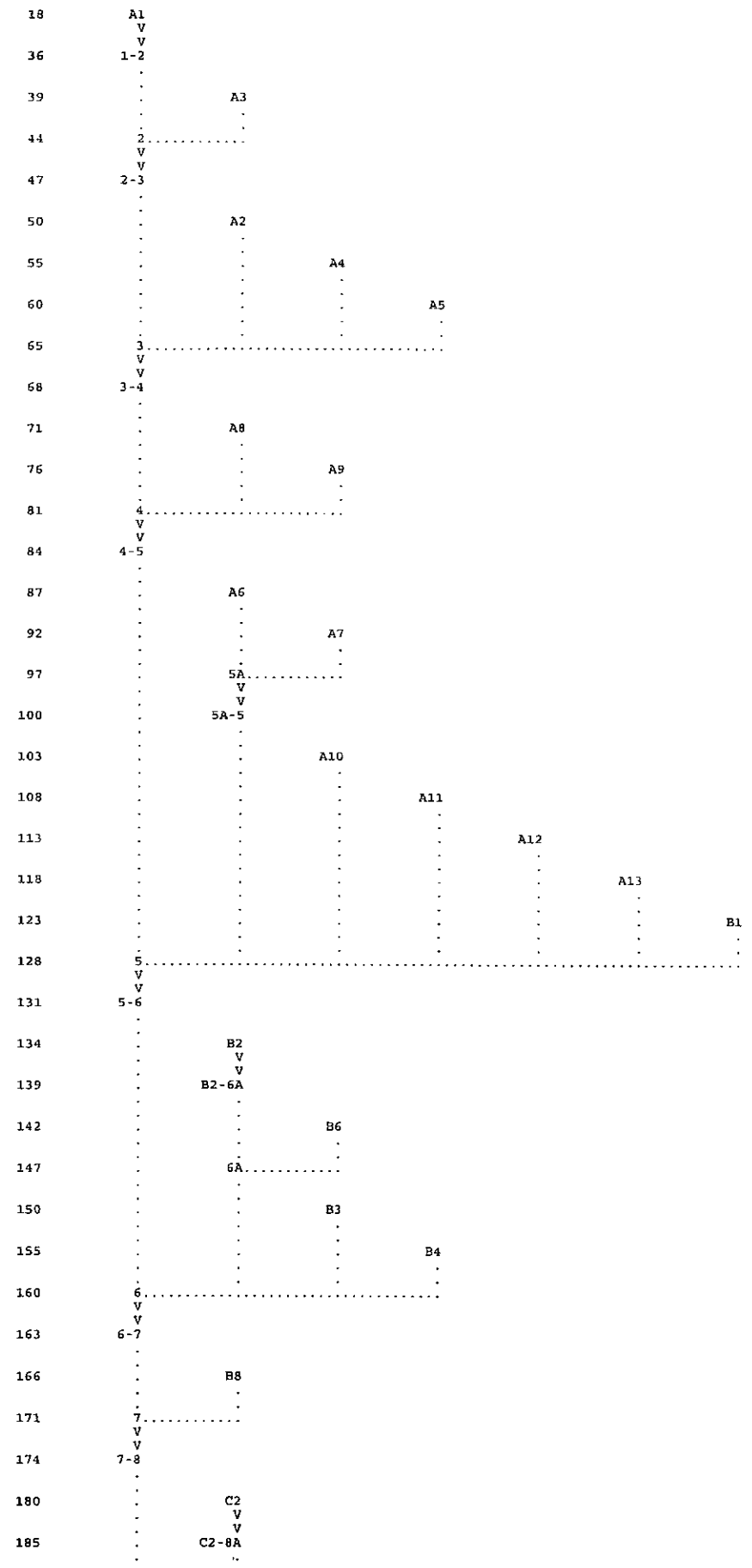
  602     KK  12C12F
  603     KM     ROUTE 12C TO DESIGN POINT 12F AT CONFLUENCE W/ COTTONWOOD CREEK
  604     KO       0
  605     RD    1650     .028     .013        0     CIRC        8

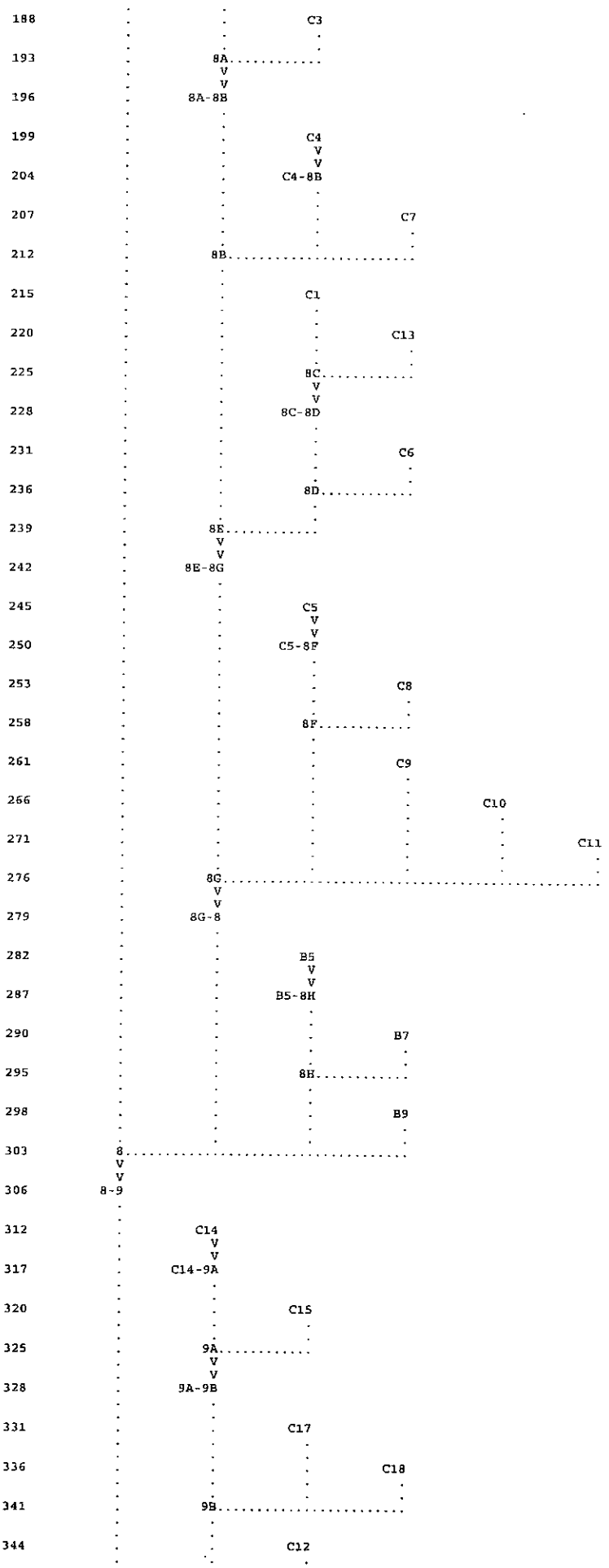
  606     KK   G8
  607     KM     RUNOFF FROM  G8
  608     BA   0.081
  609     LS       0     80.1
  610     UD   0.17

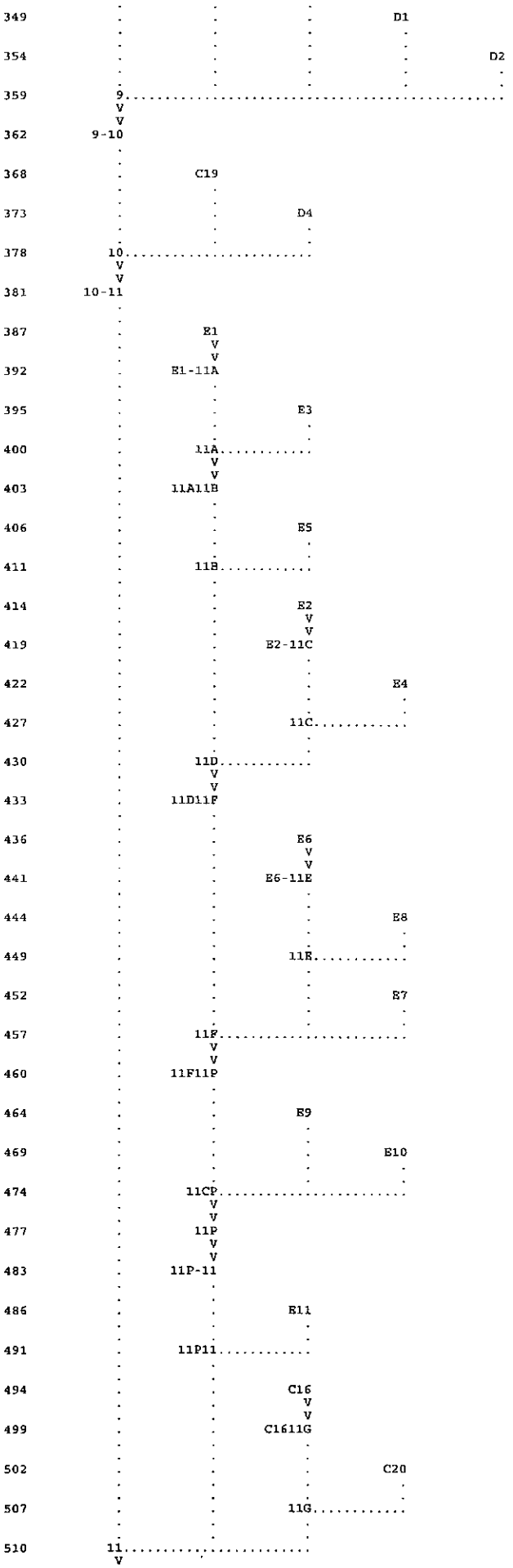
  611     KK     12F
  612     KM     COMBINE 12C12F AND G8 FOR TOTAL FLOW IN AUSTIN BLUFFS TRIBUTARY
  613     HC       2

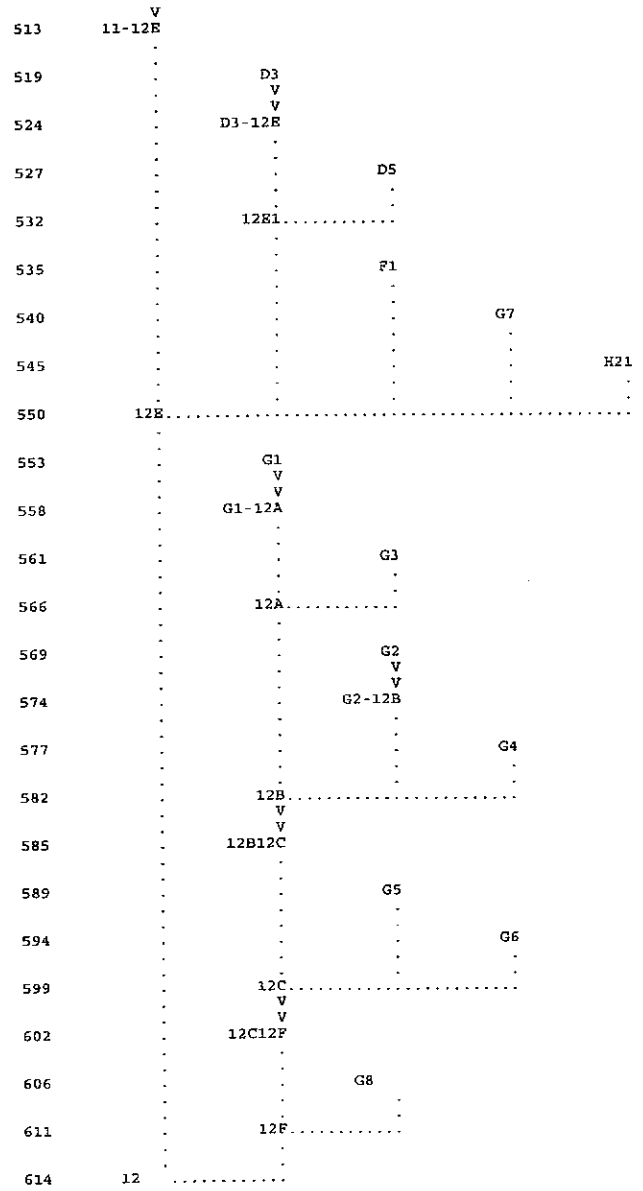
  614     KK   12
  615     KM     COMBINE 12E AND 12F FOR TOTAL FLOW BELOW CONFLUENCE W/ TRIBUTARY
  616     HC       2
  617     ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK




188
C3
193
8A
196
8A-8B
199
C4
204
C4-8B
207
C7
212
8B
215
C1
220
C13
225
8C
228
8C-8D
231
C6
236
8D
239
8E
242
8E-8G
245
C5
250
C5-8F
253
C8
258
8F
261
C9
266
C10
271
C11
276
8G
279
8G-8
282
B5
287
B5-8H
290
B7
295
8H
298
B9
303
8
306
8-9
312
C14
317
C14-9A
320
C15
325
9A
328
9A-9B
331
C17
336
C18
341
9B
344
C12


349
D1
354
D2
359
9
362
9-10
368
C19
373
D4
378
10
381
10-11
387
E1
392
E1-11A
395
E3
400
11A
403
11A11B
406
E5
411
11B
414
E2
419
E2-11C
422
E4
427
11C
430
11D
433
11D11F
436
E6
441
E6-11E
444
E8
449
11E
452
E7
457
11F
460
11F11P
464
E9
469
E10
474
11CP
477
11P
483
11P-11
486
E11
491
11P11
494
C16
499
C1611G
502
C20
507
11G
510
11



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

HEC1 S/N: 1343000062 HMVersion: 6.33 Data File: X:\871571\HYDRO\HEC1\CCAB100.DAT

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*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              MAY  1991                *
*            VERSION 4.0.1E             *
*                                       *
*  RUN DATE  08/29/1997  TIME  14:54:56 *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*        DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104              *
*                                       *
*****************************************
```

```
COTTONWOOD CREEK AYERS DBPS MODEL REVISED TO PROVIDE  HYROGRAPHS AT
A POINT IMEDIATELY UPSTREAM OF AUSTIN BLUFFS PARKWAY AND IMEDIATELY
DOWNSTREAM OF THE CONFLUENCE WITH THE AUSTIN BLUFFS TRIBUTARY.
ALSO REVISED SOME REACHES TO PIPE CONVEYENCES IN THE AUSTIN BLUFFS
TRIBUTARY. REVISED BY JR ENGINEERING, VANCE FOSSINGER ON 7-29-97

REVISED SOME KM CARDS ON 8-18-97 FOR CLEARIFICATION

100 YR 24 HR STORM

COTTONWOOD CREEK DBPS AYRES PROJECT NO. 34-0330.00
FUTURE CONDITIONS - INPUT FILE 100FDREV.INP
CN AND LAGS REVISED BASED UPON SEPTEMBER 4TH, 1996 MEETING WITH
CITY OF COLORADO SPRINGS ENGINEERING STAFF
100 YEAR 24 HOUR STORM - RUN DATE 10-08-96

 17 IO          OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                      NMIN          5  MINUTES IN COMPUTATION INTERVAL
                     IDATE      1SEP89  STARTING DATE
                     ITIME        0800  STARTING TIME
                        NQ         300  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      2SEP89  ENDING DATE
                     NDTIME        0855  ENDING TIME
                     ICENT          19  CENTURY MARK

                  COMPUTATION INTERVAL     0.08 HOURS
                      TOTAL TIME BASE    24.92 HOURS

          ENGLISH UNITS
               DRAINAGE AREA          SQUARE MILES
               PRECIPITATION DEPTH    INCHES
               LENGTH, ELEVATION      FEET
               FLOW                   CUBIC FEET PER SECOND
               STORAGE VOLUME         ACRE-FEET
               SURFACE AREA           ACRES
               TEMPERATURE            DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
 460 KK     *    11F11P  *
            *            *
            **************

 462 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
 585 KK     *    12B12C  *
            *            *
            **************

 587 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
 602 KK     *    12C12F  *
            *            *
            **************

 604 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
```

100 YEAR 24 HOUR STORM

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	A1	62.	6.33	13.	4.	4.	0.19		
ROUTED TO	1-2	62.	6.50	13.	4.	4.	0.19		
HYDROGRAPH AT	A3	60.	6.33	11.	4.	4.	0.16		
2 COMBINED AT	2	110.	6.42	24.	8.	8.	0.35		
ROUTED TO	2-3	109.	6.67	24.	8.	8.	0.35		
HYDROGRAPH AT	A2	61.	6.50	14.	5.	5.	0.21		
HYDROGRAPH AT	A4	82.	6.42	17.	6.	6.	0.25		
HYDROGRAPH AT	A5	74.	6.33	14.	5.	5.	0.21		
4 COMBINED AT	3	282.	6.58	69.	24.	23.	1.02		
ROUTED TO	3-4	277.	6.75	69.	24.	23.	1.02		
HYDROGRAPH AT	A8	79.	6.33	16.	6.	5.	0.24		
HYDROGRAPH AT	A9	81.	6.25	13.	5.	5.	0.20		
3 COMBINED AT	4	359.	6.67	98.	35.	33.	1.46		
ROUTED TO	4-5	357.	6.75	98.	34.	33.	1.46		
HYDROGRAPH AT	A6	51.	6.33	10.	3.	3.	0.14		
HYDROGRAPH AT	A7	49.	6.33	9.	3.	3.	0.14		
2 COMBINED AT	5A	100.	6.33	19.	7.	6.	0.28		
ROUTED TO	5A-5	99.	6.58	19.	7.	6.	0.28		
HYDROGRAPH AT	A10	68.	6.25	12.	4.	4.	0.17		
HYDROGRAPH AT	A11	41.	6.33	8.	3.	3.	0.12		
HYDROGRAPH AT	A12	53.	6.17	8.	3.	3.	0.12		
HYDROGRAPH AT	A13	52.	6.42	11.	4.	4.	0.16		
HYDROGRAPH AT	B1	127.	6.08	15.	5.	5.	0.19		
7 COMBINED AT	5	597.	6.50	169.	60.	57.	2.50		
ROUTED TO	5-6	595.	6.75	168.	59.	57.	2.50		
HYDROGRAPH AT	B2	173.	6.08	18.	6.	6.	0.11		
ROUTED TO	B2-6A	167.	6.17	18.	6.	6.	0.11		
HYDROGRAPH AT	B6	197.	6.25	32.	10.	10.	0.18		
2 COMBINED AT	6A	361.	6.25	51.	16.	15.	0.29		
HYDROGRAPH AT	B3	184.	6.08	22.	7.	7.	0.15		
HYDROGRAPH AT	B4	127.	6.08	15.	5.	5.	0.10		
4 COMBINED AT	6	749.	6.67	252.	87.	84.	3.04		
ROUTED TO	6-7	746.	6.92	252.	87.	83.	3.04		
HYDROGRAPH AT	B8	195.	6.25	32.	10.	9.	0.16		
2 COMBINED AT	7	857.	6.58	281.	96.	93.	3.20		
ROUTED TO	7-8	853.	6.67	281.	96.	93.	3.20		
HYDROGRAPH AT	C2	104.	6.08	11.	4.	4.	0.15		
ROUTED TO	C2-8A	99.	6.25	10.	4.	3.	0.15		
HYDROGRAPH AT	C3	102.	6.17	13.	4.	4.	0.16		
2 COMBINED AT	8A	191.	6.17	24.	8.	8.	0.32		
ROUTED TO	8A-8B	200.	6.42	24.	8.	8.	0.32		
HYDROGRAPH AT	C4	167.	6.08	21.	7.	7.	0.22		
ROUTED TO	C4-8B	162.	6.25	21.	7.	7.	0.22		
HYDROGRAPH AT	C7	205.	6.17	27.	8.	8.	0.16		
3 COMBINED AT	8B	439.	6.42	71.	24.	23.	0.70		
HYDROGRAPH AT	C1	155.	6.08	17.	6.	5.	0.17		
HYDROGRAPH AT	C13	143.	6.00	15.	5.	5.	0.13		
2 COMBINED AT	8C	298.	6.08	32.	10.	10.	0.29		
ROUTED TO	8C-8D	276.	6.25	32.	10.	10.	0.29		
HYDROGRAPH AT	C6	164.	6.08	20.	6.	6.	0.11		
2 COMBINED AT	8D	397.	6.25	51.	16.	16.	0.40		
2 COMBINED AT	8E	778.	6.33	122.	40.	39.	1.09		
ROUTED TO	8E-8G	785.	6.42	122.	40.	39.	1.09		
HYDROGRAPH AT	C5	192.	6.17	25.	8.	8.	0.23		
ROUTED TO	C5-8F	178.	6.50	24.	8.	8.	0.23		
HYDROGRAPH AT	C8	205.	6.25	32.	10.	9.	0.17		

2 COMBINED AT	8F	316.	6.42	55.	18.	17.	0.40		
HYDROGRAPH AT	C9	230.	6.25	35.	11.	11.	0.21		
HYDROGRAPH AT	C10	98.	6.25	17.	5.	5.	0.11		
HYDROGRAPH AT	C11	183.	6.17	24.	7.	7.	0.13		
5 COMBINED AT	8G	1454.	6.42	252.	81.	78.	1.93		
ROUTED TO	8G-8	1437.	6.50	252.	81.	78.	1.93		
HYDROGRAPH AT	B5	195.	6.08	22.	7.	6.	0.11		
ROUTED TO	B5-8H	190.	6.33	22.	7.	6.	0.11		
HYDROGRAPH AT	B7	366.	6.17	49.	15.	15.	0.30		
2 COMBINED AT	8H	508.	6.25	71.	22.	21.	0.40		
HYDROGRAPH AT	B9	237.	6.17	34.	10.	10.	0.17		
4 COMBINED AT	8	2733.	6.42	633.	210.	202.	5.70		
ROUTED TO	8-9	2708.	6.50	633.	210.	202.	5.70		
HYDROGRAPH AT	C14	147.	6.08	16.	5.	5.	0.10		
ROUTED TO	C14-9A	139.	6.17	16.	5.	5.	0.10		
HYDROGRAPH AT	C15	127.	6.08	14.	4.	4.	0.09		
2 COMBINED AT	9A	239.	6.17	29.	9.	9.	0.19		
ROUTED TO	9A-9B	227.	6.50	28.	9.	9.	0.19		
HYDROGRAPH AT	C17	102.	6.17	15.	5.	4.	0.09		
HYDROGRAPH AT	C18	179.	6.25	30.	10.	9.	0.20		
3 COMBINED AT	9B	450.	6.42	73.	23.	22.	0.48		
HYDROGRAPH AT	C12	195.	6.08	22.	7.	7.	0.11		
HYDROGRAPH AT	D1	261.	6.17	35.	11.	10.	0.17		
HYDROGRAPH AT	D2	323.	6.17	45.	14.	13.	0.20		
5 COMBINED AT	9	3477.	6.42	803.	264.	255.	6.65		
ROUTED TO	9-10	3456.	6.50	803.	264.	254.	6.65		
HYDROGRAPH AT	C19	122.	6.17	18.	6.	5.	0.11		
HYDROGRAPH AT	D4	203.	6.17	29.	9.	8.	0.12		
3 COMBINED AT	10	3616.	6.50	848.	278.	268.	6.88		
ROUTED TO	10-11	3570.	6.50	848.	278.	268.	6.88		
HYDROGRAPH AT	E1	122.	6.08	13.	4.	4.	0.09		
ROUTED TO	E1-11A	118.	6.25	13.	4.	4.	0.09		
HYDROGRAPH AT	E3	291.	6.08	33.	10.	10.	0.15		
2 COMBINED AT	11A	364.	6.08	46.	14.	14.	0.24		
ROUTED TO	11A11B	359.	6.25	45.	14.	14.	0.24		
HYDROGRAPH AT	E5	208.	6.17	29.	9.	8.	0.13		
2 COMBINED AT	11B	553.	6.25	74.	23.	22.	0.37		
HYDROGRAPH AT	E2	212.	6.08	24.	7.	7.	0.09		
ROUTED TO	E2-11C	209.	6.25	25.	7.	7.	0.09		
HYDROGRAPH AT	E4	162.	6.25	26.	8.	8.	0.15		
2 COMBINED AT	11C	371.	6.25	51.	16.	15.	0.24		
2 COMBINED AT	11D	924.	6.25	125.	38.	37.	0.61		
ROUTED TO	11D11F	886.	6.25	125.	38.	37.	0.61		
HYDROGRAPH AT	E6	45.	6.17	6.	2.	2.	0.05		
ROUTED TO	E6-11E	44.	6.50	6.	2.	2.	0.05		
HYDROGRAPH AT	E8	228.	6.08	28.	8.	8.	0.12		
2 COMBINED AT	11E	228.	6.08	34.	10.	10.	0.17		
HYDROGRAPH AT	E7	174.	6.17	24.	7.	7.	0.12		
3 COMBINED AT	11F	1220.	6.25	183.	56.	54.	0.90		
ROUTED TO	11F11P	1209.	6.33	184.	57.	54.	0.90		
HYDROGRAPH AT	E9	189.	6.00	19.	6.	6.	0.11		
HYDROGRAPH AT	E10	168.	6.00	16.	5.	5.	0.10		
3 COMBINED AT	11CP	1277.	6.25	218.	67.	65.	1.11		
ROUTED TO	11P	285.	7.00	214.	67.	65.	1.11	6811.36	7.00
ROUTED TO	11P-11	285.	7.08	214.	67.	65.	1.11		
HYDROGRAPH AT	E11	112.	6.17	16.	5.	5.	0.10		
2 COMBINED AT	11P11	329.	6.25	229.	72.	69.	1.21		
HYDROGRAPH AT	C16	175.	6.17	22.	7.	7.	0.14		
ROUTED TO	C1611G	174.	6.42	22.	7.	7.	0.14		
HYDROGRAPH AT	C20	136.	6.25	21.	6.	6.	0.11		

100 YR, 24 HR STORM

2 COMBINED AT	11G	294.	6.33	43.	13.	13.	0.25
3 COMBINED AT	11	4120.	6.50	1119.	364.	350.	8.35
ROUTED TO	11-12E	4085.	6.58	1119.	363.	350.	8.35
HYDROGRAPH AT	D3	277.	6.17	39.	11.	11.	0.13
ROUTED TO	D3-12E	272.	6.17	39.	11.	11.	0.13
HYDROGRAPH AT	D5	316.	6.08	38.	11.	11.	0.13
2 COMBINED AT	12E1	565.	6.08	76.	23.	22.	0.25
HYDROGRAPH AT	F1	138.	6.33	25.	8.	8.	0.14
HYDROGRAPH AT	G7	213.	6.17	29.	9.	9.	0.17
HYDROGRAPH AT	H21	199.	6.08	24.	7.	7.	0.08
5 COMBINED AT	12E	4458.	6.58	1257.	410.	395.	8.99
HYDROGRAPH AT	G1	330.	6.08	36.	11.	11.	0.18
ROUTED TO	G1-12A	324.	6.08	36.	11.	11.	0.18
HYDROGRAPH AT	G3	256.	6.17	33.	10.	10.	0.18
2 COMBINED AT	12A	572.	6.08	70.	21.	21.	0.36
HYDROGRAPH AT	G2	156.	6.08	16.	5.	5.	0.11
ROUTED TO	G2-12B	151.	6.17	16.	5.	5.	0.11
HYDROGRAPH AT	G4	272.	6.08	33.	10.	9.	0.13
3 COMBINED AT	12B	993.	6.08	119.	36.	35.	0.60
ROUTED TO	12B12C	952.	6.17	118.	36.	35.	0.60
HYDROGRAPH AT	G5	171.	6.08	19.	6.	6.	0.12
HYDROGRAPH AT	G6	213.	6.08	24.	7.	7.	0.14
3 COMBINED AT	12C	1334.	6.08	161.	50.	48.	0.86
ROUTED TO	12C12F	1308.	6.08	161.	50.	48.	0.86
HYDROGRAPH AT	G8	141.	6.08	15.	5.	5.	0.08
2 COMBINED AT	12F	1449.	6.08	177.	55.	53.	0.94
2 COMBINED AT	12	4803.	6.50	1432.	464.	447.	9.93

← UPSTREAM OF AUSTIN BLUFFS PARKWAY

← AT THE CONFLUENCE DOWNSTREAM OF AUSTIN BLUFFS PARKWAY

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
1-2	MANE	2.00	61.67	392.00	0.88	5.00	61.61	390.00	0.88
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.8845E+01 EXCESS=0.0000E+00 OUTFLOW=0.8834E+01 BASIN STORAGE=0.2554E-01 PERCENT ERROR= -0.2									
2-3	MANE	2.25	109.76	402.75	0.88	5.00	109.01	400.00	0.88
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1645E+02 EXCESS=0.0000E+00 OUTFLOW=0.1638E+02 BASIN STORAGE=0.1260E+00 PERCENT ERROR= -0.3									
3-4	MANE	2.75	276.60	404.25	0.88	5.00	276.56	405.00	0.88
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4810E+02 EXCESS=0.0000E+00 OUTFLOW=0.4797E+02 BASIN STORAGE=0.2321E+00 PERCENT ERROR= -0.2									
4-5	MANE	3.00	356.73	405.00	0.88	5.00	356.73	405.00	0.88
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6852E+02 EXCESS=0.0000E+00 OUTFLOW=0.6839E+02 BASIN STORAGE=0.2106E+00 PERCENT ERROR= -0.1									
5A-5	MANE	2.00	100.21	392.00	0.88	5.00	98.70	395.00	0.88
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1308E+02 EXCESS=0.0000E+00 OUTFLOW=0.1306E+02 BASIN STORAGE=0.6731E-01 PERCENT ERROR= -0.4									
5-6	MANE	2.75	596.75	404.25	0.88	5.00	595.48	405.00	0.88
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1181E+03 EXCESS=0.0000E+00 OUTFLOW=0.1177E+03 BASIN STORAGE=0.8170E+00 PERCENT ERROR= -0.3									
B2-6A	MANE	1.75	171.97	372.75	2.00	5.00	166.82	370.00	1.99
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1139E+02 EXCESS=0.0000E+00 OUTFLOW=0.1140E+02 BASIN STORAGE=0.8066E-02 PERCENT ERROR= -0.2									
6-7	MANE	2.50	749.27	412.50	1.06	5.00	746.01	415.00	1.06
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1725E+03 EXCESS=0.0000E+00 OUTFLOW=0.1720E+03 BASIN STORAGE=0.9010E+00 PERCENT ERROR= -0.2									
7-8	MANE	3.00	853.54	399.00	1.12	5.00	852.56	400.00	1.12
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1913E+03 EXCESS=0.0000E+00 OUTFLOW=0.1909E+03 BASIN STORAGE=0.3375E+00 PERCENT ERROR= 0.0									
C2-8A	MANE	1.25	102.81	373.75	0.88	5.00	99.30	375.00	0.87
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7249E+01 EXCESS=0.0000E+00 OUTFLOW=0.7260E+01 BASIN STORAGE=0.7438E-02 PERCENT ERROR= -0.3									
8A-8B	MANE	1.75	199.67	385.00	0.95	5.00	199.67	385.00	0.95
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1608E+02 EXCESS=0.0000E+00 OUTFLOW=0.1606E+02 BASIN STORAGE=0.6720E-01 PERCENT ERROR= -0.3									
C4-8B	MANE	1.50	167.33	376.50	1.16	5.00	162.25	375.00	1.16
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1388E+02 EXCESS=0.0000E+00 OUTFLOW=0.1389E+02 BASIN STORAGE=0.1266E-01 PERCENT ERROR= -0.1									
8C-8D	MANE	1.50	293.93	376.50	1.33	5.00	276.26	375.00	1.33
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2048E+02 EXCESS=0.0000E+00 OUTFLOW=0.2051E+02 BASIN STORAGE=0.3560E-01 PERCENT ERROR= -0.4									
8E-8G	MANE	2.50	785.46	385.00	1.36	5.00	785.46	385.00	1.36
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7936E+02 EXCESS=0.0000E+00 OUTFLOW=0.7930E+02 BASIN STORAGE=0.1526E+00 PERCENT ERROR= -0.1									
C5-8F	MANE	1.75	204.48	383.25	1.33	5.00	178.30	390.00	1.29
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1602E+02 EXCESS=0.0000E+00 OUTFLOW=0.1605E+02 BASIN STORAGE=0.9360E-01 PERCENT ERROR= -0.8									
8G-8	MANE	2.75	1437.61	390.50	1.57	5.00	1436.61	390.00	1.57
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1615E+03 EXCESS=0.0000E+00 OUTFLOW=0.1614E+03 BASIN STORAGE=0.3480E+00 PERCENT ERROR= -0.1									
B5-8H	MANE	1.75	191.03	379.75	2.35	5.00	190.04	380.00	2.33
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1338E+02 EXCESS=0.0000E+00 OUTFLOW=0.1341E+02 BASIN STORAGE=0.2715E-01 PERCENT ERROR= -0.4									
8-9	MANE	2.75	2712.18	387.75	1.37	5.00	2707.71	390.00	1.37
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4167E+03 EXCESS=0.0000E+00 OUTFLOW=0.4163E+03 BASIN STORAGE=0.4485E+00 PERCENT ERROR= 0.0									
C14-9A	MANE	1.75	143.04	372.75	1.77	5.00	139.29	370.00	1.77

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.9811E+01 EXCESS=0.0000E+00 OUTFLOW=0.9820E+01 BASIN STORAGE=0.5639E-02 PERCENT ERROR= -0.1

9A-9B	MANE	2.00	258.11	388.00	1.81	5.00	226.57	390.00	1.78

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1826E+02 EXCESS=0.0000E+00 OUTFLOW=0.1827E+02 BASIN STORAGE=0.1445E+00 PERCENT ERROR= -0.8

9-10	MANE	2.75	3484.52	388.01	1.48	5.00	3456.45	390.00	1.48

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5242E+03 EXCESS=0.0000E+00 OUTFLOW=0.5239E+03 BASIN STORAGE=0.2954E+00 PERCENT ERROR= 0.0

10-11	MANE	1.57	3601.73	391.45	1.50	5.00	3570.35	390.00	1.50

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5518E+03 EXCESS=0.0000E+00 OUTFLOW=0.5516E+03 BASIN STORAGE=0.3248E+00 PERCENT ERROR= 0.0

E1-11A	MANE	1.75	119.17	374.50	1.63	5.00	117.72	375.00	1.62

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.8062E+01 EXCESS=0.0000E+00 OUTFLOW=0.8073E+01 BASIN STORAGE=0.8358E-02 PERCENT ERROR= -0.2

11A11B	MANE	2.25	365.50	375.75	2.19	5.00	358.84	375.00	2.18

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2790E+02 EXCESS=0.0000E+00 OUTFLOW=0.2791E+02 BASIN STORAGE=0.4195E-01 PERCENT ERROR= -0.2

E2-11C	MANE	3.75	208.78	375.00	3.00	5.00	208.78	375.00	3.02

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1440E+02 EXCESS=0.0000E+00 OUTFLOW=0.1442E+02 BASIN STORAGE=0.1463E-01 PERCENT ERROR= -0.3

11D11F	MANE	3.16	901.74	376.24	2.34	5.00	885.56	375.00	2.34

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7613E+02 EXCESS=0.0000E+00 OUTFLOW=0.7613E+02 BASIN STORAGE=0.4688E-01 PERCENT ERROR= -0.1

E6-11E	MANE	2.00	46.15	386.00	1.66	5.00	44.45	390.00	1.68

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3987E+01 EXCESS=0.0000E+00 OUTFLOW=0.3990E+01 BASIN STORAGE=0.2186E-01 PERCENT ERROR= -0.6

11F11P	MANE	4.75	1209.21	380.00	2.34	5.00	1209.21	380.00	2.34

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1119E+03 EXCESS=0.0000E+00 OUTFLOW=0.1119E+03 BASIN STORAGE=0.1496E+00 PERCENT ERROR= -0.1

11P-11	MANE	1.94	285.22	422.71	2.25	5.00	285.17	425.00	2.25

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1334E+03 EXCESS=0.0000E+00 OUTFLOW=0.1333E+03 BASIN STORAGE=0.6675E-01 PERCENT ERROR= 0.0

C1611G	MANE	2.00	178.99	384.00	1.86	5.00	173.58	385.00	1.85

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1397E+02 EXCESS=0.0000E+00 OUTFLOW=0.1399E+02 BASIN STORAGE=0.4412E-01 PERCENT ERROR= -0.5

11-12E	MANE	5.00	4084.98	395.00	1.62	5.00	4084.98	395.00	1.62

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7216E+03 EXCESS=0.0000E+00 OUTFLOW=0.7207E+03 BASIN STORAGE=0.1194E+01 PERCENT ERROR= 0.0

D3-12E	MANE	3.60	273.88	370.59	3.35	5.00	272.14	370.00	3.35

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2271E+02 EXCESS=0.0000E+00 OUTFLOW=0.2271E+02 BASIN STORAGE=0.6028E-02 PERCENT ERROR= 0.0

G1-12A	MANE	1.53	326.75	366.14	2.29	5.00	323.62	365.00	2.30

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2203E+02 EXCESS=0.0000E+00 OUTFLOW=0.2203E+02 BASIN STORAGE=0.2084E-03 PERCENT ERROR= 0.0

G2-12B	MANE	1.75	155.73	367.50	1.79	5.00	150.55	370.00	1.79

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1022E+02 EXCESS=0.0000E+00 OUTFLOW=0.1023E+02 BASIN STORAGE=0.1597E-02 PERCENT ERROR= -0.1

12B12C	MANE	1.86	984.90	367.85	2.25	5.00	952.07	370.00	2.25

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7225E+02 EXCESS=0.0000E+00 OUTFLOW=0.7225E+02 BASIN STORAGE=0.4874E-02 PERCENT ERROR= 0.0

12C12F	MANE	0.70	1330.35	366.25	2.16	5.00	1307.74	365.00	2.16

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.9882E+02 EXCESS=0.0000E+00 OUTFLOW=0.9882E+02 BASIN STORAGE=0.1276E-02 PERCENT ERROR= 0.0

HEC1 S/N: 1343000062 HMVersion: 6.33 Data File: X:\871571\HYDRO\HEC1\CCAB5.DAT

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*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             MAY   1991                *
*          VERSION 4.0.1E               *
*                                       *
*  RUN DATE  08/29/1997  TIME  14:55:56 *
*                                       *
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*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*            (916) 756-1104             *
*                                       *
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X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X               X
XXXXXXX  XXXX     X         XXXXX   X
X     X  X        X                 X
X     X  X        X     X           X
X     X  XXXXXXX  XXXXX           XXX
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:::                                     :::
:::  Full Microcomputer Implementation  :::
:::                by                   :::
:::        Haestad Methods, Inc.        :::
:::                                     :::
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37 Brookside Road * Waterbury, Connecticut 06708 * (203) 755-1666

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

5 YEAR

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LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  1       ID    COTTONWOOD CREEK AYERS DBPS MODEL REVISED TO PROVIDE  HYROGRAPHS AT
  2       ID    A POINT IMEDIATELY UPSTREAM OF AUSTIN BLUFFS PARKWAY AND IMEDIATELY
  3       ID    DOWNSTREAM OF THE CONFLUENCE WITH THE AUSTIN BLUFFS TRIBUTARY.
  4       ID    ALSO REVISED SOME REACHES TO PIPE CONVEYENCES IN THE AUSTIN BLUFFS
  5       ID    TRIBUTARY. REVISED BY JR ENGINEERING, VANCE FOSSINGER ON 7-29-97
  6       ID
  7       ID    REVISED SOME KM CARDS ON 8-18-97 FOR CLEARIFICATION
  8       ID
  9       ID    5YR 24 HOUR STORM
 10       ID
 11       ID    COTTONWOOD CREEK DBPS AYRES PROJECT NO. 34-0330.00
 12       ID    FUTURE CONDITIONS - INPUT FILE 100FDREV.INP
 13       ID    CN AND LAGS REVISED BASED UPON SEPTEMBER 4TH, 1996 MEETING WITH
 14       ID    CITY OF COLORADO SPRINGS ENGINEERING STAFF
 15       ID    100 YEAR 24 HOUR STORM - RUN DATE 10-08-96
          *DIAGRAM
 16       IT       5 01SEP89     800     300
 17       IO       5

 18       KK      A1
 19       KM     RUNOFF FROM  A1
 20       BA   0.188
 21       LS      0    61.0
 22       UD   0.450
 23       KM     DESIGN POINT 1
 24       IN      15
 25       PB   2.585
 26       PC   .0000   .0005   .0015   .0030   .0045   .0060   .0080   .0100   .0120   .0143
 27       PC   .0165   .0188   .0210   .0233   .0255   .0278   .0320   .0390   .0460   .0530
 28       PC   .0600   .0750   .1000   .4000   .7000   .7250   .7500   .7650   .7800   .7900
 29       PC   .8000   .8100   .8200   .8250   .8300   .8350   .8400   .8450   .8500   .8550
 30       PC   .8600   .8638   .8675   .8713   .8750   .8788   .8825   .8863   .8900   .8938
 31       PC   .8975   .9013   .9050   .9083   .9115   .9148   .9180   .9210   .9240   .9270
 32       PC   .9300   .9325   .9350   .9375   .9400   .9425   .9450   .9475   .9500   .9525
 33       PC   .9550   .9575   .9600   .9625   .9650   .9675   .9700   .9725   .9750   .9775
 34       PC   .9800   .9813   .9825   .9838   .9850   .9863   .9875   .9888   .9900   .9913
 35       PC   .9925   .9938   .9950   .9963   .9975   .9988   1.000

 36       KK     1-2
 37       KM     ROUTE TO DESIGN POINT 2
 38       RD    2300    .033    .060       0    TRAP       5      15

 39       KK      A3
 40       KM     RUNOFF FROM  A3
 41       BA   0.162
 42       LS      0    61.0
 43       UD   0.380

 44       KK       2
 45       KM     COMBINE 1-2 AND A3
 46       HC       2
```

```
*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              MAY  1991                *
*            VERSION 4.0.1E             *
*                                       *
*  RUN DATE  08/29/1997  TIME  14:55:56 *
*                                       *
*****************************************
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*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*         609 SECOND STREET             *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```


COTTONWOOD CREEK AYERS DBPS MODEL REVISED TO PROVIDE HYROGRAPHS AT
A POINT IMEDIATELY UPSTREAM OF AUSTIN BLUFFS PARKWAY AND IMEDIATELY
DOWNSTREAM OF THE CONFLUENCE WITH THE AUSTIN BLUFFS TRIBUTARY.
ALSO REVISED SOME REACHES TO PIPE CONVEYENCES IN THE AUSTIN BLUFFS
TRIBUTARY. REVISED BY JR ENGINEERING, VANCE FOSSINGER ON 7-29-97

REVISED SOME KM CARDS ON 8-18-97 FOR CLEARIFICATION

5YR 24 HOUR STORM

COTTONWOOD CREEK DBPS AYRES PROJECT NO. 34-0330.00
FUTURE CONDITIONS - INPUT FILE 100FDREV.INP
CN AND LAGS REVISED BASED UPON SEPTEMBER 4TH, 1996 MEETING WITH
CITY OF COLORADO SPRINGS ENGINEERING STAFF
100 YEAR 24 HOUR STORM - RUN DATE 10-08-96

```
 17 IO          OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                     NMIN           5  MINUTES IN COMPUTATION INTERVAL
                     IDATE      1SEP89  STARTING DATE
                     ITIME        0800  STARTING TIME
                       NQ         300  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE      2SEP89  ENDING DATE
                    NDTIME        0855  ENDING TIME
                    ICENT           19  CENTURY MARK

                  COMPUTATION INTERVAL    0.08 HOURS
                       TOTAL TIME BASE   24.92 HOURS

          ENGLISH UNITS
               DRAINAGE AREA          SQUARE MILES
               PRECIPITATION DEPTH    INCHES
               LENGTH, ELEVATION      FEET
               FLOW                   CUBIC FEET PER SECOND
               STORAGE VOLUME         ACRE-FEET
               SURFACE AREA           ACRES
               TEMPERATURE            DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

               **************
               *            *
 460 KK        *    11F11P  *
               *            *
               **************

 462 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

               **************
               *            *
 585 KK        *    12B12C  *
               *            *
               **************

 587 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

               **************
               *            *
 602 KK        *    12C12F  *
               *            *
               **************

 604 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE
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RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	A1	9.	6.50	3.	1.	1.	0.19		
ROUTED TO	1-2	9.	6.75	3.	1.	1.	0.19		
HYDROGRAPH AT	A3	9.	6.42	2.	1.	1.	0.16		
2 COMBINED AT	2	15.	6.58	5.	2.	2.	0.35		
ROUTED TO	2-3	16.	7.00	5.	2.	2.	0.35		
HYDROGRAPH AT	A2	9.	6.58	3.	1.	1.	0.21		
HYDROGRAPH AT	A4	12.	6.50	4.	2.	1.	0.25		
HYDROGRAPH AT	A5	11.	6.42	3.	1.	1.	0.21		
4 COMBINED AT	3	35.	7.00	14.	6.	6.	1.02		
ROUTED TO	3-4	34.	7.33	14.	6.	6.	1.02		
HYDROGRAPH AT	A8	12.	6.50	3.	1.	1.	0.24		
HYDROGRAPH AT	A9	12.	6.33	3.	1.	1.	0.20		
3 COMBINED AT	4	47.	6.75	20.	9.	8.	1.46		
ROUTED TO	4-5	49.	6.83	20.	9.	8.	1.46		
HYDROGRAPH AT	A6	7.	6.42	2.	1.	1.	0.14		
HYDROGRAPH AT	A7	7.	6.42	2.	1.	1.	0.14		
2 COMBINED AT	5A	14.	6.42	4.	2.	2.	0.28		
ROUTED TO	5A-5	17.	6.67	4.	2.	2.	0.28		
HYDROGRAPH AT	A10	10.	6.33	2.	1.	1.	0.17		
HYDROGRAPH AT	A11	6.	6.42	2.	1.	1.	0.12		
HYDROGRAPH AT	A12	8.	6.25	2.	1.	1.	0.12		
HYDROGRAPH AT	A13	8.	6.50	2.	1.	1.	0.16		
HYDROGRAPH AT	B1	23.	6.17	4.	1.	1.	0.19		
7 COMBINED AT	5	85.	6.83	35.	15.	14.	2.50		
ROUTED TO	5-6	82.	7.17	35.	15.	14.	2.50		
HYDROGRAPH AT	B2	71.	6.08	7.	2.	2.	0.11		
ROUTED TO	B2-6A	69.	6.25	7.	2.	2.	0.11		
HYDROGRAPH AT	B6	76.	6.33	13.	4.	4.	0.18		
2 COMBINED AT	6A	145.	6.25	21.	7.	7.	0.29		
HYDROGRAPH AT	B3	64.	6.08	8.	3.	3.	0.15		
HYDROGRAPH AT	B4	43.	6.17	6.	2.	2.	0.10		
4 COMBINED AT	6	230.	6.25	68.	26.	25.	3.04		
ROUTED TO	6-7	233.	6.42	67.	26.	25.	3.04		
HYDROGRAPH AT	B8	81.	6.25	14.	4.	4.	0.16		
2 COMBINED AT	7	306.	6.42	80.	31.	29.	3.20		
ROUTED TO	7-8	303.	6.58	80.	30.	29.	3.20		
HYDROGRAPH AT	C2	17.	6.08	2.	1.	1.	0.15		
ROUTED TO	C2-8A	17.	6.42	2.	1.	1.	0.15		
HYDROGRAPH AT	C3	20.	6.17	3.	1.	1.	0.16		
2 COMBINED AT	8A	28.	6.42	6.	2.	2.	0.32		
ROUTED TO	8A-8B	25.	6.75	5.	2.	2.	0.32		
HYDROGRAPH AT	C4	40.	6.17	6.	2.	2.	0.22		
ROUTED TO	C4-8B	39.	6.42	6.	2.	2.	0.22		
HYDROGRAPH AT	C7	81.	6.17	11.	4.	3.	0.16		
3 COMBINED AT	8B	92.	6.33	22.	8.	8.	0.70		
HYDROGRAPH AT	C1	40.	6.08	5.	2.	2.	0.17		
HYDROGRAPH AT	C13	46.	6.08	5.	2.	2.	0.13		
2 COMBINED AT	8C	86.	6.08	10.	3.	3.	0.29		
ROUTED TO	8C-8D	88.	6.42	10.	4.	3.	0.29		
HYDROGRAPH AT	C6	66.	6.08	8.	3.	3.	0.11		
2 COMBINED AT	8D	114.	6.42	18.	6.	6.	0.40		
2 COMBINED AT	8E	199.	6.33	40.	14.	14.	1.09		
ROUTED TO	8E-8G	204.	6.50	40.	14.	14.	1.09		
HYDROGRAPH AT	C5	53.	6.17	8.	3.	3.	0.23		
ROUTED TO	C5-8F	42.	6.67	7.	3.	3.	0.23		
HYDROGRAPH AT	C8	83.	6.25	13.	4.	4.	0.17		

2 COMBINED AT	8F	83.	6.25	20.	7.	7.	0.40		
HYDROGRAPH AT	C9	89.	6.25	14.	5.	4.	0.21		
HYDROGRAPH AT	C10	35.	6.33	6.	2.	2.	0.11		
HYDROGRAPH AT	C11	77.	6.17	10.	3.	3.	0.13		
5 COMBINED AT	8G	414.	6.25	90.	31.	30.	1.93		
ROUTED TO	8G-8	406.	6.42	91.	31.	30.	1.93		
HYDROGRAPH AT	B5	87.	6.08	10.	3.	3.	0.11		
ROUTED TO	B5-8H	87.	6.42	10.	3.	3.	0.11		
HYDROGRAPH AT	B7	138.	6.17	20.	6.	6.	0.30		
2 COMBINED AT	8H	191.	6.33	29.	10.	9.	0.40		
HYDROGRAPH AT	B9	99.	6.17	15.	5.	5.	0.17		
4 COMBINED AT	8	816.	6.58	213.	76.	73.	5.70		
ROUTED TO	8-9	809.	6.67	213.	76.	73.	5.70		
HYDROGRAPH AT	C14	55.	6.08	6.	2.	2.	0.10		
ROUTED TO	C14-9A	53.	6.25	6.	2.	2.	0.10		
HYDROGRAPH AT	C15	49.	6.08	5.	2.	2.	0.09		
2 COMBINED AT	9A	80.	6.17	11.	4.	4.	0.19		
ROUTED TO	9A-9B	85.	6.67	11.	4.	4.	0.19		
HYDROGRAPH AT	C17	37.	6.25	6.	2.	2.	0.09		
HYDROGRAPH AT	C18	62.	6.33	11.	4.	4.	0.20		
3 COMBINED AT	9B	133.	6.58	28.	9.	9.	0.48		
HYDROGRAPH AT	C12	85.	6.08	10.	3.	3.	0.11		
HYDROGRAPH AT	D1	116.	6.17	16.	5.	5.	0.17		
HYDROGRAPH AT	D2	147.	6.17	21.	7.	6.	0.20		
5 COMBINED AT	9	1032.	6.67	284.	100.	96.	6.65		
ROUTED TO	9-10	1022.	6.67	284.	100.	96.	6.65		
HYDROGRAPH AT	C19	43.	6.25	7.	2.	2.	0.11		
HYDROGRAPH AT	D4	96.	6.17	14.	4.	4.	0.12		
3 COMBINED AT	10	1069.	6.67	304.	106.	102.	6.88		
ROUTED TO	10-11	1059.	6.67	303.	106.	102.	6.88		
HYDROGRAPH AT	E1	43.	6.08	5.	2.	1.	0.09		
ROUTED TO	E1-11A	40.	6.33	4.	2.	1.	0.09		
HYDROGRAPH AT	E3	137.	6.08	15.	5.	5.	0.15		
2 COMBINED AT	11A	137.	6.08	20.	6.	6.	0.24		
ROUTED TO	11A11B	132.	6.25	20.	6.	6.	0.24		
HYDROGRAPH AT	E5	95.	6.17	14.	4.	4.	0.13		
2 COMBINED AT	11B	223.	6.25	33.	11.	10.	0.37		
HYDROGRAPH AT	E2	111.	6.08	13.	4.	4.	0.09		
ROUTED TO	E2-11C	109.	6.25	12.	4.	4.	0.09		
HYDROGRAPH AT	E4	61.	6.25	11.	3.	3.	0.15		
2 COMBINED AT	11C	170.	6.25	23.	7.	7.	0.24		
2 COMBINED AT	11D	393.	6.25	56.	18.	17.	0.61		
ROUTED TO	11D11F	386.	6.33	56.	18.	17.	0.61		
HYDROGRAPH AT	E6	15.	6.17	2.	1.	1.	0.05		
ROUTED TO	E6-11E	14.	6.67	2.	1.	1.	0.05		
HYDROGRAPH AT	E8	104.	6.08	13.	4.	4.	0.12		
2 COMBINED AT	11E	104.	6.08	15.	5.	5.	0.17		
HYDROGRAPH AT	E7	75.	6.17	11.	3.	3.	0.12		
3 COMBINED AT	11F	513.	6.25	82.	26.	25.	0.90		
ROUTED TO	11F11P	508.	6.33	82.	26.	25.	0.90		
HYDROGRAPH AT	E9	74.	6.00	7.	2.	2.	0.11		
HYDROGRAPH AT	E10	63.	6.00	6.	2.	2.	0.10		
3 COMBINED AT	11CP	537.	6.33	95.	31.	29.	1.11		
ROUTED TO	11P	213.	6.83	93.	30.	29.	1.11	6802.66	6.83
ROUTED TO	11P-11	213.	6.92	93.	30.	29.	1.11		
HYDROGRAPH AT	E11	40.	6.17	6.	2.	2.	0.10		
2 COMBINED AT	11P11	222.	6.75	99.	32.	31.	1.21		
HYDROGRAPH AT	C16	66.	6.17	9.	3.	3.	0.14		
ROUTED TO	C1611G	65.	6.50	9.	3.	3.	0.14		
HYDROGRAPH AT	C20	55.	6.25	9.	3.	3.	0.11		

5yr, 24hr Storm

2 COMBINED AT	11G	108.	6.42	17.	6.	5.	0.25
3 COMBINED AT	11	1357.	6.58	419.	144.	139.	8.35
ROUTED TO	11-12E	1357.	6.67	419.	144.	138.	8.35
HYDROGRAPH AT	D3	153.	6.17	21.	6.	6.	0.13
ROUTED TO	D3-12E	150.	6.25	21.	6.	6.	0.13
HYDROGRAPH AT	D5	173.	6.08	20.	6.	6.	0.13
2 COMBINED AT	12E1	302.	6.08	41.	12.	12.	0.25
HYDROGRAPH AT	F1	55.	6.33	11.	3.	3.	0.14
HYDROGRAPH AT	G7	81.	6.17	11.	4.	4.	0.17
HYDROGRAPH AT	H21	109.	6.08	13.	4.	4.	0.08
5 COMBINED AT	12E	1510.	6.67	485.	167.	161.	8.99
HYDROGRAPH AT	G1	147.	6.08	16.	5.	5.	0.18
ROUTED TO	G1-12A	141.	6.08	16.	5.	5.	0.18
HYDROGRAPH AT	G3	105.	6.17	14.	5.	4.	0.18
2 COMBINED AT	12A	237.	6.08	30.	10.	9.	0.36
HYDROGRAPH AT	G2	60.	6.08	6.	2.	2.	0.11
ROUTED TO	G2-12B	58.	6.17	6.	2.	2.	0.11
HYDROGRAPH AT	G4	133.	6.08	16.	5.	5.	0.13
3 COMBINED AT	12B	416.	6.08	52.	17.	16.	0.60
ROUTED TO	12B12C	417.	6.17	52.	16.	16.	0.60
HYDROGRAPH AT	G5	65.	6.08	7.	2.	2.	0.12
HYDROGRAPH AT	G6	85.	6.08	10.	3.	3.	0.14
3 COMBINED AT	12C	550.	6.17	69.	22.	21.	0.86
ROUTED TO	12C12F	547.	6.17	69.	22.	21.	0.86
HYDROGRAPH AT	G8	61.	6.08	6.	2.	2.	0.08
2 COMBINED AT	12F	595.	6.17	75.	24.	23.	0.94
2 COMBINED AT	12	1639.	6.67	561.	191.	184.	9.93

← UPSTREAM OF AUSTIN BLUFFS PARKWAY

← AT THE CONFLUENCE DOWNSTREAM OF AUSTIN BLUFFS PARKWAY

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
1-2	MANE	2.25	9.19	400.50	0.22	5.00	9.02	405.00	0.22
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2220E+01 EXCESS=0.0000E+00 OUTFLOW=0.2212E+01 BASIN STORAGE=0.1543E-01 PERCENT ERROR= -0.3									
2-3	MANE	2.75	16.19	420.75	0.22	5.00	15.59	420.00	0.22
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4128E+01 EXCESS=0.0000E+00 OUTFLOW=0.4079E+01 BASIN STORAGE=0.7038E-01 PERCENT ERROR= -0.5									
3-4	MANE	3.50	34.34	441.00	0.22	5.00	34.26	440.00	0.22
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1204E+02 EXCESS=0.0000E+00 OUTFLOW=0.1196E+02 BASIN STORAGE=0.1206E+00 PERCENT ERROR= -0.3									
4-5	MANE	3.25	49.49	409.50	0.22	5.00	48.99	410.00	0.22
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1713E+02 EXCESS=0.0000E+00 OUTFLOW=0.1704E+02 BASIN STORAGE=0.1092E+00 PERCENT ERROR= -0.2									
5A-5	MANE	2.00	16.96	400.00	0.22	5.00	16.96	400.00	0.22
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3284E+01 EXCESS=0.0000E+00 OUTFLOW=0.3263E+01 BASIN STORAGE=0.4190E-01 PERCENT ERROR= -0.6									
5-6	MANE	4.00	84.24	432.00	0.22	5.00	82.15	430.00	0.22
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2973E+02 EXCESS=0.0000E+00 OUTFLOW=0.2943E+02 BASIN STORAGE=0.4362E+00 PERCENT ERROR= -0.5									
B2-6A	MANE	1.50	69.15	375.00	0.84	5.00	69.15	375.00	0.84
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4813E+01 EXCESS=0.0000E+00 OUTFLOW=0.4821E+01 BASIN STORAGE=0.8678E-02 PERCENT ERROR= -0.3									
6-7	MANE	2.75	232.96	385.00	0.32	5.00	232.96	385.00	0.32
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5204E+02 EXCESS=0.0000E+00 OUTFLOW=0.5173E+02 BASIN STORAGE=0.4879E+00 PERCENT ERROR= -0.3									
7-8	MANE	3.25	304.81	393.25	0.35	5.00	302.59	395.00	0.35
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6065E+02 EXCESS=0.0000E+00 OUTFLOW=0.6046E+02 BASIN STORAGE=0.1436E+00 PERCENT ERROR= 0.1									
C2-8A	MANE	1.00	20.51	381.00	0.22	5.00	17.30	385.00	0.22
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1820E+01 EXCESS=0.0000E+00 OUTFLOW=0.1828E+01 BASIN STORAGE=0.1116E-01 PERCENT ERROR= -1.0									
8A-8B	MANE	1.50	26.46	391.50	0.26	5.00	24.59	405.00	0.25
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4346E+01 EXCESS=0.0000E+00 OUTFLOW=0.4324E+01 BASIN STORAGE=0.5397E-01 PERCENT ERROR= -0.7									
C4-8B	MANE	1.25	41.75	382.50	0.36	5.00	39.13	385.00	0.35
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4269E+01 EXCESS=0.0000E+00 OUTFLOW=0.4275E+01 BASIN STORAGE=0.1303E-01 PERCENT ERROR= -0.4									
8C-8D	MANE	1.25	98.62	381.25	0.45	5.00	88.04	385.00	0.46
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6858E+01 EXCESS=0.0000E+00 OUTFLOW=0.6883E+01 BASIN STORAGE=0.4352E-01 PERCENT ERROR= -1.0									
8E-8G	MANE	2.25	204.37	391.50	0.48	5.00	204.35	390.00	0.48
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2801E+02 EXCESS=0.0000E+00 OUTFLOW=0.2795E+02 BASIN STORAGE=0.1135E+00 PERCENT ERROR= -0.2									
C5-8F	MANE	1.50	70.63	397.50	0.44	5.00	42.32	400.00	0.43
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5360E+01 EXCESS=0.0000E+00 OUTFLOW=0.5370E+01 BASIN STORAGE=0.7012E-01 PERCENT ERROR= -1.5									
8G-8	MANE	2.50	411.01	382.50	0.60	5.00	405.50	385.00	0.60
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6174E+02 EXCESS=0.0000E+00 OUTFLOW=0.6163E+02 BASIN STORAGE=0.2040E+00 PERCENT ERROR= -0.2									
B5-8H	MANE	1.75	87.02	385.00	1.08	5.00	87.02	385.00	1.10
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6153E+01 EXCESS=0.0000E+00 OUTFLOW=0.6171E+01 BASIN STORAGE=0.3154E-01 PERCENT ERROR= -0.8									
8-9	MANE	4.00	809.39	400.00	0.49	5.00	809.39	400.00	0.49
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1505E+03 EXCESS=0.0000E+00 OUTFLOW=0.1502E+03 BASIN STORAGE=0.2185E+00 PERCENT ERROR= 0.1									
C14-9A	MANE	1.50	52.68	375.00	0.70	5.00	52.68	375.00	0.70

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3886E+01 EXCESS=0.0000E+00 OUTFLOW=0.3891E+01 BASIN STORAGE=0.5992E-02 PERCENT ERROR= -0.3

9A-9B	MANE	1.75	93.66	400.75	0.73	5.00	84.50	400.00	0.74

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7321E+01 EXCESS=0.0000E+00 OUTFLOW=0.7314E+01 BASIN STORAGE=0.1034E+00 PERCENT ERROR= -1.3

9-10	MANE	4.25	1030.51	403.75	0.56	5.00	1021.98	400.00	0.56

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1980E+03 EXCESS=0.0000E+00 OUTFLOW=0.1977E+03 BASIN STORAGE=0.1491E+00 PERCENT ERROR= 0.1

10-11	MANE	2.81	1066.23	401.58	0.57	5.00	1058.79	400.00	0.57

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2107E+03 EXCESS=0.0000E+00 OUTFLOW=0.2106E+03 BASIN STORAGE=0.1621E+00 PERCENT ERROR= 0.0

E1-11A	MANE	1.50	42.62	376.50	0.62	5.00	40.42	380.00	0.61

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3046E+01 EXCESS=0.0000E+00 OUTFLOW=0.3054E+01 BASIN STORAGE=0.9333E-02 PERCENT ERROR= -0.6

11A11B	MANE	1.75	134.36	376.25	0.99	5.00	131.71	375.00	0.99

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1258E+02 EXCESS=0.0000E+00 OUTFLOW=0.1258E+02 BASIN STORAGE=0.3518E-01 PERCENT ERROR= -0.3

E2-11C	MANE	2.25	109.11	375.75	1.57	5.00	108.98	375.00	1.56

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7525E+01 EXCESS=0.0000E+00 OUTFLOW=0.7539E+01 BASIN STORAGE=0.1243E-01 PERCENT ERROR= -0.4

11D11F	MANE	3.00	393.71	378.00	1.09	5.00	386.42	380.00	1.09

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3539E+02 EXCESS=0.0000E+00 OUTFLOW=0.3538E+02 BASIN STORAGE=0.3437E-01 PERCENT ERROR= -0.1

E6-11E	MANE	1.75	17.15	392.00	0.64	5.00	13.64	400.00	0.62

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1524E+01 EXCESS=0.0000E+00 OUTFLOW=0.1525E+01 BASIN STORAGE=0.1651E-01 PERCENT ERROR= -1.2

11F11P	MANE	3.00	514.92	381.00	1.08	5.00	507.63	380.00	1.08

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5167E+02 EXCESS=0.0000E+00 OUTFLOW=0.5163E+02 BASIN STORAGE=0.1033E+00 PERCENT ERROR= -0.1

11P-11	MANE	2.09	213.32	413.83	1.02	5.00	213.25	415.00	1.02

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6028E+02 EXCESS=0.0000E+00 OUTFLOW=0.6025E+02 BASIN STORAGE=0.4320E-01 PERCENT ERROR= 0.0

C1611G	MANE	1.75	70.99	388.50	0.76	5.00	64.75	390.00	0.76

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5682E+01 EXCESS=0.0000E+00 OUTFLOW=0.5693E+01 BASIN STORAGE=0.3472E-01 PERCENT ERROR= -0.8

11-12E	MANE	4.25	1360.09	403.75	0.64	5.00	1357.49	400.00	0.64

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2859E+03 EXCESS=0.0000E+00 OUTFLOW=0.2851E+03 BASIN STORAGE=0.6270E+00 PERCENT ERROR= 0.1

D3-12E	MANE	3.75	149.79	375.00	1.86	5.00	149.79	375.00	1.86

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1259E+02 EXCESS=0.0000E+00 OUTFLOW=0.1260E+02 BASIN STORAGE=0.4423E-02 PERCENT ERROR= -0.1

G1-12A	MANE	1.75	142.71	367.50	1.04	5.00	141.06	365.00	1.04

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1001E+02 EXCESS=0.0000E+00 OUTFLOW=0.1001E+02 BASIN STORAGE=0.1842E-03 PERCENT ERROR= 0.0

G2-12B	MANE	1.50	58.09	370.50	0.71	5.00	57.79	370.00	0.71

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4076E+01 EXCESS=0.0000E+00 OUTFLOW=0.4078E+01 BASIN STORAGE=0.1346E-02 PERCENT ERROR= -0.1

12B12C	MANE	1.75	419.70	369.25	1.02	5.00	416.57	370.00	1.02

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3276E+02 EXCESS=0.0000E+00 OUTFLOW=0.3276E+02 BASIN STORAGE=0.3388E-02 PERCENT ERROR= 0.0

12C12F	MANE	0.84	547.76	370.32	0.96	5.00	546.79	370.00	0.96

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4379E+02 EXCESS=0.0000E+00 OUTFLOW=0.4379E+02 BASIN STORAGE=0.9347E-03 PERCENT ERROR= 0.0

*** NORMAL END OF HEC-1 ***

RIP-RAP SIZING

RIP-RAP SIZING

100 Year Flow Characteristics

SECTION	VELOCITY (fps)	SLOPE (ft/ft)	DEPTH (ft)
190	7.8	0.014	7.5
180	11.7	0.014	7.3
165	12.9	0.021	7.3

Use highest velocity (12.9) for sizing.

Per Table 10-6 of Drainage Criteria Manual find proper size

$$VS^{0.17} / (Ss-1)^{0.66} = 12.9\ (0.014^{0.17}) / (2.5-1)^{0.66} = 4.8$$

From Table proper size is Type "H".

Per Table 10-9 use 12" of Type II bedding.

Per Urban Storm Drainage Criteria Manual Volume 2, Section 5.4.4. (channel bend), increase rock size one category along the outside of bends use to Type "VH" along north bank.

Per Urban Storm Drainage Criteria Manual Volume 2, Section 5.4.2., Rip-rap blanket thickness should be at least 1.75 times d50 (or 2 times d50 on sandy soils).

Use 2 x d50 along south bank (sand) 1.5 x 2 = 3.0'

Use 1.75 x d50 along north bank (bedrock) 2 x 1.75 = 3.5'

ANALYSIS OF POTENTIAL
NORWOOD DIVERSION

IMPACT OF PROPOSED NORWOOD DIVERSION OF FLOW INTO COTTONWOOD CREEK AT THE AUSTIN BLUFFS PARKWAY BRIDGE DRAINAGE ANALYSIS

PURPOSE

The purpose of this analysis was to assess the impact of a proposed diversion of flow into Cottonwood Creek from the Norwood Subdivision on the peak flow rate in Cottonwood Creek at the proposed Austin Bluffs Parkway Bridge.

GENERAL DESCRIPTION

As shown on the map labeled "Revised Drainage Sub-Basin Map" following this text, the proposed diversion will add approximately 70 acres of watershed discharging to Cottonwood Creek above the Austin Bluffs Parkway (Pilot Road) to the watershed anticipated to contribute in the Cottonwood Creek DBPS. Information regarding this proposed diversion was obtained from Rockwell-Minchow Consultants, Inc.

The proposed diversion is apparently in a preliminary conceptual form as detailed comprehensive information regarding the watershed of the diversion was not available. Some assumptions were made in regards to the watershed in order to complete this analysis. Changes to the watershed as assumed for this analysis are described as follows:

A 53 acre portion of DBPS Sub-Basin 'D-3' located east of the west R.O.W. line of Powers Boulevard will be routed through a culvert to the southwest corner of Powers Boulevard and Woodmen Road. This area has been labeled as 'D3B' for the current analysis. This area contributed to the flow at the Austin Bluffs Parkway Bridge in the DBPS but was routed along

the north side of Woodmen Road. The limits of this basin were taken from a map entitled "Drainage Basin Designation Map, Powers Boulevard Extension", STM M240-014. A copy of a portion of this map is contained within this section.

An area of DBPS Sub-Basin 'H5' located at the southeast corner of Woodmen Road and Powers Boulevard will be routed through a culvert to the southwest corner of Woodmen Road and Powers Boulevard. Due to lack of information about the limits of this basin it was assumed that the basin would be limited to the undeveloped watershed contributing to the Southeast corner of the intersection. The assumed 20 acre watershed was delineated on City FIMMS topo. A copy of the FIMMS topo showing the assumed watershed limits is contained in this section. Per the DBPS analysis all of Basin 'H5' was to enter Cottonwood Creek down stream of Woodmen Road. The rerouted area has been labeled 'H5A' for the current analysis.

Runoff from Sub-Basins 'D3B' and 'H5A' will be combined at the southwest corner of Woodmen Road. and Powers Boulevard. and then routed approximately 3800 LF west in a storm drain along the south side of Woodmen Road.

DBPS Sub-Basins 'H11' and 'H13' were assumed to enter Cottonwood Creek south of Woodmen Road in the DBPS analysis. Portions of these sub-basins along the south side of Woodmen Road will be combined with the northeast portion of DBPS Sub-Basin 'H21' to form a sub-basin labeled 'H11A' for the purpose of the current analysis. The limits for this sub-basin were copied from a map entitled "Austin Bluffs Parkway - Rangewood To Woodmen Road Drainage Plan", by Rockwell Minchow. A copy of a portion of this map is contained in this section. The new sub-basin is approximately 120 acres in size. Runoff from this area will be combined with the routed flow from Sub-Basins 'D3B' and 'H5A' then routed under Woodmen Road to Cottonwood Creek.

Runoff from Sub-Basin 'H21' was assumed to enter Cottonwood Creek upstream of Austin Bluffs Parkway in the DBPS analysis. The current analysis assumes that the west portion of this basin will be routed to the west side of Austin Bluffs Parkway through a recently constructed culvert and enter Cottonwood Creek south of Woodmen Road.

HYDROLOGIC CALCULATIONS

In order to estimate the impact of the proposed diversion on the peak flow rate at the Austin Bluffs Parkway Bridge the Ayres DBPS HEC I model as revised for the "Final Drainage Report for Austin Bluffs Bridge At Cottonwood Creek" was further revised to reflect the diversion. Lag times for the revised basins were calculated with the goal of maintaining similarity with the lag times used in the remainder of the Ayres DBPS model. A copy of the lag time computations for the revised basins as well as the original Ayres lag time computations is contained in this section.

After revisions were made to the model it was run using the Ayres adjusted 100-year, 24 hour rainfall depth of 4.136. A negligible increase in peak flow rates at the Austin Bluffs Parkway Bridge was noted. The revised HEC I input and output data are contained within this section.

In an attempt to simulate the peak flow rate of approximately 900 cfs from Sub-Basins 'D3B', 'H5A', and 'H11A' as estimated on the "Austin Bluffs Parkway - Rangewood Drive to Woodmen Road Drainage Plan", by Rockwell-Minchow Consultants additional model runs were done. The CN used for Sub-Basin 'H11A' was raised to 98 and the lag time used was reduced to correspond with 0.60 of the time of concentration calculated by Rockwell Minchow for their Rational Method runoff calculation. The model was run to look at the effect. The resulting peak flow rate from the diverted area was significantly increased, but due to the shorter lag time, the peak from the local basin was past when the peak in Cottonwood Creek arrived resulting in a smaller peak flow rate at the Austin Bluffs Parkway Bridge than estimated in the Ayres DBPS.

The first model run utilizing lag times and CN values consistent with the overall model is judged to be the most valid. Input and output data associated with this run is contained within this section.

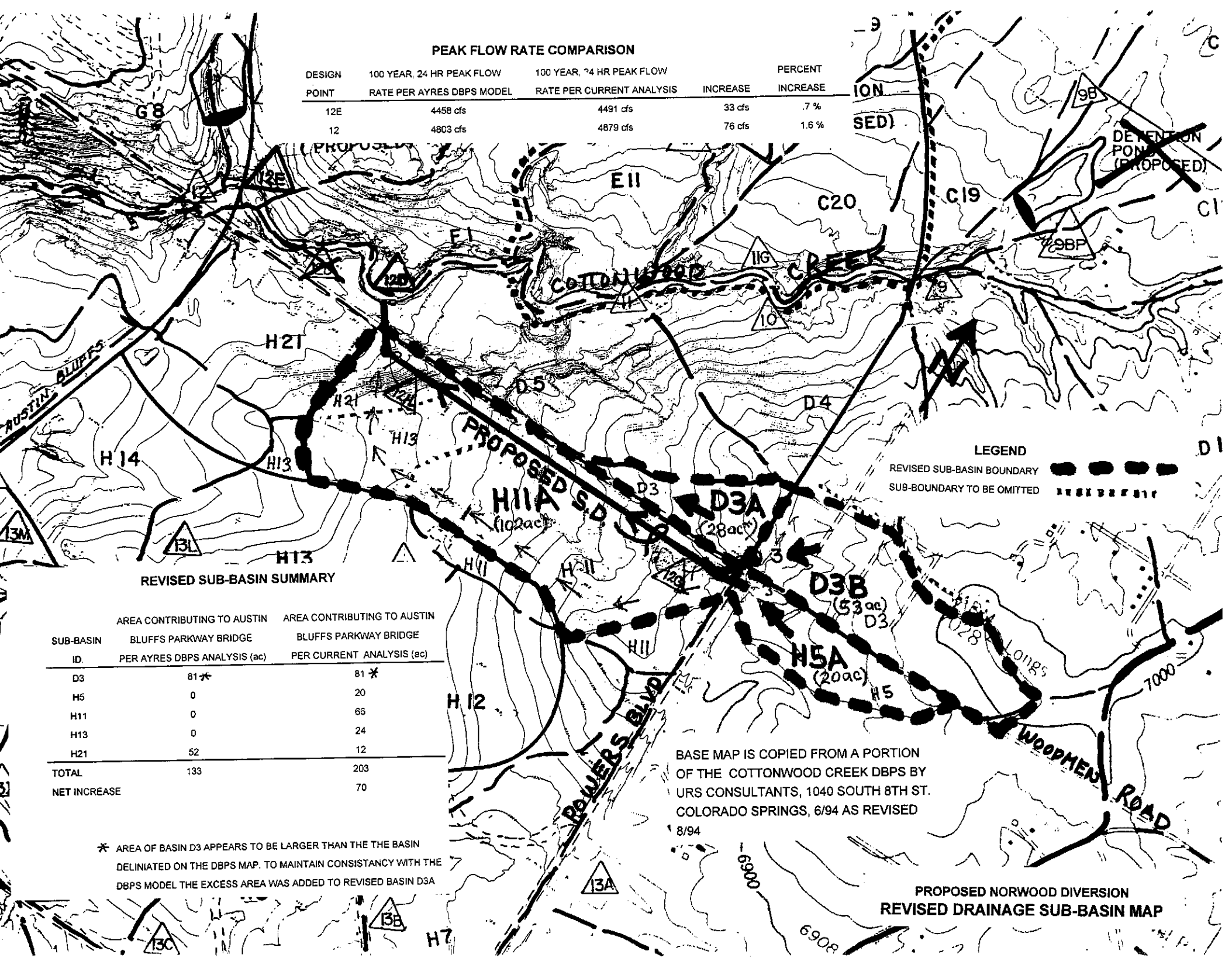
SUMMARY

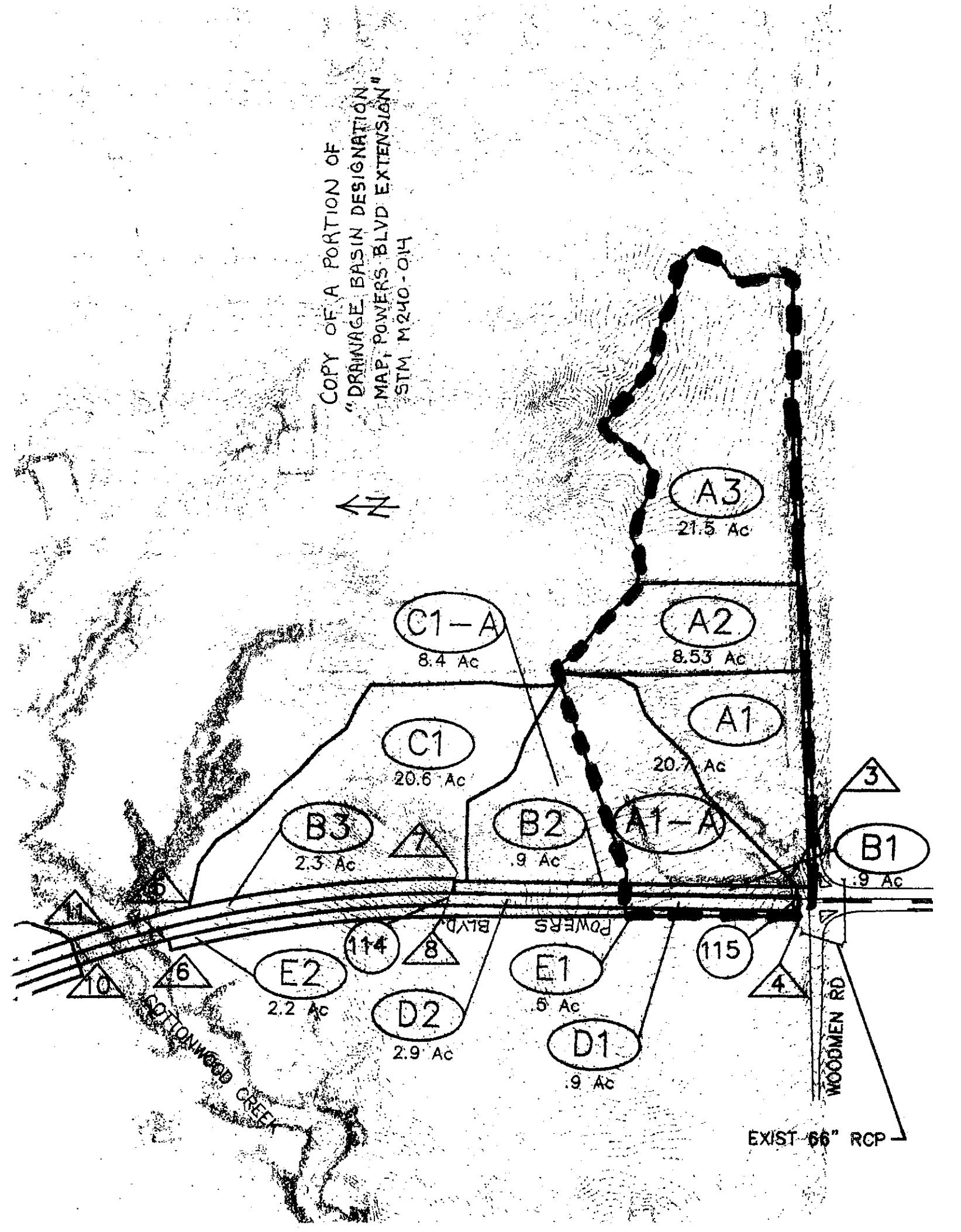
The Ayres DBPS HEC I model was modified to reflect the proposed diversion of flow into Cottonwood Creek above the Austin Bluffs Parkway Bridge. Model runs indicate that this diversion may increase the peak 100-year runoff at the Austin Bluffs Bridge by 76 cfs or 1.6%. The impact of this increase in peak flow rate will be negligible.

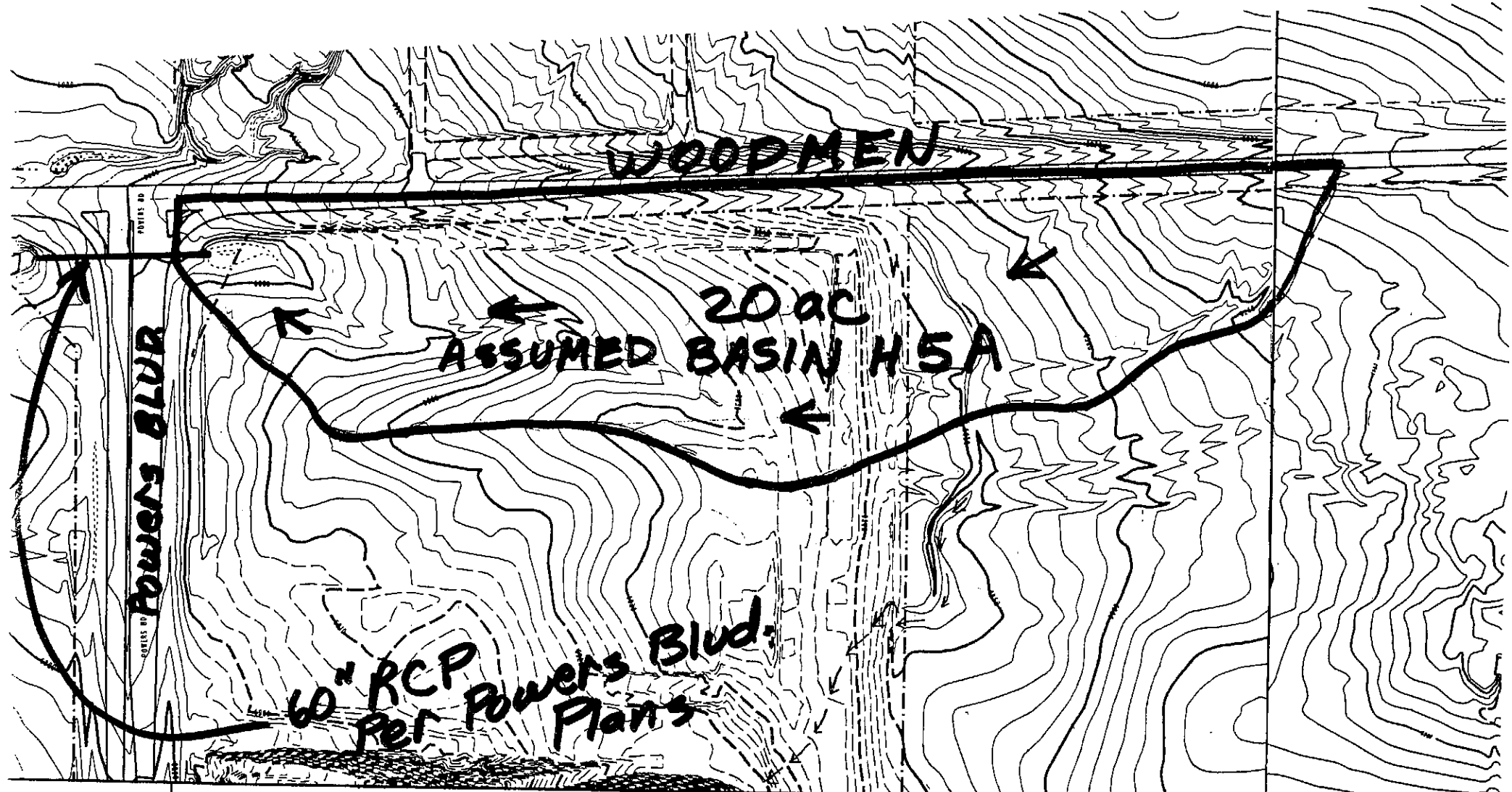
PREPARED BY:

Vancel Fossinger

Vancel Fossinger
Project Engineer
For and On Behalf of JR Engineering, Ltd.


PEAK FLOW RATE COMPARISON
DESIGN POINT
100 YEAR, 24 HR PEAK FLOW RATE PER AYRES DBPS MODEL
100 YEAR, 24 HR PEAK FLOW RATE PER CURRENT ANALYSIS
INCREASE
PERCENT INCREASE
12E 4458 cfs 4491 cfs 33 cfs .7 %
12 4803 cfs 4879 cfs 76 cfs 1.6 %
REVISED SUB-BASIN SUMMARY
SUB-BASIN ID.
AREA CONTRIBUTING TO AUSTIN BLUFFS PARKWAY BRIDGE PER AYRES DBPS ANALYSIS (ac)
AREA CONTRIBUTING TO AUSTIN BLUFFS PARKWAY BRIDGE PER CURRENT ANALYSIS (ac)
D3 81* 81*
H5 0 20
H11 0 66
H13 0 24
H21 52 12
TOTAL 133 203
NET INCREASE 70
* AREA OF BASIN D3 APPEARS TO BE LARGER THAN THE THE BASIN DELINIATED ON THE DBPS MAP. TO MAINTAIN CONSISTANCY WITH THE DBPS MODEL THE EXCESS AREA WAS ADDED TO REVISED BASIN D3A
LEGEND
REVISED SUB-BASIN BOUNDARY
SUB-BOUNDARY TO BE OMITTED
BASE MAP IS COPIED FROM A PORTION OF THE COTTONWOOD CREEK DBPS BY URS CONSULTANTS, 1040 SOUTH 8TH ST. COLORADO SPRINGS, 6/94 AS REVISED 8/94
PROPOSED NORWOOD DIVERSION
REVISED DRAINAGE SUB-BASIN MAP
PROPOSED S.D.
COTTONWOOD CREEK
AUSTIN BLUFFS
POWERS BLVD
WOODMEN ROAD
H11A (102ac)
D3A (28ac)
D3B (53ac)
H5A (20ac)
H21
H14
H13
H12
D5
D4
D3
E11
E1
C20
C19
DETENTION POND (PROPOSED)
6900
6908
7000


COPY OF A PORTION OF
"DRAINAGE BASIN DESIGNATION"
MAP, POWERS BLVD EXTENSION
STM M240-014
N
A3
21.5 Ac
A2
8.53 Ac
C1-A
8.4 Ac
A1
20.7 Ac
C1
20.6 Ac
A1-A
B3
2.3 Ac
B2
.9 Ac
B1
.9 Ac
E2
2.2 Ac
E1
.5 Ac
D2
2.9 Ac
D1
.9 Ac
POWERS BLVD
WOODMEN RD
EXIST 66" RCP
COTTONWOOD CREEK

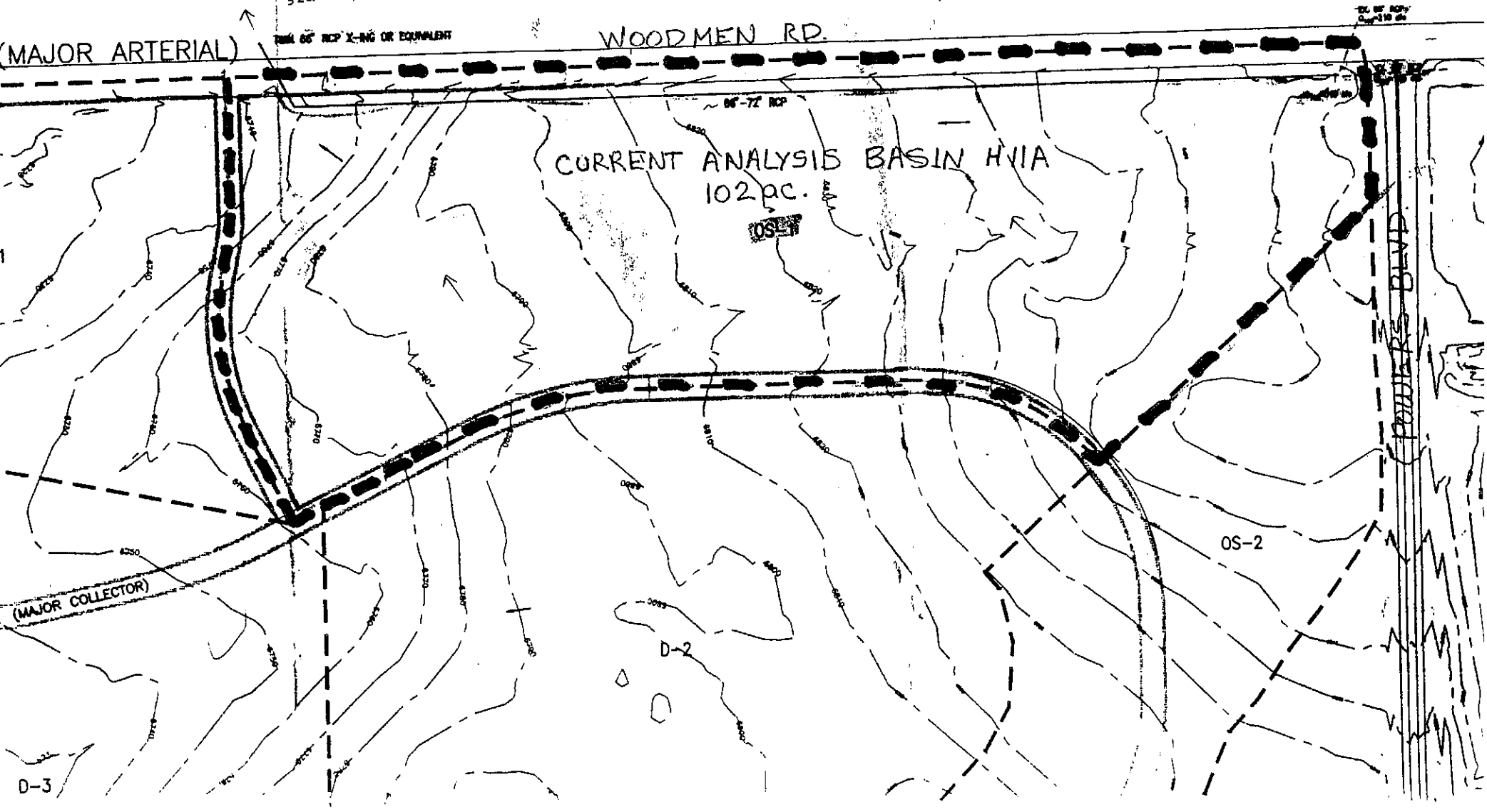


...IES ...OMPUTER SERVICES ...DO SPRINGS	COLORADO SPRINGS UTILITIES FACILITIES INFORMATION MANAGEMENT SYSTEM CONTOUR MAP	MAP VERSION: 09-17-1992 This map was primarily prepared from aerial photography dated March 21, 1989	MAP NUMBER O-21

/AY - RANGEWOOD DR TO WOODMEN RD

DRAINAGE PLAN

COPY OF A PORTION OF "AUSTIN BLUFFS PARKWAY - RANGEWOOD TO WOODMEN RD, DRAINAGE PLAN" BY ROCKWELL - MINCHOW, 4-25-97



JR Engineering, Ltd.

CLIENT La Plata JOB NO. 8715-71

PROJECT Austin Bluff Parkway BY JSF CHK. BY _____ DATE 8-29-97

SUBJECT Austin Bluffs Bridge over Cottonwood Creek SHEET NO. _____ OF _____

Analysis of Flow Diversion From Norwood

Estimate Lag Times for Revised Sub Basins

Use basic assumptions of conveyance types, lengths, and associated velocities found in the "future Land Use conditions Sub-basin lag Calculation" table contained in the Ayres DBPS adjusted to meet revised condition to remain consistant with the rest of the model

* Basin D3A: (Reduce length of grassed channel)

Overland (grass+pasture)	300 LF @ 6%	T = 2.89 min
Gutter flow	200 LF @ 6%	T = 0.69 min
Channel (grassed)	2500 LF @ 3.3%	
Ayres Vel = 4600 ÷ 28.16 (60) = 2.72 fps	2500 ÷ 2.72 ÷ 60 =	T = 15.32 min
	Total time	= 18.90 min

Lag Time = 18.90 x .60 ÷ 60 = 0.189 hr

* Basin D3B (reduce grassed channel "L", increase gutter "L"

Overland (grass+pasture)	300 LF @ 6%	T = 2.89 min
Gutter flow	500 LF @ 6%	T = 0.69 min
Channel (grassed)	2000 LF @ 3.3%	
Ayres V = 4600 ÷ 28.16 (60) = 2.72 fps	2000 ÷ 2.72 ÷ 60	T = 12.25 min
	Total time	= 15.83 min

Lag Time = 15.83 x .60 ÷ 60 = 0.158 hr

* Basin H11A (use Ayres Tc for basin H11, add 2200 LF SD @ Ayres Avg V = 8 fps)

Overland (grass+pasture)	300 LF @ 3%	T = 4.08 min
Overland (bare ground)	1870 LF @ 2.99%	T = 18.19 min
Gutter	2070 LF @ 3.04%	T = 9.99 min
Storm drain	2200 ÷ 8 ÷ 60 =	T = 4.58 min
	Total Time	36.84 min

Lag Time = 36.84 x .60 ÷ 60 = 0.368 hr

* Basin H5A (use Ayres Tc for Overland flow + reduce length gutter flow)

Overland (grass+pasture)	300 LF @ 2.9%	T = 4.23 min
Gutter	2100 LF @ 2.4%	
Ayres V = 2250 ÷ 11.44 (60) = 3.27 fps	2100 ÷ 3.27 ÷ 60 =	T = 10.70 min
	Total Time	14.93 min

Lag Time = 14.93 x 0.60 ÷ 60 = 0.149 hr

FUTURE LAND USE CONDITIONS SUB-BASIN LAG CALCULATIONS

	OVERLAND (FOREST)					OVERLAND (GRASS & PASTURE)					GRASS & PASTURE					OVERLAND (BARE GROUND)					CHANNEL (GRASSED)					GUTTER 1					GUTTER 2					PIPE/CHANNEL			Tc	LAG	
BASIN	L(ft)	B-ELEV	E-ELEV	S	Tt (min)	L(ft)	B-ELEV	E-ELEV	S	Tt (min)	L(ft)	B-ELEV	E-ELEV	S	Tt (min)	L(ft)	B-ELEV	E-ELEV	S	Tt (min)	L(ft)	B-ELEV	E-ELEV	S	Tt (min)	L(ft)	B-ELEV	E-ELEV	S	Tt (min)	L(ft)	B-ELEV	E-ELEV	S	Tt (min)	L(ft)	V (ft/s)	Tt (min)	(min)	(hrs)	BASIN
A1	500	7600	7580	4	16.562				0	0				0	0				0	0	*4650*	*7580*	*7430*	*3.226*	*28.62*				0	0				0	0			0	*45.18*	*0.452*	A1
A2	500	7470	7460	2	23.422				0	0				0	0				0	0	*4600*	*7460*	*7320*	*3.043*	*29.15*				0	0				0	0			0	*52.57*	*0.526*	A2
A3	500	7522	7505	3.4	17.964				0	0				0	0				0	0	*3700*	*7505*	*7355*	*4.054*	*20.32*				0	0				0	0			0	*38.28*	*0.383*	A3
A4	500	7490	7430	4	16.562				0	0				0	0				0	0	*4850*	*7430*	*7285*	*3.118*	*29.11*				0	0				0	0			0	*45.67*	*0.457*	A4
A5	500	7440	7420	4	16.562				0	0				0	0				0	0	*4050*	*7420*	*7285*	*3.333*	*24.52*				0	0				0	0			0	*41.09*	*0.411*	A5
A6	500	7440	7420	4	16.562				0	0				0	0				0	0	*4200*	*7420*	*7260*	*3.91*	*23.79*				0	0				0	0			0	*40.35*	*0.404*	A6
A7	500	7440	7420	4	16.562				0	0				0	0				0	0	*4150*	*7420*	*7260*	*3.855*	*23.37*				0	0				0	0			0	*39.93*	*0.399*	A7
A8	500	7460	7420	8	11.711				0	0				0	0				0	0	*5820*	*7420*	*7200*	*3.78*	*33.09*				0	0				0	0			0	*44.81*	*0.448*	A8
A9	500	7395	7360	7	12.52				0	0				0	0				0	0	*4000*	*7360*	*7170*	*4.75*	*20.29*				0	0				0	0			0	*32.81*	*0.328*	A9
A10	500	7395	7330	13	9.187				0	0				0	0				0	0	*4550*	*7330*	*7140*	*4.176*	*24.62*				0	0				0	0			0	*33.8*	*0.338*	A10
A11	500	7365	7330	7	12.52				0	0				0	0				0	0	*5125*	*7330*	*7140*	*3.707*	*29.43*				0	0				0	0			0	*41.95*	*0.419*	A11
A12	500	7290	7250	8	11.711				0	0				0	0				0	0	*3200*	*7250*	*7118*	*4.125*	*17.42*				0	0				0	0			0	*29.13*	*0.291*	A12
A13	500	7370	7350	4	16.562				0	0				0	0				0	0	*5400*	*7370*	*7140*	*4.259*	*28.93*				0	0				0	0			0	*45.49*	*0.455*	A13
B1				0	0	300	7290	7272	6	2.8868				0	0				0	0				0	0	3800	7272	7125	3.8684	16.261				0	0			0	19.147	0.1915	B1
B2				0	0	300	7280	7256	8	2.5				0	0				0	0				0	0	3200	7256	7120	4.25	13.064				0	0			0	15.564	0.1555	B2
B3				0	0	300	7210	7192	6	2.8868				0	0				0	0				0	0	2400	7192	7100	3.8333	10.317				0	0	*3250*	*6*	*9.028*	*22.23*	*0.222*	B3
B4				0	0	300	7185	7176	3	4.0825				0	0				0	0				0	0	2150	7176	7100	3.5349	9.6243				0	0	*3100*	*6*	*8.611*	*22.32*	*0.223*	B4
B5				0	0	300	7180	7168	4	3.5355				0	0				0	0				0	0	3450	7168	7060	3.1304	16.411				0	0			0	19.947	0.1995	B5
B6				0	0	300	7165	7150	5	3.1623				0	0	2400	7060	6995	2.7083	24.548				0	0	2850	7150	7060	3.1579	13.498				0	0			0	41.208	0.4121	B6
B7				0	0	300	7100	7065	5	3.1623				0	0				0	0				0	0	5750	7065	6890	3.3913	26.279				0	0			0	29.441	0.2944	B7
B8				0	0	300	7105	7090	5	3.1623				0	0	3100	7040	6850	2.9032	30.625				0	0	1500	7090	7040	3.3333	8.9147				0	0			0	40.702	0.407	B8
B9				0	0	300	7100	7091	3	4.0825				0	0				0	0				0	0	2000	7091	7020	3.55	8.9338				0	0	*7250*	*6*	*20.14*	*33.16*	*0.332*	B9
C1				0	0	300	7480	7456	8	2.5				0	0				0	0				0	0	4400	7456	7188	6.0909	15.005				0	0			0	17.505	0.175	C1
C2				0	0	300	7460	7436	8	2.5				0	0				0	0				0	0	2750	7436	7300	4.9455	10.408				0	0			0	12.908	0.1291	C2
C3				0	0	300	7480	7444	12	2.0412				0	0				0	0				0	0	5400	7444	7180	4.8889	20.555				0	0			0	22.596	0.2226	C3
C4				0	0	300	7480	7444	12	2.0412				0	0				0	0				0	0	5600	7444	7140	5.4286	20.229				0	0			0	22.27	0.2227	C4
C5				0	0	300	7400	7388	4	3.5355				0	0				0	0				0	0	5000	7388	7180	4.186	20.832				0	0			0	24.168	0.2417	C5
C6				0	0	300	7225	7198	9	2.357				0	0				0	0				0	0	4600	7198	7040	3.4348	20.889				0	0			0	23.246	0.2325	C6
C7				0	0	300	7280	7256	8	2.5				0	0				0	0				0	0	5900	7256	7040	3.661	25.952				0	0			0	28.452	0.2845	C7
C8				0	0	300	7280	7256	8	2.5				0	0				0	0				0	0	7550	7256	7000	3.3907	34.508				0	0			0	37.008	0.3701	C8
C9				0	0	300	7225	7216	3	4.0825				0	0				0	0				0	0	6800	7216	7000	3.1765	32.111				0	0			0	36.194	0.3619	C9
C10				0	0	300	7185	7176	3	4.0825				0	0	1400	7020	7000	1.4286	19.718				0	0	4200	7176	7020	3.7143	18.341				0	0			0	42.14	0.4214	C10
C11				0	0	300	7130	7118	4	3.5355				0	0				0	0				0	0	2550	7118	7020	3.8431	10.948				0	0	*5100*	*7*	*12.14*	*26.63*	*0.266*	C11
C12				0	0	300	7030	7018	4	3.5355				0	0				0	0				0	0	1300	7018	6940	6	4.4667				0	0	*4900*	*7*	*11.67*	*19.67*	*0.197*	C12
C13				0	0	300	7460	7412	16	1.7678				0	0				0	0				0	0	3400	7412	7190	6.5294	11.199				0	0			0	12.966	0.1297	C13
C14				0	0	300	7240	7228	4	3.5355				0	0				0	0				0	0	3100	7228	7118	3.5484	13.85				0	0			0	17.388	0.1739	C14
C15				0	0	300	7150	7141	3	4.0825				0	0				0	0				0	0	2900	7141	7042	3.4138	13.21				0	0			0	17.292	0.1729	C15
C16				0	0	300	7140	7122	6	2.8868				0	0				0	0				0	0	4650	7122	6980	3.0538	22.395				0	0			0	25.282	0.2528	C16
C17				0	0	300	7060	7054	2	5				0	0				0	0				0	0	5550	7054	6890	2.955	27.173				0	0			0	32.173	0.3217	C17
C18				0	0	300	7070	7058	4	3.5355				0	0				0	0	*2800*	*6940*	*6830*	*3.929*	*15.62*	4250	7058	6940	2.7755	21.466				0	0			0	*40.62*	*0.406*	C18
C19				0	0	300	7026	7016.4	3.2	3.9528				0	0				0	0				0	0	6150	7016.4	5800	3.5167	27.593				0	0			0	31.546	0.3155	C19
C20				0	0				0	0				0	0				0	0	*6000*	*6962*	*6757*	*3.417*	*35.89*				0	0				0	0			0	*35.89*	*0.359*	C20
D1				0	0	300	7000	6994	2	5				0	0	1900	6920	6840	4.2105	15.586				0	0	2000	6994	6920	3.7	8.7508				0	0			0	29.337	0.2934	D1
D2				0	0	300	7000	6988	4	3.5355				0	0	2100	6900	6830	3.3333	19.361				0	0	2200	6988	6900	4	9.2579				0	0			0	32.154	0.3215	D2
→ D3				0	0	300	7020	7002	6	2.8868				0	0				0	0	*4600*	*6990*	*6840*	*3.261*	*28.18*	200	7002	6990	6	0.6872				0	0			0	*31.74*	*0.317*	D3
D4				0	0	300	6880	6865	5	3.1623				0	0	2100	6830	6757	3.4762	18.959				0	0	1750	6865	6830	2	10.415				0	0			0	32.536	0.3254	D4
D5				0	0	300	6912	6902.4	3.2	3.9528				0	0				0	0				0	0	2200	6902.4	6810	4.2	9.0348				0	0	*3670*	*7.4*	*5.266*	*21.25*	*0.213*	D5
E1				0	0	300	7460	7412	16	1.7678				0	0				0	0				0	0	4350	7412	7140	6.2529	14.641				0	0			0	16.409	0.1641	E1
E2				0	0	300	7200	7188	4	3.5355				0	0				0	0				0	0	3700	7188	7035	4.1351	15.314				0	0			0	18.849	0.1885	E2
E3				0	0	300	7240	7216	8	2.5				0	0				0	0				0	0	4300	7216	7036	4.186	17.688				0	0			0	20.188	0.2019	E3
E4				0	0	300	7072	7062.4	3.2	3.9528				0	0	3280	7035	6936	3.0183	31.779				0	0	840	7062.4	7035	3.2619	3.9144				0	0			0	39.646	0.3965	E4
E5				0	0	300	7082	7073	3	4.0825				0	0	1630	6990	6936	3.3129	15.074				0	0	2690	7073	6990	3.0655	12.889				0	0			0	32.045	0.3205	E5
E6				0	0	300	7092	7085.4	2.2	4.7673				0	0	2450	7081	7011	2.8571	24.398				0	0	200	7085.4	7081	2.2	1.1348				0	0			0	30.3	0.303	E6
E7				0	0	300	7044	7015.6	9.4	2.3063				0	0	1960	6936	6888	2.449	21.082				0	0	1980	7015.6	6936	4.0303	8.3007				0	0			0	31.589	0.3169	E7
E8				0	0	300	7031	7019	4	3.5355				0	0				0	0				0	0	4160	7019	6888	3.149	19.73				0	0			0	23.265	0.2327	E8
E9				0	0	300	6953	6942.8	3.4	3.8348				0	0				0	0				0	0	2020	6942.8	6860	4.099	8.3971				0	0			0	12.232	0.1223	E9
E10				0	0	300	6942	6926	5.3333	3.0619				0	0	380	6836	6828	2.1053	4.4084				0	0	1010	6926	6879	4.6535	3.9405	1690	6914	6869	2.6627	8.7165	360	7	0.8571	12.268	0.1227	E10
E11				0	0	300	6864	6847	5.6667	2.9704				0	0	2530	6800	6718	3.2411	29.655				0	0	820	6847	6800	5.7317	2.8826				0	0			0	29.508	0.2951	E11
F1				0	0	300	6880.5	6870.6	3.3	3.8625				0	0	3000	6780	6700	2.6667	30.923				0	0	2740	6870.6	6780	3.3066	12.682				0	0			0	47.498	0.475	F1
G1				0	0	300	7054	7040.8	4.4	3.371				0	0				0	0				0	0	3220	7040.8	6928	3.5031	14.479				0	0			0	17.85	0.1785	G1
G2				0	0	300	7062	7050.9	3.7	3.6761				0	0				0	0				0	0	2280	7012	6950	2.7193	11.637	1370	7050.9	7012	2.8394	8.8427				15.313	0.1531	G2
G3				0	0	240	7007	6986	8.75	1.9124				0	0	460	6886	6880	1.3043	5.7797				0	0	3580	6986	6889	2.7095	18.304				0	0	180	7	0.4286	27.425	0.2743	G3
G4				0	0	300	6989	6982	2.3333	4.6291				0	0	510	6982	6956	5.098	3.802	500	6841	6827	2.8	3.3034	2680	6956	6841	4.291	10.889				0	0			0	22.623	0.2262	G4
G5				0	0	300	6860	6827	11	2.132				0	0				0	0	2440	6827	6762	2.6639	16.527				0	0				0	0			0	18.659	0.1866	G5
G6				0	0	300	6920	6904	5.3333	3.0619				0	0				0	0				0	0	3840	6904	6758	3.5417	17.173				0	0			0	20.235	0.3023	G6
G7				0	0	300	6878	6870	2.6667	4.3301				0	0				0	0	*3830*	*6870*	*6740*	*3.394*	*22.98*	*530*	*6740*	*6690*	*7.937*	*1.882*				0	0			0	*29.19*	*0.292*	G7
G8				0	0	300	6814	5796	6	2.8868				0	0	460	6796	6760	7.8261	2.7678	2000	6760	6680	4	11.055				0	0				0	0			0	16.71	0.1671	G8
H1				0	0	300	6853	6839.8	4.4	3.371				0	0				0	0	*940*	*6779*	*6759*	*1.17*	*9.607*	4110	6839.8	6770	1.6983	25.543				0	0			0	*39.52*	*0.395*	H1
H2				0	0	300	6843	6833.4	3.2	3.9528				0	0				0	0				0	0	1900	6800	6790	0.5263	22.042	1800	6833.4	6800	1.8556	11.121				25.995	0.2599	H2
H3				0	0				0	0				0	0	1220	6732	6711	1.7213	15.652				0	0	1705	6817	6780	2.1701	9.741	1950	6780	6732	2.4615	10.46				25.393	0.2539	H3
H4				0	0	160	6798	6794	2.5	2.3851				0	0				0	0				0	0	2720	6794	6724	2.5735	14.27				0	0			0	16.655	0.1666	H4
→ H5				0	0	300	7010	7001.6	2.8	4.2258				0	0				0	0	*3800*	*6940*	*6825*	*3.026*	*24.15*	2250	7001.6	6940	2.7378	11.445				0	0			0	*39.82*	*0.398*	H5

COPIED FROM "COTTONWOOD CREEK DBPS", AYRES ASSOCIATES 10/96

FUTURE LAND USE CONDITIONS SUB-BASIN LAG CALCULATIONS

H6				0	0	300	6900	6888	4	3.5355				0	0				0	0				0	0	3400	6888	6817	2.0882	19.802				0	0			0	23.337	0.2334	H6
H7				0	0	300	6888	6874.8	4.4	3.371				0	0	2040	6819	6770	2.402	22.156				0	0	1580	6874.8	6819	3.5318	7.078				0	0			0	32.603	0.326	H7
H8				0	0	300	6821	6803.6	5.8	2.9361				0	0	1320	6782	6725	2.803	13.271				0	0	1520	6803.6	6762	2.7368	7.7328				0	0			0	23.94	0.2394	H8
H9				0	0	300	6821	6803.6	5.8	2.9361				0	0				0	0				0	0	3500	6803.6	6678	3.5886	15.55				0	0			0	18.488	0.1849	H9
H10				0	0	300	6792	6775.8	5.4	3.0429				0	0	1720	6726	6668	3.3721	15.766				0	0	1000	6775.8	6726	4.98	3.7714				0	0			0	22.581	0.2258	H10
H11				0	0	300	6888	6879	3	4.0825				0	0	1870	6816	6760	2.9947	18.189				0	0	2070	6879	6816	3.0435	9.9683				0	0			0	32.258	0.3226	H11
H12				0	0	300	6888	6872.4	5.2	3.1009				0	0				0	0				0	0	4020	6872.4	6760	2.796	20.234				0	0			0	23.335	0.2333	H12
H13				0	0	300	6822	6808.8	4.4	3.371				0	0				0	0				0	0	3370	6808.8	6726	2.457	18.095				0	0			0	21.466	0.2147	H13
H14				0	0	300	6763	6754	3	4.0825				0	0	2320	6720	6666	2.3276	25.597				0	0	1060	6754	6720	3.2075	4.9812				0	0			0	34.66	0.3466	H14
H15				0	0	300	6739	6726.4	4.2	3.4503				0	0				0	0	5300	6708	6590	2.226	39.27	500	6726.4	6708	3.68	2.1936				0	0			0	44.91	0.449	H15
H16				0	0	300	6858	6839.4	6.2	2.8398				0	0				0	0				0	0	2080	6806	6765	1.9712	12.469	620	6839.4	6806	5.3871	2.2482			0	15.309	0.1531	H16
H17				0	0	300	6847	6823	8	2.5				0	0				0	0				0	0	1940	6823	6770	2.732	9.8783				0	0			0	12.378	0.1238	H17
H18				0	0	300	6794	6784.4	3.2	3.9528				0	0	1060	6724	6710	1.2963	15.967				0	0	2020	6784.4	6724	2.9901	9.8317				0	0			0	29.751	0.2975	H18
H19				0	0	300	6797	6787.4	3.2	3.9528				0	0	1660	6710	6668	2.5301	17.567				0	0	1700	6787.4	6710	4.5529	6.7054				0	0			0	28.225	0.2822	H19
H20				0	0	300	6770	6754.4	5.2	3.1009				0	0				0	0	2360	6744	6710	1.441	21.74	200	6754.4	6744	5.2	0.7382				0	0			0	25.58	0.256	H20
H21				0	0				0	0				0	0	2380	6790	6713	3.2353	22.272				0	0				0	0				0	0			0	22.272	0.2227	H21
H22				0	0	300	6739	6725.8	4.4	3.371				0	0				0	0				0	0	2200	6725.8	6630	4.3545	8.873				0	0	2380	8.3	4.779	17.02	0.17	H22
H23				0	0	300	6763	6737.2	8.6	2.4112				0	0	2280	6670	6618	2.2807	25.413				0	0	820	6737.2	6670	10.839	1.585				0	0			0	29.409	0.2941	H23
J1				0	0	500	6870	6814	11.2	3.5215				0	0				0	0				0	0	4140	6814	6705	2.6329	21.474				0	0			0	24.995	0.25	J1
J2				0	0				0	0				0	0				0	0				0	0	5520	6796	6590	3.7319	24.049				0	0			0	24.049	0.2405	J2
J3				0	0	300	6797	6780	5.667	2.97				0	0				0	0				0	0	1840	6780	6676	5.652	6.514				0	0	5340	8.3	10.72	20.21	0.202	J3
K1				0	0	300	6862	6833.8	9.4	2.3063				0	0	880	6680	6668	1.3636	12.885				0	0	3260	6833.8	6680	4.7178	12.632				0	0			0	27.623	0.2762	K1
K2				0	0	300	6848	6825.2	7.6	2.5649				0	0	3400	6776	6660	3.4118	30.084				0	0	760	6825.2	6776	6.4737	2.514				0	0			0	38.063	0.3806	K2
K3				0	0	130	6740	6732	6.1538	1.2352				0	0				0	0				0	0	3720	6732	6644	2.3656	20.356				0	0			0	21.591	0.2159	K3
K4				0	0	300	6794	6784.4	3.2	3.9528				0	0				0	0	3520	6660	6590	1.989	27.8	1280	6730	6660	5.4688	4.8068	1080	6784.4	6730	5.037	4.05			0	36.16	0.362	K4
L1				0	0	300	6778	6764	4.6667	3.2733				0	0				0	0				0	0	3470	6764	6632	3.804	14.974				0	0			0	18.247	0.1825	L1
L2				0	0	500	6660	6636	4.8	5.3791	880	6636	6590	5.2273	9.0721				0	0				0	0				0	0				0	0	2880	7.8	6.316	20.77	0.208	L2
M1				0	0	500	6768	6730	7.6	4.2749	1150	6730	6690	3.4783	14.534				0	0				0	0	-			0	0				0	0			0	18.809	0.1881	M1
M2				0	0	500	6706	6692	2.8	7.043	460	6692	6680	2.6087	6.7129				0	0				0	0	1500	6680	6581	6.6	4.914				0	0	720	7	1.7143	20.384	0.2038	M2
M3				0	0	300	6784	6764	6.6667	2.7386				0	0	2600	6764	6690	2.8462	25.041				0	0	2880	6690	6560	4.8872	10.127				0	0			0	38.807	0.3881	M3
M4				0	0	500	6746	6698	9.6	3.8036	2280	6698	6600	4.2982	25.921				0	0	1000	6600	6576	2.4	7.136	920	6576	6560.8	1.6739	5.9847				0	0			0	42.85	0.428	M4
M5				0	0	500	6729	6691	7.6	4.2749	1570	6691	6566	7.9618	13.115				0	0				0	0	520	6566	6542	4.6154	2.0371				0	0	500	7	1.1905	20.617	0.2062	M5
M6				0	0	500	6620	6580	8	4.1667				0	0				0	0				0	0	2840	6580	6497	2.9225	13.982				0	0	400	7	0.9524	19.101	0.191	M6
O1				0	0	500	6834	6780	10.8	3.5861				0	0				0	0				0	0	2660	6780	6691	3.3459	12.239				0	0			0	15.825	0.1583	O1
O2				0	0	300	6773	6766	2.3333	4.6291				0	0				0	0				0	0	4100	6766	6580	4.5366	18.201				0	0			0	20.83	0.2083	O2
P1				0	0	160	6764	6760	2.5	2.3851				0	0				0	0				0	0	4820	6760	6532	4.9351	17.503				0	0			0	19.888	0.1989	P1
P2				0	0	100	6754	6752	2	1.6667				0	0				0	0				0	0	3300	6752	6617	4.0909	13.732				0	0			0	15.398	0.154	P2
P3				0	0	300	6646	6604	14	1.8898				0	0				0	0				0	0	3800	6604	6504	2.6316	19.715				0	0			0	21.605	0.216	P3
Q1				0	0	300	6822	6810	4	3.5355				0	0				0	0				0	0	2380	6810	6668	6.0169	8.0973				0	0			0	11.633	0.1163	Q1
Q2				0	0	300	6773	6759	4.6667	3.2733				0	0				0	0				0	0	4100	6759	6576	4.4634	16.333				0	0			0	19.606	0.1961	Q2
Q3				0	0	300	6710	6701	3	4.0825	260	6701	6698	1.1538	5.7051				0	0				0	0	2800	6696	6560	4.9286	10.615				0	0			0	20.402	0.204	Q3
Q4				0	0				0	0	1440	6620	6510	7.6389	12.28	1250	6510	6476	2.72	12.758				0	0	960	6656	6620	3.75	4.1723				0	0			0	29.21	0.2921	Q4
Q5				0	0				0	0				0	0				0	0				0	0	4100	6640	6481	3.878	17.522				0	0			0	17.522	0.1752	Q5
Q6				0	0	200	6535	6526	4.5	2.2222				0	0				0	0	2680	6456	6420	1.343	26.56	1340	6526	6450	5.6716	4.7355				0	0			0	32.52	0.325	Q6
Q7				0	0	200	6544	6516	14	1.2599				0	0				0	0	2400	6400	6358	1.75	20.057	2040	6516	6400	5.6863	7.2				0	0			0	28.517	0.2852	Q7
Q8				0	0	200	6434	6430	2	3.333				0	0				0	0				0	0	1420	6430	6390	2.817	7.121				0	0	3700	10.6	5.818	16.27	0.163	Q8
S1				0	0	300	6593	6578	5	3.1623				0	0	1000	6490	6434	5.6	7.113				0	0	1940	6578	6490	4.5361	7.5662				0	0			0	17.942	0.1794	S1
S2				0	0	300	6614	6600	4.6667	3.2733	780	6600	6560	5.1282	8.1185				0	0				0	0	1200	6560	6424	11.333	3				0	0			0	14.392	0.1439	S2
S3				0	0	200	6545	6536	4.5	2.2222				0	0				0	0				0	0	4680	6536	6380	3.3333	21.574				0	0			0	23.796	0.238	S3
T1A				0	0	300	6561	6543	6	2.8868	900	6543	6490	5.8889	8.7416	1900	6490	6429	3.2105	17.849				0	0				0	0				0	0			0	29.477	0.2948	T1A
T1B				0	0	300	6479	6460	6.3333	2.8098				0	0	620	6400	6380	3.2258	5.8106				0	0	2380	6460	6400	2.521	12.616				0	0			0	21.236	0.2124	T1B
T2				0	0	300	6710	6694	5.3333	3.0619	2540	6694	6576	4.6457	27.776				0	0				0	0	1600	6576	6530	2.875	7.9418				0	0			0	38.78	0.3878	T2
T3				0	0	300	6659	6642	5.6667	2.9704	2120	6642	6540	4.8113	22.761	1200	6540	6480	5	9.0333				0	0				0	0				0	0			0	34.784	0.3478	T3
T4A				0	0	300	6510	6500	3.3333	3.873	1060	6468	6425	3.9623	12.552	800	6500	6468	4	8.733				0	0	1320	6426	6398	2.1212	7.6278				0	0			0	30.785	0.3079	T4A
T4B				0	0	300	6482	6472	3.3333	3.873	300	6472	6454	2.6667	4.3301	1000	6430	6398	3.2	9.4097				0	0	1140	6464	6430	2.9825	5.5557				0	0			0	23.168	0.2317	T4B
V1				0	0	300	6524	6450	24.667	1.4237				0	0				0	0				0	0	5600	6450	6370	1.4286	39.433				0	0			0	40.856	0.4086	V1
V2				0	0	300	6352	6315	12.33	2.013				0	0				0	0				0	0				0	0				0	0	4520	11.3	6.667	8.68	0.087	V2
W1				0	0	300	6390	6382	2.667	4.33				0	0				0	0				0	0	720	6382	6370	1.667	4.694				0	0	3700	10.6	5.818	14.84	0.148	W1
W2				0	0	300	6358	6341.5	4.8333	3.2163	600	6341.5	6304	6.25	5.6569				0	0				0	0				0	0				0	0	2160	10.6	3.398	12.27	0.123	W2
W3				0	0	150	6334	6332	1.3333	3.0619				0	0				0	0				0	0	1430	6332	6260	5.035	5.3636				0	0	1500	11.3	2.212	10.64	0.106	W3

COPIED FROM "COTTONWOOD CREEK DBPS", AYRES ASSOCIATES, 10/96

HEC1 S/N: 1343000062 HMVersion: 6.33 Data File: X:\871571\HYDRO\HEC1\CCABR2.DAT

```
*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*         MAY  1991                     *
*        VERSION 4.0.1E                 *
*                                       *
*  RUN DATE  08/29/1997  TIME  13:21:05 *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*         609 SECOND STREET             *
*       DAVIS, CALIFORNIA 95616         *
*            (916) 756-1104             *
*                                       *
*****************************************
```

```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X               X
XXXXXXX  XXXX     X       XXXXX   X
X     X  X        X               X
X     X  X        X     X         X
X     X  XXXXXXX   XXXXX          XXX
```

```
::::::::::::::::::::::::::::::::::::::::::::
::::::::::::::::::::::::::::::::::::::::::::
:::                                      :::
:::  Full Microcomputer Implementation   :::
:::                 by                   :::
:::        Haestad Methods, Inc.         :::
:::                                      :::
::::::::::::::::::::::::::::::::::::::::::::
::::::::::::::::::::::::::::::::::::::::::::
```

37 Brookside Road * Waterbury, Connecticut 06708 * (203) 755-1666

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

100 Year w/ Norwood Diversion

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

    1     ID    COTTONWOOD CREEK AYERS DBPS MODEL REVISED TO PROVIDE  HYROGRAPHS AT
    2     ID    A POINT IMEDIATELY UPSTREAM OF AUSTIN BLUFFS PARKWAY AND IMEDIATELY
    3     ID    DOWNSTREAM OF THE CONFLUENCE WITH THE AUSTIN BLUFFS TRIBUTARY.
    4     ID    ALSO REVISED SOME REACHES TO PIPE CONVEYENCES IN THE AUSTIN BLUFFS
    5     ID    TRIBUTARY. REVISED BY JR ENGINEERING, VANCE FOSSINGER ON 7-29-97
    6     ID
    7     ID
    8     ID    REVISED MODEL ON 8-29-97 TO REFLECT PROPOSED REROUTING OF RUNOFF FROM
    9     ID    THE INTERSECTION OF POWERS & WOODMEN AND BASIN H11A SOUTH OF WOODMEN TO
   10     ID    A POINT IN COTTONWOOD CREEK LOCATED UPSTREAM OF THE PROPOSED AUSTIN
   11     ID    BLUFFS BRIDGE. THIS REVISION IS BASED ON DATA SUPPLIED BY ROCKWELL-
   12     ID    MINCHOW CONSULTANTS INC. NEW TIMES OF CONCENTRATIONS FOR THE REVISED
   13     ID    SUBBASINS WERE ESTIMATED USING VELOCITIES AND LENGTHS CONSISTANT WITH
   14     ID    THE VELOCITIES AND LENGTHS USED TO DEVELOP THE TIMES OF CONCENTRATIONS
   15     ID    FOR THE ORIGINAL BASINS IN THE AYRES MODEL IN ORDER TO REMAIN SOMEWHAT
   16     ID    CONSISTANT WITH THE AYRES MODEL. PER THE DATA SUPPLIED BY ROCKWELL-
   17     ID    MINCHOW, RUNOFF FROM BASIN H21 WILL BE ROUTED ACROSS AUSTIN BLUFFS PKWY
   18     ID    SOUTH OF WOODMEN AND THEN WEST TO COTTONWOOD CREEK SOUTH OF WOODMEN.
   19     ID    MODEL REVISED BY JR ENGINEERING, VANCE FOSSINGER 8-29-97
   20     ID
   21     ID    100 YR 24 HR STORM
   22     ID
   23     ID    COTTONWOOD CREEK DBPS AYRES PROJECT NO. 34-0330.00
   24     ID    FUTURE CONDITIONS - INPUT FILE 100FDREV.INP
   25     ID    CN AND LAGS REVISED BASED UPON SEPTEMBER 4TH, 1996 MEETING WITH
   26     ID    CITY OF COLORADO SPRINGS ENGINEERING STAFF
   27     ID    100 YEAR 24 HOUR STORM - RUN DATE 10-08-96
          *DIAGRAM
   28     IT       5 01SEP89     800     300
   29     IO       5

   30     KK      A1
   31     KM      RUNOFF FROM  A1
   32     BA   0.188
   33     LS       0    61.0
   34     UD   0.450
   35     KM      DESIGN POINT 1
   36     IN      15
   37     PB   4.136
   38     PC   .0000   .0005   .0015   .0030   .0045   .0060   .0080   .0100   .0120   .0143
   39     PC   .0165   .0188   .0210   .0233   .0255   .0278   .0320   .0390   .0460   .0530
   40     PC   .0600   .0750   .1000   .4000   .7000   .7250   .7500   .7650   .7800   .7900
   41     PC   .8000   .8100   .8200   .8250   .8300   .8350   .8400   .8450   .8500   .8550
   42     PC   .8600   .8638   .8675   .8713   .8750   .8788   .8825   .8863   .8900   .8938
   43     PC   .8975   .9013   .9050   .9083   .9115   .9148   .9180   .9210   .9240   .9270
   44     PC   .9300   .9325   .9350   .9375   .9400   .9425   .9450   .9475   .9500   .9525
   45     PC   .9550   .9575   .9600   .9625   .9650   .9675   .9700   .9725   .9750   .9775
   46     PC   .9800   .9813   .9825   .9838   .9850   .9863   .9875   .9888   .9900   .9913
   47     PC   .9925   .9938   .9950   .9963   .9975   .9988  1.000
```

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  48      KK     1-2
  49      KM     ROUTE TO DESIGN POINT 2
  50      RD    2300    .033    .060       0    TRAP       5      15

  51      KK      A3
  52      KM     RUNOFF FROM  A3
  53      BA   0.162
  54      LS       0    61.0
  55      UD   0.380

  56      KK       2
  57      KM     COMBINE 1-2 AND A3
  58      HC       2

  59      KK     2-3
  60      KM     ROUTE TO DESIGN POINT 3
  61      RD    3500    .020    .060       0    TRAP       8      15

  62      KK      A2
  63      KM     RUNOFF FROM  A2
  64      BA   0.210
  65      LS       0    61.0
  66      UD   0.530

  67      KK      A4
  68      KM     RUNOFF FROM  A4
  69      BA   0.254
  70      LS       0    61.0
  71      UD   0.460

  72      KK      A5
  73      KM     RUNOFF FROM  A5
  74      BA   0.210
  75      LS       0    61.0
  76      UD   0.410

  77      KK       3
  78      KM     COMBINE 2-3,A2,A4,A5
  79      HC       4

  80      KK     3-4
  81      KM     ROUTE TO DESIGN POINT 4
  82      RD    3500    .030    .060       0    TRAP      10      15

  83      KK      A8
  84      KM     RUNOFF FROM  A8
  85      BA   0.240
  86      LS       0    61.0
  87      UD   0.450
```

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

   88         KK      A9
   89         KM     RUNOFF FROM  A9
   90         BA   0.197
   91         LS        0    61.0
   92         UD   0.330

   93         KK        4
   94         KM     COMBINE 3-4,A8,A9
   95         HC        3

   96         KK     4-5
   97         KM     ROUTE TO DESIGN POINT 5
   98         RD    2000    .025    .060       0    TRAP      15      15

   99         KK      A6
  100         KM     RUNOFF FROM  A6
  101         BA   0.141
  102         LS        0    61.0
  103         UD   0.400

  104         KK      A7
  105         KM     RUNOFF FROM  A7
  106         BA   0.137
  107         LS        0    61.0
  108         UD   0.400

  109         KK      5A
  110         KM     COMBINE A6,A7
  111         HC        2

  112         KK    5A-5
  113         KM     ROUTE TO DESIGN POINT 5
  114         RD    3900    .031    .060       0    TRAP       5      15

  115         KK     A10
  116         KM     RUNOFF FROM  A10
  117         BA   0.169
  118         LS        0    61.0
  119         UD   0.340

  120         KK     A11
  121         KM     RUNOFF FROM  A11
  122         BA   0.119
  123         LS        0    61.0
  124         UD   0.420

  125         KK     A12
  126         KM     RUNOFF FROM  A12
  127         BA   0.119
  128         LS        0    61.0
  129         UD   0.290
```

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  130         KK     A13
  131         KM     RUNOFF FROM  A13
  132         BA   0.161
  133         LS       0    61.0
  134         UD   0.460

  135         KK      B1
  136         KM     RUNOFF FROM  B1
  137         BA   0.192
  138         LS       0    62.7
  139         UD   0.190

  140         KK       5
  141         KM     COMBINE 4-5,5A-5,A10,A11,A12,A13,B1
  142         HC       7

  143         KK     5-6
  144         KM     ROUTE TO DESIGN POINT 6
  145         RD    6000    .015    .035       0    TRAP      20      15

  146         KK      B2
  147         KM     RUNOFF FROM  B2
  148         BA   0.107
  149         LS       0    78.0
  150         UD   0.160

  151         KK   B2-6A
  152         KM     ROUTE TO DESIGN POINT 6A
  153         RD    3000    .035    .060       0    TRAP       5      15

  154         KK      B6
  155         KM     RUNOFF FROM  B6
  156         BA   0.183
  157         LS       0    78.8
  158         UD   0.410

  159         KK      6A
  160         KM     COMBINE B2-6A,B6
  161         HC       2

  162         KK      B3
  163         KM     RUNOFF FROM  B3
  164         BA   0.146
  165         LS       0    74.9
  166         UD   0.220

  167         KK      B4
  168         KM     RUNOFF FROM  B4
  169         BA   0.104
  170         LS       0    74.3
  171         UD   0.220
```

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 172      KK       5
 173      KM     COMBINE 5-6,6A,B3,B4
 174      HC       4

 175      KK     6-7
 176      KM     ROUTE TO DESIGN POINT 7
 177      RD    5500     .018     .035        0    TRAP       20       15

 178      KK      B8
 179      KM     RUNOFF FROM  B8
 180      BA   0.159
 181      LS       0     81.6
 182      UD   0.410

 183      KK       7
 184      KM     COMBINE 6-7,B8
 185      HC       2

 186      KK     7-8
 187      KM     ROUTE TO DESIGN POINT 8
 188      RD
 189      RC    .040     .035     .040     3500     .018
 190      RX       0       76       83      138      144      189      214      291
 191      RY    6940     6930     6920     6914     6914     6920     6930     6940

 192      KK      C2
 193      KM     RUNOFF FROM  C2
 194      BA   0.154
 195      LS       0     61.0
 196      UD   0.130

 197      KK   C2-8A
 198      KM     ROUTE TO DESIGN POINT 8A
 199      RD    3000     .035     .060        0    TRAP        5       15

 200      KK      C3
 201      KM     RUNOFF FROM  C3
 202      BA   0.162
 203      LS       0     63.7
 204      UD   0.230

 205      KK      8A
 206      KM     COMBINE C2-8A,C3
 207      HC       2

 208      KK   8A-8B
 209      KM     ROUTE 8A TO DESIGN POINT 8B
 210      RD    4000     .030     .060        0    TRAP        8       15
```

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  211     KK      C4
  212     KM     RUNOFF FROM  C4
  213     BA   0.224
  214     LS      0     65.9
  215     UD   0.220

  216     KK   C4-8B
  217     KM     ROUTE C4 TO DESIGN POINT 8B
  218     RD    3000    .030    .060       0    TRAP       5      15

  219     KK      C7
  220     KM     RUNOFF FROM  C7
  221     BA   0.156
  222     LS      0     78.3
  223     UD   0.280

  224     KK      8B
  225     KM     COMBINE 8A-8B,C4-8B,C7
  226     HC      3

  227     KK      C1
  228     KM     RUNOFF FROM  C1
  229     BA   0.165
  230     LS      0     67.5
  231     UD   0.180

  232     KK     C13
  233     KM     RUNOFF FROM  C13
  234     BA   0.125
  235     LS      0     69.8
  236     UD   0.130

  237     KK      8C
  238     KM     COMBINE C1,C13
  239     HC      2

  240     KK   8C-8D
  241     KM     ROUTE 8C TO DESIGN POINT 8D
  242     RD    4500    .027    .060       0    TRAP       5      15

  243     KK      C6
  244     KM     RUNOFF FROM  C6
  245     BA   0.107
  246     LS      0     79.6
  247     UD   0.230

  248     KK      8D
  249     KM     COMBINE 8C-8D,C6
  250     HC      2
```

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  251         KK      8E
  252         KM     COMBINE 8B,8D
  253         HC       2

  254         KK    8E-8G
  255         KM      ROUTE 8E TO DESIGN POINT 8G
  256         RD    3000    .018    .035       0    TRAP      10      15

  257         KK      C5
  258         KM     RUNOFF FROM  C5
  259         BA    0.227
  260         LS        0    68.5
  261         UD    0.240

  262         KK    C5-8F
  263         KM      ROUTE C5 TO DESIGN POINT 8F
  264         RD    6300    .030    .060       0    TRAP       5      15

  265         KK      C8
  266         KM     RUNOFF FROM  C8
  267         BA    0.171
  268         LS        0    79.8
  269         UD    0.370

  270         KK      8F
  271         KM     COMBINE C5-8F,C8
  272         HC       2

  273         KK      C9
  274         KM     RUNOFF FROM  C9
  275         BA    0.206
  276         LS        0    78.0
  277         UD    0.360

  278         KK     C10
  279         KM     RUNOFF FROM  C10
  280         BA    0.106
  281         LS        0    76.1
  282         UD    0.420

  283         KK     C11
  284         KM     RUNOFF FROM  C11
  285         BA    0.125
  286         LS        0    80.5
  287         UD    0.270

  288         KK      8G
  289         KM     COMBINE 8E-8G,8F,C9,C10,C11
  290         HC       5
```

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  291     KK    8G-8
  292     KM     ROUTE 8G TO DESIGN POINT 8
  293     RD    4000    .028    .035       0    TRAP      15      15

  294     KK      B5
  295     KM     RUNOFF FROM  B5
  296     BA   0.107
  297     LS       0    82.3
  298     UD   0.200

  299     KK   B5-8H
  300     KM     ROUTE B5 TO DESIGN POINT 8H
  301     RD    4800    .035    .060       0    TRAP       5      15

  302     KK      B7
  303     KM     RUNOFF FROM  B7
  304     BA   0.297
  305     LS       0    77.2
  306     UD   0.290

  307     KK      8H
  308     KM     COMBINE B5-8H,B7
  309     HC       2

  310     KK      B9
  311     KM     RUNOFF FROM  B9
  312     BA   0.169
  313     LS       0    81.7
  314     UD   0.330

  315     KK       8
  316     KM     COMBINE 7-8,8G-8,8H,B9
  317     HC       4

  318     KK     8-9
  319     KM     ROUTE 8 TO DESIGN POINT 9
  320     RD
  321     RC    .040    .040    .040    3000    .015
  322     RX      23      69      90     115     149     197     209     254
  323     RY    6910    6899    6886    6880    6880    6892    6890    6907

  324     KK     C14
  325     KM     RUNOFF FROM  C14
  326     BA   0.104
  327     LS       0    75.0
  328     UD   0.170

  329     KK  C14-9A
  330     KM     ROUTE C14 TO DESIGN POINT 9A
  331     RD    2500    .032    .060       0    TRAP       5      15
```

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 332          KK     C15
 333          KM     RUNOFF FROM  C15
 334          BA   0.085
 335          LS       0    76.3
 336          UD   0.170

 337          KK      9A
 338          KM     COMBINE C14-9A,C15
 339          HC       2

 340          KK   9A-9B
 341          KM     ROUTE 9A TO DESIGN POINT 9B
 342          RD    6800    .030    .060       0    TRAP       8      15

 343          KK     C17
 344          KM     RUNOFF FROM  C17
 345          BA   0.088
 346          LS       0    77.1
 347          UD   0.320

 348          KK     C18
 349          KM     RUNOFF FROM  C18
 350          BA   0.201
 351          LS       0    75.1
 352          UD   0.410

 353          KK      9B
 354          KM     COMBINE 9A-9B,C17,C18
 355          HC       3

 356          KK     C12
 357          KM     RUNOFF FROM  C12
 358          BA   0.112
 359          LS       0    81.2
 360          UD   0.200

 361          KK      D1
 362          KM     RUNOFF FROM  D1
 363          BA   0.165
 364          LS       0    83.0
 365          UD   0.290

 366          KK      D2
 367          KM     RUNOFF FROM  D2
 368          BA   0.199
 369          LS       0    84.7
 370          UD   0.320

 371          KK       9
 372          KM     COMBINE 8-9,9B,C12,D1,D2
 373          HC       5
```

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  374         KK    9-10
  375         KM     ROUTE 9 TO DESIGN POINT 10
  376         RD
  377         RC    .040    .040    .040    1800    .017
  378         RX       0     108     121     125     159     205     230     276
  379         RY    6840    6826    6810    6808    6808    6812    6824    6840

  380         KK     C19
  381         KM     RUNOFF FROM  C19
  382         BA   0.112
  383         LS       0    75.9
  384         UD   0.320

  385         KK      D4
  386         KM     RUNOFF FROM  D4
  387         BA   0.118
  388         LS       0    86.6
  389         UD   0.330

  390         KK      10
  391         KM     COMBINE 9-10,C19,D4
  392         HC       3

  393         KK   10-11
  394         KM     ROUTE 10 TO DESIGN POINT 11
  395         RD
  396         RC    .040    .040    .040    1100    .018
  397         RX       0       9      15      48      82     117     135     140
  398         RY    6800    6790    6788    6786    6786    6788    6796    6800

  399         KK      E1
  400         KM     RUNOFF FROM  E1
  401         BA   0.093
  402         LS       0    73.0
  403         UD   0.160

  404         KK  E1-11A
  405         KM     ROUTE E1 TO DESIGN POINT 11A
  406         RD    3000    .035    .060       0    TRAP       5      15

  407         KK      E3
  408         KM     RUNOFF FROM  E3
  409         BA   0.146
  410         LS       0    84.7
  411         UD   0.200

  412         KK     11A
  413         KM     COMBINE E1-11A,E3
  414         HC       2
```

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 415      KK  11A11B
 416      KM     ROUTE 11A TO DESIGN POINT 11B
 417      RD    3300    .030    .060       0    TRAP       8      15

 418      KK      E5
 419      KM     RUNOFF FROM  E5
 420      BA   0.127
 421      LS       0    84.9
 422      UD   0.320

 423      KK     11B
 424      KM     COMBINE 11A11B,E5
 425      HC       2

 426      KK      E2
 427      KM     RUNOFF FROM  E2
 428      BA   0.090
 429      LS       0    89.5
 430      UD   0.190

 431      KK  E2-11C
 432      KM     ROUTE E2 TO DESIGN POINT 11C
 433      RD    3300    .030    .060       0    TRAP       5      15

 434      KK      E4
 435      KM     RUNOFF FROM  E4
 436      BA   0.154
 437      LS       0    78.0
 438      UD   0.400

 439      KK     11C
 440      KM     COMBINE E2-11C,E4
 441      HC       2

 442      KK     11D
 443      KM     COMBINE 11B,11C
 444      HC       2

 445      KK  11D11F
 446      KM     ROUTE 11D TO DESIGN POINT 11F
 447      RD    2000    .036    .035       0    TRAP       8      15

 448      KK      E6
 449      KM     RUNOFF FROM  E6
 450      BA   0.045
 451      LS       0    73.5
 452      UD   0.300

 453      KK  E6-11E
 454      KM     ROUTE E6 TO DESIGN POINT 11E
 455      RD    4000    .030    .060       0    TRAP       5      15
```

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 456      KK      E8
 457      KM     RUNOFF FROM  E8
 458      BA   0.124
 459      LS       0     84.5
 460      UD   0.240

 461      KK     11E
 462      KM     COMBINE E6-11E,E8
 463      HC       2

 464      KK      E7
 465      KM     RUNOFF FROM  E7
 466      BA   0.118
 467      LS       0     82.4
 468      UD   0.320

 469      KK     11F
 470      KM     COMBINE 11D11F,11E,E7
 471      HC       3

 472      KK  11F11P
 473      KM     ROUTE 11F TO DESIGN POINT 11P
 474      KO       0
 475      RD    3300    .028    .035       0    TRAP      10      15

 476      KK      E9
 477      KM     RUNOFF FROM  E9
 478      BA   0.112
 479      LS       0     77.0
 480      UD   0.120

 481      KK     E10
 482      KM     RUNOFF FROM  E10
 483      BA   0.103
 484      LS       0     76.1
 485      UD   0.120

 486      KK    11CP
 487      KM     COMBINE 11F11P,E9,E10
 488      HC       3

 489      KK     11P
 490      KM    FAIRFAX POND BY JR ENGINEERING - AS BUILT
 491      SV       0     9.0    21.1    38.0    60.0    88.2    96.0   104.8   108.0   115.2
 492      SE    6788    6800    6804    6808    6812    6816    6817    6818    6819    6820
 493      SQ       0      190     225     260     290     320     805    1666    2771    4076
 494      RS       1    ELEV    6788

 495      KK  11P-11
 496      KM     ROUTE 11P TO DESIGN POINT 11
 497      RD     800    .026    .035       0    TRAP      10      15
```

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 498      KK     E11
 499      KM     RUNOFF FROM  E11
 500      BA   0.100
 501      LS       0    75.7
 502      UD   0.300

 503      KK   11P11
 504      KM     COMBINE 11P-11,E11
 505      HC       2

 506      KK     C16
 507      KM     RUNOFF FROM  C16
 508      BA   0.141
 509      LS       0    76.2
 510      UD   0.250

 511      KK  C1611G
 512      KM     ROUTE C16 TO DESIGN POINT 11G
 513      RD    4800    .030    .060       0    TRAP       5      15

 514      KK     C20
 515      KM     RUNOFF FROM  C20
 516      BA   0.113
 517      LS       0    79.6
 518      UD   0.360

 519      KK     11G
 520      KM     COMBINE C16-11G,C20
 521      HC       2

 522      KK      11
 523      KM     COMBINE 10-11,11F11P,11G
 524      HC       3

 525      KK  11-12D
 526      KM     ROUTE 11 TO DESIGN POINT 12D
 527      RD
 528      RC    .040    .040    .040    2600    .018
 529      RX      68      96     138     158     206     207     244     268
 530      RY    6752    6730    6730    6728    6728    6730    6738    6752

 531      KK     D3B
 532      KM     RUNOFF FROM  D3B
 533      BA   0.083
 534      LS       0    93.0
 535      UD   0.158

 536      KK     H5A
 537      KM     RUNOFF FROM  H5A
 538      BA   0.032
 539      LS       0    90.0
 540      UD   0.149
```

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 541      KK     12G
 542      KM    COMBINE D3B,H5A
 543      HC       2

 544      KK  12G12H
 545      KM     ROUTE 12G TO DESIGN POINT 12H AT NW CORNER OF SUBBASIN H11A
 546      KO       0
 547      RD    3750     .038     .013        0     CIRC        5

 548      KK    H11A
 549      KM     RUNOFF FROM  H11A
 550      BA   0.159
 551      LS       0     92.0
 552      UD   0.368

 553      KK     12H
 554      KM    COMBINE 12G12H,H11A
 555      HC       2

 556      KK  12H12D
 557      KM     ROUTE 12H TO DESIGN POINT 12D AT COTTONWOOD CREEK
 558      KO       0
 559      RD    350     .038     .013        0     CIRC        5

 560      KK     12D
 561      KM    COMBINE 12H12D,11-12D
 562      HC       2

 563      KK  12D12E
 564      KM     ROUTE 12D TO DESIGN POINT 12E
 565      RD
 566      RC    .040     .040     .040     1900    .018
 567      RX      68       96      138      158      206      207      244      268
 568      RY    6752     6730     6730     6728     6728     6730     6738     6752

 569      KK     D3A
 570      KM     RUNOFF FROM  D3A (NOTE:BASIN PLANIMETERS @ 15ac BUT MODELED AS 28ac TO
 571      KM     REMAIN CONSISTANT WITH DBPS MODEL.(BASIN D2) 81ac-(BASIN D2B)53ac=28ac
 572      BA   0.044
 573      LS       0     93.0
 574      UD   0.158

 575      KK  D3-12D
 576      KM     ROUTE D3 TO DESIGN POINT 12D
 577      RD    2300     .037     .035        0     TRAP        5        4

 578      KK     D5
 579      KM     RUNOFF FROM  D5
 580      BA   0.128
 581      LS       0     91.8
 582      UD   0.210
```

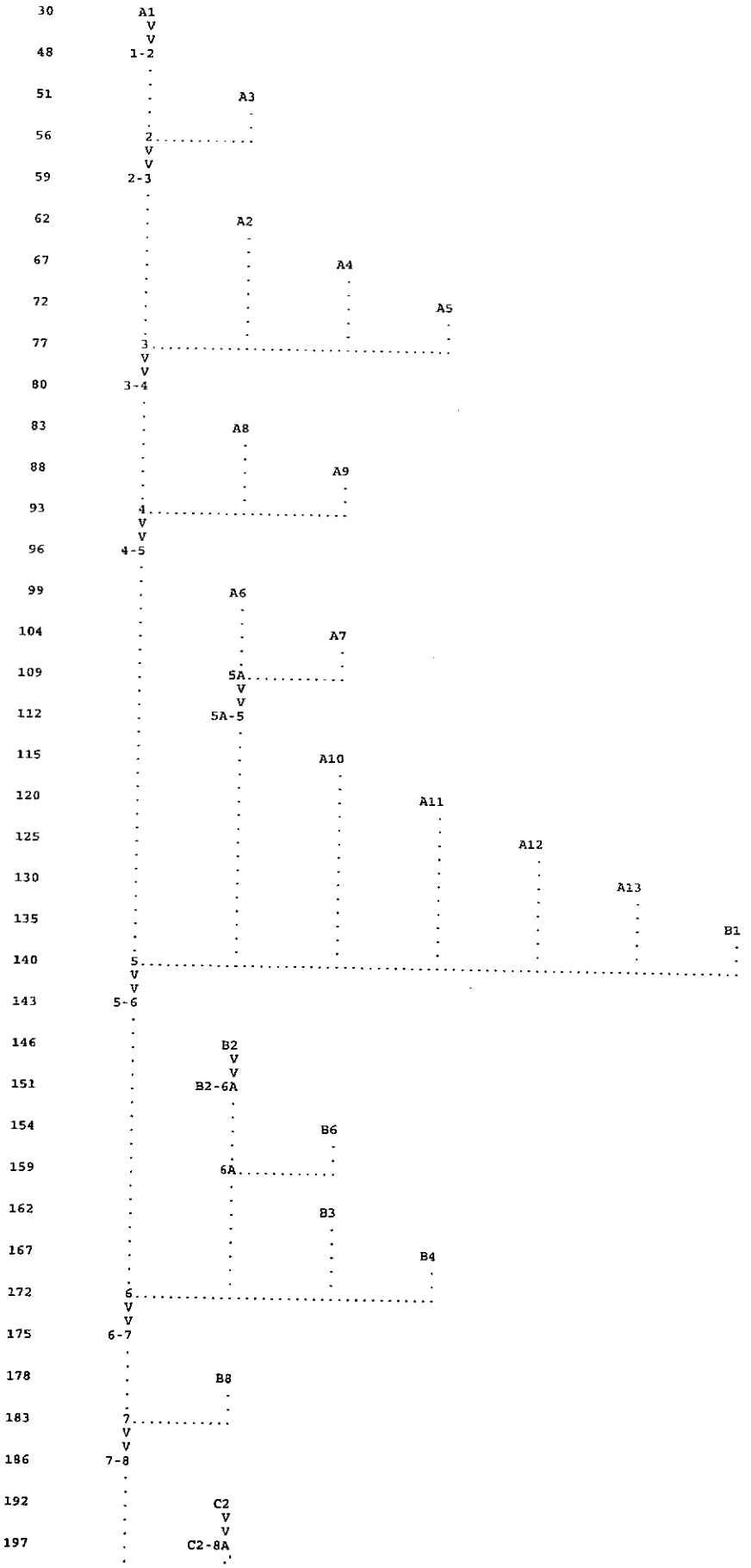
```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 583      KK     12D
 584      KM     COMBINE D3-12D,D5
 585      HC       2

 586      KK      F1
 587      KM     RUNOFF FROM  F1
 588      BA   0.137
 589      LS      0     79.7
 590      UD   0.480

 591      KK      G7
 592      KM     RUNOFF FROM  G7
 593      BA   0.171
 594      LS      0     77.4
 595      UD   0.290

 596      KK     12E
 597      KM     COMBINE 12D-12E,12D,F1, AND G7 FOR TOTAL FLOW ABOVE ASTN. BLFFS PKWY
 598      HC       4

 599      KK      G1
 600      KM     RUNOFF FROM  G1
 601      BA   0.180
 602      LS      0     81.7
 603      UD   0.180

 604      KK  G1-12A
 605      KM     ROUTE G1 TO DESIGN POINT 12A
 606      RD    2400    .023    .013       0    CIRC      5.5

 607      KK      G3
 608      KM     RUNOFF FROM  G3
 609      BA   0.183
 610      LS      0     79.4
 611      UD   0.270

 612      KK     12A
 613      KM     COMBINE G1-12A,G3
 614      HC       2

 615      KK      G2
 616      KM     RUNOFF FROM  G2
 617      BA   0.107
 618      LS      0     75.3
 619      UD   0.150

 620      KK  G2-12B
 621      KM     ROUTE G2 TO DESIGN POINT 12B
 622      RD    2900    .042    .035       0    TRAP      5       8
```

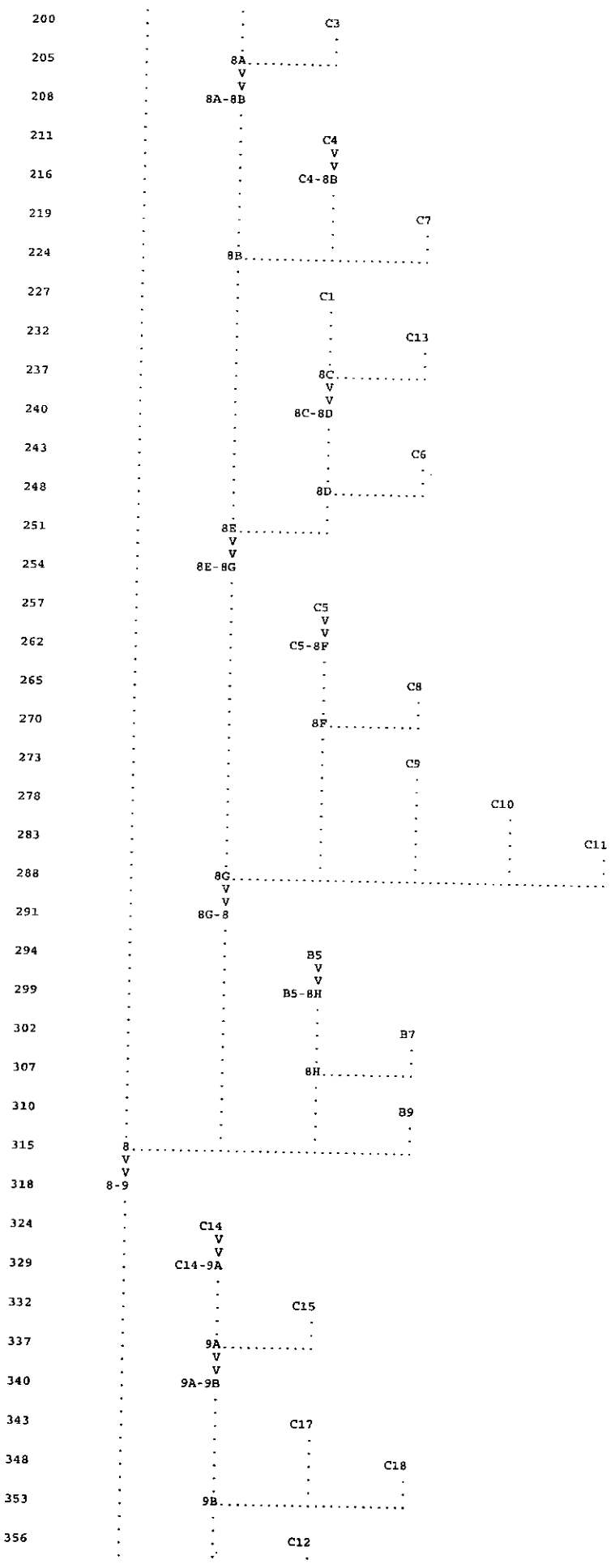
```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  623     KK      G4
  624     KM     RUNOFF FROM  G4
  625     BA   0.132
  626     LS        0     87.0
  627     UD   0.230

  628     KK     12B
  629     KM     COMBINE 12A,G2-12B,G4
  630     HC       3

  631     KK  12B12C
  632     KM     ROUTE 12B TO DESIGN POINT 12C
  633     KO       0
  634     RD    2500     .025     .015        0     TRAP       10        5

  635     KK      G5
  636     KM     RUNOFF FROM  G5
  637     BA   0.118
  638     LS        0     76.3
  639     UD   0.190

  640     KK      G6
  641     KM     RUNOFF FROM  G6
  642     BA   0.139
  643     LS        0     78.1
  644     UD   0.200

  645     KK     12C
  646     KM     COMBINE 12B-12C,G5,G6 FOR TOTAL FLOW AT MEADOW RIDGE
  647     HC       3

  648     KK  12C12F
  649     KM     ROUTE 12C TO DESIGN POINT 12F AT CONFLUENCE W/ COTTONWOOD CREEK
  650     KO       0
  651     RD    1650     .028     .013        0     CIRC       8

  652     KK   G8
  653     KM     RUNOFF FROM  G8
  654     BA   0.081
  655     LS        0     80.1
  656     UD   0.17

  657     KK     12F
  658     KM     COMBINE 12C12F AND G8 FOR TOTAL FLOW IN AUSTIN BLUFFS TRIBUTARY
  659     HC       2

  660     KK   12
  661     KM     COMBINE 12E AND 12F FOR TOTAL FLOW BELOW CONFLUENCE W/ TRIBUTARY
  662     HC       2
  663     ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

(V) ROUTING (---->) DIVERSION OR PUMP FLOW

(.) CONNECTOR (<----) RETURN OF DIVERTED OR PUMPED FLOW

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348
353
356
C3
8A
8A-8B
C4
C4-8B
C7
8B
C1
C13
8C
8C-8D
C6
8D
8E
8E-8G
C5
C5-8F
C8
8F
C9
C10
C11
8G
8G-8
B5
B5-8H
B7
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C15
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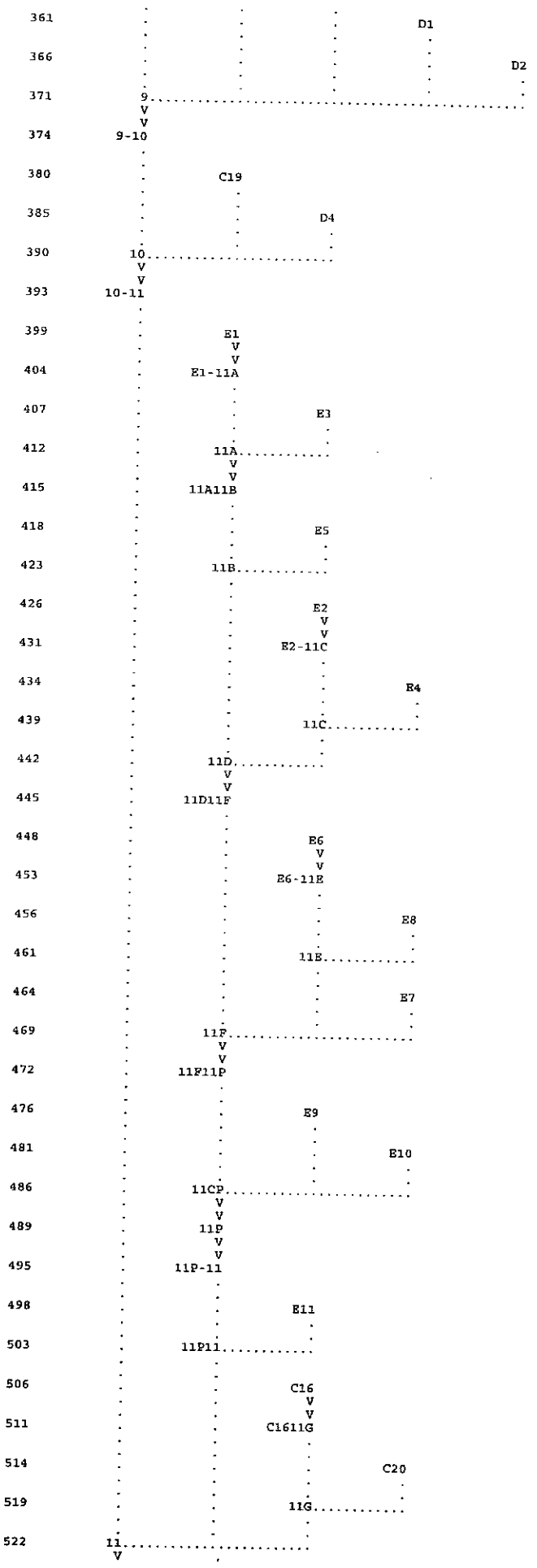
C17
C18
9B
C12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519
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D1
D2
9
9-10
C19
D4
10
10-11
E1
E1-11A
E3
11A
11A11B
E5
11B
E2
E2-11C
E4
11C
11D
11D11F
E6
E6-11E
E8
11E
E7
11F
11F11P
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E10
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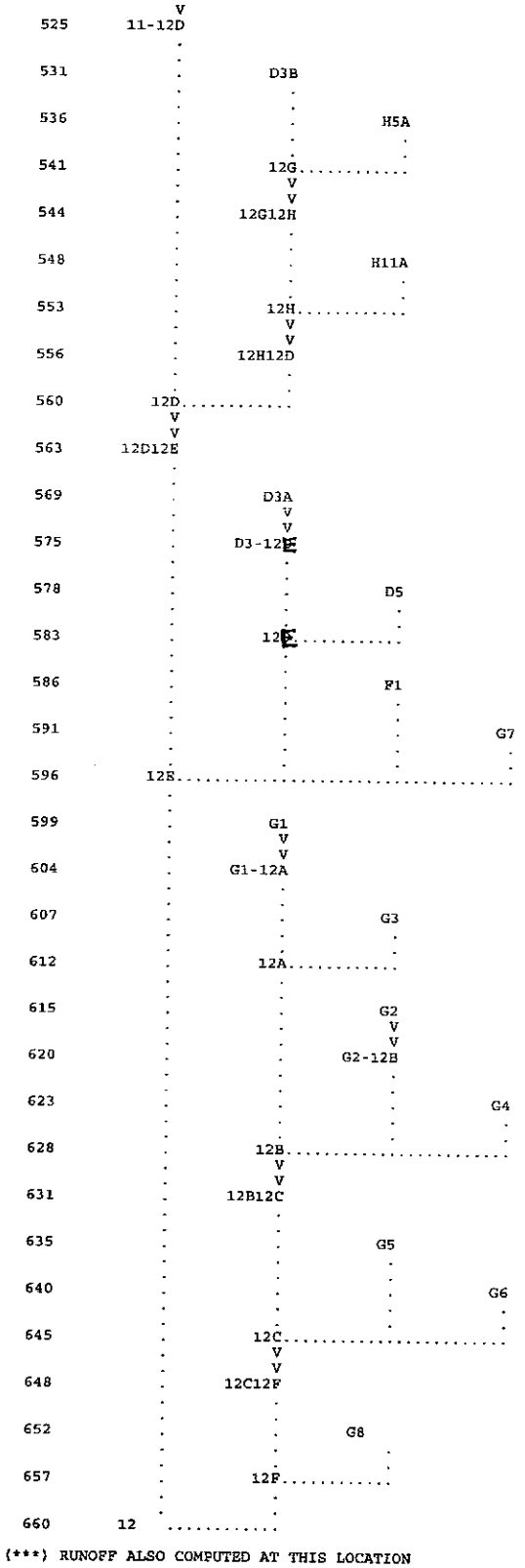
11P
11P-11
E11
11P11
C16
C1611G
C20
11G
11
V



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

HEC1 S/N: 1343000062 HMVersion: 6.33 Data File: X:\871571\HYDRO\HEC1\CCABR2.DAT

```
**************************************
*                                    *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)*
*             MAY  1991              *
*          VERSION 4.0.1E            *
*                                    *
*  RUN DATE  08/29/1997  TIME  13:21:05 *
*                                    *
**************************************
```

```
**************************************
*                                    *
*    U.S. ARMY CORPS OF ENGINEERS    *
*    HYDROLOGIC ENGINEERING CENTER   *
*         609 SECOND STREET          *
*       DAVIS, CALIFORNIA 95616      *
*            (916) 756-1104          *
*                                    *
**************************************
```

COTTONWOOD CREEK AYERS DBPS MODEL REVISED TO PROVIDE HYROGRAPHS AT
A POINT IMEDIATELY UPSTREAM OF AUSTIN BLUFFS PARKWAY AND IMEDIATELY
DOWNSTREAM OF THE CONFLUENCE WITH THE AUSTIN BLUFFS TRIBUTARY.
ALSO REVISED SOME REACHES TO PIPE CONVEYENCES IN THE AUSTIN BLUFFS
TRIBUTARY. REVISED BY JR ENGINEERING, VANCE FOSSINGER ON 7-29-97

REVISED MODEL ON 8-29-97 TO REFLECT PROPOSED REROUTING OF RUNOFF FROM
THE INTERSECTION OF POWERS & WOODMEN AND BASIN H11A SOUTH OF WOODMEN TO
A POINT IN COTTONWOOD CREEK LOCATED UPSTREAM OF THE PROPOSED AUSTIN
BLUFFS BRIDGE. THIS REVISION IS BASED ON DATA SUPPLIED BY ROCKWELL-
MINCHOW CONSULTANTS INC. NEW TIMES OF CONCENTRATIONS FOR THE REVISED
SUBBASINS WERE ESTIMATED USING VELOCITIES AND LENGTHS CONSISTANT WITH
THE VELOCITIES AND LENGTHS USED TO DEVELOP THE TIMES OF CONCENTRATIONS
FOR THE ORIGINAL BASINS IN THE AYRES MODEL IN ORDER TO REMAIN SOMEWHAT
CONSISTANT WITH THE AYRES MODEL. PER THE DATA SUPPLIED BY ROCKWELL-
MINCHOW, RUNOFF FROM BASIN H21 WILL BE ROUTED ACROSS AUSTIN BLUFFS PKWY
SOUTH OF WOODMEN AND THEN WEST TO COTTONWOOD CREEK SOUTH OF WOODMEN.
MODEL REVISED BY JR ENGINEERING, VANCE FOSSINGER 8-29-97

100 YR 24 HR STORM

COTTONWOOD CREEK DBPS AYRES PROJECT NO. 34-0330.00
FUTURE CONDITIONS - INPUT FILE 100FDREV.INP
CN AND LAGS REVISED BASED UPON SEPTEMBER 4TH, 1996 MEETING WITH
CITY OF COLORADO SPRINGS ENGINEERING STAFF
100 YEAR 24 HOUR STORM - RUN DATE 10-08-96

```
 29 IO          OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                      NMIN          5  MINUTES IN COMPUTATION INTERVAL
                     IDATE     1SEP89  STARTING DATE
                     ITIME       0800  STARTING TIME
                        NQ        300  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE     2SEP89  ENDING DATE
                    NDTIME       0855  ENDING TIME
                     ICENT         19  CENTURY MARK

                   COMPUTATION INTERVAL    0.08 HOURS
                       TOTAL TIME BASE   24.92 HOURS

         ENGLISH UNITS
              DRAINAGE AREA          SQUARE MILES
              PRECIPITATION DEPTH    INCHES
              LENGTH, ELEVATION      FEET
              FLOW                   CUBIC FEET PER SECOND
              STORAGE VOLUME         ACRE-FEET
              SURFACE AREA           ACRES
              TEMPERATURE            DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
 472 KK       *   11F11P   *
              *            *
              **************

 474 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
 544 KK       *   12G12H   *
              *            *
              **************

 546 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
 556 KK       *   12H12D   *
              *            *
              **************

 558 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE
```

```
*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

           **************
           *            *
631 KK     *    12B12C  *
           *            *
           **************

633 KO          OUTPUT CONTROL VARIABLES
                     IPRNT            5  PRINT CONTROL
                     IPLOT            0  PLOT CONTROL
                     QSCAL           0.  HYDROGRAPH PLOT SCALE


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

           **************
           *            *
648 KK     *    12C12F  *
           *            *
           **************

650 KO          OUTPUT CONTROL VARIABLES
                     IPRNT            5  PRINT CONTROL
                     IPLOT            0  PLOT CONTROL
                     QSCAL           0.  HYDROGRAPH PLOT SCALE
```

100 year, 24hr Storm W/ Norwood Diversion

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	A1	62.	6.33	13.	4.	4.	0.19		
ROUTED TO	1-2	62.	6.50	13.	4.	4.	0.19		
HYDROGRAPH AT	A3	60.	6.33	11.	4.	4.	0.16		
2 COMBINED AT	2	110.	6.42	24.	8.	8.	0.35		
ROUTED TO	2-3	109.	6.67	24.	8.	8.	0.35		
HYDROGRAPH AT	A2	61.	6.50	14.	5.	5.	0.21		
HYDROGRAPH AT	A4	82.	6.42	17.	6.	6.	0.25		
HYDROGRAPH AT	A5	74.	6.33	14.	5.	5.	0.21		
4 COMBINED AT	3	282.	6.58	69.	24.	23.	1.02		
ROUTED TO	3-4	277.	6.75	69.	24.	23.	1.02		
HYDROGRAPH AT	A8	79.	6.33	16.	6.	5.	0.24		
HYDROGRAPH AT	A9	81.	6.25	13.	5.	5.	0.20		
3 COMBINED AT	4	359.	6.67	98.	35.	33.	1.46		
ROUTED TO	4-5	357.	6.75	98.	34.	33.	1.46		
HYDROGRAPH AT	A6	51.	6.33	10.	3.	3.	0.14		
HYDROGRAPH AT	A7	49.	6.33	9.	3.	3.	0.14		
2 COMBINED AT	5A	100.	6.33	19.	7.	6.	0.28		
ROUTED TO	5A-5	99.	6.58	19.	7.	6.	0.28		
HYDROGRAPH AT	A10	68.	6.25	12.	4.	4.	0.17		
HYDROGRAPH AT	A11	41.	6.33	8.	3.	3.	0.12		
HYDROGRAPH AT	A12	53.	6.17	8.	3.	3.	0.12		
HYDROGRAPH AT	A13	52.	6.42	11.	4.	4.	0.16		
HYDROGRAPH AT	B1	127.	6.08	15.	5.	5.	0.19		
7 COMBINED AT	5	597.	6.50	169.	60.	57.	2.50		
ROUTED TO	5-6	595.	6.75	168.	59.	57.	2.50		
HYDROGRAPH AT	B2	173.	6.08	18.	6.	6.	0.11		
ROUTED TO	B2-6A	167.	6.17	18.	6.	6.	0.11		
HYDROGRAPH AT	B6	197.	6.25	32.	10.	10.	0.18		
2 COMBINED AT	6A	361.	6.25	51.	16.	15.	0.29		
HYDROGRAPH AT	B3	184.	6.08	22.	7.	7.	0.15		
HYDROGRAPH AT	B4	127.	6.08	15.	5.	5.	0.10		
4 COMBINED AT	6	749.	6.67	252.	87.	84.	3.04		
ROUTED TO	6-7	746.	6.92	252.	87.	83.	3.04		
HYDROGRAPH AT	B8	195.	6.25	32.	10.	9.	0.16		
2 COMBINED AT	7	857.	6.58	281.	96.	93.	3.20		
ROUTED TO	7-8	853.	6.67	281.	96.	93.	3.20		
HYDROGRAPH AT	C2	104.	6.08	11.	4.	4.	0.15		
ROUTED TO	C2-8A	99.	6.25	10.	4.	3.	0.15		
HYDROGRAPH AT	C3	102.	6.17	13.	4.	4.	0.16		
2 COMBINED AT	8A	191.	6.17	24.	8.	8.	0.32		
ROUTED TO	8A-8B	200.	6.42	24.	8.	8.	0.32		
HYDROGRAPH AT	C4	167.	6.08	21.	7.	7.	0.22		
ROUTED TO	C4-8B	162.	6.25	21.	7.	7.	0.22		
HYDROGRAPH AT	C7	205.	6.17	27.	8.	8.	0.16		
3 COMBINED AT	8B	439.	6.42	71.	24.	23.	0.70		
HYDROGRAPH AT	C1	155.	6.08	17.	6.	5.	0.17		
HYDROGRAPH AT	C13	143.	6.00	15.	5.	5.	0.13		
2 COMBINED AT	8C	298.	6.08	32.	10.	10.	0.29		
ROUTED TO	8C-8D	276.	6.25	32.	10.	10.	0.29		
HYDROGRAPH AT	C6	164.	6.08	20.	6.	6.	0.11		
2 COMBINED AT	8D	397.	6.25	51.	16.	16.	0.40		
2 COMBINED AT	8E	778.	6.33	122.	40.	39.	1.09		
ROUTED TO	8E-8G	785.	6.42	122.	40.	39.	1.09		
HYDROGRAPH AT	C5	192.	6.17	25.	8.	8.	0.23		
ROUTED TO	C5-8F	178.	6.50	24.	8.	8.	0.23		
HYDROGRAPH AT	C8	205.	6.25	32.	10.	9.	0.17		

100 Yr, 24 hr Storm w/ Norwood Diversion

2 COMBINED AT	8F	316.	6.42	55.	18.	17.	0.40		
HYDROGRAPH AT	C9	230.	6.25	35.	11.	11.	0.21		
HYDROGRAPH AT	C10	98.	6.25	17.	5.	5.	0.11		
HYDROGRAPH AT	C11	183.	6.17	24.	7.	7.	0.13		
5 COMBINED AT	8G	1454.	6.42	252.	81.	78.	1.93		
ROUTED TO	8G-8	1437.	6.50	252.	81.	78.	1.93		
HYDROGRAPH AT	B5	195.	6.08	22.	7.	6.	0.11		
ROUTED TO	B5-8H	190.	6.33	22.	7.	6.	0.11		
HYDROGRAPH AT	B7	366.	6.17	49.	15.	15.	0.30		
2 COMBINED AT	8H	508.	6.25	71.	22.	21.	0.40		
HYDROGRAPH AT	B9	237.	6.17	34.	10.	10.	0.17		
4 COMBINED AT	8	2733.	6.42	633.	210.	202.	5.70		
ROUTED TO	8-9	2708.	6.50	633.	210.	202.	5.70		
HYDROGRAPH AT	C14	147.	6.08	16.	5.	5.	0.10		
ROUTED TO	C14-9A	139.	6.17	16.	5.	5.	0.10		
HYDROGRAPH AT	C15	127.	6.08	14.	4.	4.	0.09		
2 COMBINED AT	9A	239.	6.17	29.	9.	9.	0.19		
ROUTED TO	9A-9B	227.	6.50	28.	9.	9.	0.19		
HYDROGRAPH AT	C17	102.	6.17	15.	5.	4.	0.09		
HYDROGRAPH AT	C18	179.	6.25	30.	10.	9.	0.20		
3 COMBINED AT	9B	450.	6.42	73.	23.	22.	0.48		
HYDROGRAPH AT	C12	195.	6.08	22.	7.	7.	0.11		
HYDROGRAPH AT	D1	261.	6.17	35.	11.	10.	0.17		
HYDROGRAPH AT	D2	323.	6.17	45.	14.	13.	0.20		
5 COMBINED AT	9	3477.	6.42	803.	264.	255.	6.65		
ROUTED TO	9-10	3456.	6.50	803.	264.	254.	6.65		
HYDROGRAPH AT	C19	122.	6.17	18.	6.	5.	0.11		
HYDROGRAPH AT	D4	203.	6.17	29.	9.	8.	0.12		
3 COMBINED AT	10	3616.	6.50	848.	278.	268.	6.88		
ROUTED TO	10-11	3570.	6.50	848.	278.	268.	6.88		
HYDROGRAPH AT	E1	122.	6.08	13.	4.	4.	0.09		
ROUTED TO	E1-11A	118.	6.25	13.	4.	4.	0.09		
HYDROGRAPH AT	E3	291.	6.08	33.	10.	10.	0.15		
2 COMBINED AT	11A	364.	6.08	46.	14.	14.	0.24		
ROUTED TO	11A11B	359.	6.25	45.	14.	14.	0.24		
HYDROGRAPH AT	E5	208.	6.17	29.	9.	8.	0.13		
2 COMBINED AT	11B	553.	6.25	74.	23.	22.	0.37		
HYDROGRAPH AT	E2	212.	6.08	24.	7.	7.	0.09		
ROUTED TO	E2-11C	209.	6.25	25.	7.	7.	0.09		
HYDROGRAPH AT	E4	162.	6.25	26.	8.	8.	0.15		
2 COMBINED AT	11C	371.	6.25	51.	16.	15.	0.24		
2 COMBINED AT	11D	924.	6.25	125.	38.	37.	0.61		
ROUTED TO	11D11F	886.	6.25	125.	38.	37.	0.61		
HYDROGRAPH AT	E6	45.	6.17	6.	2.	2.	0.05		
ROUTED TO	E6-11E	44.	6.50	6.	2.	2.	0.05		
HYDROGRAPH AT	E8	228.	6.08	28.	8.	8.	0.12		
2 COMBINED AT	11E	228.	6.08	34.	10.	10.	0.17		
HYDROGRAPH AT	E7	174.	6.17	24.	7.	7.	0.12		
3 COMBINED AT	11F	1220.	6.25	183.	56.	54.	0.90		
ROUTED TO	11F11P	1209.	6.33	184.	57.	54.	0.90		
HYDROGRAPH AT	E9	189.	6.00	19.	6.	6.	0.11		
HYDROGRAPH AT	E10	168.	6.00	16.	5.	5.	0.10		
3 COMBINED AT	11CP	1277.	6.25	218.	67.	65.	1.11		
ROUTED TO	11P	285.	7.00	214.	67.	65.	1.11	6811.36	7.00
ROUTED TO	11P-11	285.	7.08	214.	67.	65.	1.11		
HYDROGRAPH AT	E11	112.	6.17	16.	5.	5.	0.10		
2 COMBINED AT	11P11	329.	6.25	229.	72.	69.	1.21		
HYDROGRAPH AT	C16	175.	6.17	22.	7.	7.	0.14		
ROUTED TO	C1611G	174.	6.42	22.	7.	7.	0.14		
HYDROGRAPH AT	C20	136.	6.25	21.	6.	6.	0.11		

100 yr, 24 hr Storm W/ Norwood Diversion

2 COMBINED AT	11G	294.	6.33	43.	13.	13.	0.25
3 COMBINED AT	11	4120.	6.50	1119.	364.	350.	8.35
ROUTED TO	11-12D	4049.	6.58	1119.	364.	350.	8.35
HYDROGRAPH AT	D3B	227.	6.00	25.	7.	7.	0.08
HYDROGRAPH AT	H5A	82.	6.00	9.	3.	3.	0.03
2 COMBINED AT	12G	309.	6.00	34.	10.	10.	0.11
ROUTED TO	12G12H	299.	6.00	34.	10.	10.	0.11
HYDROGRAPH AT	H11A	314.	6.17	47.	14.	13.	0.16
2 COMBINED AT	12H	585.	6.08	81.	24.	23.	0.27
ROUTED TO	12H12D	567.	6.17	81.	24.	23.	0.27
2 COMBINED AT	12D	4256.	6.50	1193.	387.	373.	8.62
ROUTED TO	12D12E	4250.	6.58	1192.	387.	373.	8.62
HYDROGRAPH AT	D3A	121.	6.00	13.	4.	4.	0.04
ROUTED TO	D3-12D	118.	6.08	14.	4.	4.	0.04
HYDROGRAPH AT	D5	316.	6.08	38.	11.	11.	0.13
2 COMBINED AT	12D	434.	6.08	51.	15.	15.	0.17
HYDROGRAPH AT	F1	138.	6.33	25.	8.	8.	0.14
HYDROGRAPH AT	G7	213.	6.17	29.	9.	9.	0.17
4 COMBINED AT	12E	4491.	6.58	1290.	419.	404.	9.10
HYDROGRAPH AT	G1	330.	6.08	36.	11.	11.	0.18
ROUTED TO	G1-12A	324.	6.08	36.	11.	11.	0.18
HYDROGRAPH AT	G3	256.	6.17	33.	10.	10.	0.18
2 COMBINED AT	12A	572.	6.08	70.	21.	21.	0.36
HYDROGRAPH AT	G2	156.	6.08	16.	5.	5.	0.11
ROUTED TO	G2-12B	151.	6.17	16.	5.	5.	0.11
HYDROGRAPH AT	G4	272.	6.08	33.	10.	9.	0.13
3 COMBINED AT	12B	993.	6.08	119.	36.	35.	0.60
ROUTED TO	12B12C	952.	6.17	118.	36.	35.	0.60
HYDROGRAPH AT	G5	171.	6.08	19.	6.	6.	0.12
HYDROGRAPH AT	G6	213.	6.08	24.	7.	7.	0.14
3 COMBINED AT	12C	1334.	6.08	161.	50.	48.	0.86
ROUTED TO	12C12F	1308.	6.08	161.	50.	48.	0.86
HYDROGRAPH AT	G8	141.	6.08	15.	5.	5.	0.08
2 COMBINED AT	12F	1449.	6.08	177.	55.	53.	0.94
2 COMBINED AT	12	4879.	6.50	1465.	474.	456.	10.04

← UPSTREAM OF AUSTIN BLUFFS PARKWAY

← AT THE CONFLUENCE DOWNSTREAM OF AUSTIN BLUFFS PARKWAY