



## APPENDIX B

### HEC-HMS MODEL FOR THE CALCULATION OF THE 100-YEAR PEAK DISCHARGES



WCS

DGD

Dec-03

PAGE 1 OF 1

## PLAYA ELEVATION, STORAGE, OUTFLOW

## ELEVATION AND STORAGE

ELEV.	AREA	DELTA E	AVERAGE AREA	STORAGE VOLUME	CUMULATIVE STORAGE
MSL	SQ. FT.	FT.	SQ. FT.	CU. FT.	AC.-FT
3478	402878			0	0
		2	517775		
3480	632672			1035550	24
		2	811324.5		
3482	989977			1622649	61
		2	2375467		
3484	3760957			4750934	170
		2	6247779.5		
3486	8734602			12495559	457
		2	10261979		
3488	11789356			20523958	928

## OUTFLOW

## WEIR EQUATION

$$Q = C * L * H^{3/2}$$

WHERE:

Q= FLOW, CFS

C= WEIR COEFFICIENT

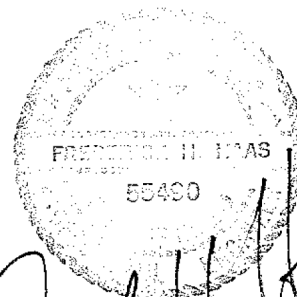
L= HORIZONTAL LENGTH, FT

H= HEAD ON WEIR, FT

ASSUME TOP OF PLAYA IS ELEVATION 3486  
 LENGTH OF 3486 CONTOUR IS 241 FT.

HEAD FT.	Cw	Q CU FT /SEC
0.5	3.58	305
1.0	3.58	863
1.5	3.58	1585
2.0	3.56	2427

NOTE: Cw IS FROM WATER-RESOURCES ENGINEERING, LINSLEY AND FRANZINI



APP A-70

*[Handwritten Signature]*  
 11/15/05



## Meteorologic Model Input

**HMS \* Meteorologic Model**

File Edit Help

Meteorologic Model Met100 Year

Description 100 Year, 24 Hour Storm

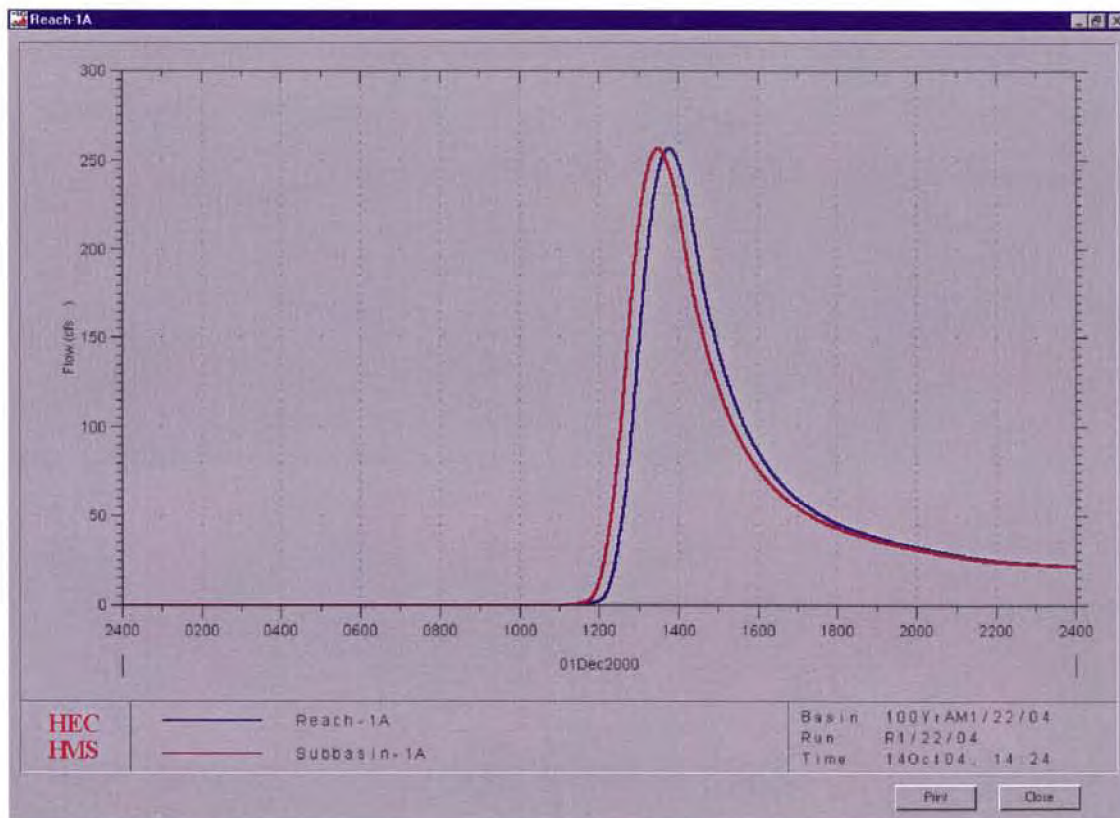
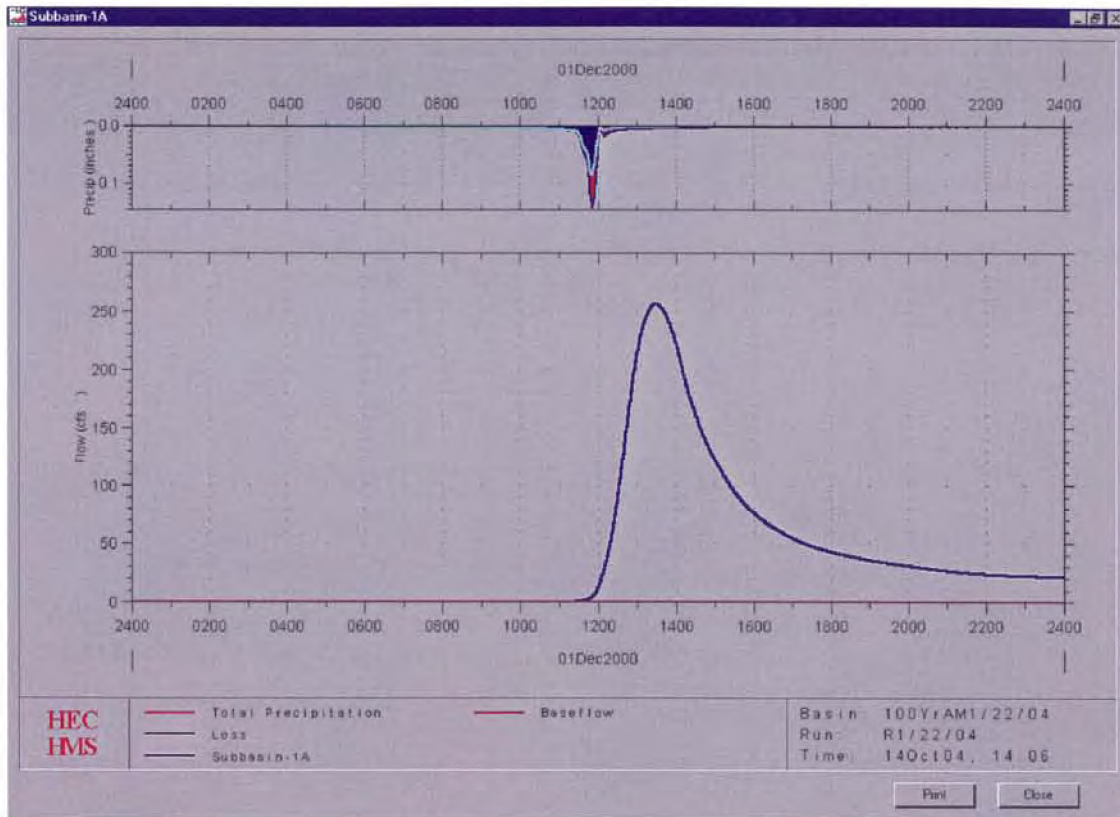
Precipitation Evaporation

Method SCS Hypothetical Storm

Storm Selection Type II

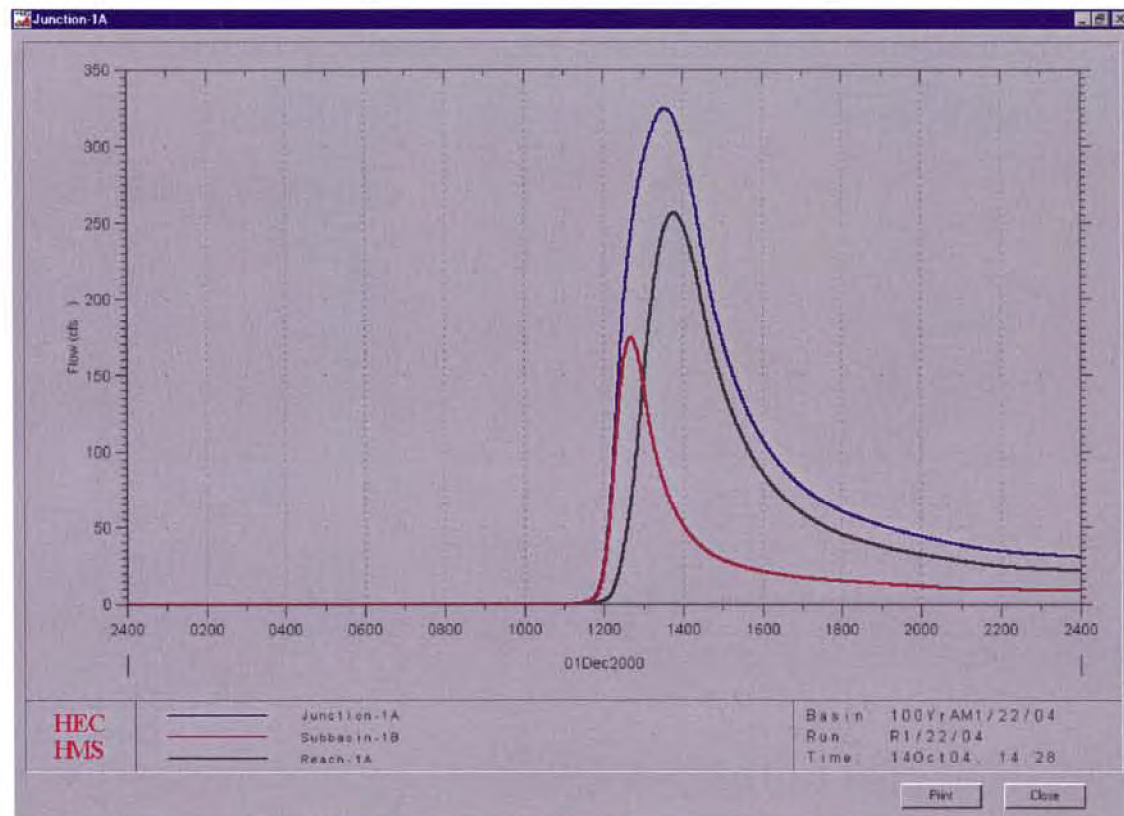
Storm Depth 6.0

# WCS FACILITY FLOOD PLAIN STUDY HYDROGRAPHS





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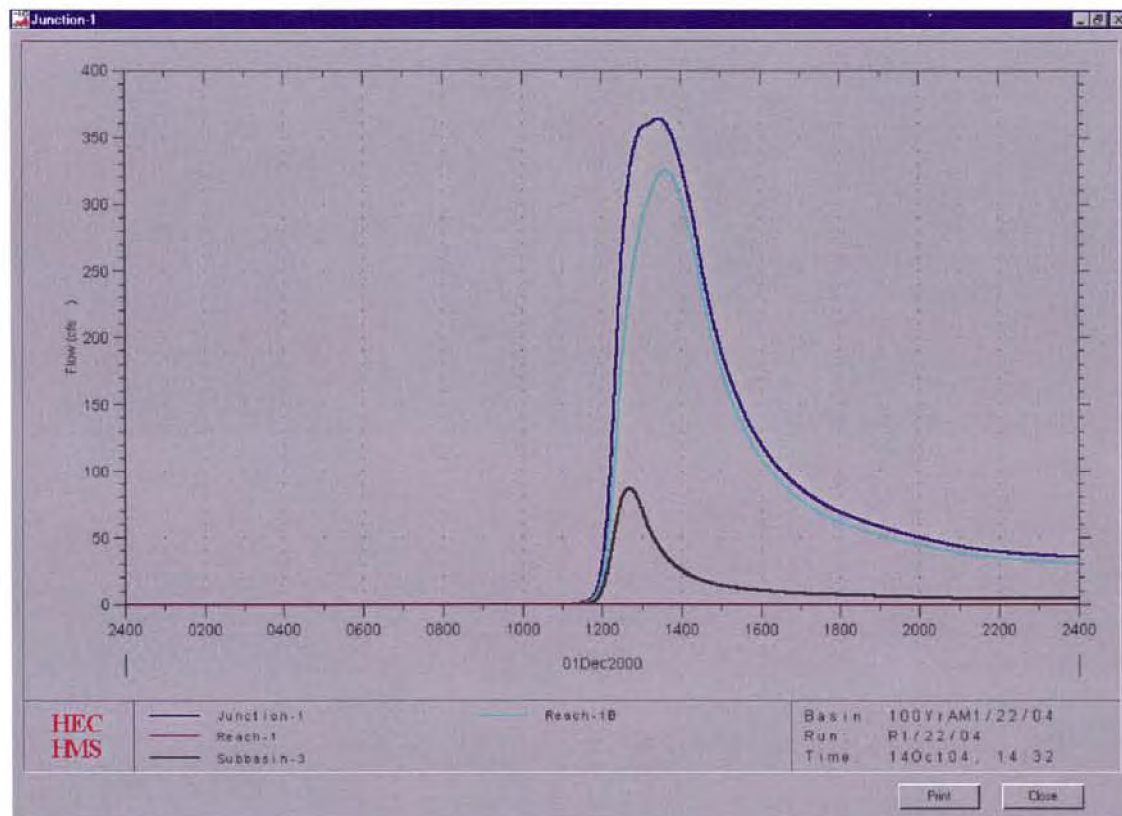
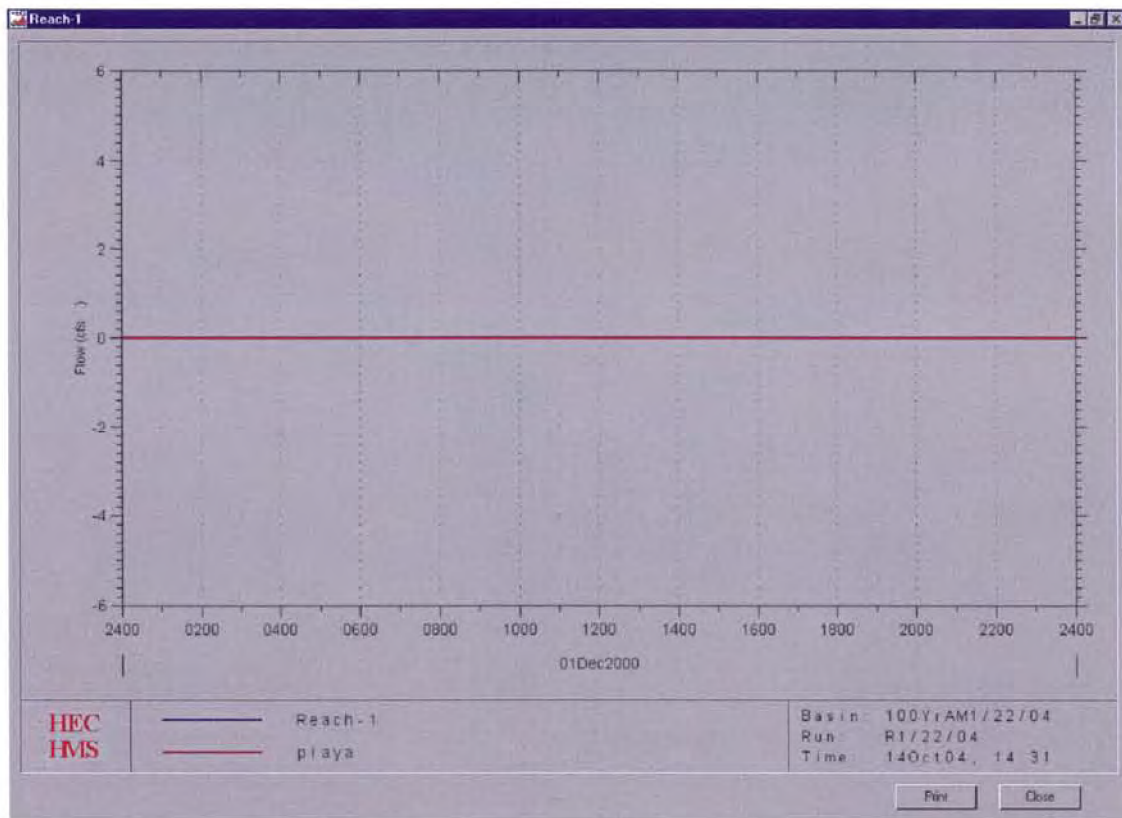




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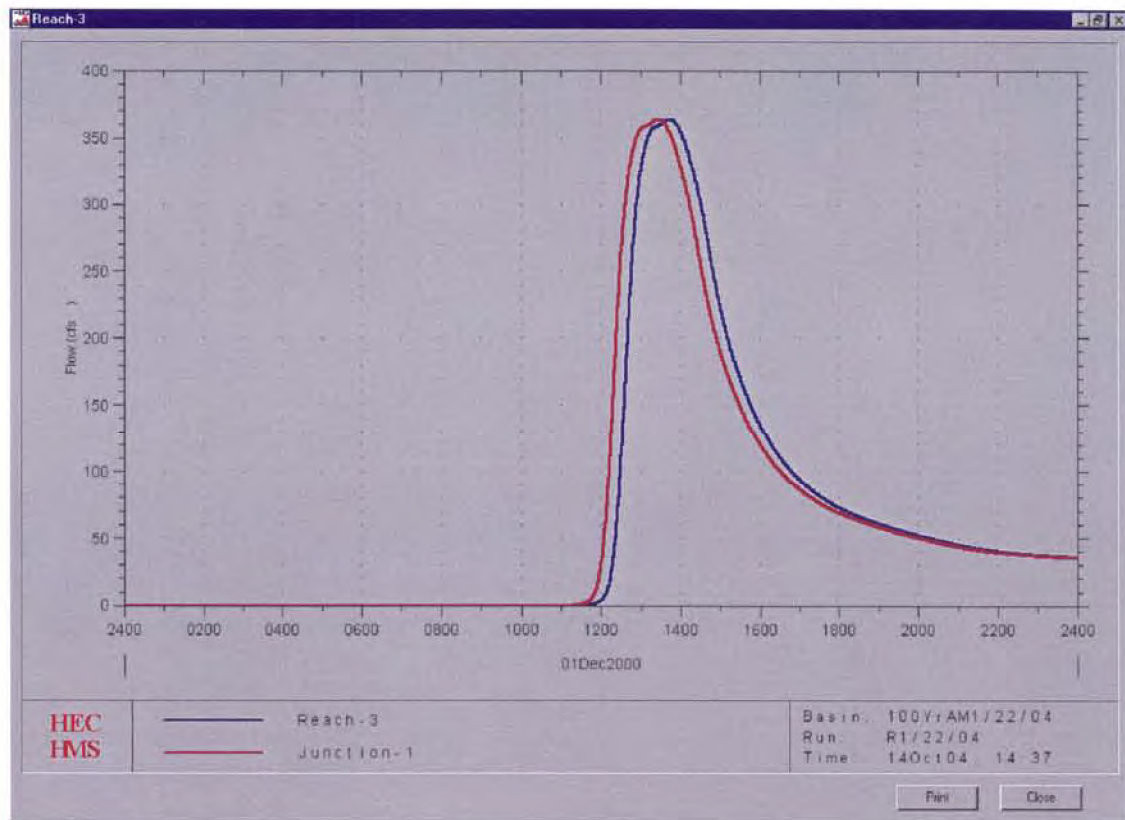


# WCS FACILITY FLOOD PLAIN STUDY HYDROGRAPHS

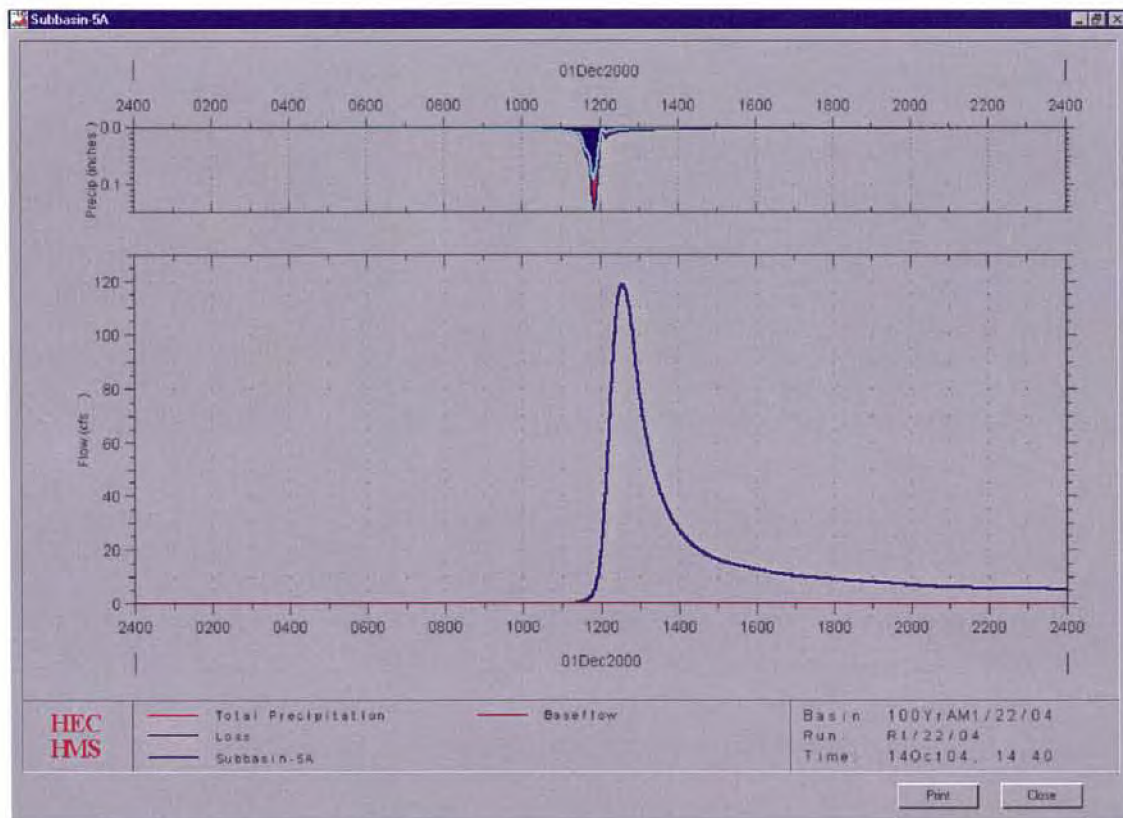
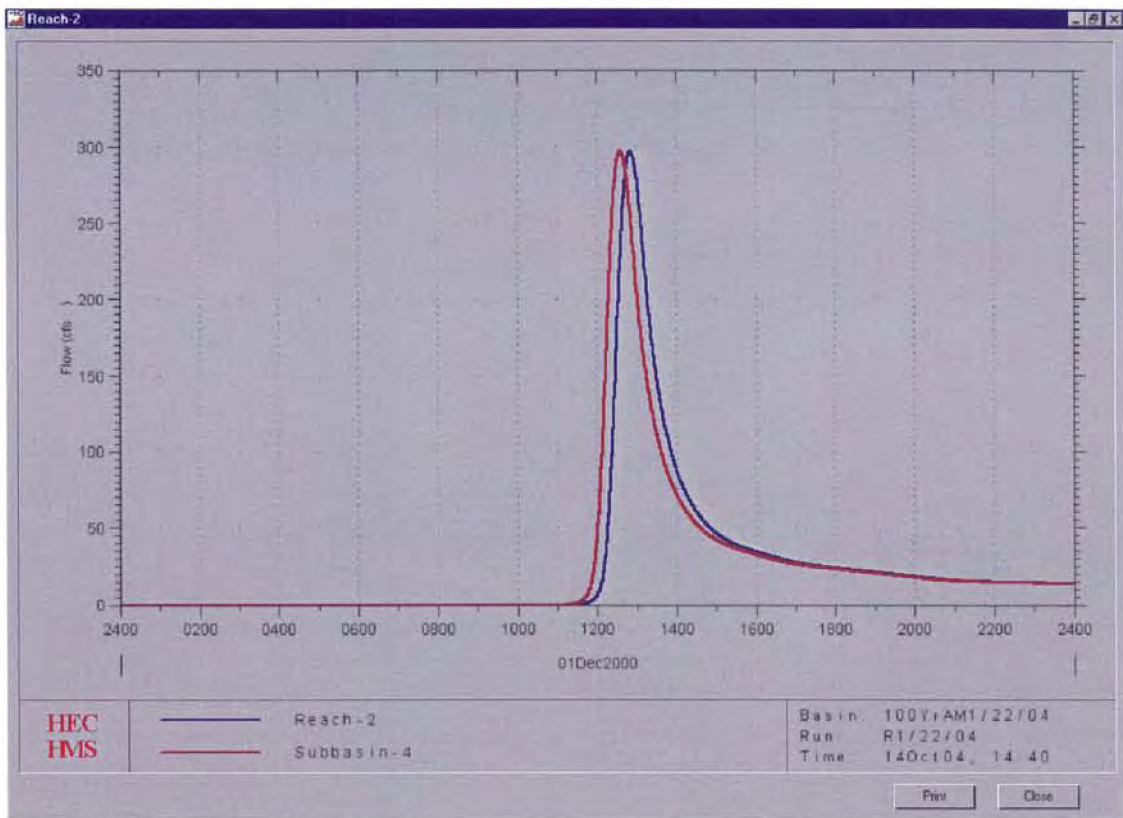




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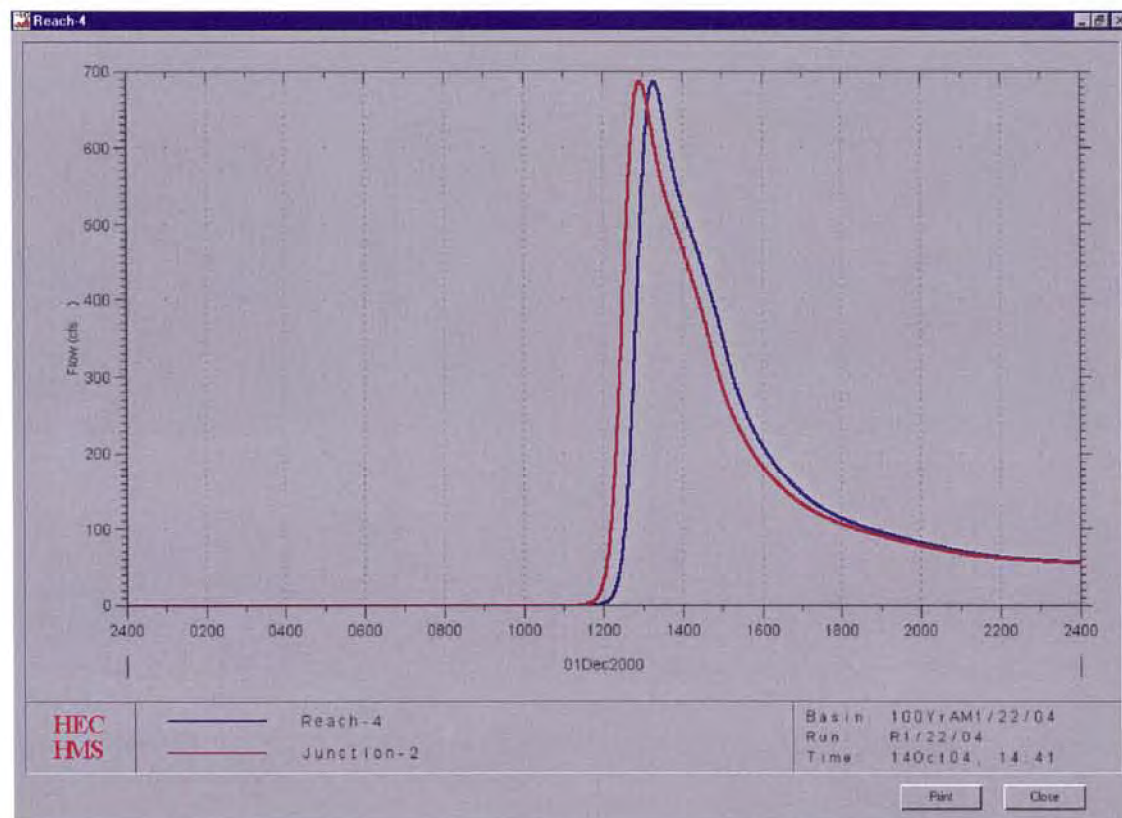
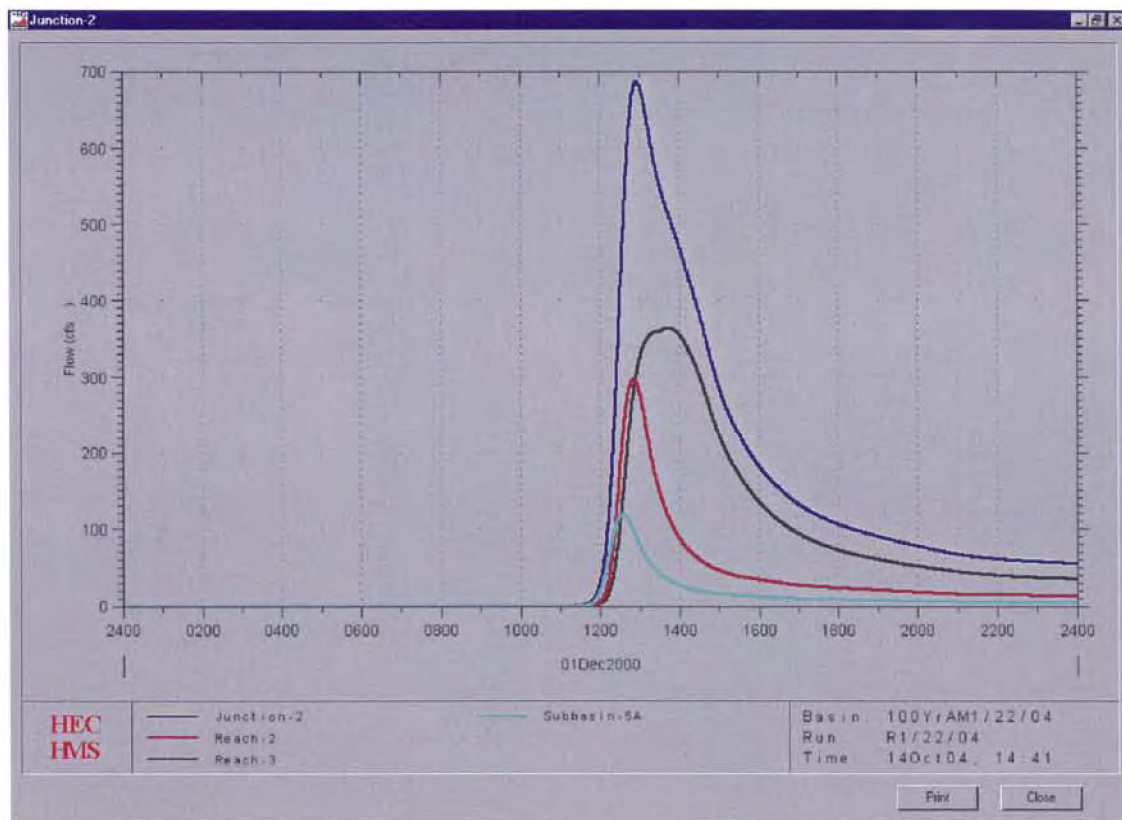


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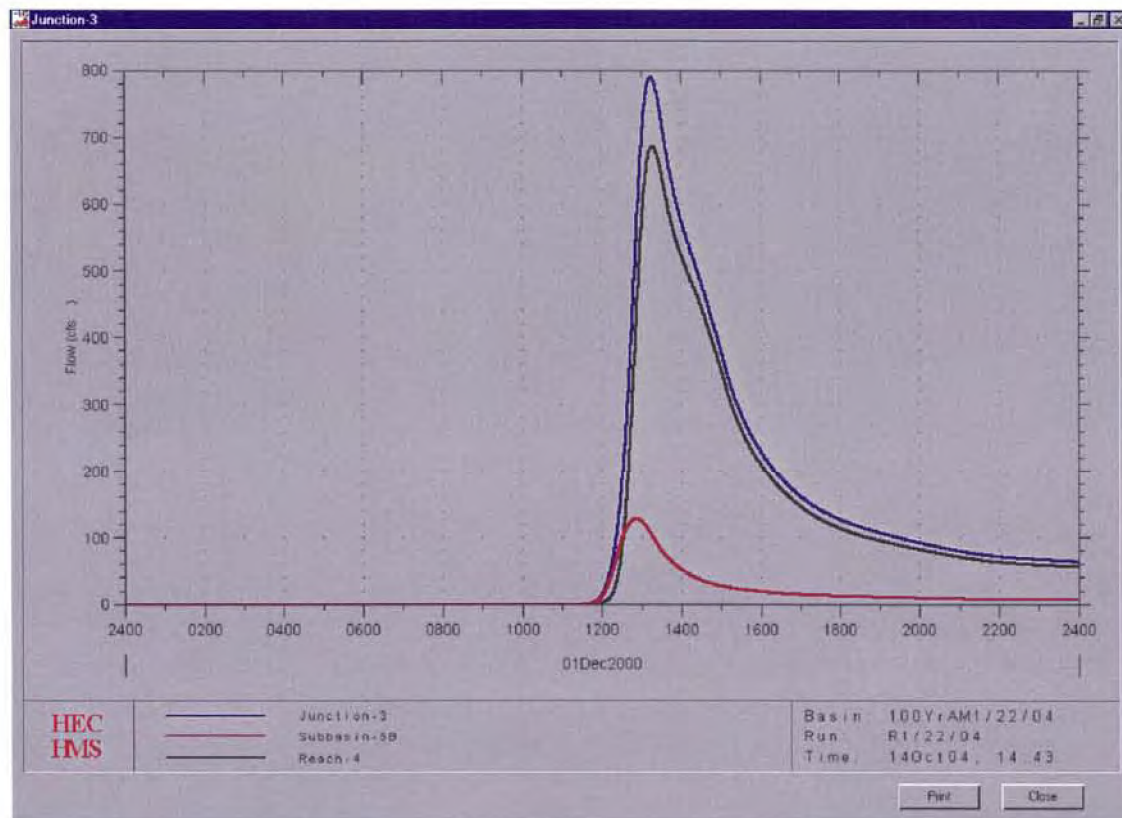
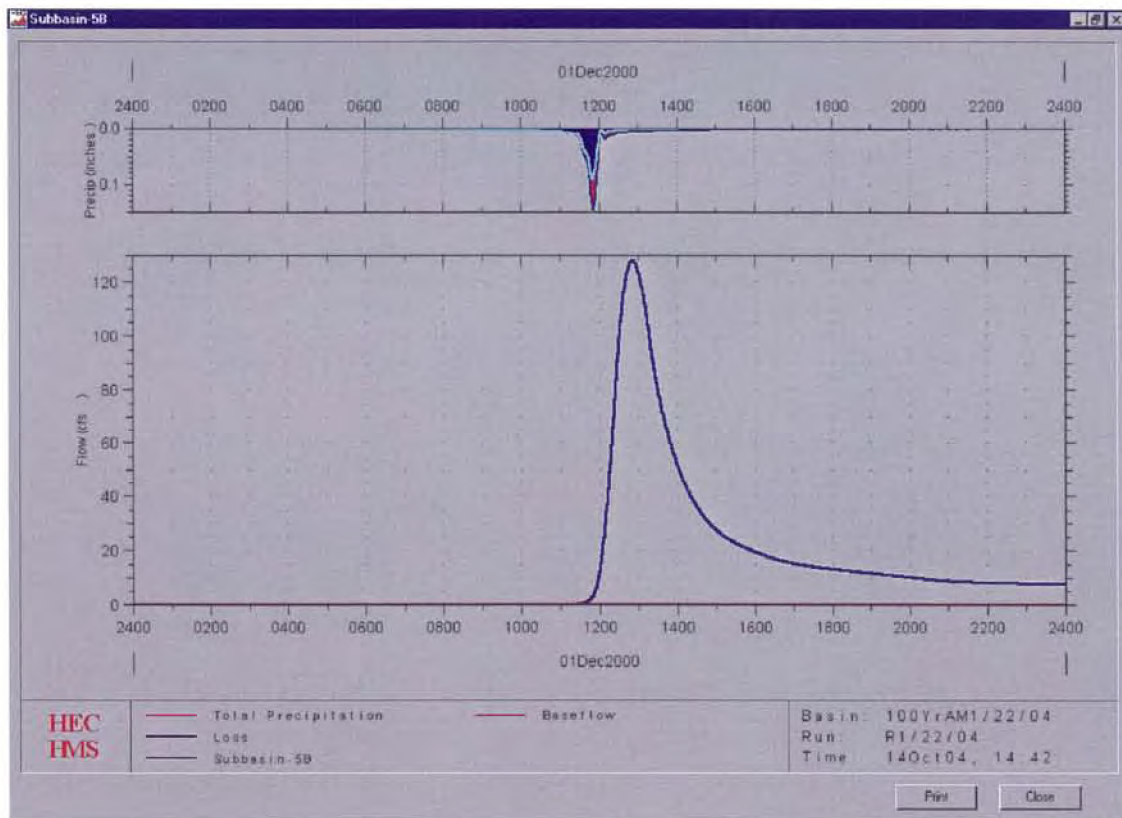




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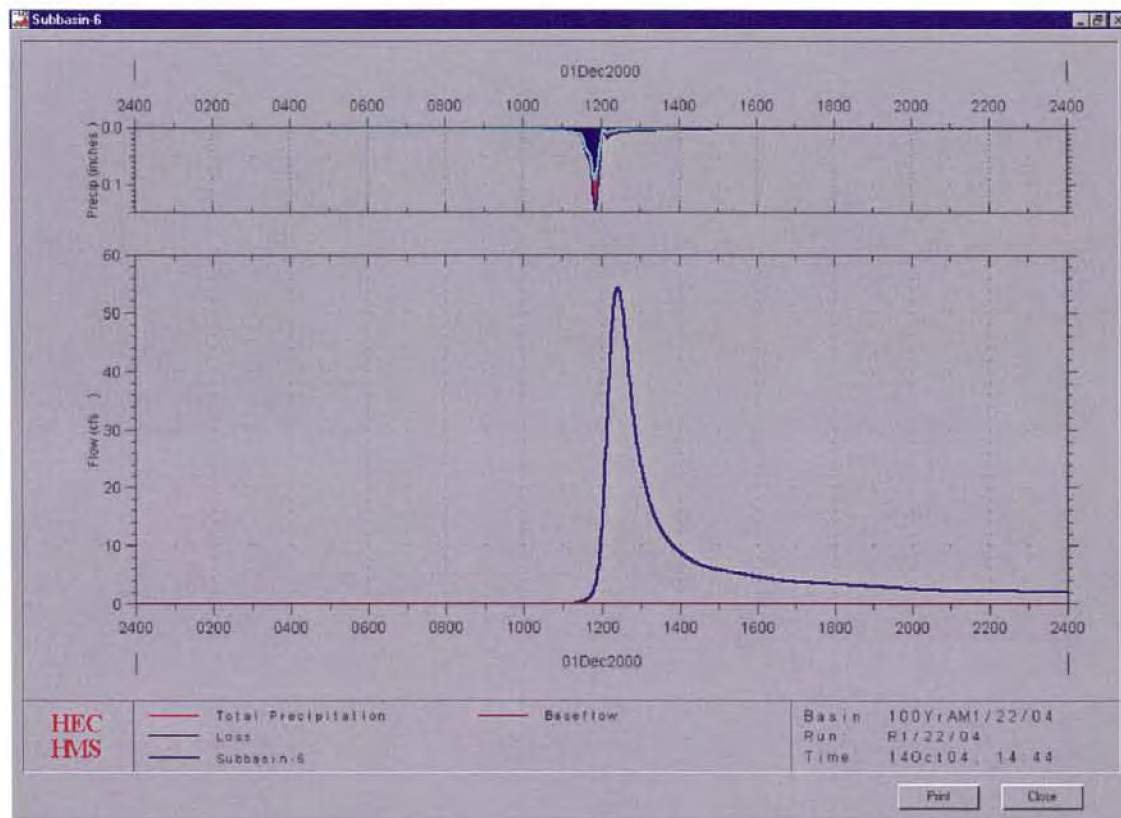
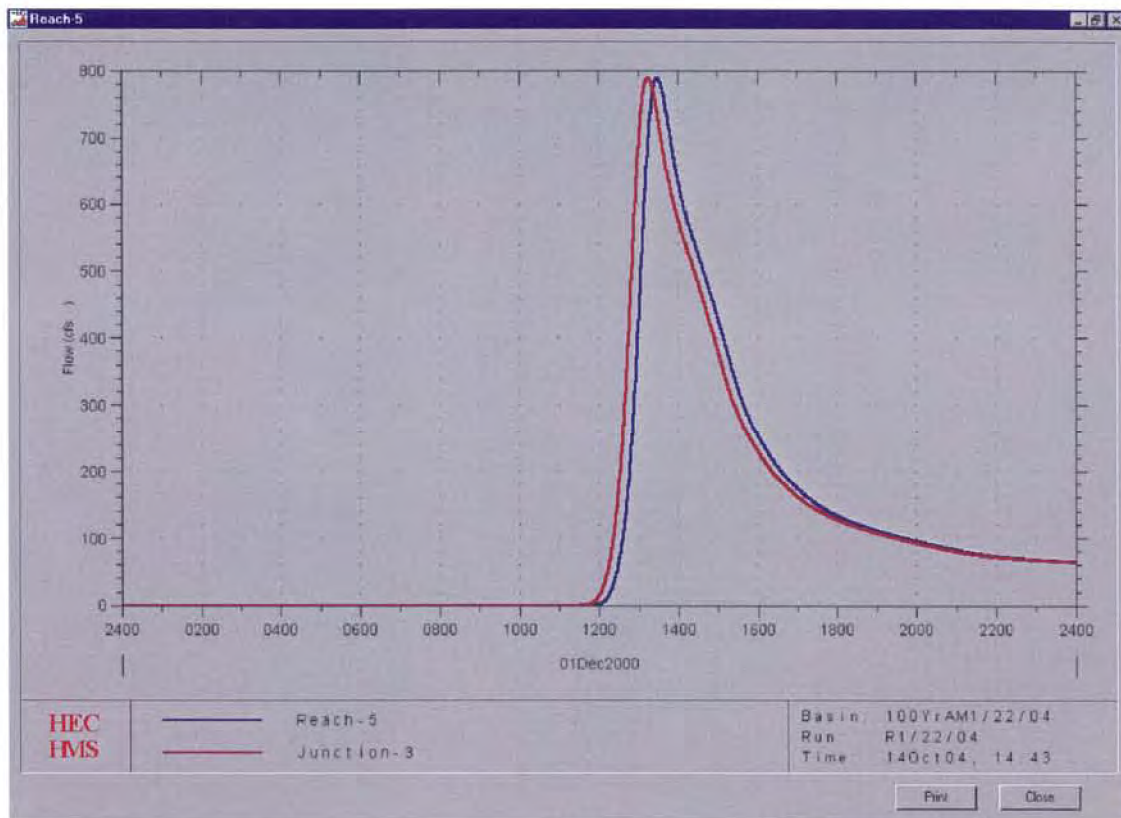


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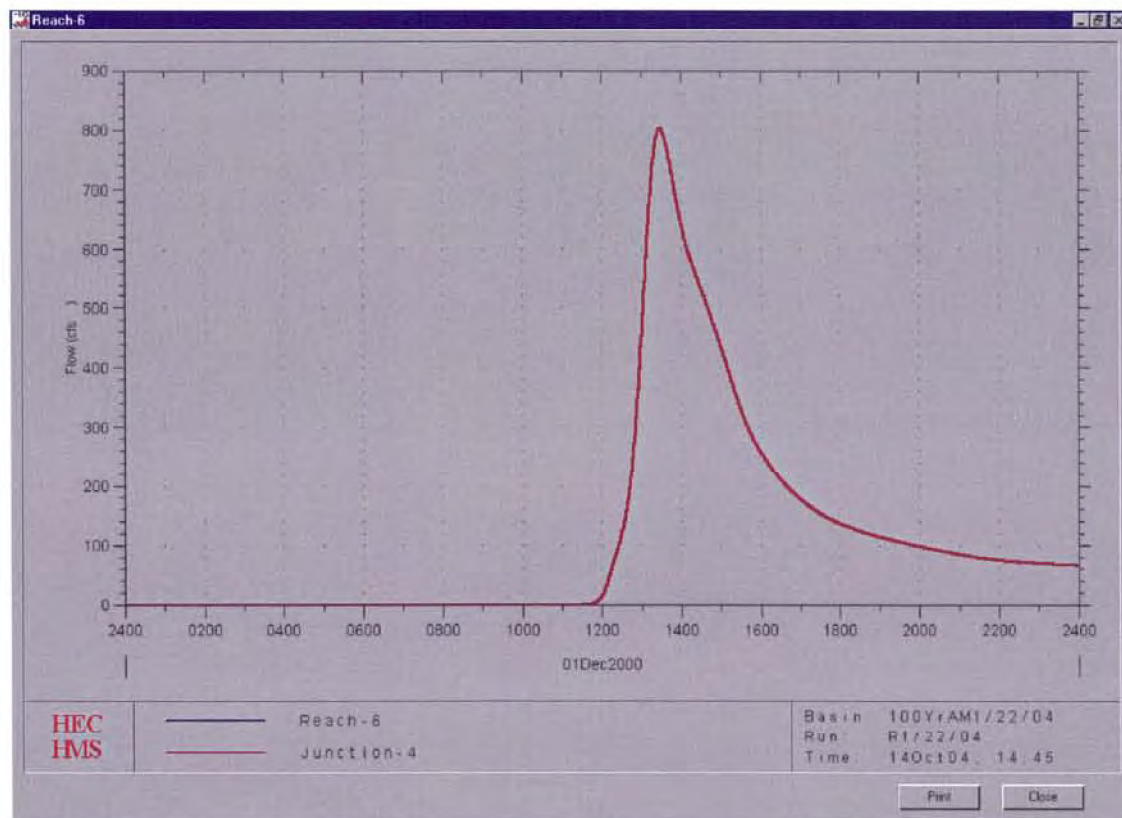
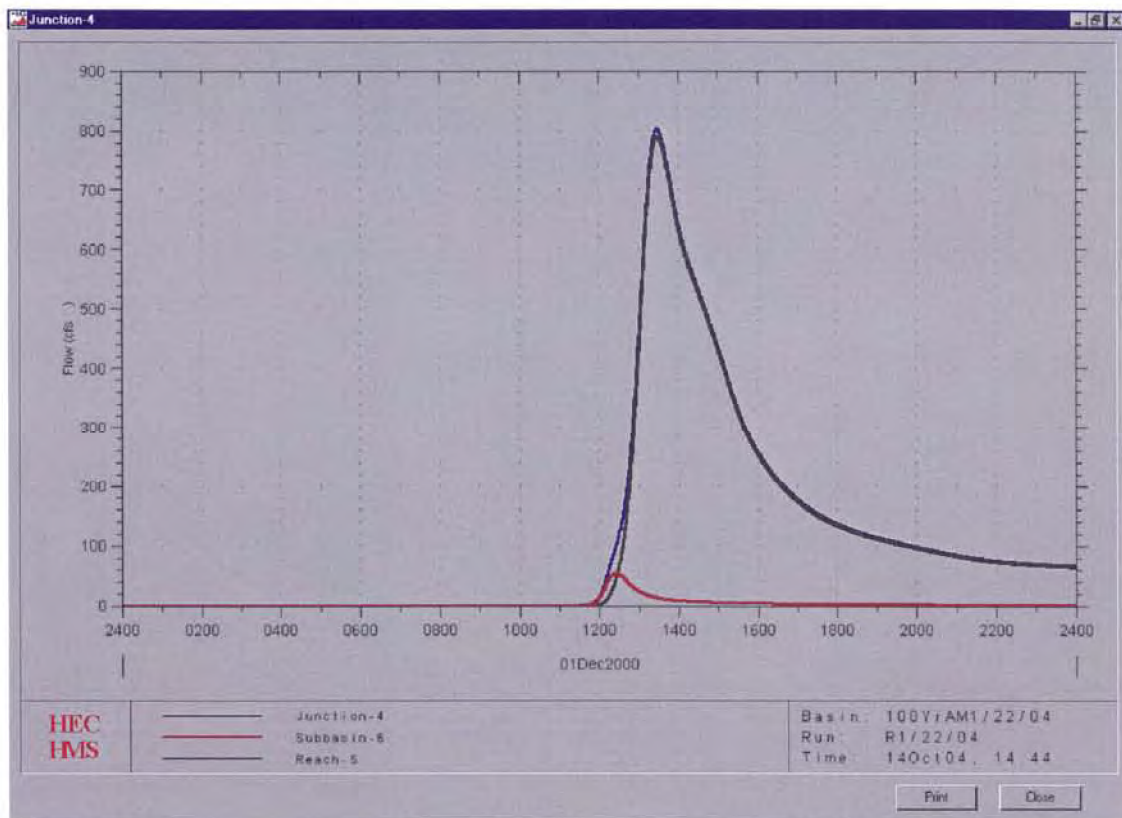




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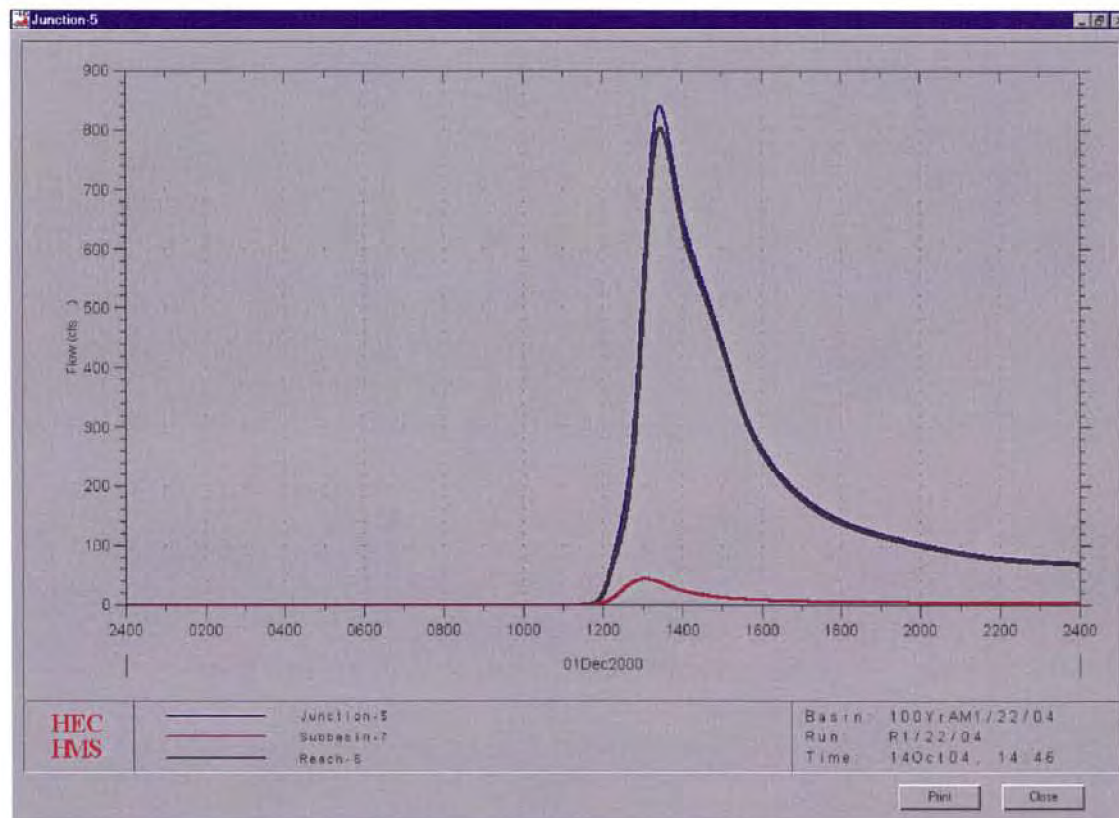
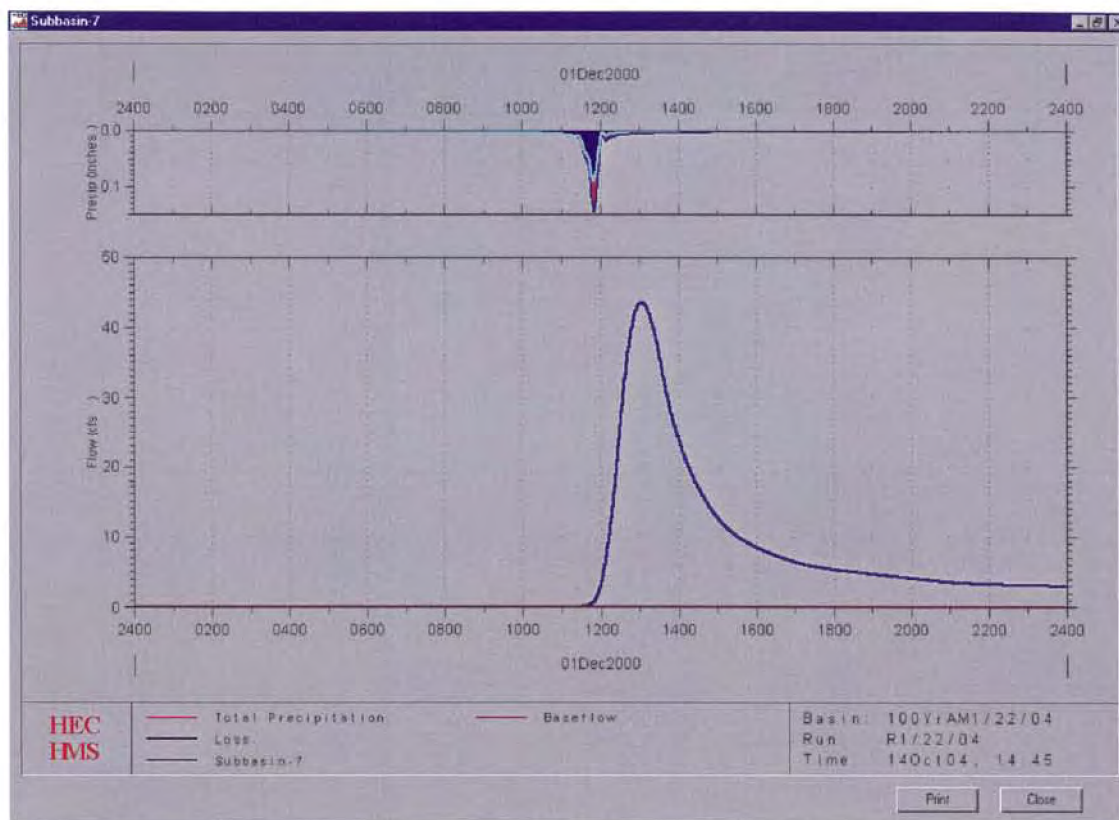


# WCS FACILITY FLOOD PLAIN STUDY HYDROGRAPHS





# WCS FACILITY FLOOD PLAIN STUDY HYDROGRAPHS



# HMS \* Summary of Results

Project : WCS

Run Name : R1/22/04

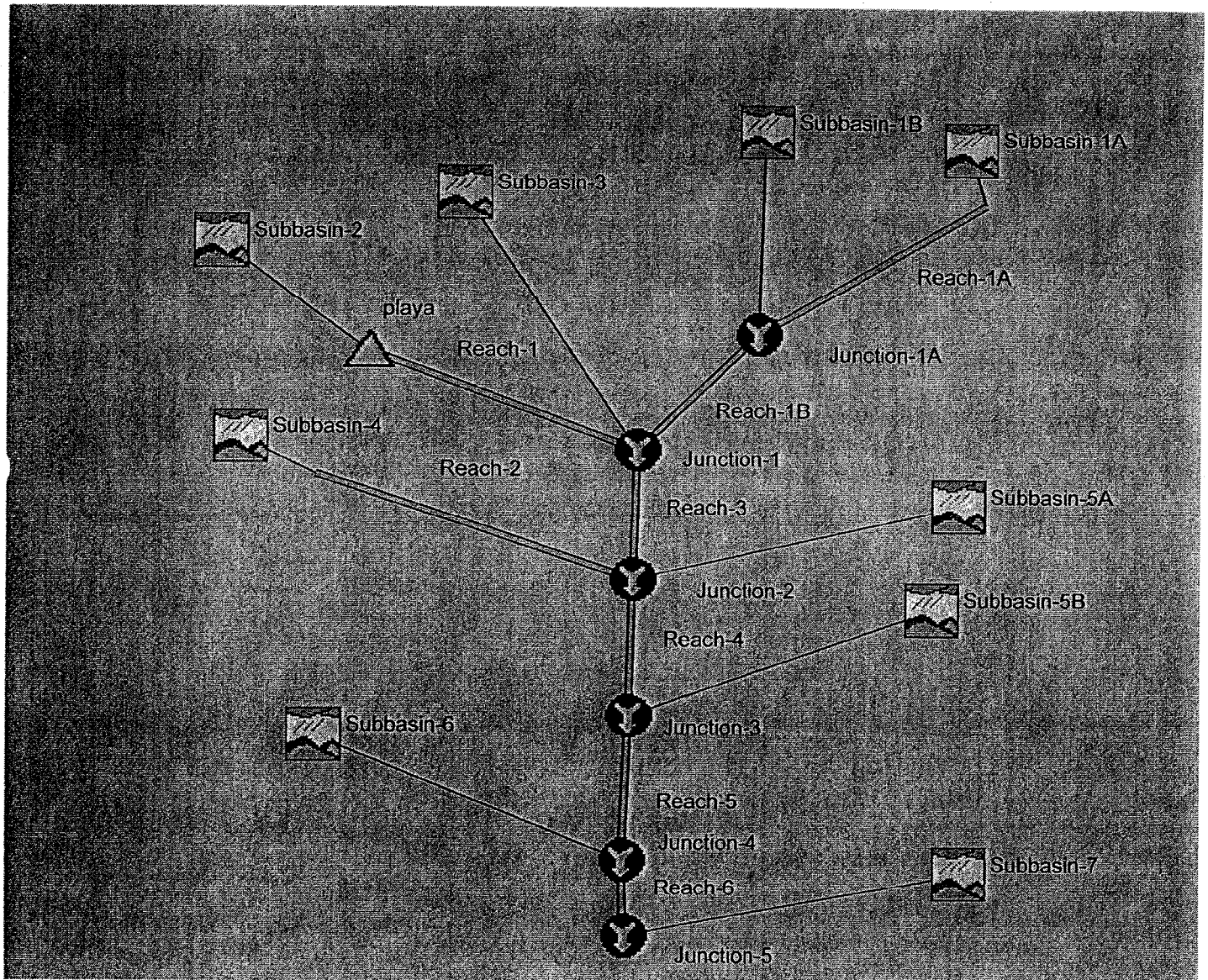
Start of Run : 01Dec00 0000 Basin Model : 100YrAM1/22/04

End of Run : 02Dec00 0000 Met. Model : Met100 Year

Execution Time : 29Jan04 1349 Control Specs : Control 1

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
Subbasin-4	297.60	01 Dec 00 1235	49.246	0.490
Reach-2	297.60	01 Dec 00 1250	48.953	0.490
Subbasin-2	440.24	01 Dec 00 1305	105.39	1.063
playa	0.0	30 Nov 00 2400	0.0	1.063
Reach-1	0.0	30 Nov 00 2400	0.0	1.063
Subbasin-1A	256.61	01 Dec 00 1328	73.808	0.691
Reach-1A	256.61	01 Dec 00 1345	73.298	0.691
Subbasin-1B	174.42	01 Dec 00 1241	31.477	0.314
Junction-1A	324.86	01 Dec 00 1332	104.77	1.005
Reach-1B	324.86	01 Dec 00 1335	104.65	1.005
Subbasin-3	86.653	01 Dec 00 1241	15.638	0.156
Junction-1	364.05	01 Dec 00 1326	120.28	2.224
Reach-3	364.05	01 Dec 00 1343	119.45	2.224
Subbasin-5A	118.86	01 Dec 00 1234	19.306	0.192
nction-2	686.69	01 Dec 00 1255	187.71	2.906
Reach-4	686.69	01 Dec 00 1316	186.08	2.906
Subbasin-5B	128.06	01 Dec 00 1251	26.440	0.265
Junction-3	790.00	01 Dec 00 1314	212.52	3.171
Reach-5	790.00	01 Dec 00 1328	211.28	3.171
Subbasin-6	54.403	01 Dec 00 1225	7.4715	0.074
Junction-4	803.31	01 Dec 00 1328	218.75	3.245
Reach-6	803.31	01 Dec 00 1328	218.75	3.245
Subbasin-7	43.582	01 Dec 00 1304	10.316	0.104
Junction-5	841.14	01 Dec 00 1327	229.07	3.349







**HMS \* Basin Model \* SCS Curve Number**

Sort: Hap


Basin Model ID: 1001-AM1/22/04

Subbasin Name	SCS Curve Number	Initial Abstraction (in)	Imperviousness (%)
Subbasin 1A	62		0.0
Subbasin 2	60		0.0
Subbasin 3	60		0.0
Subbasin 4	60		0.0
Subbasin 5B	60		0.0
Subbasin 5	60		0.0
Subbasin 1B	60		0.0
Subbasin 5A	60		0.0
Subbasin 7	60		0.0

**HMS \* Basin Model \* SCS UH**

Sort: Hap

Basin Model ID: 1001-AM1/22/04

Time Units:  

Subbasin Name	SCS Lag (min)
Subbasin 1A	86
Subbasin 2	65
Subbasin 3	44
Subbasin 4	39
Subbasin 5B	53
Subbasin 5	30
Subbasin 1B	44
Subbasin 5A	38
Subbasin 7	64



HMS \* Basin Model \* Lag Routing

Basin Model ID: 1007 AMH/22/04

Interval: Minutes

Reach Name	Lag (min)
Reach-1	35
Reach-2	15
Reach-3	17
Reach-4	21
Reach-5	14
Reach-6A	17
Reach-6B	3
Reach-6C	0

HMS \* Basin Model \* Reservoir Editor

Reservoir Name: playa

Description:

Method: Elevation-Storage-Outflow

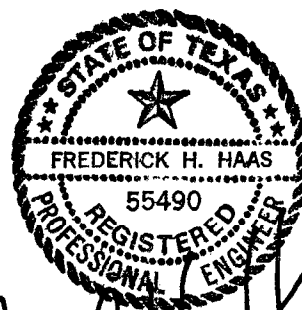
Initial Elevation (ft): 3478

Elevation (ft)	Storage (acre-feet)	Outflow (cfs)
3478.0	0.0	0.0
3480.0	24.0	0.0
3482.0	61.0	0.0
3484.0	170.0	0.0
3486.0	457.0	0.0
3487.0	693.0	863.0
3488.0	928.0	2427.0



## APPENDIX C

### HEC-RAS MODEL FOR THE CALCULATION OF THE 100-YEAR WATER SURFACE PROFILE



*Handwritten signature of Frederick H. Haas*  
*2/9/04*

	Depth (ft)	Wb Chb (ft)	Wb Elev (ft)	Chb Elev (ft)	Max Ch Dpth (ft)	E.G. Elev (ft)	E.G. Slope (ft/m)	Vel Chb (ft/s)	Gr Wb Lth (ft)	SU Wb Rst (ft)	Flow Area (sq ft)	Top Width (ft)	Profile # Chb
1272	257.00	3477.00	3478.09	3477.76	1.09	3478.13	0.002948	1.71	373.88	640.51	150.30	266.62	0.39
1273	257.00	3477.00	3478.09	3477.76	1.09	3478.13	0.002948	1.71	373.88	640.51	150.30	266.62	0.39
1274	257.00	3477.00	3478.09	3477.76	1.09	3478.13	0.002948	1.71	373.88	640.51	150.30	266.62	0.39
1275	257.00	3477.00	3478.09	3477.76	1.09	3478.13	0.002948	1.71	373.88	640.51	150.30	266.62	0.39
1276	257.00	3469.00	3470.06	3470.03	1.06	3470.31	0.016594	3.96	433.62	551.32	64.97	117.70	0.93
1277	257.00	3469.00	3470.06	3470.03	1.06	3470.31	0.016594	3.96	433.62	551.32	64.97	117.70	0.93
1278	257.00	3469.00	3470.06	3470.03	1.06	3470.31	0.016594	3.96	433.62	551.32	64.97	117.70	0.93
1279	257.00	3469.00	3470.06	3470.03	1.06	3470.31	0.016594	3.96	433.62	551.32	64.97	117.70	0.93
1280	257.00	3464.00	3465.38	3465.18	1.38	3465.56	0.008826	3.45	487.13	588.43	74.55	101.30	0.71
1281	257.00	3464.00	3465.38	3465.18	1.38	3465.56	0.008826	3.45	487.13	588.43	74.55	101.30	0.71
1282	257.00	3464.00	3465.38	3465.18	1.38	3465.56	0.008826	3.45	487.13	588.43	74.55	101.30	0.71
1283	257.00	3464.00	3465.38	3465.18	1.38	3465.56	0.008826	3.45	487.13	588.43	74.55	101.30	0.71
1284	257.00	3456.00	3456.67	3456.67	0.67	3456.87	0.022674	3.57	427.42	615.18	71.89	187.76	1.02
1285	257.00	3456.00	3456.67	3456.67	0.67	3456.87	0.022674	3.57	427.42	615.18	71.89	187.76	1.02
1286	257.00	3456.00	3456.67	3456.67	0.67	3456.87	0.022674	3.57	427.42	615.18	71.89	187.76	1.02
1287	257.00	3456.00	3456.67	3456.67	0.67	3456.87	0.022674	3.57	427.42	615.18	71.89	187.76	1.02
1288	325.00	3450.00	3451.19	3450.87	1.19	3451.26	0.004338	2.13	482.85	733.67	152.62	250.83	0.48
1289	325.00	3450.00	3451.19	3450.87	1.19	3451.26	0.004338	2.13	482.85	733.67	152.62	250.83	0.48
1290	325.00	3450.00	3451.19	3450.87	1.19	3451.26	0.004338	2.13	482.85	733.67	152.62	250.83	0.48
1291	325.00	3450.00	3451.19	3450.87	1.19	3451.26	0.004338	2.13	482.85	733.67	152.62	250.83	0.48
1292	325.00	3445.00	3446.12	3446.04	1.12	3446.32	0.014428	3.57	482.15	652.03	91.07	169.88	0.86
1293	325.00	3445.00	3446.12	3446.04	1.12	3446.32	0.014428	3.57	482.15	652.03	91.07	169.88	0.86
1294	325.00	3445.00	3446.12	3446.04	1.12	3446.32	0.014428	3.57	482.15	652.03	91.07	169.88	0.86
1295	325.00	3445.00	3446.12	3446.04	1.12	3446.32	0.014428	3.57	482.15	652.03	91.07	169.88	0.86
1296	325.00	3440.00	3441.25	3440.85	1.25	3441.30	0.002988	1.84	507.15	781.10	176.81	273.95	0.40
1297	325.00	3440.00	3441.25	3440.85	1.25	3441.30	0.002988	1.84	507.15	781.10	176.81	273.95	0.40
1298	325.00	3440.00	3441.25	3440.85	1.25	3441.30	0.002988	1.84	507.15	781.10	176.81	273.95	0.40
1299	325.00	3440.00	3441.25	3440.85	1.25	3441.30	0.002988	1.84	507.15	781.10	176.81	273.95	0.40
1300	325.00	3437.80	3438.44	3438.44	0.64	3438.64	0.022265	3.64	350.26	574.17	89.29	223.91	1.02
1301	325.00	3437.80	3438.44	3438.44	0.64	3438.64	0.022265	3.64	350.26	574.17	89.29	223.91	1.02
1302	325.00	3437.80	3438.44	3438.44	0.64	3438.64	0.022265	3.64	350.26	574.17	89.29	223.91	1.02
1303	325.00	3437.80	3438.44	3438.44	0.64	3438.64	0.022265	3.64	350.26	574.17	89.29	223.91	1.02
1304	364.00	3435.00	3436.09	3435.67	1.09	3436.12	0.001631	1.28	419.36	910.46	284.83	491.10	0.29
1305	364.00	3435.00	3436.09	3435.67	1.09	3436.12	0.001631	1.28	419.36	910.46	284.83	491.10	0.29
1306	364.00	3435.00	3436.09	3435.67	1.09	3436.12	0.001631	1.28	419.36	910.46	284.83	491.10	0.29
1307	364.00	3435.00	3436.09	3435.67	1.09	3436.12	0.001631	1.28	419.36	910.46	284.83	491.10	0.29
1308	687.00	3430.00	3430.46	3430.46	0.46	3430.67	0.022292	3.65	817.89	1287.51	188.08	469.62	1.02
1309	687.00	3430.00	3430.46	3430.46	0.46	3430.67	0.022292	3.65	817.89	1287.51	188.08	469.62	1.02
1310	687.00	3430.00	3430.46	3430.46	0.46	3430.67	0.022292	3.65	817.89	1287.51	188.08	469.62	1.02
1311	687.00	3430.00	3430.46	3430.46	0.46	3430.67	0.022292	3.65	817.89	1287.51	188.08	469.62	1.02
1312	687.00	3425.00	3426.02	3425.54	1.02	3426.05	0.001698	1.41	740.20	1479.77	486.85	739.57	0.31
1313	687.00	3425.00	3426.02	3425.54	1.02	3426.05	0.001698	1.41	740.20	1479.77	486.85	739.57	0.31
1314	687.00	3425.00	3426.02	3425.54	1.02	3426.05	0.001698	1.41	740.20	1479.77	486.85	739.57	0.31
1315	687.00	3425.00	3426.02	3425.54	1.02	3426.05	0.001698	1.41	740.20	1479.77	486.85	739.57	0.31
1316	790.00	3420.00	3420.71	3420.71	0.71	3420.96	0.020617	4.01	571.82	974.07	196.80	402.25	1.01
1317	790.00	3420.00	3420.71	3420.71	0.71	3420.96	0.020617	4.01	571.82	974.07	196.80	402.25	1.01
1318	790.00	3420.00	3420.71	3420.71	0.71	3420.96	0.020617	4.01	571.82	974.07	196.80	402.25	1.01
1319	790.00	3420.00	3420.71	3420.71	0.71	3420.96	0.020617	4.01	571.82	974.07	196.80	402.25	1.01
1320	790.00	3416.00	3416.92	3416.52	1.91	3416.96	0.002177	1.66	126.92	870.25	493.43	743.33	0.35
1321	790.00	3416.00	3416.92	3416.52	1.91	3416.96	0.002177	1.66	126.92	870.25	493.43	743.33	0.35
1322	790.00	3416.00	3416.92	3416.52	1.91	3416.96	0.002177	1.66	126.92	870.25	493.43	743.33	0.35
1323	790.00	3416.00	3416.92	3416.52	1.91	3416.96	0.002177	1.66	126.92	870.25	493.43	743.33	0.35
1324	790.00	3413.80	3414.32	3414.32	0.52	3414.51	0.022050	3.36	185.72	786.06	226.05	600.34	0.99
1325	790.00	3413.80	3414.32	3414.32	0.52	3414.51	0.022050	3.36	185.72	786.06	226.05	600.34	0.99
1326	790.00	3413.80	3414.32	3414.32	0.52	3414.51	0.022050	3.36	185.72	786.06	226.05	600.34	0.99
1327	790.00	3413.80	3414.32	3414.32	0.52	3414.51	0.022050	3.36	185.72	786.06	226.05	600.34	0.99
1328	790.00	3409.00	3413.71	3412.70	4.71	3413.72	0.000067	0.99	176.53	629.07	1102.27	452.54	0.08
1329	790.00	3409.00	3413.71	3412.70	4.71	3413.72	0.000067	0.99	176.53	629.07	1102.27	452.54	0.08
1330	790.00	3409.00	3413.71	3412.70	4.71	3413.72	0.000067	0.99	176.53	629.07	1102.27	452.54	0.08
1331	790.00	3409.00	3413.71	3412.70	4.71	3413.72	0.000067	0.99	176.53	629.07	1102.27	452.54	0.08
1332	Culvert												
1333	790.00	3408.90	3412.70	3412.70	3.80	3412.73	0.000281	1.71	84.13	515.36	662.35	431.23	0.16
1334	790.00	3408.90	3412.70	3412.70	3.80	3412.73	0.000281	1.71	84.13	515.36	662.35	431.23	0.16
1335	790.00	3408.90	3412.70	3412.70	3.80	3412.73	0.000281	1.71	84.13	515.36	662.35	431.23	0.16
1336	790.00	3408.90	3412.70	3412.70	3.80	3412.73	0.000281	1.71	84.13	515.36	662.35	431.23	0.16
1337	803.00	3408.00	3408.49	3408.49	0.49	3408.70	0.021935	3.68	276.91	809.83	218.19	532.93	1.01
1338	803.00	3408.00	3408.49	3408.49	0.49	3408.70	0.021935	3.68	276.91	809.83	218.19	532.93	1.01
1339	803.00	3408.00	3408.49	3408.49	0.49	3408.70	0.021935	3.68	276.91	809.83	218.19	532.93	1.01
1340	803.00	3408.00	3408.49	3408.49	0.49	3408.70	0.021935	3.68	276.91	809.83	218.19	532.93	1.01
1341	841.00	3402.70	3404.50	3403.77	1.80	3404.54	0.001751	1.65	614.45	1554.00	511.24	626.40	0.32

HEC-RAS Plan: 100YR River: Ditch A Reach: 5 (Continued)

841.00	3402.70	3405.00	3403.77	2.30	3405.01	0.000467	0.91	540.97	1554.00	921.10	1013.03	0.17
841.00	3402.70	3406.00	3403.77	3.30	3406.00	0.000042	0.42	394.00	1554.00	2007.81	1160.00	0.06
841.00	3402.70	3407.00	3403.77	4.30	3407.00	0.000009	0.26	247.00	1554.00	3241.11	1307.00	0.03



FloodPlain.rep

HEC-RAS Version 3.0.1 Mar 2001  
 U.S. Army Corp of Engineers  
 Hydrologic Engineering Center  
 609 Second Street, Suite D  
 Davis, California 95616-4687  
 (916) 756-1104

```

X   X   XXXXXX   XXXX   XXXX   XX   XXXX
X   X   X       X   X   X   X   X   X
X   X   X       X   X   X   X   X   X
XXXXXXXX XXXX   X   XXX XXXX   XXXXXX   XXXX
X   X   X       X   X   X   X   X   X
X   X   X       X   X   X   X   X   X
X   X   XXXXXX   XXXX   X   X   X   X   XXXX
  
```

PROJECT DATA

Project Title: WCS  
 Project File : FloodPlain.prj  
 Run Date and Time: 2/4/04 9:56:12 AM

Project in English units

Project Description:  
 100year

PLAN DATA

Plan Title: 2-04-04MANY  
 Plan File : D:\program files\WCS\FloodPlain.p21

Geometry Title: 1-20-04SecRemoved  
 Geometry File : D:\program files\WCS\FloodPlain.g03

Flow Title : 100YrAM2-04-04Many  
 Flow File : D:\program files\WCS\FloodPlain.f21

Plan Summary Information:

Number of: Cross Sections =	18	Multitple Openings =	0
Culverts =	1	Inline Weirs =	0
Bridges =	0		

Computational Information

Water surface calculation tolerance =	0.01
Critical depth calculaton tolerance =	0.01
Maximum number of iterations =	20
Maximum difference tolerance =	0.3
Flow tolerance factor =	0.001

Computation Options

Critical depth computed only where necessary  
 Conveyance Calculation Method: At breaks in n values only  
 Friction Slope Method: Average Conveyance  
 Computational Flow Regime: Mixed Flow

# FloodPlain.rep

## FLOW DATA

Flow Title: 100YrAM2-04-04Many

Flow File : D:\program files\WCS\FloodPlain.f21

Flow Data (cfs)

River	Reach	RS	100 Yr.-WS3404.5	100 Yr.-WS3405	100 Yr.-WS3406
100 Yr.-WS3407					
Ditch A	5	12674	257	257	257
257					
Ditch A	5	9690	325	325	325
325					
Ditch A	5	7253	364	364	364
364					
Ditch A	5	6343	687	687	687
687					
Ditch A	5	4221	790	790	790
790					
Ditch A	5	1888	803	803	803
803					
Ditch A	5	1060	841	841	841
841					

## Boundary Conditions

River stream	Reach	Profile	Upstream	Down
Ditch A	5	100 Yr.-WS3404.5	Critical	Known WS
= 3404.5				
Ditch A	5	100 Yr.-WS3405	Critical	Known
WS = 3405				
Ditch A	5	100 Yr.-WS3406	Critical	Known
WS = 3406				
Ditch A	5	100 Yr.-WS3407	Critical	Known
WS = 3407				

## GEOMETRY DATA

Geometry Title: 1-20-04SecRemoved

Geometry File : D:\program files\WCS\FloodPlain.g03

CROSS SECTION RIVER: Ditch A  
REACH: 5 RS: 12674

## INPUT

Description: Sta. 12674

Station Elevation Data		num=	6						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
100	3482	380	3478	560	3477	635	3478	761	3480
964	3482								

Manning's n Values num= 3  
Sta n Val Sta n Val Sta n Val

## FloodPlain.rep

100 .033 380 .033 635 .033

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	380	635		1206 1337	1433	.1	.3

CROSS SECTION OUTPUT Profile #100 Yr.-WS3405

E.G. Elev (ft)	3478.13	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.	0.033	0.033	0.033
W.S. Elev (ft)	3478.09	Reach Len. (ft)	1206.00	1337.00	1433.00
Crit W.S. (ft)	3477.76	Flow Area (sq ft)	0.27	149.79	0.24
E.G. Slope (ft/ft)	0.002948	Area (sq ft)	0.27	149.79	0.24
Q Total (cfs)	257.00	Flow (cfs)	0.08	256.85	0.07
Top Width (ft)	266.62	Top Width (ft)	6.12	255.00	5.51
Vel Total (ft/s)	1.71	Avg. Vel. (ft/s)	0.30	1.71	0.30
Max Chl Dpth (ft)	1.09	Hydr. Depth (ft)	0.04	0.59	0.04
Conv. Total (cfs)	4733.3	Conv. (cfs)	1.5	4730.5	1.3
Length Wtd. (ft)	1336.99	Wetted Per. (ft)	6.12	255.01	5.51
Min Ch El (ft)	3477.00	Shear (lb/sq ft)	0.01	0.11	0.01
Alpha	1.01	Stream Power (lb/ft s)	0.00	0.19	0.00
Frctn Loss (ft)	7.80	Cum Volume (acre-ft)	9.42	58.71	1.69
C & E Loss (ft)	0.02	Cum SA (acres)	11.65	95.98	1.54

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Ditch A  
REACH: 5 RS: 11337

## INPUT

Description: Sta. 11337

Station Elevation Data		num=	8
Sta	Elev	Sta	Elev
100	3477	315	3474
550	3470	591	3472
		694	3474

Manning's n Values		num=	3
Sta	n Val	Sta	n Val
100	.033	435	.033
		550	.033

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	435	550		545 400	332	.1	.3

## CROSS SECTION OUTPUT

Profile #100 Yr.-WS3405

E.G. Elev (ft)	3470.31	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.24	Wt. n-Val.	0.033	0.033	0.033
W.S. Elev (ft)	3470.06	Reach Len. (ft)	545.00	400.00	332.00
Crit W.S. (ft)	3470.03	Flow Area (sq ft)	0.04	64.88	0.04
E.G. Slope (ft/ft)	0.016594	Area (sq ft)	0.04	64.88	0.04
Q Total (cfs)	257.00	Flow (cfs)	0.03	256.95	0.02
Top Width (ft)	117.70	Top Width (ft)	1.38	115.00	1.32
Vel Total (ft/s)	3.96	Avg. Vel. (ft/s)	0.59	3.96	0.59
Max Chl Dpth (ft)	1.06	Hydr. Depth (ft)	0.03	0.56	0.03
Conv. Total (cfs)	1995.1	Conv. (cfs)	0.2	1994.7	0.2
Length Wtd. (ft)	400.00	Wetted Per. (ft)	1.38	115.02	1.32
Min Ch El (ft)	3469.00	Shear (lb/sq ft)	0.03	0.58	0.03
Alpha	1.00	Stream Power (lb/ft s)	0.02	2.31	0.02
Frctn Loss (ft)	4.72	Cum Volume (acre-ft)	9.42	55.42	1.68
C & E Loss (ft)	0.02	Cum SA (acres)	11.55	90.30	1.43

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Ditch A  
REACH: 5 RS: 10937

## INPUT

Description: Sta. 10937

## Station Elevation Data

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
100	3470	351	3468	428	3467	465	3466	536	3464
543	3464	609	3466	683	3468	811	3472		

## Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
100	.033	428	.033	609	.033

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	428	609		729 649	445	.1	.3

CROSS SECTION OUTPUT Profile #100 Yr.-WS3405

E.G. Elev (ft)	3465.56	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.18	Wt. n-Val.		0.033	
W.S. Elev (ft)	3465.38	Reach Len. (ft)	729.00	649.00	445.00



## FloodPlain.rep

Crit W.S. (ft)	3465.18	Flow Area (sq ft)	74.55		
E.G. Slope (ft/ft)	0.008826	Area (sq ft)	74.55		
Q Total (cfs)	257.00	Flow (cfs)	257.00		
Top Width (ft)	101.30	Top Width (ft)	101.30		
Vel Total (ft/s)	3.45	Avg. Vel. (ft/s)	3.45		
Max Chl Dpth (ft)	1.38	Hydr. Depth (ft)	0.74		
Conv. Total (cfs)	2735.6	Conv. (cfs)	2735.6		
Length Wtd. (ft)	649.00	Wetted Per. (ft)	101.34		
Min Ch El (ft)	3464.00	Shear (lb/sq ft)	0.41		
Alpha	1.00	Stream Power (lb/ft s)	1.40		
Frctn Loss (ft)	8.69	Cum Volume (acre-ft)	9.42	54.78	1.68
C & E Loss (ft)	0.00	Cum SA (acres)	11.54	89.31	1.43

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross

section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Ditch A  
REACH: 5 RS: 10288

## INPUT

Description: Sta. 10288

Station Elevation Data		num= 12									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
100	3464	177	3462	238	3460	298	3458	493	3456		
519	3456	662	3457	778	3457.1	857	3458	903	3460		
947	3462	989	3464								

Manning's n Values		num= 3			
Sta	n Val	Sta	n Val	Sta	n Val
100	.033	298	.033	857	.033

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	298	857		552 598	633	.1	.3

CROSS SECTION OUTPUT Profile #100 Yr.-WS3405

E.G. Elev (ft)	3456.87	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.		0.033	
W.S. Elev (ft)	3456.67	Reach Len. (ft)	552.00	598.00	633.00
Crit W.S. (ft)	3456.67	Flow Area (sq ft)		71.89	
E.G. Slope (ft/ft)	0.022674	Area (sq ft)		71.89	

## FloodPlain.rep

Q Total (cfs)	257.00	Flow (cfs)	257.00
Top Width (ft)	187.76	Top Width (ft)	187.76
Vel Total (ft/s)	3.57	Avg. Vel. (ft/s)	3.57
Max Chl Dpth (ft)	0.67	Hydr. Depth (ft)	0.38
Conv. Total (cfs)	1706.8	Conv. (cfs)	1706.8
Length Wtd. (ft)	598.00	Wetted Per. (ft)	187.77
Min Ch El (ft)	3456.00	Shear (lb/sq ft)	0.54
Alpha	1.00	Stream Power (lb/ft s)	1.94
Frctn Loss (ft)	4.59	Cum Volume (acre-ft)	9.42 53.69 1.68
C & E Loss (ft)	0.04	Cum SA (acres)	11.54 87.16 1.43

Warning: The energy equation could not be balanced within the specified number of iterations.

The program used critical depth for the water surface and continued on with the calculations.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross

section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION RIVER: Ditch A  
REACH: 5 RS: 9690

## INPUT

Description: Sta. 9690

Station Elevation Data		num= 8									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
100	3454.5	202	3454	381	3452	632	3450	638	3450		
799	3452	897	3454	1010	3458						

## Manning's n Values

num= 3									
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
100	.033	381	.033	799	.033				

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
381	799	639 681	658	.1	.3

## CROSS SECTION OUTPUT Profile #100 Yr.-WS3405

E.G. Elev (ft)	3451.26	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.		0.033	

W.S. Elev (ft)	3451.19	FloodPlain.rep Reach Len. (ft)	639.00	681.00	658.00
Crit W.S. (ft)	3450.87	Flow Area (sq ft)		152.62	
E.G. Slope (ft/ft)	0.004338	Area (sq ft)		152.62	
Q Total (cfs)	325.00	Flow (cfs)		325.00	
Top Width (ft)	250.83	Top Width (ft)		250.83	
Vel Total (ft/s)	2.13	Avg. Vel. (ft/s)		2.13	
Max Chl Dpth (ft)	1.19	Hydr. Depth (ft)		0.61	
Conv. Total (cfs)	4934.2	Conv. (cfs)		4934.2	
Length Wtd. (ft)	681.00	Wetted Per. (ft)		250.84	
Min Ch El (ft)	3450.00	Shear (lb/sq ft)		0.16	
Alpha	1.00	Stream Power (lb/ft s)		0.35	
Frctn Loss (ft)	4.93	Cum Volume (acre-ft)	9.42	52.14	1.68
C & E Loss (ft)	0.01	Cum SA (acres)	11.54	84.15	1.43

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Ditch A  
REACH: 5 RS: 9009

#### INPUT

Description: Sta. 9009

Station Elevation Data		num=	9
Sta	Elev	Sta	Elev
100	3452	203	3450
637	3446	892	3448
		1007	3450
		1124	3452

Manning's n Values		num=	3
Sta	n Val	Sta	n Val
100	.033	325	.033
		892	.033

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
325	892	898	879	.1	.3

CROSS SECTION OUTPUT Profile #100 Yr.-WS3405

E.G. Elev (ft)	3446.32	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.		0.033	
W.S. Elev (ft)	3446.12	Reach Len. (ft)	898.00	879.00	794.00
Crit W.S. (ft)	3446.04	Flow Area (sq ft)		91.07	
E.G. Slope (ft/ft)	0.014428	Area (sq ft)		91.07	

## FloodPlain.rep

Q Total (cfs)	325.00	Flow (cfs)	325.00		
Top Width (ft)	169.88	Top Width (ft)	169.88		
Vel Total (ft/s)	3.57	Avg. Vel. (ft/s)	3.57		
Max Chl Dpth (ft)	1.12	Hydr. Depth (ft)	0.54		
Conv. Total (cfs)	2705.7	Conv. (cfs)	2705.7		
Length Wtd. (ft)	879.00	Wetted Per. (ft)	169.90		
Min Ch El (ft)	3445.00	Shear (lb/sq ft)	0.48		
Alpha	1.00	Stream Power (lb/ft s)	1.72		
Frctn Loss (ft)	4.96	Cum Volume (acre-ft)	9.42	50.24	1.68
C & E Loss (ft)	0.04	Cum SA (acres)	11.54	80.86	1.43

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Ditch A  
REACH: 5 RS: 8130

## INPUT

Description: Sta. 8130

Station Elevation Data		num= 8							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
100	3448	303	3444	419	3442	654	3440	663	3440
852	3442	995	3444	1104	3446				

Manning's n Values		num= 3			
Sta	n Val	Sta	n Val	Sta	n Val
100	.033	419	.033	852	.033

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	419	852		399 413	456	.1	.3

CROSS SECTION OUTPUT Profile #100 Yr.-WS3405

E.G. Elev (ft)	3441.30	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.033	
W.S. Elev (ft)	3441.25	Reach Len. (ft)	399.00	413.00	456.00
Crit W.S. (ft)	3440.85	Flow Area (sq ft)		176.81	
E.G. Slope (ft/ft)	0.002988	Area (sq ft)		176.81	
Q Total (cfs)	325.00	Flow (cfs)		325.00	
Top Width (ft)	273.95	Top Width (ft)		273.95	

		FloodPlain.rep			
Vel Total (ft/s)	1.84	Avg. Vel. (ft/s)		1.84	
Max Chl Dpth (ft)	1.25	Hydr. Depth (ft)		0.65	
Conv. Total (cfs)	5945.6	Conv. (cfs)		5945.6	
Length Wtd. (ft)	413.00	Wetted Per. (ft)		273.96	
Min Ch El (ft)	3440.00	Shear (lb/sq ft)		0.12	
Alpha	1.00	Stream Power (lb/ft s)		0.22	
Frctn Loss (ft)	2.64	Cum Volume (acre-ft)	9.42	47.54	1.68
C & E Loss (ft)	0.02	Cum SA (acres)	11.54	76.38	1.43

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Ditch A  
REACH: 5 RS: 7717

#### INPUT

Description: Sta 7717

Station Elevation Data		num=	8						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
100	3442	233	3440	383	3438	492	3437.8	510	3438
657	3439	747	3440	879	3442				

Manning's n Values		num=	3		
Sta	n Val	Sta	n Val	Sta	n Val
100	.033	233	.033	747	.033

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	233	747		444 464	510	.1	.3

CROSS SECTION OUTPUT Profile #100 Yr.-WS3405

E.G. Elev (ft)	3438.64	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.		0.033	
W.S. Elev (ft)	3438.44	Reach Len. (ft)	444.00	464.00	510.00
Crit W.S. (ft)	3438.44	Flow Area (sq ft)		89.29	
E.G. Slope (ft/ft)	0.022265	Area (sq ft)		89.29	
Q Total (cfs)	325.00	Flow (cfs)		325.00	
Top Width (ft)	223.91	Top Width (ft)		223.91	
Vel Total (ft/s)	3.64	Avg. Vel. (ft/s)		3.64	
Max Chl Dpth (ft)	0.64	Hydr. Depth (ft)		0.40	
Conv. Total (cfs)	2178.1	Conv. (cfs)		2178.1	

## FloodPlain.rep

Length Wtd. (ft)	464.00	Wetted Per. (ft)	223.91
Min Ch El (ft)	3437.80	Shear (lb/sq ft)	0.55
Alpha	1.00	Stream Power (lb/ft s)	2.02
Froctn Loss (ft)	1.76	Cum Volume (acre-ft)	9.42 46.28 1.68
C & E Loss (ft)	0.05	Cum SA (acres)	11.54 74.02 1.43

Warning: The energy equation could not be balanced within the specified number of iterations.  
The

program used critical depth for the water surface and continued on with the calculations.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross

section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION RIVER: Ditch A  
REACH: 5 RS: 7253

## INPUT

Description: Sta. 7253

Station Elevation Data

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
100	3438	109	3438.7	321	3438	424	3436	668	3435
906	3436	1005	3438	1200	3440	1365	3442		

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
100	.033	424	.033	906	.033

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	424	906		756 910	980	.1	.3

CROSS SECTION OUTPUT Profile #100 Yr.-WS3405

E.G. Elev (ft)	3436.12	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.033	0.033	0.033
W.S. Elev (ft)	3436.09	Reach Len. (ft)	756.00	910.00	980.00
Crit W.S. (ft)	3435.67	Flow Area (sq ft)	0.21	284.42	0.20
E.G. Slope (ft/ft)	0.001631	Area (sq ft)	0.21	284.42	0.20
Q Total (cfs)	364.00	Flow (cfs)	0.05	363.91	0.05
Top Width (ft)	491.10	Top Width (ft)	4.64	482.00	4.46

Vel Total (ft/s)	1.28	FloodPlain.rep Avg. Vel. (ft/s)	0.23	1.28	0.23
Max Chl Dpth (ft)	1.09	Hydr. Depth (ft)	0.05	0.59	0.05
Conv. Total (cfs)	9012.2	Conv. (cfs)	1.2	9009.9	1.1
Length Wtd. (ft)	910.00	Wetted Per. (ft)	4.64	482.00	4.46
Min Ch El (ft)	3435.00	Shear (lb/sq ft)	0.00	0.06	0.00
Alpha	1.00	Stream Power (lb/ft s)	0.00	0.08	0.00
Frctn Loss (ft)	5.42	Cum Volume (acre-ft)	9.41	44.29	1.68
C & E Loss (ft)	0.02	Cum SA (acres)	11.52	70.26	1.40

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Ditch A  
REACH: 5 RS: 6343

#### INPUT

Description: Sta. 6343

Station Elevation Data		num=	9						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
100	3434	346	3433	663	3432	732	3431	860	3430.2
981	3430	1273	3430	1320	3431.5	1566	3432		

Manning's n Values		num=	3			
Sta	n Val	Sta	n Val	Sta	n Val	
100	.033	663	.033	1320	.033	

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	663	1320		767 980	1051	.1	.3

CROSS SECTION OUTPUT Profile #100 Yr.-WS3405

E.G. Elev (ft)	3430.67	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.		0.033	
W.S. Elev (ft)	3430.46	Reach Len. (ft)	767.00	980.00	1051.00
Crit W.S. (ft)	3430.46	Flow Area (sq ft)		188.08	
E.G. Slope (ft/ft)	0.022292	Area (sq ft)		188.08	
Q Total (cfs)	687.00	Flow (cfs)		687.00	
Top Width (ft)	469.62	Top Width (ft)		469.62	
Vel Total (ft/s)	3.65	Avg. Vel. (ft/s)		3.65	
Max Chl Dpth (ft)	0.46	Hydr. Depth (ft)		0.40	
Conv. Total (cfs)	4601.3	Conv. (cfs)		4601.3	

## FloodPlain.rep

Length Wtd. (ft)	980.00	Wetted Per. (ft)	469.63		
Min Ch El (ft)	3430.00	Shear (lb/sq ft)	0.56		
Alpha	1.00	Stream Power (lb/ft s)	2.04		
Frctn Loss (ft)	4.09	Cum Volume (acre-ft)	9.41	39.35	1.68
C & E Loss (ft)	0.05	Cum SA (acres)	11.48	60.32	1.35

Warning: The energy equation could not be balanced within the specified number of iterations.  
The

program used critical depth for the water surface and continued on with the calculations.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m) between the current and previous cross

section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to

critical depth, the calculated water surface came back below critical depth. This indicates

that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION RIVER: Ditch A  
REACH: 5 RS: 5363

## INPUT

Description: Sta. 5363

Station Elevation Data		num= 10							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
100	3432	282	3430	550	3428	742	3426	885	3425
1097	3425	1476	3426	1877	3428	1966	3428	2160	3430

Manning's n Values		num= 3			
Sta	n Val	Sta	n Val	Sta	n Val
100	.033	742	.033	1476	.033

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
742	1476	1199 1142	713	.1	.3

CROSS SECTION OUTPUT Profile #100 Yr.-WS3405

E.G. Elev (ft)	3426.05	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.033	0.033	0.033
W.S. Elev (ft)	3426.02	Reach Len. (ft)	1199.00	1142.00	713.00
Crit W.S. (ft)	3425.54	Flow Area (sq ft)	0.02	486.80	0.04
E.G. Slope (ft/ft)	0.001698	Area (sq ft)	0.02	486.80	0.04
Q Total (cfs)	687.00	Flow (cfs)	0.00	687.00	0.00
Top Width (ft)	739.57	Top Width (ft)	1.80	734.00	3.77



		FloodPlain.rep			
Vel Total (ft/s)	1.41	Avg. Vel. (ft/s)	0.08	1.41	0.08
Max Chl Dpth (ft)	1.02	Hydr. Depth (ft)	0.01	0.66	0.01
Conv. Total (cfs)	16669.9	Conv. (cfs)	0.0	16669.8	0.1
Length Wtd. (ft)	1142.00	Wetted Per. (ft)	1.80	734.00	3.77
Min Ch El (ft)	3425.00	Shear (lb/sq ft)	0.00	0.07	0.00
Alpha	1.00	Stream Power (lb/ft s)	0.00	0.10	0.00
Frctn Loss (ft)	5.07	Cum Volume (acre-ft)	9.41	31.76	1.68
C & E Loss (ft)	0.02	Cum SA (acres)	11.46	46.78	1.30

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m) between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Ditch A  
REACH: 5 RS: 4221

#### INPUT

Description: Sta. 4221

Station Elevation Data		num= 12									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
100	3423	341	3422	544	3421	640	3420	669	3420		
753	3420.2	829	3420	837	3420	1030	3421	1320	3422		
1407	3423	1497	3424								

Manning's n Values		num= 3			
Sta	n Val	Sta	n Val	Sta	n Val
100	.033	544	.033	1407	.033

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff, Contr.	Expan.
	544	1407		749 732	843	.1	.3

#### CROSS SECTION OUTPUT Profile #100 Yr.-WS3405

E.G. Elev (ft)	3420.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.25	Wt. n-Val.		0.033	
W.S. Elev (ft)	3420.71	Reach Len. (ft)	749.00	732.00	843.00
Crit W.S. (ft)	3420.71	Flow Area (sq ft)		196.80	
E.G. Slope (ft/ft)	0.020617	Area (sq ft)		196.80	
Q Total (cfs)	790.00	Flow (cfs)		790.00	
Top Width (ft)	402.25	Top Width (ft)		402.25	
Vel Total (ft/s)	4.01	Avg. Vel. (ft/s)		4.01	
Max Chl Dpth (ft)	0.71	Hydr. Depth (ft)		0.49	

Conv. Total (cfs)	5502.0	FloodPlain.rep Conv. (cfs)	5502.0
Length Wtd. (ft)	736.33	Wetted Per. (ft)	402.26
Min Ch El (ft)	3420.00	Shear (lb/sq ft)	0.63
Alpha	1.00	Stream Power (lb/ft s)	2.53
Frctn Loss (ft)	3.65	Cum Volume (acre-ft)	9.41 22.80 1.68
C & E Loss (ft)	0.06	Cum SA (acres)	11.44 31.89 1.27

Warning: The energy equation could not be balanced within the specified number of iterations.  
The program selected the water surface that had the least amount of error between computed and assumed values.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION RIVER: Ditch A  
REACH: 5 RS: 3489

#### INPUT

Description: Sta. 3489

Station Elevation Data		num=	15
Sta	Elev	Sta	Elev
100	3417	258	3416.5
405	3416	422	3416
744	3416	830	3416
299	3416	539	3416.4
309	3415	581	3416.2
318	3416	642	3416.4
1068	3420	1159	3421

Manning's n Values		num=	3
Sta	n Val	Sta	n Val
100	.033	539	.033
918	.033	918	.033

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
539	918	464	500	.1	.3

CROSS SECTION OUTPUT Profile #100 Yr.-WS3405

E.G. Elev (ft)	3416.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.033	0.033	
W.S. Elev (ft)	3416.92	Reach Len. (ft)	464.00	500.00	457.00
Crit W.S. (ft)	3416.52	Flow Area (sq ft)	260.10	233.33	
E.G. Slope (ft/ft)	0.002177	Area (sq ft)	260.10	233.33	
Q Total (cfs)	790.00	Flow (cfs)	401.97	388.03	

## FloodPlain.rep

Top Width (ft)	743.33	Top Width (ft)	412.08	331.25	
Vel Total (ft/s)	1.60	Avg. Vel. (ft/s)	1.55	1.66	
Max Chl Dpth (ft)	1.91	Hydr. Depth (ft)	0.63	0.70	
Conv. Total (cfs)	16933.4	Conv. (cfs)	8616.2	8317.2	
Length Wtd. (ft)	482.36	Wetted Per. (ft)	412.18	331.26	
Min Ch El (ft)	3416.00	Shear (lb/sq ft)	0.09	0.10	
Alpha	1.00	Stream Power (lb/ft s)	0.13	0.16	
Frctn Loss (ft)	2.43	Cum Volume (acre-ft)	7.18	19.18	1.68
C & E Loss (ft)	0.02	Cum SA (acres)	7.89	25.72	1.27

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Ditch A  
REACH: 5 RS: 2989

## INPUT

Description: Sta. 2989

Station Elevation Data		num=	12								
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
170	3414.8	196	3414	436	3413.8	613	3414	651	3414		
700	3414	747	3414	761	3414	841	3415.01	920	3416		
976	3418	1067	3420								

Manning's n Values		num=	3		
Sta	n Val	Sta	n Val	Sta	n Val
170	.033	436	.033	841	.033

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.	
	436	841		317	215	172	.3	.5

## CROSS SECTION OUTPUT Profile #100 Yr.-WS3405

E.G. Elev (ft)	3414.51	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.	0.033	0.033	
W.S. Elev (ft)	3414.32	Reach Len. (ft)	317.00	215.00	172.00
Crit W.S. (ft)	3414.32	Flow Area (sq ft)	101.56	124.49	
E.G. Slope (ft/ft)	0.022050	Area (sq ft)	101.56	124.49	
Q Total (cfs)	790.00	Flow (cfs)	372.18	417.82	
Top Width (ft)	600.34	Top Width (ft)	250.28	350.06	
Vel Total (ft/s)	3.49	Avg. Vel. (ft/s)	3.66	3.36	

## FloodPlain.rep

Max Chl Dpth (ft)	0.52	Hydr. Depth (ft)	0.41	0.36
Conv. Total (cfs)	5320.2	Conv. (cfs)	2506.4	2813.8
Length Wtd. (ft)	260.56	Wetted Per. (ft)	250.29	350.06
Min Ch El (ft)	3413.80	Shear (lb/sq ft)	0.56	0.49
Alpha	1.01	Stream Power (lb/ft s)	2.05	1.64
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	5.25	17.13 1.68
C & E Loss (ft)	0.09	Cum SA (acres)	4.36	21.81 1.27

Warning: The energy equation could not be balanced within the specified number of iterations.  
The

program used critical depth for the water surface and continued on with the calculations.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION RIVER: Ditch A  
REACH: 5 RS: 2774

## INPUT

Description: Sta. 2774 Upstream of culverts

Station Elevation Data		num= 13							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
100	3413.8	175	3413.8	204	3412	261	3412	298	3411.2
402	3410.9	437	3410	469	3409	491	3409	511	3410
560	3412	641	3414	725	3416				

Manning's n Values		num= 3			
Sta	n Val	Sta	n Val	Sta	n Val
100	.033	437	.033	511	.033

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	437	511		40	40	.3	.5

Ineffective Flow		num= 2	
Sta L	Sta R	Elev	Permanent
888	F		
888	F		

CROSS SECTION OUTPUT Profile #100 Yr.-WS3405

E.G. Elev (ft)	3413.72	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.033	0.033	0.033
W.S. Elev (ft)	3413.71	Reach Len. (ft)	40.00	40.00	40.00
Crit W.S. (ft)	3412.70	Flow Area (sq ft)	588.63	322.19	191.45

		FloodPlain.rep			
E.G. Slope (ft/ft)	0.000067	Area (sq ft)	588.63	322.19	191.45
Q Total (cfs)	790.00	Flow (cfs)	374.76	317.56	97.68
Top Width (ft)	452.54	Top Width (ft)	260.47	74.00	118.07
Vel Total (ft/s)	0.72	Avg. Vel. (ft/s)	0.64	0.99	0.51
Max Chl Dpth (ft)	4.71	Hydr. Depth (ft)	2.26	4.35	1.62
Conv. Total (cfs)	96197.5	Conv. (cfs)	45634.1	38669.0	11894.4
Length Wtd. (ft)	40.00	Wetted Per. (ft)	260.55	74.04	118.13
Min Ch El (ft)	3409.00	Shear (lb/sq ft)	0.01	0.02	0.01
Alpha	1.20	Stream Power (lb/ft s)	0.01	0.02	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	2.74	16.03	1.30
C & E Loss (ft)		Cum SA (acres)	2.51	20.77	1.04

CULVERT RIVER: Ditch A  
REACH: 5 RS: 2773

#### INPUT

##### Description:

Distance from Upstream XS = 8

Deck/Roadway Width = 24

Weir Coefficient = 3

##### Upstream Deck/Roadway Coordinates

num= 6

Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord
26	3413.8				100	3413.8				402	3412.7			
500	3412.8				600	3413.9				700	3415.7			

##### Upstream Bridge Cross Section Data

Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
100	3413.8	175	3413.8	204	3412	261	3412	298	3411.2
402	3410.9	437	3410	469	3409	491	3409	511	3410
560	3412	641	3414	725	3416				

##### Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
100	.033	437	.033	511	.033

Bank Sta: Left Right Coeff Contr. Expan.

437 511 .3 .5

Ineffective Flow num= 2

Sta L Sta R Elev Permanent

888 F

888 F

##### Downstream Deck/Roadway Coordinates

num= 6

Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord
26	3413.8				100	3413.8				402	3412.7			
500	3412.8				600	3413.9				700	3415.7			

##### Downstream Bridge Cross Section Data

Station Elevation Data num= 15

## FloodPlain.rep

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
26	3413.8	100	3412.4	155	3412	299	3411.4	349	3410
387	3408.9	391.4	3408.9	395.8	3408.9	400.2	3408.9	404.6	3408.9
409	3408.9	434	3410	487	3412	568	3414	658	3416

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
26	.033	349	.033	434	.033

Bank Sta: Left Right Coeff Contr. Expan.

349	434	.3	.5
-----	-----	----	----

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-------	-------	------	-----------

888 F  
888 F

Upstream Embankment side slope = 3 horiz. to 1.0 vertical  
Downstream Embankment side slope = 3 horiz. to 1.0 vertical  
Maximum allowable submergence for weir flow = .95  
Elevation at which weir flow begins = 3412.7  
Energy head used in spillway design =  
Spillway height used in design =  
Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name	Shape	Rise	Span
Culvert #1	Pipe Arch	1.833	2.43

FHWA Chart # 34- 18 inch corner radius; Corrugated metal  
FHWA Scale # 1 - 90 Degree headwall  
Solution Criteria = Highest U.S. EG

Culvert Upstrm Dist	Length	n Value	Entrance Loss Coef	Exit Loss Coef
1	39	.024	.5	1

Number of Barrels = 6  
Upstream Elevation = 3409  
Centerline Stations

Sta.	Sta.	Sta.	Sta.	Sta.	Sta.
469	473.4	477.8	482.2	486.6	491

Downstream Elevation = 3408.9

Centerline Stations

Sta.	Sta.	Sta.	Sta.	Sta.	Sta.
387	391.4	395.8	400.2	404.6	409

CULVERT OUTPUT Profile #100 Yr.-WS3405  
Culvert ID : Culvert #1

Culv Q (cfs)	124.90	Culv Ful Lngh (ft)	39.00
# Barrels	6	Culv Vel US (ft/s)	4.73
Q Barrel (cfs)	20.82	Culv Vel DS (ft/s)	4.73
E.G. US. (ft)	3413.72	Culv Inv El Up (ft)	3409.00
W.S. US. (ft)	3413.71	Culv Inv El Dn (ft)	3408.90
E.G. DS (ft)	3412.73	Culv Frctn Ls (ft)	0.49
W.S. DS (ft)	3412.70	Culv Ext Lss (ft)	0.32
Delta EG (ft)	0.98	Culv Ent Lss (ft)	0.17
Delta WS (ft)	1.01	Q Weir (cfs)	665.10
E.G. IC (ft)	3413.62	Weir Sta Lft (ft)	176.47
E.G. OC (ft)	3413.72	Weir Sta Rgt (ft)	582.62
Culvert Control	Outlet	Weir Submerg	0.00
Culv WS Inlet (ft)	3410.83	Weir Max Depth (ft)	1.01
Culv WS Outlet (ft)	3410.73	Weir Avg Depth (ft)	0.66
Culv Nml Depth (ft)		Wr Flw Area (sq ft)	266.04
Culv Crt Depth (ft)	1.16	Min El Weir Flow (ft)	3412.71

CROSS SECTION

RIVER: Ditch A

REACH: 5

RS: 2734

## INPUT

Description: Sta. 2734 Downstream of culverts

Station Elevation Data		num= 15									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
26	3413.8	100	3412.4	155	3412	299	3411.4	349	3410		
387	3408.9	391.4	3408.9	395.8	3408.9	400.2	3408.9	404.6	3408.9		
409	3408.9	434	3410	487	3412	568	3414	658	3416		

## Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
26	.033	349	.033	434	.033

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	349	434		745	846	1015	
						.3	.5

Ineffective Flow		num= 2			
Sta L	Sta R	Elev	Permanent		
888	F				
888	F				

## CROSS SECTION OUTPUT Profile #100 Yr.-WS3405

E.G. Elev (ft)	3412.73	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.033	0.033	0.033
W.S. Elev (ft)	3412.70	Reach Len. (ft)	745.00	846.00	1015.00
Crit W.S. (ft)	3412.70	Flow Area (sq ft)	273.94	288.37	100.04
E.G. Slope (ft/ft)	0.000281	Area (sq ft)	273.94	288.37	100.04
Q Total (cfs)	790.00	Flow (cfs)	211.62	491.68	86.70
Top Width (ft)	431.23	Top Width (ft)	264.87	85.00	81.36
Vel Total (ft/s)	1.19	Avg. Vel. (ft/s)	0.77	1.71	0.87
Max Chl Dpth (ft)	3.80	Hydr. Depth (ft)	1.03	3.39	1.23
Conv. Total (cfs)	47090.5	Conv. (cfs)	12614.4	29308.0	5168.1
Length Wtd. (ft)	841.78	Wetted Per. (ft)	264.90	85.04	81.40
Min Ch El (ft)	3408.90	Shear (lb/sq ft)	0.02	0.06	0.02
Alpha	1.44	Stream Power (lb/ft s)	0.01	0.10	0.02
Frctn Loss (ft)	0.77	Cum Volume (acre-ft)	2.34	15.75	1.17
C & E Loss (ft)	0.05	Cum SA (acres)	2.27	20.69	0.95

Warning: The energy equation could not be balanced within the specified number of iterations.  
The

program used critical depth for the water surface and continued on with the calculations.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cr



## FloodPlain.rep

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section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to

critical depth, the calculated water surface came back below critical depth. This indicates

that there is not a valid subcritical answer. The program defaulted to critical depth.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION RIVER: Ditch A  
REACH: 5 RS: 1888

## INPUT

Description: Sta. 1888

Station	Elevation	Data	num=	6	Sta	Elev	Sta	Elev	Sta	Elev
100	3410.2	110	3410	331	3408	532	3408	690	3408	
1180	3410									

Manning's n	Values	num=	3	Sta	n Val	Sta	n Val
100	.033	100	.033	1180	.033		

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	100	1180		305 828	980	.1	.3

CROSS SECTION OUTPUT Profile #100 Yr.-WS3405

E.G. Elev (ft)	3408.70	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.		0.033	
W.S. Elev (ft)	3408.49	Reach Len. (ft)	305.00	828.00	980.00
Crit W.S. (ft)	3408.49	Flow Area (sq ft)		218.19	
E.G. Slope (ft/ft)	0.021974	Area (sq ft)		218.19	
Q Total (cfs)	803.00	Flow (cfs)		803.00	
Top Width (ft)	532.93	Top Width (ft)		532.93	
Vel Total (ft/s)	3.68	Avg. Vel. (ft/s)		3.68	
Max Chl Dpth (ft)	0.49	Hydr. Depth (ft)		0.41	
Conv. Total (cfs)	5417.1	Conv. (cfs)		5417.1	
Length Wtd. (ft)	828.00	Wetted Per. (ft)		532.93	
Min Ch El (ft)	3408.00	Shear (lb/sq ft)		0.56	
Alpha	1.00	Stream Power (lb/ft s)		2.07	
Frctn Loss (ft)	1.14	Cum Volume (acre-ft)		10.83	
C & E Loss (ft)	0.06	Cum SA (acres)		14.69	

## FloodPlain.rep

Warning: The energy equation could not be balanced within the specified number of iterations.  
The

program used critical depth for the water surface and continued on with the calculations.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m) between the current and previous cross section. This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION RIVER: Ditch A  
REACH: 5 RS: 1060

## INPUT

Description: Sta. 1060

Station Elevation Data		num=	6						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
100	3408	394	3406	879	3402.7	909	3402.7	1206	3405
1554	3404.3								

Manning's n Values		num=	3		
Sta	n Val	Sta	n Val	Sta	n Val
100	.033	394	.033	1554	.033

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	394	1554		60 60	60	.1	.3

CROSS SECTION OUTPUT Profile #100 Yr.-WS3405

E.G. Elev (ft)	3405.01	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.		0.033	
W.S. Elev (ft)	3405.00	Reach Len. (ft)			
Crit W.S. (ft)	3403.77	Flow Area (sq ft)		921.10	
E.G. Slope (ft/ft)	0.000467	Area (sq ft)		921.10	
Q Total (cfs)	841.00	Flow (cfs)		841.00	
Top Width (ft)	1013.03	Top Width (ft)		1013.03	
Vel Total (ft/s)	0.91	Avg. Vel. (ft/s)		0.91	
Max Chl Dpth (ft)	2.30	Hydr. Depth (ft)		0.91	
Conv. Total (cfs)	38907.7	Conv. (cfs)		38907.7	
Length Wtd. (ft)		Wetted Per. (ft)		1013.75	
Min Ch El (ft)	3402.70	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)		0.02	
Frctn Loss (ft)		Cum Volume (acre-ft)			

C & E Loss (ft)

FloodPlain.rep  
Cum SA (acres)

Warning: Divided flow computed for this cross-section.

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

# SUMMARY OF MANNING'S N VALUES

River: Ditch A

Reach	River Sta.	n1	n2	n3
5	12674	.033	.033	.033
5	11337	.033	.033	.033
5	10937	.033	.033	.033
5	10288	.033	.033	.033
5	9690	.033	.033	.033
5	9009	.033	.033	.033
5	8130	.033	.033	.033
5	7717	.033	.033	.033
5	7253	.033	.033	.033
5	6343	.033	.033	.033
5	5363	.033	.033	.033
5	4221	.033	.033	.033
5	3489	.033	.033	.033
5	2989	.033	.033	.033
5	2774	.033	.033	.033
5	2773	Culvert		
5	2734	.033	.033	.033
5	1888	.033	.033	.033
5	1060	.033	.033	.033

# SUMMARY OF REACH LENGTHS

River: Ditch A

Reach	River Sta.	Left	Channel	Right
5	12674	1206	1337	1433
5	11337	545	400	332
5	10937	729	649	445
5	10288	552	598	633
5	9690	639	681	658
5	9009	898	879	794
5	8130	399	413	456
5	7717	444	464	510
5	7253	756	910	980
5	6343	767	980	1051
5	5363	1199	1142	713
5	4221	749	732	843
5	3489	464	500	457
5	2989	317	215	172
5	2774	40	40	40
5	2773	Culvert		
5	2734	745	846	1015
5	1888	305	828	980
5	1060	60	60	60

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS  
River: Ditch A

Reach	River Sta.	Contr.	Expan.
5	12674	.1	.3
5	11337	.1	.3
5	10937	.1	.3
5	10288	.1	.3
5	9690	.1	.3
5	9009	.1	.3
5	8130	.1	.3
5	7717	.1	.3
5	7253	.1	.3
5	6343	.1	.3
5	5363	.1	.3
5	4221	.1	.3
5	3489	.1	.3
5	2989	.3	.5
5	2774	.3	.5
5	2773	Culvert	
5	2734	.3	.5
5	1888	.1	.3
5	1060	.1	.3

Profile Output Table - Standard Table 1

Reach lope	Vel Chnl (ft/s)	River Sta Flow Area (sq ft)	Q Total Top Width (ft)	Min Ch El Froude # Chl (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. S (ft)
5		12674	257.00	3477.00	3478.09	3477.76	3478.13	0.00
2948	1.71	150.30	266.62	0.39				
5		11337	257.00	3469.00	3470.06	3470.03	3470.31	0.01
6594	3.96	64.97	117.70	0.93				
5		10937	257.00	3464.00	3465.38	3465.18	3465.56	0.00
8826	3.45	74.55	101.30	0.71				
5		10288	257.00	3456.00	3456.67	3456.67	3456.87	0.02
2674	3.57	71.89	187.76	1.02				
5		9690	325.00	3450.00	3451.19	3450.87	3451.26	0.00
4338	2.13	152.62	250.83	0.48				
5		9009	325.00	3445.00	3446.12	3446.04	3446.32	0.01
4428	3.57	91.07	169.88	0.86				
5		8130	325.00	3440.00	3441.25	3440.85	3441.30	0.00
2988	1.84	176.81	273.95	0.40				
5		7717	325.00	3437.80	3438.44	3438.44	3438.64	0.02
2265	3.64	89.29	223.91	1.02				
5		7253	364.00	3435.00	3436.09	3435.67	3436.12	0.00
1631	1.28	284.83	491.10	0.29				
5		6343	687.00	3430.00	3430.46	3430.46	3430.67	0.02
2292	3.65	188.08	469.62	1.02				
5		5363	687.00	3425.00	3426.02	3425.54	3426.05	0.00
1698	1.41	486.85	739.57	0.31				
5		4221	790.00	3420.00	3420.71	3420.71	3420.96	0.02
0617	4.01	196.80	402.25	1.01				
5		3489	790.00	3416.00	3416.92	3416.52	3416.96	0.00

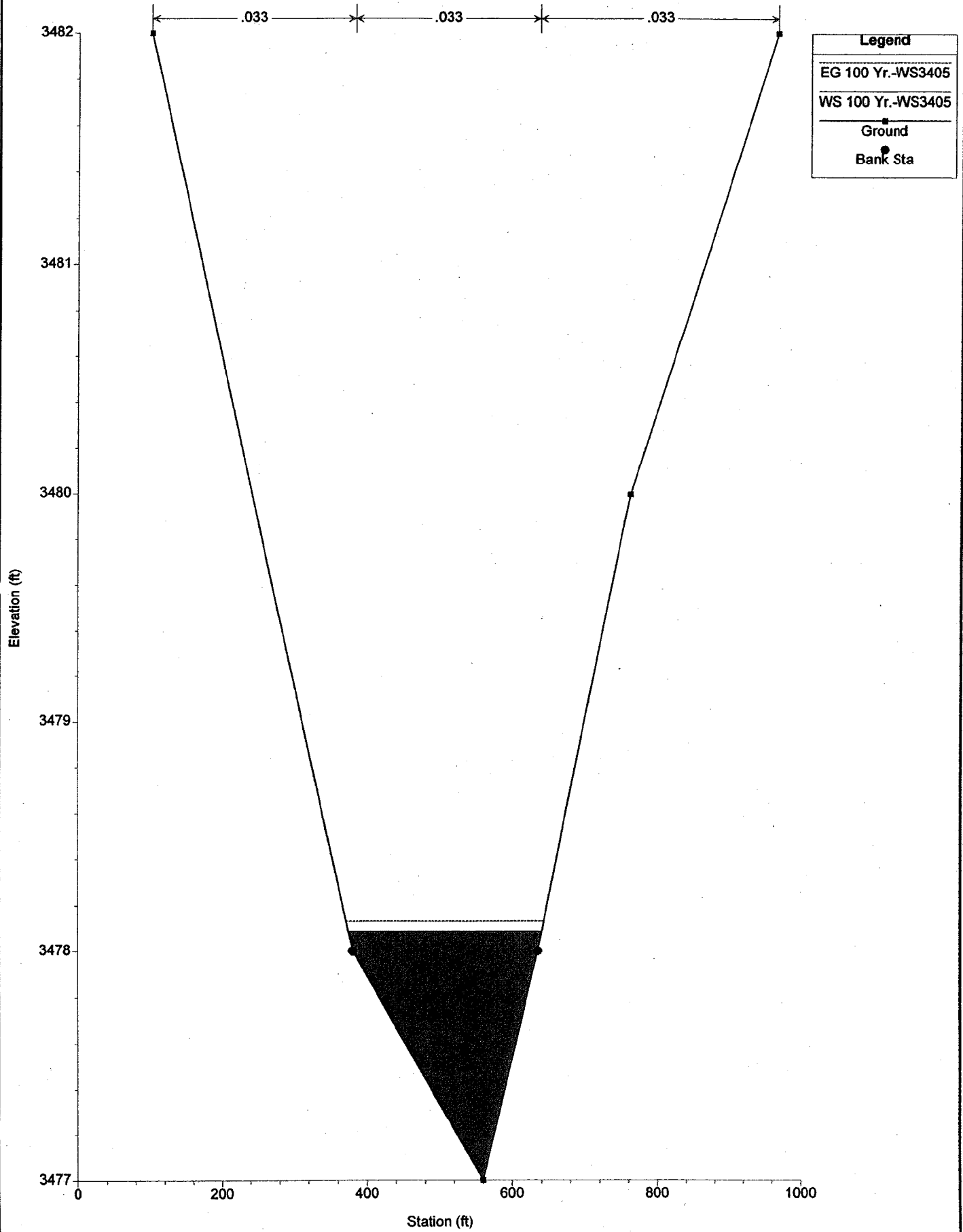
FloodPlain.rep								
2177	1.66	493.43	743.33	0.35				
5		2989	790.00	3413.80	3414.32	3414.32	3414.51	0.02
2050	3.36	226.05	600.34	0.99				
5		2774	790.00	3409.00	3413.71	3412.70	3413.72	0.00
0067	0.99	1102.27	452.54	0.08				
5		2773	Culvert					
5		2734	790.00	3408.90	3412.70	3412.70	3412.73	0.00
0281	1.71	662.35	431.23	0.16				
5		1888	803.00	3408.00	3408.49	3408.49	3408.70	0.02
1974	3.68	218.19	532.93	1.01				
5		1060	841.00	3402.70	3405.00	3403.77	3405.01	0.00
0467	0.91	921.10	1013.03	0.17				

# Profile Output Table - Report

Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	Max Chl Dpth	E.G	
. Elev	E.G. Slope	Vel Chnl	Sta W.S. Lft	Sta W.S. Rgt	Flow Area	Top Width	Froude #	Chl
(ft)	(ft/ft)	(ft/s)	(cfs) (ft)	(ft) (ft)	(ft) (sq ft)	(ft) (ft)	(ft)	(ft)
5	12674		257.00	3477.00	3478.09	3477.76	1.09	3
478.13	0.002948	1.71	373.88	640.51	150.30	266.62		0.39
5	11337		257.00	3469.00	3470.06	3470.03	1.06	3
470.31	0.016594	3.96	433.62	551.32	64.97	117.70		0.93
5	10937		257.00	3464.00	3465.38	3465.18	1.38	3
465.56	0.008826	3.45	487.13	588.43	74.55	101.30		0.71
5	10288		257.00	3456.00	3456.67	3456.67	0.67	3
456.87	0.022674	3.57	427.42	615.18	71.89	187.76		1.02
5	9690		325.00	3450.00	3451.19	3450.87	1.19	3
451.26	0.004338	2.13	482.85	733.67	152.62	250.83		0.48
5	9009		325.00	3445.00	3446.12	3446.04	1.12	3
446.32	0.014428	3.57	482.15	652.03	91.07	169.88		0.86
5	8130		325.00	3440.00	3441.25	3440.85	1.25	3
441.30	0.002988	1.84	507.15	781.10	176.81	273.95		0.40
5	7717		325.00	3437.80	3438.44	3438.44	0.64	3
438.64	0.022265	3.64	350.26	574.17	89.29	223.91		1.02
5	7253		364.00	3435.00	3436.09	3435.67	1.09	3
436.12	0.001631	1.28	419.36	910.46	284.83	491.10		0.29
5	6343		687.00	3430.00	3430.46	3430.46	0.46	3
430.67	0.022292	3.65	817.89	1287.51	188.08	469.62		1.02
5	5363		687.00	3425.00	3426.02	3425.54	1.02	3
426.05	0.001698	1.41	740.20	1479.77	486.85	739.57		0.31
5	4221		790.00	3420.00	3420.71	3420.71	0.71	3
420.96	0.020617	4.01	571.82	974.07	196.80	402.25		1.01

FloodPlain.rep									
5	3489		790.00	3416.00	3416.92	3416.52	1.91	3	
416.96	0.002177	1.66	126.92	870.25	493.43	743.33		0.35	
5	2989		790.00	3413.80	3414.32	3414.32	0.52	3	
414.51	0.022050	3.36	185.72	786.06	226.05	600.34		0.99	
5	2774		790.00	3409.00	3413.71	3412.70	4.71	3	
413.72	0.000067	0.99	176.53	629.07	1102.27	452.54		0.08	
5	2773		Culvert						
5	2734		790.00	3408.90	3412.70	3412.70	3.80	3	
412.73	0.000281	1.71	84.13	515.36	662.35	431.23		0.16	
5	1888		803.00	3408.00	3408.49	3408.49	0.49	3	
408.70	0.021974	3.68	276.94	809.87	218.19	532.93		1.01	
5	1060		841.00	3402.70	3405.00	3403.77	2.30	3	
405.01	0.000467	0.91	540.97	1554.00	921.10	1013.03		0.17	

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Sta. 12674





# WCS Plan: 2-04-04MANY

Sta. 11337

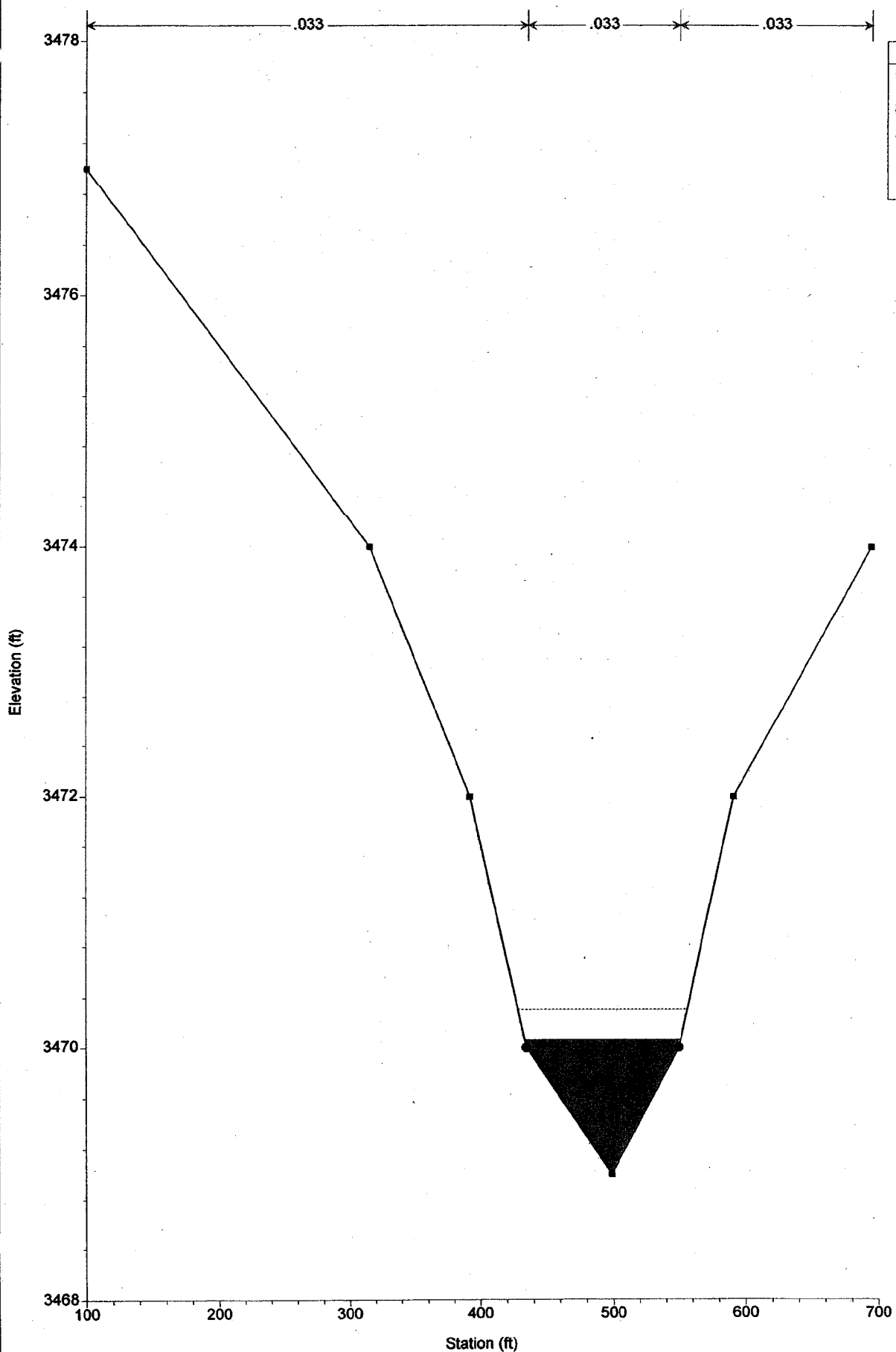
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EG 100 Yr.-WS3405

WS 100 Yr.-WS3405

Ground

Bank Sta



WCS Plan: 2-04-04MANY

Sta. 10937

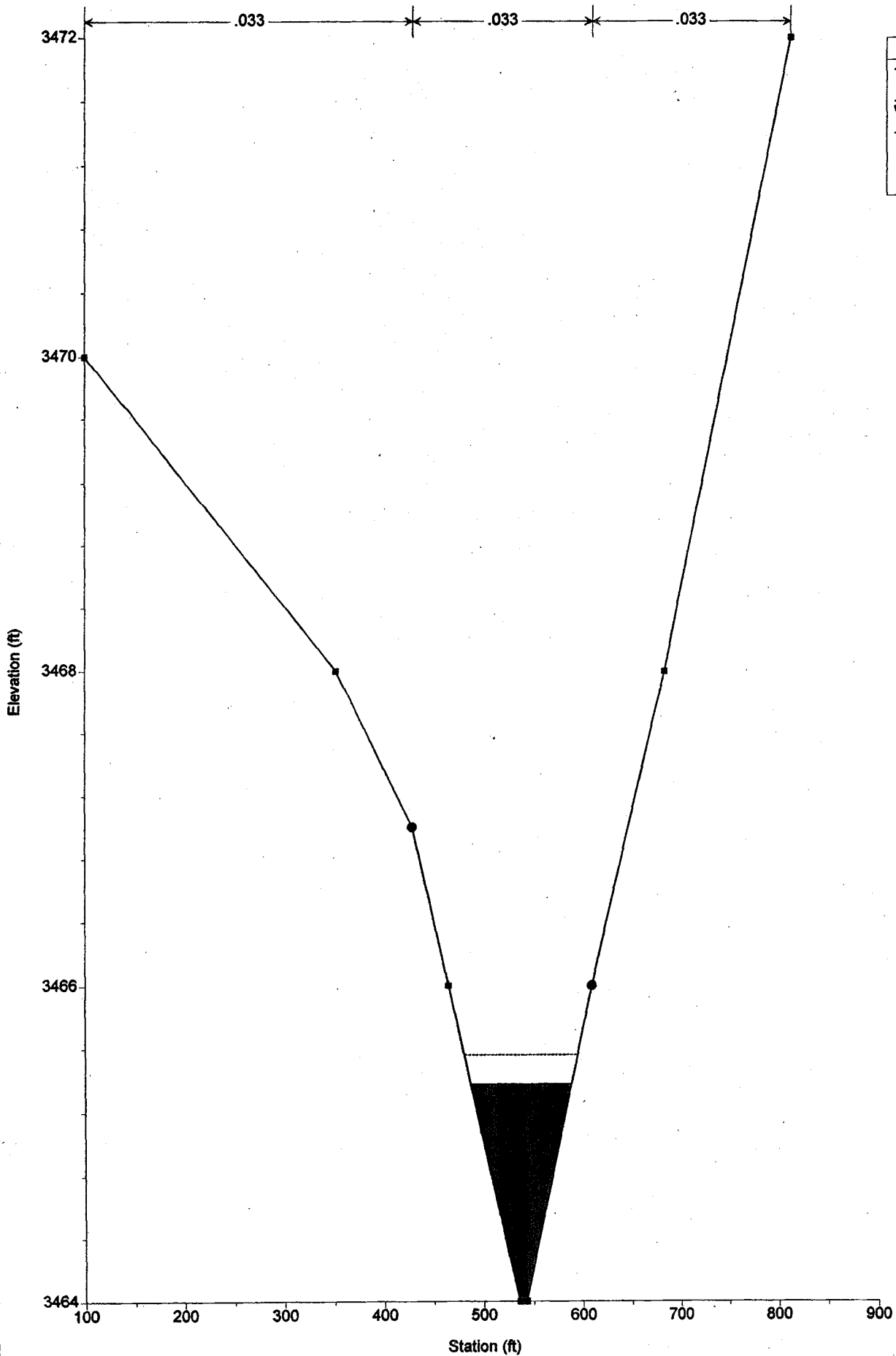
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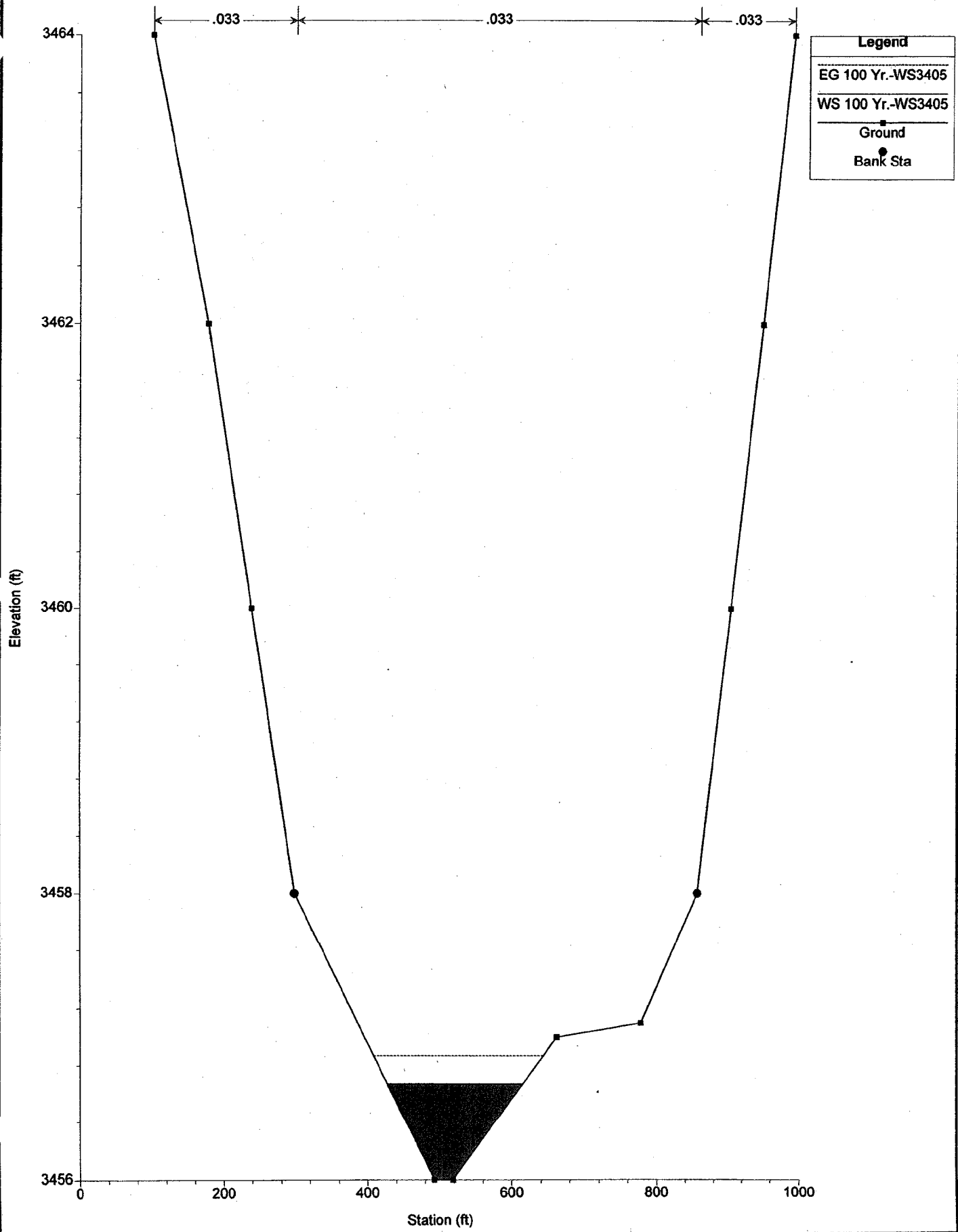
WS 100 Yr.-WS3405

Ground

Bank Sta

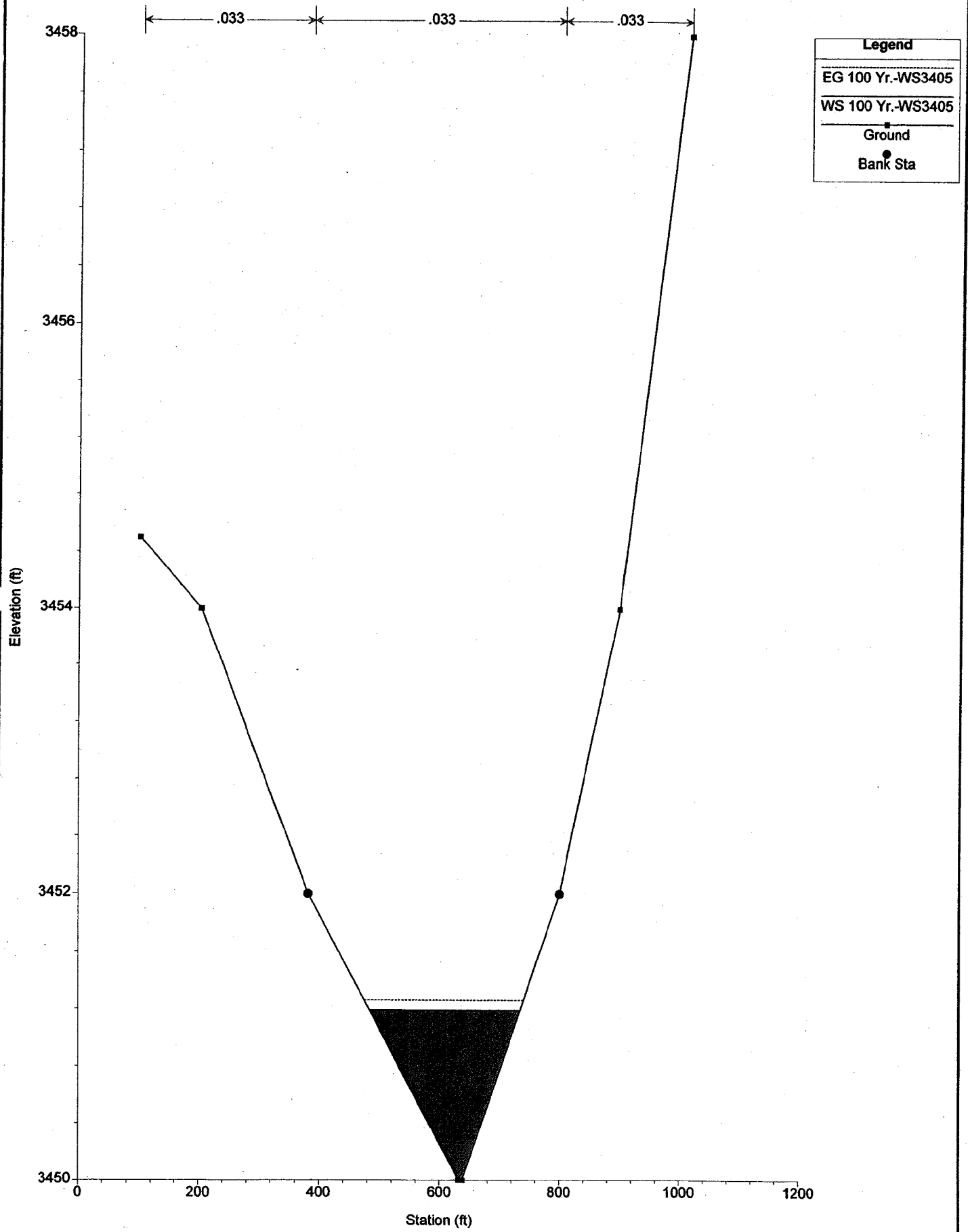


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Sta. 10288



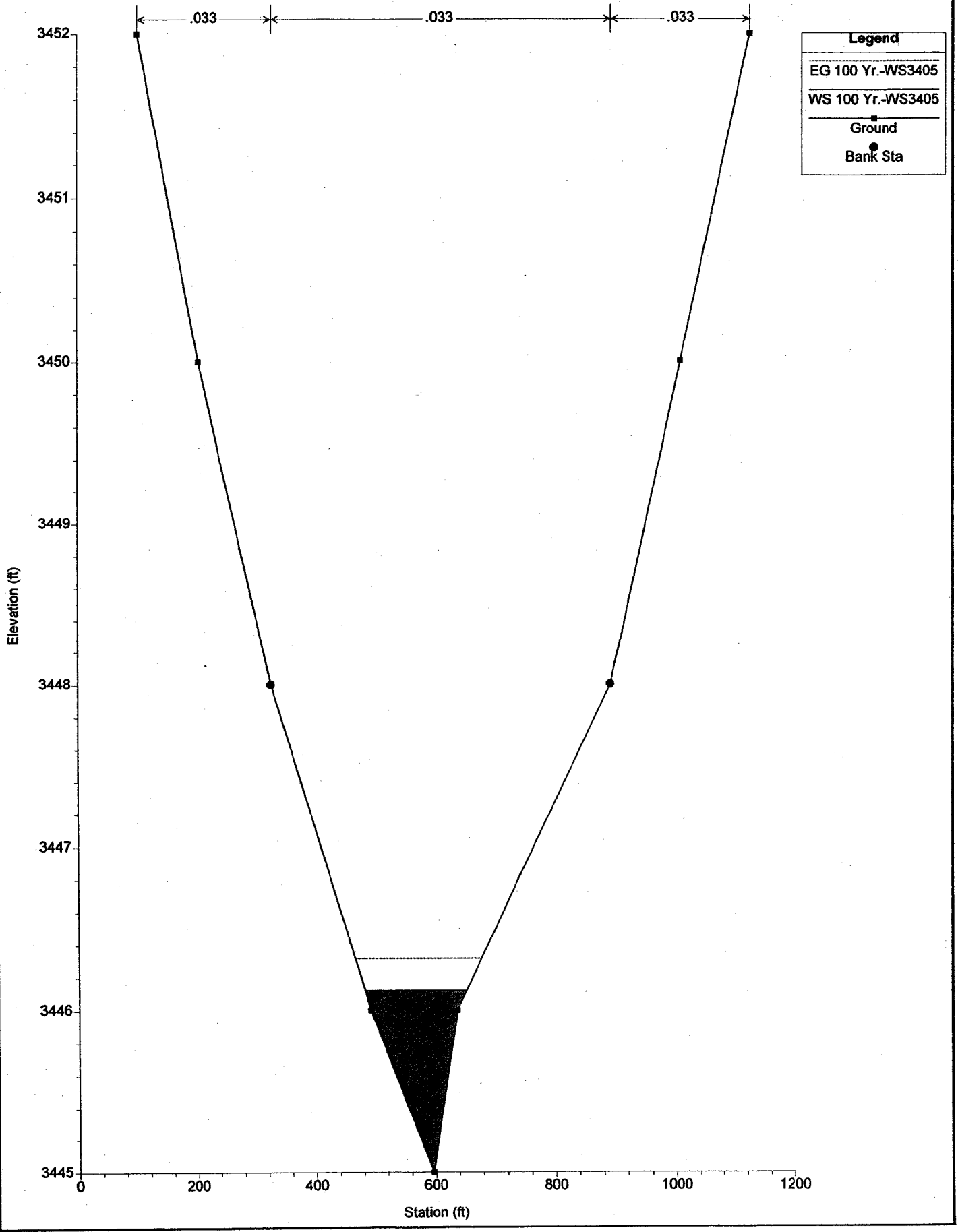


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Sta. 9690



# WCS Plan: 2-04-04MANY

Sta. 9009



# WCS Plan: 2-04-04MANY

Sta. 8130

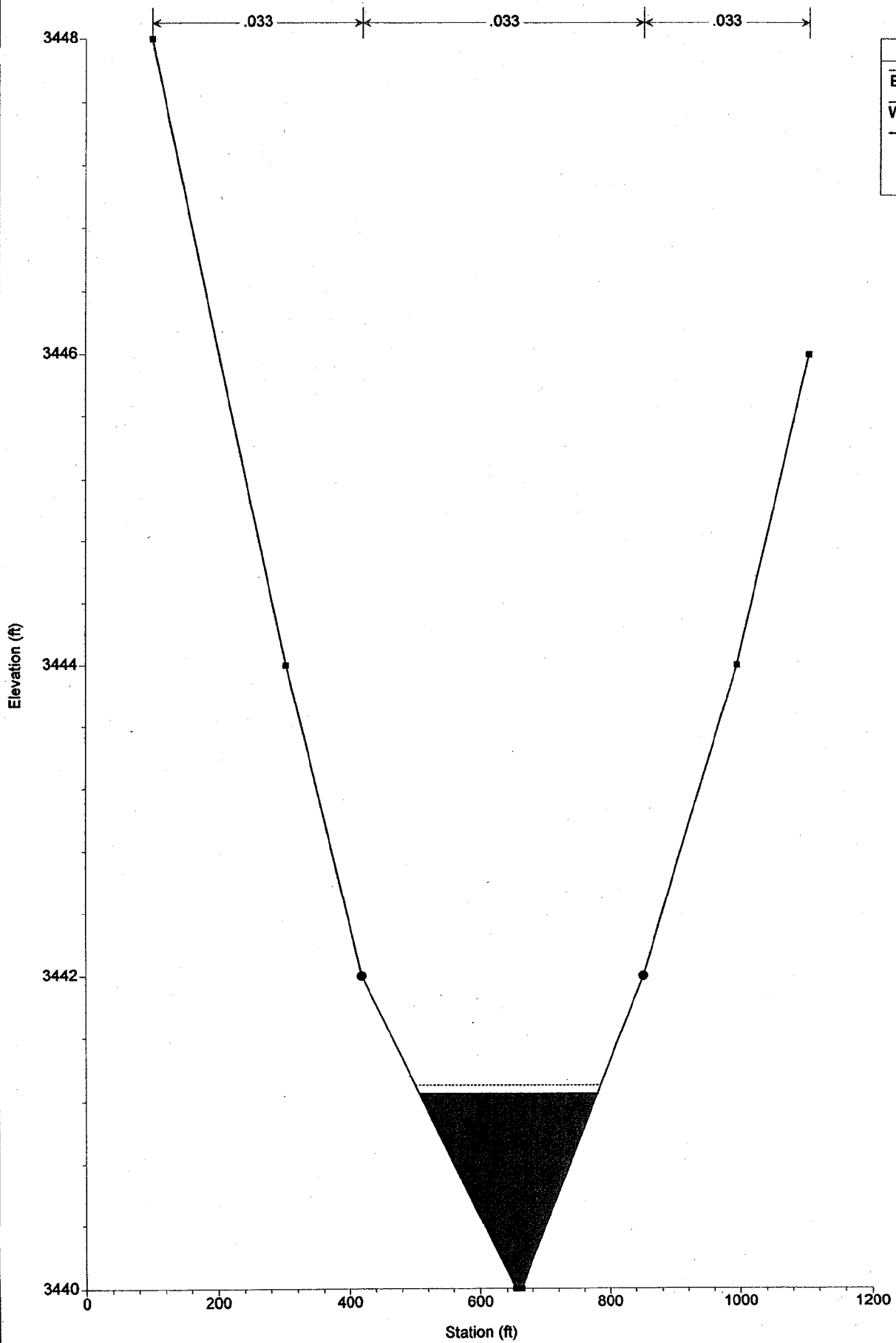
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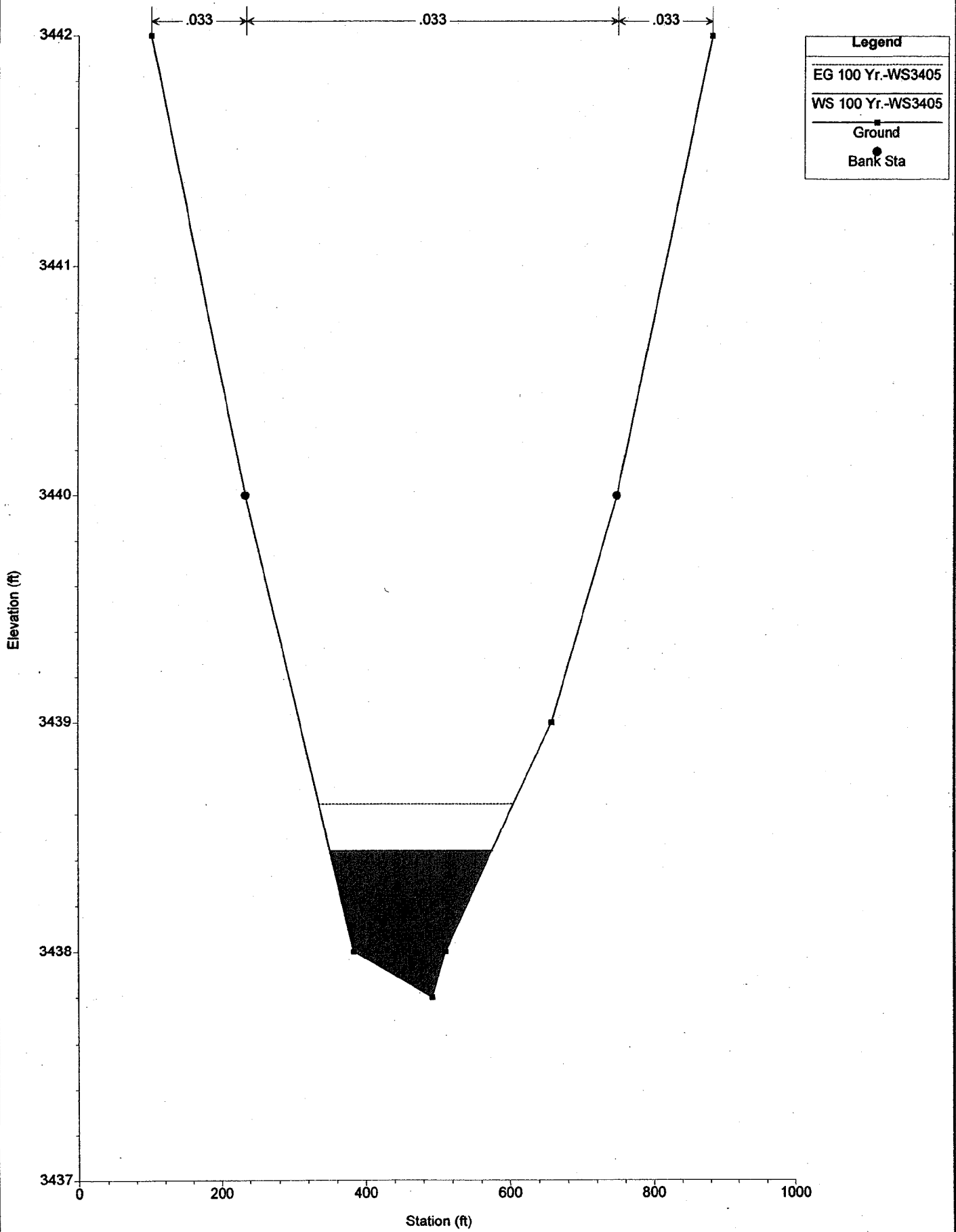
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Ground

Bank Sta

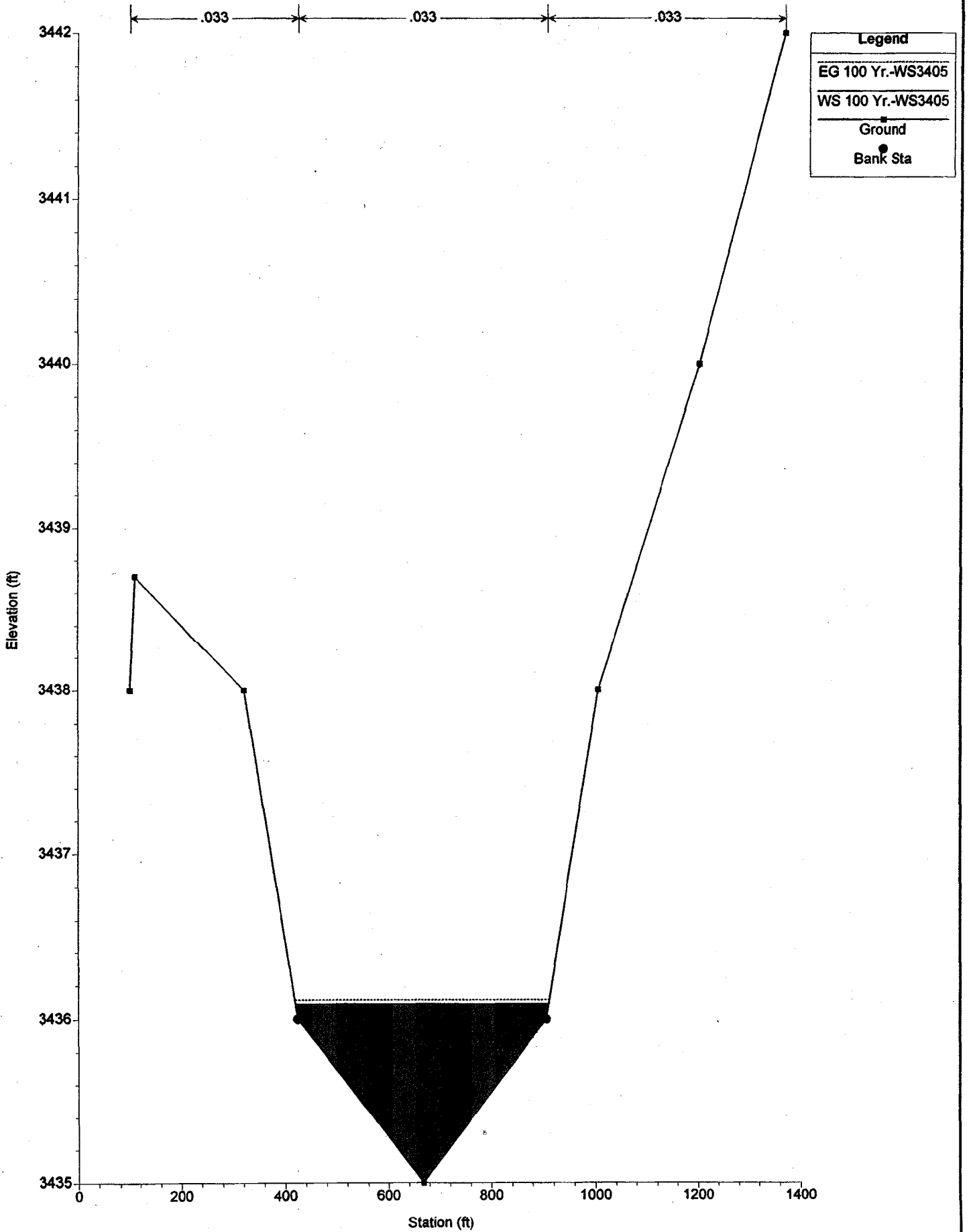


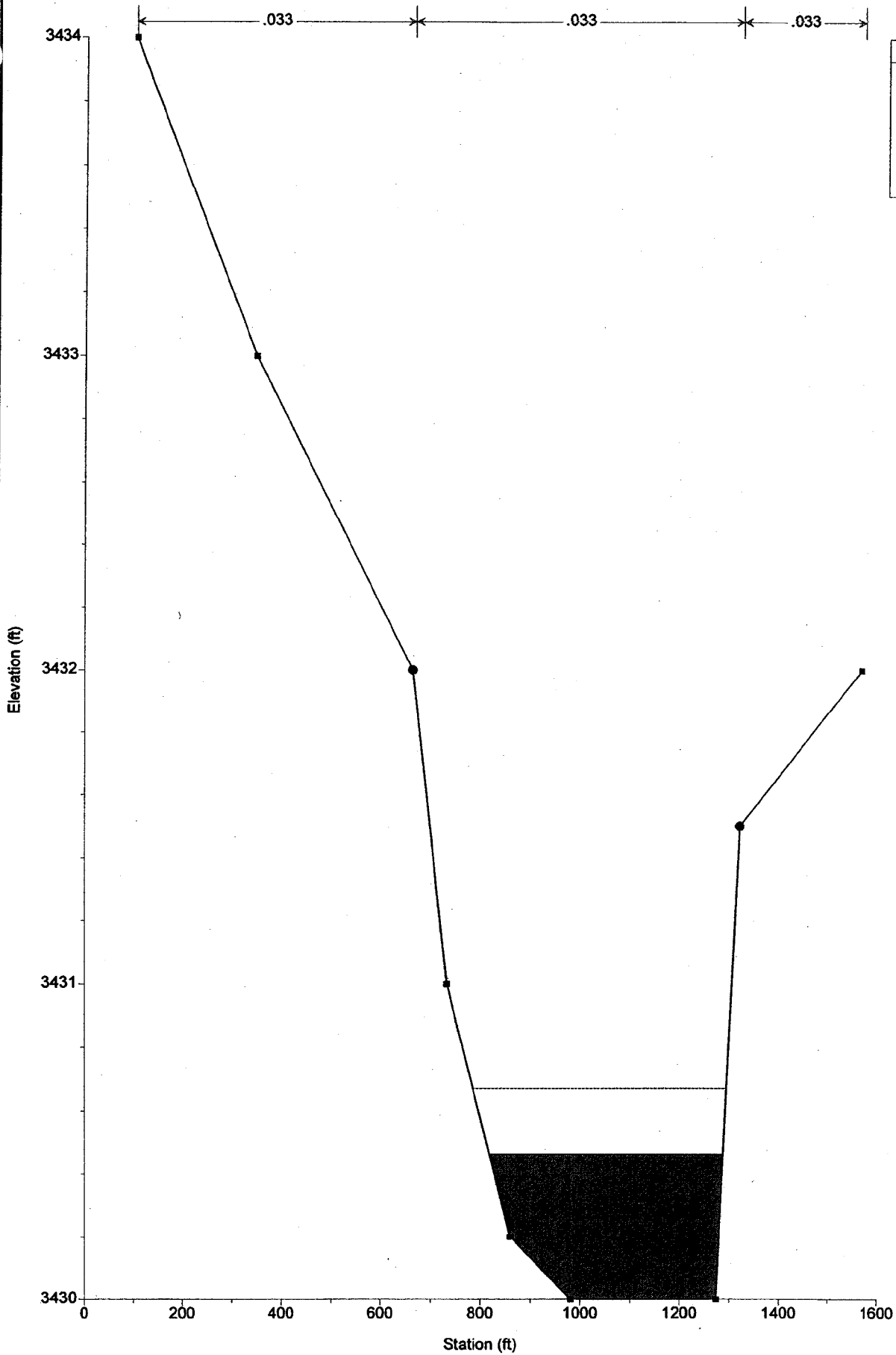
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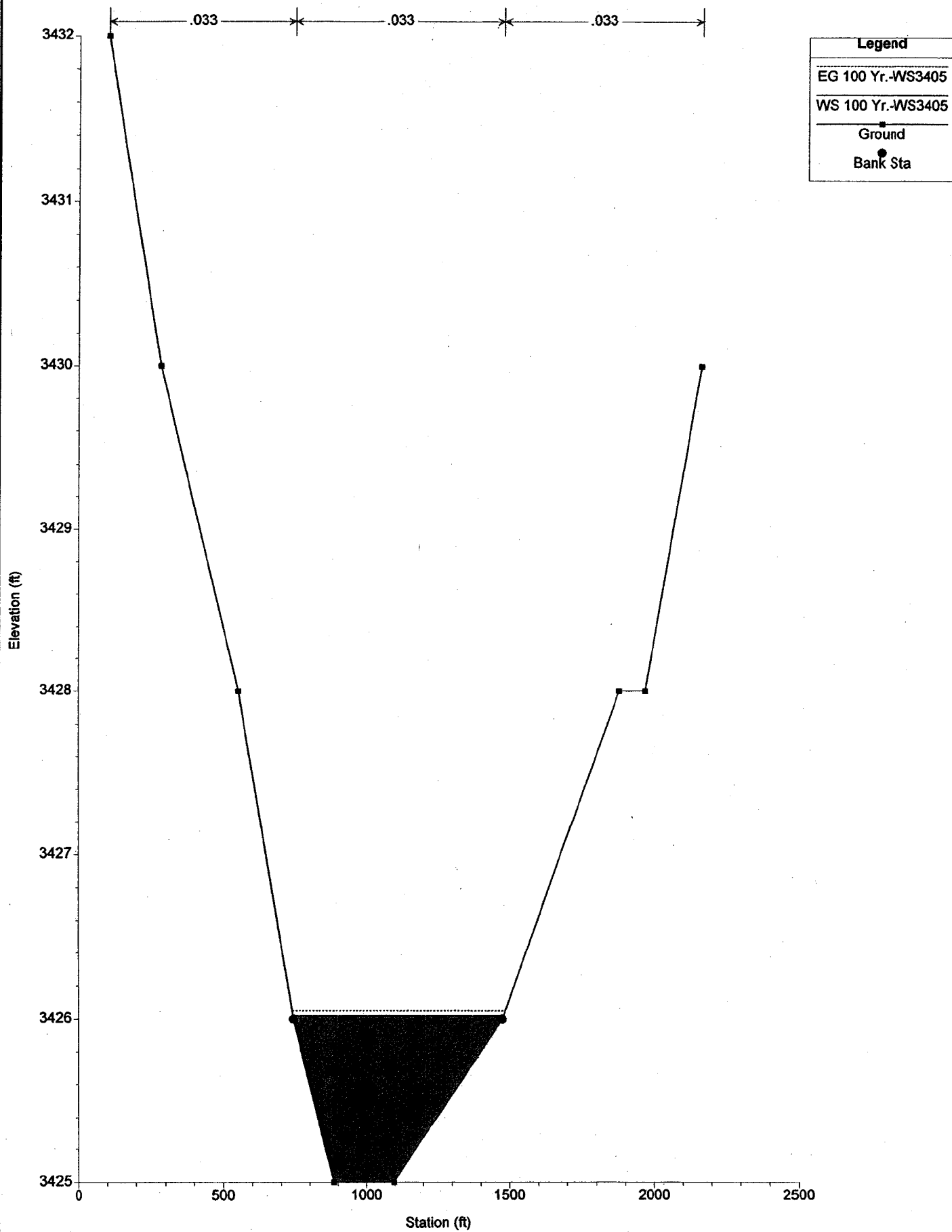
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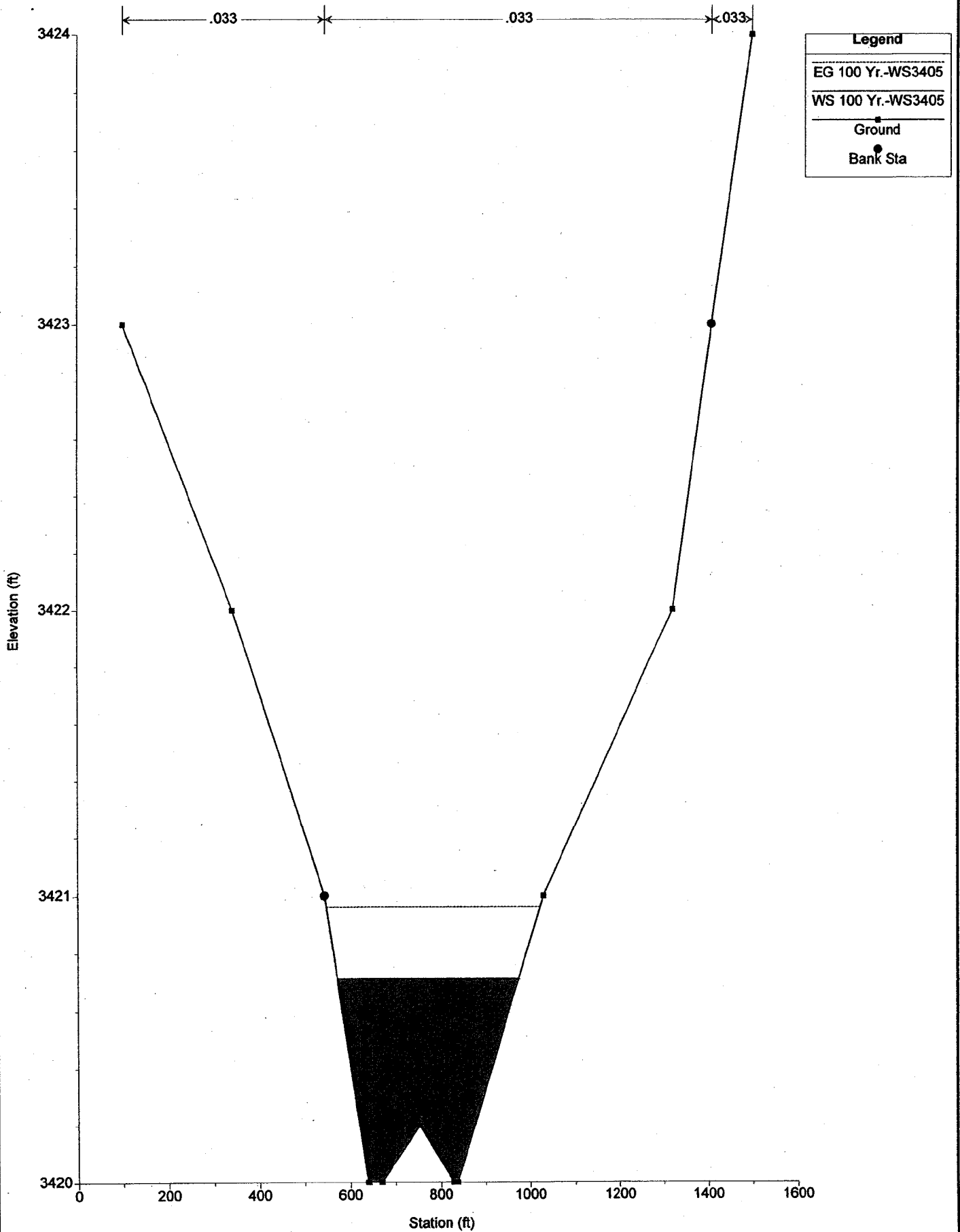


Legend
EG 100 Yr.-WS3405
WS 100 Yr.-WS3405
Ground
Bank Sta

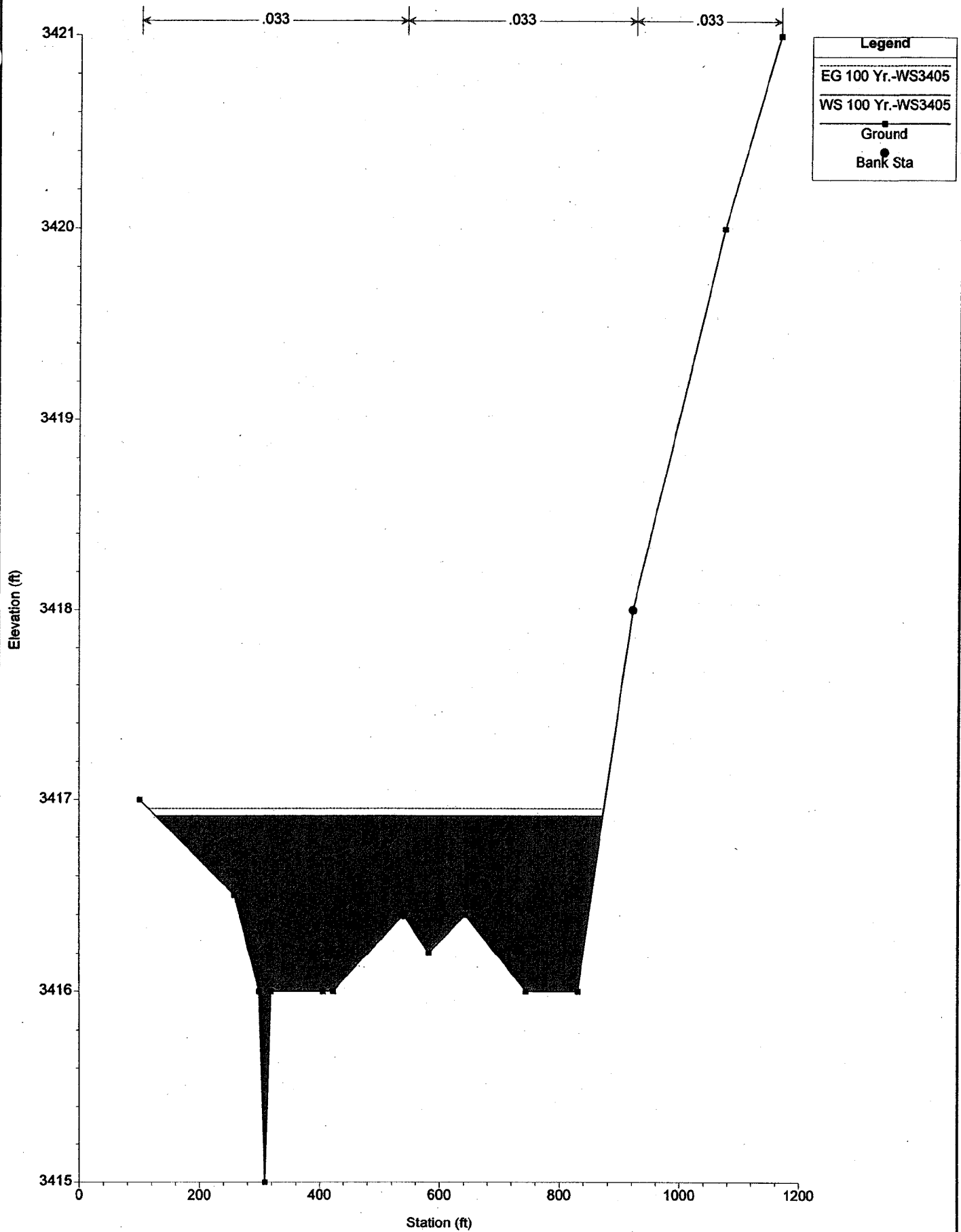
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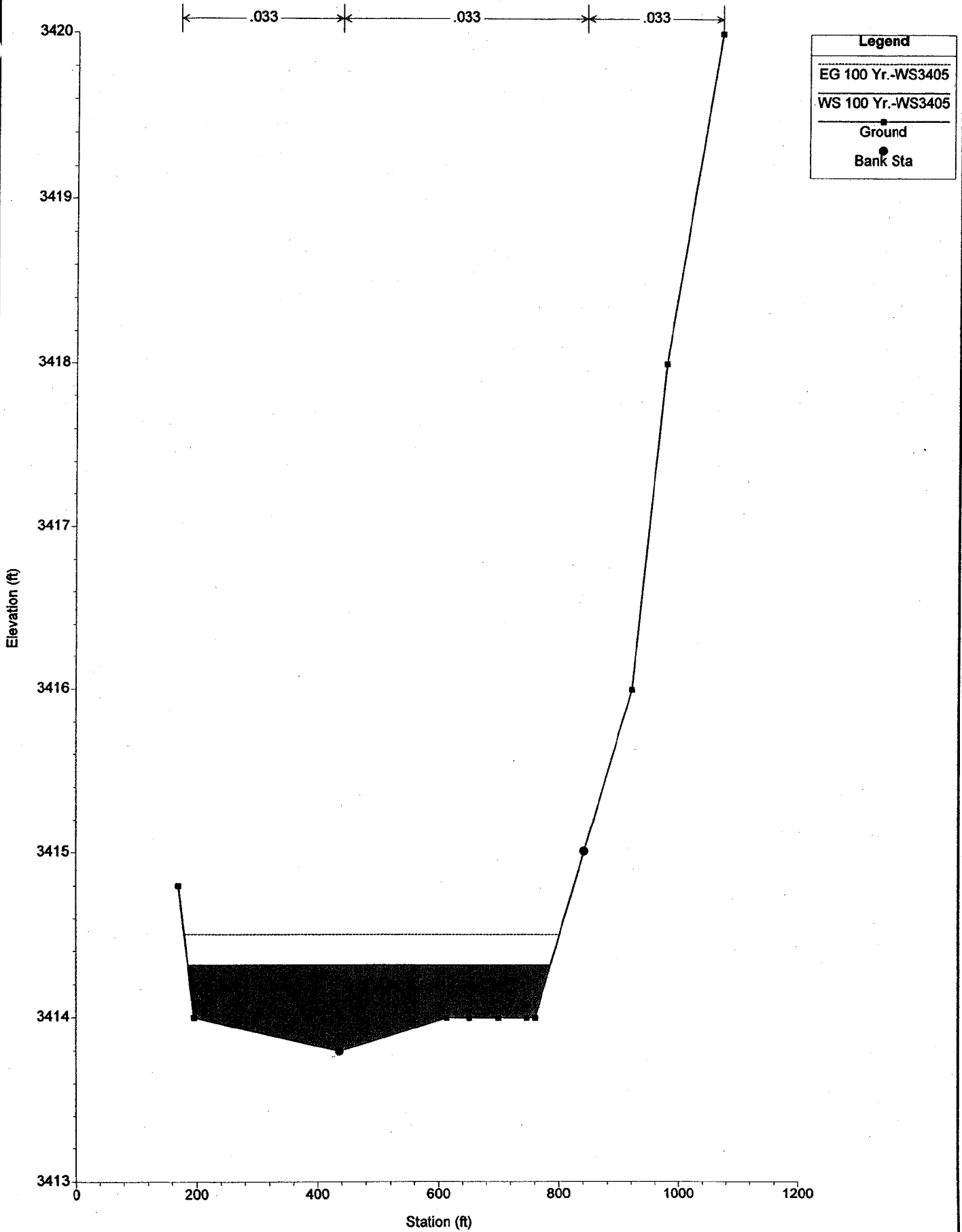
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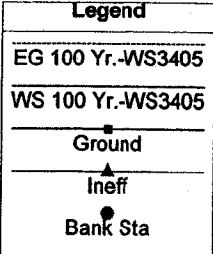


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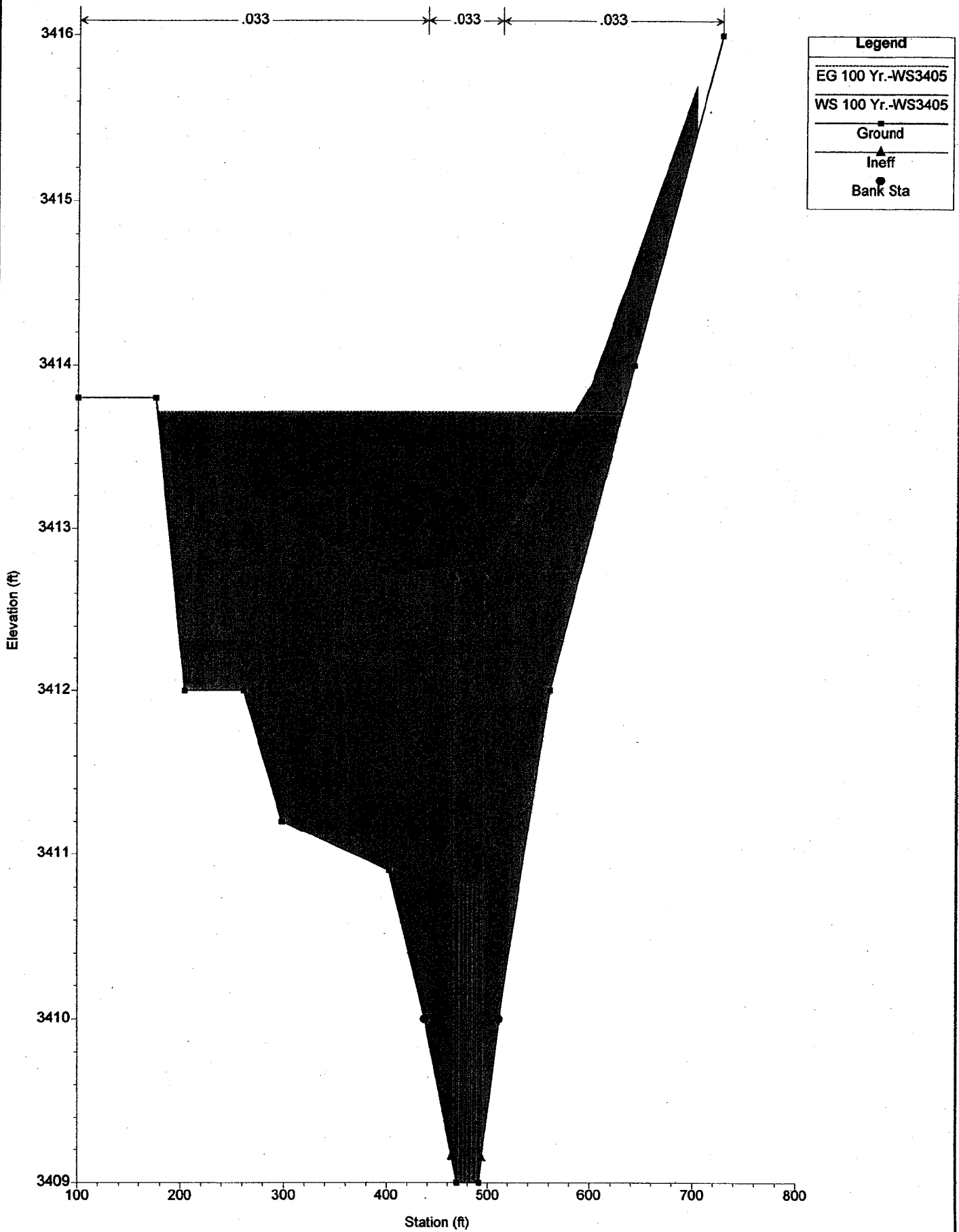
Sta. 2989



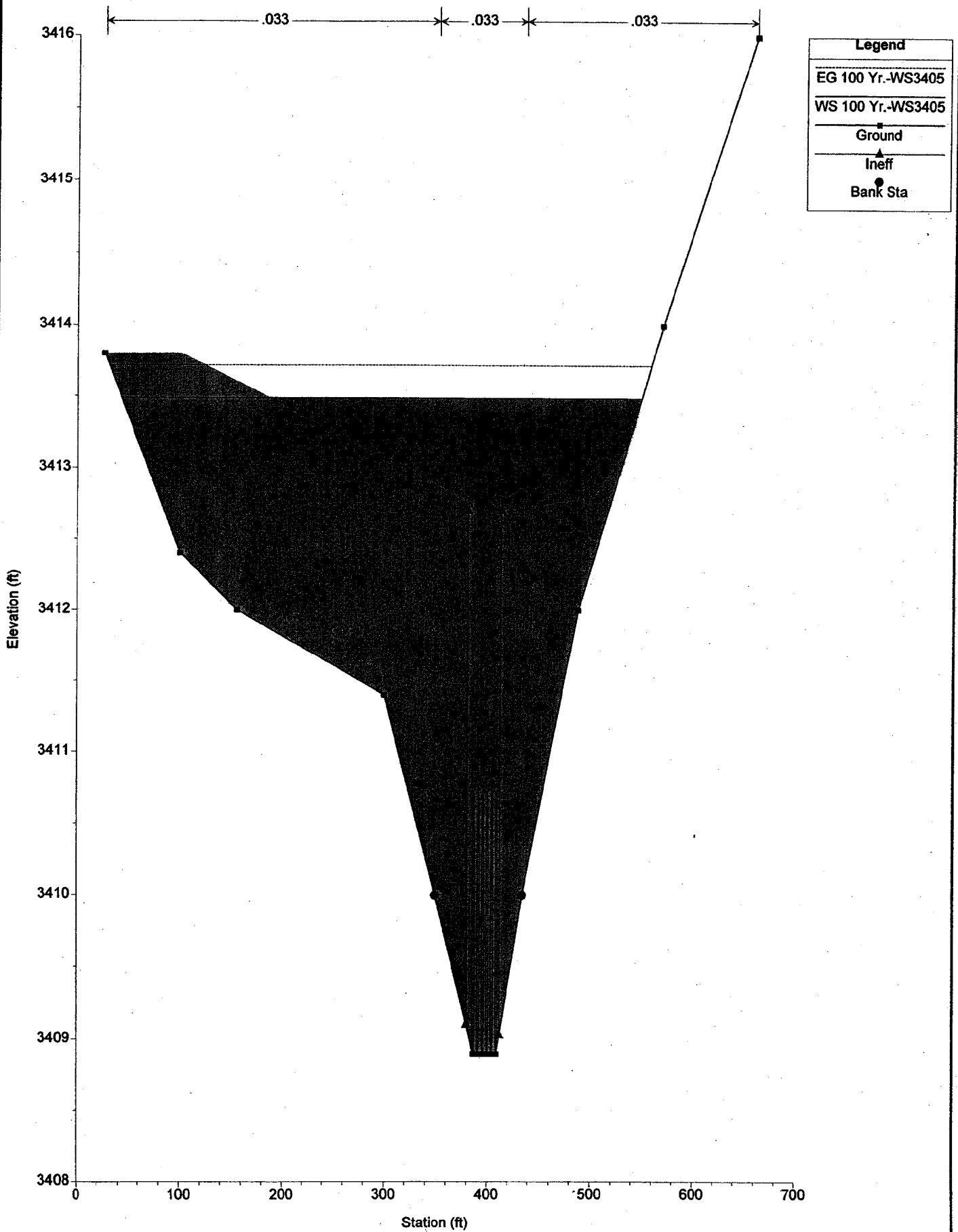
**Sta. 2774 Upstream of culverts**



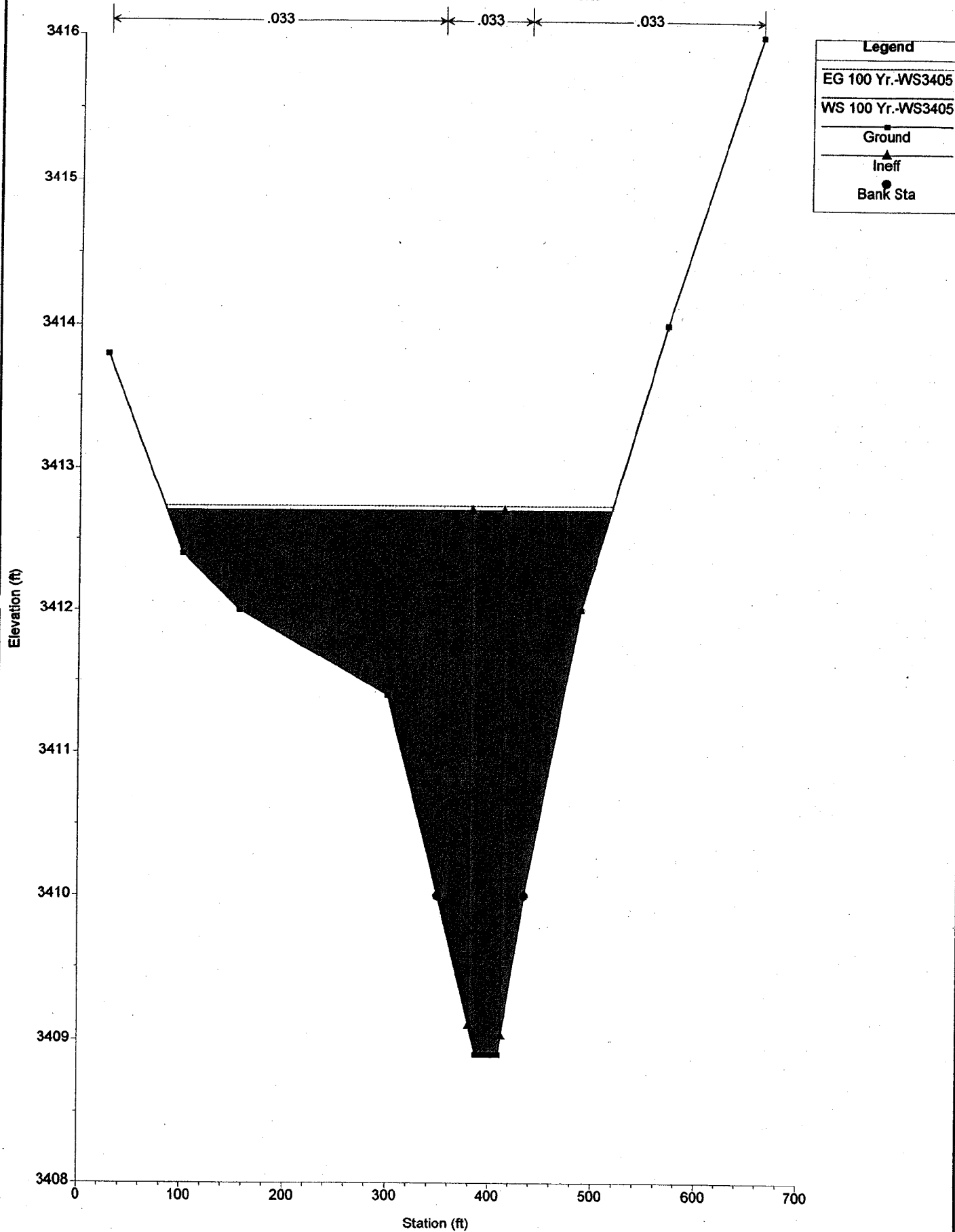
# WCS Plan: 2-04-04MANY



WCS Plan: 2-04-04MANY



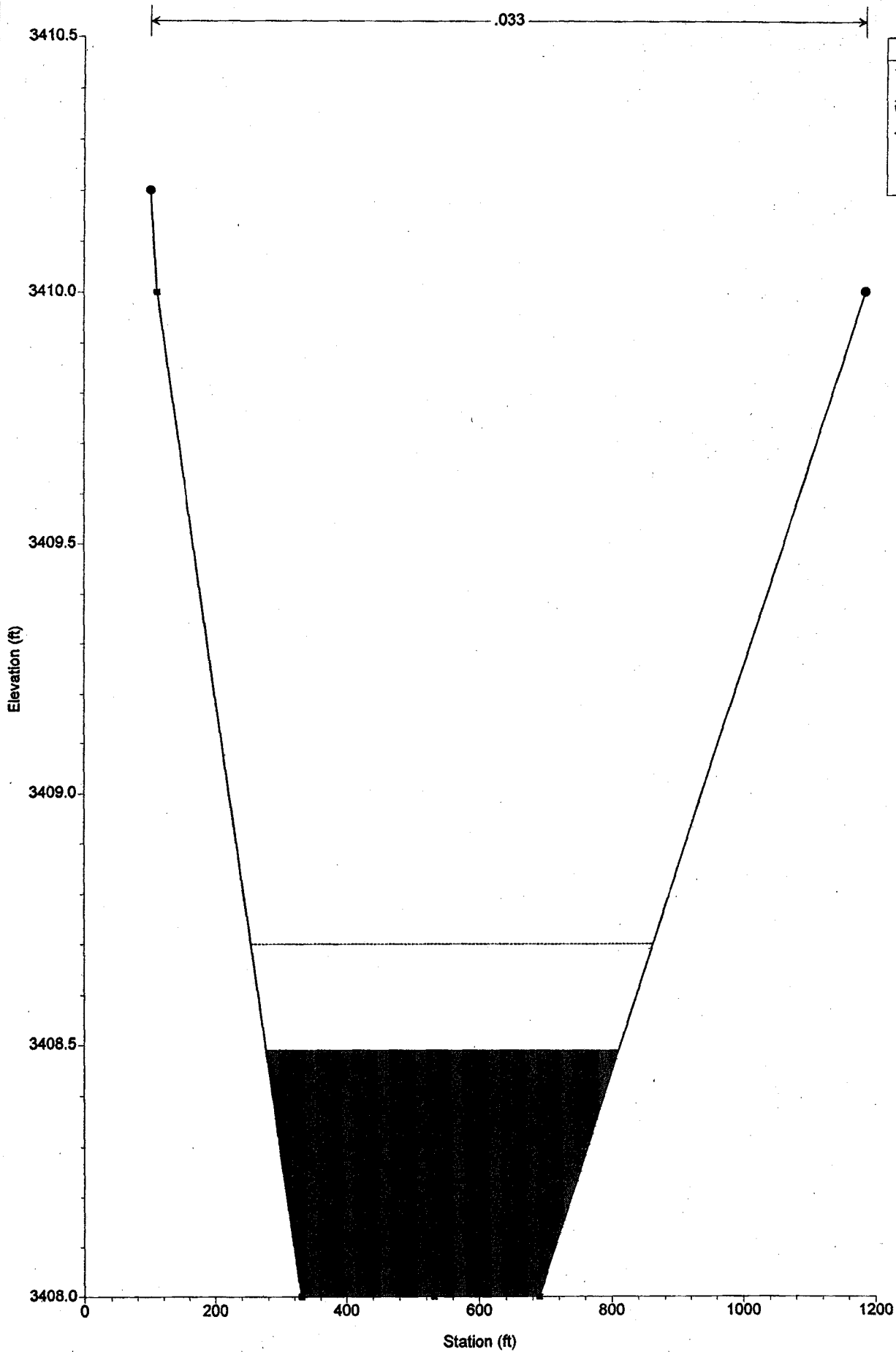
WCS Plan: 2-04-04MANY  
Sta. 2734 Downstream of culverts





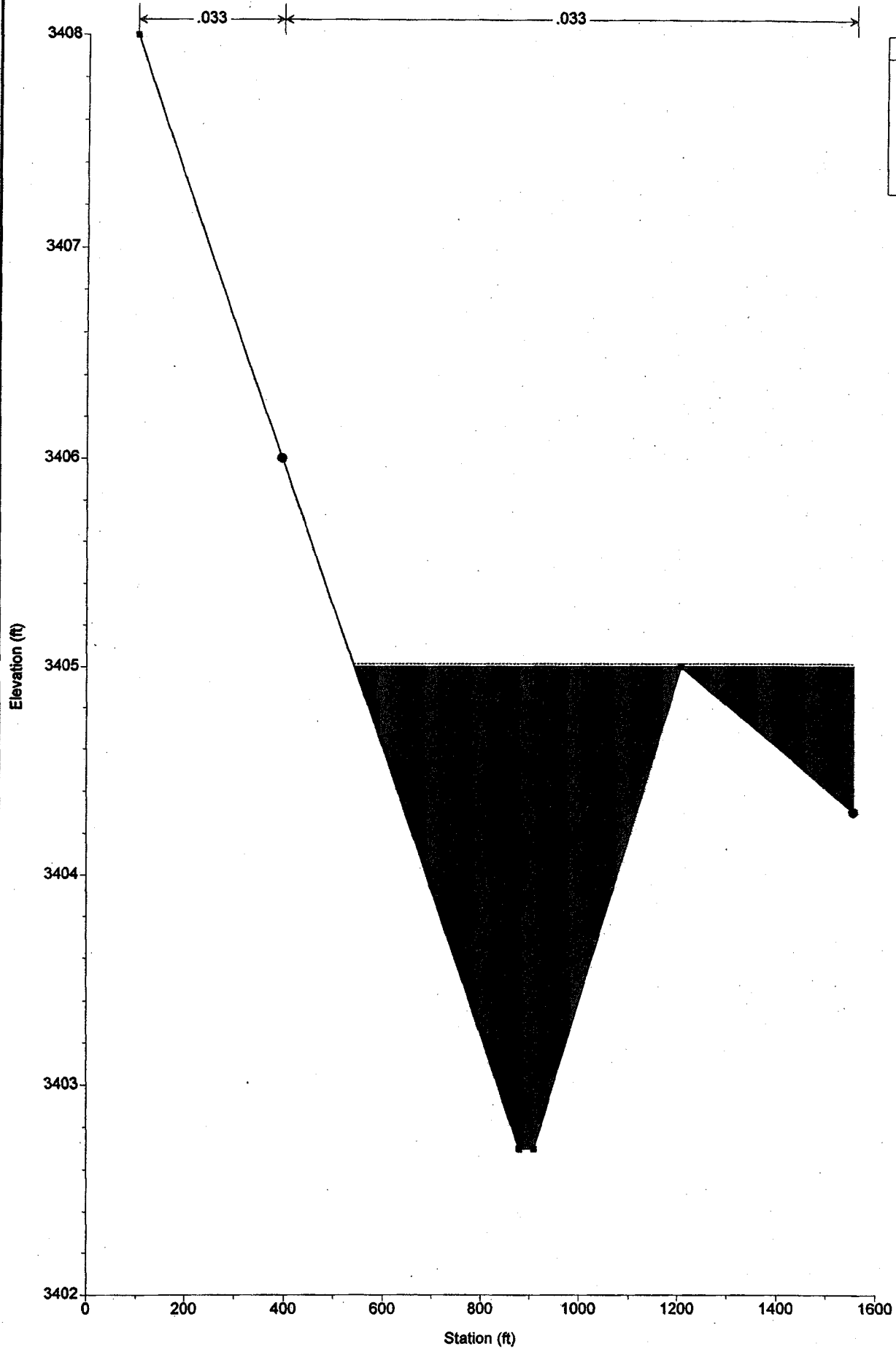
WCS Plan: 2-04-04MANY  
Sta. 1888

.033



Legend	
EG 100 Yr.-WS3405	
WS 100 Yr.-WS3405	
Ground	●
Bank Sta	●

WCS Plan: 2-04-04MANY  
Sta. 1060



Legend
EG 100 Yr.-WS3405
WS 100 Yr.-WS3405
Ground
Bank Sta



## APPENDIX D

### HEC-HMS MODEL FOR THE CALCULATION OF THE 500-YEAR PEAK DISCHARGES



*[Handwritten Signature]*  
12/17/04

# HMS \* Summary of Results

Project : WCS

Run Name : 500 Year Storm

Start of Run : 01Dec00 0000 Basin Model : 100YrAM1/22/04  
 End of Run : 02Dec00 0000 Met. Model : Met 500 Year  
 Execution Time : 16Dec04 1252 Control Specs : Control 1

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
Subbasin-4	641.22	01 Dec 00 1233	99.591	0.490
Reach-2	641.22	01 Dec 00 1248	99.086	0.490
Subbasin-2	949.25	01 Dec 00 1302	213.56	1.063
playa	0.0	30 Nov 00 2400	0.0	1.063
Reach-1	0.0	30 Nov 00 2400	0.0	1.063
Subbasin-1A	533.30	01 Dec 00 1325	146.15	0.691
Reach-1A	533.30	01 Dec 00 1342	145.29	0.691
Subbasin-1B	376.03	01 Dec 00 1239	63.679	0.314
Junction-1A	676.52	01 Dec 00 1327	208.96	1.005
Reach-1B	676.52	01 Dec 00 1330	208.75	1.005
Subbasin-3	186.82	01 Dec 00 1239	31.637	0.156
Junction-1	769.83	01 Dec 00 1300	240.38	2.224
Reach-3	769.83	01 Dec 00 1317	238.95	2.224
Subbasin-5A	256.07	01 Dec 00 1232	39.040	0.192
Junction-2	1495.7	01 Dec 00 1253	377.08	2.906
Reach-4	1495.7	01 Dec 00 1314	374.29	2.906
Subbasin-5B	276.18	01 Dec 00 1249	53.528	0.265
Junction-3	1716.7	01 Dec 00 1312	427.82	3.171
Reach-5	1716.7	01 Dec 00 1326	425.68	3.171
Subbasin-6	116.97	01 Dec 00 1223	15.099	0.074
Junction-4	1742.7	01 Dec 00 1325	440.78	3.245
Reach-6	1742.7	01 Dec 00 1325	440.78	3.245
Subbasin-7	93.976	01 Dec 00 1301	20.903	0.104
Junction-5	1823.2	01 Dec 00 1325	461.69	3.349

## Meteorologic Model Input

**HMS - Meteorologic Model**

File Edit Help

Meteorologic Model: Met 500 Year

Description: 500 Year, 24 Hour Storm

Subbasin List

Precipitation: Evaporation

Method: SCS Hypothetical Storm

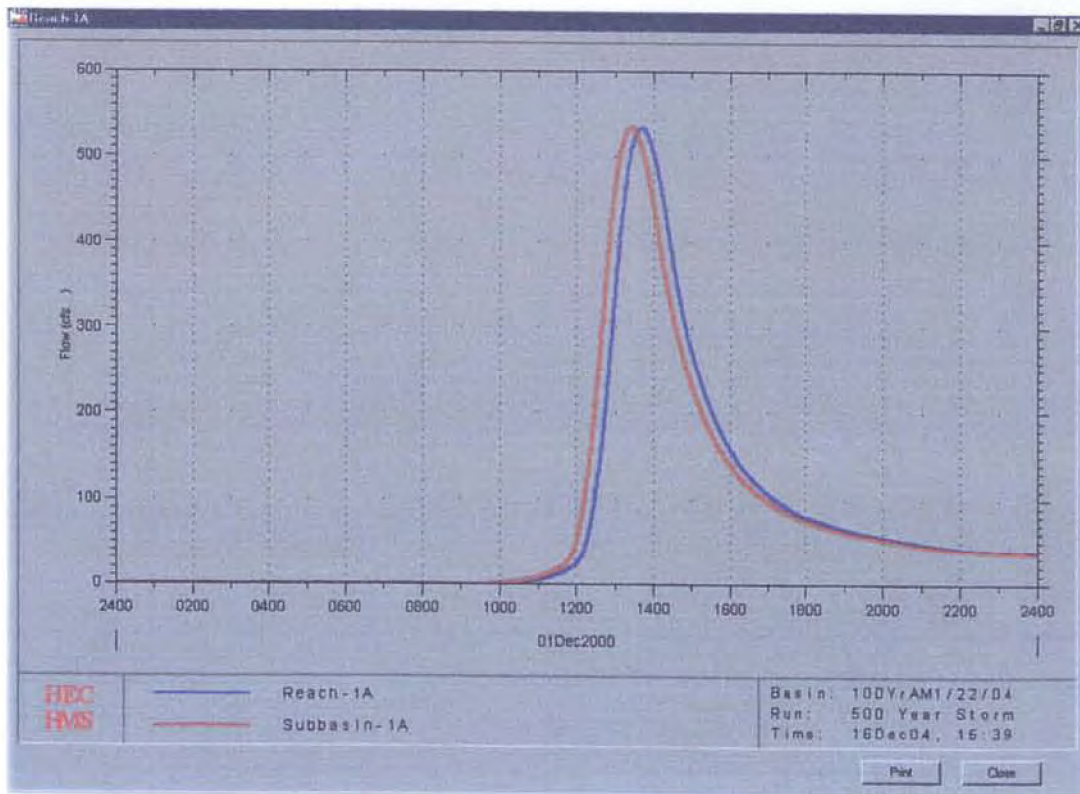
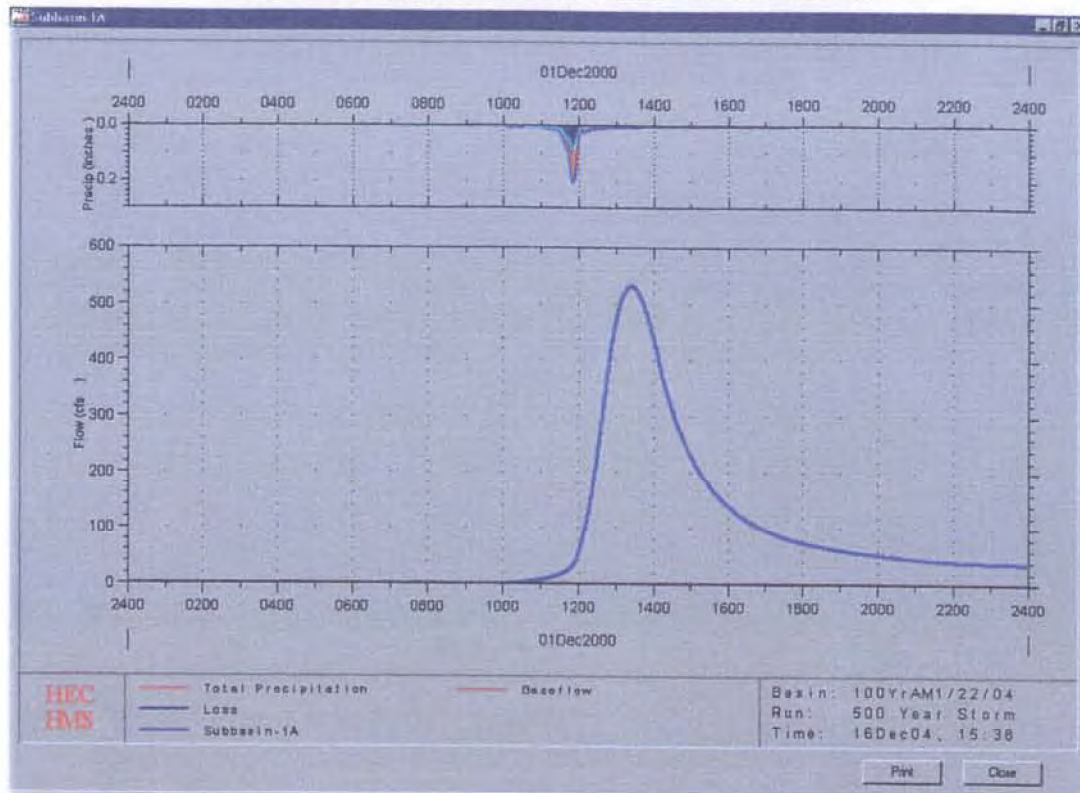
Storm Selection: Type II

Storm Depth (in): 8.71

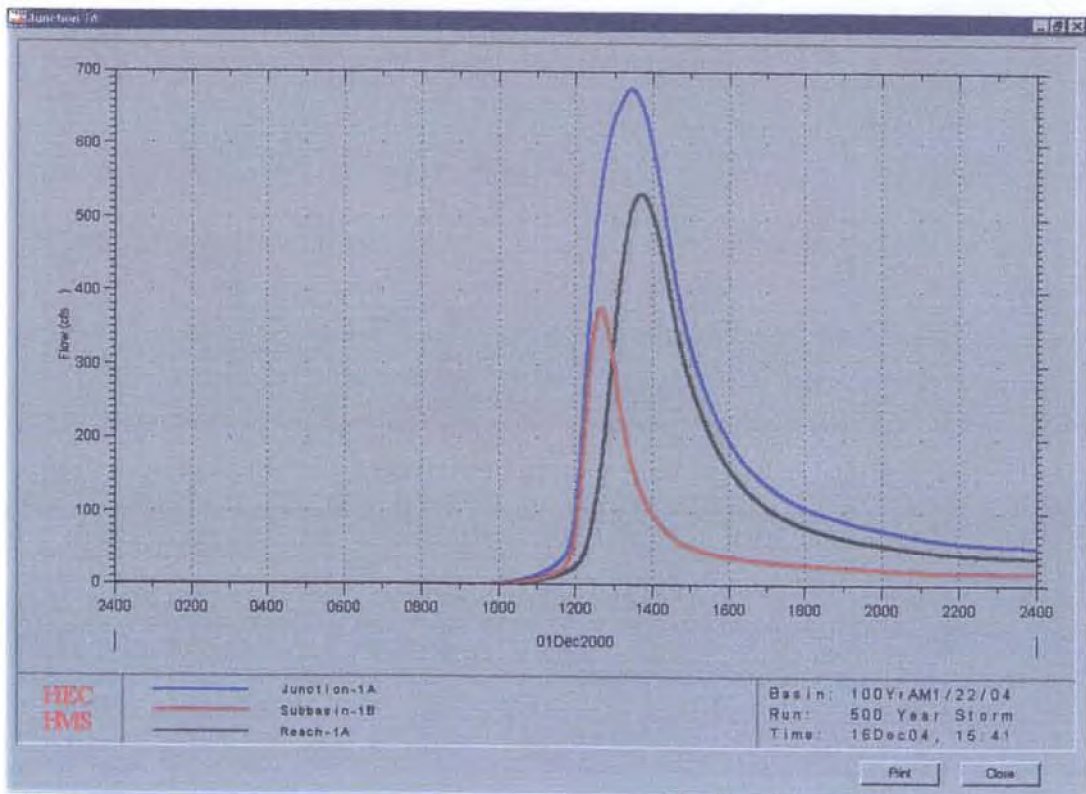
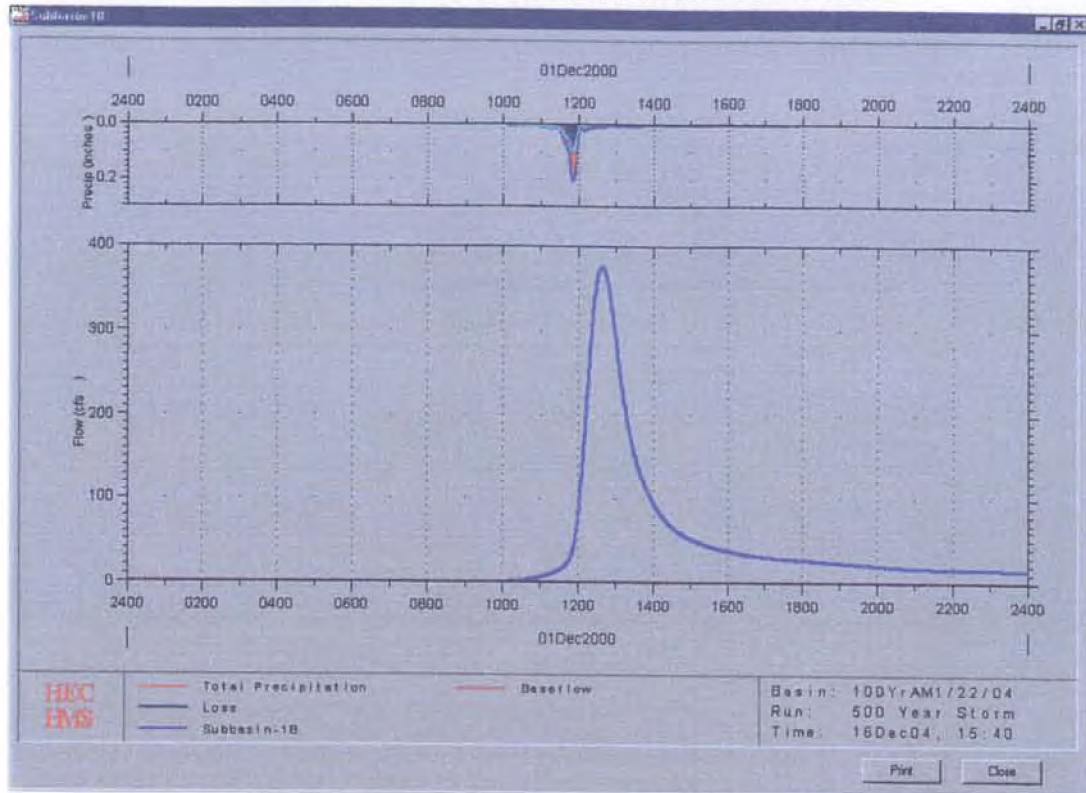
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# WCS FACILITY FLOOD PLAIN STUDY HYDROGRAPHS

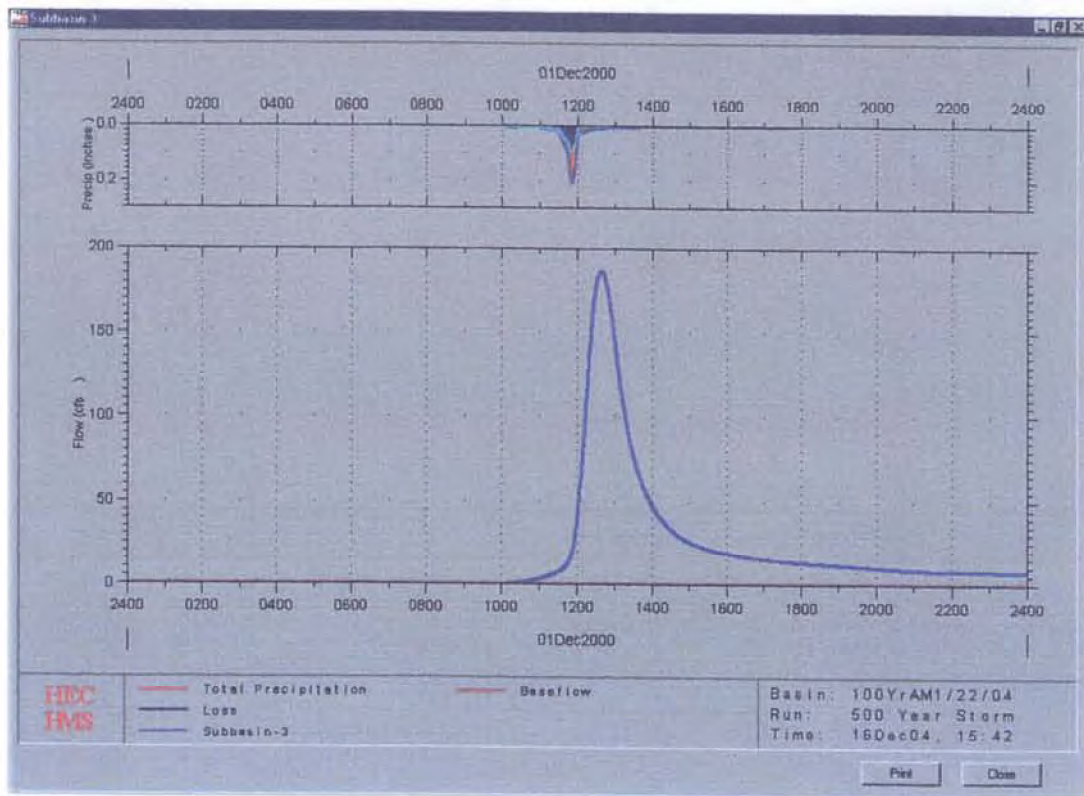
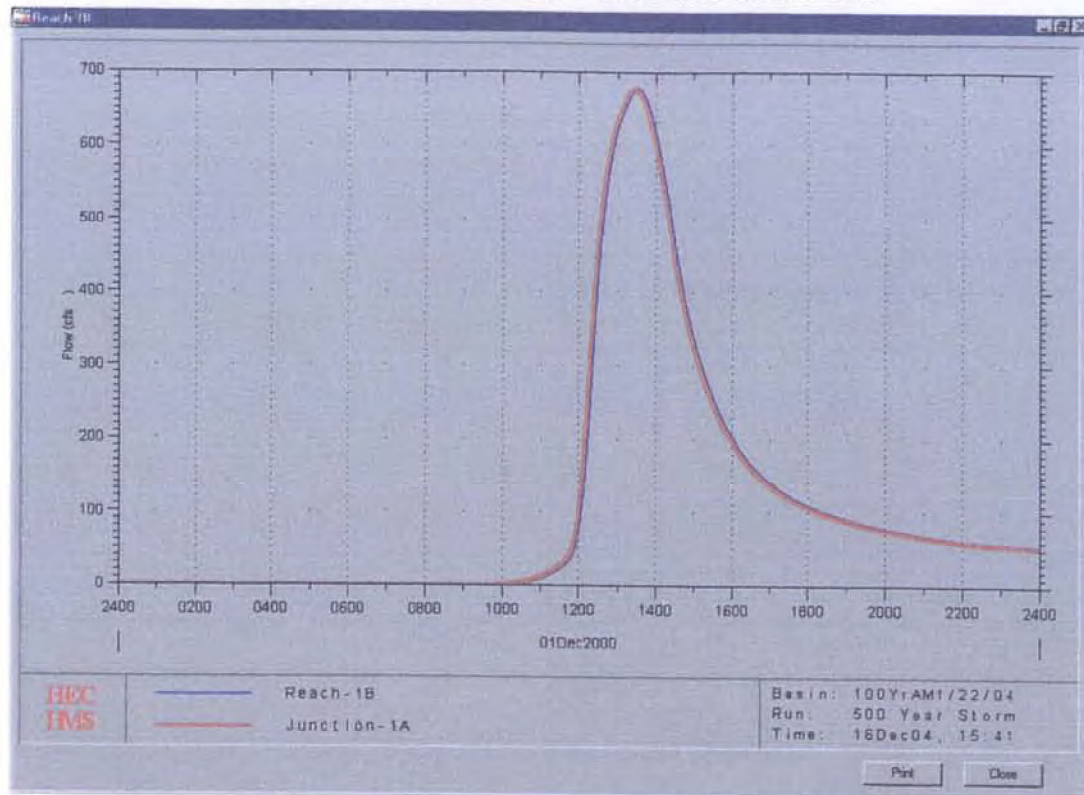


# WCS FACILITY FLOOD PLAIN STUDY HYDROGRAPHS

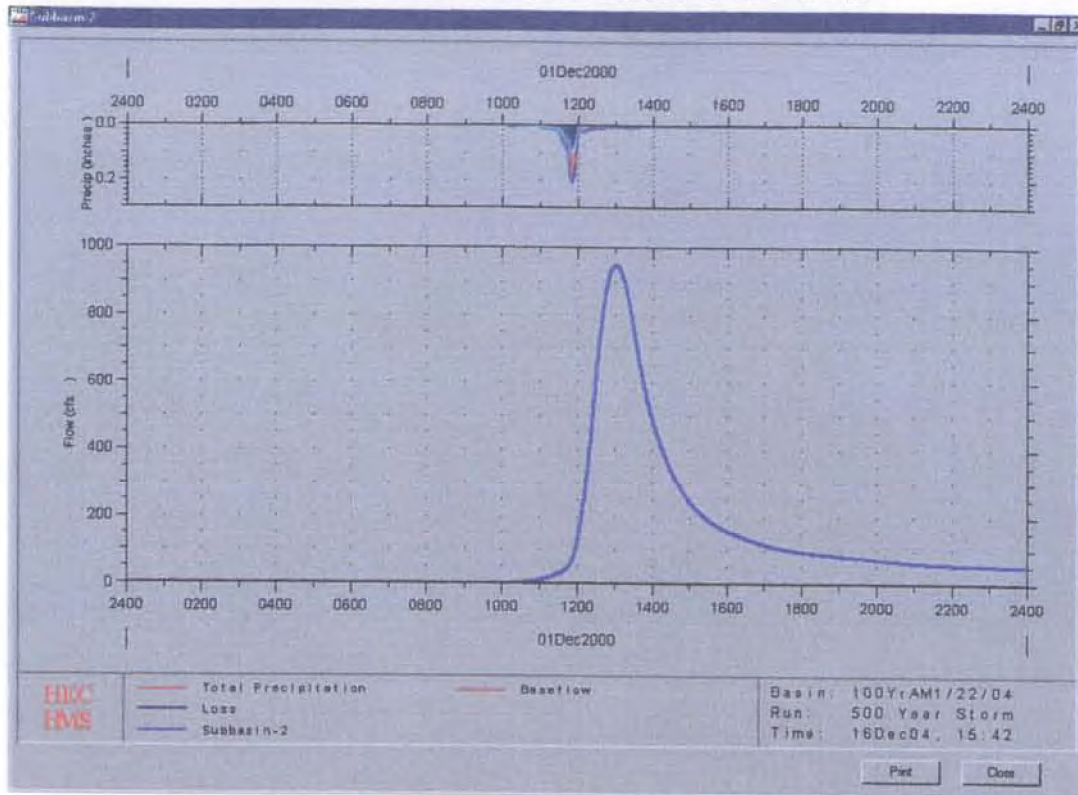




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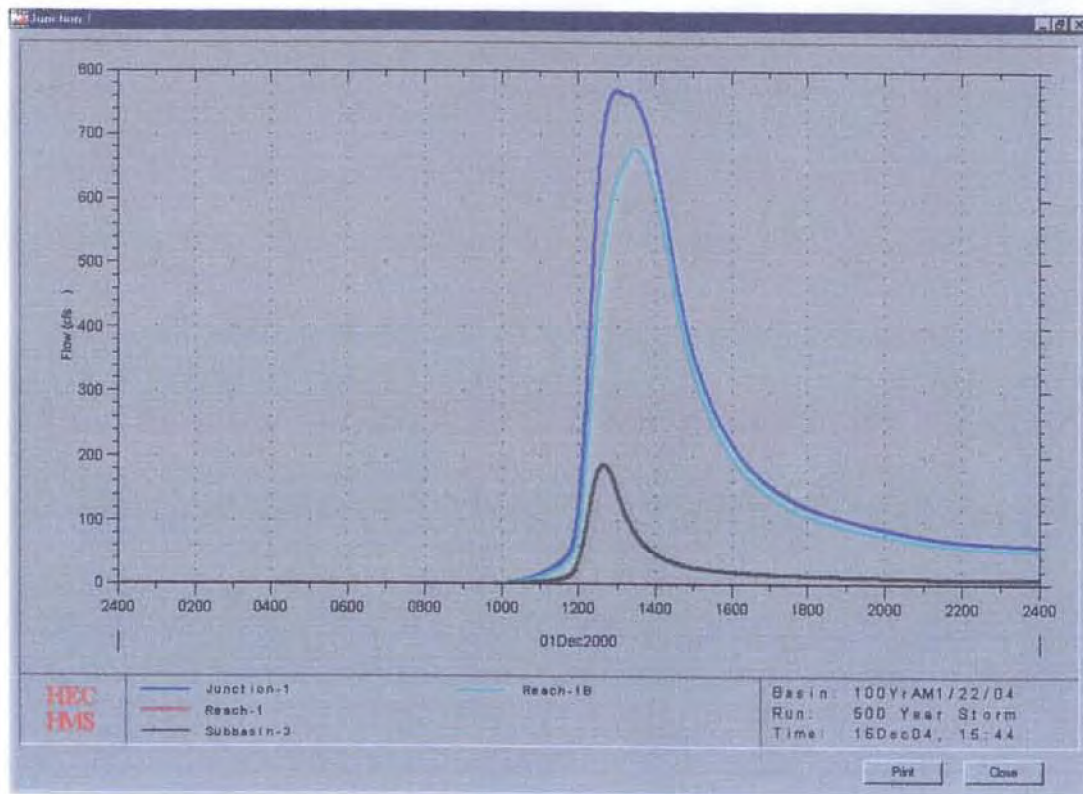


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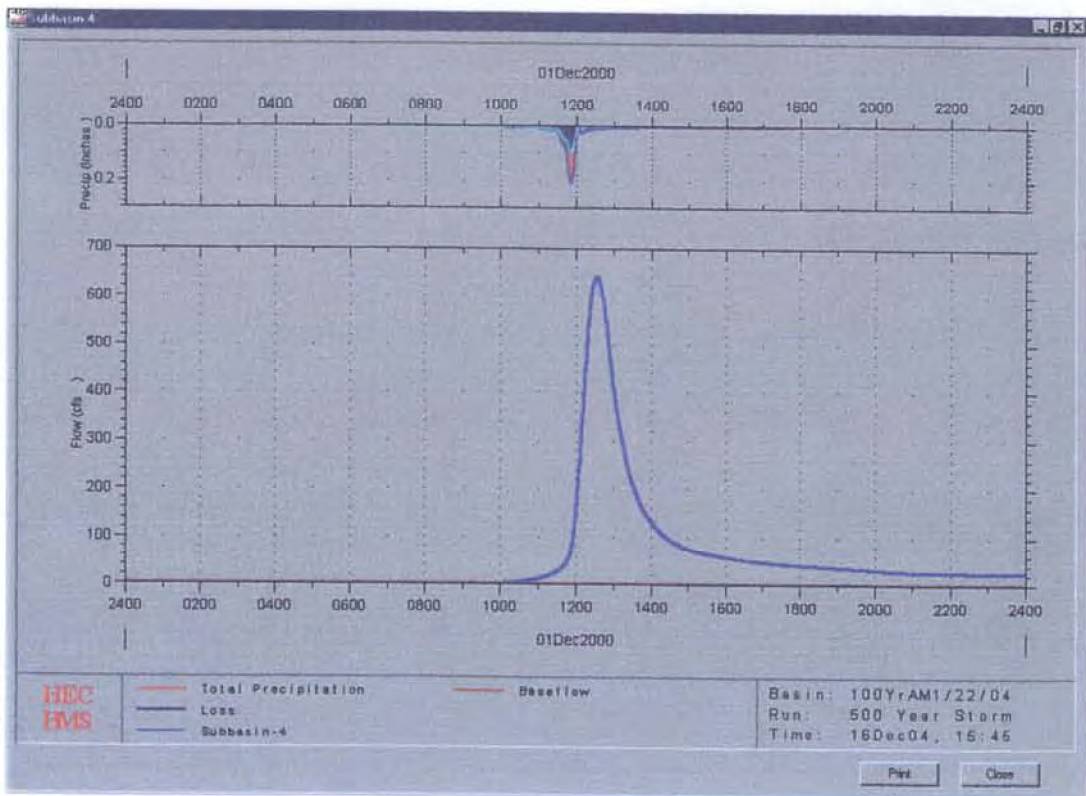
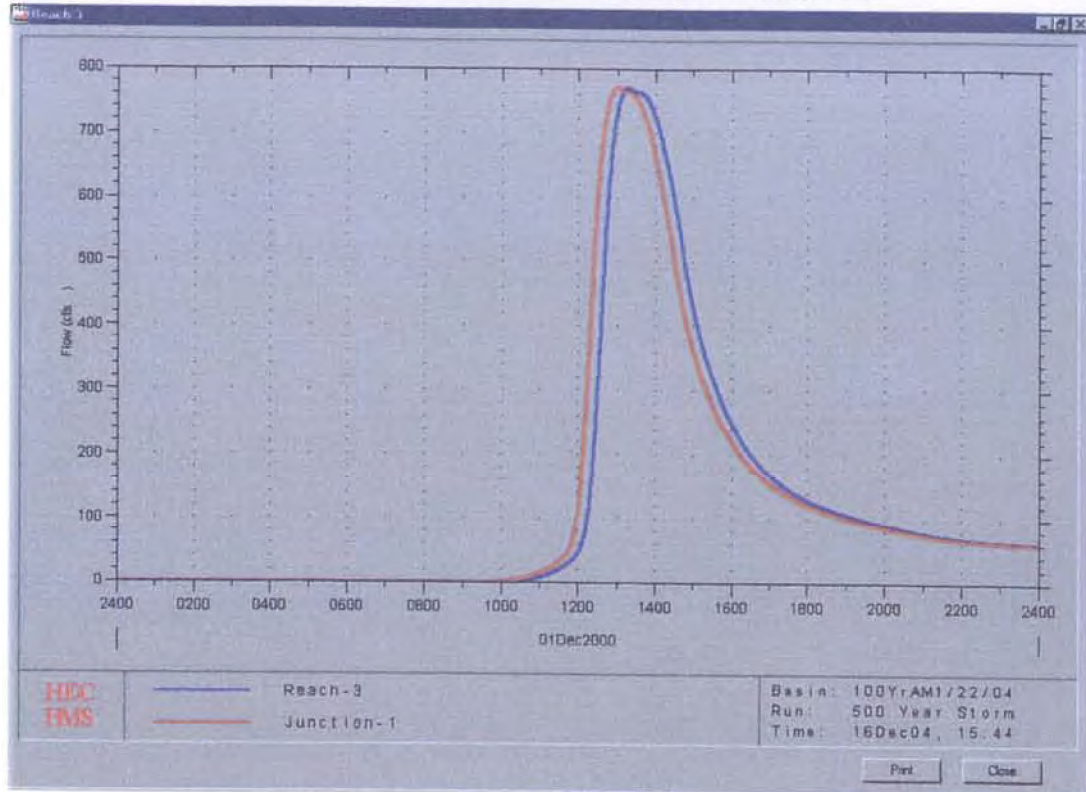


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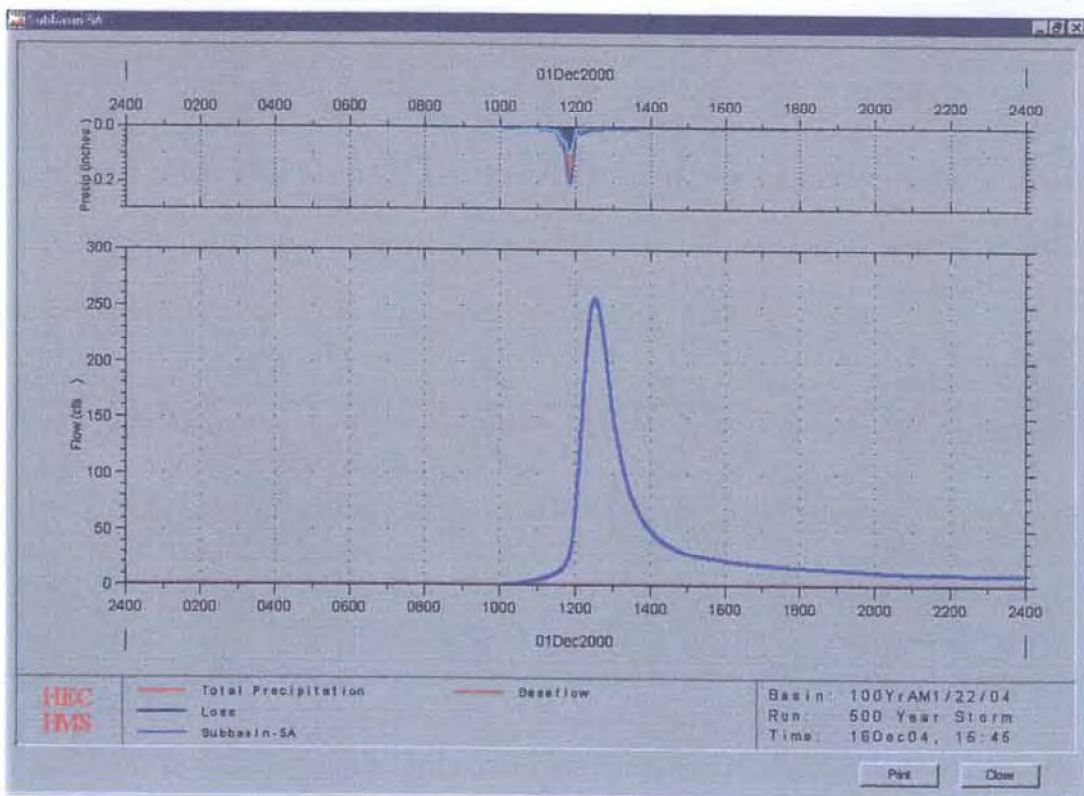
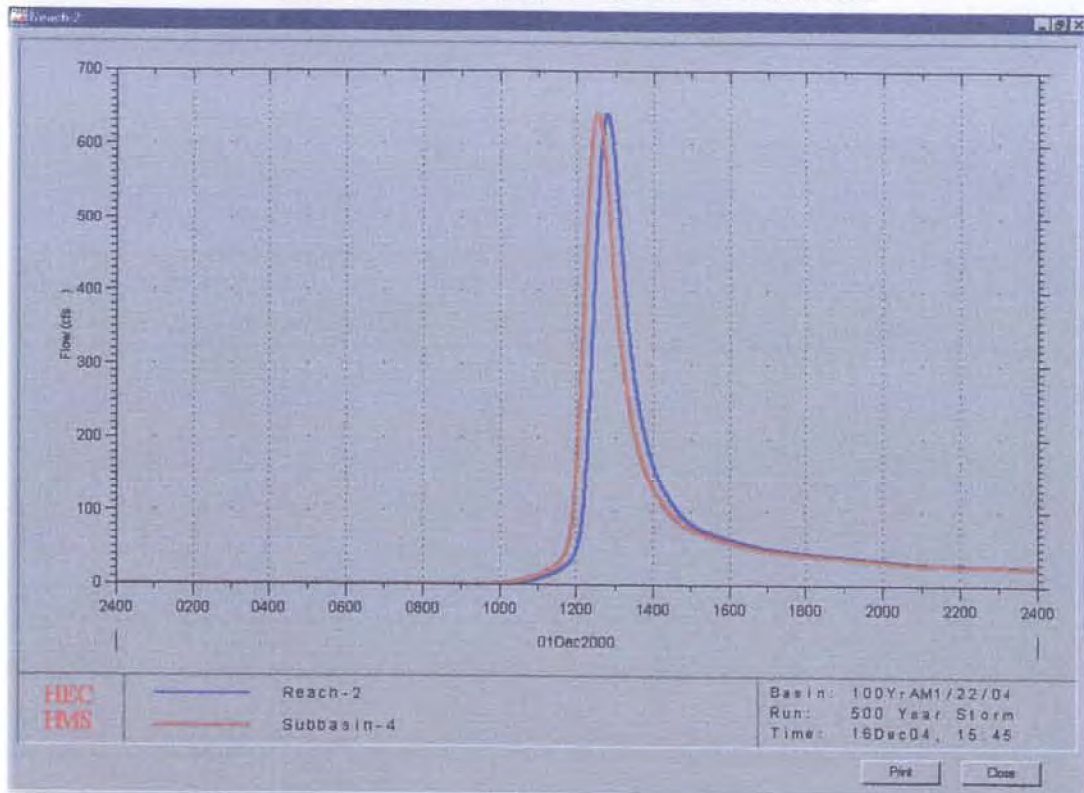




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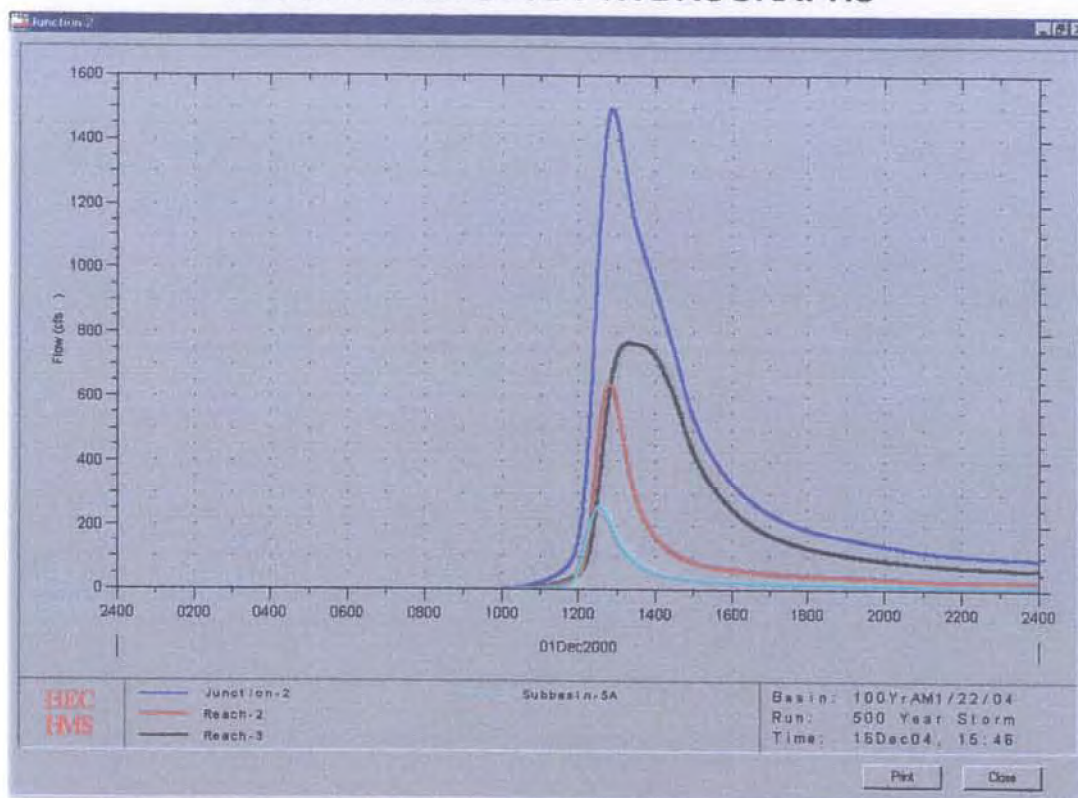


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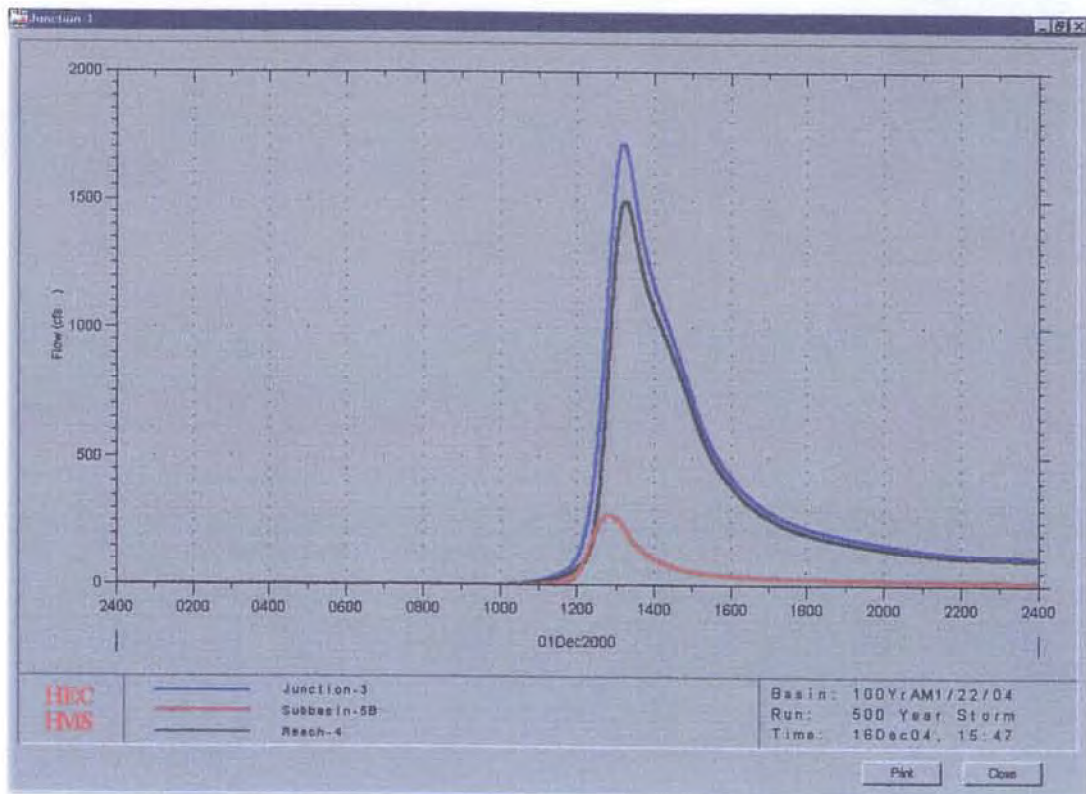
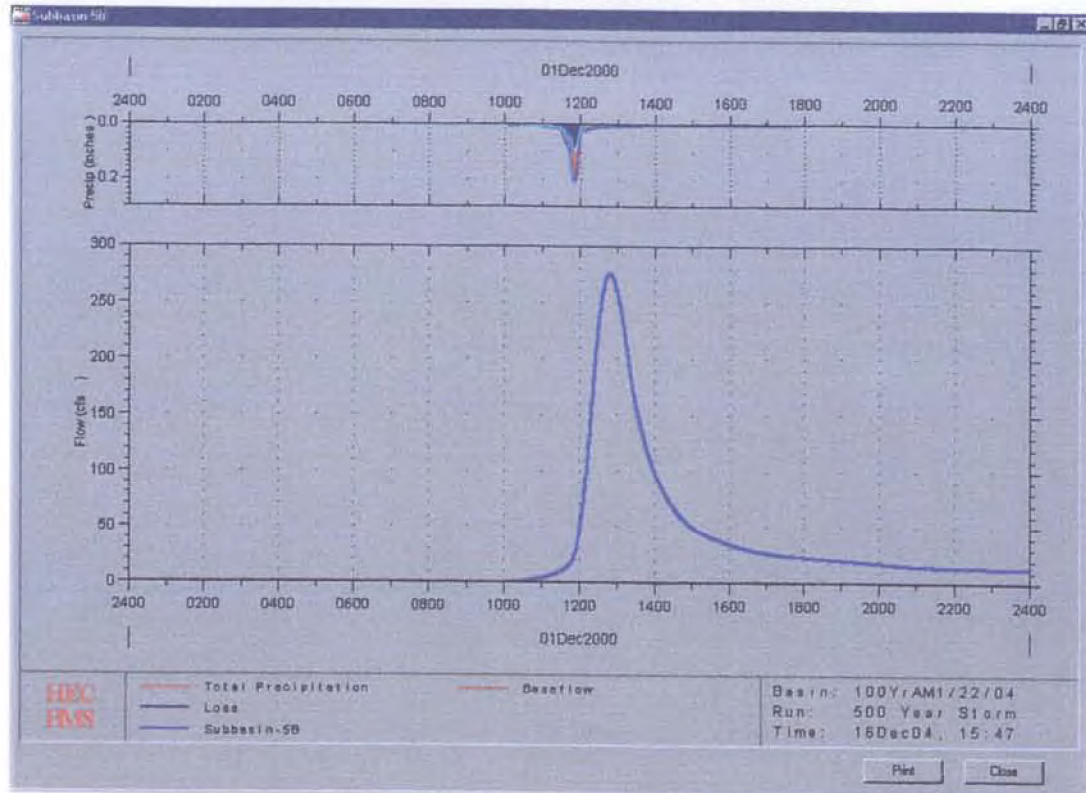




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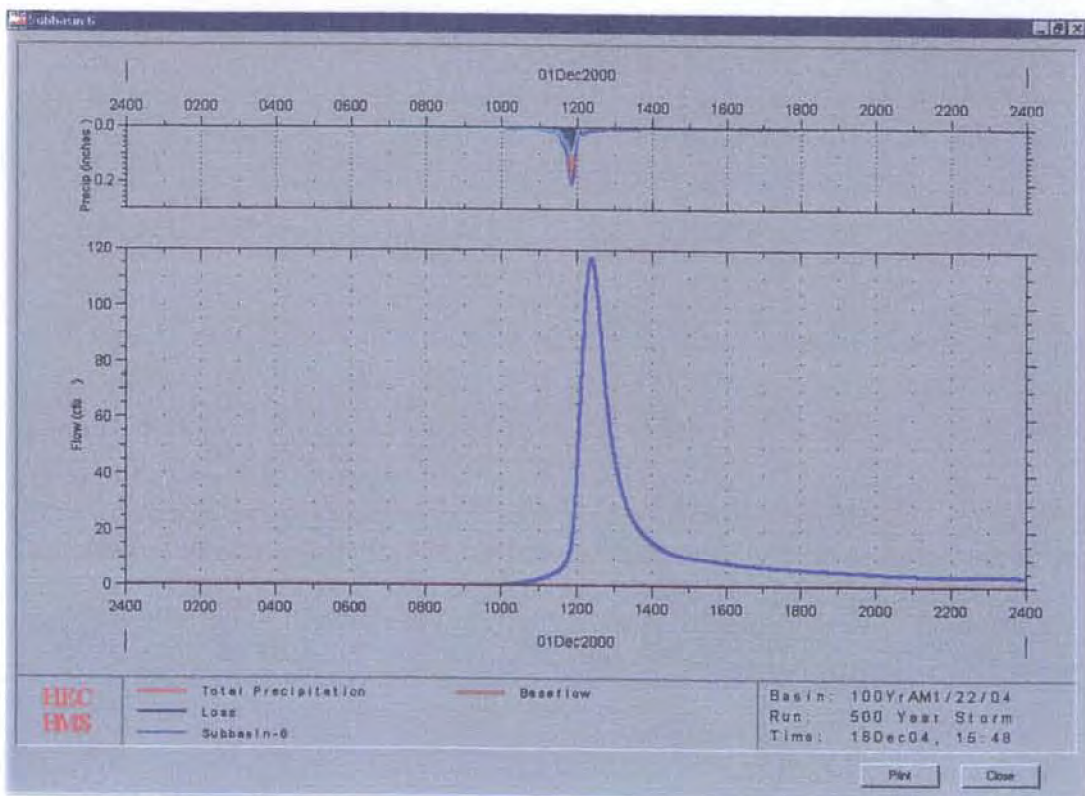
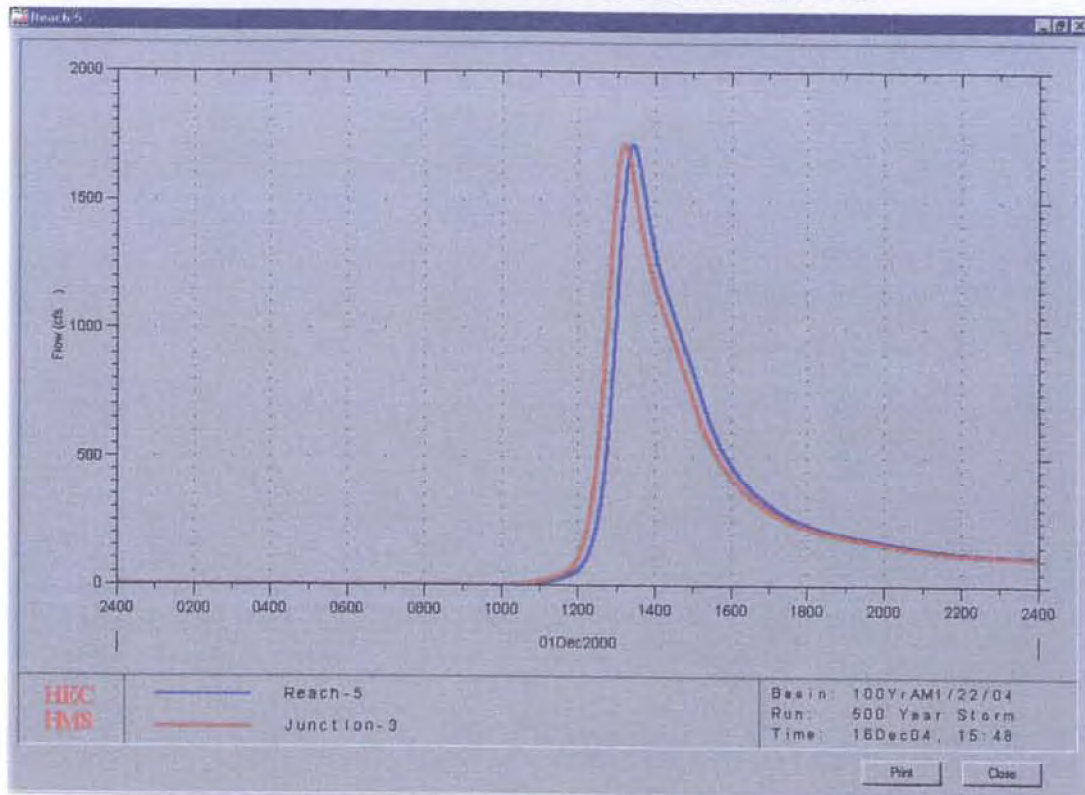


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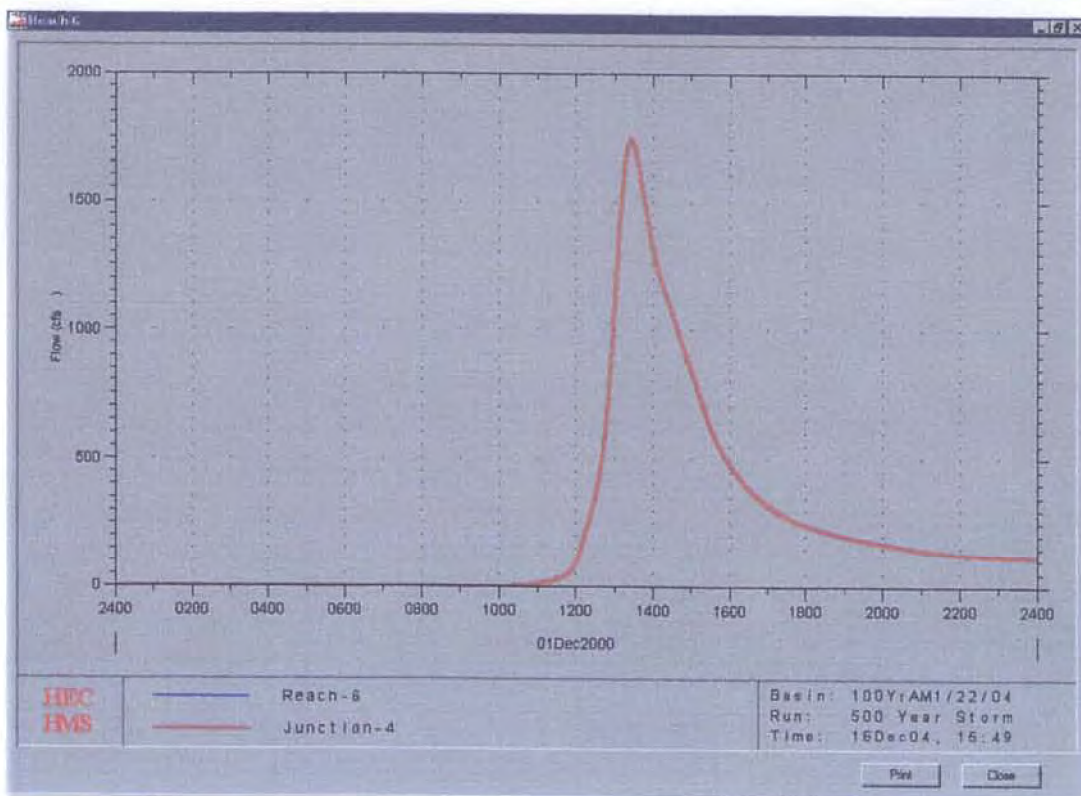
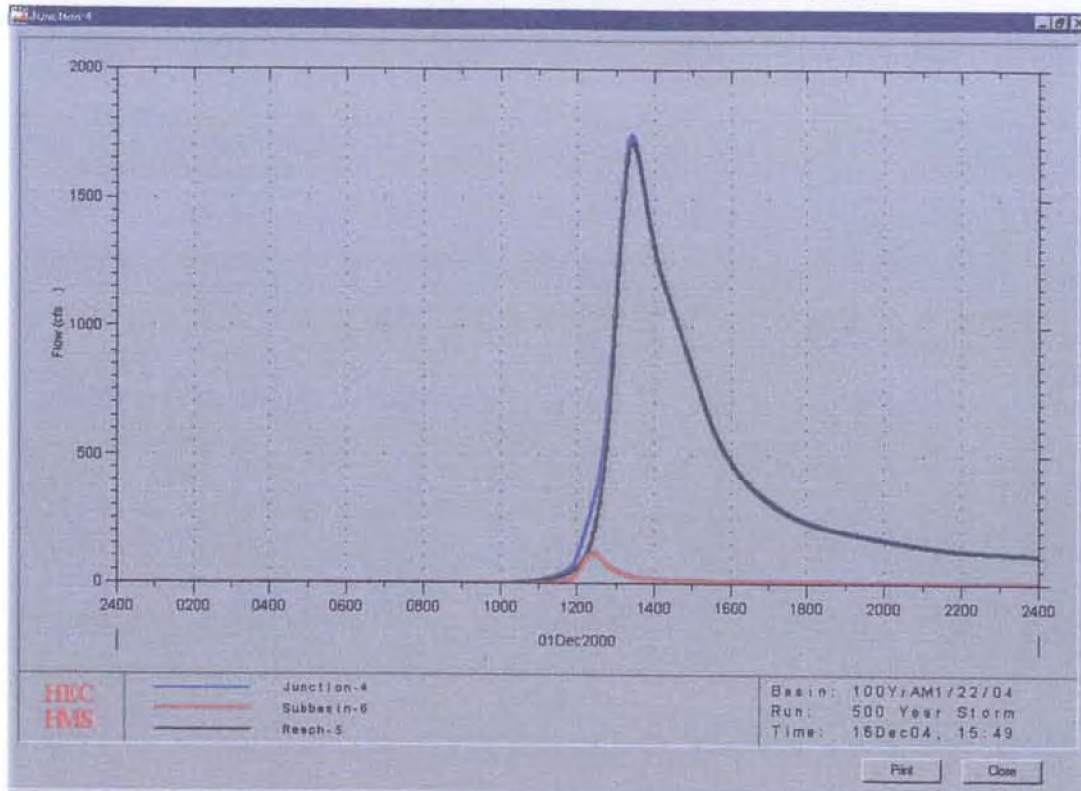


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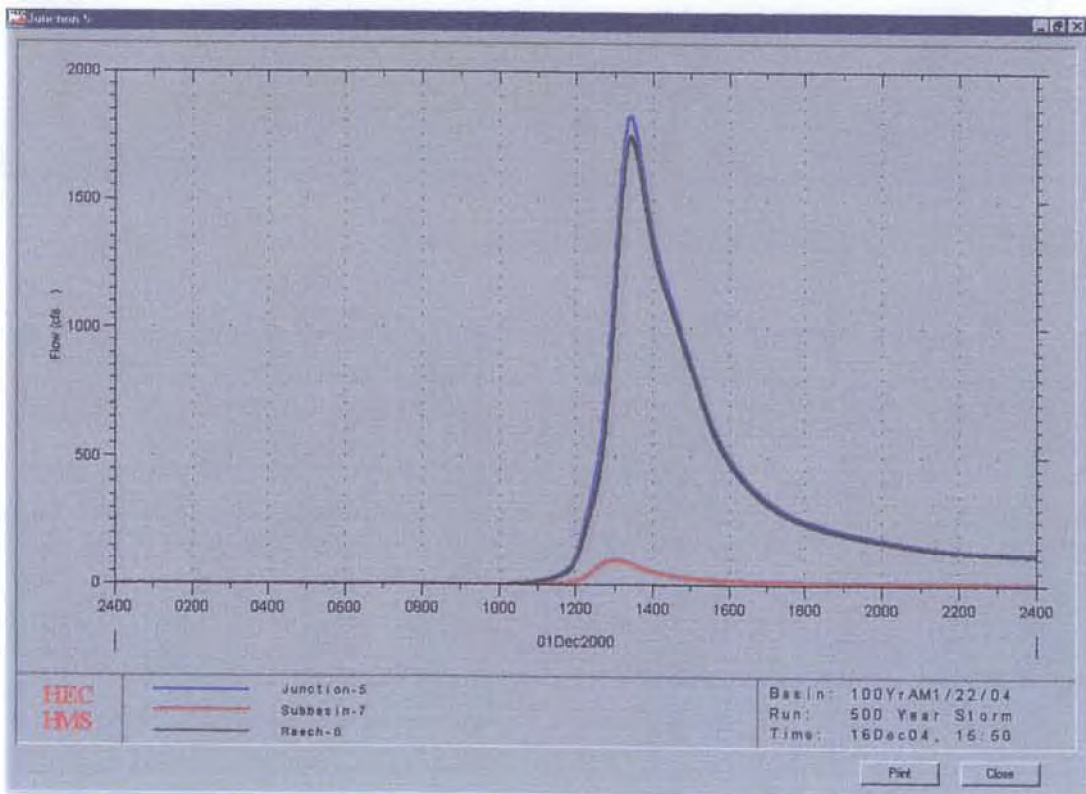
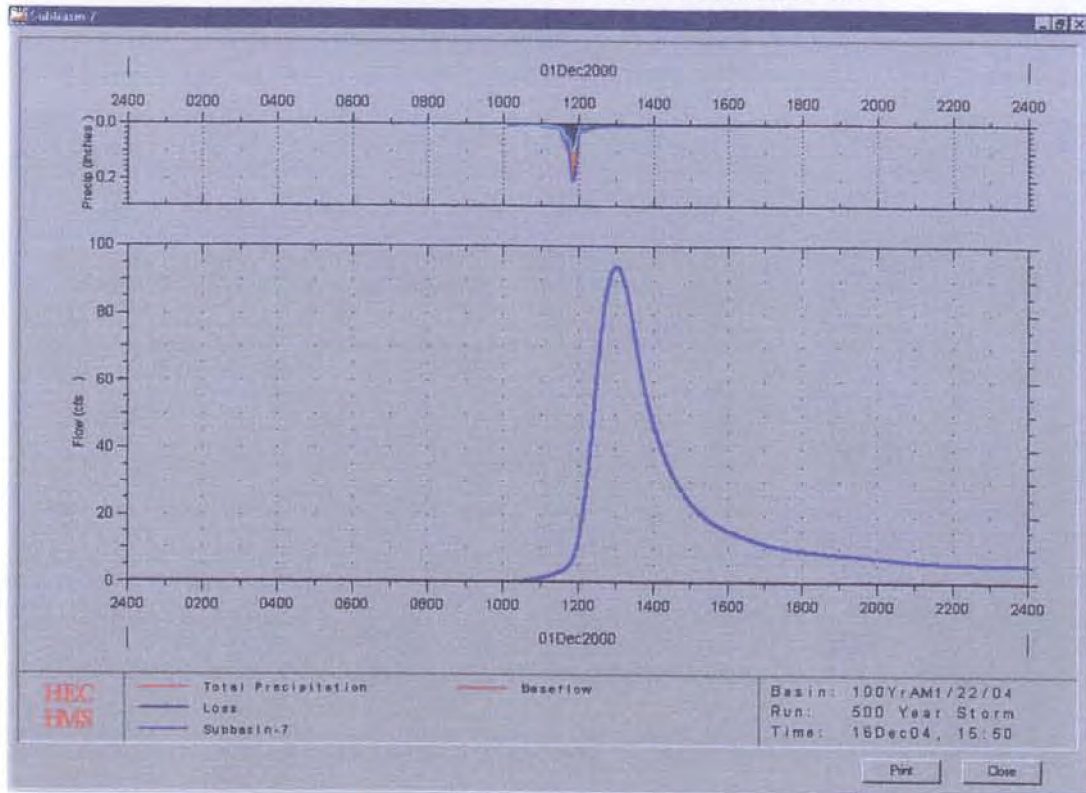




# WCS FACILITY FLOOD PLAIN STUDY HYDROGRAPHS



# WCS FACILITY FLOOD PLAIN STUDY HYDROGRAPHS





# HMS \* Summary of Results

Project : WCS

Run Name : 500 Year R1

Start of Run : 01Dec00 0000 Basin Model : 100YrAM1/22/04  
 End of Run : 02Dec00 0000 Met. Model : Met 500 Year R1  
 Execution Time : 03Nov05 1631 Control Specs : Control 1

Hydrologic Element	Discharge Peak (cfs)	Time of Peak	Volume (ac ft)	Drainage Area (sq mi)
Subbasin-4	714.02	01 Dec 00 1233	110.29	0.490
Reach-2	714.02	01 Dec 00 1248	109.75	0.490
Subbasin-2	1057.3	01 Dec 00 1302	236.57	1.063
playa	0.0	30 Nov 00 2400	0.0	1.063
Reach-1	0.0	30 Nov 00 2400	0.0	1.063
Subbasin-1A	591.53	01 Dec 00 1325	161.43	0.691
Reach-1A	591.53	01 Dec 00 1342	160.49	0.691
Subbasin-1B	418.70	01 Dec 00 1239	70.527	0.314
Junction-1A	750.62	01 Dec 00 1327	231.02	1.005
Reach-1B	750.62	01 Dec 00 1330	230.78	1.005
Subbasin-3	208.01	01 Dec 00 1239	35.039	0.156
Junction-1	857.40	01 Dec 00 1300	265.82	2.224
Reach-3	857.40	01 Dec 00 1317	264.27	2.224
Subbasin-5A	285.12	01 Dec 00 1232	43.236	0.192
Junction-2	1668.0	01 Dec 00 1253	417.25	2.906
Reach-4	1668.0	01 Dec 00 1314	414.24	2.906
Subbasin-5B	307.55	01 Dec 00 1249	59.289	0.265
Junction-3	1913.6	01 Dec 00 1312	473.53	3.171
Reach-5	1913.6	01 Dec 00 1326	471.22	3.171
Subbasin-6	130.23	01 Dec 00 1223	16.721	0.074
Junction-4	1942.7	01 Dec 00 1325	487.94	3.245
Reach-6	1942.7	01 Dec 00 1325	487.94	3.245
Subbasin-7	104.67	01 Dec 00 1301	23.156	0.104
Junction-5	2031.8	01 Dec 00 1325	511.09	3.349

Meteorologic Model Input - 500-Year Storm

**HMS - Meteorologic Model**

File Edit Help

Meteorologic Model: Met 500 Year R1 Subbasin List

Description: 500 Year, 24 Hour Storm ...

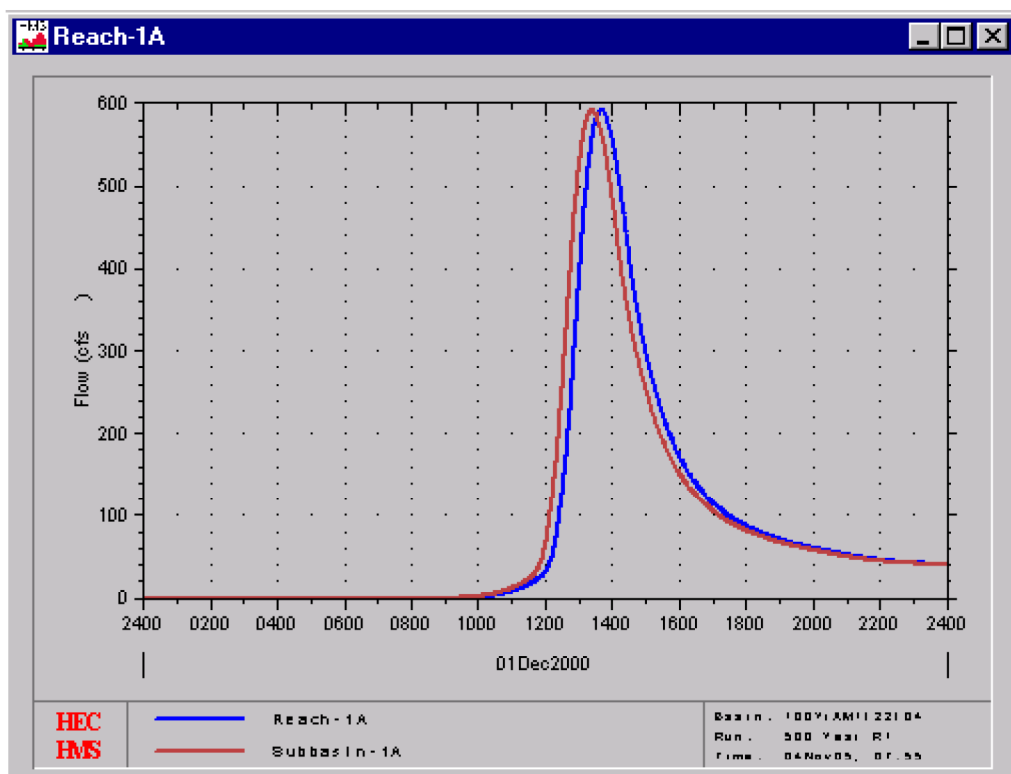
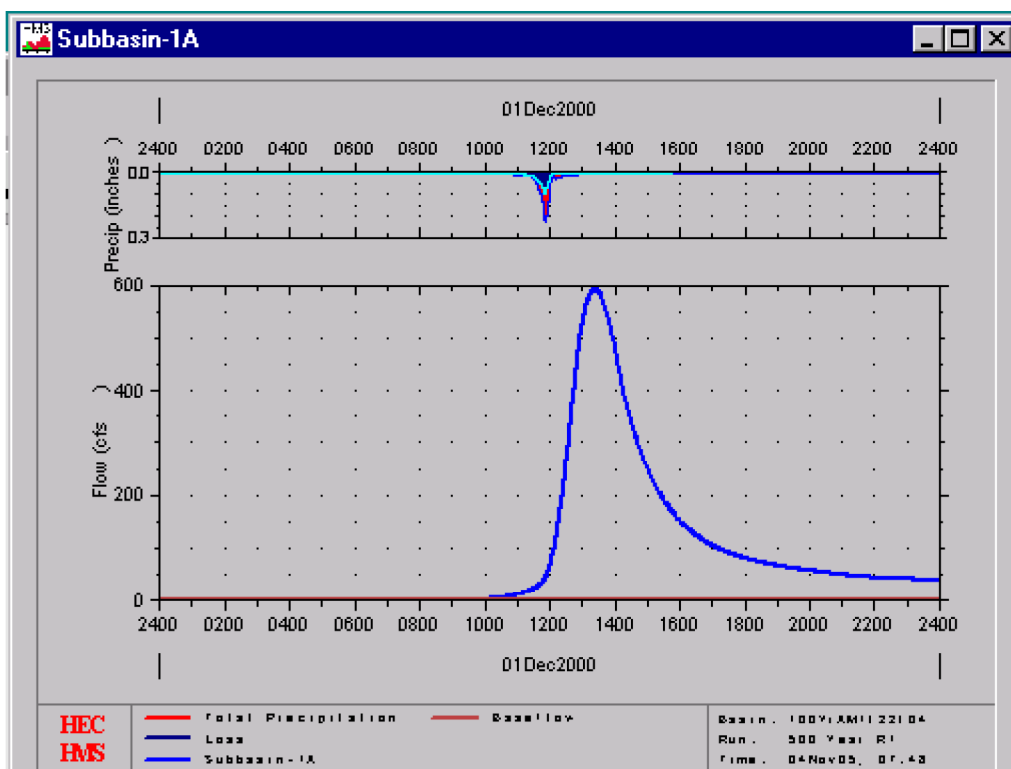
Precipitation | Evapotranspiration

Method: SCS Hypothetical Storm

Storm Selection: Type II

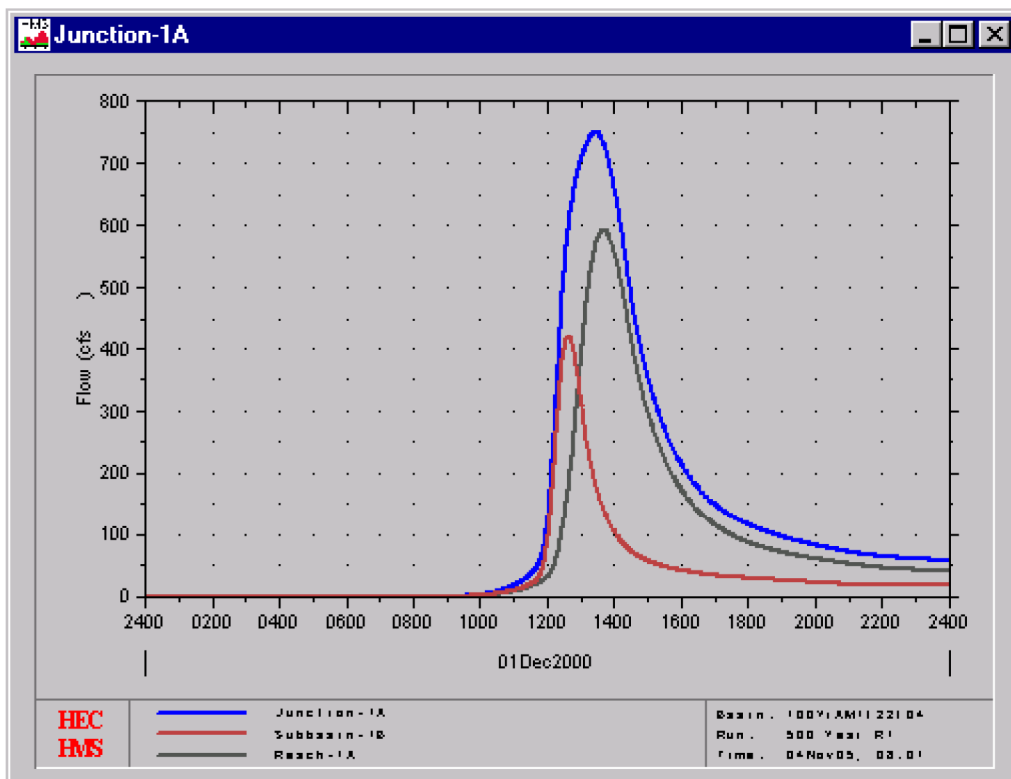
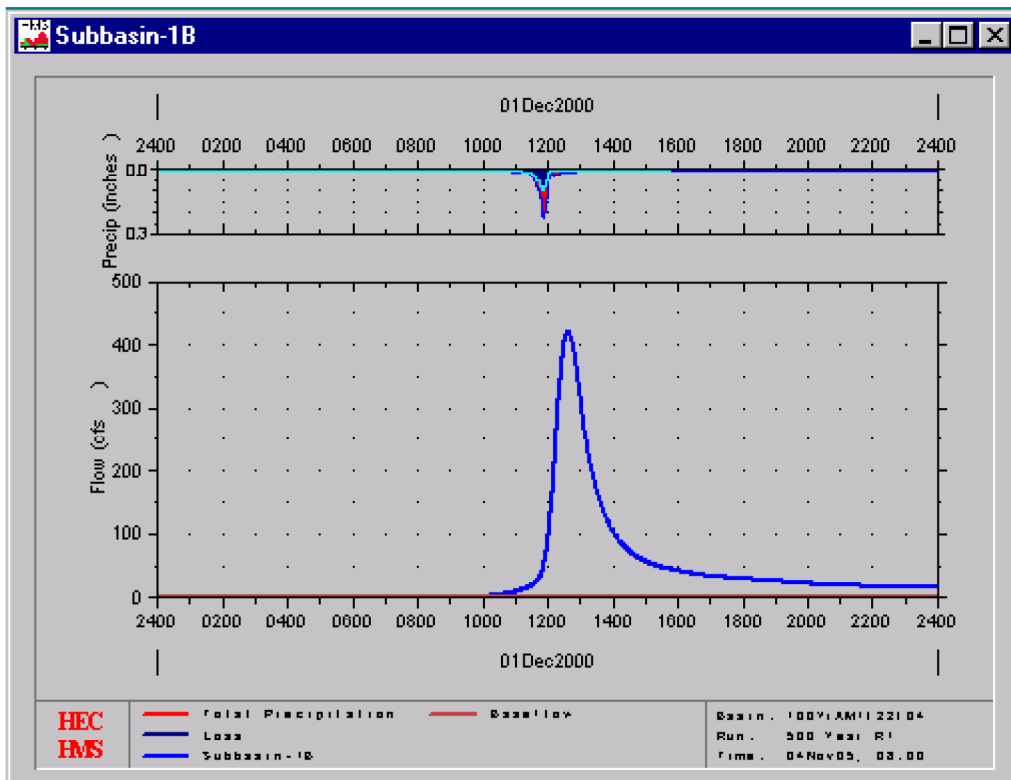
Storm Depth (in): 9.24

# WCS FACILITY FLOOD PLAIN STUDY HYDROGRAPHS

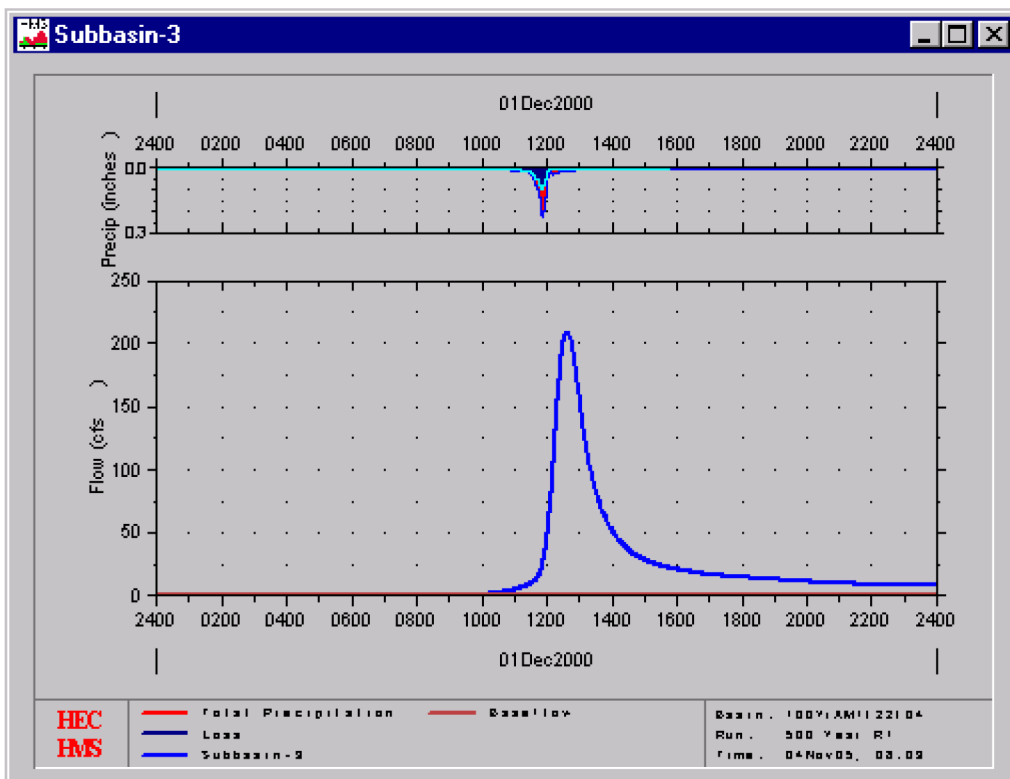
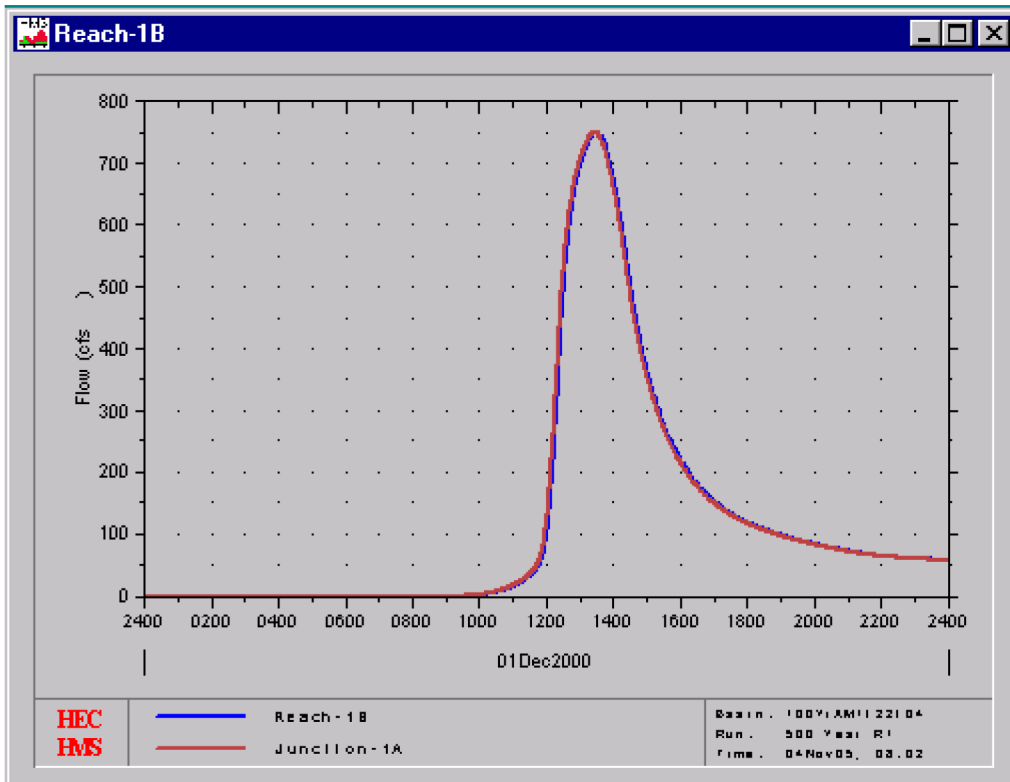




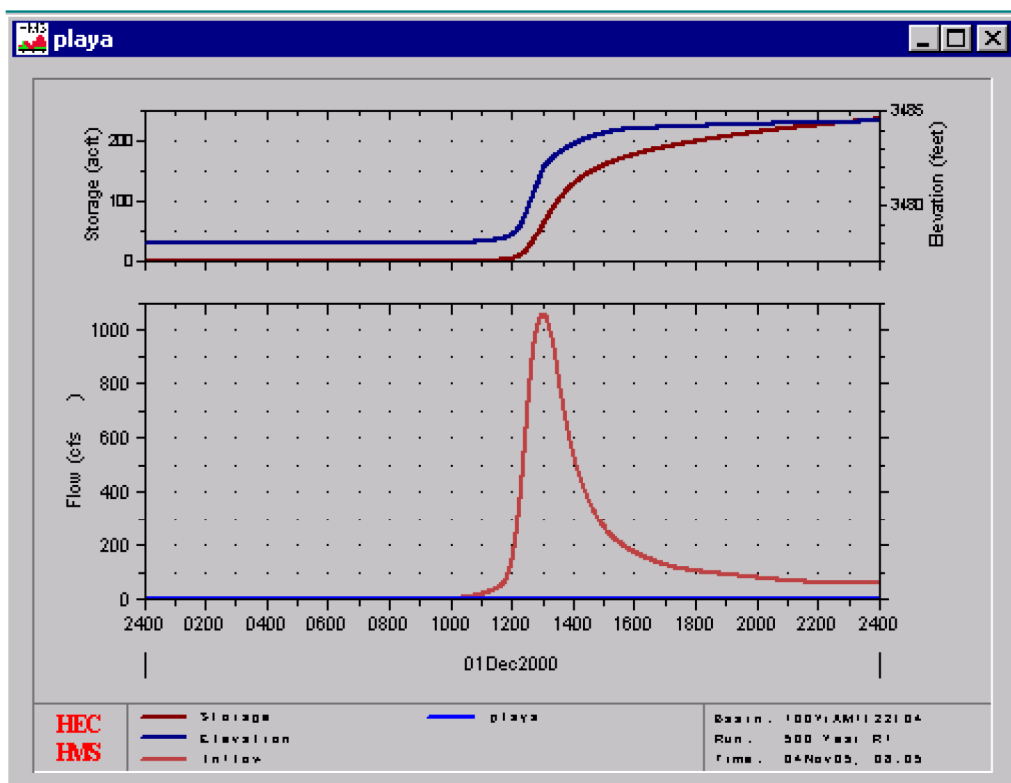
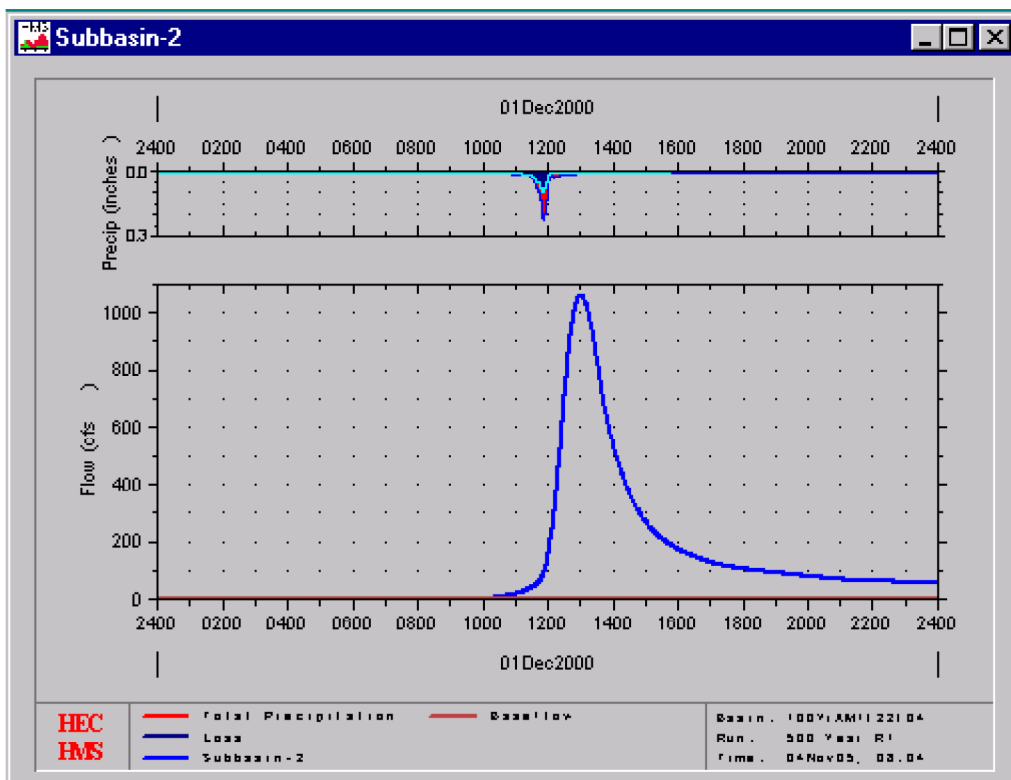
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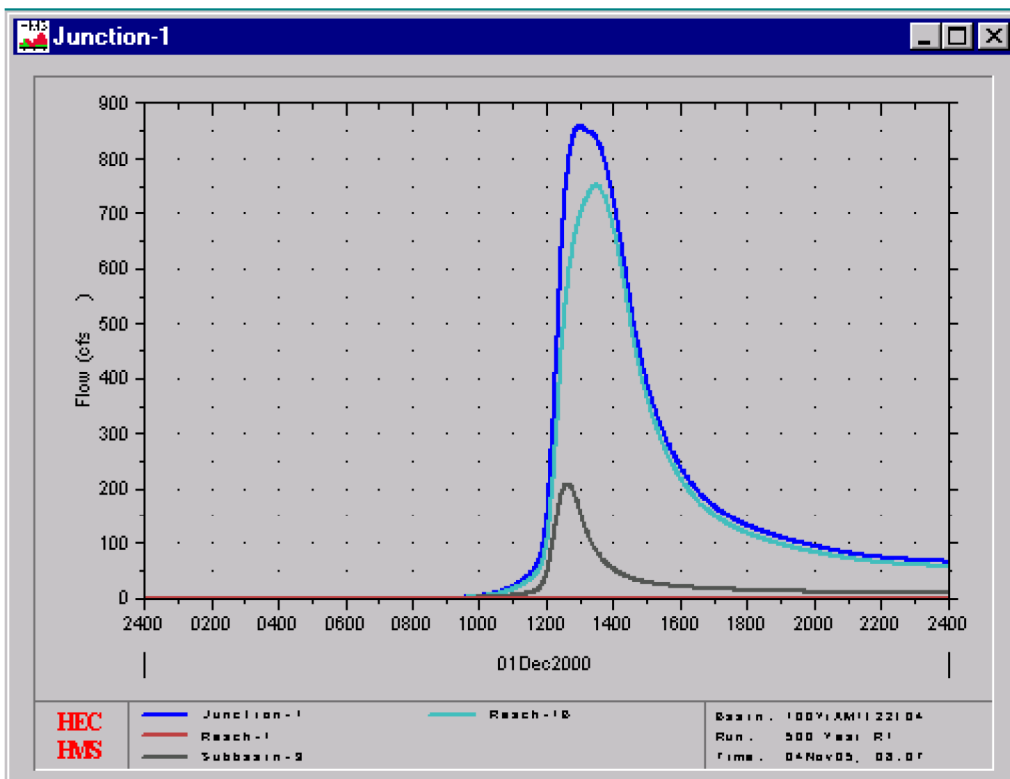
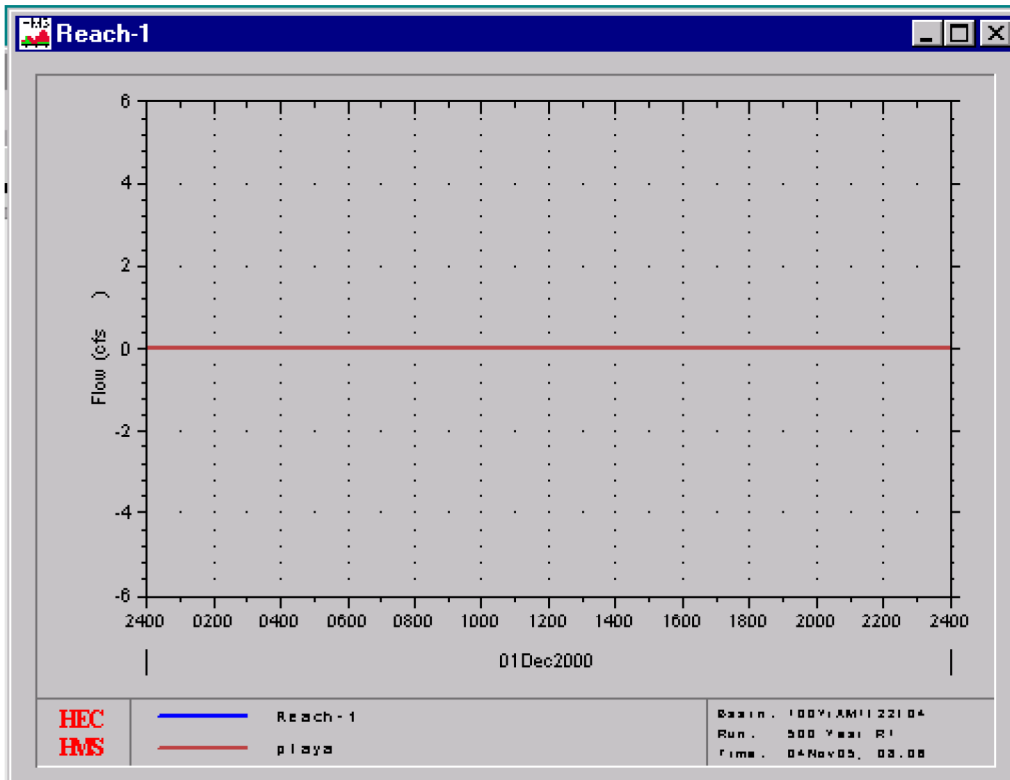
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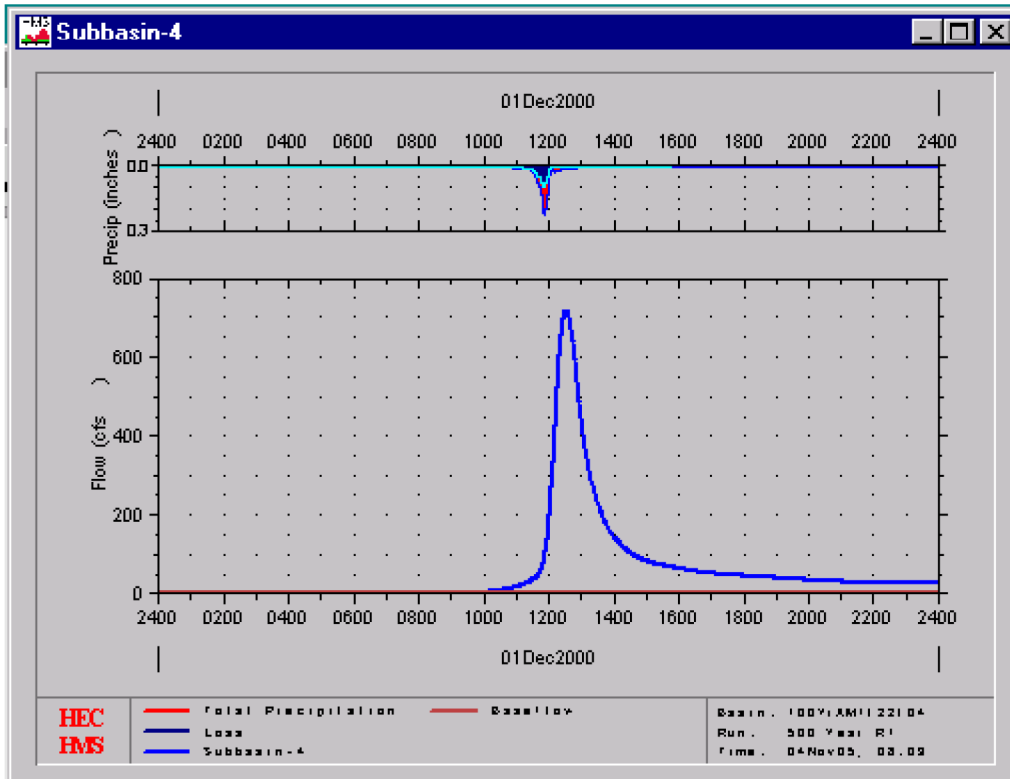
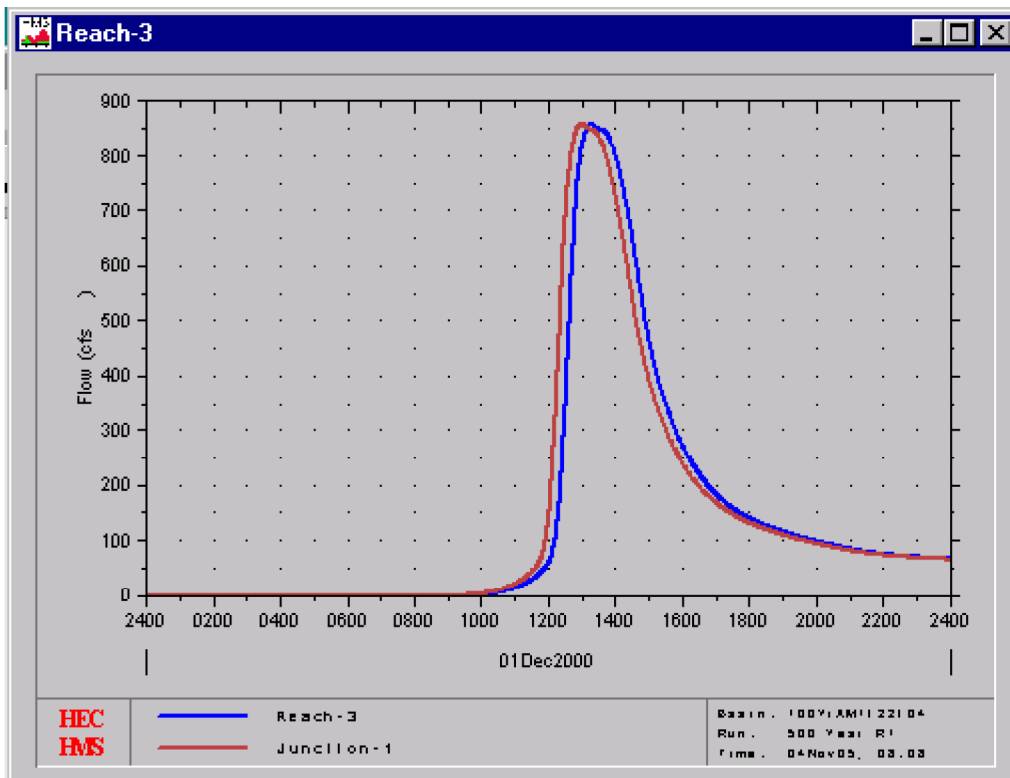
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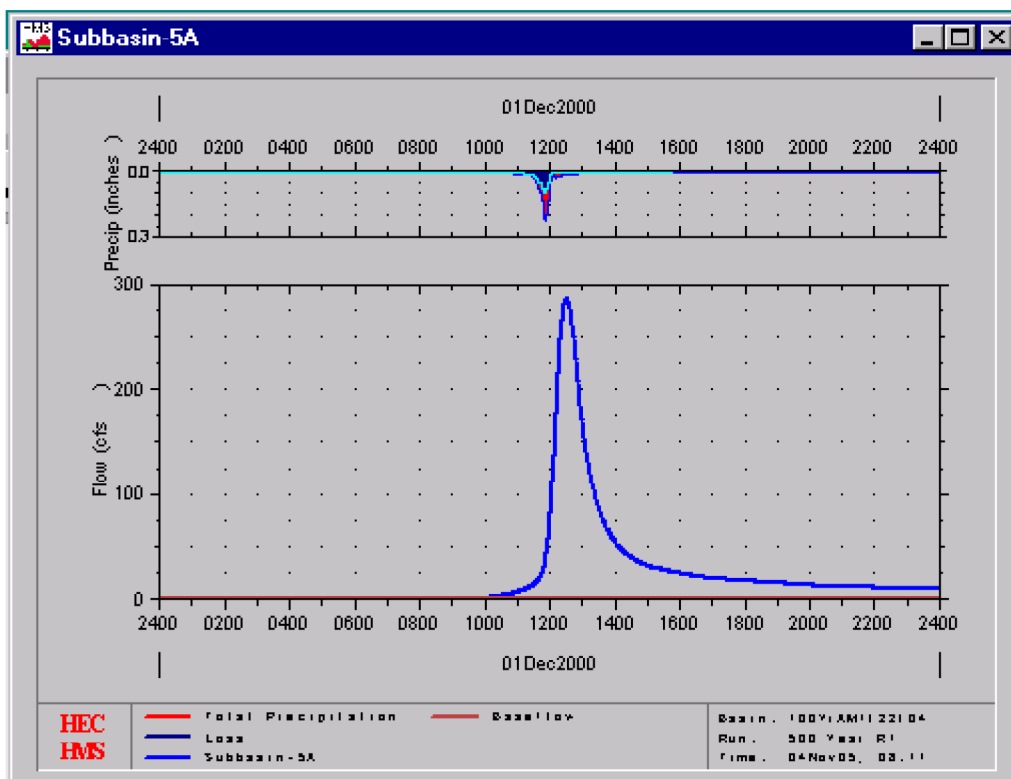
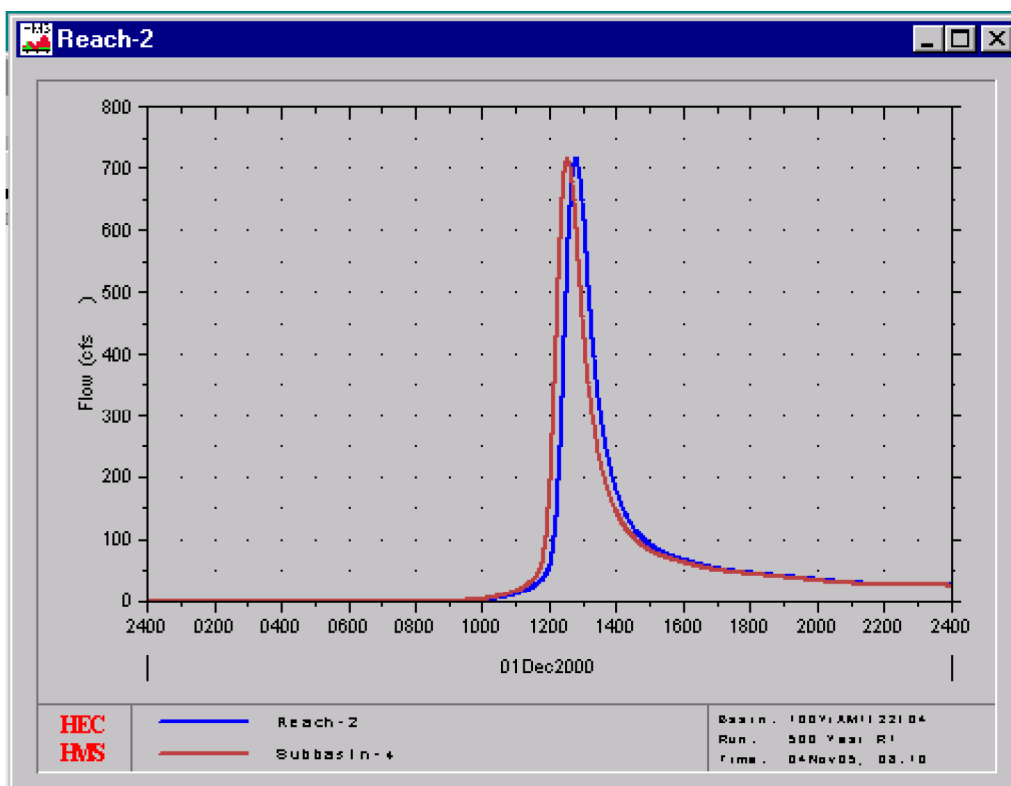


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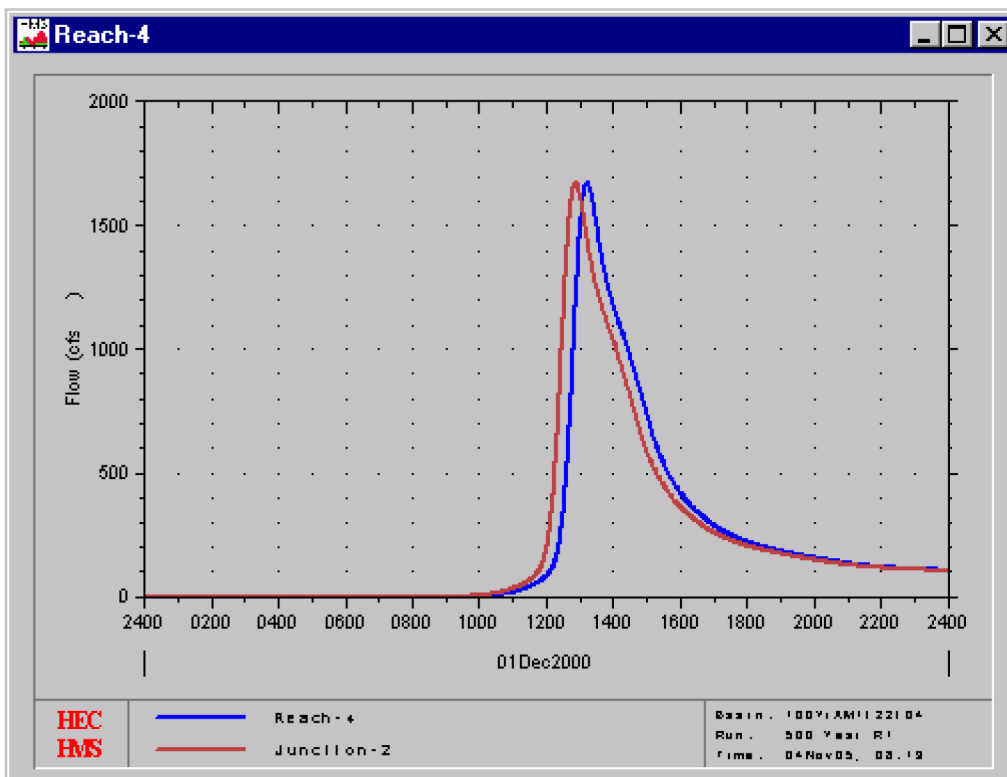
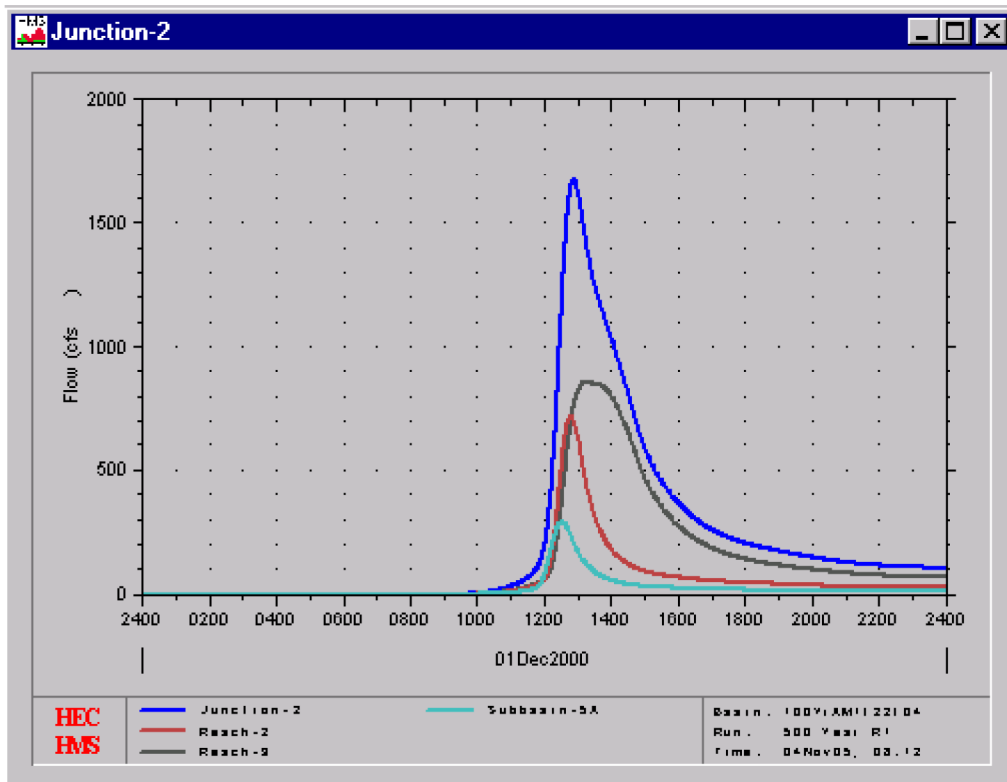




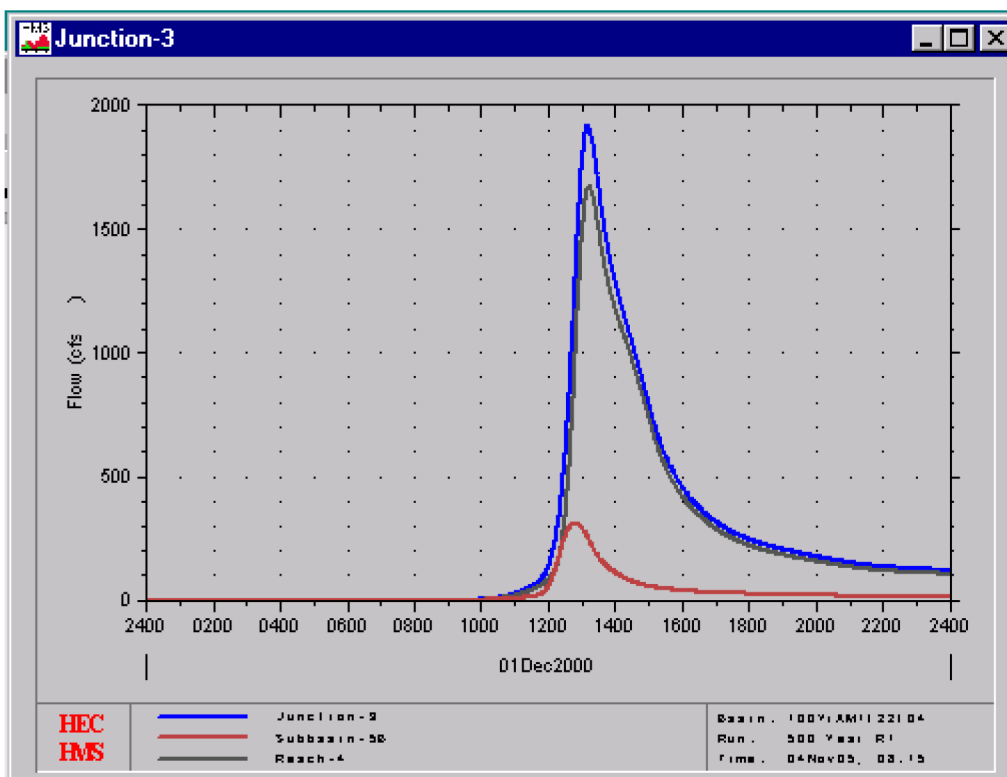
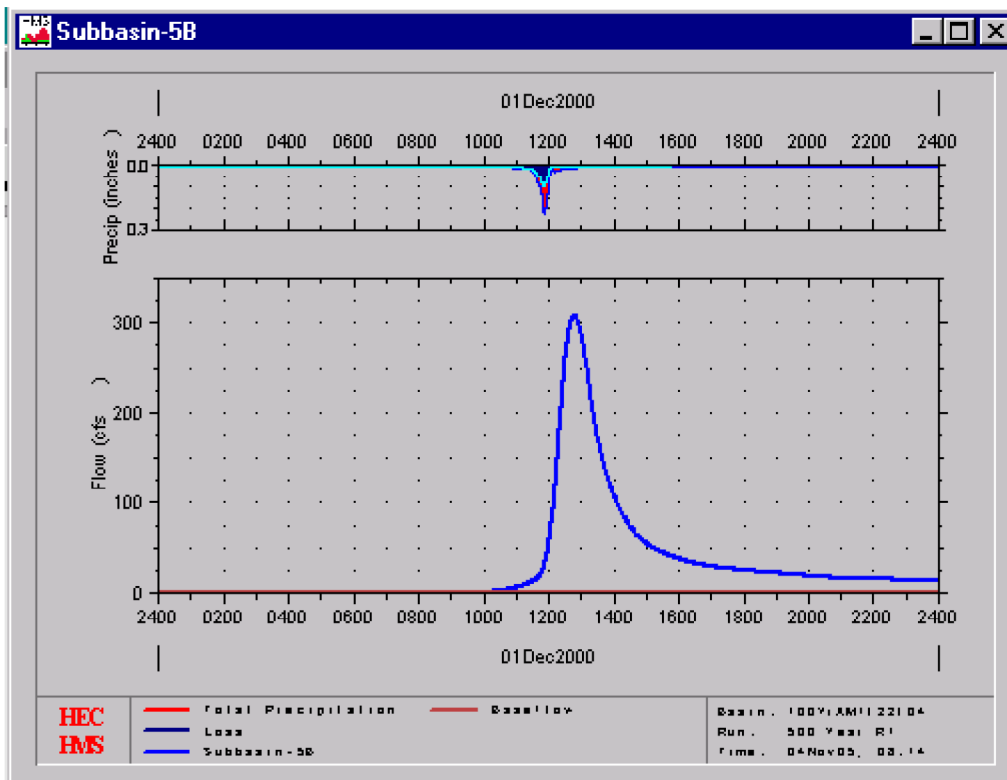
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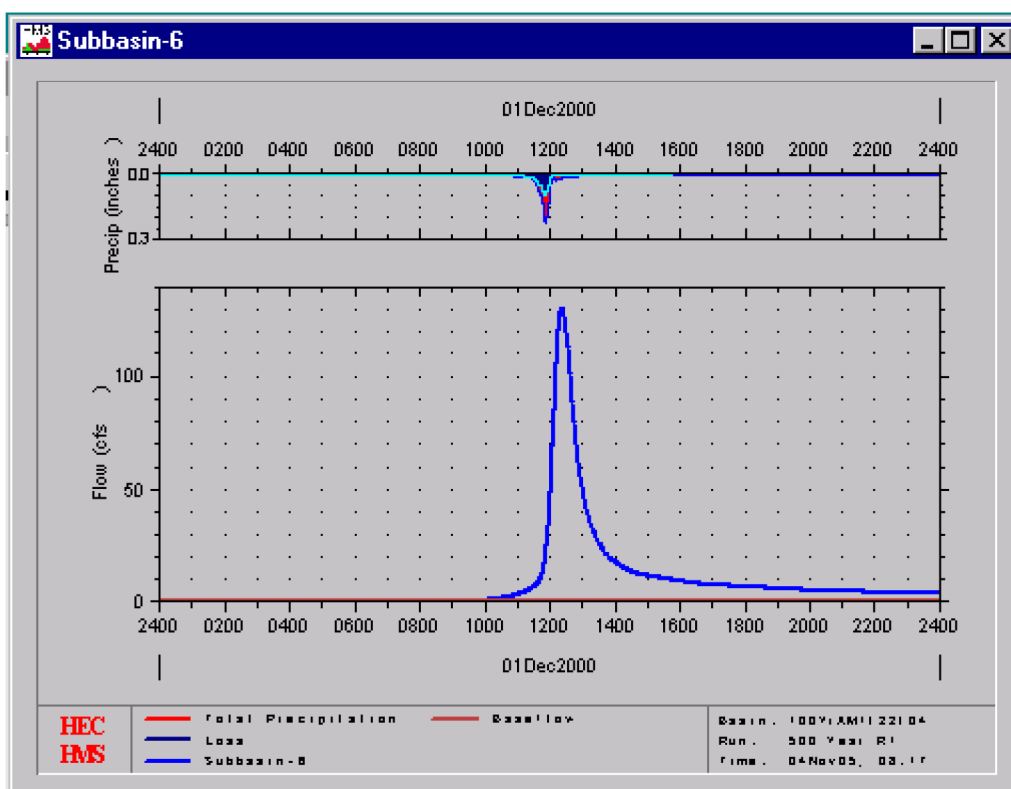
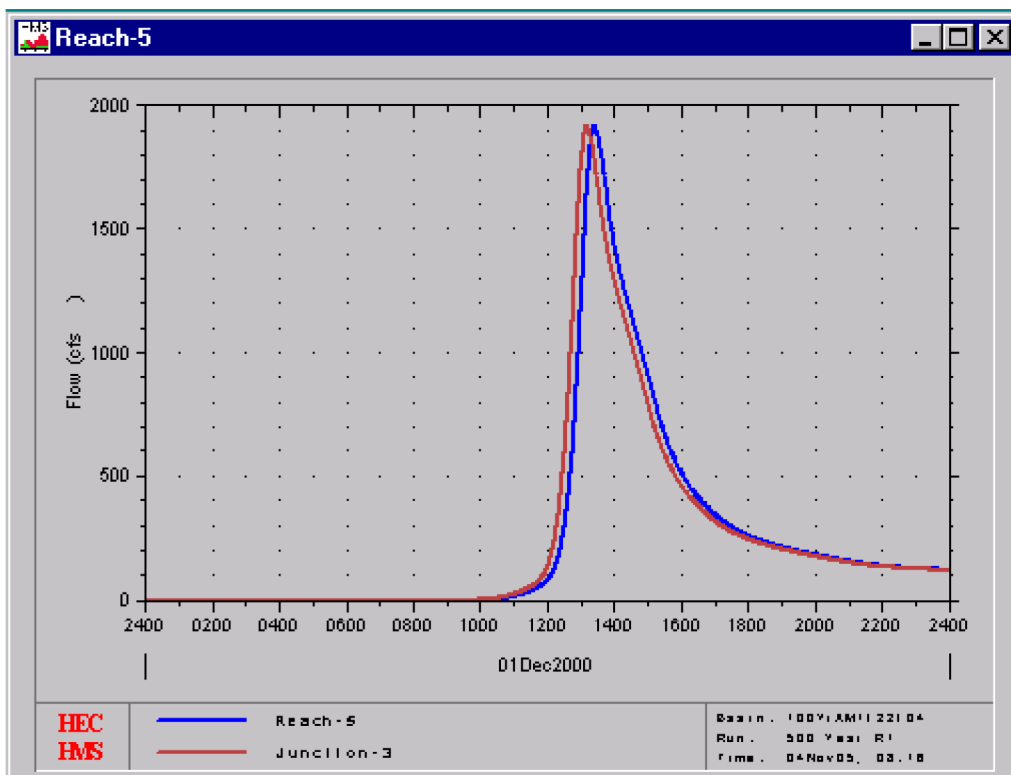
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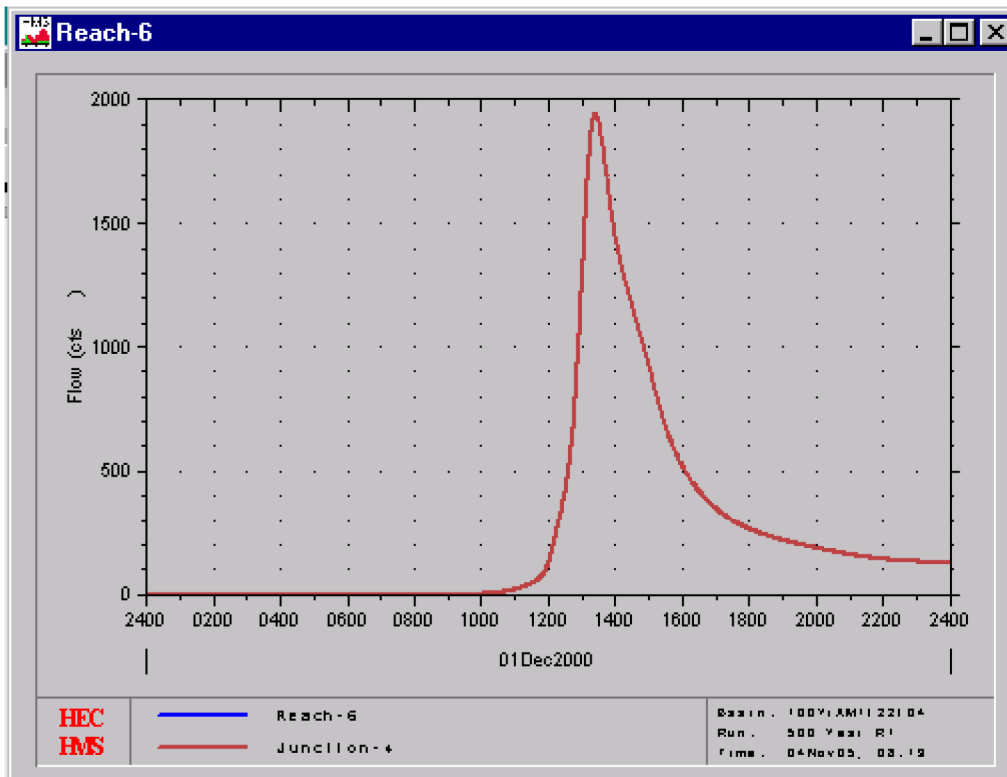
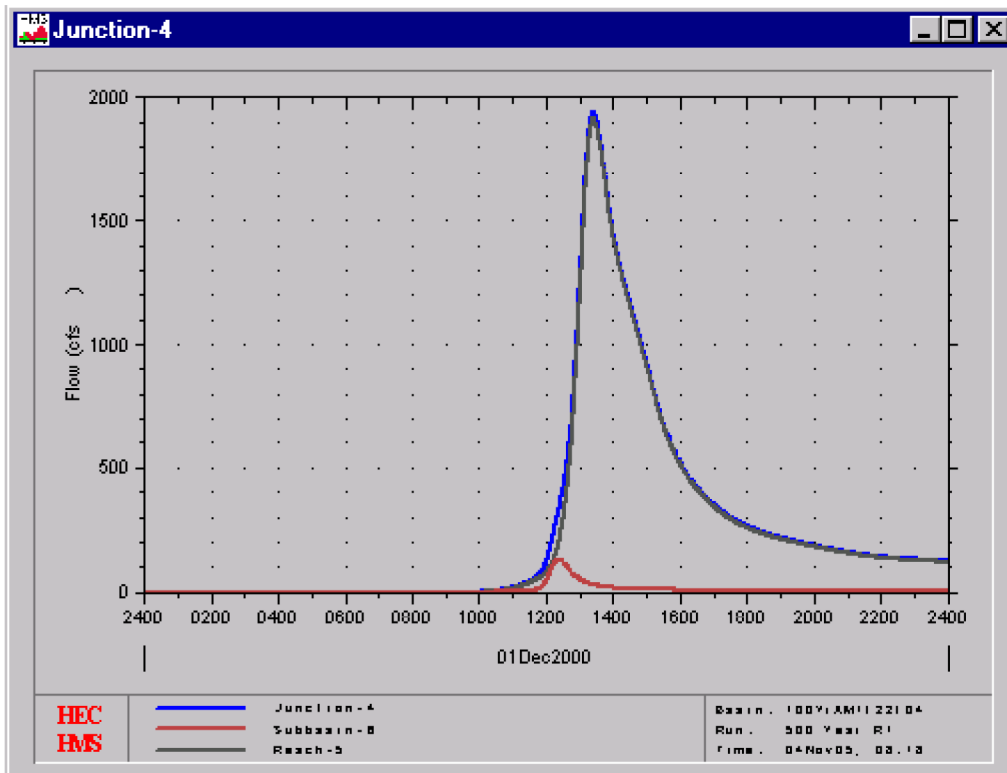


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