WM-68
10/24/90

PART 506

DEPARTMENT OF ENERGY
ALBUQUERQUE OPERATIONS OFFICE
CONTRACT NO. DE-AC04-83AL18796

GREEN RIVER, UTAH

D R A F T

Completion Report

VOLUME 4B
APPENDIX B

Remedial Actions
Contractor
for the
Uranium Mill Tailings
Remedial Actions
Project

MAY 1990

MK-FERGUSON COMPANY
A MORRISON KNUDSEN COMPANY

9011080155

UMTRA PROJECT - GREEN RIVER, UTAH

CALCULATIONS

FINAL DESIGN

CONTENTS

Calculation Cover Sheet

Contract No. 5057 Discipline Earth Sci

Calc. No. 12-539-02-00 01

No. of Sheets ~~23*~~ 109 HW

*Sheet Nos. 21-23 comprise 90 computer printout pages
19 pages + 90 computer printout sheets

Project

LIMTRA - Green River

Feature

Flood Analysis - Brown Wash

Item

Hydrologic and Hydraulic analysis of PMF

Sources of Data

Sources of Formulae & References

① DOE, "Remedial Action Plan and Site Conceptual Design for Stabilization of the Inactive Uranium Mill Tailings at Green River, Utah", Draft, vol. II - Appendix D, Jan., 1987

② McCuen, R.H., "A Guide to Hydrologic Analysis using SCS Methods" Prentice-Hall, Inc., Englewood Cliffs, 1982.

③ Sheaffer, J.R., "Urban Storm Drainage Management", Marcel Dekker, Inc., 1982.

④ TAC, "Green River - Draft RAP, Site Conceptual Design - Civil Engineering calculations vol. I MKE Document No. 5057-GRN-C-04-00061-00, 1987.

Preliminary Calc. ☐ Final Calc. ☒ Supersedes Calc. No. _____

Rev. No.	Revision	Calculation By	Date	Checked By	Date	Approved By	Date
1	Changed to Final Calc	Martin J. Cardenas	11-11-87	D.K. Chan	11/11/87	D.K. Chan	11/11/87
0		James K. Ran	4/21/87	H. Majumder	5/19/87	DKC	7/17/87

Form 42-110

MORRISON-KNUDSEN ENGINEERS, INC.
A MORRISON KNUDSEN COMPANY

Sheet 1

Project UMTRA – Green River | Contract No. 5057 | File No.
Feature Hydrology | Designed FTK | Date 4/10/87
Item Flood Analysis of Brown Wash | Checked HM | Date 5/11/87

Purpose: To determine the PMF peak flow in the Brown Wash at the vicinity of the tailings pile and its potential flooding.

Approach: TAC has performed studies to analyze the potential flooding of the pile due to either a 72-hr general or a 6-hr local PMF. MKE will check TAC's precipitation data and, if appropriate, will use them for an independent flood analysis to confirm TAC's results. The Corps of Engineers HEC1 and HEC2 computer codes will be used for the peak flow and water surface profile analyses, respectively.

Summary of Results: TAC has used 3 different methods of computing the lag time for the subbasins. Their results obtained by the most conservative method check closely with those derived by MKE, as summarized in the Table. Peak flows from PMF on Sh. 2.

Q (cfs) from PMF

		General 72-hr.	local 6-hr.
T&C	Approach (1)	17,000	28,000
	(2)	12,000	23,000
	(3)	26,000	98,000
		or 35,000 (in RAP)	
MKE		36,000	90,000

The peak flow values obtained by T&C and MKE are rounded off to 100,000 cfs for use in the HEC2 water surface profile analysis. The results show that the existing tailings pile will be inundated with the maximum water level @ approx. 4092' at the vicinity of the existing pile (see water surface profile on sh. 18 and cross sections on sh. 13-16) The proposed pile at the new disposal location will be about 40 ft. above the maximum water level in the Brown Wash during a 6-hr. local PMF.

Analysis

The entire watershed of Brown Wash upstream of the existing tailings pile comprises of a drainage area of about 83 sq. miles. It is divided into 9 subbasins as shown on Sheet 4. The Kirpich equation was used to derive the lag time for the individual sub-basins (sh. 5) which compared well with those obtained by the Tulsa USACE (sh. 7) method which considers the shape of the drainage basin as well as the hydraulic characteristics of the longest flow path. These lag time values are smaller than those derived by either the upland method (sh. 5) or the SCS curve number method and therefore, are used in HEC1 to compute the peak flow along the Brown Wash. The SCS curve number method, as adopted by TAC as one of their approaches to derive the lag times, is applicable only to drainage areas of less than 3 sq. miles whereas most of the subbasins designed for the computer simulation has area greater.

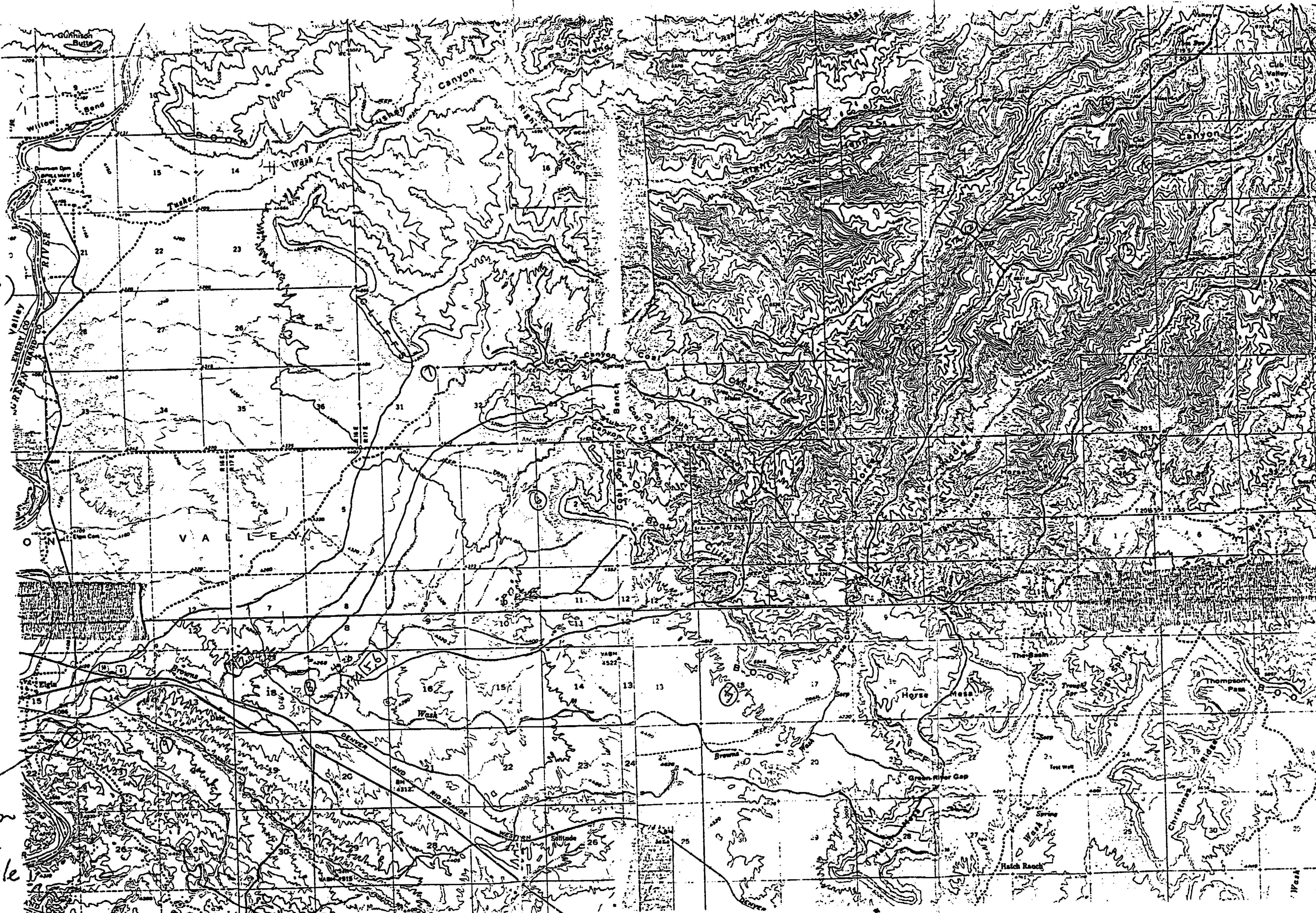
The precipitation data for the general and local PMF derived by TAC in their calculations (ref. ④) were checked and found to be reasonable and thus were used in the HEC1 runs made by MKE to obtain the peak flow. A table of the hydraulic characteristics of the subbasin is summarized on Sh. 5. HEC1 outputs are shown on Sh. 20. and 21.

Sh. 4

Exhibit (1)

Basin	Area (mi²)
1	2.6
2	5.5
3	12.1
4	6.4
5	20.7
6	11.8
7	12.2
8	.5
9	11.3
	Σ = [illegible]

from ref. (4)



Approx. location of existing tailings pile

0 1 2 miles

FTK 4/1/87
HM 5/11/87

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Project UMTRA – Green River | Contract No. 5057 | Sheet 5
Feature Hydrology | Designed JTK | File No.
Item Flood analysis of Brown Wash | Checked HM | Date 4/1/87 | Date 5/11/87

Watershed

	L (mi)	Δh (ft)	S (%)	V (fps)	Kirpich Eqn (Sh. 6) T_c (hr.)	Kirpich Eqn (Sh. 6) T_L (hr.)	Upland Method (see sh. 6) T_c (hr)
1	4.7 (24,816')	960	3.9	3.0	1.10	0.66	2.30
2	5.7 (30,096')	1,320	4.4	3.2	1.22	0.73	2.61
3	8.5 (44,880')	2,160	4.8	3.4	1.60	0.96	3.67
4	5.0 (26,400')	840	3.2	2.7	1.25	0.75	2.72
5	10.2 (53,856')	810	1.5	1.9	2.88	1.73	7.87
6	7.9 (41,712')	1,770	4.2	3.1	1.59	0.95	3.74
7	10.5 (55,440')	2,200	4.0	3.1	2.03	1.22	4.97
8	1.2 (6,336')	30	0.5	1.1	0.86	0.52	1.60
9	6.2 (32,736')	320	1.0	1.5	2.32	1.39	6.06

The time of Concentration T_c is calculated

(1) using the kirpich equation as follow:

$$T_c = (11.9\, L^3/\Delta h)^{0.385}$$

(hr)

where L = Stream Length in miles

Δh = Difference in elevation in feet between upper and lower limits of the drainage basin

T_L (time lag) $= 0.60\, T_c$

(2) using the upland method

$$T_c = \frac{l}{V \times 3600}$$

(hr)

where l = stream length in feet

V = velocity in ft/sec as determined from chart on Sh. 8

The following Time Lag (t_p) values are derived from Tulsa USACE

$$t_p = 1.42\left(\frac{L \cdot L_{ca}}{\sqrt{S}}\right)^{0.39}$$

where S = watershed slope (ft/mi)
L = Stream length (mi)
L_{ca} = length along stream from study point to centroid of basin (mi)

from reference (3) Sh. 9 and 11

Watershed	L_{ca} (mi)	$\frac{L \cdot L_{ca}}{\sqrt{S}}\left(\frac{mi \cdot mi}{ft/mi}\right)$	Time Lag T_p (hr.) from fig. on sh. 11
1	2.3	0.76	1.28
2	2.8	1.05	1.45
3	4.0	2.13	1.91
4	2.0	0.77	1.28
5	5.8	6.64	2.97
6	5.3	2.80	2.12
7	6.3	4.57	2.57
8	0.6	.14	0.66
9	3.2	2.76	2.11

Sh. 8

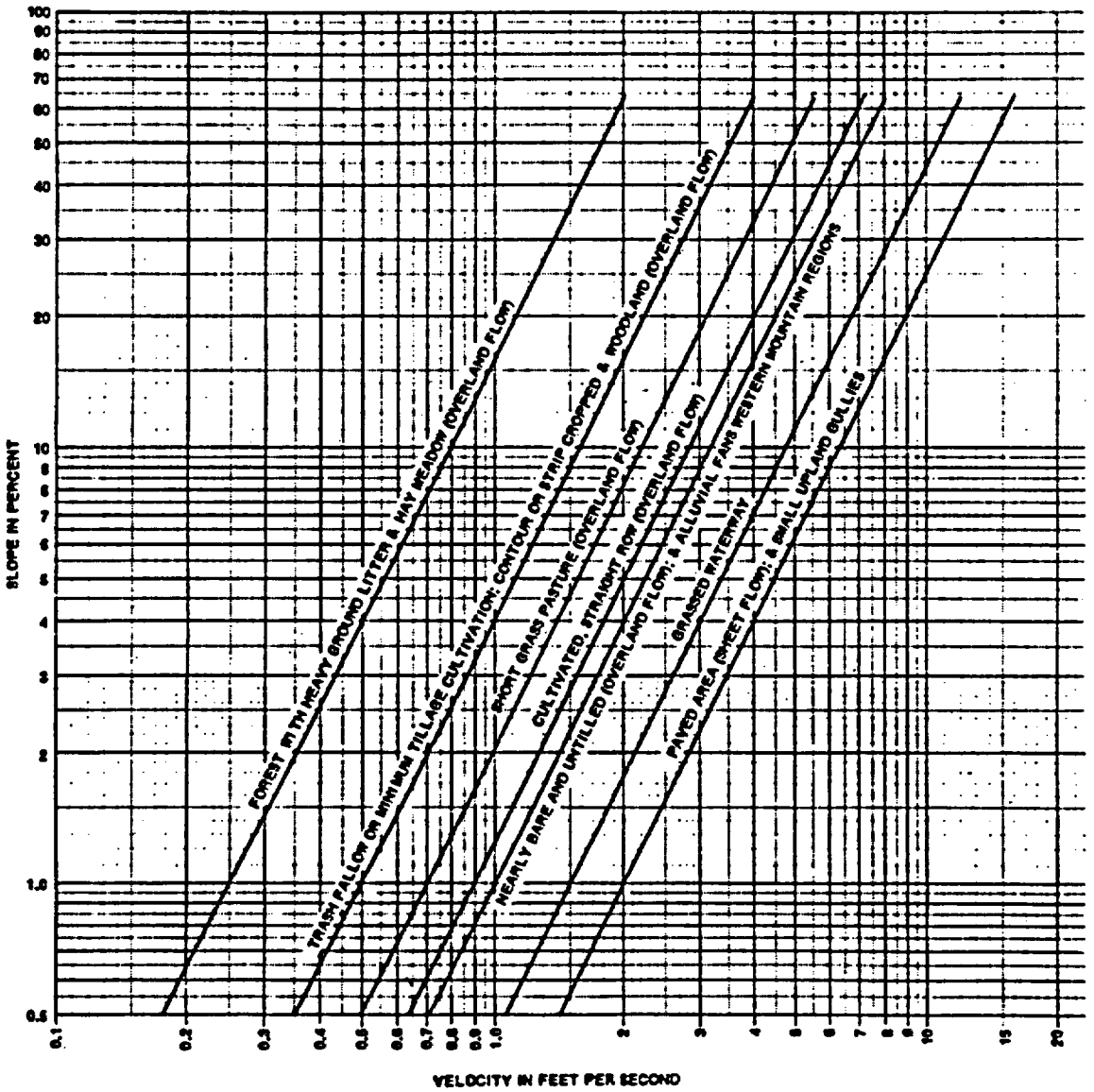


Figure 8. Velocities for upland method of estimating T_c

Reference (2)

JTK 4/1/87
HM 5/12/87

Sh. 9

Reference (3) FK 4/6/87

HM Mar 12/87

However, SCS notes that the numerator of 5.29 [484] is known to vary from 6.56 [600] to 3.28 [300], similar to variances noted by Snyder [9, 18]. Further, a relationship is derived to define the recommended unit rainfall duration for the unit hydrograph as:

$$t_u = 0.133t_c \quad \text{or} \quad \frac{t_c}{7.5} \tag{6.21}$$

where t_c = time of concentration as illustrated in Fig. 6.9 and the average relationship between the lag time t_p and the time of concentration is:

$$t_p = 0.6t_c \tag{6.22}$$

General Guidelines for Determining Parameters

The previous discussion presents basic relationships of synthetic unit hydrograph theory. Final determination of a synthetic unit hydrograph for a given watershed requires additional information. For example, values of C_t in Eq. (6.15) are needed to determine the lag time. The basic approach is to determine these types of coefficients or equations by analysis of rainfall runoff data from other similar watersheds. The HEC-1 computer program [28] provides an efficient means of analyzing such data.

Fortunately, many other hydrologists have already performed such analyses of local, regional, and national data and have arrived at coefficients and variations of and additions to the basic unit hydrograph equations. Any of these relationships, which are presented below, have potential application to the basin being studied and thus provide a savings in study effort. But the hydrologist must determine which equations are applicable based upon the similarity between the study basin and the watersheds for which the equations were derived.

The relationships available can generally be put into three categories:

1. Estimation of lag time t_p
2. Estimation of a synthetic unit hydrograph discharge peak q_p
3. Unit hydrograph shape factors

Estimation of Lag Time t_p

The various unit hydrograph methods are sensitive to lag time or other peak response time factors. The unit hydrograph peak discharge and shaping factors are usually a function of the lag time and other parameters. Most methods are usually derived with algorithms that are a direct or indirect function of the lag time. Thus, the determination of the lag time is critical to the reliability of the results.

Rural Areas

The Tulsa District Army Corps of Engineers [19] has derived a relationship for t_p based upon data for natural watersheds in the central and northeastern Oklahoma area, which is:

$$t_p = 0.1842\left(\frac{LL_{ca}}{\sqrt{S}}\right)^{0.39} \qquad \left[t_p = 1.42\left(\frac{LL_{ca}}{\sqrt{S}}\right)^{0.39}\right] \tag{6.23}$$

Sh. 10

where S = watershed slope, m/m [ft/mi]
L = stream length, km [mi]
L_{ca} = length along stream to centroid of basin, km [mi]

Reference ③

FTK 4/6/87
HM 5/11/87

This equation, illustrated in Fig. 6.10, is recommended for natural watersheds. Note that the data and derivation were performed originally in British units; thus the graph is presented in these units only. It can be checked for unusual cases by estimating the time of concentration and multiplying by a factor of 0.60 as indicated earlier.

Also shown in Fig. 6.10 are relationships for California mountain and foothill regions [20, 26] as follows:

California mountains:

$$t_p = 0.1642\left(\frac{LL_{ca}}{\sqrt{S}}\right)^{0.38} \qquad \left[t_p = 1.2\left(\frac{LL_{ca}}{\sqrt{S}}\right)^{0.38}\right] \tag{6.24}$$

California foothills:

$$t_p = 0.0985\left(\frac{LL_{ca}}{\sqrt{S}}\right)^{0.38} \qquad \left[t_p = 0.72\left(\frac{LL_{ca}}{\sqrt{S}}\right)^{0.38}\right] \tag{6.25}$$

A report by Espey, et al. [21] for watersheds in Texas, New Mexico, and Oklahoma resulted in the following recommended equation:

$$T_R = 3.056 L_f^{\,0.12} S_f^{\,-0.52} \qquad \left[T_R = 2.65\, L_f^{\,0.12} S_f^{\,-0.52}\right] \tag{6.26}$$

where T_R = time of rise in minutes which can be assumed to be equal to

$$T_R = T_p = \frac{t_u}{2} + t_p \tag{6.27}$$

and L_f = stream length, m [ft]
S_f = slope, m/m [ft/ft]

This equation is based on data from small watersheds ranging as follows: L, 990 to 7700 m [3250 to 25,300 ft]; S, 0.008 to 0.015 m/m [ft/ft]; and T_R, 30 to 150 min.

Urbanized Areas

Several approaches are presented here which should be used with judgment and in comparison to arrive at a recommended t_p.

The Tulsa District Army Corps has derived parallel relationships for 50 and 100 percent urbanized basins as follows:

For 50 percent urbanized:

$$t_p = 0.1193\left(\frac{LL_{ca}}{\sqrt{S}}\right)^{0.39} \qquad \left[t_p = 0.92\left(\frac{LL_{ca}}{\sqrt{S}}\right)^{0.39}\right] \tag{6.28}$$

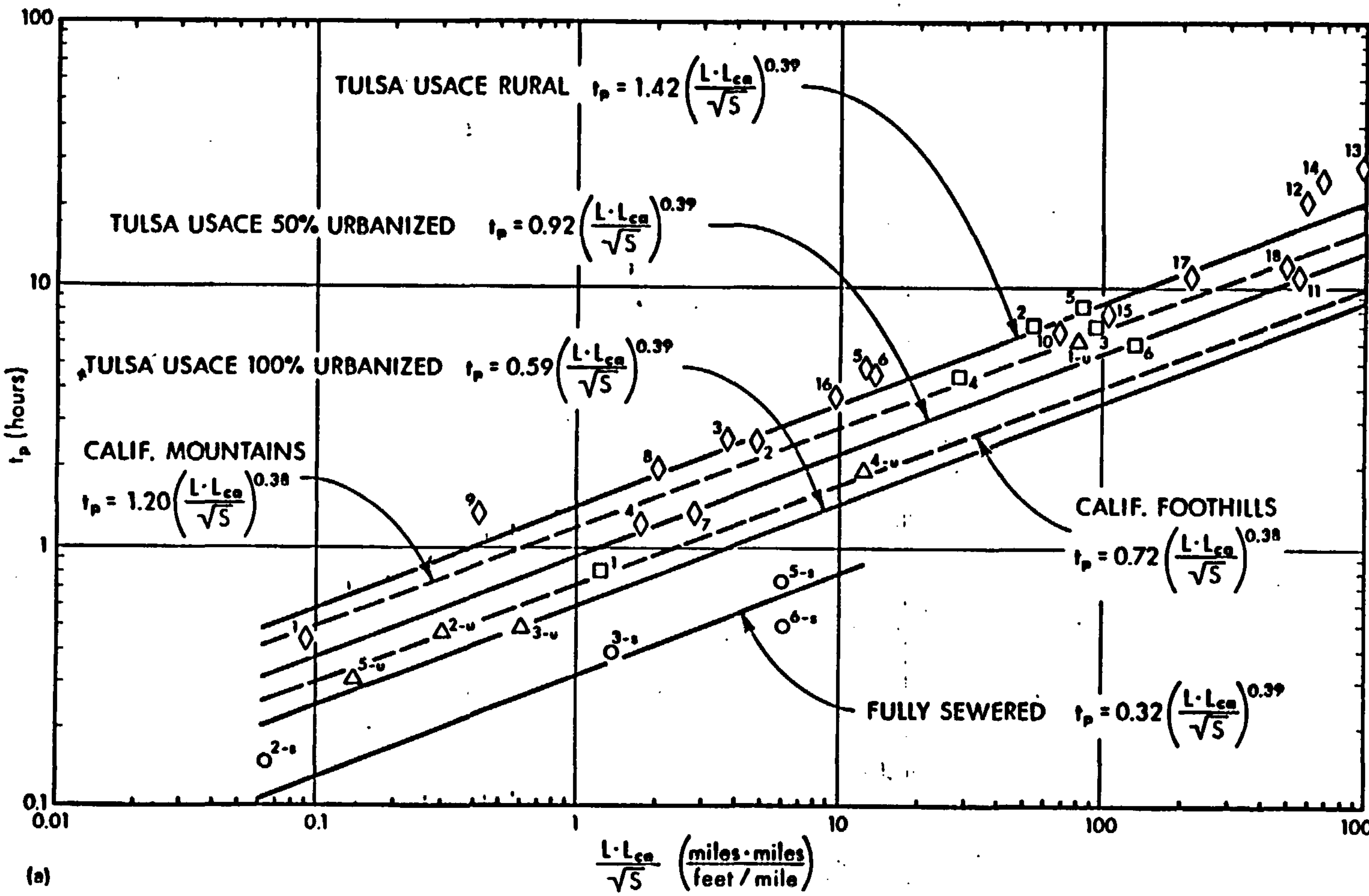


Figure 6.10 (a) t_p vs. $LL_{ca}/\sqrt{S}$ for Synthetic Unit Hydrograph Procedure.

Reference (3) TK 4/6/87

HM 5/17/87

Sh. 11

Tc

The 5 cross sections plotted in TAC's calculations (Ref. (4)) were checked, adjusted and used in the HEC2 water surface profile analysis by MKE. The cross sections are shown on Sh. 19 and results are included in the computer printout Sh. 22-23. Inclusion of cross sections (1) and (7) from TAC calculation in the HEC2 analysis indicates insignificant difference in the result from the previous run using 5 cross-sections only, (see Sh. 22-23) This suggests that modeling using (2) and (6) sections as the end stations is adequate enough. Computed water surface profiles are presented on Sh. 17-18

JACOBS ENGINEERING

DATE 2/7/87 SUBJECT GRW SURFACE-WATER FLOOD STUDIES HYDRAULIC ANALYSIS SHEET NO. Sh. 13

BY RP CHKD. JOB NO.

Reference ④ FE 4/8/87 HM 5/12/87

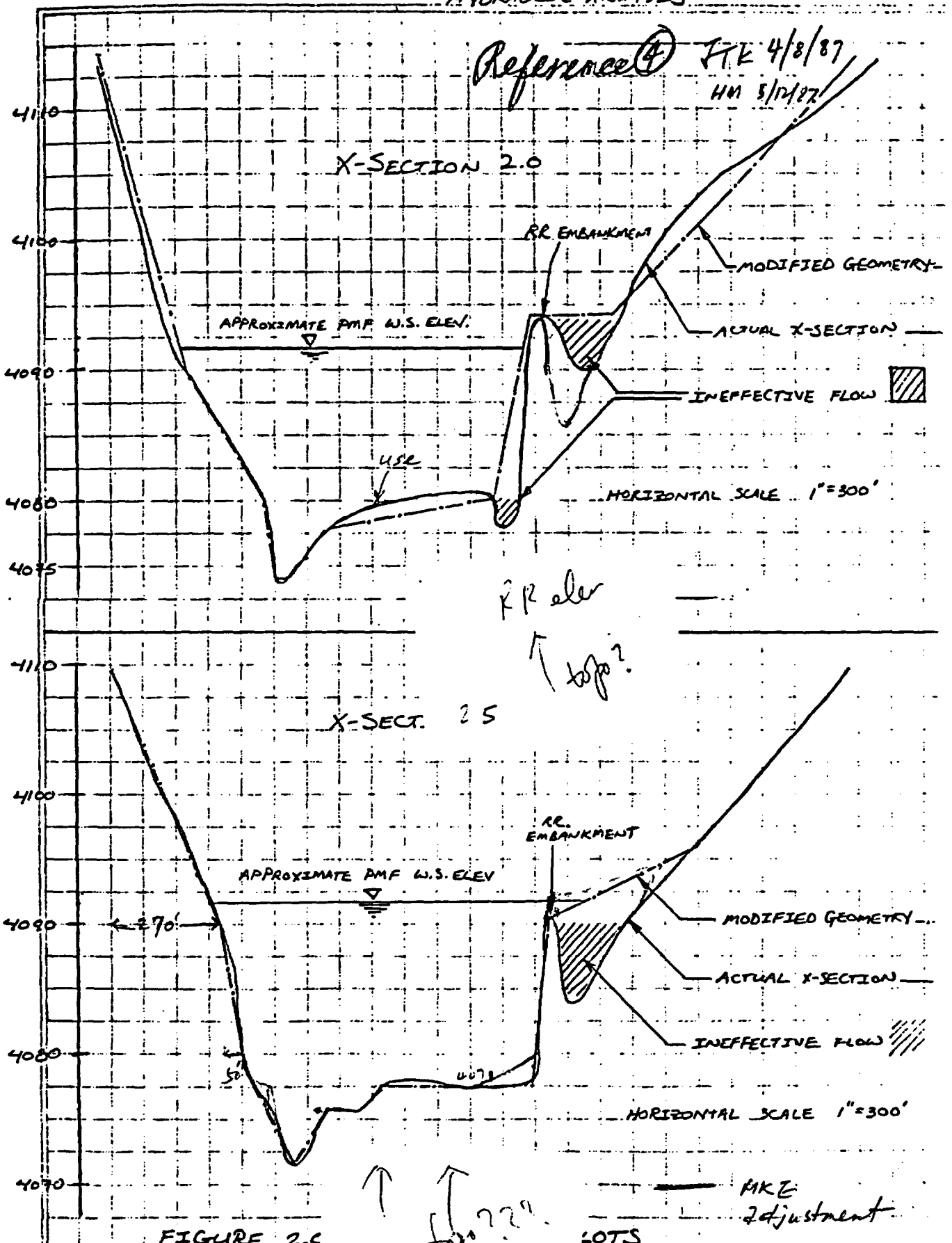


FIGURE 2.C LOTS

FORM 91-005-1 (4/81)

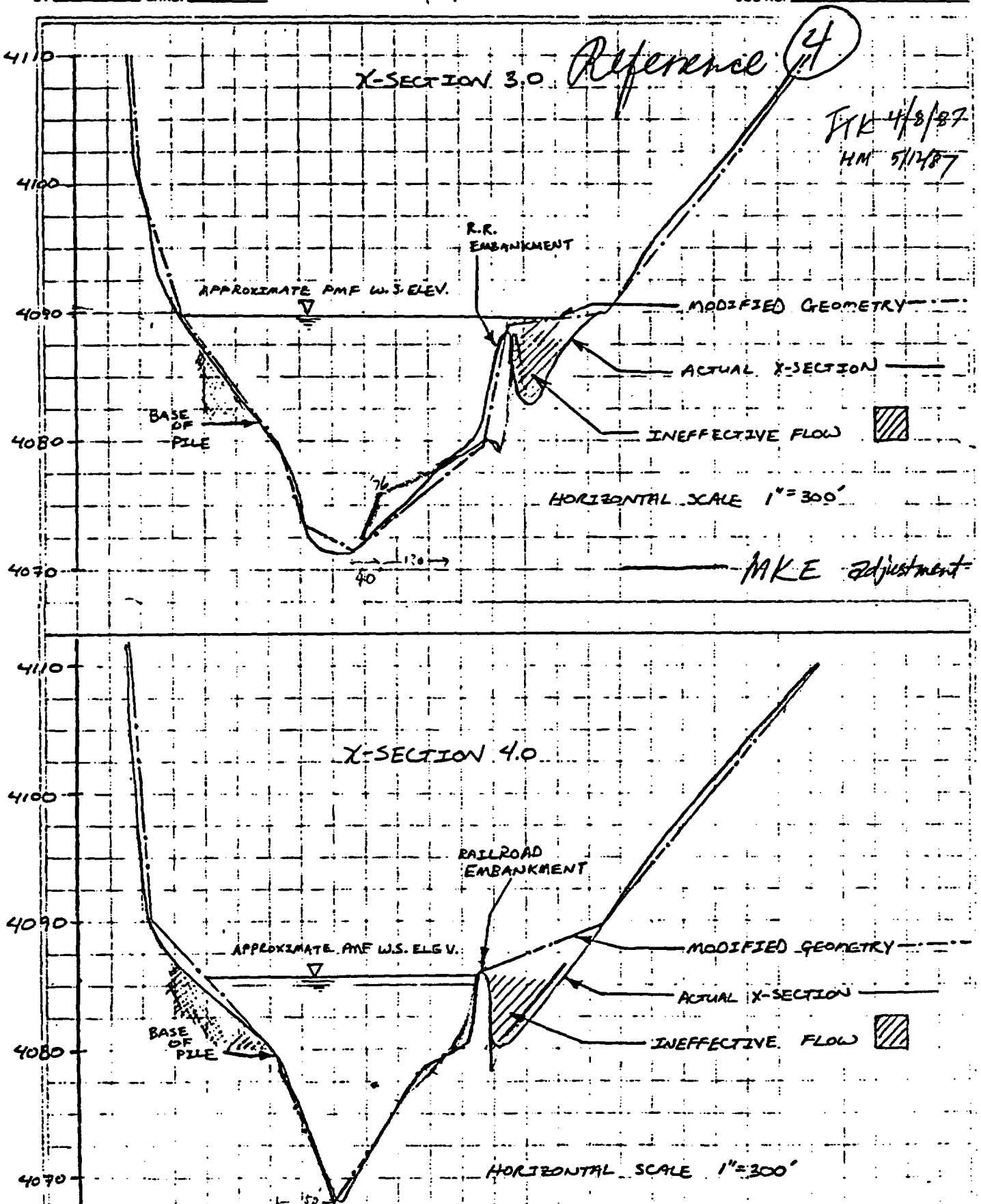


FIGURE 3.0 X-SECTION PLOTS

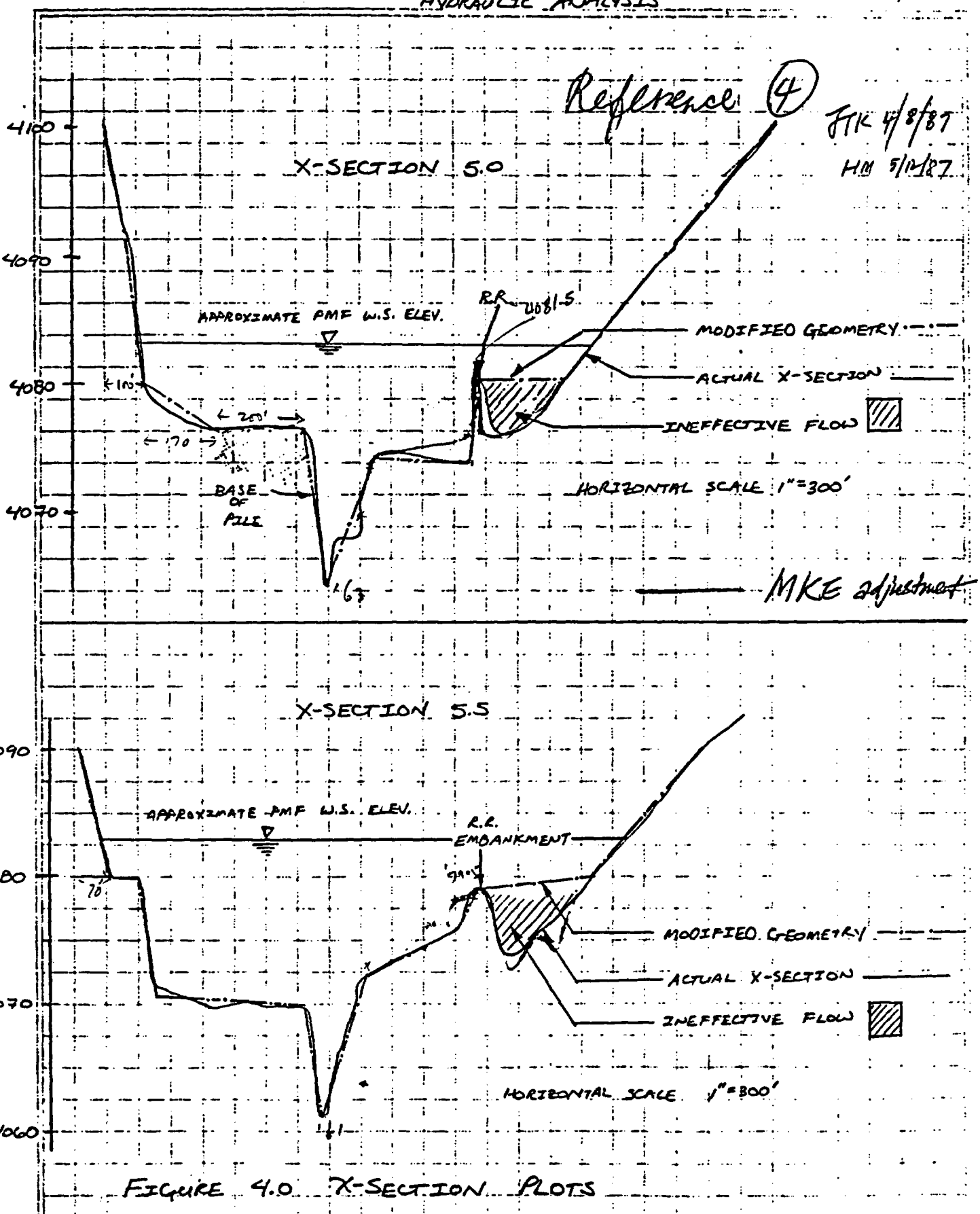


FIGURE 4.0 X-SECTION PLOTS

JACOBS ENGINEERING

DATE 2/7/87 SUBJECT GRN, SURFACE-WATER FLOOD STUDIES HYDRAULIC ANALYSIS SHEET NO. ___

BY RP CHKD. ___ JOB NO. ___

Reference (4) BTK 4/8/87 HM 5/12/87

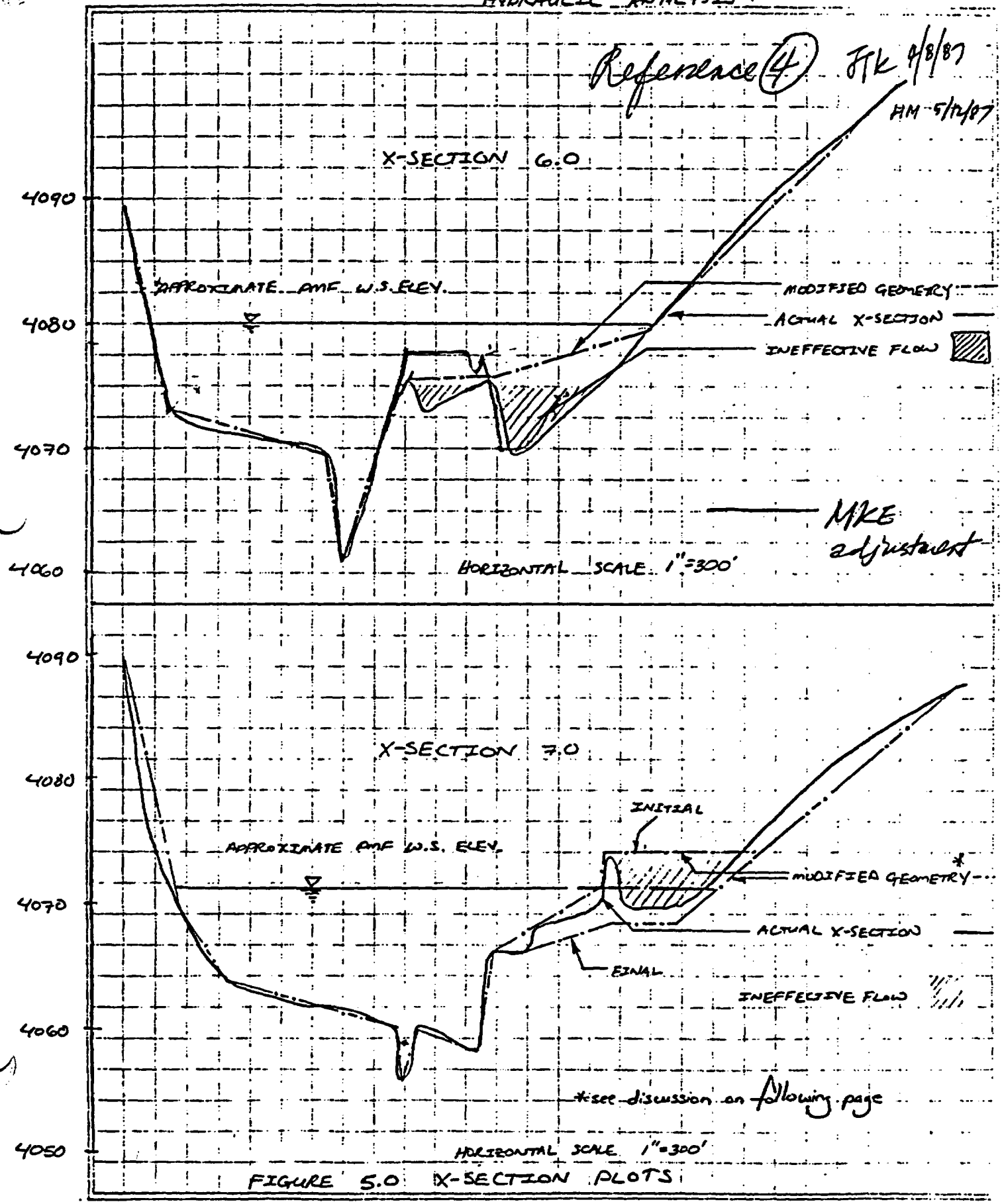


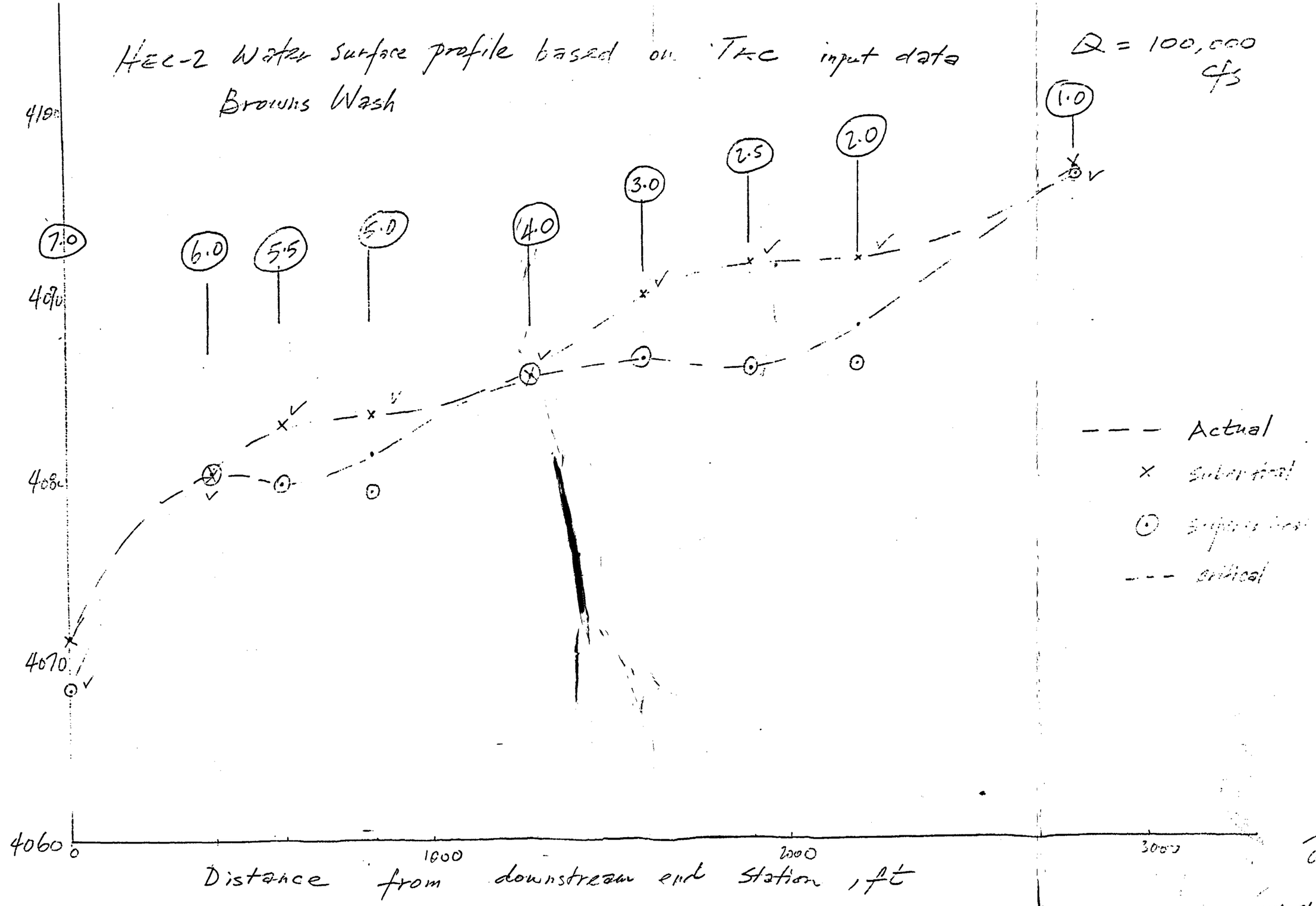
FIGURE 5.0 X-SECTION PLOTS

FORM 81-005-1 (4/81)

Hec-2 Water surface profile based on Tec input data

Browns Wash

Q = 100,000 cfs



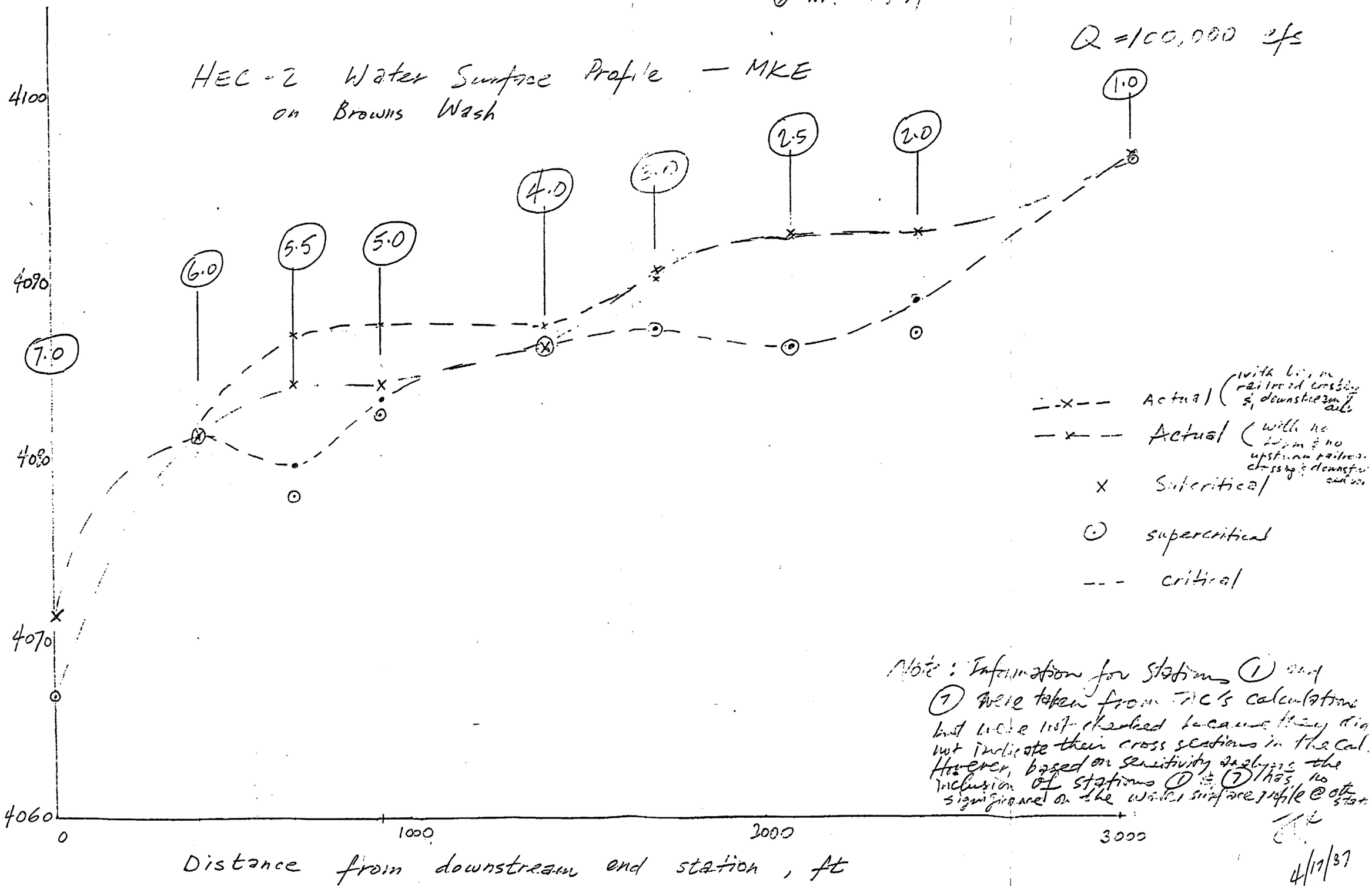
4/17/87

HM 5/14/87

6-hr. PMF

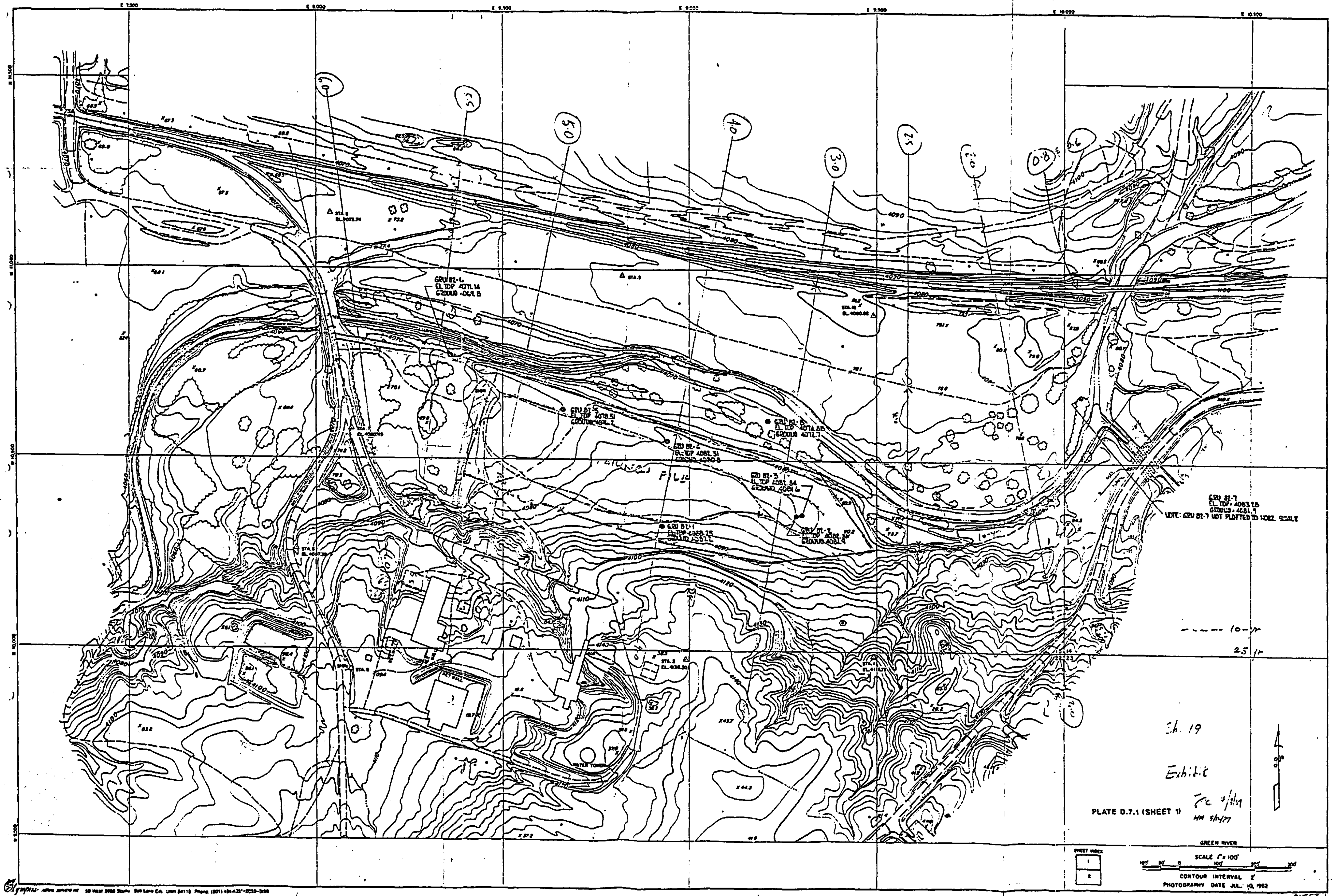
Q = 100,000 cfs

HEC-2 Water Surface Profile — MKE
on Browns Wash



Note: Information for stations (1) and (7) were taken from FIC's calculations but were not checked because they did not indicate their cross sections in the cal. However, based on sensitivity analysis the inclusion of stations (1) & (7) has no significance on the water surface profile @ other stations.

4/11/87
HM 5/11/87


GRU 81-7
NOTE: GRU 81-7 NOT PLOTTED TO HORZ. SCALE
WATER TOWER
PLATE D.7.1 (SHEET 1)
GREEN RIVER
SHEET INDEX
SCALE 1" = 100'
CONTOUR INTERVAL 2'
PHOTOGRAPHY DATE JUL. 10, 1982
Exhibit
SHEET 1

Sh. 20-1

UMTRA - Green River

General PMF - 72 hr.

Computation of peak flow

JTK

4/3/87

HM 5/11/87

1 ****

FLOOD HYDROGRAPH PACKAGE HEC-1 (IBM XT 512K VERSION) -FEB 1,1985

U.S. ARMY CORPS OF ENGINEERS, THE HYDROLOGIC ENGINEERING CENTER, 609 SECOND STREET, DAVIS, CA. 95616

****

THIS HEC-1 VERSION CONTAINS ALL OPTIONS EXCEPT ECONOMICS, AND THE NUMBER OF PLANS ARE REDUCED TO 3

1 HEC-1 INPUT PAGE 1

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

    1     ID    UMTRA - GREEN RIVER - BROWN WASH
    2     ID    GENERAL PMF - 72 HR.
    3     IT    9                  300
    4     IN    60
    5     ID    5

    6     KK    BAS1 SUB-BASIN 1
    7     KM        GENERAL PMF
    8     BA    2.6
    9     PB    19.4
   10     PI    0.01   0.02   0.02   0.02   0.02   0.01   0.05   0.05   0.05   0.05
   11     PI    0.05   0.05   0.05   0.05   0.05   0.05   0.05   0.05   0.11   0.12
   12     PI    0.12   0.12   0.12   0.11   0.11   0.12   0.12   0.12   0.12   0.11
   13     PI    0.23   0.23   0.23   0.23   0.23   0.23   0.68   0.68   0.69   0.69
   14     PI    0.68   0.68   0.16   0.17   0.17   0.17   0.17   0.16   0.11   0.12
   15     PI    0.12   0.12   0.12   0.11   0.06   0.07   0.07   0.07   0.07   0.06
   16     PI    0.05   0.05   0.05   0.05   0.05   0.05   0.03   0.03   0.04   0.04
   17     PI    0.03   0.03
   18     LU     0     0.2
   19     UD    .66

   20     KK    BAS2
   21     KM        GEN. PMF
   22     BA    3.3
   23     LU     0     0.2
   24     UD    0.73
```

Sh. 20.2

JTK 4/3/87
HH 5/11/87

```
                LU      0    0.2
                UD   0.73

          25    KK   ST12   COMBINE BAS. 1&2 FLOWS
          26    HC     2

          27    KK   3,4       FLOW 1,2 FROM STA.1,2 TO 3,4
          28    RK  26400   .032    .04          TRAP      0   0.45

          29    KK   BAS4
          30    KM         GEN. PMF
          31    BA    6.4
          32    LU      0    0.2
          33    UD   0.75

          34    KK   BAS3
          35    KM         GEN. PMF
          36    BA   12.1
          37    LU      0    0.2
          38    UD    .96

          39    KK   ST34   COMBINE FLOWS 3,4
          40    HC     3

          41    KK   5,6       FLOW 3,4 FROM STA.3,4 TO 5,6
          42    RK  53856   .015    .04          TRAP      0   0.83
1                                    HEC-1 INPUT                                    PAGE  2

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

          43    KK   BAS5
          44    KM         GEN. PMF
          45    BA   20.7
          46    LU      0    0.2
          47    UD   1.73

          48    KK   BAS6
          49    KM         GEN. PMF
          50    BA   11.8
          51    LU      0    0.2
          52    UD   0.99

          53    KK   ST56   COMBINE FLOWS 5,6
          54    HC     3

          55    KK   7,8       FLOW 5,6 FROM STA.5,6 TO 7,8
          56    RK   6336  0.005    .04          TRAP      0   0.825

          57    KK   BAS8
          58    KM         GEN. PMF
          59    BA    0.5
          60    LU      0    0.2
          61    UD   0.52

          62    KK   BAS7
          63    KM         GEN. PMF
          64    BA   12.2
          65    LU      0    0.2
          66    UD   1.22

          67    KK   ST78   COMBINE FLOWS 7,8
          68    HC     3

          69    KK   9         FLOWS 7,8 FROM STA.7,8 TO 9
          70    RK  32736   0.01    .04          TRAP      0   0.85

          71    KK   BAS9
```

```
            KK    BAS9
            KM        GEN. PMF
73          BA    11.3
74          LU       0    0.2
75          UD    1.39

76          KK    ST9   COMBINE FLOWS
77          HC      2
78          ZZ
```

Sh. 20.3

JTK 4/3/87

HN 5/11/87

1

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FLOOD HYDROGRAPH PACKAGE HEC-1 (IBM XT 512K VERSION) -FEB 1,1985

U.S. ARMY CORPS OF ENGINEERS, THE HYDROLOGIC ENGINEERING CENTER, 609 SECOND STREET, DAVIS, CA. 95616

****

UNTRA - GREEN RIVER - BROWN WASH
GENERAL PMF - 72 HR.

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

  IT        HYDROGRAPH TIME DATA
                   NMIN          9  MINUTES IN COMPUTATION INTERVAL
                  IDATE     1    0  STARTING DATE
                  ITIME       0000  STARTING TIME
                     NQ        300  NUMBER OF HYDROGRAPH ORDINATES
                 NDDATE     2    0  ENDING DATE
                 NDTIME       2051  ENDING TIME

            COMPUTATION INTERVAL     .15 HOURS
                 TOTAL TIME BASE   44.85 HOURS

     ENGLISH UNITS
```

1

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	BAS1	1137.	40.05	1064.	332.	177.	2.60		
+	HYDROGRAPH AT	BAS2	2404.	40.05	2237.	701.	375.	5.50		
+	2 COMBINED AT	ST12	3540.	40.05	3300.	1033.	553.	8.10		
+	ROUTED TO	3,4	3539.	40.20	3281.	1027.	550.	8.10		
+	HYDROGRAPH AT	BAS4	2797.	40.05	2599.	816.	437.	6.40		
+	HYDROGRAPH AT	BAS3	5273.	40.35	4837.	1530.	823.	12.10		
+	3 COMBINED AT	ST34	11607.	40.35	10703.	3381.	1809.	26.60		

+		ST34	11687.	40.35	[illegible]	3381.	1009.	26.60
+	ROUTED TO	5,6	11504.	41.70	10101.	3144.	1682.	26.60
+	HYDROGRAPH AT	BASS	6863.	42.00	7782.	2536.	1357.	20.70
+	HYDROGRAPH AT	BASS	5144.	40.35	4721.	1500.	883.	11.80
+	3 COMBINED AT	ST35	25436.	41.65	22268.	7100.	3842.	59.10
+	ROUTED TO	7,8	25435.	42.00	22253.	7106.	3883.	59.10
+	HYDROGRAPH AT	BASS	219.	39.90	207.	64.	34.	.50
+	HYDROGRAPH AT	BASS	5286.	40.00	4779.	1540.	824.	12.20
+	3 COMBINED AT	ST78	30911.	41.65	27092.	8710.	4661.	71.80
+	ROUTED TO	9	30896.	42.30	26982.	8299.	4441.	71.80
+	HYDROGRAPH AT	BASS	4875.	41.25	4366.	1415.	757.	11.30
+	2 COMBINED AT	ST9	35749.	42.15	31053.	9715.	5198.	83.10

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

Sh. 20.4

JTK

4/3/87

HM 5/1/87

UMTRA – Green River

Sh. 21.1

Local PMF -6 hr.

JTK 4/3/87
HM 5/11/87

Computation of peak flow

Sh. 21.2

JTK
4/3/87

1 ****
FLOOD HYDROGRAPH PACKAGE HEC-1 (IBM XT 512K VERSION) -FEB 1,1985
U.S. ARMY CORPS OF ENGINEERS, THE HYDROLOGIC ENGINEERING CENTER, 609 SECOND STREET, DAVIS, CA. 95616
****

THIS HEC-1 VERSION CONTAINS ALL OPTIONS EXCEPT ECONOMICS, AND THE NUMBER OF PLANS ARE REDUCED TO 3

1 HEC-1 INPUT PAGE 1

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

  1       ID      UNTRA - GREEN RIVER - BROWN WASH
  2       ID      LOCAL  PMF = 6 HR.
  3       IT    9                   300
  4       IN    15
  5       IO    5

  6       KK    BAS1 SUB-BASIN 1
  7       KM      LOCAL  PMF
  8       BA    2.6
  9       PB    4.958
 10       PI  .0425  .0425  .0425  .0425  .085  .085  .085  .085  1.62  .84
 11       PI   .46   .37   .202   .202  .202  .202  .065  .065  .065  .065
 12       PI  .0225  .0225  .0225  .0225
 13       LU    0    0.2
 14       UD   .66

 15       KK    BAS2
 16       KM      LOCAL PMF
 17       BA    5.5
 18       PB    4.958
 19       PI  .0425  .0425  .0425  .0425  .085  .085  .085  .085  1.62  .84
```

```
17        BA    5.5
18        PB    4.938
19        PI  .0425  .0425  .0425  .0425   .065   .065   .065   .065   1.62    .84
20        PI    .46    .37   .202   .202   .202   .202   .065   .065   .065   .065
21        PI  .0225  .0225  .0225  .0225
22        LU     0    0.2
23        UD  0.73

24        KK   ST12   COMBINE BAS. 1&2 FLOWS
25        HC     2

26        KK   3,4        FLOW 1,2 FROM STA.1,2 TO 3,4
27        RK  26400   .032    .04           TRAP     0   0.45

28        KK   BAS4
29        KM        LOCAL PMF
30        BA    6.4
31        PB  4.938
32        PI  .0425  .0425  .0425  .0425   .065   .065   .065   .065   1.62    .84
33        PI    .46    .37   .202   .202   .202   .202   .065   .065   .065   .065
34        PI  .0225  .0225  .0225  .0225
35        LU     0    0.2
36        UD  0.75

37        KK   BAS3
38        KM        LOCAL PMF
39        BA   12.1
40        PB   5.32
41        PI  .0425  .0425  .0425  .0425   .065   .065   .065   .065   1.73    .96
42        PI    .48    .48  .2225  .2225  .2225  .2225   .065   .065   .065   .065
43        PI  .0225  .0225  .0225  .0225
44        LU     0    0.2
45        UD   .96
```



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

46        KK   ST34   COMBINE FLOWS 3,4
47        HC     3

48        KK   5,6        FLOW 3,4 FROM STA.3,4 TO 5,6
49        RK  53856   .015    .04           TRAP     0   0.63

50        KK   BAS5
51        KM        LOCAL PMF
52        BA   20.7
53        PB   5.99
54        PI  .0425  .0425  .0425  .0425   .065   .065   .065   .065   2.27    1.05
55        PI    .49    .41  .2275  .2275  .2275  .2275   .065   .065   .065   .065
56        PI  .0225  .0225  .0225  .0225
57        LU     0    0.2
58        UD   1.73

59        KK   BAS6
60        KM        LOCAL PMF
61        BA   11.8
62        PB   6.75
63        PI  .0425  .0425  .0425  .0425   .065   .065   .065   .065   2.81    1.21
64        PI    .51    .43   .235   .235   .235   .235   .065   .065   .065   .065
65        PI  .0225  .0225  .0225  .0225
66        LU     0    0.2
67        UD  0.95

68        KK   ST56   COMBINE FLOWS 5,6
69        HC     3

70        KK   7,8        FLOW 5,6 FROM STA.5,6 TO 7,8
71        RK   5736  0.035    .04           TRAP     0   0.025
```

Sh. 21.3

JTK

4/3/87

HM 5/11/87

```
                70         KK   7,8       FLOW 5,6 FROM STA.5,6 TO 7,8
                71         RK   6336  0.005    .04          TRAP      0  0.025

                72         KK   BASB
                73         KM        LOCAL PMF
                74         BA    0.5
                75         PB    5.99
                76         PI  .0425  .0425  .0425  .0425  .065  .065  .065  .065  2.27  1.05
                77         PI   .49   .41  .2275  .2275  .2275  .2275  .065  .065  .065  .065
                78         PI  .0225  .0225  .0225  .0225
                79         LU     0   0.2
                80         UD  0.52

                81         KK   BAS7
                82         KM        LOCAL PMF
                83         BA   12.2
                84         PB   5.34
                85         PI  .0425  .0425  .0425  .0425  .065  .065  .065  .065  1.74   .96
                86         PI   .48   .48   .225   .225   .225   .225  .065  .065  .065  .065
                87         PI  .0225  .0225  .0225  .0225
                88         LU     0   0.2
                89         UD  1.22
1                                          HEC-1 INPUT                                    PAGE  3

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

                90         KK   ST78   COMBINE FLOWS 7,8
                91         HC      3

                92         KK   9         FLOWS 7,8 FROM STA.7,8 TO 9
                93         RK  32736   0.01    .04          TRAP      0   0.05

                94         KK   BASS
                95         KM        LOCAL PMF
                96         BA   11.3
                97         PB   4.11
                98         PI  .0425  .0425  .0425  .0425  .065  .065  .065  .065  1.01   .68
                99         PI   .43   .34  .1975  .1975  .1975  .1975  .065  .065  .065  .065
               100         PI  .0225  .0225  .0225  .0225
               101         LU     0   0.2
               102         UD  1.39

               103         KK   ST9  COMBINE FLOWS
               104         HC      2
               105         ZZ
1                                          ****
                        FLOOD HYDROGRAPH PACKAGE HEC-1 (IBM XT 512K VERSION) -FEB 1,1985
                    U.S. ARMY CORPS OF ENGINEERS, THE HYDROLOGIC ENGINEERING CENTER, 609 SECOND STREET, DAVIS, CA. 95616
                                           ****



                                 UNTRA - GREEN RIVER - BROWN MASH
                                 LOCAL  PMF -  6 HR.

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

   IT         HYDROGRAPH TIME DATA
                    NMIN        9  MINUTES IN COMPUTATION INTERVAL
                   IDATE     1   0  STARTING DATE
                   ITIME      0000  STARTING TIME
                      NQ       300  NUMBER OF HYDROGRAPH ORDINATES
                  NDDATE     2   0  ENDING DATE
```

Sh. 21.4

FTK

4/3/87

HM 5/11/87

ITIME 0000 START.
NQ 300 NUMBER OF HYDROGRAPH ORDINATES
NDDATE 2 0 ENDING DATE
NOTIME 2051 ENDING TIME

COMPUTATION INTERVAL .15 HOURS
TOTAL TIME BASE 44.85 HOURS

ENGLISH UNITS

1

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	BAS1	4220.	3.00	1888.	272.	146.	2.60		
HYDROGRAPH AT	BAS2	8407.	3.00	2381.	576.	308.	5.50		
2 COMBINED AT	ST12	12536.	3.00	3350.	848.	454.	8.10		
ROUTED TO	3,4	12385.	3.15	3384.	848.	454.	8.10		
HYDROGRAPH AT	BAS4	9638.	3.15	2678.	678.	358.	6.40		
HYDROGRAPH AT	BAS3	17186.	3.30	5327.	1384.	741.	12.10		
3 COMBINED AT	ST34	38452.	3.15	11383.	2908.	1555.	26.60		
ROUTED TO	5,6	34831.	4.05	11429.	2912.	1558.	26.60		
HYDROGRAPH AT	BAS5	23187.	4.20	10720.	2741.	1467.	20.70		
HYDROGRAPH AT	BAS6	23938.	3.30	7218.	1807.	967.	11.80		
3 COMBINED AT	ST56	71154.	4.05	29163.	7439.	3992.	59.10		
ROUTED TO	7,8	70792.	4.20	29273.	7497.	4012.	59.10		
HYDROGRAPH AT	BAS8	1216.	2.85	265.	66.	35.	.50		
HYDROGRAPH AT	BAS7	14657.	3.60	5577.	1402.	750.	12.20		
3 COMBINED AT	ST78	84443.	4.05	35040.	8965.	4798.	71.80		
ROUTED TO	9	81819.	4.35	34652.	8972.	4802.	71.80		
HYDROGRAPH AT	BAS9	8670.	3.90	3657.	925.	495.	11.30		

Sh. 21.5

JTK

4/3/87

HM 5/11/87

HYDROGRAPH AT							
	8489	8870.	3.90	3857.	925.	493.	11.36
2 COMBINED AT							
+	579	89741.	4.35	38163.	9897.	5297.	83.10

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

Sh. 21.6

FIK
4/3/87
HM 5/11/87

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**********************************************************
*  WATER SURFACE PROFILES                                *
*  VERSION OF NOVEMBER 1976                              *
*  UPDATED MAY 1984                                      *
*                                                        *
*  RUN DATE  9-APR-87 TIME 09:24:14          *
**********************************************************
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*****************************************
*  U.S. ARMY CORPS OF ENGINEERS         *
*  THE HYDROLOGIC ENGINEERING CENTER    *
*  609 SECOND STREET, SUITE D           *
*  DAVIS, CALIFORNIA 95616              *
*  (916) 440-2105 (FTS) 448-2105        *
*****************************************
```


```
X     X  XXXXXXX   XXXXX             XXXXX
X     X  X        X     X           X     X
X     X  X        X                 X     X
XXXXXXX  XXXX     X          XXXXX   XXXXX
X     X  X        X                 X
X     X  X        X     X           X
X     X  XXXXXXX   XXXXX             XXXXXXX
```

Sh. 22 A.1

UMTRA - Green River

Using TAC's data ref(4)

Subcritical flow
using 7 cross sections

Ltr 4/9/87 HEC clients

Sh. 22A-2

FIK 4/9/87
HN 5/14/87

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**************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
**************************************************

T1      UMTRA - GREEN RIVER - LOCAL PMF
T2      WATER SURFACE PROFILE ON BROWN WASH
T3

J1  ICHECK     INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ
      0.        0.        0.        0.  0.009000      0.00      0.0    100000.  4074.000    0.000
J2  NPROF      IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE
     -1.000     0.000     0.000     0.000     0.000     0.000    -1.000     0.000     0.000     0.000
J3  VARIABLE CODES FOR SUMMARY PRINTOUT
     38.000    43.000     1.000     2.000    13.000    14.000    15.000    35.000    60.000    59.000
     55.000    26.000    56.000     0.000    38.000    58.000    25.000     1.000    42.000     8.000
     51.000    10.000     4.000    53.000    54.000    33.000     5.000     0.000     0.000     0.000

NC    0.045     0.050     0.035     0.100     0.300     0.000     0.000     0.000     0.000     0.000
X1    7.000    12.000   242.000   970.000     0.000     0.000     0.000     0.000     0.000     0.000
GR 4090.000     0.000  4070.000   140.000  4064.000   242.000  4060.000   665.000  4056.000   680.000
GR 4060.000   710.000  4068.000   860.000  4066.000   915.000  4066.000   970.000  4068.000  1180.000
GR 4068.000  1350.000  4088.000  2040.000     0.000     0.000     0.000     0.000     0.000     0.000

X1    6.000     8.000   110.000   890.000   385.000   410.000   400.000     0.000     0.000     0.000
GR 4090.000     0.000  4074.000   110.000  4070.000   490.000  4062.000   525.000  4076.000   685.000
GR 4076.000   890.000  4080.000  1265.000  4100.000  1885.000     0.000     0.000     0.000     0.000

X1    5.500    11.000   180.000   890.000   100.000   270.000   190.000     0.000     0.000     0.000
GR 4090.000     0.000  4080.000    80.000  4080.000   140.000  4071.000   180.000  4070.000   530.000
GR 4062.000   570.000  4073.000   680.000  4076.000   890.000  4079.000   940.000  4080.000  1200.000
GR 4090.000  1460.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000

NC    0.000     0.000     0.000     0.200     0.500     0.000     0.000     0.000     0.000     0.000
X1    5.000    10.000   270.000   876.000   230.000   290.000   250.000     0.000     0.000     0.000
GR 4100.000     0.000  4080.000    95.000  4076.000   270.000  4076.000   470.000  4064.000   530.000
GR 4074.000   635.000  4064.000   876.000  4080.000   890.000  4080.000  1090.000  4110.000  1885.000
```

X1	4.000	9.000	385.000	840.000	470.000	420.000	440.000	0.000	0.000	1.000
QR	4130.000	0.000	4090.000	100.000	4080.000	385.000	4068.000	530.000	4078.000	800.000
QR	4080.000	840.000	4086.000	870.000	4090.000	1165.000	4120.000	1930.000	0.000	0.000
X1	3.000	11.000	400.000	880.000	315.000	305.000	320.000	0.000	0.000	1.000
QR	4130.000	0.000	4100.000	80.000	4090.000	170.000	4080.000	400.000	4074.000	455.000
QR	4072.000	570.000	4080.000	880.000	4088.000	925.000	4090.000	1150.000	4110.000	1640.000
QR	4120.000	1820.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NC	0.000	0.000	0.000	0.100	0.300	0.000	0.000	0.000	0.000	0.000
X1	2.500	11.000	300.000	960.000	365.000	240.000	300.000	0.000	0.000	0.000
QR	4110.000	0.000	4090.000	250.000	4080.000	300.000	4073.000	420.000	4076.000	500.000
QR	4076.000	560.000	4078.000	620.000	4078.000	960.000	4091.000	1000.000	4096.000	1330.000
QR	4110.000	1700.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
X1	2.000	10.000	380.000	920.000	335.000	250.000	300.000	0.000	0.000	0.000
QR	4114.000	0.000	4090.000	200.000	4080.000	380.000	4074.000	400.000	4074.000	430.000
QR	4078.000	510.000	4080.000	920.000	4094.000	990.000	4094.000	1170.000	4120.000	1890.000
X1	1.000	7.000	150.000	765.000	730.000	510.000	610.000	0.000	0.000	0.000
QR	4104.000	0.000	4090.000	150.000	4084.000	390.000	4080.000	470.000	4102.000	765.000
QR	4110.000	1145.000	4120.000	1385.000	0.000	0.000	0.000	0.000	0.000	0.000
EJ	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Sh. 22A.3

JTK 4/9/87
HM 5/12/87

Sh. 22. A. 4

JTK 4/9/87
HM 5/12/87

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	GLOB	GCH	GROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*PROF 1

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

CCHV= 0.100 CEHV= 0.300
*SECNO 7.000
3720 CRITICAL DEPTH ASSUMED

7.00	15.15	4071.15	4071.15	4074.00	4074.11	2.96	0.00	0.00	4064.00
100000.	3022.	87956.	9022.	428.	6044.	1577.	0.	0.	4066.00
0.00	7.07	14.55	5.72	0.045	0.035	0.050	0.000	4056.00	131.97
0.007001	0.	0.	0.	0	10	4	0.00	1326.60	1458.57

*SECNO 6.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

6.00	18.22	4080.22	4080.22	0.00	4083.66	3.43	2.98	0.14	4074.00
100000.	829.	95414.	3758.	133.	6283.	834.	70.	12.	4076.00
0.01	6.23	15.19	4.51	0.045	0.035	0.050	0.000	4062.00	67.23
0.007943	385.	400.	410.	0	11	0	0.00	1204.65	1271.87

*SECNO 5.500

3301 HV CHANGED MORE THAN HVINS

5.50	20.81	4082.81	4079.53	0.00	4084.61	1.80	0.79	0.16	4071.00
100000.	2424.	93317.	4258.	492.	8409.	1228.	110.	18.	4076.00
0.01	4.92	11.10	3.47	0.045	0.035	0.050	0.000	4062.00	57.54
0.002537	100.	190.	270.	3	8	0	0.00	1215.48	1273.01

CCHV= 0.200 CEHV= 0.500
*SECNO 5.000

5.00	19.29	4083.29	4081.19	0.00	4085.57	2.28	0.72	0.24	4076.00
100000.	5373.	90789.	3838.	952.	7201.	960.	165.	24.	4064.00
0.02	5.64	12.61	4.00	0.045	0.035	0.050	0.000	4064.00	79.36
0.003265	230.	250.	290.	3	12	0	0.00	1097.89	1177.25

*SECNO 4.000

9-APR-87 09:24:14

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	QLOSS	BANK ELEV
Q	GLOB	GCH	GROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

Sh. 22A.5

JTK 4/9/87
HM 5/14/87

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

4.00	17.44	4085.44	4085.44	0.00	4090.60	5.15	2.06	1.44	4080.00
100000.	2306.	97334.	360.	422.	5277.	74.	241.	33.	4080.00
0.03	5.46	18.45	4.85	0.045	0.035	0.050	0.000	4068.00	229.86
0.007205	470.	440.	420.	0	11	0	0.00	637.35	867.22

*SECNO 3.000

3301 HV CHANGED MORE THAN HVINS

3.00	17.89	4089.89	4086.49	0.00	4092.47	2.58	1.35	0.52	4080.00
100000.	3689.	92666.	1646.	1125.	6957.	466.	293.	39.	4080.00
0.03	5.06	13.32	3.53	0.045	0.035	0.050	0.000	4072.00	172.54
0.002788	315.	320.	305.	4	15	0	0.00	965.01	1137.56

CCHV= 0.100 CEHV= 0.300
*SECNO 2.500

3301 HV CHANGED MORE THAN HVINS

2.50	18.65	4091.65	4085.88	0.00	4093.19	1.54	0.62	0.10	4080.00
100000.	1542.	97239.	1219.	350.	9650.	300.	359.	45.	4078.00
0.04	4.41	10.08	4.06	0.045	0.035	0.050	0.000	4073.00	229.36
0.001576	365.	300.	240.	2	19	0	0.00	813.61	1042.97

*SECNO 2.000

3301 HV CHANGED MORE THAN HVINS

2.00	17.78	4091.78	4088.18	0.00	4094.00	2.21	0.60	0.20	4080.00
100000.	7433.	90862.	1706.	1235.	7335.	347.	425.	51.	4080.00
0.05	6.02	12.39	4.91	0.045	0.035	0.050	0.000	4074.00	185.11
0.002633	335.	300.	250.	2	15	0	0.00	793.82	978.93

Sh. 22A.6

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

JTC 4/9/87
HM 4/10/87

*SECNO 1.000

3301 HV CHANGED MORE THAN HVINS

7165 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

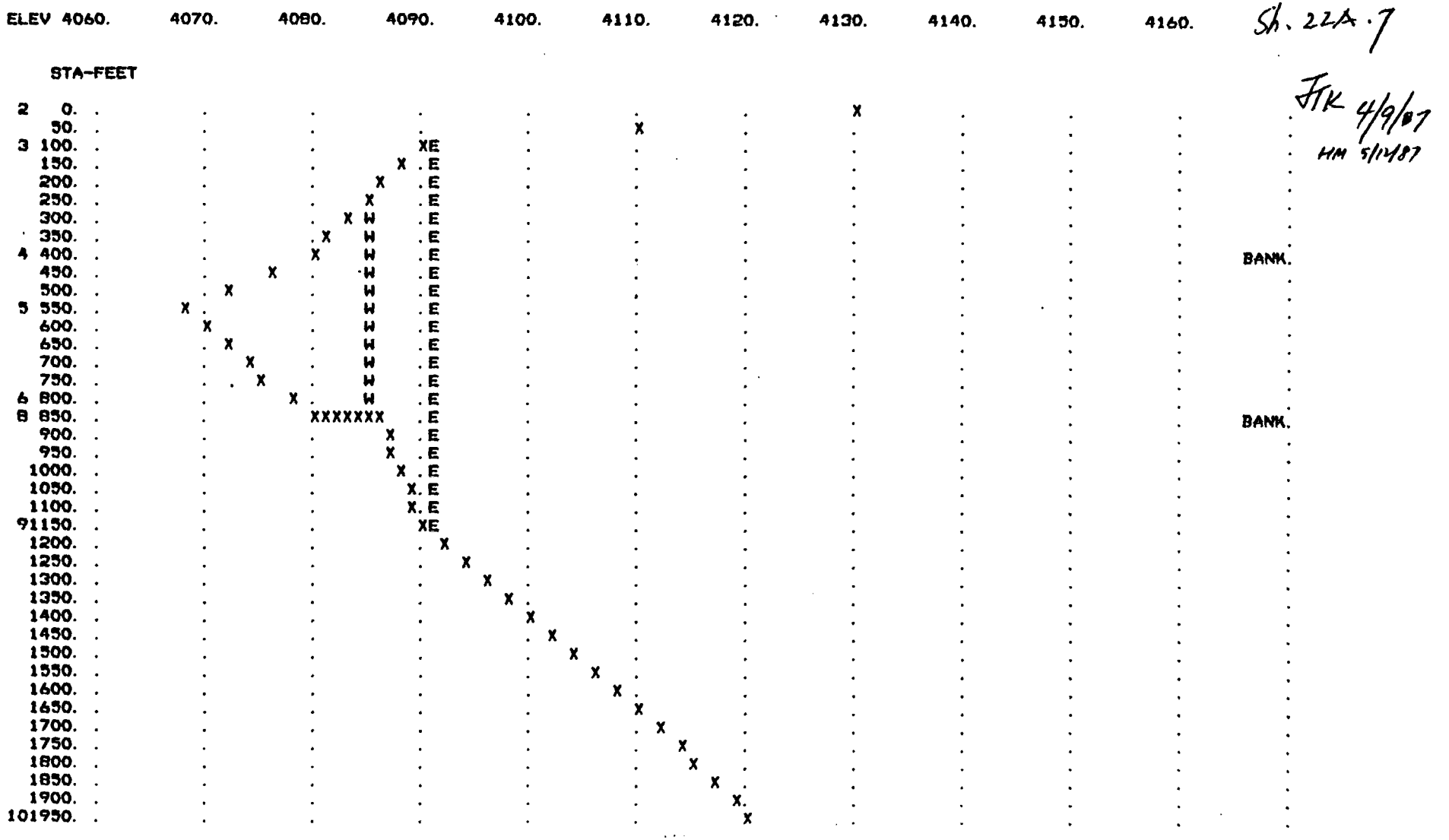
1.00	16.93	4096.93	4096.93	0.00	4101.81	4.88	2.63	0.80	4090.00
100000.	1755.	98245.	0.	256.	5501.	0.	530.	61.	4102.00
0.06	6.82	17.86	0.00	0.045	0.035	0.000	0.000	4080.00	75.72
0.008167	730.	610.	510.	0	11	0	0.00	621.34	697.06

CROSS SECTION 4.00
STREAM
DISCHARGE= 100000.

PLOTTED POINTS (BY PRIORITY)-B=BOTTOM BRIDGE, T=TOP BRIDGE, X=GROUND, W=WATER SUR, E=ENERGY GRADIENT, C=CRITICAL WSEL

Sh. 22A-7

JTK 4/9/87
HM 5/14/87



NRD= 0 ELLC= 9999999.00 ELTRD= 9999999.00

EL(I), STA(I)

4130.00	0.00	4090.00	100.00	4080.00	385.00	4068.00	530.00	4078.00	800.00
4080.00	840.00	4086.00	870.00	4090.00	1165.00	4120.00	1930.00		

Sh. 22A-8

CROSS SECTION 3.00
STREAM
DISCHARGE= 100000.

PLOTTED POINTS (BY PRIORITY)-B=BOTTOM BRIDGE, T=TOP BRIDGE, X=GROUND, W=WATER SUR, E=ENERGY GRADIENT, C=CRITICAL WSEL

FTK 4/9/87
HM 5/12/87

```
ELEV 4070.      4080.      4090.      4100.      4110.      4120.      4130.      4140.      4150.      4160.      4170.

    STA-FEET

 2   0. .          .          .          .          .          .          X          .          .          .          .          .
      50. .          .          .          .          .        X .          .          .          .          .          .          .
 3  100. .          .          .          .          X          .          .          .          .          .          .          .
 4  150. .          .          .            X E      .          .          .          .          .          .          .          .
    200. .          .          .          X W E      .          .          .          .          .          .          .          .
    250. .          .          X          W E      .          .          .          .          .          .          .          .
    300. .          .        X C          W E      .          .          .          .          .          .          .          .
    350. .          .      X   C          W E      .          .          .          .          .          .          .          .
 5  400. .          .      X   C          W E      .          .          .          .          .          .          .      BANK.
 6  450. .        X .        C          W E      .          .          .          .          .          .          .          .
    500. .      X   .        C          W E      .          .          .          .          .          .          .          .
 7  550. .    X     .        C          W E      .          .          .          .          .          .          .          .
    600. .      X   .        C          W E      .          .          .          .          .          .          .          .
    650. .        X .        C          W E      .          .          .          .          .          .          .          .
    700. .          X        C          W E      .          .          .          .          .          .          .          .
    750. .            X      C          W E      .          .          .          .          .          .          .          .
    800. .              X    C          W E      .          .          .          .          .          .          .          .
    850. .                X  C          W E      .          .          .          .          .          .          .          .
 9  900. .                XXXXXXXXX W E      .          .          .          .          .          .          .      BANK.
    950. .                .          X W E      .          .          .          .          .          .          .          .
   1000. .                .            XW E      .          .          .          .          .          .          .          .
   1050. .                .            XW E      .          .          .          .          .          .          .          .
   1100. .                .             X E      .          .          .          .          .          .          .          .
 101150. .                .             X E      .          .          .          .          .          .          .          .
   1200. .                .               X      .          .          .          .          .          .          .          .
   1250. .                .                 X    .          .          .          .          .          .          .          .
   1300. .                .                   X  .          .          .          .          .          .          .          .
   1350. .                .                     X.          .          .          .          .          .          .          .
   1400. .                .                     X          .          .          .          .          .          .          .
   1450. .                .                      .X        .          .          .          .          .          .          .
   1500. .                .                       .  X     .          .          .          .          .          .          .
   1550. .                .                       .    X   .          .          .          .          .          .          .
   1600. .                .                       .      X .          .          .          .          .          .          .
 111650. .                .                       .        X          .          .          .          .          .          .
   1700. .                .                       .          .X       .          .          .          .          .          .
   1750. .                .                       .            .  X   .          .          .          .          .          .
 121800. .                .                       .               .X  .          .          .          .          .          .

NRD=       0 ELLC=  9999999.00 ELTRD=  9999999.00

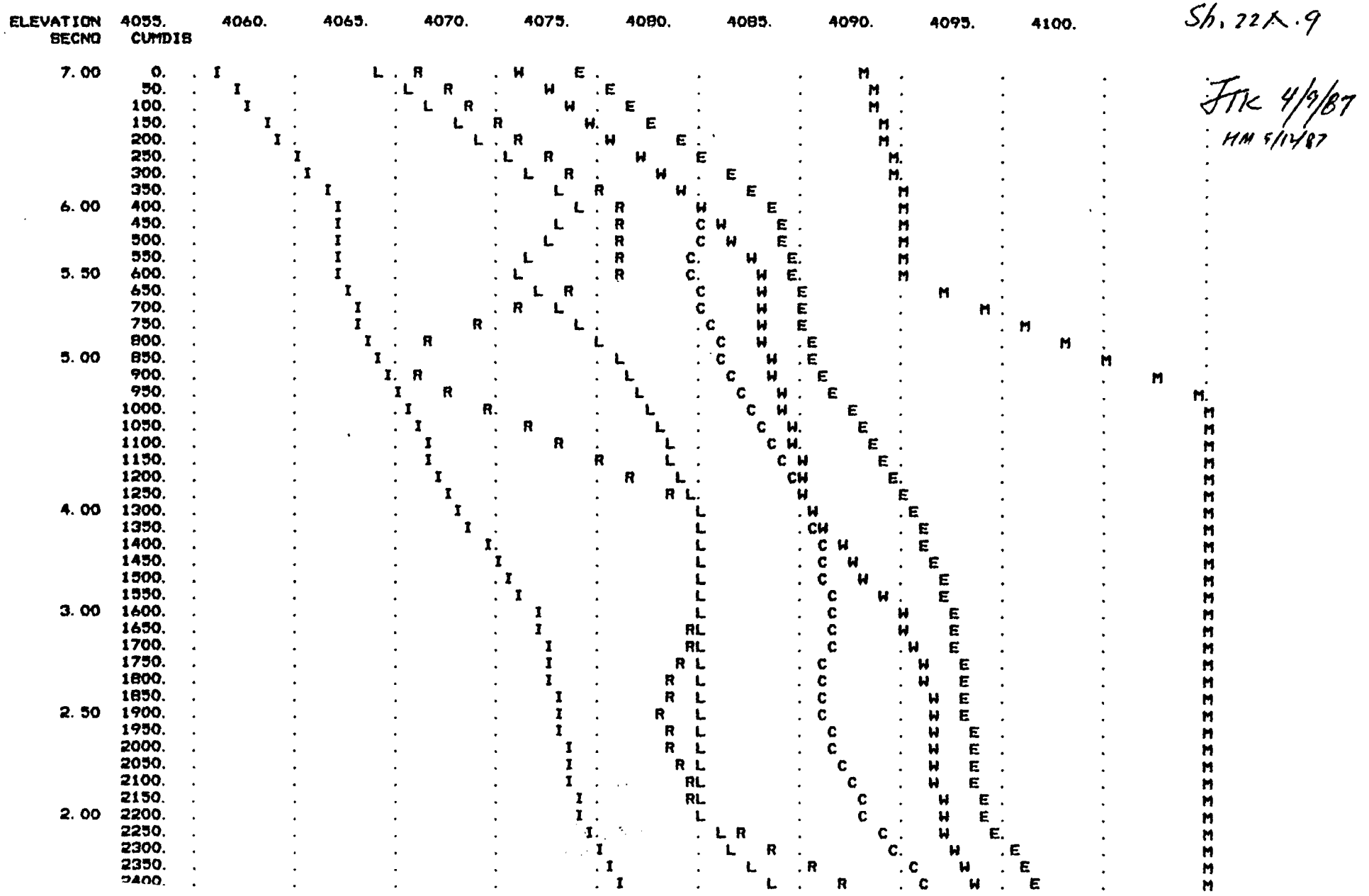
  EL(I), STA(I)
    4130.00        0.00     4100.00       80.00     4090.00      170.00     4080.00      400.00     4074.00      455.00
    4072.00      570.00     4080.00      880.00     4088.00      925.00     4090.00     1150.00     4110.00     1640.00
    4120.00     1820.00
```

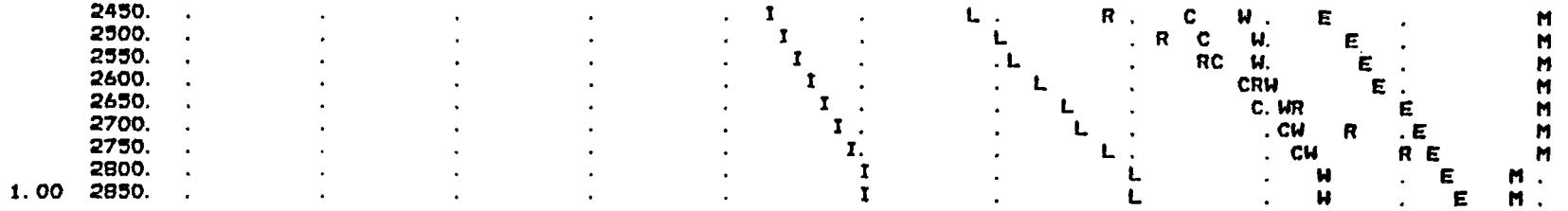
PROFILE FOR STREAM

PLOTTED POINTS (BY PRIORITY)-E-ENERGY, W-WATER SURFACE, I-INVERT, C-CRITICAL W.S., L-LEFT BANK, R-RIGHT BANK, M-LOWER END STA

Sh. 22A.9

FTK 4/9/87
HM 5/14/87





Sh. 22A-10

FTK 4/9/87
HM 5/14/87

****
HEC2 RELEASE DATED NOV 76 UPDATED MAY 1984
ERROR CORR - 01,02,03,04,05,06
MODIFICATION - 50,51,52,53,54,55,56
****

Sh. 22A.11

JTK 4/9/87
HM 5/14/87

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

SUMMARY PRINTOUT

	SECNO	Q	CWSEL	CRIWS	GLOB	GCH	GROB	GLOBP	GCHP	GROBP	VLOB	VCH	VROB
*	7.000	100000.00	4071.15	4071.15	3022.18	87956.16	9021.66	3.02	87.96	9.02	7.07	14.55	5.72
*	6.000	100000.00	4080.22	4080.22	828.76	95413.52	3757.72	0.83	95.41	3.76	6.23	15.19	4.51
	5.500	100000.00	4082.81	4079.53	2424.47	93317.07	4258.46	2.42	93.32	4.26	4.92	11.10	3.47
	5.000	100000.00	4083.29	4081.19	5373.17	90789.27	3837.56	5.37	90.79	3.84	5.64	12.61	4.00
*	4.000	100000.00	4085.44	4085.44	2306.18	97334.28	359.55	2.31	97.33	0.36	5.46	18.45	4.85
	3.000	100000.00	4089.89	4086.49	5688.55	92665.67	1645.78	5.69	92.67	1.65	5.06	13.32	3.53
	2.500	100000.00	4091.65	4085.88	1541.68	97238.88	1219.45	1.54	97.24	1.22	4.41	10.08	4.06
	2.000	100000.00	4091.78	4088.18	7432.88	90861.55	1705.56	7.43	90.86	1.71	6.02	12.39	4.91
*	1.000	100000.00	4096.93	4096.93	1755.21	98244.80	0.00	1.76	98.24	0.00	6.82	17.86	0.00

Sh. 22A.12

JTK 4/9/87
HM 5/14/87

SUMMARY PRINTOUT

	SECNO	KRATIO	AREA	CWSEL	ELMIN	DEPTH	DIFWSX	HV	TOPWID	SSTA	ENDST	K*CHSL	10K*S
*	7.000	0.00	8048.28	4071.15	4056.00	15.15	0.00	2.96	1326.60	131.97	1458.57	0.00	70.01
*	6.000	0.94	7249.86	4080.22	4062.00	18.22	9.07	3.43	1204.65	67.23	1271.87	15.00	79.43
	5.500	1.77	10129.13	4082.81	4062.00	20.81	2.59	1.80	1215.48	57.54	1273.01	0.00	25.37
	5.000	0.88	9113.40	4083.29	4064.00	19.29	0.48	2.28	1097.89	79.36	1177.25	8.00	32.65
*	4.000	0.67	5773.03	4085.44	4068.00	17.44	2.15	5.15	637.35	229.86	867.22	9.09	72.05
	3.000	1.61	8547.39	4089.89	4072.00	17.89	4.45	2.58	965.01	172.54	1137.56	12.50	27.88
	2.500	1.33	10299.36	4091.65	4073.00	18.65	1.76	1.54	813.61	229.36	1042.97	3.33	15.76
	2.000	0.77	8916.78	4091.78	4074.00	17.78	0.13	2.21	793.82	185.11	978.93	3.33	26.33
*	1.000	0.57	5758.50	4096.93	4080.00	16.93	5.15	4.88	621.34	75.72	697.06	9.84	81.67

SUMMARY OF ERRORS AND SPECIAL NOTES

```
CAUTION  SECNO=     7.000  PROFILE= 1  CRITICAL DEPTH ASSUMED

CAUTION  SECNO=     6.000  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=     6.000  PROFILE= 1  MINIMUM SPECIFIC ENERGY

CAUTION  SECNO=     4.000  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=     4.000  PROFILE= 1  MINIMUM SPECIFIC ENERGY

CAUTION  SECNO=     1.000  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=     1.000  PROFILE= 1  MINIMUM SPECIFIC ENERGY
```

Sh. 22A.13

JTK 4/9/87

HM 5/12/87

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**************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
**************************************************
```

Sh. 22B.1

JIMK

UMTRA - Green River

WSLP

Subcritical flow

using 7 cross sections adjusted by MKE

OU5;1

JTK 4/16/87

HM 5/14/87

File _DUA0:[251020]WSLP.OU5;1 (5493,35,0), last revised on 16-APR-1987 15:51, is a 82 block sequential file owned by UIC [ER509501,EARTH]. The records are variable length with FORTRAN (FTN) carriage control. The longest record is 133 bytes.

Job WSLP (249) queued to SYS$PRINT on 16-APR-1987 15:51 by user JIMK, UIC [ER509501,EARTH], under account EARTH at priority 100, started on printer _TXA2: on 16-APR-1987 15:51 from queue SYS$PRINT.

CCCCCCCCC 999… CCCCCCCCC
CCCCCCCCC 9999999999999999999999999 Digital Equipment Corporation - VAX/VMS Version V4.5 9999999999999999999999999 CCCCCCCCC
CCCCCCCCC 999… CCCCCCCCC

****
* WATER SURFACE PROFILES *

****
* U.S. ARMY CORPS OF ENGINEERS *

```
*********************************************************
*  WAT  URFACE PROFILES                                 *
*  VE    OF NOVEMBER 1976                               *
*  UPL  D MAY 1984                                      *
*                                                       *
*  RUN DATE 16-APR-87 TIME 15:51:20                     *
*********************************************************
```


```
*********************************************
*  U.S. ARMY CORPS OF ENGIN  S              *
*  THE HYDROLOGIC ENGINEER  ENTER           *
*  609 SECOND STREET, SUITE                 *
*  DAVIS, CALIFORNIA 95616                  *
*  (916) 440-2105 (FTS) 448-2105            *
*********************************************
```


Sh. 22B·2

FTR 4/16/87
HM 5/14/87

```
X     X  XXXXXXX   XXXXX              XXXXX
X     X  X        X     X            X     X
X     X  X        X                        X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X        X                   X
X     X  X        X     X             X
X     X  XXXXXXX   XXXXX              XXXXXXX
```

```
**************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01, 02, 03, 04, 05, 06
  MODIFICATION -  50, 51, 52, 53, 54, 55, 56
**************************************************

T1      UMTRA - GREEN RIVER - LOCAL PMF
T2      WATER SURFACE PROFILE ON BROWN WASH
T3      DISCHARGE = 100000 CFS

J1  ICHECK     INQ        NINV       IDIR       STRT       METRIC     HVINS      Q          WSEL       FQ

       0.       0.         0.         0.   0.009000       0.00       0.0     100000.   4074.000    0.000

J2  NPROF      IPLOT      PRFVS      XSECV      XSECH      FN         ALLDC      IBW        CHNIM      ITRACE

     -1.000     0.000      0.000      0.000      0.000      0.000     -1.000     0.000      0.000      0.000

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

     38.000     43.000      1.000      2.000     13.000     14.000     15.000     35.000     60.000     59.000

     55.000     26.000     56.000      0.000     38.000     58.000     25.000      1.000     42.000      8.000

     51.000     10.000      4.000     53.000     54.000     33.000      5.000      0.000      0.000      0.000

NC       0.045      0.050      0.035      0.100      0.300      0.000      0.000      0.000      0.000      0.000
X1       7.000     12.000    242.000    970.000      0.000      0.000      0.000      0.000      0.000      0.000
GR    4090.000      0.000   4070.000    140.000   4064.000    242.000   4060.000    665.000   4056.000    680.000
GR    4060.000    710.000   4068.000    860.000   4066.000    915.000   4066.000    970.000   4068.000   1180.000
GR    4068.000   1350.000   4088.000   2040.000      0.000      0.000      0.000      0.000      0.000      0.000

X1       6.000      8.000    110.000    890.000    385.000    410.000    400.000      0.000      0.000      0.000
GR    4090.000      0.000   4074.000    110.000   4070.000    490.000   4062.000    525.000   4078.000    685.000
GR    4078.000    890.000   4080.000   1265.000   4100.000   1885.000      0.000      0.000      0.000      0.000

X1       5.500     11.000    180.000    890.000    150.000    280.000    270.000      0.000      0.000      0.000
GR    4090.000      0.000   4080.000     80.000   4080.000    140.000   4071.000    180.000   4070.000    530.000
GR    4062.000    570.000   4073.000    680.000   4076.000    890.000   4079.000    940.000   4080.000   1200.000
GR    4090.000   1460.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000

NC       0.000      0.000      0.000      0.200      0.500      0.000      0.000      0.000      0.000      0.000
X1       5.000     10.000    270.000    876.000    230.000    290.000    250.000      0.000      0.000      0.000
GR    4100.000      0.000   4080.000     95.000   4076.000    270.000   4076.000    470.000   4064.000    530.000
GR    4074.000    635.000   4076.000    876.000   4082.000    890.000   4082.000   1090.000   4110.000   1885.000
```

Sh. 22 B. 3

JTK 4/16/87
HM 5/14/87

Sh. 22-B-4

Sh. 22B.4

JTK 4/16/87 HM 5/17/87

X1	4.000	9.000	385.000	840.000	470.000	440.000	460.000	0.000	0.000	1.000
QR	4130.000	0.000	4090.000	100.000	4080.000	385.000	4068.000	530.000	4078.000	750.000
QR	4080.000	840.000	4086.000	870.000	4090.000	1165.000	4120.000	1930.000	0.000	0.000
X1	3.000	12.000	400.000	880.000	315.000	320.000	318.000	0.000	0.000	1.000
QR	4130.000	0.000	4100.000	80.000	4090.000	170.000	4080.000	400.000	4074.000	455.000
QR	4072.000	570.000	4076.000	620.000	4080.000	880.000	4088.000	925.000	4090.000	1150.000
QR	4110.000	1640.000	4120.000	1820.000	0.000	0.000	0.000	0.000	0.000	0.000
NC	0.000	0.000	0.000	0.100	0.300	0.000	0.000	0.000	0.000	0.000
X1	2.500	12.000	300.000	960.000	365.000	380.000	380.000	0.000	0.000	0.000
QR	4110.000	0.000	4090.000	250.000	4080.000	300.000	4073.000	420.000	4076.000	500.000
QR	4076.000	560.000	4078.000	620.000	4078.000	800.000	4080.000	960.000	4091.000	1000.000
QR	4096.000	1330.000	4110.000	1700.000	0.000	0.000	0.000	0.000	0.000	0.000
X1	2.000	11.000	380.000	900.000	350.000	300.000	350.000	0.000	0.000	0.000
QR	4114.000	0.000	4090.000	200.000	4080.000	380.000	4074.000	400.000	4074.000	430.000
QR	4078.000	510.000	4080.000	600.000	4080.000	900.000	4094.000	990.000	4094.000	1170.000
QR	4120.000	1890.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
X1	1.000	7.000	150.000	765.000	730.000	510.000	610.000	0.000	0.000	0.000
QR	4104.000	0.000	4090.000	150.000	4084.000	390.000	4080.000	470.000	4102.000	765.000
QR	4110.000	1145.000	4120.000	1385.000	0.000	0.000	0.000	0.000	0.000	0.000
EJ	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	QLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

Sh. 22B.5

JTK 4/16/87
HM 5/12/87

*PROF 1

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

CCHV= 0.100 CEHV= 0.300
*SECNO 7.000
3720 CRITICAL DEPTH ASSUMED

7.00	15.15	4071.15	4071.15	4074.00	4074.11	2.96	0.00	0.00	4064.00
100000.	3022.	87956.	9022.	428.	6044.	1577.	0.	0.	4066.00
0.00	7.07	14.55	5.72	0.045	0.035	0.050	0.000	4056.00	131.97
0.007001	0.	0.	0.	0	10	4	0.00	1326.60	1458.57

*SECNO 6.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

6.00	19.23	4081.23	4081.23	0.00	4084.42	3.19	2.81	0.07	4074.00
100000.	1168.	95215.	3617.	180.	6503.	861.	72.	12.	4078.00
0.01	6.49	14.64	4.20	0.045	0.035	0.050	0.000	4062.00	60.27
0.007056	385.	400.	410.	0	13	0	0.00	1242.99	1303.26

*SECNO 5.500

3301 HV CHANGED MORE THAN HVINS

5.50	22.05	4084.05	4079.53	0.00	4085.43	1.38	0.83	0.18	4071.00
100000.	2930.	91205.	5865.	650.	9290.	1723.	130.	19.	4076.00
0.02	4.50	9.82	3.40	0.045	0.035	0.050	0.000	4062.00	47.61
0.001739	150.	270.	280.	3	11	0	0.00	1257.66	1305.27

CCHV= 0.200 CEHV= 0.500
*SECNO 5.000

3301 HV CHANGED MORE THAN HVINS

5.00	19.92	4083.92	4083.07	0.00	4086.99	3.07	0.71	0.84	4076.00
100000.	8396.	89778.	1826.	1073.	6136.	505.	187.	26.	4076.00
0.02	7.83	14.63	3.61	0.045	0.035	0.050	0.000	4064.00	76.38
0.005440	230.	250.	290.	3	15	0	0.00	1068.16	1144.54

Sh. 22B.6

JTK 4/16/87
HM 5/14/87

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	QLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 4.000

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

4.00	18.09	4086.09	4086.09	0.00	4091.12	5.03	2.85	0.98	4080.00
100000.	3088.	96426.	486.	528.	5271.	93.	259.	36.	4080.00
0.03	5.84	18.29	5.23	0.045	0.035	0.050	0.000	4068.00	211.44
0.007098	470.	460.	440.	0	11	0	0.00	665.19	876.63

*SECNO 3.000

3301 HV CHANGED MORE THAN HVINS

3.00	18.42	4090.42	4087.25	0.00	4092.99	2.57	1.38	0.49	4080.00
100000.	6845.	90925.	2230.	1247.	6791.	610.	312.	42.	4080.00
0.04	5.49	13.39	3.66	0.045	0.035	0.050	0.000	4072.00	166.24
0.002911	315.	318.	320.	4	11	0	0.00	994.00	1160.24

CCHV= 0.100 CEHV= 0.300
*SECNO 2.500

3301 HV CHANGED MORE THAN HVINS

2.50	19.41	4092.41	4086.14	0.00	4093.84	1.43	0.74	0.11	4080.00
100000.	1768.	97086.	1146.	407.	9991.	342.	396.	50.	4080.00
0.05	4.35	9.72	3.35	0.045	0.035	0.050	0.000	4073.00	219.87
0.001399	365.	380.	380.	2	19	0	0.00	873.24	1093.10

*SECNO 2.000

3301 HV CHANGED MORE THAN HVINS

2.00	18.54	4092.54	4088.80	0.00	4094.71	2.17	0.65	0.22	4080.00
100000.	8786.	88643.	2570.	1385.	7174.	506.	475.	56.	4080.00
0.05	6.34	12.36	5.08	0.045	0.035	0.050	0.000	4074.00	178.78
0.002565	350.	350.	300.	2	15	0	0.00	801.88	980.66

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	GLOB	GCH	GROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

Sh. 22B.7

*SECNO 1.000

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

1.00	16.94	4096.94	4096.94	0.00	4101.81	4.87	2.59	0.81	4090.00
100000.	1758.	98242.	0.	258.	5505.	0.	580.	67.	4102.00
0.06	6.81	17.85	0.00	0.045	0.035	0.000	0.000	4080.00	75.64
0.008149	730.	610.	510.	0	11	0	0.00	621.52	697.16

JTK 4/16/87
HM 5/14/87

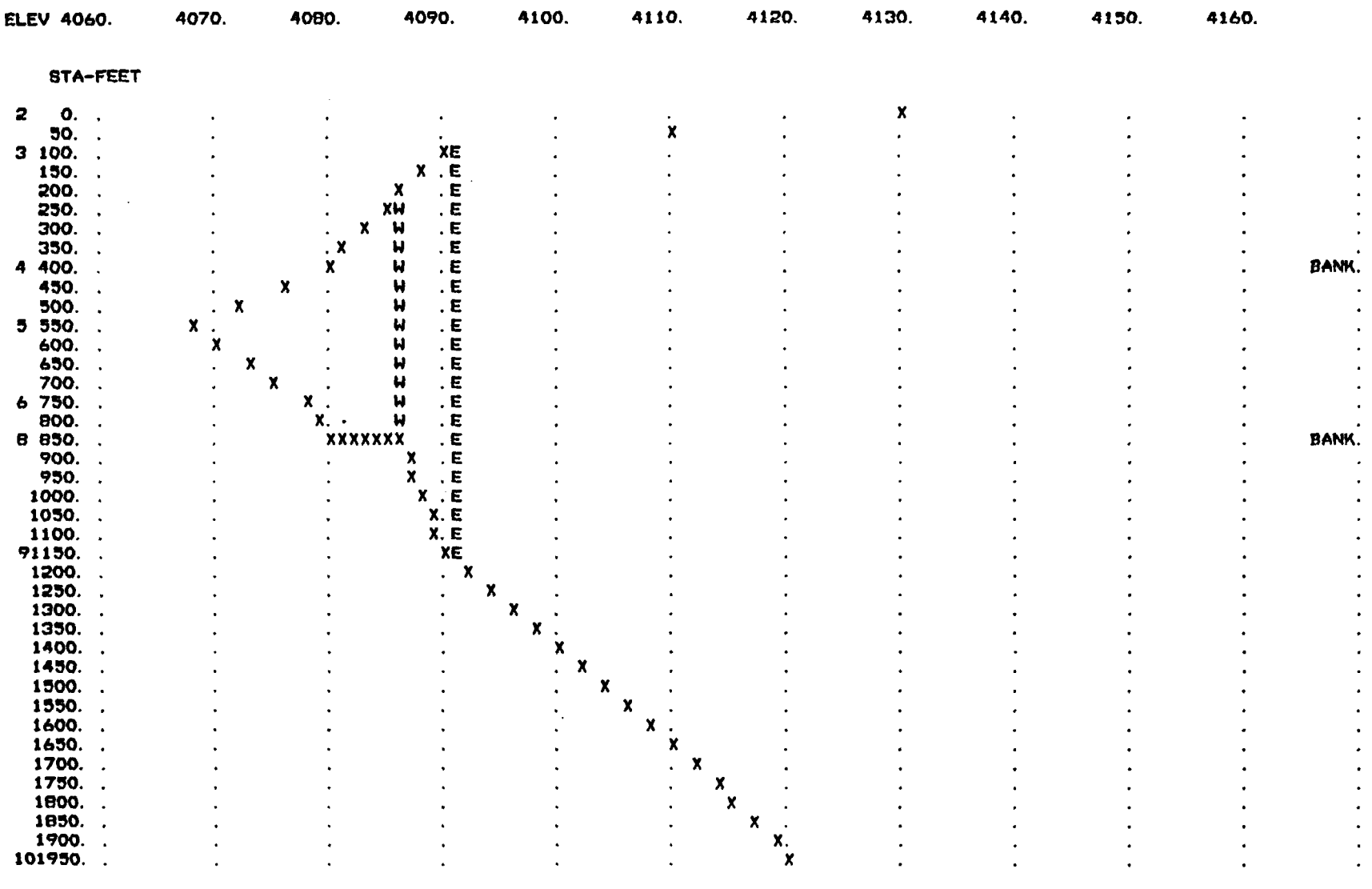
Sh. 22B.9

Sh. 22B.8

JTK 4/16/87
HM 5/14/87

CROSS SECTION 4.00
STREAM DISCHARGE = 100000 CFS
DISCHARGE= 100000.

PLOTTED POINTS (BY PRIORITY)-B=BOTTOM BRIDGE, T=TOP BRIDGE, X=GROUND, W=WATER SUR, E=ENERGY GRADIENT, C=CRITICAL WSEL



NRD= 0 ELLC= 9999999.00 ELTRD= 9999999.00

EL(I), STA(I)

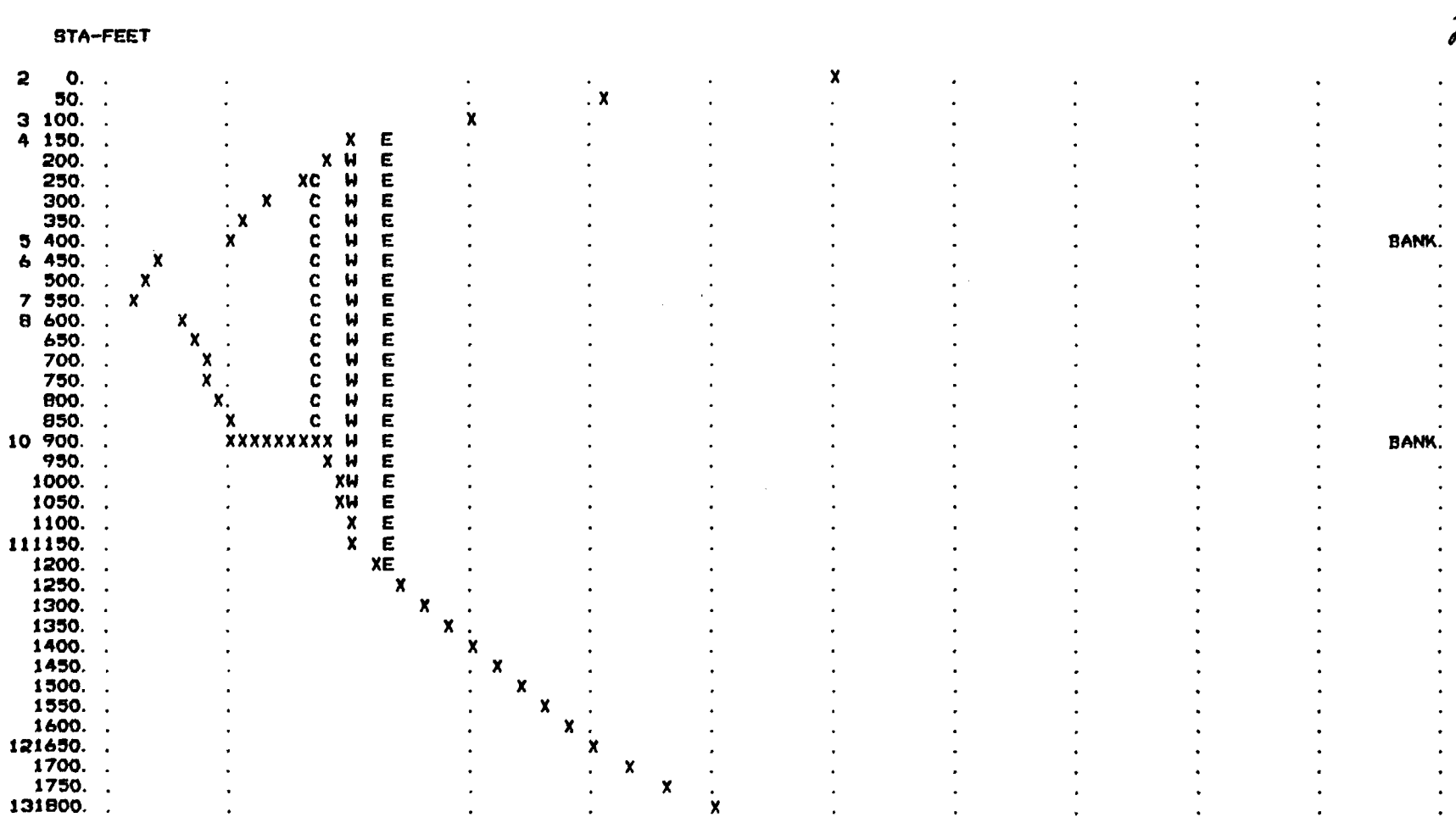
4130.00	0.00	4090.00	100.00	4080.00	385.00	4068.00	530.00	4078.00	750.00
4080.00	840.00	4086.00	870.00	4090.00	1165.00	4120.00	1930.00		

CROSS SECTION 3.00
STREAM DISCHARGE = 100000 CFS
DISCHARGE= 100000.

PLOTTED POINTS (BY PRIORITY)-B=BOTTOM BRIDGE, T=TOP BRIDGE, X=GROUND, W=WATER SUR, E=ENERGY GRADIENT, C=CRITICAL WSEL

Sh. 22B.9

FTK 4/16/87
HM 5/7/87



NRD= 0 ELLC= 9999999.00 ELTRD= 9999999.00

EL(I), STA(I)

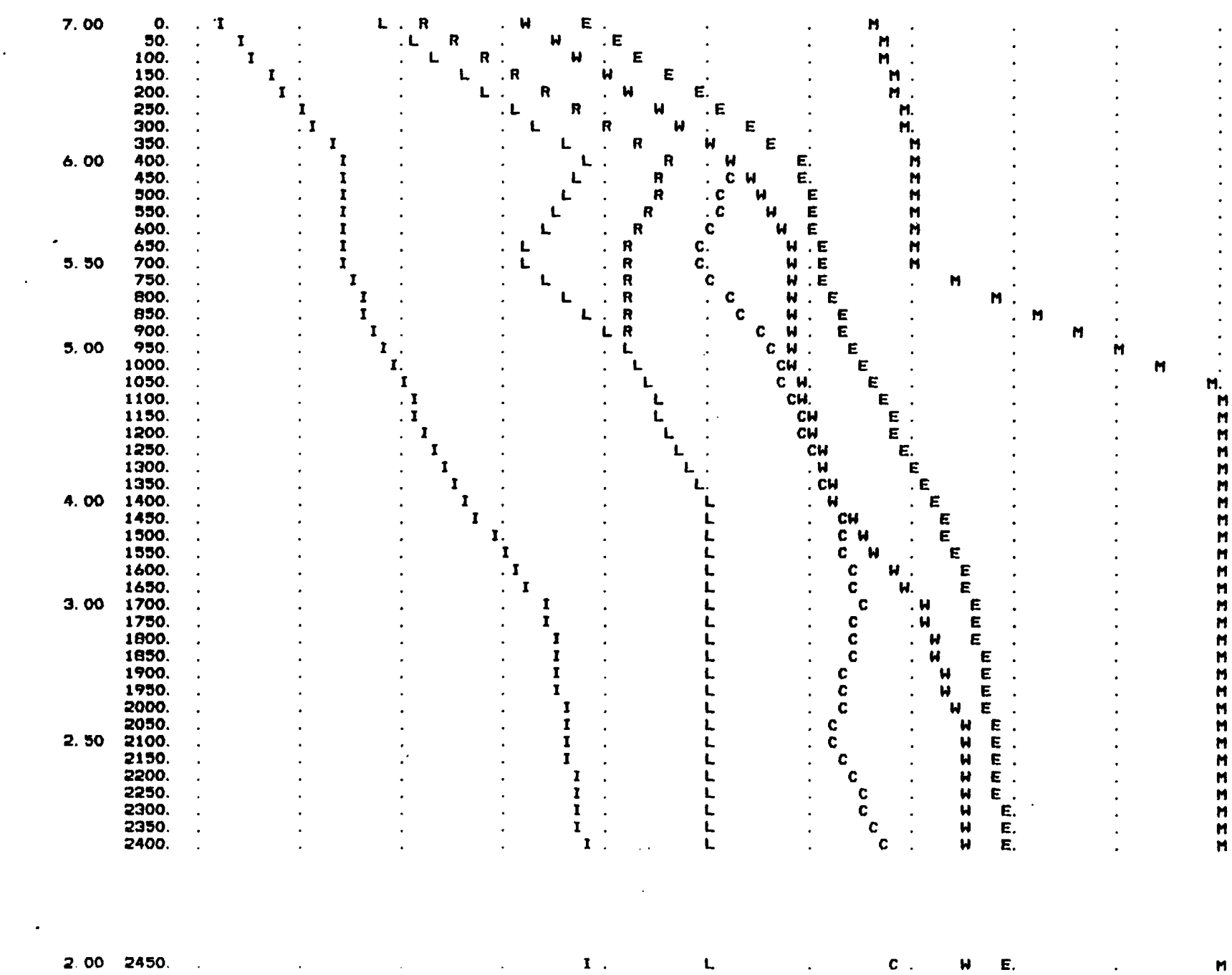
4130.00	0.00	4100.00	80.00	4090.00	170.00	4080.00	400.00	4074.00	455.00
4072.00	570.00	4076.00	620.00	4080.00	880.00	4088.00	925.00	4090.00	1150.00
4110.00	1640.00	4120.00	1820.00						

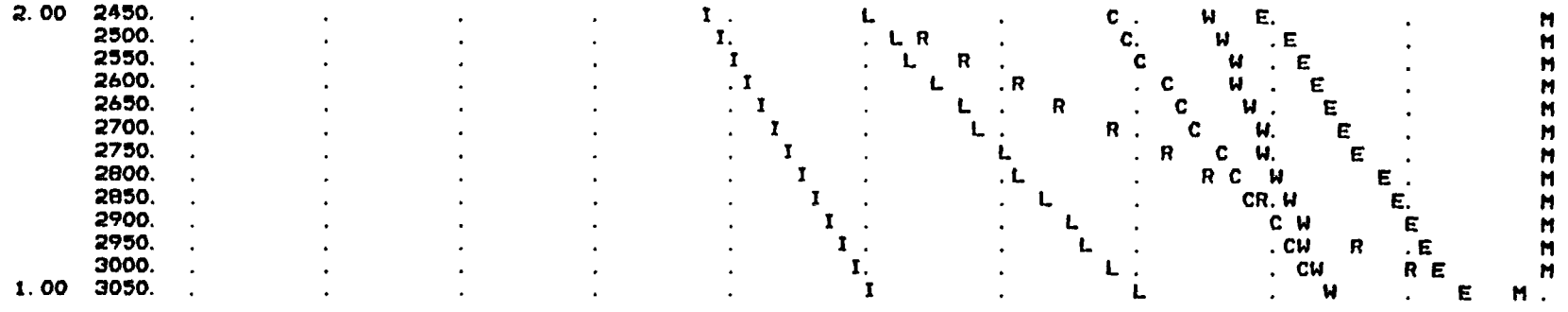
PROFI('R STREAM DISCHARGE = 100000 CFS

Sh. 22R 'D

FTL
4/16/87
HM 9/11/87

PLOTTED POINTS (BY PRIORITY)-E-ENERGY, W-WATER SURFACE, I-INVERT, C-CRITICAL W.S., L-LEFT BANK, R-RIGHT BANK, M-LOWER END STA





Sh. 22B-11

FTK 4/16/87

HM 5/12/87

Sh. 22B.12

STK 4/16/87
HM 5/17/87

****
HEC2 RELEASE DATED NOV 76 UPDATED MAY 1984
ERROR CORR - 01,02,03,04,05,06
MODIFICATION - 50,51,52,53,54,55,56
****

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

DISCHARGE = 100000 CFS

SUMMARY PRINTOUT

	SECNO	Q	CWSEL	CRIWS	QLOB	QCH	QROB	QLOBP	QCHP	QROBP	VLOB	VCH	VROB
*	7.000	100000.00	4071.15	4071.15	3022.18	87956.16	9021.66	3.02	87.96	9.02	7.07	14.55	5.72
*	6.000	100000.00	4081.23	4081.23	1167.62	95215.20	3617.18	1.17	95.22	3.62	6.49	14.64	4.20
	5.500	100000.00	4084.05	4079.53	2929.98	91205.13	5864.88	2.93	91.21	5.86	4.50	9.82	3.40
	5.000	100000.00	4083.92	4083.07	8396.17	89777.63	1826.18	8.40	89.78	1.83	7.83	14.63	3.61
*	4.000	100000.00	4086.09	4086.09	3087.51	96426.41	486.08	3.09	96.43	0.49	5.84	18.29	5.23
	3.000	100000.00	4090.42	4087.25	6844.99	90925.29	2229.72	6.84	90.93	2.23	5.49	13.39	3.66
	2.500	100000.00	4092.41	4086.14	1768.09	97085.75	1146.17	1.77	97.09	1.15	4.35	9.72	3.35
	2.000	100000.00	4092.54	4088.80	8786.27	88643.24	2570.50	8.79	88.64	2.57	6.34	12.36	5.08
*	1.000	100000.00	4096.94	4096.94	1758.18	98241.83	0.00	1.76	98.24	0.00	6.81	17.85	0.00

16-APR-87 15:51:21

DISCHARGE = 100000 CFS

SUMMARY PRINTOUT

	SECNO	KRATIO	AREA	CWSEL	ELMIN	DEPTH	DIFWSX	HV	TOPWID	SSTA	ENDST	K*CHSL	10K*S
*	7.000	0.00	8048.28	4071.15	4056.00	15.15	0.00	2.96	1326.60	131.97	1458.57	0.00	70.01
*	6.000	1.00	7543.91	4081.23	4062.00	19.23	10.09	3.19	1242.99	60.27	1303.26	15.00	70.56
	5.500	2.01	11663.37	4084.05	4062.00	22.05	2.82	1.38	1257.66	47.61	1305.27	0.00	17.39
	5.000	0.57	7714.19	4083.92	4064.00	19.92	-0.13	3.07	1068.16	76.38	1144.54	8.00	54.40
*	4.000	0.88	5892.35	4086.09	4068.00	18.09	2.17	5.03	665.19	211.44	876.63	8.70	70.98
	3.000	1.56	8647.54	4090.42	4072.00	18.42	4.33	2.57	994.00	166.24	1160.24	12.58	29.11
	2.500	1.44	10739.97	4092.41	4073.00	19.41	1.99	1.43	873.24	219.87	1093.10	2.63	13.99
	2.000	0.74	9065.85	4092.54	4074.00	18.54	0.13	2.17	801.88	178.78	980.66	2.86	25.65
*	1.000	0.56	5763.05	4096.94	4080.00	16.94	4.40	4.87	621.52	75.64	697.16	9.84	81.49

Sh. 22B.13

FTK

4/16/87

HM 5/14/87

Sh. 22B.14

FTK 4/16/87

HM 5/14/87

SUMMARY OF ERRORS AND SPECIAL NOTES

```
CAUTION  SECNO=     7.000  PROFILE= 1  CRITICAL DEPTH ASSUMED

CAUTION  SECNO=     6.000  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=     6.000  PROFILE= 1  MINIMUM SPECIFIC ENERGY

CAUTION  SECNO=     4.000  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=     4.000  PROFILE= 1  MINIMUM SPECIFIC ENERGY

CAUTION  SECNO=     1.000  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=     1.000  PROFILE= 1  MINIMUM SPECIFIC ENERGY
```

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**************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
**************************************************
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Sh. 22B.15

FTK 4/16/87

HM 5/14/87

```
                    J    III    M    M  K    K
                    J     I     MM MM  K    K
                    J     I     M M M  K  K
                    J     I     M   M  KKK
                J   J     I     M   M  K  K
                J   J     I     M   M  K   K
                 JJJ    III    M   M  K   K

WW      WW    SSSSSSSS  LL          PPPPPPPP
WW      WW    SSSSSSSS  LL          PPPPPPPP
WW      WW   SS         LL          PP      PP
WW      WW   SS         LL          PP      PP
WW      WW   SS         LL          PP      PP
WW      WW   SS         LL          PP      PP
WW      WW    SSSSSS    LL          PPPPPPPP
WW      WW    SSSSSS    LL          PPPPPPPP
WW  WW  WW         SS   LL          PP
WW  WW  WW         SS   LL          PP
WWWW  WWWW         SS   LL          PP
WWWW  WWWW         SS   LL          PP
WW      WW   SSSSSSSS   LLLLLLLLLL  PP
WW      WW   SSSSSSSS   LLLLLLLLLL  PP

  OOOOOO    UU      UU  77777777      ;;;;       11
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File _DUA0:[251020]WSLP.OU7;1 (1579,32,0), last revised on 21-APR-1987 11:26, is a 71 block sequential file owned by UIC [ER509501,EARTH]. The records are variable length with FORTRAN (FTN) carriage control. The longest record is 133 bytes.

Job WSLP (324) queued to SYS$PRINT on 21-APR-1987 11:26 by user JIMK, UIC [ER509501,EARTH], under account EARTH at priority 100, started on printer _TXA2: on 21-APR-1987 11:26 from queue SYS$PRINT.

```
**********************************************************
*  WATER SURFACE PROFILES                                *
*  VERSION OF NOVEMBER 1976                              *
*  UPDATED MAY 1984                                      *
*                                                        *
*  RUN DATE 21-APR-87 TIME 11:26:38          *
**********************************************************
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```
****************************************
*  U.S. ARMY CORPS OF ENGINEERS        *
*  THE HYDROLOGIC ENGINEERING CENTER   *
*  609 SECOND STREET, SUITE D          *
*  DAVIS, CALIFORNIA 95616             *
*  (916) 440-2105 (FTS) 448-2105       *
****************************************
```


```
X     X  XXXXXXX   XXXXX              XXXXX
X     X  X        X     X            X     X
X     X  X        X                  X     X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X        X                  X
X     X  X        X     X            X
X     X  XXXXXXX   XXXXX              XXXXXXX
```

Sh. 22c.1

UMTRA – Green River

Subcritical flow

Using 5 cross sections

JTK 4/21/87
HM 5/14/87

Sh. 22 c. 2

FTK 4/21/87
HM 5/19/87

```
**************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
**************************************************

T1      UMTRA - GREEN RIVER - LOCAL PMF
T2      WATER SURFACE PROFILE ON BROWN WASH
T3      DISCHARGE = 100000 CFS

J1  ICHECK     INQ        NINV       IDIR       STRT       METRIC     HVINS      Q          WSEL       FQ
       0.        0.         0.         0.   0.009000       0.00       0.0   100000.   4074.000      0.000
J2  NPROF      IPLOT      PRFVS      XSECV      XSECH      FN         ALLDC      IBW        CHNIM      ITRACE
     -1.000     0.000      0.000      0.000      0.000      0.000     -1.000      0.000      0.000      0.000
J3  VARIABLE CODES FOR SUMMARY PRINTOUT
     38.000     43.000      1.000      2.000     13.000     14.000     15.000     35.000     60.000     59.000
     55.000     26.000     56.000      0.000     38.000     58.000     25.000      1.000     42.000      8.000
     51.000     10.000      4.000     53.000     54.000     33.000      5.000      0.000      0.000      0.000

NC       0.045      0.050      0.035      0.100      0.300      0.000      0.000      0.000      0.000      0.000
X1       6.000      8.000    110.000    890.000    385.000    410.000    400.000      0.000      0.000      0.000
GR    4090.000      0.000   4074.000    110.000   4070.000    490.000   4062.000    525.000   4078.000    685.000
GR    4078.000    890.000   4080.000   1265.000   4100.000   1885.000      0.000      0.000      0.000      0.000

X1       5.500     11.000    180.000    890.000    150.000    280.000    270.000      0.000      0.000      0.000
GR    4090.000      0.000   4080.000     80.000   4080.000    140.000   4071.000    180.000   4070.000    530.000
GR    4062.000    570.000   4073.000    680.000   4076.000    890.000   4079.000    940.000   4080.000   1200.000
GR    4090.000   1460.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000

NC       0.000      0.000      0.000      0.200      0.500      0.000      0.000      0.000      0.000      0.000
X1       5.000     10.000    270.000    876.000    230.000    290.000    250.000      0.000      0.000      0.000
GR    4100.000      0.000   4080.000     95.000   4076.000    270.000   4076.000    470.000   4064.000    530.000
GR    4074.000    635.000   4076.000    876.000   4082.000    890.000   4082.000   1090.000   4110.000   1885.000

X1       4.000      9.000    385.000    840.000    470.000    440.000    460.000      0.000      0.000      1.000
GR    4130.000      0.000   4090.000    100.000   4080.000    385.000   4068.000    530.000   4078.000    750.000
GR    4080.000    840.000   4086.000    870.000   4090.000   1165.000   4120.000   1930.000      0.000      0.000
```

X1	3.000	12.000	400.000	880.000	315.000	320.000	318.000	0.000	0.000	1.000
GR	4130.000	0.000	4100.000	80.000	4090.000	170.000	4080.000	400.000	4074.000	455.000
GR	4072.000	570.000	4076.000	620.000	4080.000	880.000	4088.000	925.000	4090.000	1150.000
GR	4110.000	1640.000	4120.000	1820.000	0.000	0.000	0.000	0.000	0.000	0.000
NC	0.000	0.000	0.000	0.100	0.300	0.000	0.000	0.000	0.000	0.000
X1	2.500	12.000	300.000	960.000	365.000	380.000	380.000	0.000	0.000	0.000
GR	4110.000	0.000	4090.000	250.000	4080.000	300.000	4073.000	420.000	4076.000	500.000
GR	4076.000	560.000	4078.000	620.000	4078.000	800.000	4080.000	960.000	4091.000	1000.000
GR	4096.000	1330.000	4110.000	1700.000	0.000	0.000	0.000	0.000	0.000	0.000
X1	2.000	11.000	380.000	900.000	350.000	300.000	350.000	0.000	0.000	0.000
GR	4114.000	0.000	4090.000	200.000	4080.000	380.000	4074.000	400.000	4074.000	430.000
GR	4078.000	510.000	4080.000	600.000	4080.000	900.000	4094.000	990.000	4094.000	1170.000
GR	4120.000	1890.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
EJ	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Sh. 22C.3

FTK 4/21/87

HM 5/14/87

Sh. 22 c.4

JTK 4/21/87
HN 5/19/87

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	QLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*PROF 1

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

CCHV= 0.100 CEHV= 0.300
*SECNO 6.000
3720 CRITICAL DEPTH ASSUMED

6.00	18.96	4080.96	4080.96	4074.00	4084.43	3.47	0.00	0.00	4074.00
100000.	1120.	95806.	3074.	166.	6286.	748.	0.	0.	4078.00
0.00	6.73	15.24	4.11	0.045	0.035	0.050	0.000	4062.00	62.17
0.007998	385.	400.	410.	0	17	6	0.00	1232.48	1294.65

*SECNO 5.500

3301 HV CHANGED MORE THAN HVINS

5.50	22.13	4084.13	4079.53	0.00	4085.49	1.36	0.85	0.21	4071.00
100000.	2962.	91072.	5966.	661.	9347.	1757.	58.	8.	4076.00
0.01	4.48	9.74	3.40	0.045	0.035	0.050	0.000	4062.00	46.97
0.001698	150.	270.	280.	3	11	0	0.00	1260.39	1307.36

CCHV= 0.200 CEHV= 0.500
*SECNO 5.000

3301 HV CHANGED MORE THAN HVINS

5.00	20.00	4084.00	4083.07	0.00	4087.01	3.00	0.69	0.82	4076.00
100000.	8467.	89616.	1917.	1089.	6187.	528.	115.	15.	4076.00
0.01	7.78	14.48	3.63	0.045	0.035	0.050	0.000	4064.00	75.98
0.005274	230.	250.	290.	3	15	0	0.00	1070.94	1146.92

*SECNO 4.000

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

4.00	18.09	4086.09	4086.09	0.00	4091.12	5.03	2.80	1.01	4080.00
100000.	3091.	96422.	487.	529.	5273.	93.	187.	24.	4080.00
0.02	5.84	18.29	5.23	0.045	0.035	0.050	0.000	4068.00	211.32
0.007088	470.	460.	440.	0	11	0	0.00	665.61	876.93

21-APR-87 11:26:38

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	QLOSS	BANK ELEV
Q	GLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

Sh. 22 C. 5

FTK 4/21/87
HM 5/14/87

*SECNO 3.000

3301 HV CHANGED MORE THAN HVINS

3.00	18.42	4090.42	4087.25	0.00	4092.99	2.57	1.38	0.49	4080.00
100000.	6842.	90930.	2228.	1246.	6789.	609.	240.	30.	4080.00
0.03	5.49	13.39	3.66	0.045	0.035	0.050	0.000	4072.00	166.26
0.002913	315.	318.	320.	4	11	0	0.00	993.92	1160.18

CCHV= 0.100 CEHV= 0.300
*SECNO 2.500

3301 HV CHANGED MORE THAN HVINS

2.50	19.41	4092.41	4086.14	0.00	4093.84	1.43	0.74	0.11	4080.00
100000.	1768.	97086.	1146.	407.	9991.	342.	324.	38.	4080.00
0.04	4.35	9.72	3.35	0.045	0.035	0.050	0.000	4073.00	219.88
0.001400	365.	380.	380.	2	19	0	0.00	873.18	1093.05

*SECNO 2.000

3301 HV CHANGED MORE THAN HVINS

2.00	18.54	4092.54	4088.79	0.00	4094.71	2.17	0.65	0.22	4080.00
100000.	8786.	88644.	2570.	1385.	7174.	506.	403.	44.	4080.00
0.05	6.34	12.36	5.08	0.045	0.035	0.050	0.000	4074.00	178.78
0.002566	350.	350.	300.	2	15	0	0.00	801.87	980.65

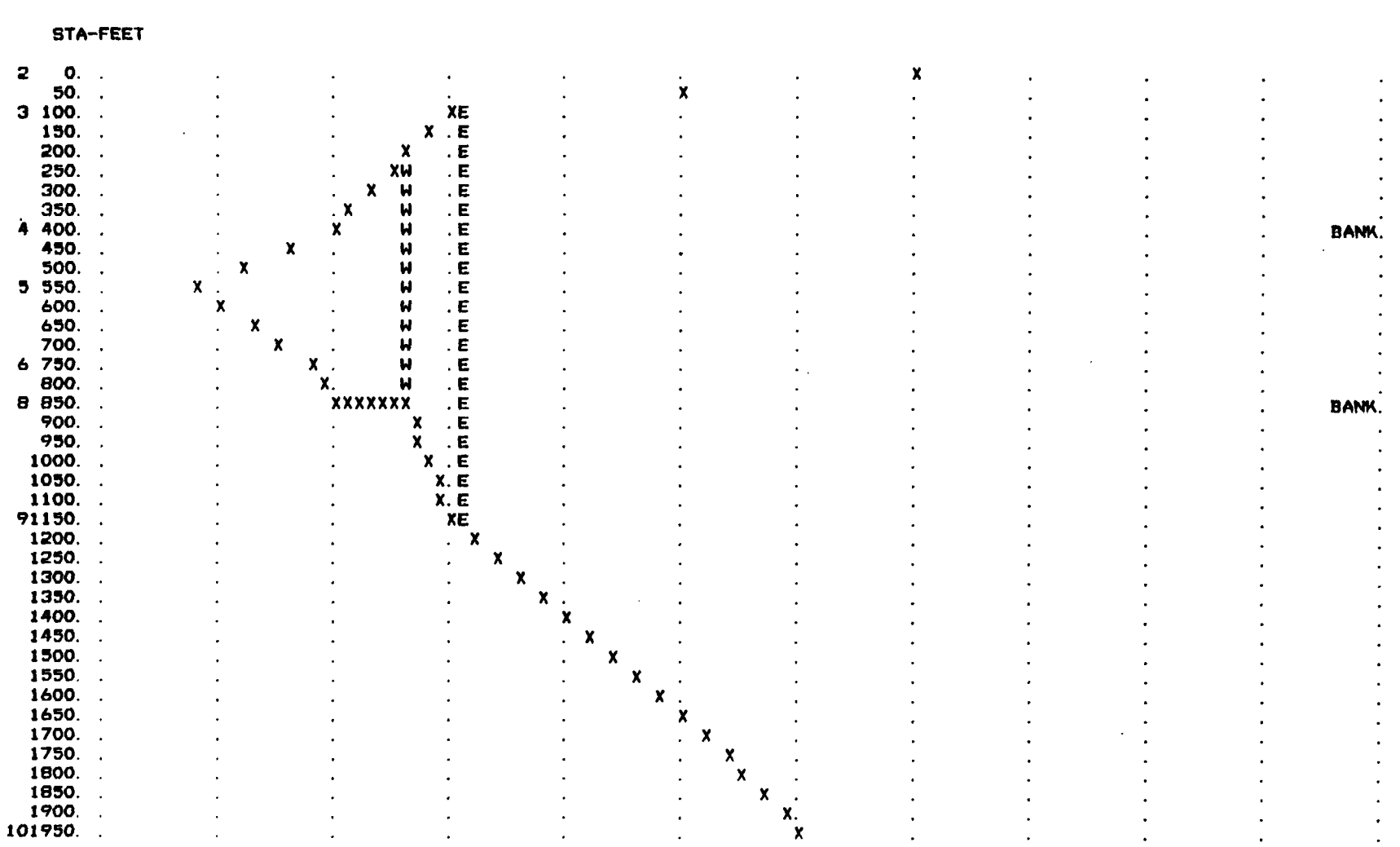
Sh. 22C.6

FTK 4/21/87

HM 5/14/87

CROSS SECTION 4.00
STREAM DISCHARGE = 100000 CFS
DISCHARGE= 100000.

PLOTTED POINTS (BY PRIORITY)-B=BOTTOM BRIDGE, T=TOP BRIDGE, X=GROUND, W=WATER SUR, E=ENERGY GRADIENT, C=CRITICAL WSEL



NRD= 0 ELLC= 9999999.00 ELTRD= 9999999.00

EL(I), STA(I)

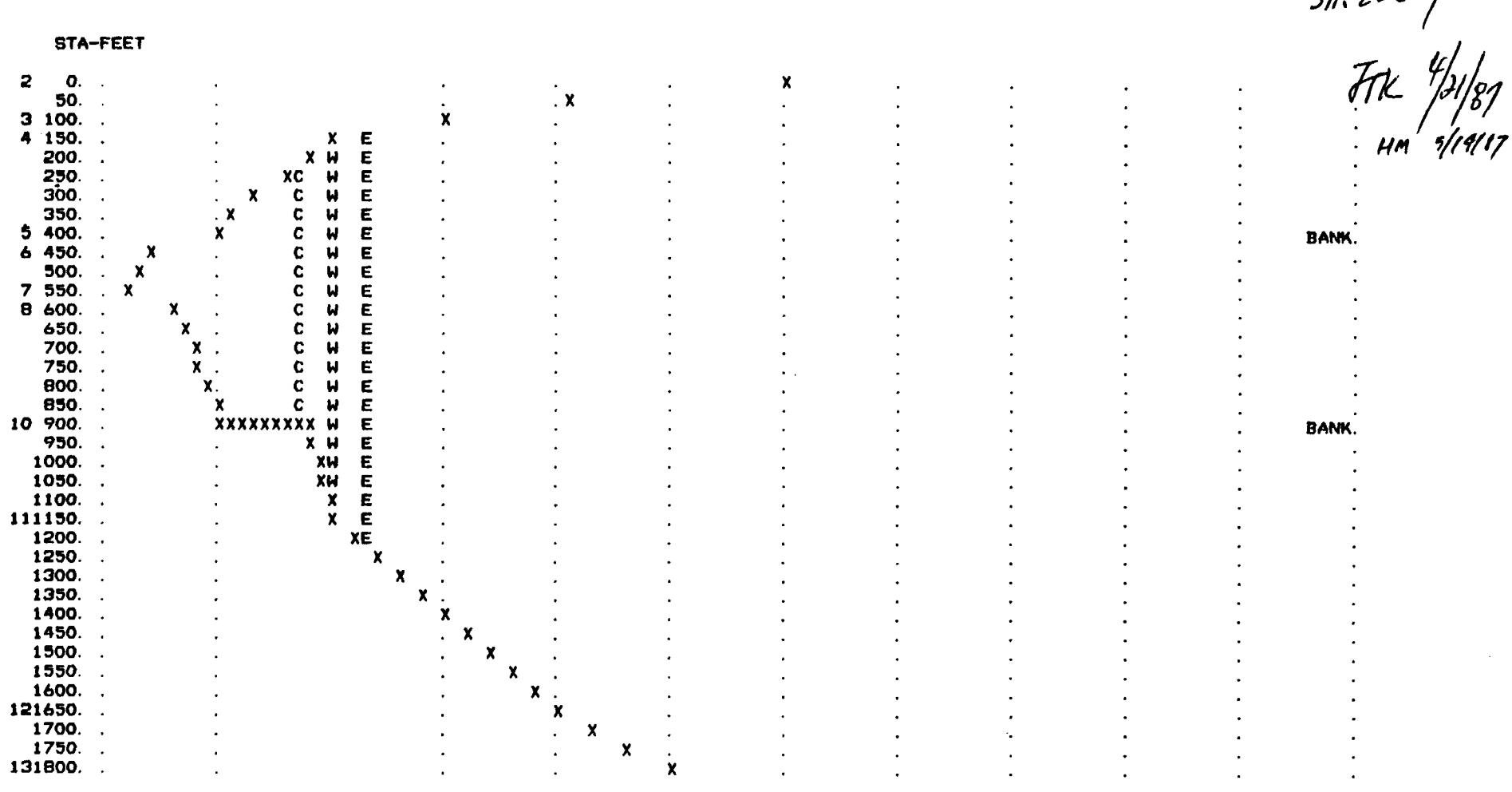
4130.00	0.00	4090.00	100.00	4080.00	385.00	4068.00	530.00	4078.00	750.00
4080.00	840.00	4086.00	870.00	4090.00	1165.00	4120.00	1930.00		

CROSS SECTION 3.00
STREAM DISCHARGE = 100000 CFS
DISCHARGE= 100000.

PLOTTED POINTS (BY PRIORITY)-B=BOTTOM BRIDGE, T=TOP BRIDGE, X=GROUND, W=WATER SUR, E=ENERGY GRADIENT, C=CRITICAL WSEL

Sh. 22C.7

FTK 4/21/87
HM 5/19/87



NRD= 0 ELLC= 9999999.00 ELTRD= 9999999.00

EL(I), STA(I)

4130.00	0.00	4100.00	80.00	4090.00	170.00	4080.00	400.00	4074.00	455.00
4072.00	570.00	4076.00	620.00	4080.00	880.00	4088.00	925.00	4090.00	1150.00
4110.00	1640.00	4120.00	1820.00						

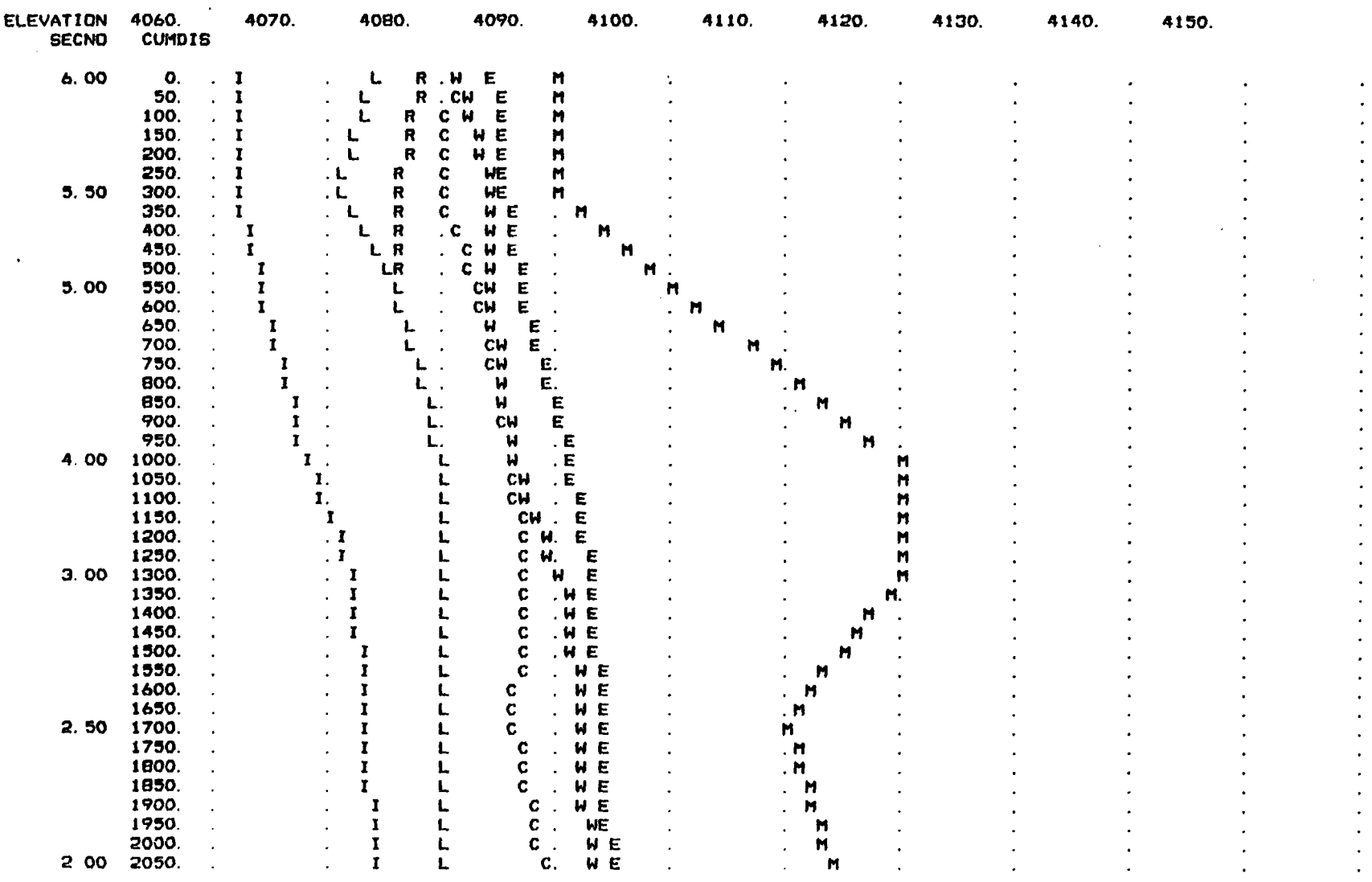
Sh. 22C. B

FK 4/21/87

HM 5/11/87

PROFILE FOR STREAM DISCHARGE = 100000 CFS

PLOTTED POINTS (BY PRIORITY)-E-ENERGY, W-WATER SURFACE, I-INVERT, C-CRITICAL W. S., L-LEFT BANK, R-RIGHT BANK, M-LOWER END STA



****
HEC2 RELEASE DATED NOV 76 UPDATED MAY 1984
ERROR CORR - 01,02,03,04,05,06
MODIFICATION - 50,51,52,53,54,55,56
****

Sh. 22c.9

FTK 4/21/87
HM 5/14/87

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

DISCHARGE = 100000 CFS

SUMMARY PRINTOUT

	SECNO	Q	CWSEL	CRIWS	QLOB	QCH	QROB	QLOBP	QCHP	QROBP	VLOB	VCH	VROB
*	6.000	100000.00	4080.96	4080.96	1119.98	95806.41	3073.61	1.12	95.81	3.07	6.73	15.24	4.11
	5.500	100000.00	4084.13	4079.53	2961.67	91072.47	5965.85	2.96	91.07	5.97	4.48	9.74	3.40
	5.000	100000.00	4084.00	4083.07	8467.16	89615.53	1917.31	8.47	89.62	1.92	7.78	14.48	3.63
*	4.000	100000.00	4086.09	4086.09	3090.94	96422.21	486.87	3.09	96.42	0.49	5.84	18.29	5.23
	3.000	100000.00	4090.42	4087.25	6842.18	90930.22	2227.60	6.84	90.93	2.23	5.49	13.39	3.66
	2.500	100000.00	4092.41	4086.14	1767.90	97086.11	1145.98	1.77	97.09	1.15	4.35	9.72	3.35
	2.000	100000.00	4092.54	4088.79	8785.67	88644.07	2570.26	8.79	88.64	2.57	6.34	12.36	5.08

21-APR-87 11:26:38

FTK 4/21/87
HM 5/14/87

DISCHARGE = 100000 CFS

SUMMARY PRINTOUT

	SECNO	KRATIO	AREA	CWSEL	ELMIN	DEPTH	DIFWSX	HV	TOPWID	SSTA	ENDST	K*CHSL	10K*S
*	6.000	0.00	7200.34	4080.96	4062.00	18.96	0.00	3.47	1232.48	62.17	1294.65	0.00	79.98
	5.500	2.17	11764.48	4084.13	4062.00	22.13	3.17	1.36	1260.39	46.97	1307.36	0.00	16.98
	5.000	0.57	7803.74	4084.00	4064.00	20.00	-0.13	3.00	1070.94	75.98	1146.92	8.00	52.74
*	4.000	0.86	5895.09	4086.09	4068.00	18.09	2.09	5.03	665.61	211.32	876.93	8.70	70.88
	3.000	1.56	8645.11	4090.42	4072.00	18.42	4.32	2.57	993.92	166.26	1160.18	12.58	29.13
	2.500	1.44	10739.32	4092.41	4073.00	19.41	1.99	1.43	873.18	219.88	1093.05	2.63	14.00
	2.000	0.74	9065.25	4092.54	4074.00	18.54	0.13	2.17	801.87	178.78	980.65	2.86	25.66

SUMMARY OF ERRORS AND SPECIAL NOTES

CAUTION SECNO= 6.000 PROFILE= 1 CRITICAL DEPTH ASSUMED

CAUTION SECNO= 4.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 4.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY

Sh. 22C-11

JTK 4/21/87
HM 5/11/87

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**************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
**************************************************
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*********************************************************
*  WATER SURFACE PROFILES                               *
*  VERSION OF NOVEMBER 1976                             *
*  UPDATED MAY 1984                                     *
*                                                       *
*  RUN DATE  9-APR-87 TIME 14:24:18          *
*********************************************************
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*****************************************
*  U.S. ARMY CORPS OF ENGINEERS         *
*  THE HYDROLOGIC ENGINEERING CENTER    *
*  609 SECOND STREET, SUITE D           *
*  DAVIS, CALIFORNIA 95616              *
*  (916) 440-2105 (FTS) 448-2105        *
*****************************************
```

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X     X  XXXXXXX   XXXXX              XXXXX
X     X  X        X     X            X     X
X     X  X        X                        X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X        X                   X
X     X  X        X     X             X
X     X  XXXXXXX   XXXXX              XXXXXXX
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Sh. 23A.1

UMTRA - Green River

using TAC's data ref (4)

Supercritical flow

using 7 cross sections

JTR 4/9/87

HM 5/19/87

Sh. 23A.2

FTK 4/9/87
HM 5/19/87

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**************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
**************************************************

T1      UMTRA - GREEN RIVER - LOCAL PMF
T2      WATER SURFACE PROFILE ON BROWN WASH
T3      DISCHARGE = 100000 CFS

J1  ICHECK     INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ
       0.       0.        0.        1.   0.009000      0.00      0.0    100000.  4074.000   0.000
J2  NPROF      IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE
    -1.000     0.000     0.000     0.000     0.000     0.000    -1.000     0.000     0.000     0.000
J3  VARIABLE CODES FOR SUMMARY PRINTOUT
    38.000    43.000     1.000     2.000    13.000    14.000    15.000    35.000    60.000    59.000
    55.000    26.000    56.000     0.000    38.000    58.000    25.000     1.000    42.000     8.000
    51.000    10.000     4.000    53.000    54.000    33.000     5.000     0.000     0.000     0.000

NC      0.045     0.050     0.035     0.100     0.300     0.000     0.000     0.000     0.000     0.000
X1      1.000     7.000   150.000   765.000   730.000   510.000   610.000     0.000     0.000     0.000
GR   4104.000     0.000  4090.000   150.000  4084.000   390.000  4080.000   470.000  4102.000   765.000
GR   4110.000  1145.000  4120.000  1385.000     0.000     0.000     0.000     0.000     0.000     0.000

X1      2.000    10.000   380.000   920.000   335.000   250.000   300.000     0.000     0.000     0.000
GR   4114.000     0.000  4090.000   200.000  4080.000   380.000  4074.000   400.000  4074.000   430.000
GR   4078.000   510.000  4080.000   920.000  4094.000   990.000  4094.000  1170.000  4120.000  1890.000

X1      2.500    11.000   300.000   960.000   365.000   240.000   300.000     0.000     0.000     0.000
GR   4110.000     0.000  4090.000   250.000  4080.000   300.000  4073.000   420.000  4076.000   500.000
GR   4076.000   560.000  4078.000   620.000  4078.000   960.000  4091.000  1000.000  4096.000  1330.000
GR   4110.000  1700.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000

NC      0.000     0.000     0.000     0.100     0.300     0.000     0.000     0.000     0.000     0.000
X1      3.000    11.000   400.000   880.000   315.000   300.000   320.000     0.000     0.000     1.000
GR   4130.000     0.000  4100.000    80.000  4090.000   170.000  4080.000   400.000  4074.000   455.000
GR   4072.000   570.000  4080.000   880.000  4088.000   925.000  4090.000  1150.000  4110.000  1640.000
GR   4120.000  1820.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000
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JTK 4/9/87

9-APR-87 14:24:18

X1	4.000	9.000	385.000	840.000	470.000	~~420.000~~ 460	440.000	0.000	0.000	1.000
OR	4130.000	0.000	4090.000	100.000	4080.000	385.000	4068.000	530.000	4078.000	~~800.000~~ 750
OR	4080.000	840.000	4086.000	870.000	4090.000	1165.000	4120.000	1930.000	0.000	0.000
X1	5.000	10.000	270.000	876.000	230.000	~~290.000~~ 250	~~250.000~~ 290	0.000	0.000	0.000
OR	4100.000	0.000	4080.000	95.000	4076.000	270.000	4076.000	470.000	4064.000	530.000
OR	4074.000	635.000	~~4064.000~~ 4076	876.000	~~4080.000~~ 4082	890.000	~~4080.000~~ 4082	1090.000	4110.000	1885.000
NC	0.000	0.000	0.000	~~0.200~~ 0.1	~~0.500~~ 0.3	0.000	0.000	0.000	0.000	0.000
X1	5.500	11.000	180.000	890.000	~~100.000~~ 150	270.000	~~190.000~~ 280	0.000	0.000	0.000
OR	4090.000	0.000	4080.000	80.000	4080.000	140.000	4071.000	180.000	4070.000	530.000
OR	4062.000	570.000	4073.000	680.000	4076.000	890.000	4079.000	940.000	4080.000	1200.000
OR	4090.000	1460.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
X1	6.000	8.000	110.000	890.000	385.000	410.000	400.000	0.000	0.000	0.000
OR	4090.000	0.000	4074.000	110.000	4070.000	490.000	4062.000	525.000	~~4076.000~~ 4078	685.000
OR	~~4076.000~~ 4078	890.000	4080.000	1265.000	4100.000	1885.000	0.000	0.000	0.000	0.000
X1	7.000	12.000	242.000	970.000	0.000	0.000	0.000	0.000	0.000	0.000
OR	4090.000	0.000	4070.000	140.000	4064.000	242.000	4060.000	665.000	4056.000	680.000
OR	4060.000	710.000	4068.000	860.000	4066.000	915.000	4066.000	970.000	4068.000	1180.000
OR	4068.000	1350.000	4088.000	2040.000	0.000	0.000	0.000	0.000	0.000	0.000
EJ	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Sh.23A.4

JTK 4/9/87
HM 5/9/87

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	GLOB	GCH	GROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

```
#PROF 1

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

CCHV=   0.100 CEHV=   0.300
#SECNO 1.000
3840 SECTION NOT HIGH ENOUGH  4347.487  4154.000  4080.000  4154.000  4083.000        14
3840 SECTION NOT HIGH ENOUGH  4347.487  4204.000  4080.000  4204.000  4083.000        14
3840 SECTION NOT HIGH ENOUGH  4347.487  4254.000  4080.000  4254.000  4083.000        14
3840 SECTION NOT HIGH ENOUGH  4347.487  4304.000  4080.000  4304.000  4083.000        14
     1.00     16.62   4096.62   4096.93   4074.00   4101.83      5.21      0.00      0.00   4090.00
   100000.    1630.    98370.       0.      235.      5332.       0.        0.        0.    4102.00
     0.00      6.94     18.45      0.00     0.045     0.035     0.000     0.000   4080.00     79.03
 0.008992        0.       0.         0.        0        35        11      0.00    613.87    692.91


#SECNO 2.000

3301 HV CHANGED MORE THAN HVINS

     2.00     12.00   4086.00   4088.26      0.00   4093.86      7.87      7.71      0.27   4080.00
   100000.    3042.    96207.     751.      323.      4206.       90.       72.        9.    4080.00
     0.01      9.41     22.87      8.37     0.045     0.035     0.050     0.000   4074.00    272.14
 0.018846      730.      610.       510.        7        16         0      0.00    677.82    949.96


#SECNO 2.500

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
     2.50     12.89   4085.89   4085.89      0.00   4090.28      4.39      3.69      2.71   4080.00
   100000.     540.    98821.     639.       87.      5846.       96.      109.       14.    4078.00
     0.01      6.23     16.91      6.67     0.045     0.035     0.050     0.000   4073.00    270.56
 0.008656      335.       300.       250.       20         8         0      0.00    713.70    984.27


CCHV=   0.100 CEHV=   0.300
#SECNO 3.000
3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
```

Sh. 23A of 45

JTK 4/9/87
HM 5/14/87

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	GLOB	GCH	GROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

3720 CRITICAL DEPTH ASSUMED

3.00	14.53	4086.53	4086.53	0.00	4091.41	4.87	2.38	1.99	4080.00
100000.	3037.	96301.	662.	491.	5347.	120.	150.	19.	4080.00
0.02	6.18	18.01	5.51	0.045	0.035	0.050	0.000	4072.00	249.70
0.007242	365.	300.	240.	20	8	0	0.00	667.06	916.76

*SECNO 4.000
3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

4.00	17.43	4085.43	4085.43	0.00	4090.60	5.17	2.32	1.96	4080.00
100000.	2293.	97350.	357.	420.	5269.	74.	193.	24.	4080.00
0.02	5.46	18.48	4.86	0.045	0.035	0.050	0.000	4068.00	230.36
0.007243	315.	320.	305.	20	11	0	0.00	636.77	867.13

*SECNO 5.000

3301 HV CHANGED MORE THAN HVINS

5.00	15.07	4079.07	4081.16	0.00	4085.84	6.76	4.60	0.16	4076.00
100000.	1155.	97747.	1099.	206.	4640.	99.	247.	31.	4064.00
0.03	5.62	21.07	11.06	0.045	0.035	0.050	0.000	4064.00	135.88
0.016381	470.	440.	420.	7	8	0	0.00	753.31	889.18

CCHV= 0.200 CEHV= 0.500
*SECNO 5.500

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

5.50	17.53	4079.53	4079.53	0.00	4083.53	4.00	2.83	1.43	4071.00
100000.	1258.	98261.	481.	162.	6082.	138.	280.	36.	4076.00
0.03	7.77	16.16	3.48	0.045	0.035	0.050	0.000	4062.00	142.08
0.008281	230.	250.	290.	20	11	0	0.00	936.04	1078.13

*SECNO 6.000

JTK 4/9/87
HM 5/19/87

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EQ	HV	HL	OLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL, CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

6.00	18.22	4080.22	4080.22	0.00	4083.66	3.43	1.55	2.74	4074.00
100000.	829.	95414.	3758.	133.	6283.	834.	310.	41.	4076.00
0.04	6.23	15.19	4.51	0.045	0.035	0.050	0.000	4062.00	67.23
0.007943	100.	190.	270.	20	8	0	0.00	1204.65	1271.87

*SECNO 7.000

3301 HV CHANGED MORE THAN HVINS

7.00	12.38	4068.38	4071.24	0.00	4076.94	8.56	5.69	1.03	4064.00
100000.	1633.	96259.	2108.	163.	4030.	357.	365.	52.	4066.00
0.04	10.01	23.89	5.90	0.045	0.035	0.050	0.000	4056.00	167.53
0.032377	385.	400.	410.	8	10	0	0.00	1195.60	1363.13

Sh. 23A.7

```
CROSS SECTION       3.00
STREAM  DISCHARGE = 100000 CFS
DISCHARGE=    100000.

PLOTTED POINTS (BY PRIORITY)-B=BOTTOM BRIDGE, T=TOP BRIDGE, X=GROUND, W=WATER SUR, E=ENERGY GRADIENT, C=CRITICAL WSEL

ELEV 4070.      4080.      4090.      4100.      4110.      4120.      4130.      4140.      4150.      4160.      4170.

    STA-FEET

 2   0.  .          .          .          .          .          .          X          .          .          .          .          .
    50.  .          .          .          .          .          X          .          .          .          .          .          .
 3 100.  .          .          .          .          X          .          .          .          .          .          .          .
 4 150.  .          .          .          XE         .          .          .          .          .          .          .          .
   200.  .          .          .          X .E       .          .          .          .          .          .          .          .
   250.  .          .          .          XW .E      .          .          .          .          .          .          .          .
   300.  .          .          X          W .E       .          .          .          .          .          .          .          .
   350.  .          .          X          W .E       .          .          .          .          .          .          .          .
 5 400.  .          .          X          W .E       .          .          .          .          .          .          .          BANK.
 6 450.  .          X          .          W .E       .          .          .          .          .          .          .          .
   500.  .          X          .          W .E       .          .          .          .          .          .          .          .
 7 550.  .          X          .          W .E       .          .          .          .          .          .          .          .
   600.  .          X          .          W .E       .          .          .          .          .          .          .          .
   650.  .          .          X          W .E       .          .          .          .          .          .          .          .
   700.  .          .          X          W .E       .          .          .          .          .          .          .          .
   750.  .          .          X          W .E       .          .          .          .          .          .          .          .
   800.  .          .          X          W .E       .          .          .          .          .          .          .          .
   850.  .          .          X          W .E       .          .          .          .          .          .          .          .
 9 900.  .          .          XXXXXXXXX .E          .          .          .          .          .          .          .          BANK.
   950.  .          .          .          X .E       .          .          .          .          .          .          .          .
  1000.  .          .          .          X.E        .          .          .          .          .          .          .          .
  1050.  .          .          .          X.E        .          .          .          .          .          .          .          .
  1100.  .          .          .          XE         .          .          .          .          .          .          .          .
101150.  .          .          .          XE         .          .          .          .          .          .          .          .
  1200.  .          .          .          .  X       .          .          .          .          .          .          .          .
  1250.  .          .          .          .    X     .          .          .          .          .          .          .          .
  1300.  .          .          .          .      X   .          .          .          .          .          .          .          .
  1350.  .          .          .          .        X .          .          .          .          .          .          .          .
  1400.  .          .          .          .          X          .          .          .          .          .          .          .
  1450.  .          .          .          .          .  X       .          .          .          .          .          .          .
  1500.  .          .          .          .          .    X     .          .          .          .          .          .          .
  1550.  .          .          .          .          .      X   .          .          .          .          .          .          .
  1600.  .          .          .          .          .        X .          .          .          .          .          .          .
111650.  .          .          .          .          .          X          .          .          .          .          .          .
  1700.  .          .          .          .          .          .  X       .          .          .          .          .          .
  1750.  .          .          .          .          .          .    X     .          .          .          .          .          .
121800.  .          .          .          .          .          .          X          .          .          .          .          .

NRD=       0 ELLC=  9999999.00 ELTRD=  9999999.00

  EL(I), STA(I)
    4130.00        0.00     4100.00       80.00     4090.00      170.00     4080.00      400.00     4074.00      455.00
    4072.00      570.00     4080.00      880.00     4088.00      925.00     4090.00     1150.00     4110.00     1640.00
    4120.00     1820.00
```

FIK 4/9/87

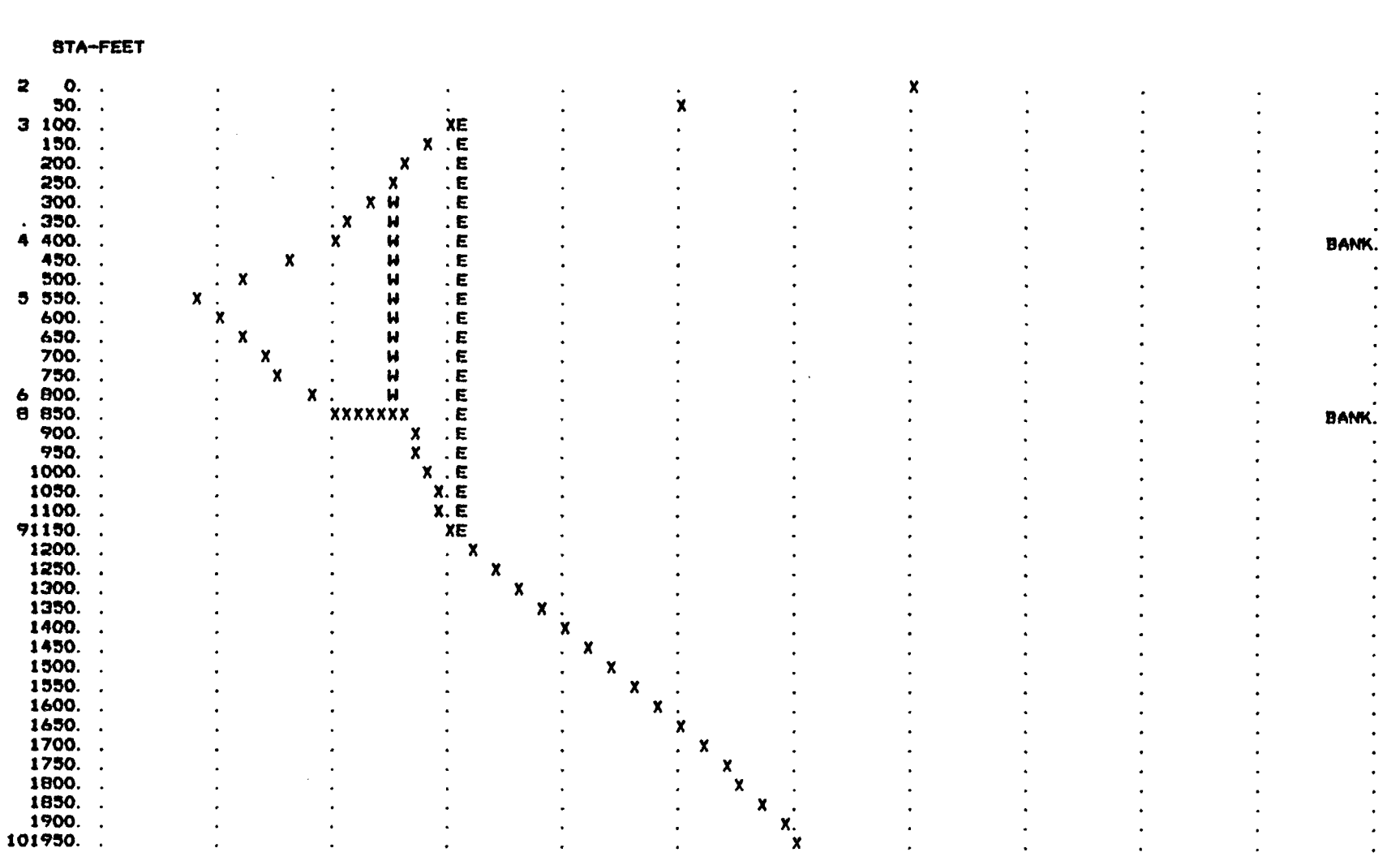
HM 5/19/87

Sh. 23A. 8

JTR 4/9/87
HM 5/14/87

CROSS SECTION 4.00
STREAM DISCHARGE = 100000 CFS
DISCHARGE= 100000.

PLOTTED POINTS (BY PRIORITY)-B=BOTTOM BRIDGE, T=TOP BRIDGE, X=GROUND, W=WATER SUR, E=ENERGY GRADIENT, C=CRITICAL WSEL



NRD= 0 ELLC= 9999999.00 ELTRD= 9999999.00

EL(I), STA(I)

4130.00	0.00	4090.00	100.00	4080.00	385.00	4068.00	530.00	4078.00	800.00
4080.00	840.00	4086.00	870.00	4090.00	1165.00	4120.00	1930.00		

Sh. 23A .9

JTK 4/9/87

PROFILE FOR STREAM DISCHARGE = 100000 CFS

PLOTTED POINTS (BY PRIORITY)-E-ENERGY,W-WATER SURFACE,I-INVERT,C-CRITICAL W.S.,L-LEFT BANK,R-RIGHT BANK,M-LOWER END STA MM 5/19/87

```
ELEVATION 4050.     4100.     4150.     4200.     4250.     4300.     4350.     4400.     4450.     4500.
   SECNO   CUMDIS

    1.00     0.  .     I LWE         .         .         .         .M        .         .         .         .
            50.  .     I LWE         .         .         .      M  .         .         .         .         .
           100.  .     I LWE         .         .         .   M     .         .         .         .         .
           150.  .     I LWE         .         .         .M        .         .         .         .         .
           200.  .     IL WE         .         .        M.         .         .         .         .         .
           250.  .     ILWCE         .         .     M   .         .         .         .         .         .
           300.  .    I LWCE         .         .  M      .         .         .         .         .         .
           350.  .    I LWE.         .         M.        .         .         .         .         .         .
           400.  .    I LWE.         .      M  .         .         .         .         .         .         .
           450.  .    I LWE.         .   M     .         .         .         .         .         .         .
           500.  .    ILRWE.         M         .         .         .         .         .         .         .
           550.  .    ILWCE.      M  .         .         .         .         .         .         .         .
           600.  .    ILWCE.  M      .         .         .         .         .         .         .         .
    2.00   650.  .    ILWCE.  M      .         .         .         .         .         .         .         .
           700.  .    ILWCE.  M      .         .         .         .         .         .         .         .
           750.  .    ILW E.  M      .         .         .         .         .         .         .         .
           800.  .    ILWE . M       .         .         .         .         .         .         .         .
           850.  .    ILWE . M       .         .         .         .         .         .         .         .
           900.  .    ILWE . M       .         .         .         .         .         .         .         .
    2.50   950.  .    ILWE . M       .         .         .         .         .         .         .         .
          1000.  .    ILWE . M       .         .         .         .         .         .         .         .
          1050.  .    ILWE .  M      .         .         .         .         .         .         .         .
          1100.  .    ILWE .  M      .         .         .         .         .         .         .         .
          1150.  .   I LWE .  M      .         .         .         .         .         .         .         .
          1200.  .   I LWE .   M     .         .         .         .         .         .         .         .
    3.00  1250.  .   I LWE .   M     .         .         .         .         .         .         .         .
          1300.  .   I LWE .   M     .         .         .         .         .         .         .         .
          1350.  .   I LWE .   M     .         .         .         .         .         .         .         .
          1400.  .   I LWE .   M     .         .         .         .         .         .         .         .
          1450.  .   I LWE .   M     .         .         .         .         .         .         .         .
          1500.  .   I LWE .   M     .         .         .         .         .         .         .         .
    4.00  1550.  .   I LWE .   M     .         .         .         .         .         .         .         .
          1600.  .   I LWE .   M     .         .         .         .         .         .         .         .
          1650.  .  I RLWE .  M      .         .         .         .         .         .         .         .
          1700.  .  I RLWE .  M      .         .         .         .         .         .         .         .
          1750.  .  I RLWE . M       .         .         .         .         .         .         .         .
          1800.  .  IR WCE . M       .         .         .         .         .         .         .         .
          1850.  .  IRLWE   .M       .         .         .         .         .         .         .         .
          1900.  .  I LWE   .M       .         .         .         .         .         .         .         .
          1950.  .  I LWE   M        .         .         .         .         .         .         .         .
    5.00  2000.  .  I LWE   M        .         .         .         .         .         .         .         .
          2050.  .  I LWE   M        .         .         .         .         .         .         .         .
          2100.  .  IRLWE M.         .         .         .         .         .         .         .         .
          2150.  .  IRLWE M.         .         .         .         .         .         .         .         .
          2200.  . I LRWEM .         .         .         .         .         .         .         .         .
    5.50  2250.  . I LRWEM .         .         .         .         .         .         .         .         .
          2300.  . I LRWEM .         .         .         .         .         .         .         .         .
          2350.  . I  LWEM .         .         .         .         .         .         .         .         .
          2400.  . I  LWEM .         .         .         .         .         .         .         .         .
```

6.00	2450.	.	I		LWEM	.	.	.	.	.	.	.	.	.	.
	2500.	.	I		LWEM	.	.	.	.	.	.	.	.	.	.
	2550.	.	I	LWE	M	.	.	.	.	.	.	.	.	.	.
	2600.	.	I	LWE	M	.	.	.	.	.	.	.	.	.	.
	2650.	.	I	LWE	M	.	.	.	.	.	.	.	.	.	.
	2700.	.	I	LWE	M	.	.	.	.	.	.	.	.	.	.
	2750.	.	I	LWCE	M	.	.	.	.	.	.	.	.	.	.
	2800.	.	I	LW E	M	.	.	.	.	.	.	.	.	.	.
7.00	2850.	.	I	LWE	M	.	.	.	.	.	.	.	.	.	.

Sh. 23A.10

FTK 4/9/87
HM 5/19/87

Sh. 23A.11

JTK 4/9/87
HM 5/19/87

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**************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
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NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

DISCHARGE = 100000 CFS

SUMMARY PRINTOUT

	SECNO	Q	CWSEL	CRIWS	QLOB	QCH	QROB	QLOBP	QCHP	QROBP	VLOB	VCH	VROB
	1.000	100000.00	4096.62	4096.93	1630.48	98369.52	0.00	1.63	98.37	0.00	6.94	18.45	0.00
	2.000	100000.00	4086.00	4088.26	3041.58	96207.13	751.29	3.04	96.21	0.75	9.41	22.87	8.37
*	2.500	100000.00	4085.89	4085.89	539.68	98821.49	638.82	0.54	98.82	0.64	6.23	16.91	6.67
*	3.000	100000.00	4086.53	4086.53	3036.91	96301.13	661.97	3.04	96.30	0.66	6.18	18.01	5.51
*	4.000	100000.00	4085.43	4085.43	2292.56	97350.02	357.43	2.29	97.35	0.36	5.46	18.48	4.86
	5.000	100000.00	4079.07	4081.16	1154.80	97746.55	1098.65	1.15	97.75	1.10	5.62	21.07	11.06
*	5.500	100000.00	4079.53	4079.53	1257.50	98261.48	481.02	1.26	98.26	0.48	7.77	16.16	3.48
*	6.000	100000.00	4080.22	4080.22	828.76	95413.52	3757.72	0.83	95.41	3.76	6.23	15.19	4.51
	7.000	100000.00	4068.38	4071.24	1632.62	96258.91	2108.48	1.63	96.26	2.11	10.01	23.89	5.90

Sh. 23A.12

DISCHARGE = 100000 CFS

SUMMARY PRINTOUT

FTK 4/9/87
HM 5/14/87

	SECNO	KRATIO	AREA	CWSEL	ELMIN	DEPTH	DIFWSX	HV	TOPWID	SSTA	ENDST	K*CHSL	10K*S
	1.000	0.00	5567.30	4096.62	4080.00	16.62	0.00	5.21	613.87	79.03	692.91	0.00	89.92
	2.000	1.45	4618.70	4086.00	4074.00	12.00	-10.63	7.87	677.82	272.14	949.96	-9.84	188.46
*	2.500	1.13	6027.91	4085.89	4073.00	12.89	-0.11	4.39	713.70	270.56	984.27	-3.33	86.56
*	3.000	1.55	5957.95	4086.53	4072.00	14.53	0.65	4.87	667.06	249.70	916.76	-3.33	72.42
*	4.000	1.73	5761.97	4085.43	4068.00	17.43	-1.11	5.17	636.77	230.36	867.13	-12.50	72.43
	5.000	1.50	4944.67	4079.07	4064.00	15.07	-6.35	6.76	753.31	135.88	889.18	-9.09	163.81
*	5.500	0.75	6382.18	4079.53	4062.00	17.53	0.46	4.00	936.04	142.08	1078.13	-8.00	82.81
*	6.000	2.29	7249.86	4080.22	4062.00	18.22	0.69	3.43	1204.65	67.23	1271.87	0.00	79.43
	7.000	2.02	4550.32	4068.38	4056.00	12.38	-11.84	8.56	1195.60	167.53	1363.13	-15.00	323.77

JTK 4/9/87
HM 5/19/87

SUMMARY OF ERRORS AND SPECIAL NOTES

```
CAUTION  SECNO=     2.500  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=     2.500  PROFILE= 1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=     2.500  PROFILE= 1  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION  SECNO=     3.000  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=     3.000  PROFILE= 1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=     3.000  PROFILE= 1  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION  SECNO=     4.000  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=     4.000  PROFILE= 1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=     4.000  PROFILE= 1  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION  SECNO=     5.500  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=     5.500  PROFILE= 1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=     5.500  PROFILE= 1  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION  SECNO=     6.000  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=     6.000  PROFILE= 1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=     6.000  PROFILE= 1  20 TRIALS ATTEMPTED TO BALANCE WSEL
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Sh. 23A. 14

JTK 4/9/87
HM 5/19/87

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**************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
**************************************************
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**********************************************************
*  WATER SURFACE PROFILES                                *
*  VERSION OF NOVEMBER 1976                              *
*  UPDATED MAY 1984                                      *
*                                                        *
*  RUN DATE 16-APR-87 TIME 15:57:34          *
**********************************************************
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*****************************************
*  U.S. ARMY CORPS OF ENGINEERS         *
*  THE HYDROLOGIC ENGINEERING CENTER    *
*  609 SECOND STREET, SUITE D           *
*  DAVIS, CALIFORNIA 95616              *
*  (916) 440-2105 (FTS) 448-2105        *
*****************************************
```


```
X     X  XXXXXXX   XXXXX              XXXXX
X     X  X        X     X            X     X
X     X  X        X                  X     X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X        X                  X
X     X  X        X     X            X
X     X  XXXXXXX   XXXXX              XXXXXXX
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UMTRA - Green River

Sh. 23 B.1

supercritical flow

Using 7 Cross sections adjusted by MKE

JTK 4/16/87

Sh. 23 B. 2

FHC 4/16/87
HM 5/14/87

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**************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
**************************************************

T1      UMTRA - GREEN RIVER - LOCAL PMF
T2      WATER SURFACE PROFILE ON BROWN WASH
T3      DISCHARGE = 100000 CFS

J1  ICHECK     INQ        NINV       IDIR       STRT       METRIC     HVINS      Q          WSEL       FQ
      0.         0.         0.         1.   0.009000       0.00       0.0     100000.   4074.000     0.000

J2  NPROF      IPLOT      PRFVS      XSECV      XSECH      FN         ALLDC      IBW        CHNIM      ITRACE
    -1.000     0.000      0.000      0.000      0.000      0.000     -1.000      0.000      0.000      0.000

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

     38.000     43.000      1.000      2.000     13.000     14.000     15.000     35.000     60.000     59.000

     55.000     26.000     56.000      0.000     38.000     58.000     25.000      1.000     42.000      8.000

     51.000     10.000      4.000     53.000     54.000     33.000      5.000      0.000      0.000      0.000

NC       0.045      0.050      0.035      0.100      0.300      0.000      0.000      0.000      0.000      0.000
X1       1.000      7.000    150.000    765.000    730.000    510.000    610.000      0.000      0.000      0.000
GR    4104.000      0.000   4090.000    150.000   4084.000    390.000   4080.000    470.000   4102.000    765.000
GR    4110.000   1145.000   4120.000   1385.000      0.000      0.000      0.000      0.000      0.000      0.000

X1       2.000     11.000    380.000    900.000    350.000    300.000    350.000      0.000      0.000      0.000
GR    4114.000      0.000   4090.000    200.000   4080.000    380.000   4074.000    400.000   4074.000    430.000
GR    4078.000    510.000   4080.000    600.000   4080.000    900.000   4094.000    990.000   4094.000   1170.000
GR    4120.000   1890.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000      0.000

X1       2.500     12.000    300.000    960.000    365.000    380.000    380.000      0.000      0.000      0.000
GR    4110.000      0.000   4090.000    250.000   4080.000    300.000   4073.000    420.000   4076.000    500.000
GR    4076.000    560.000   4078.000    620.000   4078.000    800.000   4080.000    960.000   4091.000   1000.000
GR    4096.000   1330.000   4110.000   1700.000      0.000      0.000      0.000      0.000      0.000      0.000

NC       0.000      0.000      0.000      0.200      0.500      0.000      0.000      0.000      0.000      0.000
X1       3.000     12.000    400.000    880.000    315.000    320.000    318.000      0.000      0.000      1.000
GR    4130.000      0.000   4100.000     80.000   4090.000    170.000   4080.000    400.000   4074.000    455.000
GR    4072.000    570.000   4076.000    620.000   4080.000    880.000   4088.000    925.000   4090.000   1150.000
GR    4110.000   1640.000   4120.000   1820.000      0.000      0.000      0.000      0.000      0.000      0.000
```

FTK 9/14/87
HM 9/14/87

X1	4.000	9.000	385.000	840.000	470.000	440.000	460.000	0.000	0.000	1.000
GR	4130.000	0.000	4090.000	100.000	4080.000	385.000	4068.000	530.000	4078.000	750.000
GR	4080.000	840.000	4086.000	870.000	4090.000	1165.000	4120.000	1930.000	0.000	0.000
X1	5.000	10.000	270.000	876.000	230.000	290.000	250.000	0.000	0.000	0.000
GR	4100.000	0.000	4080.000	95.000	4076.000	270.000	4076.000	470.000	4064.000	530.000
GR	4074.000	635.000	4076.000	876.000	4082.000	890.000	4082.000	1090.000	4110.000	1885.000
NC	0.000	0.000	0.000	0.100	0.300	0.000	0.000	0.000	0.000	0.000
X1	5.500	11.000	180.000	890.000	150.000	280.000	270.000	0.000	0.000	0.000
GR	4090.000	0.000	4080.000	80.000	4080.000	140.000	4071.000	180.000	4070.000	530.000
GR	4062.000	570.000	4073.000	680.000	4076.000	890.000	4079.000	940.000	4080.000	1200.000
GR	4090.000	1460.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
X1	6.000	8.000	110.000	890.000	385.000	410.000	400.000	0.000	0.000	0.000
GR	4090.000	0.000	4074.000	110.000	4070.000	490.000	4062.000	525.000	4078.000	685.000
GR	4078.000	890.000	4080.000	1265.000	4100.000	1885.000	0.000	0.000	0.000	0.000
X1	7.000	12.000	242.000	970.000	0.000	0.000	0.000	0.000	0.000	0.000
GR	4090.000	0.000	4070.000	140.000	4064.000	242.000	4060.000	665.000	4056.000	680.000
GR	4060.000	710.000	4068.000	860.000	4066.000	915.000	4066.000	970.000	4068.000	1180.000
GR	4068.000	1350.000	4088.000	2040.000	0.000	0.000	0.000	0.000	0.000	0.000
EJ	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Sh. 23B.4

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

FNL 4/16/87
HM 5/19/87

*PROF 1

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

CCHV= 0.100 CEHV= 0.300
*SECNO 1.000
3840 SECTION NOT HIGH ENOUGH 4347.487 4154.000 4080.000 4154.000 4083.000 14
3840 SECTION NOT HIGH ENOUGH 4347.487 4204.000 4080.000 4204.000 4083.000 14
3840 SECTION NOT HIGH ENOUGH 4347.487 4254.000 4080.000 4254.000 4083.000 14
3840 SECTION NOT HIGH ENOUGH 4347.487 4304.000 4080.000 4304.000 4083.000 14

1.00	16.62	4096.62	4096.93	4074.00	4101.83	5.21	0.00	0.00	4090.00
100000.	1630.	98370.	0.	235.	5332.	0.	0.	0.	4102.00
0.00	6.94	18.45	0.00	0.045	0.035	0.000	0.000	4080.00	79.03
0.008992	0.	0.	0.	0	35	11	0.00	613.87	692.91

*SECNO 2.000

3301 HV CHANGED MORE THAN HVINS

2.00	12.91	4086.91	4088.81	0.00	4094.27	7.35	7.35	0.21	4080.00
100000.	4194.	94467.	1339.	429.	4241.	153.	73.	9.	4080.00
0.01	9.77	22.27	8.73	0.045	0.035	0.050	0.000	4074.00	255.68
0.016802	730.	610.	510.	6	11	0	0.00	688.72	944.40

*SECNO 2.500

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

2.50	13.21	4086.21	4086.21	0.00	4090.54	4.33	4.03	2.99	4080.00
100000.	615.	98987.	398.	97.	5902.	70.	117.	15.	4080.00
0.01	6.37	16.77	5.67	0.045	0.035	0.050	0.000	4073.00	268.93
0.008412	350.	350.	300.	20	5	0	0.00	713.67	982.60

CCHV= 0.200 CEHV= 0.500
*SECNO 3.000
3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY

Sh. 23B.5

FTK 4/16/87
HM 5/14/87

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	QLOSS	BANK ELEV
Q	GLOB	GCH	GROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

3720 CRITICAL DEPTH ASSUMED

3.00	15.34	4087.34	4087.34	0.00	4092.09	4.74	2.95	3.09	4080.00
100000.	4129.	94972.	900.	620.	5314.	152.	170.	21.	4080.00
0.02	6.66	17.87	5.94	0.045	0.035	0.050	0.000	4072.00	231.13
0.007189	365.	380.	380.	20	8	0	0.00	690.17	921.30

*SECNO 4.000
3685 20 TRIALS ATTEMPTED WSEL, CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

4.00	18.08	4086.08	4086.08	0.00	4091.12	5.04	2.27	0.54	4080.00
100000.	3080.	96435.	485.	527.	5267.	93.	214.	26.	4080.00
0.02	5.84	18.31	5.23	0.045	0.035	0.050	0.000	4068.00	211.67
0.007115	315.	318.	320.	20	11	0	0.00	664.36	876.03

*SECNO 5.000

5.00	18.32	4082.32	4083.06	0.00	4087.06	4.74	3.91	0.15	4076.00
100000.	6775.	92838.	387.	769.	5166.	112.	277.	35.	4076.00
0.03	8.81	17.97	3.46	0.045	0.035	0.050	0.000	4064.00	83.98
0.010323	470.	460.	440.	5	8	0	0.00	1015.12	1099.10

CCHV= 0.100 CEHV= 0.300
*SECNO 5.500

3301 HV CHANGED MORE THAN HVINS

5.50	16.18	4078.18	4079.53	0.00	4083.90	5.72	3.06	0.10	4071.00
100000.	1062.	98786.	152.	115.	5122.	40.	309.	40.	4076.00
0.04	9.28	19.29	3.83	0.045	0.035	0.050	0.000	4062.00	148.09
0.014836	230.	250.	290.	7	8	0	0.00	778.23	926.32

*SECNO 6.000

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL, CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

6.00	18.96	4080.96	4080.96	0.00	4084.43	3.47	2.86	0.78	4074.00
100000.	1120.	95803.	3076.	166.	6287.	748.	348.	46.	4078.00
0.04	6.73	15.24	4.11	0.045	0.035	0.050	0.000	4062.00	62.16
0.007992	150.	270.	280.	20	11	0	0.00	1232.53	1294.70

16-APR-87 15:57:35

Sh. 23B.6

JTK 4/16/87
HM 5/14/87

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 7.000

3301 HV CHANGED MORE THAN HVINS

7.00	12.11	4068.11	4071.22	0.00	4077.77	9.65	6.04	0.62	4064.00
100000.	1512.	96985.	1503.	144.	3838.	255.	400.	57.	4066.00
0.05	10.50	25.27	5.90	0.045	0.035	0.050	0.000	4056.00	172.02
0.038679	385.	400.	410.	7	14	0	0.00	1182.01	1354.03

Sh. 23B.7

JTK 4/16/87

HM 5/19/87

CROSS SECTION 3.00
STREAM DISCHARGE = 100000 CFS
DISCHARGE= 100000.

PLOTTED POINTS (BY PRIORITY)-B=BOTTOM BRIDGE, T=TOP BRIDGE, X=GROUND, W=WATER SUR, E=ENERGY GRADIENT, C=CRITICAL WSEL

```
ELEV 4070.      4080.      4090.      4100.      4110.      4120.      4130.      4140.      4150.      4160.      4170.

    STA-FEET

 2   0.  .          .          .          .          .          .          X          .          .          .          .
    50.  .          .          .          .          .        X .          .          .          .          .          .
 3 100.  .          .          .          .        X .          .          .          .          .          .          .
 4 150.  .          .          .        X E          .          .          .          .          .          .          .
   200.  .          .        X . E          .          .          .          .          .          .          .          .
   250.  .          .       XW . E          .          .          .          .          .          .          .          .
   300.  .          .   X   W . E          .          .          .          .          .          .          .          .
   350.  .          . X     W . E          .          .          .          .          .          .          .          .
 5 400.  .          X       W . E          .          .          .          .          .          .          .          . BANK.
 6 450.  .    X     .       W . E          .          .          .          .          .          .          .          .
   500.  .  X       .       W . E          .          .          .          .          .          .          .          .
 7 550.  .X         .       W . E          .          .          .          .          .          .          .          .
 8 600.  .      X   .       W . E          .          .          .          .          .          .          .          .
   650.  .     X    .       W . E          .          .          .          .          .          .          .          .
   700.  .    X     .       W . E          .          .          .          .          .          .          .          .
   750.  .    X     .       W . E          .          .          .          .          .          .          .          .
   800.  .     X    .       W . E          .          .          .          .          .          .          .          .
   850.  .      X   .       W . E          .          .          .          .          .          .          .          .
10 900.  .      XXXXXXXXX  . E          .          .          .          .          .          .          .          . BANK.
   950.  .          .        X . E          .          .          .          .          .          .          .          .
  1000.  .          .       X. E          .          .          .          .          .          .          .          .
  1050.  .          .       X. E          .          .          .          .          .          .          .          .
  1100.  .          .        X E          .          .          .          .          .          .          .          .
111150.  .          .        X E          .          .          .          .          .          .          .          .
  1200.  .          .        . X          .          .          .          .          .          .          .          .
  1250.  .          .        .   X        .          .          .          .          .          .          .          .
  1300.  .          .        .     X      .          .          .          .          .          .          .          .
  1350.  .          .        .       X    .          .          .          .          .          .          .          .
  1400.  .          .        .         X  .          .          .          .          .          .          .          .
  1450.  .          .        .          . X         .          .          .          .          .          .          .
  1500.  .          .        .          .   X       .          .          .          .          .          .          .
  1550.  .          .        .          .     X     .          .          .          .          .          .          .
  1600.  .          .        .          .       X   .          .          .          .          .          .          .
121650.  .          .        .          .         X .          .          .          .          .          .          .
  1700.  .          .        .          .          . X         .          .          .          .          .          .
  1750.  .          .        .          .          .   X       .          .          .          .          .          .
131800.  .          .        .          .          .     X     .          .          .          .          .          .
```

NRD= 0 ELLC= 9999999.00 ELTRD= 9999999.00

EL(I), STA(I)

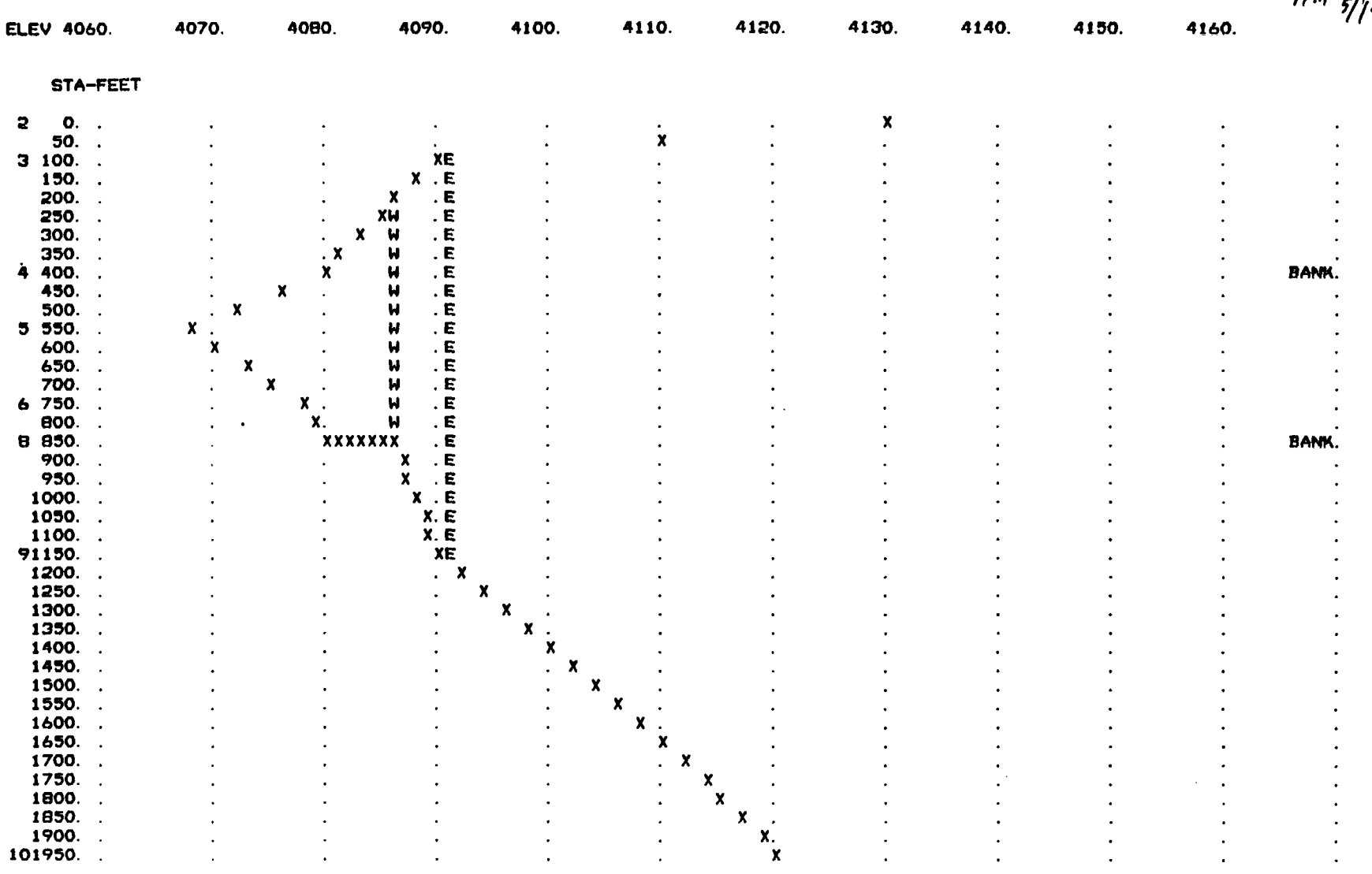
4130.00	0.00	4100.00	80.00	4090.00	170.00	4080.00	400.00	4074.00	455.00
4072.00	570.00	4076.00	620.00	4080.00	880.00	4088.00	925.00	4090.00	1150.00
4110.00	1640.00	4120.00	1820.00						

Sh. 23B-8

JTK 4/16/87
HM 5/19/87

CROSS SECTION 4.00
STREAM DISCHARGE = 100000 CFS
DISCHARGE= 100000.

PLOTTED POINTS (BY PRIORITY)-B=BOTTOM BRIDGE, T=TOP BRIDGE, X=GROUND, W=WATER SUR, E=ENERGY GRADIENT, C=CRITICAL WSEL



NRD= 0 ELLC= 9999999.00 ELTRD= 9999999.00

EL(I), STA(I)

4130.00	0.00	4090.00	100.00	4080.00	385.00	4068.00	530.00	4078.00	750.00
4080.00	840.00	4086.00	870.00	4090.00	1165.00	4120.00	1930.00		

Sh. 23B. 9

JTK 4/16/87

HM 5/19/87

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PROFILE FOR STREAM  DISCHARGE = 100000 CFS

PLOTTED POINTS (BY PRIORITY)-E-ENERGY,W-WATER SURFACE,I-INVERT,C-CRITICAL W.S.,L-LEFT BANK,R-RIGHT BANK,M-LOWER END STA

ELEVATION  4050.     4100.     4150.     4200.     4250.     4300.     4350.     4400.     4450.     4500.
    SECNO   CUMDIS

     1.00     0.  .     I LWE         .         .         .         .M        .         .         .         .         .
             50.  .     I LWE         .         .         .       M .         .         .         .         .         .
            100.  .     I LWE         .         .         .    M    .         .         .         .         .         .
            150.  .     I LWE         .         .         .M        .         .         .         .         .         .
            200.  .     IL WE         .         .       M .         .         .         .         .         .         .
            250.  .     IL WE         .         .    M    .         .         .         .         .         .         .
            300.  .    I LWCE         .         . M       .         .         .         .         .         .         .
            350.  .    I LWE.         .        M.         .         .         .         .         .         .         .
            400.  .    I LWE.         .     M   .         .         .         .         .         .         .         .
            450.  .    I LWE.         .  M      .         .         .         .         .         .         .         .
            500.  .    ILRWE.         M         .         .         .         .         .         .         .         .
            550.  .    IL WE.      M  .         .         .         .         .         .         .         .         .
            600.  .    ILWCE.  M      .         .         .         .         .         .         .         .         .
     2.00   650.  .    ILWCE.  M      .         .         .         .         .         .         .         .         .
            700.  .    ILWCE.  M      .         .         .         .         .         .         .         .         .
            750.  .    ILWCE.  M      .         .         .         .         .         .         .         .         .
            800.  .    ILWCE. M       .         .         .         .         .         .         .         .         .
            850.  .    ILWE . M       .         .         .         .         .         .         .         .         .
            900.  .    ILWE . M       .         .         .         .         .         .         .         .         .
            950.  .    ILWE . M       .         .         .         .         .         .         .         .         .
     2.50  1000.  .    ILWE . M       .         .         .         .         .         .         .         .         .
           1050.  .    ILWE . M       .         .         .         .         .         .         .         .         .
           1100.  .    ILWE .  M      .         .         .         .         .         .         .         .         .
           1150.  .    ILWE .  M      .         .         .         .         .         .         .         .         .
           1200.  .   I LWE .  M      .         .         .         .         .         .         .         .         .
           1250.  .   I LWE .  M      .         .         .         .         .         .         .         .         .
           1300.  .   I LWE .   M     .         .         .         .         .         .         .         .         .
     3.00  1350.  .   I LWE .   M     .         .         .         .         .         .         .         .         .
           1400.  .   I LWE .   M     .         .         .         .         .         .         .         .         .
           1450.  .   I LWE .   M     .         .         .         .         .         .         .         .         .
           1500.  .   I LWE .   M     .         .         .         .         .         .         .         .         .
           1550.  .   I LWE .   M     .         .         .         .         .         .         .         .         .
           1600.  .   I LWE .   M     .         .         .         .         .         .         .         .         .
           1650.  .   I LWE .   M     .         .         .         .         .         .         .         .         .
     4.00  1700.  .   I LWE .   M     .         .         .         .         .         .         .         .         .
           1750.  .   I LWE .   M     .         .         .         .         .         .         .         .         .
           1800.  .  I  LWE .  M      .         .         .         .         .         .         .         .         .
           1850.  .  I  LWE .  M      .         .         .         .         .         .         .         .         .
           1900.  .  I  LWE . M       .         .         .         .         .         .         .         .         .
           1950.  .  I  LWE . M       .         .         .         .         .         .         .         .         .
           2000.  .  I L WE .M        .         .         .         .         .         .         .         .         .
           2050.  .  I L WE .M        .         .         .         .         .         .         .         .         .
           2100.  .  I L WE .M        .         .         .         .         .         .         .         .         .
     5.00  2150.  .  I LWE  M         .         .         .         .         .         .         .         .         .
           2200.  .  I LWE  M         .         .         .         .         .         .         .         .         .
           2250.  .  I LWE M.         .         .         .         .         .         .         .         .         .
           2300.  .  I LWE M.         .         .         .         .         .         .         .         .         .
           2350.  . I LRWEM .         .         .         .         .         .         .         .         .         .
     5.50  2400.  . I LRWEM .         .         .         .         .         .         .         .         .         .
```

	2450.	.	I	LRWEM	.	.	.	.	.	.	.	.	.	.
	2500.	.	I	LRWEM	.	.	.	.	.	.	.	.	.	.
	2550.	.	I	LWEM	.	.	.	.	.	.	.	.	.	.
	2600.	.	I	LWEM	.	.	.	.	.	.	.	.	.	.
6.00	2650.	.	I	LWEM	.	.	.	.	.	.	.	.	.	.
	2700.	.	I	LWEM	.	.	.	.	.	.	.	.	.	.
	2750.	.	I	LRWEM	.	.	.	.	.	.	.	.	.	.
	2800.	.	I	LWE M	.	.	.	.	.	.	.	.	.	.
	2850.	.	I	LWE M	.	.	.	.	.	.	.	.	.	.
	2900.	.	I	LWE M	.	.	.	.	.	.	.	.	.	.
	2950.	.	I	LWCE M	.	.	.	.	.	.	.	.	.	.
	3000.	.	I	LW E M	.	.	.	.	.	.	.	.	.	.
7.00	3050.	.	I	LW E M	.	.	.	.	.	.	.	.	.	.

Sh. 23B.10

JK 4/16/87
HM 5/14/87

Sh. 23B.11

JTK 4/16/87
HM 5/19/87

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  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
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NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

DISCHARGE = 100000 CFS

SUMMARY PRINTOUT

	SECNO	Q	CWSEL	CRIWS	QLOB	QCH	QROB	QLOBP	QCHP	QROBP	VLOB	VCH	VROB
	1.000	100000.00	4096.62	4096.93	1630.48	98369.52	0.00	1.63	98.37	0.00	6.94	18.45	0.00
	2.000	100000.00	4086.91	4088.81	4193.84	94467.47	1338.69	4.19	94.47	1.34	9.77	22.27	8.73
*	2.500	100000.00	4086.21	4086.21	614.70	98987.43	397.86	0.61	98.99	0.40	6.37	16.77	5.67
*	3.000	100000.00	4087.34	4087.34	4128.52	94971.57	899.91	4.13	94.97	0.90	6.66	17.87	5.94
*	4.000	100000.00	4086.08	4086.08	3080.27	96435.16	484.55	3.08	96.44	0.48	5.84	18.31	5.23
	5.000	100000.00	4082.32	4083.06	6775.17	92837.50	387.33	6.78	92.84	0.39	8.81	17.97	3.46
	5.500	100000.00	4078.18	4079.53	1062.46	98786.02	151.53	1.06	98.79	0.15	9.28	19.29	3.83
*	6.000	100000.00	4080.96	4080.96	1120.24	95803.27	3076.48	1.12	95.80	3.08	6.73	15.24	4.11
	7.000	100000.00	4068.11	4071.22	1512.11	96984.69	1503.22	1.51	96.98	1.50	10.50	25.27	5.90

Sh. 23B.12

JTK 4/16/87
HM 5/19/87

DISCHARGE = 100000 CFS

SUMMARY PRINTOUT

	SECND	KRATIO	AREA	CWSEL	ELMIN	DEPTH	DIFWSX	HV	TOPWID	SSTA	ENDST	K*CHSL	10K*S
	1.000	0.00	5567.30	4096.62	4080.00	16.62	0.00	5.21	613.87	79.03	692.91	0.00	89.92
	2.000	1.37	4823.97	4086.91	4074.00	12.91	-9.71	7.35	688.72	255.68	944.40	-9.84	168.02
*	2.500	1.19	6068.58	4086.21	4073.00	13.21	-0.70	4.33	713.67	268.93	982.60	-2.86	84.12
*	3.000	1.64	6085.87	4087.34	4072.00	15.34	1.13	4.74	690.17	231.13	921.30	-2.63	71.89
*	4.000	1.13	5886.97	4086.08	4068.00	18.08	-1.26	5.04	664.36	211.67	876.03	-12.58	71.15
	5.000	1.20	6047.20	4082.32	4064.00	18.32	-3.76	4.74	1015.12	83.98	1099.10	-8.70	103.23
	5.500	1.20	5276.52	4078.18	4062.00	16.18	-4.14	5.72	778.23	148.09	926.32	-8.00	148.36
*	6.000	0.78	7202.15	4080.96	4062.00	18.96	2.78	3.47	1232.53	62.16	1294.70	0.00	79.92
	7.000	2.20	4236.59	4068.11	4056.00	12.11	-12.84	9.65	1182.01	172.02	1354.03	-15.00	386.79

Sh. 23B. 13

FTK 4/16/87
HM 5/19/87

SUMMARY OF ERRORS AND SPECIAL NOTES

CAUTION	SECNO=	2.500	PROFILE= 1	CRITICAL DEPTH ASSUMED
CAUTION	SECNO=	2.500	PROFILE= 1	PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION	SECNO=	2.500	PROFILE= 1	20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION	SECNO=	3.000	PROFILE= 1	CRITICAL DEPTH ASSUMED
CAUTION	SECNO=	3.000	PROFILE= 1	PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION	SECNO=	3.000	PROFILE= 1	20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION	SECNO=	4.000	PROFILE= 1	CRITICAL DEPTH ASSUMED
CAUTION	SECNO=	4.000	PROFILE= 1	PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION	SECNO=	4.000	PROFILE= 1	20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION	SECNO=	6.000	PROFILE= 1	CRITICAL DEPTH ASSUMED
CAUTION	SECNO=	6.000	PROFILE= 1	PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION	SECNO=	6.000	PROFILE= 1	20 TRIALS ATTEMPTED TO BALANCE WSEL

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LLLLLLLLLL    55555555555555555555555555555555555555555555555555555555555555555555555555555555555555555555555555555555555555    LLLLLLLLLL

                                   J   III   M   M  K   K
                                   J    I    MM MM  K   K
                                   J    I    M M M  K  K
                                   J    I    M   M  KKK
                                J  J    I    M   M  K  K
                                J  J    I    M   M  K   K
                                 JJJ    III   M   M  K   K

                          WW      WW    SSSSSSSS  LL          PPPPPPPP
                          WW      WW    SSSSSSSS  LL          PPPPPPPP
                          WW      WW  SS          LL          PP      PP
                          WW      WW  SS          LL          PP      PP
                          WW      WW  SS          LL          PP      PP
                          WW      WW  SS          LL          PP      PP
                          WW      WW    SSSSSS    LL          PPPPPPPP
                          WW      WW    SSSSSS    LL          PPPPPPPP
                          WW  WW  WW          SS  LL          PP
                          WW  WW  WW          SS  LL          PP
                          WWWW  WWWW          SS  LL          PP
                          WWWW  WWWW          SS  LL          PP
                          WW      WW  SSSSSSSS    LLLLLLLLLL  PP
                          WW      WW  SSSSSSSS    LLLLLLLLLL  PP

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                          00      00  UU      UU  88      88              11
                          00      00  UU      UU  88      88              11
                          00      00  UU      UU    888888      ;;;;      11
                          00      00  UU      UU    888888      ;;;;      11
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                  ....      000000    UUUUUUUUUU    888888      ;;    111111
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Sh. 23c.1

UMTRA – Green River

Supercritical flow

using 5 cross sections

FTK 4/21/87

HM 5/19/87

File _DUA0:[251020]WSLP.OUB;1 (1751,50,0), last revised on 21-APR-1987 11:31, is a 72 block sequential file owned by UIC [ER509501,EARTH]. The records are variable length with FORTRAN (FTN) carriage control. The longest record is 133 bytes.

Job WSLP (326) queued to SYS$PRINT on 21-APR-1987 11:31 by user JIMK, UIC [ER509501,EARTH], under account EARTH at priority 100, started on printer _TXA2: on 21-APR-1987 11:32 from queue SYS$PRINT.

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LLLLLLLLLL    55555555555555555555555555555555555555555555555555555555555555555555555555555555555555555555555555555555555555    LLLLLLLLLL
LLLLLLLLLL    55555555555555555555  Digital Equipment Corporation - VAX/VMS Version V4.5  55555555555555555555    LLLLLLLLLL
LLLLLLLLLL    55555555555555555555555555555555555555555555555555555555555555555555555555555555555555555555555555555555555555    LLLLLLLLLL
```

```
**********************************************************
*  WATER SURFACE PROFILES                                *
*  VERSION OF NOVEMBER 1976                              *
*  UPDATED MAY 1984                                      *
*                                                        *
*  RUN DATE 21-APR-87 TIME 11:30:48           *
**********************************************************
```


```
*****************************************
*  U.S. ARMY CORPS OF ENGINEERS         *
*  THE HYDROLOGIC ENGINEERING CENTER    *
*  609 SECOND STREET, SUITE D           *
*  DAVIS, CALIFORNIA 95616              *
*  (916) 440-2105 (FTS) 448-2105        *
*****************************************
```


Sh. 23c.2

```
X     X  XXXXXXX   XXXXX              XXXXX
X     X  X        X     X            X     X
X     X  X        X                        X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X        X                   X
X     X  X        X     X             X
X     X  XXXXXXX   XXXXX              XXXXXXX
```

FK 4/21/87
HM 5/19/87

Sh. 23C.3

JPK 4/21/87
MM 5/19/87

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**************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
**************************************************

T1      UMTRA - GREEN RIVER - LOCAL PMF
T2      WATER SURFACE PROFILE ON BROWN WASH
T3      DISCHARGE = 100000 CFS

J1  ICHECK     INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ
       0.       0.        0.        1.  0.009000      0.00      0.0    100000.  4085.000     0.000
J2  NPROF      IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE
    -1.000     0.000     0.000     0.000     0.000     0.000    -1.000     0.000     0.000     0.000
J3  VARIABLE CODES FOR SUMMARY PRINTOUT
    38.000    43.000     1.000     2.000    13.000    14.000    15.000    35.000    60.000    59.000
    55.000    26.000    56.000     0.000    38.000    58.000    25.000     1.000    42.000     8.000
    51.000    10.000     4.000    53.000    54.000    33.000     5.000     0.000     0.000     0.000

NC      0.045     0.050     0.035     0.100     0.300     0.000     0.000     0.000     0.000     0.000
X1      2.000    11.000   380.000   900.000   350.000   300.000   350.000     0.000     0.000     0.000
GR   4114.000     0.000  4090.000   200.000  4080.000   380.000  4074.000   400.000  4074.000   430.000
GR   4078.000   510.000  4080.000   600.000  4080.000   900.000  4094.000   990.000  4094.000  1170.000
GR   4120.000  1890.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000     0.000

X1      2.500    12.000   300.000   960.000   365.000   380.000   380.000     0.000     0.000     0.000
GR   4110.000     0.000  4090.000   250.000  4080.000   300.000  4073.000   420.000  4076.000   500.000
GR   4076.000   560.000  4078.000   620.000  4078.000   800.000  4080.000   960.000  4091.000  1000.000
GR   4096.000  1330.000  4110.000  1700.000     0.000     0.000     0.000     0.000     0.000     0.000

NC      0.000     0.000     0.000     0.200     0.500     0.000     0.000     0.000     0.000     0.000
X1      3.000    12.000   400.000   880.000   315.000   320.000   318.000     0.000     0.000     1.000
GR   4130.000     0.000  4100.000    80.000  4090.000   170.000  4080.000   400.000  4074.000   455.000
GR   4072.000   570.000  4076.000   620.000  4080.000   880.000  4088.000   925.000  4090.000  1150.000
GR   4110.000  1640.000  4120.000  1820.000     0.000     0.000     0.000     0.000     0.000     0.000

X1      4.000     9.000   385.000   840.000   470.000   440.000   460.000     0.000     0.000     1.000
GR   4130.000     0.000  4090.000   100.000  4080.000   385.000  4068.000   530.000  4078.000   750.000
GR   4080.000   840.000  4086.000   870.000  4090.000  1165.000  4120.000  1930.000     0.000     0.000
```

Sh. 23C.4

TK 4/21/87
HM 5/19/87

X1	5.000	10.000	270.000	876.000	230.000	290.000	250.000	0.000	0.000	0.000
GR	4100.000	0.000	4080.000	95.000	4076.000	270.000	4076.000	470.000	4064.000	530.000
GR	4074.000	635.000	4076.000	876.000	4082.000	890.000	4082.000	1090.000	4110.000	1885.000
NC	0.000	0.000	0.000	0.100	0.300	0.000	0.000	0.000	0.000	0.000
X1	5.500	11.000	180.000	890.000	150.000	280.000	270.000	0.000	0.000	0.000
GR	4090.000	0.000	4080.000	80.000	4080.000	140.000	4071.000	180.000	4070.000	530.000
GR	4062.000	570.000	4073.000	680.000	4076.000	890.000	4079.000	940.000	4080.000	1200.000
GR	4090.000	1460.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
X1	6.000	8.000	110.000	890.000	385.000	410.000	400.000	0.000	0.000	0.000
GR	4090.000	0.000	4074.000	110.000	4070.000	490.000	4062.000	525.000	4078.000	685.000
GR	4078.000	890.000	4080.000	1265.000	4100.000	1885.000	0.000	0.000	0.000	0.000
EJ	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

JTK 4/21/87
HM 5/19/87

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	QLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*PROF 1

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

CCHV= 0.100 CEHV= 0.300
*SECNO 2.000

2.00	14.47	4088.47	4088.91	4085.00	4093.43	4.95	0.00	0.00	4080.00
100000.	5314.	92989.	1696.	646.	5057.	231.	0.	0.	4080.00
0.00	8.22	18.39	7.35	0.045	0.035	0.050	0.000	4074.00	227.47
0.009061	0.	0.	0.	0	11	4	0.00	727.01	954.48

*SECNO 2.500

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

2.50	13.14	4086.14	4086.14	0.00	4090.55	4.40	3.09	0.37	4080.00
100000.	604.	99005.	391.	94.	5856.	69.	48.	6.	4080.00
0.01	6.40	16.91	5.70	0.045	0.035	0.050	0.000	4073.00	269.28
0.008639	350.	350.	300.	20	11	0	0.00	713.07	982.34

CCHV= 0.200 CEHV= 0.500
*SECNO 3.000
3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3.00	15.35	4087.35	4087.35	0.00	4092.09	4.73	2.98	3.11	4080.00
100000.	4135.	94963.	901.	621.	5318.	152.	101.	12.	4080.00
0.01	6.66	17.86	5.93	0.045	0.035	0.050	0.000	4072.00	230.93
0.007170	365.	380.	380.	20	8	0	0.00	690.42	921.35

*SECNO 4.000
3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

4.00	18.08	4086.08	4086.08	0.00	4091.12	5.04	2.27	0.55	4080.00
100000.	3080.	96435.	485.	527.	5267.	93.	144.	17.	4080.00
0.02	5.84	18.31	5.23	0.045	0.035	0.050	0.000	4068.00	211.67
0.007115	315.	318.	320.	20	11	0	0.00	664.36	876.03

JTK 4/21/87
HM 5/19/87

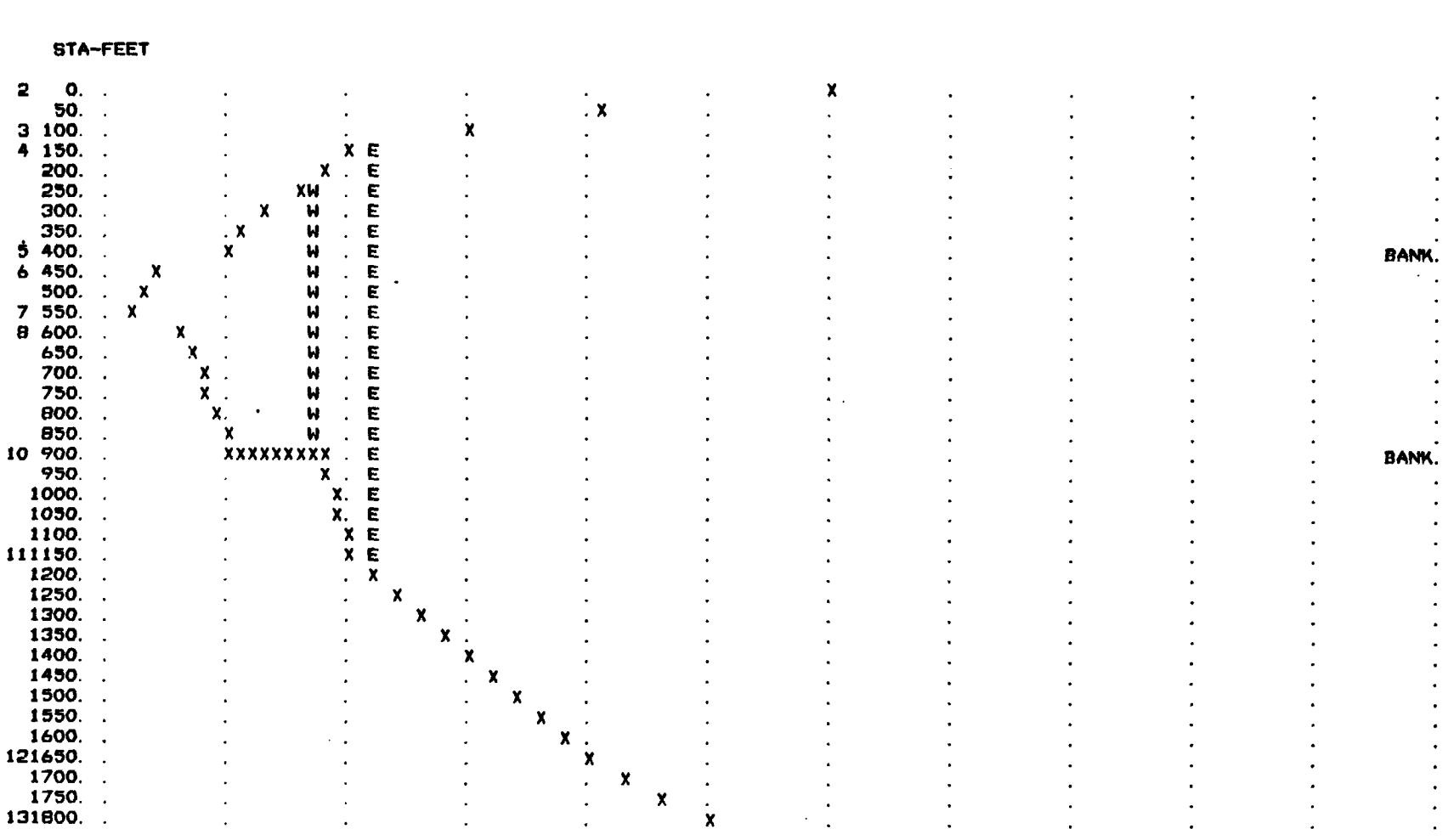
SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST
*SECNO 5.000									
5.00	18.32	4082.32	4083.06	0.00	4087.06	4.74	3.91	0.15	4076.00
100000.	6775.	92838.	387.	769.	5166.	112.	207.	26.	4076.00
0.02	8.81	17.97	3.46	0.045	0.035	0.050	0.000	4064.00	83.98
0.010323	470.	460.	440.	5	8	0	0.00	1015.12	1099.10
CCHV= 0.100 CEHV= 0.300									
*SECNO 5.500									
3301 HV CHANGED MORE THAN HVINS									
5.50	16.18	4078.18	4079.53	0.00	4083.90	5.72	3.06	0.10	4071.00
100000.	1062.	98786.	152.	115.	5122.	40.	240.	31.	4076.00
0.03	9.28	19.29	3.83	0.045	0.035	0.050	0.000	4062.00	148.09
0.014836	230.	250.	290.	7	8	0	0.00	778.23	926.32
*SECNO 6.000									
3301 HV CHANGED MORE THAN HVINS									
3685 20 TRIALS ATTEMPTED WSEL,CWSEL									
3693 PROBABLE MINIMUM SPECIFIC ENERGY									
3720 CRITICAL DEPTH ASSUMED									
6.00	18.96	4080.96	4080.96	0.00	4084.43	3.47	2.86	0.78	4074.00
100000.	1120.	95803.	3076.	166.	6287.	748.	278.	37.	4078.00
0.03	6.73	15.24	4.11	0.045	0.035	0.050	0.000	4062.00	62.16
0.007992	150.	270.	280.	20	11	0	0.00	1232.53	1294.70

Sh. 23C.7

JTK 4/21/87
HM 5/14/87

CROSS SECTION 3.00
STREAM DISCHARGE = 100000 CFS
DISCHARGE= 100000.

PLOTTED POINTS (BY PRIORITY)-B=BOTTOM BRIDGE, T=TOP BRIDGE, X=GROUND, W=WATER SUR, E=ENERGY GRADIENT, C=CRITICAL WSEL



NRD= 0 ELLC= 9999999.00 ELTRD= 9999999.00

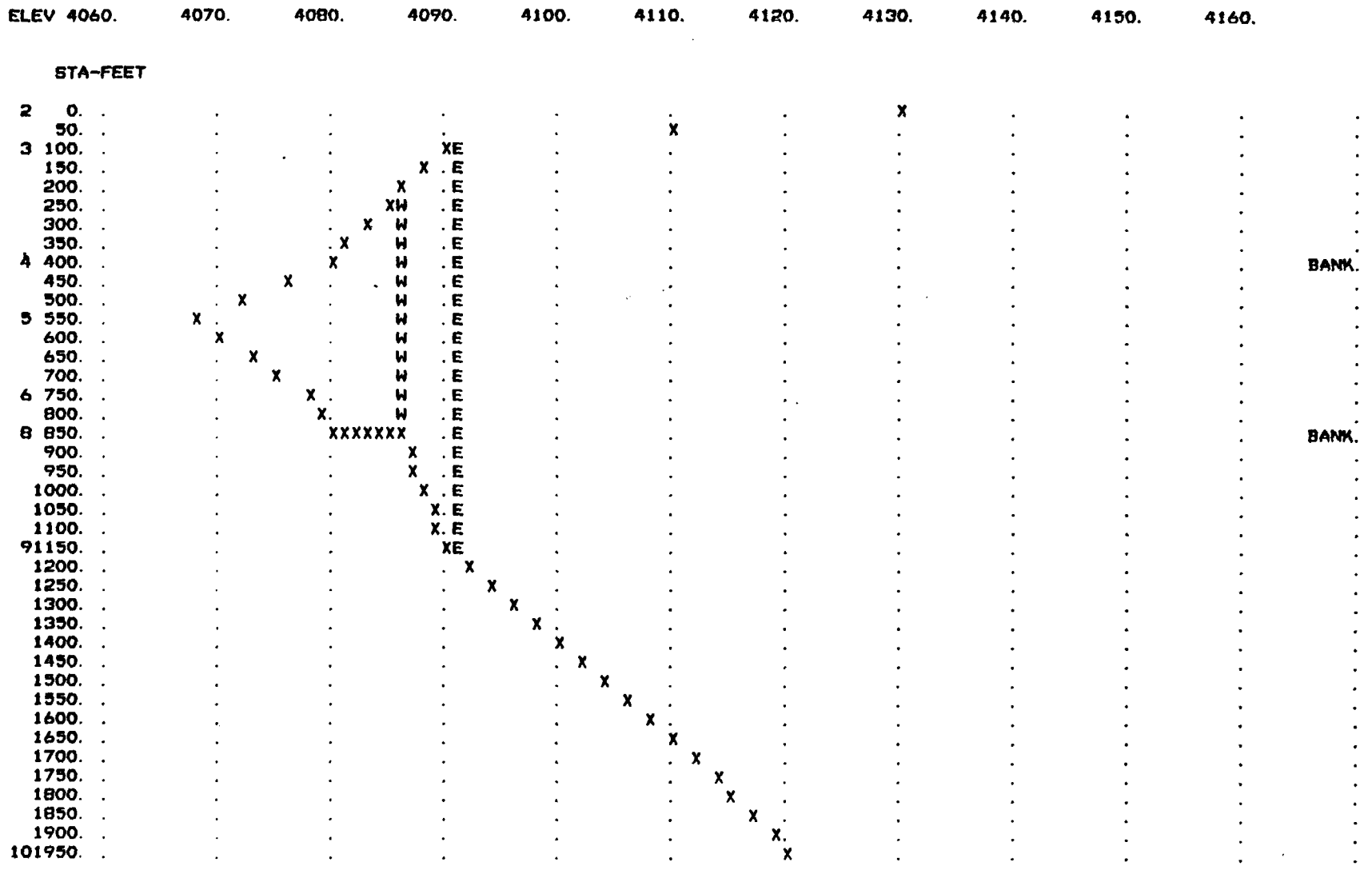
EL(I), STA(I)									
4130.00	0.00	4100.00	80.00	4090.00	170.00	4080.00	400.00	4074.00	455.00
4072.00	570.00	4076.00	620.00	4080.00	880.00	4088.00	925.00	4090.00	1150.00
4110.00	1640.00	4120.00	1820.00						

Sh. 23C.8

FTK 4/21/87
HM 5/14/87

CROSS SECTION 4.00
STREAM DISCHARGE = 100000 CFS
DISCHARGE= 100000.

PLOTTED POINTS (BY PRIORITY)-B=BOTTOM BRIDGE, T=TOP BRIDGE, X=GROUND, W=WATER SUR, E=ENERGY GRADIENT, C=CRITICAL WSEL



NRD= 0 ELLC= 9999999.00 ELTRD= 9999999.00

EL(I), STA(I)

4130.00	0.00	4090.00	100.00	4080.00	385.00	4068.00	530.00	4078.00	750.00
4080.00	840.00	4086.00	870.00	4090.00	1165.00	4120.00	1930.00		

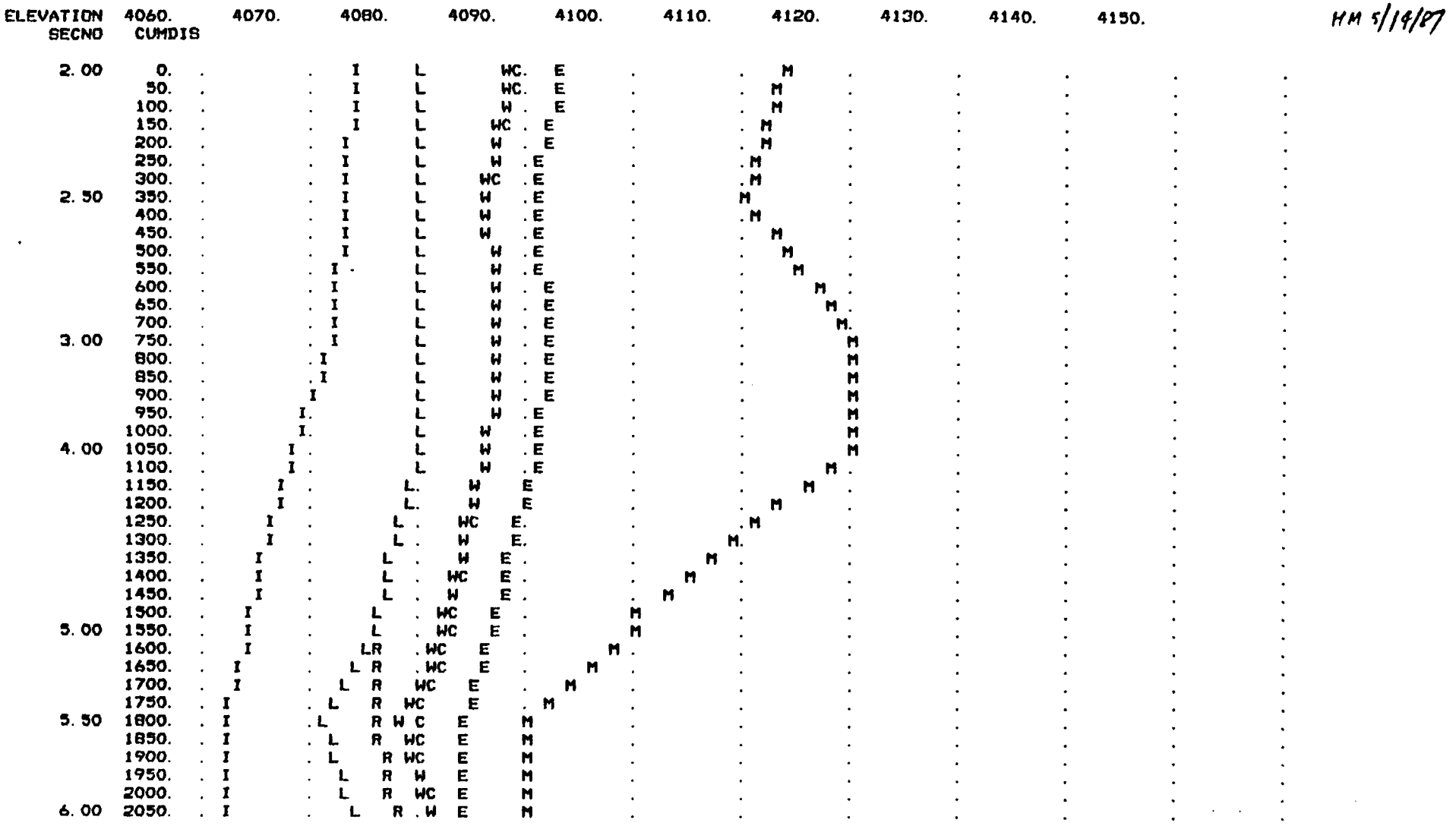
Sh. 23C.9

FTK 4/21/87

HM 5/14/87

PROFILE FOR STREAM DISCHARGE = 100000 CFS

PLOTTED POINTS (BY PRIORITY)-E-ENERGY, W-WATER SURFACE, I-INVERT, C-CRITICAL W.S., L-LEFT BANK, R-RIGHT BANK, M-LOWER END STA



Sh. 23C.10

FTR 4/21/87
HM 4/21/87

****
HEC2 RELEASE DATED NOV 76 UPDATED MAY 1984
ERROR CORR - 01,02,03,04,05,06
MODIFICATION - 50,51,52,53,54,55,56
****

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

DISCHARGE = 100000 CFS

SUMMARY PRINTOUT

	SECNO	Q	CWSEL	CRIWS	GLOB	GCH	GROB	GLOBP	GCHP	GROBP	VLOB	VCH	VROB
	2.000	100000.00	4088.47	4088.91	5314.26	92989.40	1696.34	5.31	92.99	1.70	8.22	18.39	7.35
*	2.500	100000.00	4086.14	4086.14	604.33	99004.52	391.15	0.60	99.00	0.39	6.40	16.91	5.70
*	3.000	100000.00	4087.35	4087.35	4135.43	94963.16	901.42	4.14	94.96	0.90	6.66	17.86	5.93
*	4.000	100000.00	4086.08	4086.08	3080.27	96435.16	484.55	3.08	96.44	0.48	5.84	18.31	5.23
	5.000	100000.00	4082.32	4083.06	6775.17	92837.50	387.33	6.78	92.84	0.39	8.81	17.97	3.46
	5.500	100000.00	4078.18	4079.53	1062.46	98786.02	151.53	1.06	98.79	0.15	9.28	19.29	3.83
*	6.000	100000.00	4080.96	4080.96	1120.24	95803.27	3076.48	1.12	95.80	3.08	6.73	15.24	4.11

Sh. 23C.11

JTK 4/21/87
HM 5/14/87

DISCHARGE = 100000 CFS

SUMMARY PRINTOUT

	SECNO	KRATIO	AREA	CWSEL	ELMIN	DEPTH	DIFWSX	HV	TOPWID	SSTA	ENDST	K*CHSL	10K*S
	2.000	0.00	5933.66	4088.47	4074.00	14.47	0.00	4.95	727.01	227.47	954.48	0.00	90.61
*	2.500	1.09	6018.59	4086.14	4073.00	13.14	-2.33	4.40	713.07	269.28	982.34	-2.86	86.39
*	3.000	1.61	6091.74	4087.35	4072.00	15.35	1.21	4.73	690.42	230.93	921.35	-2.63	71.70
*	4.000	1.13	5886.97	4086.08	4068.00	18.08	-1.27	5.04	664.36	211.67	876.03	-12.58	71.15
	5.000	1.20	6047.20	4082.32	4064.00	18.32	-3.76	4.74	1015.12	83.98	1099.10	-8.70	103.23
	5.500	1.20	5276.52	4078.18	4062.00	16.18	-4.14	5.72	778.23	148.09	926.32	-8.00	148.36
*	6.000	0.78	7202.15	4080.96	4062.00	18.96	2.78	3.47	1232.53	62.16	1294.70	0.00	79.92

Sh. 23C.12

JTK 4/21/87
HM 5/14/87

SUMMARY OF ERRORS AND SPECIAL NOTES

```
CAUTION  SECNO=     2.500  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=     2.500  PROFILE= 1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=     2.500  PROFILE= 1  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION  SECNO=     3.000  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=     3.000  PROFILE= 1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=     3.000  PROFILE= 1  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION  SECNO=     4.000  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=     4.000  PROFILE= 1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=     4.000  PROFILE= 1  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION  SECNO=     6.000  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=     6.000  PROFILE= 1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=     6.000  PROFILE= 1  20 TRIALS ATTEMPTED TO BALANCE WSEL
```

MKE DOCUMENT NO. 5057-GRN-C-01-00272-01

Calculation Cover Sheet

Contract No. 5057 Discipline Earth Sci Calc. No. 10-539-01-00 01
No. of Sheets 10 11 rev

Project
LIMTRA – Green River

Feature
PMP for Erosion Protection

Item
SOS Disposal Site

Sources of Data
(3) Nelson J. D., et al "Methodologies for evaluating long-term Stabilization Designs of Uranium Mill Tailings Impoundments" prepared for Division of Waste Management, U.S. NRC, NRC FIN B0279, NUREG/CR-4620 ORNL/TM-10067, June, 1986.

Sources of Formulae & References
(1) TAC "Green River, Draft Rap, Site conceptual design Civil Engineering Calculations – Vol. 2", MKE Document No 5057-GRN-C-04-00062-00, 1987.
(2) Hansa. et al: "Probable Maximum Precipitation Estimates, Colorado River and Great Basin Drainages, Hydrometeorological Report No. 49, prepared by the National Weather Service, Office of Hydrology, for the U.S. Department of Commerce and U.S. Dept. of the Army, Silver Spring, Maryland.

Preliminary Calc. ☐ Final Calc. ☒ Supersedes Calc. No. ——

Rev. No.	Revision	Calculation By	Date	Checked By	Date	Approved By	Date
1	Changed to Final Calc	Morton & Cranmer	11-11-87	P K Chen	11/11/87	P K Chen	11/11/87
0	Checked effect of incorrect site location (Sh. 4 & 5)	FB Guevos	9-8-87	P K Chen	9/18/87	P K Chen	9/18/87
0	——	James Kam	4/23/87	Martin Hanlon	5/18/87	P K Chen	9/18/87

Form 42-110

MORRISON-KNUDSEN ENGINEERS, INC.
A MORRISON KNUDSEN COMPANY

Project Umtka - Green River | Contract No. 5057 | Sheet 1
Feature Hydrology | Designed JTK | File No.
Item PMP for pile design | Checked MJG | Date 4/22/87 | Date 5/18/87

Purpose: To derive a rainfall intensity frequency duration curve from the local 6-hr. PMP for the SOS disposal site

Summary of Results:

The derivation of precipitation data by TAC (ref. 1) from ref. 2 has been checked (Sh. 2-7) and applied to the plotting of the rainfall intensity vs. duration curve (Sh. 10). The parameters of a curve which best fits the data are determined as

$$\text{Log}(I) = 1.81 - 0.31\,[\text{Log}(T_c)]^{1.77}$$

Where I = rainfall intensity

T_c = Time of concentration

The above equation can be entered into the computer program used for erosion protection design at the SOS disposal site

JACOBS ENGINEERING

DATE 1/14/87 SUBJECT GRN—SOS disposal site SHEET No. 2

BY VDey CHKD. MJG 5/18/87 PMP Calculations JOB NO. 05057010106

Reference 1

III Calculations and Analysis

The table below contains the step-by-step procedure for determining the local-PMP for the Green River-SOS disposal site.

Table 6.3A.—Local-storm PMP computation, Colorado River, Great Basin and California drainages. For drainage average depth PMP. Go to table 6.3B if areal variation is required.

Drainage Green River SOS Disposal Site Area _____ mi^2 (km^2)
Latitude 38°58'58" Longitude 110° 08' 20" Minimum Elevation 4134 (ft) (m)

Steps correspond to those in sec. 6.3A.

1. Average 1-hr 1-mi^2 (2.6-km^2) PMP for drainage [fig. 4.5]. 8.5 (in) (mm)

2. a. Reduction for elevation. [No adjustment for elevations up to 5,000 feet (1,524 m): 5% decrease per 1,000 feet (305 m) above 5,000 feet (1,524 m)]. _____ %

   b. Multiply step 1 by step 2a. 8.5 (in) (mm)

3. Average 6/1-hr ratio for drainage [fig. 4.7]. 1.2

	Duration (hr)								
	1/4	1/2	3/4	1	2	3	4	5	6
4. Durational variation for 6/1-hr ratio of step 3 [table 4.4].	74	89	95	100	110	115	118	119	120 %
5. ~~1-mi^2~~ ~~(2.6-km^2)~~ PMP for indicated durations [step 2b X step 4].	6.3	7.6	8.1	8.5	9.4	9.8	10.0	10.1	10.2 (in) (mm)
6. Areal reduction [fig. 4.9].									%
7. Areal reduced PMP [steps 5 X 6].	6.3	7.6	8.1	8.5	9.4	9.8	10.0	10.1	10.2 (in) (mm)
8. Incremental PMP [successive subtraction in step 7].				largest	2nd	3rd	4th	5th	least
				8.5	0.9	0.4	0.2	0.1	0.1 (in) (mm)
	6.3	1.3	0.5	0.4	} 15-min. increments				

Checked FTK 4/22/87

JACOBS ENGINEERING

DATE 1/14/87 SUBJECT GEN – SOS disposal site PMP Calculations SHEET NO. —

BY VDey CHKD. MJF 5/18/87 JOB NO. 050510101O6

III Calculations and Analysis, cont. Reference 1

9. Time sequence of incremental PMP according to: HMR No. 5

Hourly increments [table 4.7]. 0.1 (1) 0.4 (2) 8.5 (3) 0.9 (4) 0.2 (5) 0.1 (last) (in) (mm)

Four largest 15-min. increments [table 4.8]. 6.3 1.3 0.5 0.4 (in) (mm)

Reference: Hansen, et al., 1977

IV Conclusions and Recommendations

A one-hour PMP rainfall value of 8.5" will be used in all related calculations. In some cases, a peak 5-minute intensity will be determined and converted to a maximum one-hour intensity. Likewise the 8.5" will be divided into 5-minute intervals in order to develop a rainfall hydrograph for estimating runoff.

checked JFK 4/22/87

JACOBS ENGINEERING

DATE 1/14/87 BY VDey CHKD. MJG 5/18/87

SUBJECT GRN – SOS disposal site PMP Calculations

SHEET NO. 4

JOB NO. 050510101D6

II, Procedure, cont.

Reference 1

Approximate location of Green River SOS disposal area

Va B.5"

Note: same "latitude" lines are incorrectly positioned on 110°, 115°, and 120° Meridians

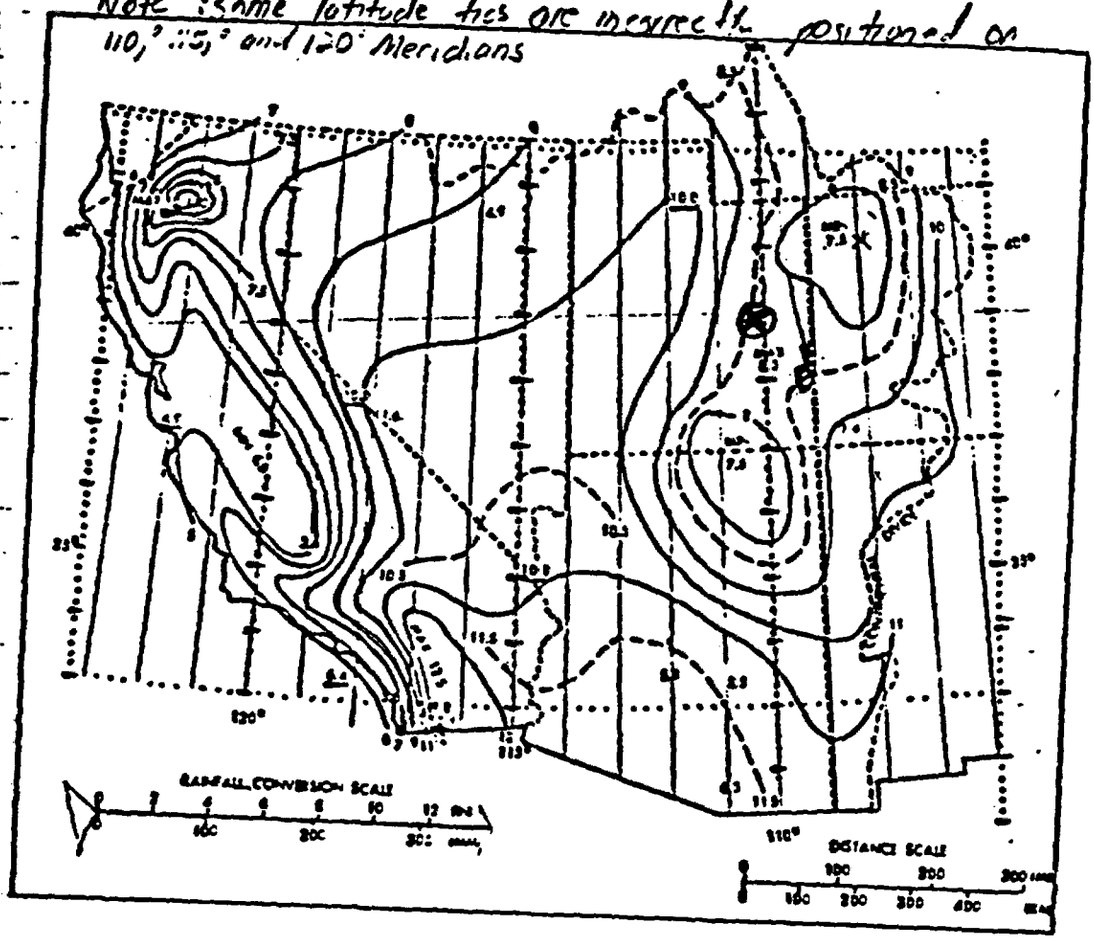


Figure 4.5—Local-storm PMP for 1 mi^2 (2.6 km^2) 1 hr. Directly applicable for locations between sea level and 5000 ft (1524 m). Elevation adjustment must be applied for locations above 5000 ft.

Reference: Hansen, et. al., 1977

NOTE: ⊗ INDICATES ACTUAL SITE LOCATION. HOWEVER, THE VALUE FOR LOCAL STORM PMP FROM THIS FIGURE REMAINS 8.5" AS USED IN THIS CALC.

Checked FTK 4/22/87

FBG 9-18-87

PKL 9-18-87

II Procedure, cont. Reference 1

Approximate location of Green River SOS disposal site), V-1.20

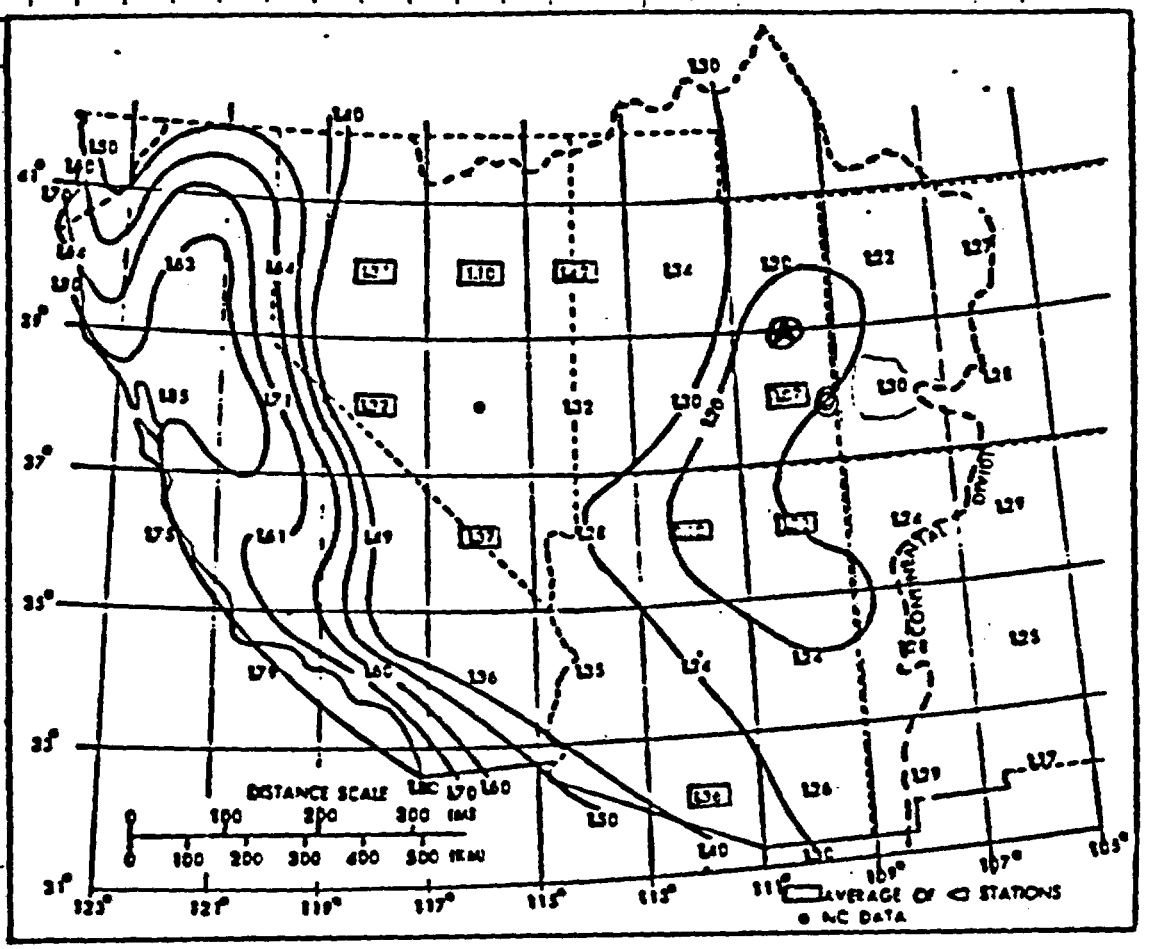


Figure 4.7.--Analysis of 6/1-hr ratios of averaged maximum station data (plotted at midpoints of a 2° latitude-longitude grid).

Reference: Hansen, et. al., 1977

6/1-hr ratio = 1.2 ± AS USED IN THIS CALC.

SEE NOTE, SHEET 4, REGARDING SITE LOCATION CORRECTION "⊗"

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FBG 9-18-87

JFK 9-18-87

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Sh. 6

DATE 1/14/87 SUBJECT GRN-505 disposal site PMP Calculations SHEET NO. —

BY VDesy CHKD. MJG 5/14/87 JOB NO. 050510101061

II. Procedure, cont. Reference 1

Table 4.4.—Durational variation of 1-mi^2 (2.6-km^2) local-storm PMP in percent of 1-hr PMP (see figure 4.3)

checked FTK 9/22/87

6/1-hr ratio	Duration (hr) 1/4	1/2	3/4	1	2	3	4	5	6
1.1	86	93	97	100	107	109	110	110	110
1.2	74	89	95	100	110	115	118	119	120
1.3	74	89	95	100	114	121	125	128	130
1.4	63	83	93	100	118	126	132	137	140
1.5	63	83	93	100	121	132	140	145	150
1.6	43	70	87	100	124	138	147	154	160
1.8	43	70	87	100	130	149	161	171	180
2.0	43	70	87	100	137	161	175	188	200

Reference: Hansen et al, 1977

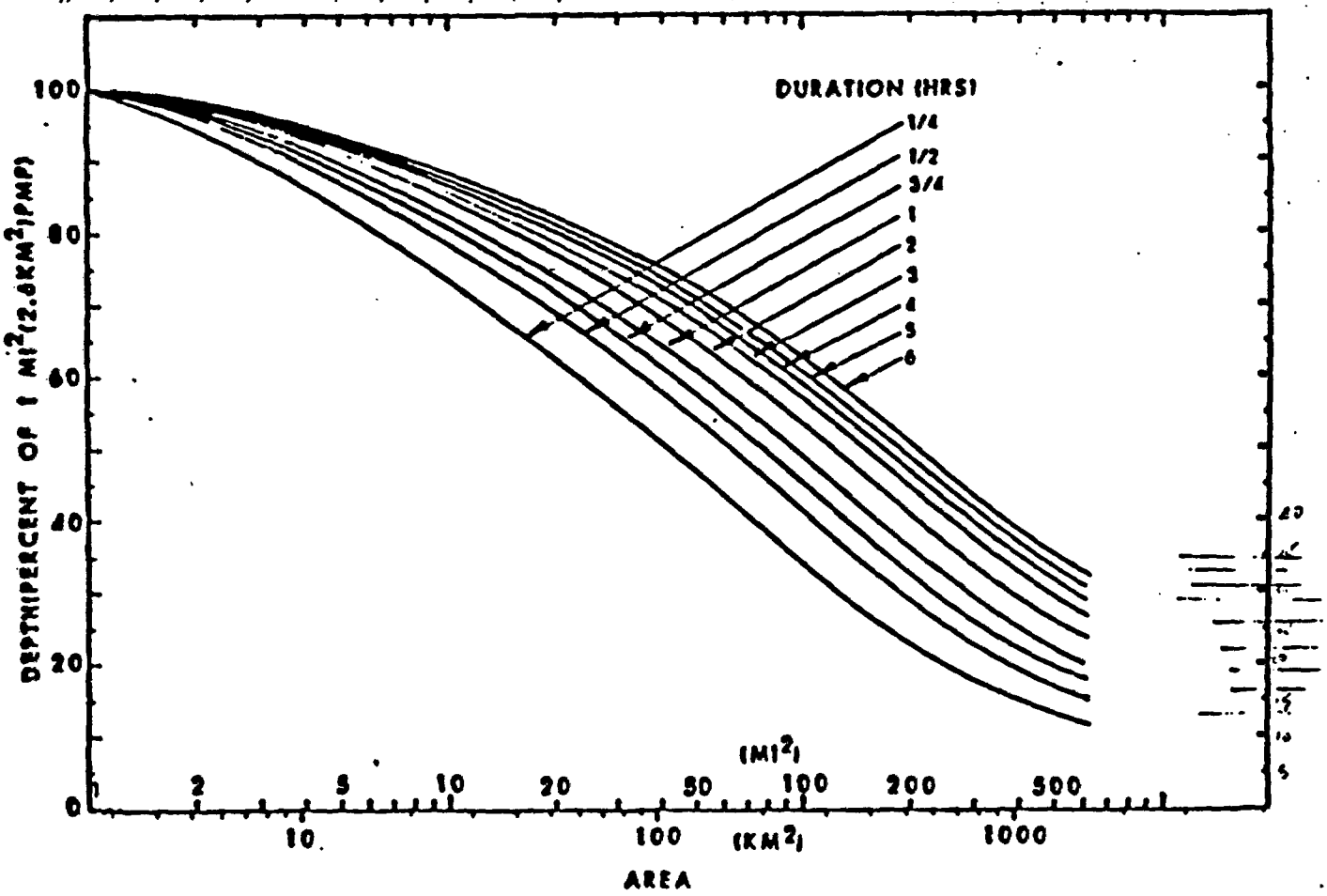

Figure 4.9.--Adopted depth-area relations for local-storm PMP.

Reference: Hansen, et. al., 1977

II. Procedure, cont. Reference 1

Table 4.7.—Time sequence for hourly incremental PMP in 6-hr storm

Increment	HMR No. 5[1] Sequence Position	EM1110-2-1411[2] Sequence Position
Largest hourly amount	Third	Fourth
2nd largest	Fourth	Third
3rd largest	Second	Fifth
4th largest	Fifth	Second
5th largest	First	Last
least	Last	First

[1]U. S. Weather Bureau 1947.
[2]U. S. Corps of Engineers 1952.

Reference: Hansen, et al., 1977

Table 4.8.—Time sequence for 15-min incremental PMP within 1 hr.

Increment	Sequence Position
Largest 15-min amount	First
2nd largest	Second
3rd largest	Third
least	Last

Reference: Hansen, et al, 1977

Note: The 15-minute distribution calculated in this analysis has been superceded by the 5-minute distribution sequence presented in the TAD (DOE, 1986).

Checked
FPK
4/22/87

From Sh. 2 local PMP vs. duration (TAC's calculation)

Duration (min)	PMP (in)	Intensity (in/hr)
15	6.3	25.2
30	7.6	15.2
45	8.1	10.8
60	8.5	8.5
120	9.4	4.7
180	9.8	3.3
240	10.0	2.5

For durations smaller than 15 min, refer to Table on Sh. 8b.
from reference 3

2.5	2.3	56.1
5.0	3.8	45.9
10.0	5.3	31.6

PMP distribution for various rainfall durations Sheet 86

10 Reference 3 JTK 4/22/87

to six hours although the majority of the precipitation falls within the first three hours of the storm. In order to reflect the durational and geographical differences between sites, ratios between the 6-hour general type storm and the 1-hour thunderstorm (6/1-hr ratios) were determined and are presented in Figure 2.4 for the southwest United States. Similar information is available in HMR 51 and HMR 55 (NWS, 1979 and 1984). Figure 2.4 indicates that the 6/1-hr ratios range from 1.1 to 2.0 and that a single depth-duration relation is not regionally applicable. Therefore, the 6/1-hr ratio is site specific and varies with drainage basin area. Furthermore, the lower the 6/1-hr ratio, the greater the local-storm PMP percentage that falls in the initial period of the storm.

For determining the PMF for a watershed or reclaimed site with small drainage areas, the rainfall intensity corresponding to the time of concentration must be determined. In order to determine the PMP rainfall intensity, the incremental PMP rainfall depths for a specific site must first be derived. The PMP rainfall depths can be estimated as a percent of the PMP values for both the 1-hour thunderstorm and the 6-hour general-type storm. Table 2.1 presents the rainfall duration and percent PMP values (thunderstorms ranging in duration from 2.5 to 60 minutes) for determining appropriate rainfall depths in the Colorado River basin (NWS, 1977 and NRC, 1985). Similar rainfall duration and PMP percentage relations can be developed for the northwest states (HMR 43), for the midwestern and eastern states (HMR 51) and for the region between the continental divide and the 103° meridian (HMR 55) as shown in Figure 2.2.

Table 2.1 Percent of Probable Maximum Precipitation for Various Rainfall Durations in the Colorado River Drainage Area.

Rainfall Duration min.	% of 1-hour PMP*
2.5	27.5
5	45
10	62
15	74
20	82
30	89
45	95
60	100

*The 1-hour, 1 square mile local storm is derived using 6/1-hour ratios from 1.2 to 1.3.

Source: NWS, 1977 and NRC, 1985.

cc Mike Goodman 5/18/87

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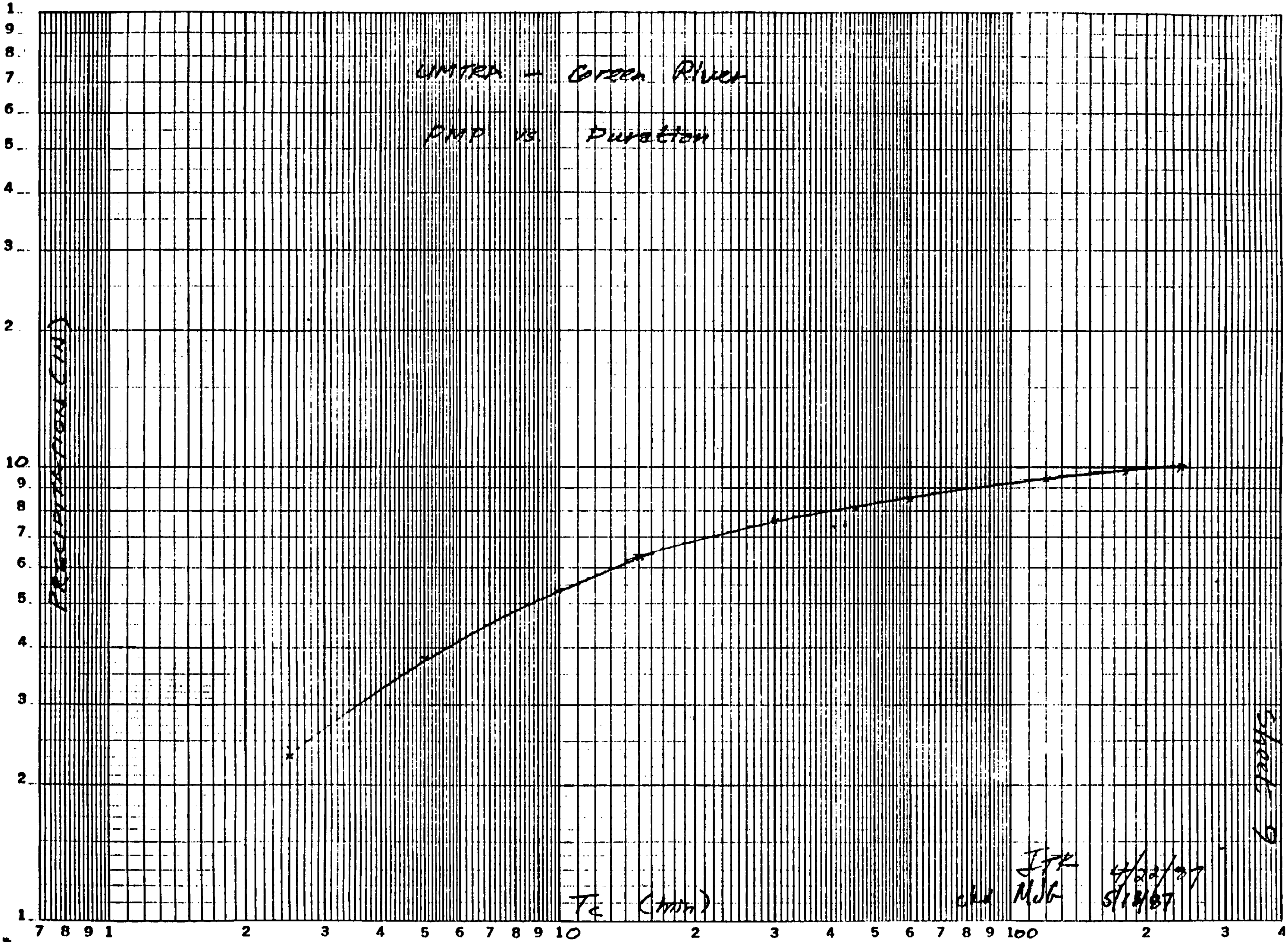
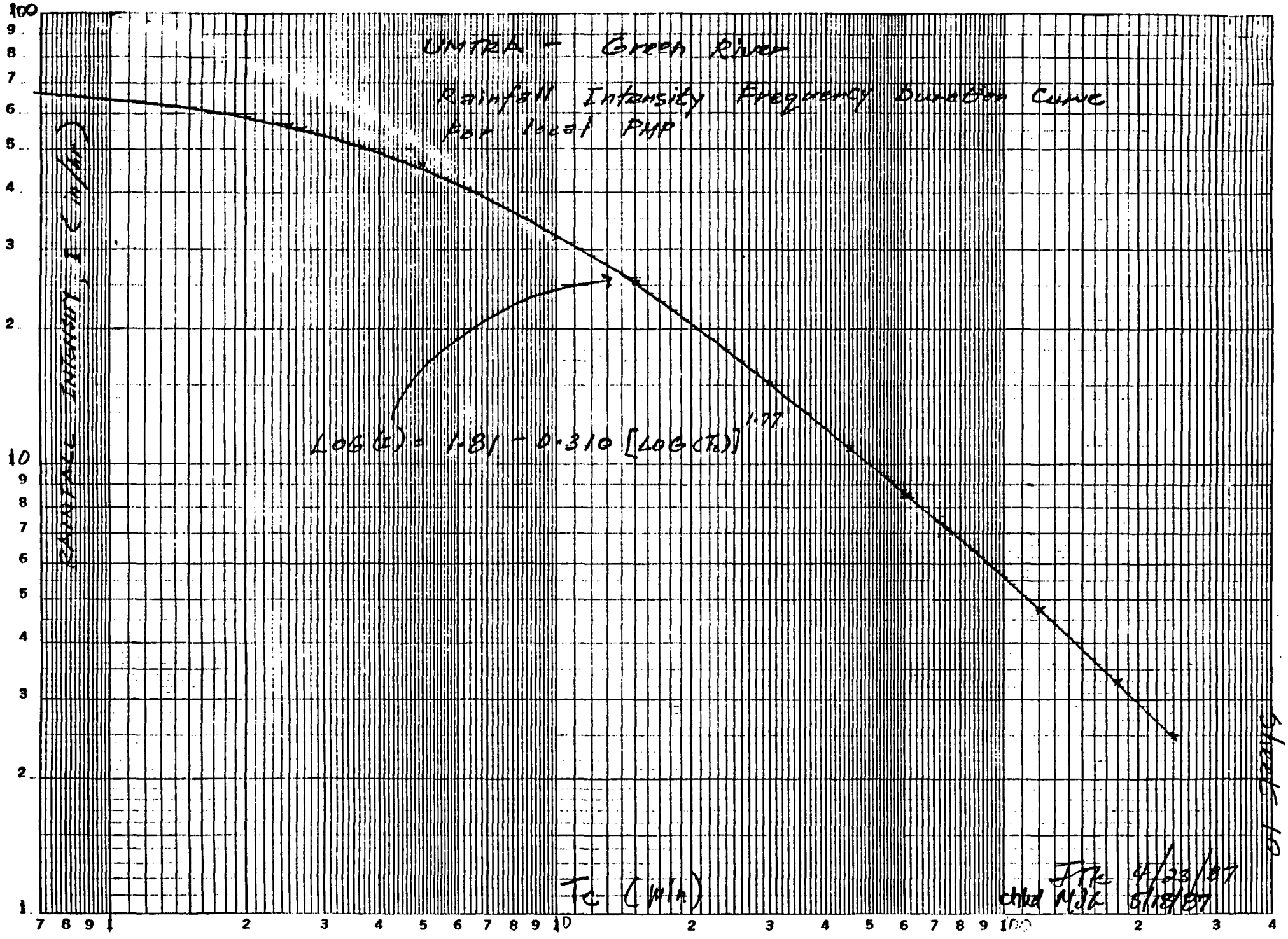
46 7283




UMTRA - Green River
Rainfall Intensity Frequency Duration Curve
For Local PMP
$\Delta \log(I_2) = 1.81 - 0.310\,[\Delta \log(T_c)]^{1.77}$
Tc (min)
Sheet 10
JTK 4/23/97
Chkd MJL 5/18/97

MKE DOCUMENT NO. 5057-GRN-C-01-00216-01

Calculation Cover Sheet

Contract No. 5057 Discipline Earth Sci Calc. No. 10-534-01-00 01
No. of Sheets 110

Project
UMTRA – Green River

Feature
Hydrology

Item
Flood Frequency Analysis (10-YR & 25-YR)

Sources of Data

Sources of Formulae & References
(1) Haan, C.T. "Hydrology and sedimentology of surface mined lands"

(2) Miller J F et al. "Precipitation-frequency Atlas of the Western United States, NOAA ATLAS 2 vol. VI - Utah" U.S. Dept. of Commerce, NOAA, National Weather Service", 1973.

(3) McCuen R. H., "A Guide to Hydrologic Analysis using SCS Methods", Prentice-Hall, Inc., 1982

Preliminary Calc. ☐ Final Calc. ☒ Supersedes Calc. No. _____

Rev. No.	Revision	Calculation By	Date	Checked By	Date	Approved By	Date
1	Changed to Final Calc	Martin J. Goodman	11-11-87	pk Cla	11/11/87	pk Cla	11/11/87
0		James Kam	5/1/87	HM	7/17/87	pk Cla	7/20/87

Form 42-110

MORRISON-KNUDSEN ENGINEERS, INC.
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Project UMTRA – Green River | Contract No. 5057 | Sheet 1
Feature Hydrology | Designed FTK | File No.
Item Flooding Potential on Browns Wash | Checked HM | Date 5/1/87 | Date June 09, 19

Purpose: To determine the discharge in the Browns Wash resulting from the 10-yr and 25-yr 24-hr. storm at the vicinity of the existing tailings pile. From the peak discharge, the maximum water level was derived.

Summary of Results:

The peak flows for the 10-yr and 25-yr 24 hr. storms are determined to be 11,300 and 15,300 cfs, respectively. The max. water level elevation resulting from these floods at Sec. 5 T 26 and R. 22 is estimated to be at 4073.35'.

Assume design life of project = 6 months = $\frac{1}{2}$ yr.

ie. excavation and clean-up of existing pile will take approx 6 months.

By $p = 1 - (1 - 1/T)^n$

where p = probability that a T-yr. event will be equalled or exceeded at least once in an n-year period

T = Design return period (yr)

n = Design life of project (yr)

for $T = 25$-yr event, $n = \frac{1}{2}$ yr.

$$p = 1 - (1 - 1/25)^{\frac{1}{2}}$$

$$= 0.02$$

If design life of project is extended to 1 yr. ie. $n = 1$ yr.
and $T = 25$-yr event

$$p = 1 - (1 - \tfrac{1}{25})$$

$$= 0.04$$

∴ If the design is based on a 25-yr. event, at least 95% sure that this storm event will not be equalled or exceeded in either a 6-month or 1-yr period.

Values of p for various T and n

		T		
		10-yr	25-yr	50-yr
n	½ yr	0.05	0.02	0.01
	1 yr.	0.10	0.04	0.02

From figures on Sh. 11–18, the following precipitation values are tabulated:

Precipitation (inches)		Return Period				
		2-yr.	10-yr.	25-yr.	50-yr.	100-yr
Duration	1-hr.	.58 1)	.90 3)	1.10 3)	1.20 3)	1.47 2)
	6-hr.	.75	1.20	1.40	1.60	1.80
	24-hr.	.90	1.60	1.95	2.25	2.50

from Sh. 6 ref. (2)

1) Y_2 = 2-yr 1-hr. estimated value
$= -0.011 + 0.942 [.75 (.75/.90)]$
$= 0.58$"

2) Y_{100} = 100-yr 1-hr. estimated value
$= 0.494 + 0.755 [1.80 (1.80/2.50)]$
$= 1.47$"

3) from plot on Sh. 10 : Precipitation depth vs. return period

Using data on sh. 4, plot data on precipitation depth-durati. diagram on sh. 7 and 8

Precipitation (inches)

Hr.	Cumulative 25-yr.	Cumulative 50-yr.	Incremental 25-yr	Incremental 50-yr.	Incre. Sequence 25-yr.	Incre. Sequence 50-yr
					0.15	0.20
6	1.40	1.60	1.40	1.60		
					[1.40	1.60]
12	1.70	1.90	0.30	0.30		
					0.30	0.30
18	1.80	2.10	0.10	0.20		
					0.10	0.15
24	1.95	2.25	0.15	0.15		
					0.05	0.06
7			1.10	1.20		
					0.05	0.07
8			0.10	0.10		
					0.05	0.07
9	from chart on Sh. 7		0.05	0.10		
					0.05	0.10
10			0.05	0.07		
					0.10	0.10
11			0.05	0.07		
					[1.10	1.20]
12			0.05	0.06		
11:05	.32	.35	.32	.35	.03	.04
11:10	.50	.54	.18	.19	.04	.04
11:15	.63	.68	.13	.14	.04	.04
11:20	.71	.77	.08	.09	.04	.04
11:25	.79	.86	.08	.09	.04	.04
11:30	.87	.95	.08	.09	.04	.05
11:35	.91	1.00	.04	.05	.08	.09
11:40	.95	1.04	.04	.04	.08	.09
11:45	.99	1.08.	.04	.04	.08	.09
11:50	1.03	1.12	.04	.04	.13	.14
11:55	1.07	1.16	.04	.04	.18	.19
12:00	1.10	1.20	.03	.04	.32	.35

from Table: adjustment factors to obtain n-min estimate from 1-hr vol. Sh. 9

Precipitation (inches)

10-yr

Hr.	Cumulative	Incremental	Incremental Sequence
			0.10
6	1.20	1.20	
			[1.20]
12	1.40	0.20	
			0.20
18	1.50	0.10	
			0.10
24	1.60	0.10	

7		0.90	0.05
8		0.10	0.05
9	from chart on Sh. 7	0.05	0.05
10		0.05	0.05
11		0.05	0.10
			[0.90]
12		0.05	

(7.5 f) Type = SCS curve curve is used to pick peak hr. between 11 and 12

11:05	.26	.26	.02
11:10	.41	.15	.03
11:15	.51	.10	.03
11:20	.58	.07	.03
11:25	.65	.07	.04
11:30	.71	.06	.04
11:35	.75	.04	.06
11:40	.79	.04	.07
11:45	.82	.03	.07
11:50	.85	.03	.10
11:55	.88	.03	.15
12:00	.90	.02	.26

from Table: adjustment factors to obtain n-min estimates from 1-hr. values

Sh. 9

$\Delta t = 5$ min.

Precipitation distribution for 10-yr 24 hr.
Precipitation distribution for 25-yr 24 hr.
Precipitation distribution for 50-yr 24 hr.

0–0:50

·00139 ·00208 ·00278 →
0:55 – 1:40

·00139 ·00208 ·00278 →
1:45 – 2:30

·00139 ·00208 ·00278 →
2:35 – 3:20

·00139 ·00208 ·00278 →
3:25 – 4:10

·00139 ·00208 ·00278 →
4:15 – 5:00

·00139 ·00208 ·00278 →
5:05 – 5:50

·00139 ·00208 ·00278 →
5:55 – 6:40

·00139 ·00208 ·00278 | ·00139 ·00208 ·00278 | ·00417 ·00417 ·005 →
6:45 – 7:30

·00417 ·00417 ·005 | ·005 ·005 | ·00583 ·00583 ·00583 ·00583 ·00583 ·00583 →
7:35 – 8:20

·00417 ·00417 ·00583 →
8:25 – 9:10

·00417 ·00417 ·00583 | ·00583 ·00583 ·00583 ·00583 ·00583 ·00583 ·00833 ·00833 →

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Sheet 5d

Project UMTRA – Green River | Contract No. 5057 | File No.
Feature Hydrology | Designed JTK | Date 4/30/87
Item Flood Frequency Analysis | Checked HM | Date 7/16/87

Precipitation distribution for 10-yr 24 hr. Δt = 5 min (Continued)
Precipitation distribution for 25-yr 24 hr.
Pcc dist. for 50-yr 24 hr.

9:15 – 10:00
.00417 →
.00417
.00833

10:05 – 10:50
.00833 →
.00833
.00833

10:55 – 11:40
.00833 .00833 .02 .03 .03 .03 .04 .04 .06 .07
.00833 .00833 .03 .04 .04 .04 .04 .04 .08 .08
.00833 .00833 .04 .04 .04 .04 .04 .05 .09 .09

11:45 – 12:30
.07 .10 .15 .26 .00278 →
.08 .13 .18 .32 .00417
.09 .14 .19 .35 .00417

12:35 – 13:20
.00278 →
.00417
.00417

13:25 – 14:10
.00278 →
.00417
.00417

14:15 – 15:00
.00278 →
.00417
.00417

15:05 – 15:50
.00278 →
.00417
.00417

15:55 – 16:40
.00278 →
.00417
.00417

16:45 – 17:30
.00278 →
.00417
.00417

17:35 – 18:20
.00278 .00278 .00278 .00278 .00278 .00278 .00139 .00139 .00139 .00139
.00417 .00417 .00417 .00417 .00417 .00417 .00139 .00139 .00139 .00139
.00417 → .00208

Precipitation distribution for 10-yr 24 hr. $\Delta t = 5$ min

Precipitation distribution (continued) for 25 yr 24 hr.
for 50 yr 24 hr

Precip. Dist.

18:25 – 19:10

.00139 →

19:15 – 20:00

.00139
.00139
.00208 →

20:05 – 20:50

.00139
.00139
.00208 →

20:55 – 21:40

.00139
.00139
.00208 →

21:45 – 22:30

.00139
.00139
.00208 →

22:35 – 23:20

.00139
.00139
.00208 →

23:25 – 24:00

.00139
.00139
.00208 →

.00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139

.00139
.00139
.00208 →

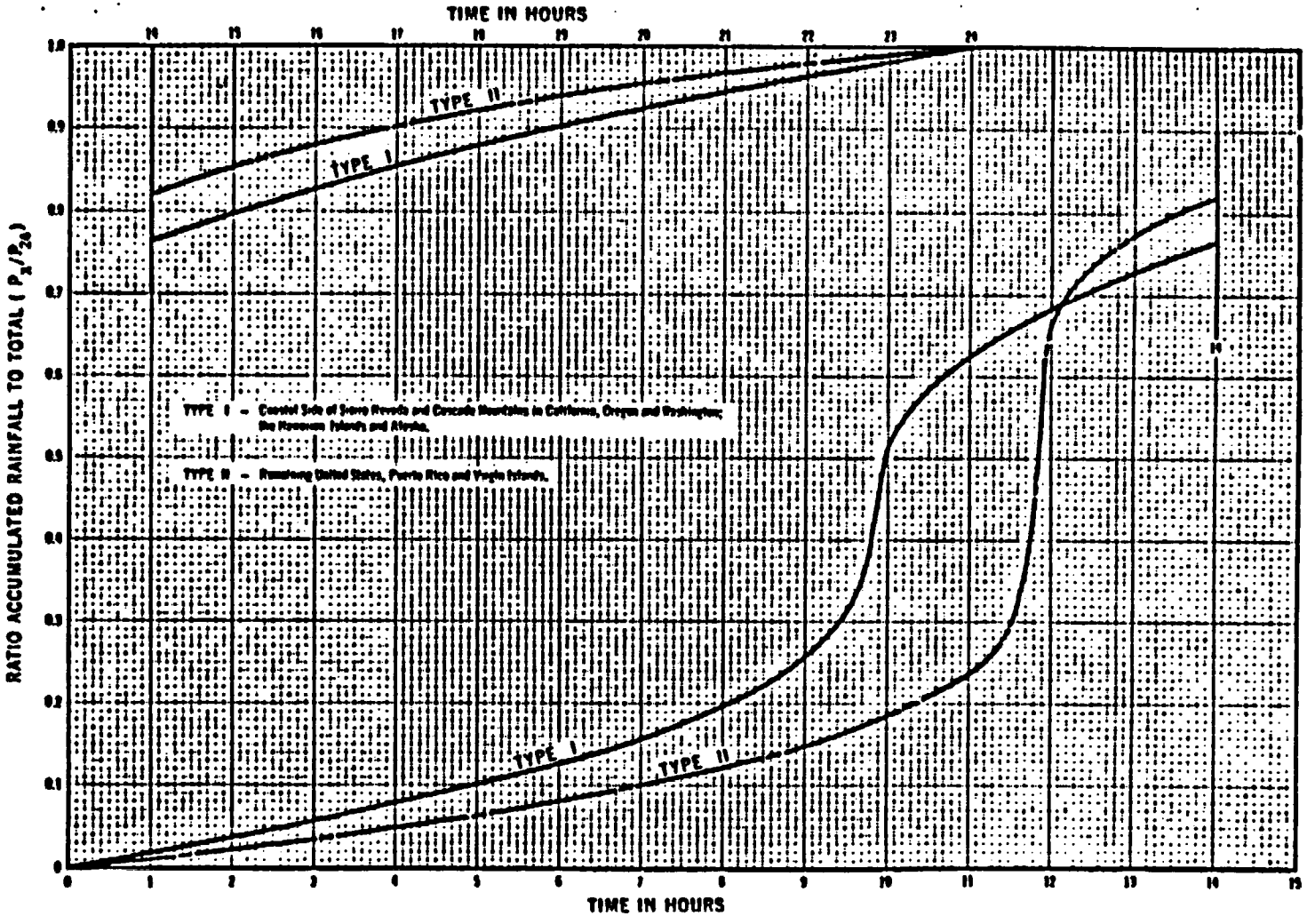
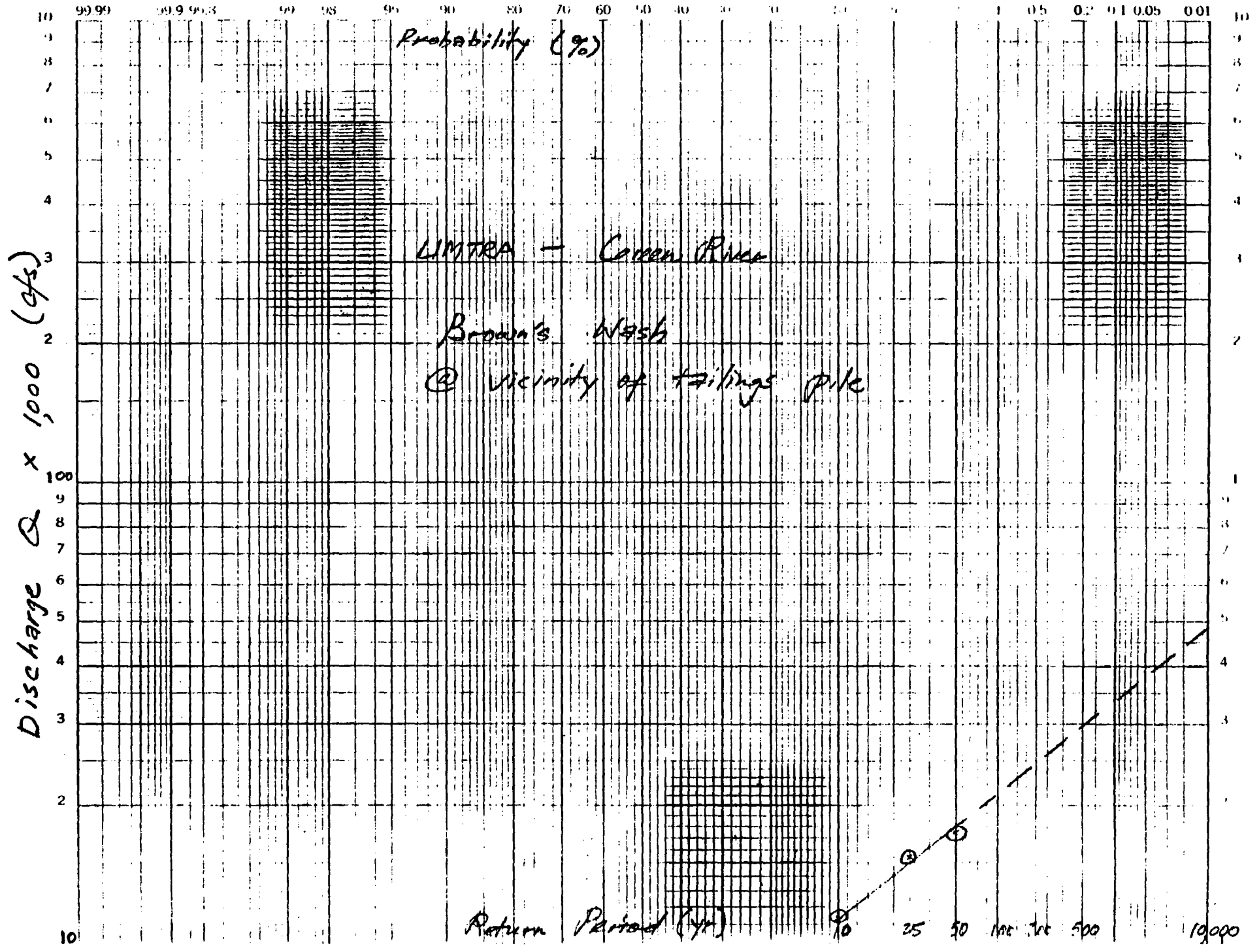


Figure 2. Twenty-four hour rainfall distributions (SCS).

McCuen R. H., "A Guide to Hydrologic Analysis using SCS Methods" Prentice-Hall, Inc. 1982.


Probability (%)
99.99
99.9
99.8
99
98
95
90
80
70
60
50
40
30
20
10
5
2
1
0.5
0.2
0.1
0.05
0.01
UMTRA – Green River
Brown's Wash
@ vicinity of Tailings pile
Discharge Q x 1,000 (cfs)
Return Period (yr)
10
25
50
100
200
500
10,000

Sheet 59

Table 11. *Equations for estimating 1-hr values in Utah with statistical parameters for each equation*

Region of applicability*	Equation	Corr. coeff.	No. of stations	Mean of computed stn. values (inches)	Standard error of estimate (inches)
Utah south of the Unitas east of Wasatch, and east and south of Boulder and Pine Valley Mountains (1)	$Y_2 = -0.011 + 0.942[(X_1)(X_1/X_2)]$	0.95	86	0.72	0.085
	$Y_{100} = 0.494 + 0.755[(X_3)(X_3/X_4)]$	.90	85	1.96	.290
Most of western Utah (2)	$Y_2 = 0.005 + 0.852[(X_1)(X_1/X_2)]$	.89	65	0.41	.047
	$Y_{100} = 0.322 + 0.789[(X_3)(X_3/X_4)]$	.87	65	1.25	.196
Northeast and northwest corners of Utah (3)	$Y_2 = 0.019 + 0.711[(X_1)(X_1/X_2)] + 0.001Z$	.82	98	0.40	.031
	$Y_{100} = 0.338 + 0.670[(X_3)(X_3/X_4)] + 0.001Z$	.80	79	1.04	.141

* Numbers in parentheses refer to geographic regions shown in figure 18. See text for more complete description.

List of variables

Y_2 = 2-yr 1-hr estimated value
Y_{100} = 100-yr 1-hr estimated value
X_1 = 2-yr 6-hr value from precipitation-frequency maps
X_2 = 2-yr 24-hr value from precipitation-frequency maps
X_3 = 100-yr 6-hr value from precipitation-frequency maps
X_4 = 100-yr 24-hr value from precipitation-frequency maps
Z = point elevation in hundreds of feet

Procedures for estimating 1-hr (60-min) precipitation-frequency values. Multiple-regression screening techniques were used to develop equations for estimating 1-hr values. Factors considered in the screening process were restricted to those that could be determined easily from the maps of this Atlas or from generally

the Wasatch Range, and east and south of the Boulder and Pine Valley Mountains (Region 1, fig. 18). The second region is most of western Utah and is labeled Region 2 on figure 18. Northeastern Utah north of the Unitas and the northwestern tip of Utah (Region 3, fig. 18) comprises the third region. Equations to provide estimates for the 1-hr duration for 2- and 100-yr return periods are shown in table 11. Also listed are the statistical parameters associated with each equation. In these equations, the variable $[(X_1)(X_1/X_2)]$ or $[(X_3)(X_3/X_4)]$ can be regarded as the 6-hr value times the slope of the line connecting the 6- and 24-hr values for the appropriate return period.

As with any separation into regions, the boundary can only be

precipitation occurring within these months, but the investigations mentioned in the preceding paragraph indicate that these maps will approximate the values that would be obtained by using a data series made up of precipitation events that are exclusively rain. Since data for only part of the year were used, these maps have been labeled with the appropriate probabilities rather than with a return period in years (figs. 31–42).

Procedures for Estimating Values for Durations Other Than 6 and 24 Hrs

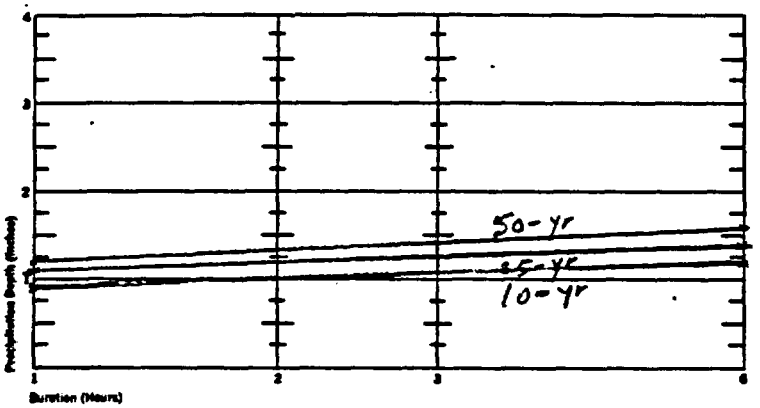
The isopluvial maps in this Atlas are for 6- and 24-hr durations. For many hydrologic purposes, values for other durations are necessary. Such values can be estimated using the 6- and 24-hr maps and the empirical methods outlined in the following sections. The procedures detailed below for obtaining 1-, 2-, and 3-hr estimates were developed specifically for this Atlas. The procedures for obtaining estimates for less than 1-hr duration and for 12-hr duration were adopted from *Weather Bureau Technical Paper* No. 40 (U.S. Weather Bureau 1961) only after investigation demonstrated their applicability to data from the area covered by this Atlas.

Y_{100} = 100-yr 1-hr estimated value
X_1 = 2-yr 6-hr value from precipitation-fre
X_2 = 2-yr 24-hr value from precipitation-
X_3 = 100-yr 6-hr value from precipitatior
X_4 = 100-yr 24-hr value from precipitatio
Z = point elevation in hundreds of feet

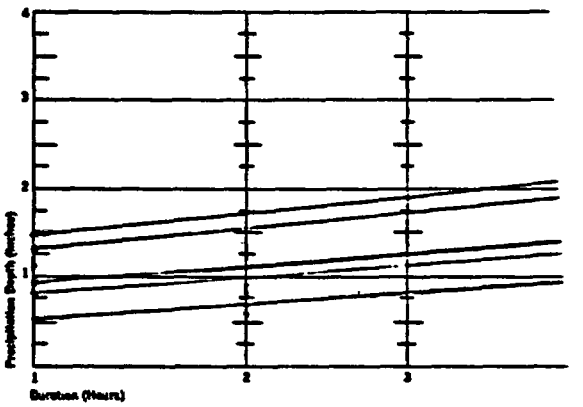
Sh. 7

Procedures for estimating 1-hr (60-mi quency values. Multiple-regression screening t to develop equations for estimating 1-hr values in the screening process were restricted to t determined easily from the maps of this Atla available topographic maps.

The 11 western states were separated into regions. The regions were chosen on the basi and climatological homogeneity and are general river basins separated by prominent divides. T graphic regions are partially within Utah. For use as an overlay on the precipitation-frequ regions are outlined in figure 18. The first regio is that portion of the State south of the Unita M



(A)



(B)

Figure 15. *Precipitation depth-duration diagram (1- to 6-hr). a. Utah south of the Unita Mountains, east of the Wasatch Range, and east and south of the Boulder and Pine Valley Mountains. (Region 1, fig. 18).*

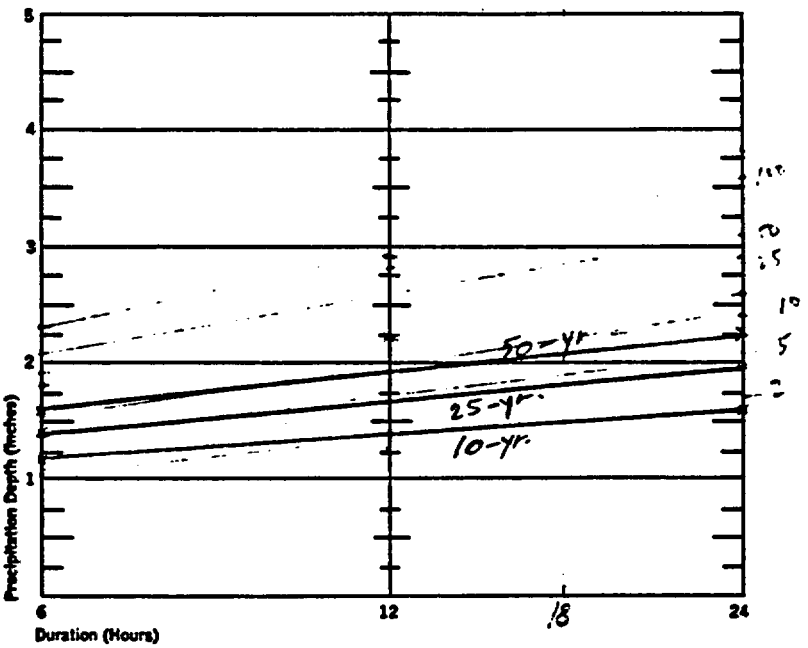
b. Most of western Utah. (Region 2, f

Ref. (2)

FTK 4:27 87

HM 6/12/87

Figure 16. *Precipitation depth-duration diagram (6- to 24-hr).*



Estimates of 1-hr precipitation-frequency values for return periods between 2 and 100 yrs. The 1-hr values for the 2- and 100-yr return periods can be plotted on the nomogram of figure 6 to obtain values for return periods greater than 2 yrs or less than 100 yrs. Draw a straight line connecting the 2- and 100-yr values and read the desired return-period value from the nomogram.

Estimates for 2- and 3-hr (120- and 180-min) precipitation-frequency values. To obtain estimates of precipitation-frequency values for 2 or 3 hrs, plot the 1- and 6-hr values from the Atlas on the appropriate nomogram of figure 15. Draw a straight line connecting the 1- and 6-hr values, and read the 2- and 3-hr values from the nomogram. This nomogram is independent of return period. It was developed using data from the same regions used to develop the 1-hr equations.

The mathematical solution from the data used to develop figure 15 gives the following equations for estimating the 2- and 3-hr values:

For Region 1, figure 18

$$2\text{-hr} = 0.341\ (6\text{-hr}) + 0.659\ (1\text{-hr}) \quad (3)$$

$$3\text{-hr} = 0.569\ (6\text{-hr}) + 0.431\ (1\text{-hr}) \quad (4)$$

For Region 2,

$$2\text{-hr} = 0.299\ (6\text{-hr}) + 0.701\ (1\text{-hr}) \quad (5)$$

Illustration of Use Maps, Diagrams, a

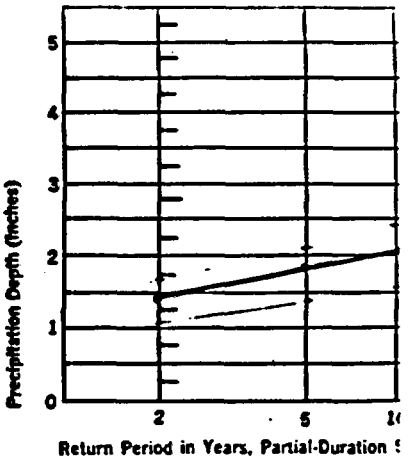
To illustrate the use figures 19 to 30 for the de These values are shown read from the maps shoul of figure 6 because (1) n series of maps as are labe registration differences ir between isolines is difficu values in table 13 (fig. 17 subjectively. On this nor what above the line, so th (as shown by the strikeou adopted in preference to t

The 2- and 100-yr 1 from the equations applic The 2-yr 1-hr value is e values from table 13); the (100-yr 6- and 24-hr valu values on figure 6 and cc can obtain estimates for re

The 2- and 3-hr valu gram of figure 15 or equa for the desired return pe points on the nomogram straight line. Read the esti of the connecting line at example is shown in figur 100-yr 2-hr (1.82 in.) ar italics on table 13.

can obtain estimates for return periods of 5, 10, 25, and 50 yrs.

The 2- and 3-hr values can be estimated by using the nomogram of figure 15 or equations (3) and (4). The 1- and 6-hr values for the desired return period are obtained as above. Plot these points on the nomogram of figure 15 and connect them with a straight line. Read the estimates for 2 or 3 hrs at the intersections of the connecting line and the 2- and 3-hr vertical lines. An example is shown in figure 17b for the 100-yr return period. The 100-yr 2-hr (1.82 in.) and 100-yr 3-hr (1.95 in.) values are in italics on table 13.



Ⓐ

Sh. 7

Ref. (2)

TLK 4/27
HM 6/18/8-

'ues for return
- the 2- and
10b...n of figure 6
2 yrs or less than
and 100-yr values
he nomogram.
nin) precipitation-
pitation-frequency
es from the Atlas
aw a straight line
2- and 3-hr values
xendent of return
ne regions used to

used to develop
nating the 2- and

).659 (1-hr) (3)
).431 (1-hr) (4)
).701 (1-hr) (5)
).474 (1-hr) (6)
).750 (1-hr) (7)
).533 (1-hr) (8)

-frequency values.
t values from the
'mates at the
..h the 12-hr

stimates for dura-
le 12 to the 1-hr

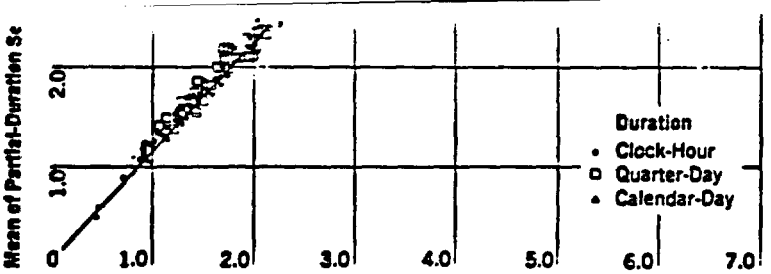
Table 12. *Adjustment factors to obtain n-min estimates from 1-hr values*

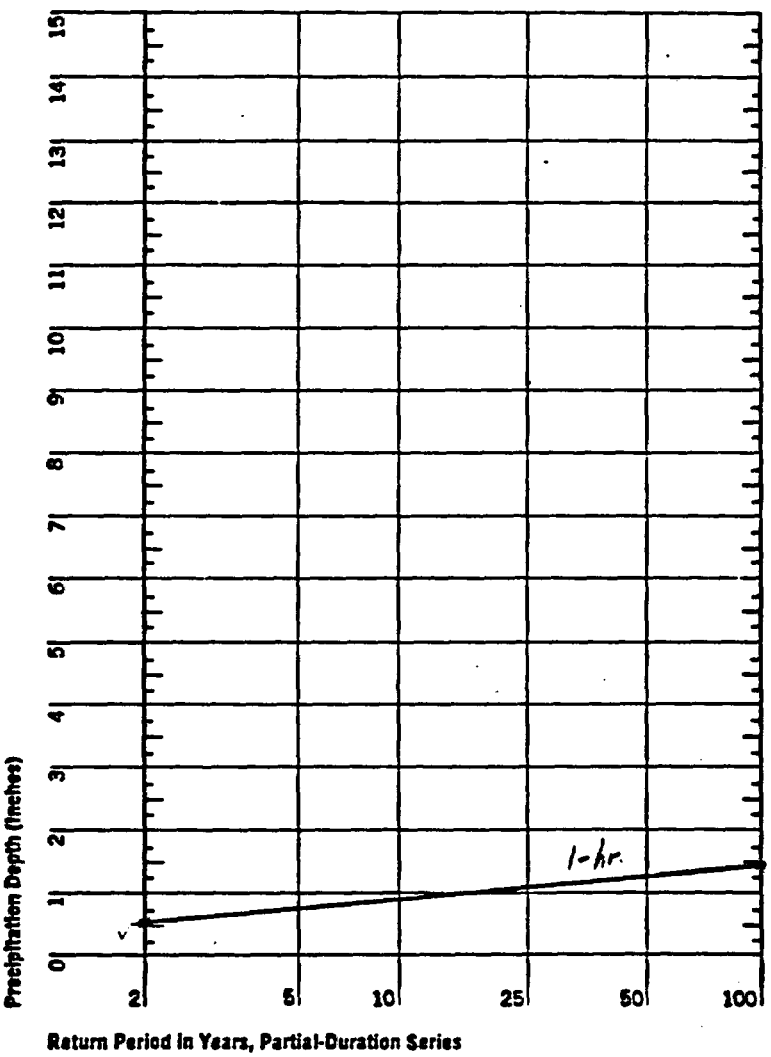
	.29	.16	.12	
Duration (min)	5	10	15	30
Ratio to 1-hr	0.29	0.45	0.57	0.79

(Adopted from *U.S. Weather Bureau Technical Paper* No. 40, 1961.)

Table 13. *Precipitation data for computed for town of*

	1-hr	2-hr
2-yr	0.65	
5-yr		
10-yr		
25-yr		
50-yr		
100-yr	*1.63*	*1.82*





portant. Next, an examination wa topographic and meteorologic cor direction to moisture sources. Eac ure of some physical reality, and to variation in the precipitation-fr

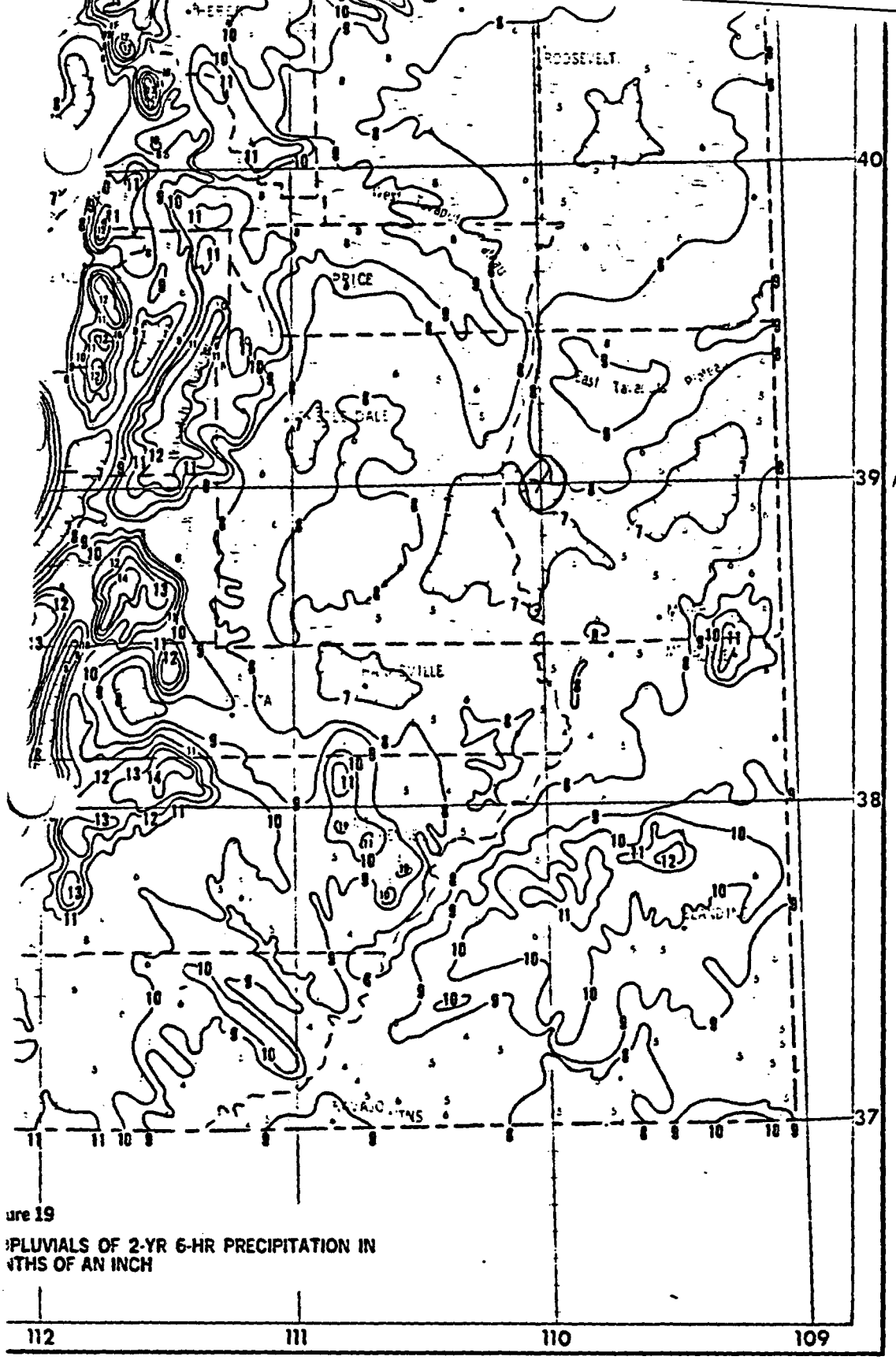
Finally, various climatologic could be indexes of variation of t. were considered. The procedure equations was a multiple-regressio ess was done by computer using computer program was capable o pendent variables for as many l The number of variables screened between 60 and 100. This does pletely different factors could be factors might involve different me measures of slope might be over d ent orientations. In each instance, computer to select the most critical factor.

Although the computer progr ear during the regression analysis, computations to use logarithms, po binations of any or all of the f selected the single variable most hi tation-frequency value under inves select the variable that, combined lected, would explain the greatest v quency values. The third, fourth, fi selected in a similar manner. The

Figure 6. *Precipitation depth versus return period for partial-duration series.*

6/29/87

HM 6/18/87



ure 19

PLUVIALS OF 2-YR 6-HR PRECIPITATION IN
NTHS OF AN INCH

Ch. 11

ref. (2)

Fig 2/3

HM 6/18/87

PPT

2-yr 6hr. = .75 "

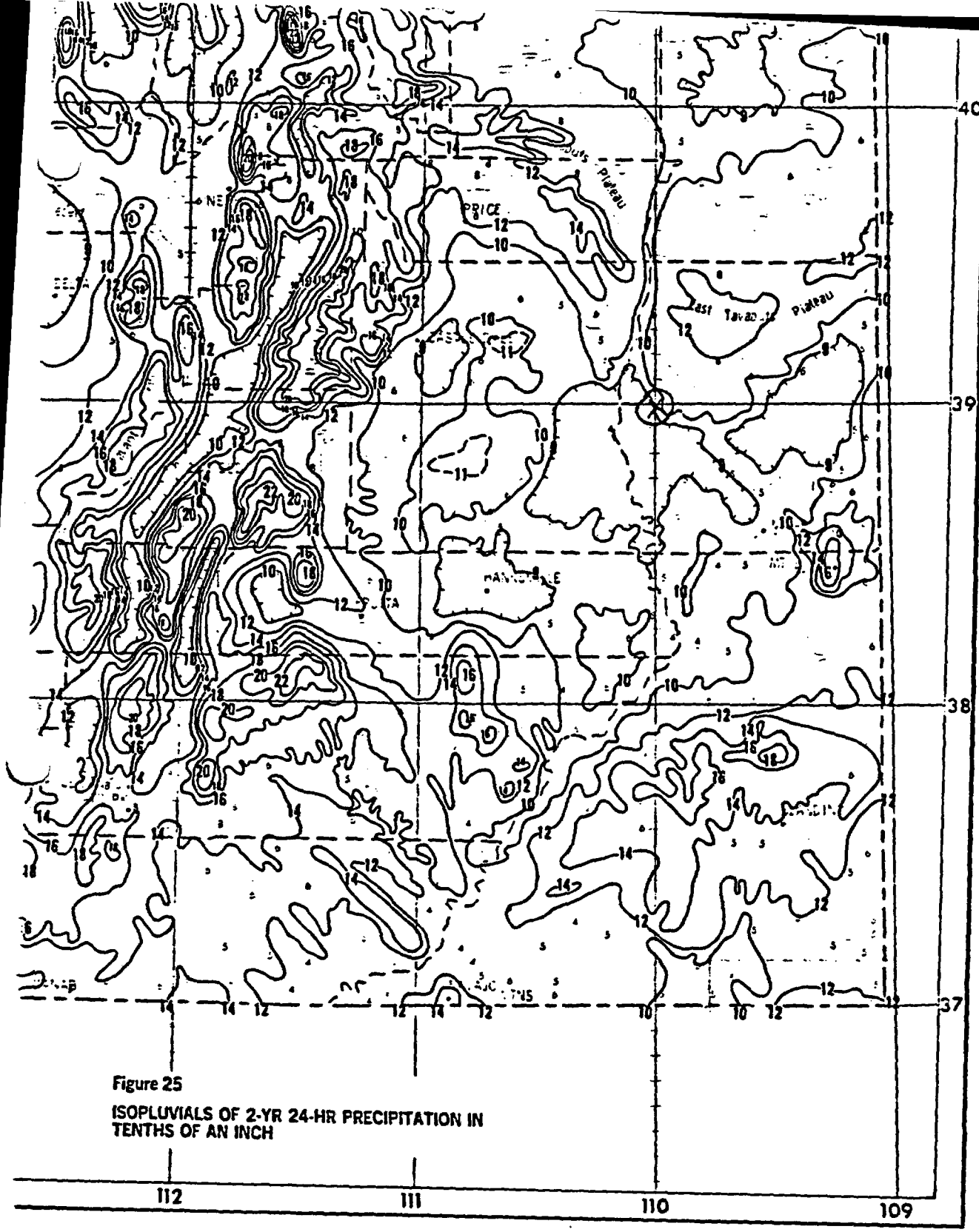


Figure 25

ISOPLUVIALS OF 2-YR 24-HR PRECIPITATION IN TENTHS OF AN INCH

Ch. 12

ref (2)

HM 6/18/87

PPT = .9

2-yr 24-hr ✓

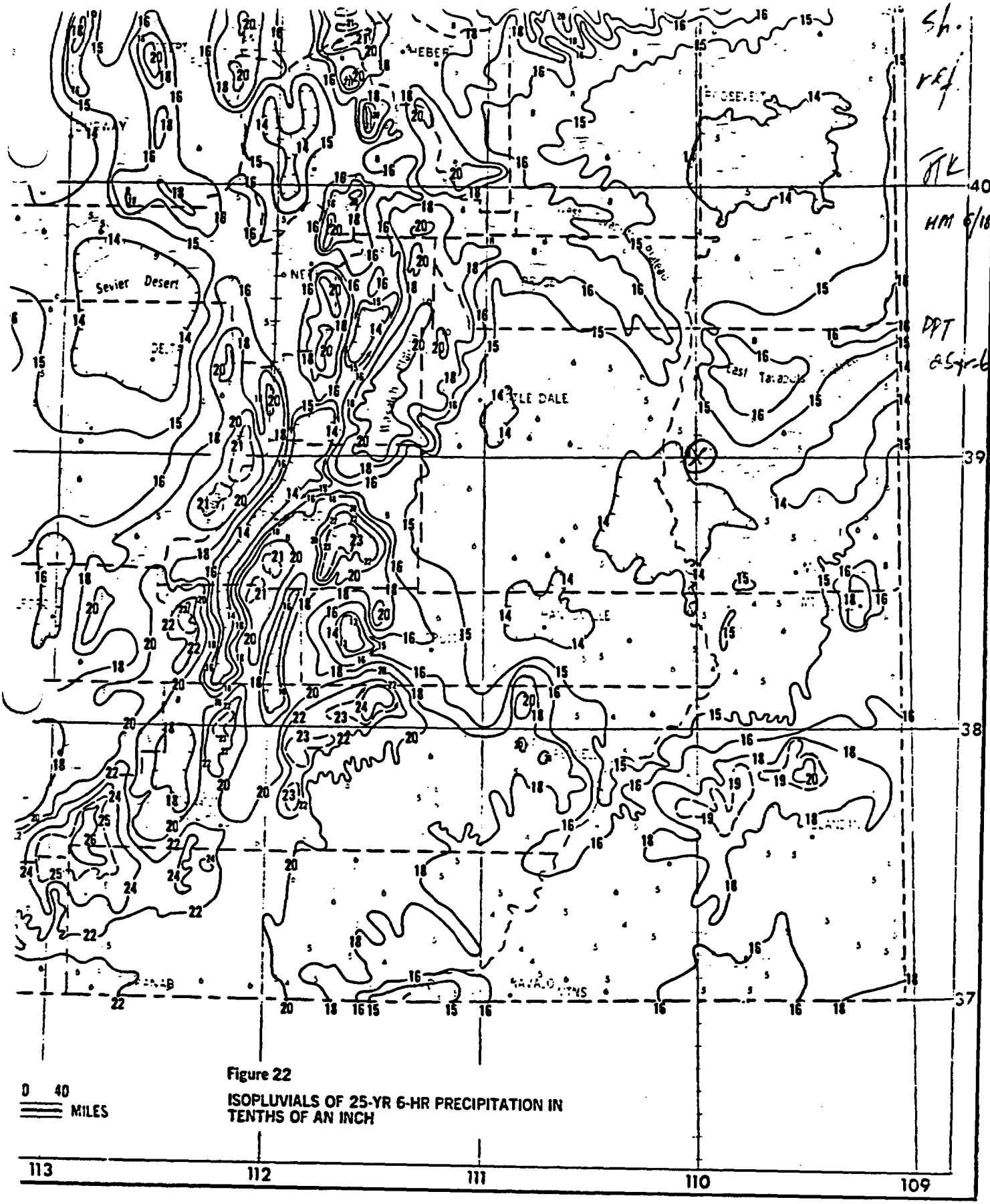


Figure 22

ISOPLUVIALS OF 25-YR 6-HR PRECIPITATION IN TENTHS OF AN INCH

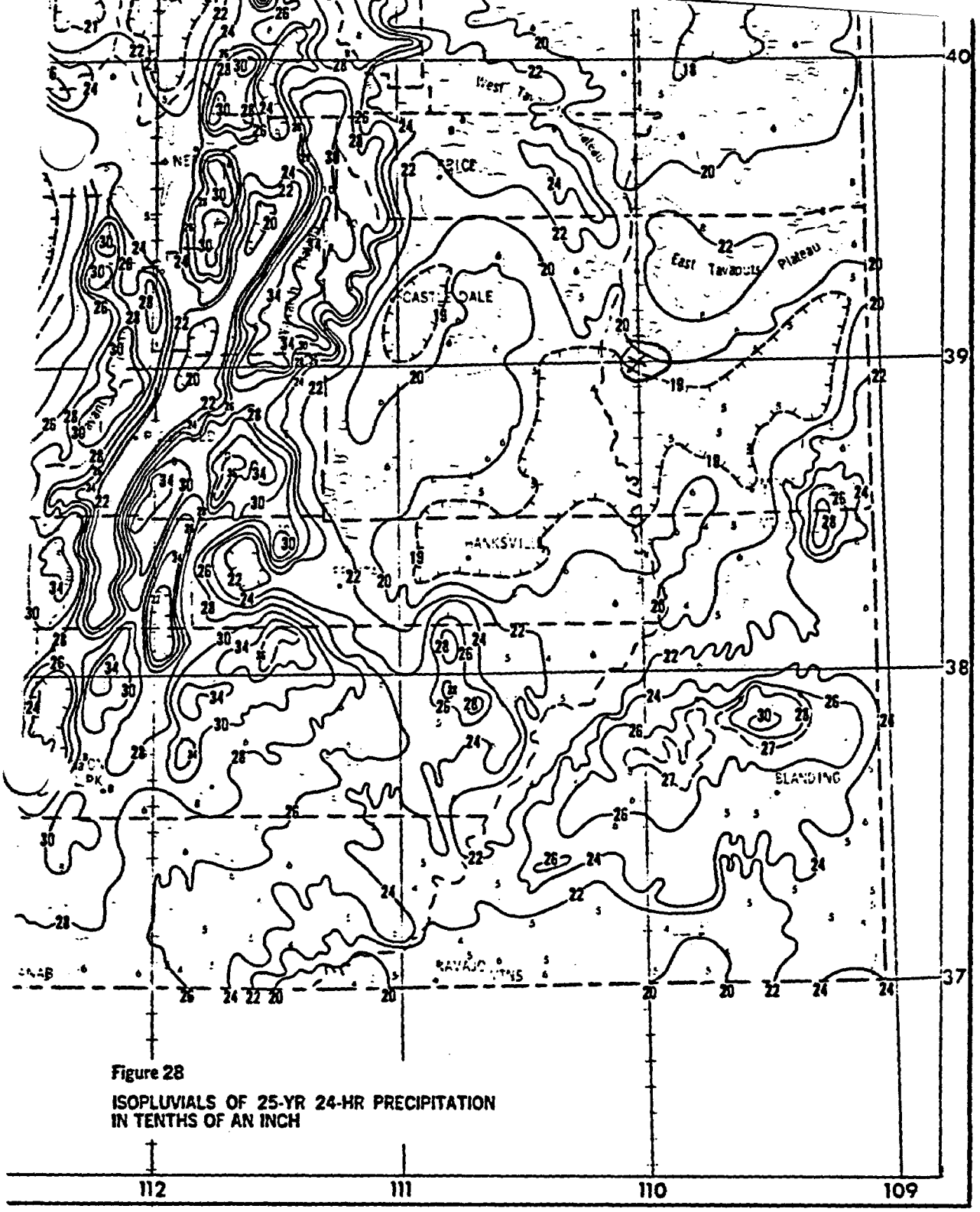


Figure 28

ISOPLUVIALS OF 25-YR 24-HR PRECIPITATION
IN TENTHS OF AN INCH

Sh. 14
ref. (2)

JFK 4/29/87
HM 6/12/87

PPT = 1.95'
25-yr 24h. ✓

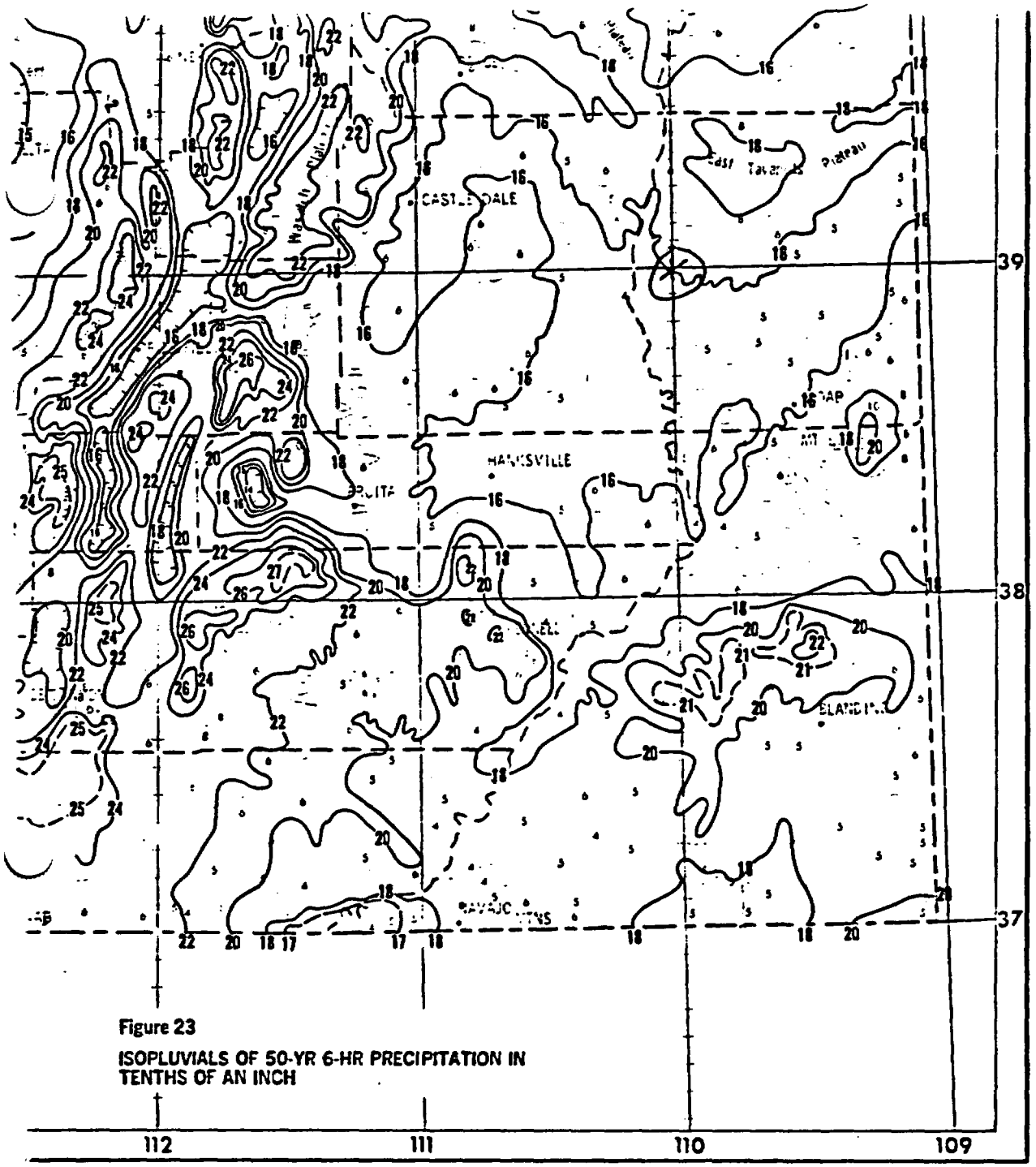


Figure 23

ISOPLUVIALS OF 50-YR 6-HR PRECIPITATION IN TENTHS OF AN INCH

Sh. 15
ref (2)

JTK 4/21
HM 6/18/87

I-57 = 1.6"
50-yr 6hr ✓

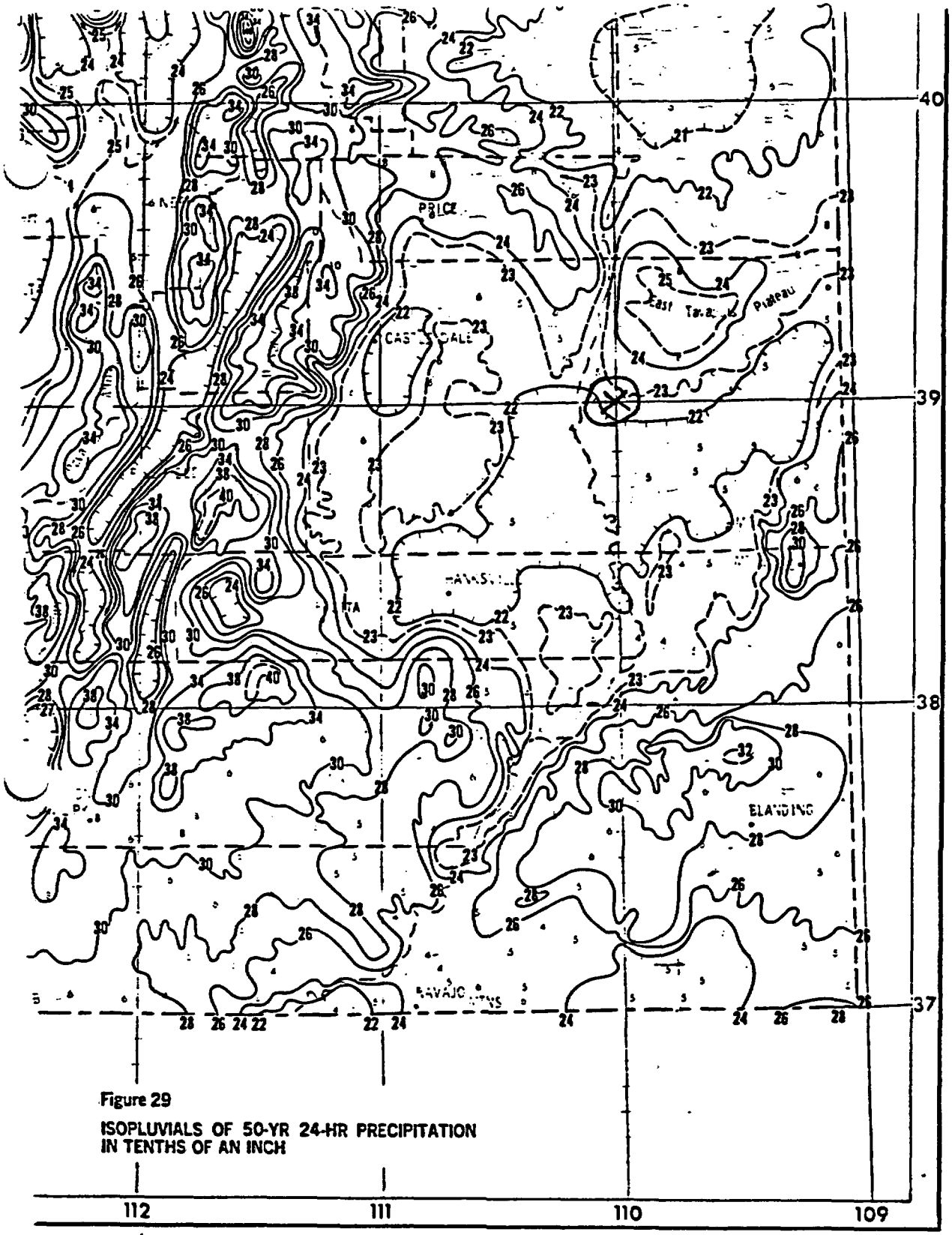


Figure 29

ISOPLUVIALS OF 50-YR 24-HR PRECIPITATION IN TENTHS OF AN INCH

Sh. 16

ref. (2)

FTC 4/29/87

HM 6/18/87

PPT 50-yr 24hr. = 2.2" ✓

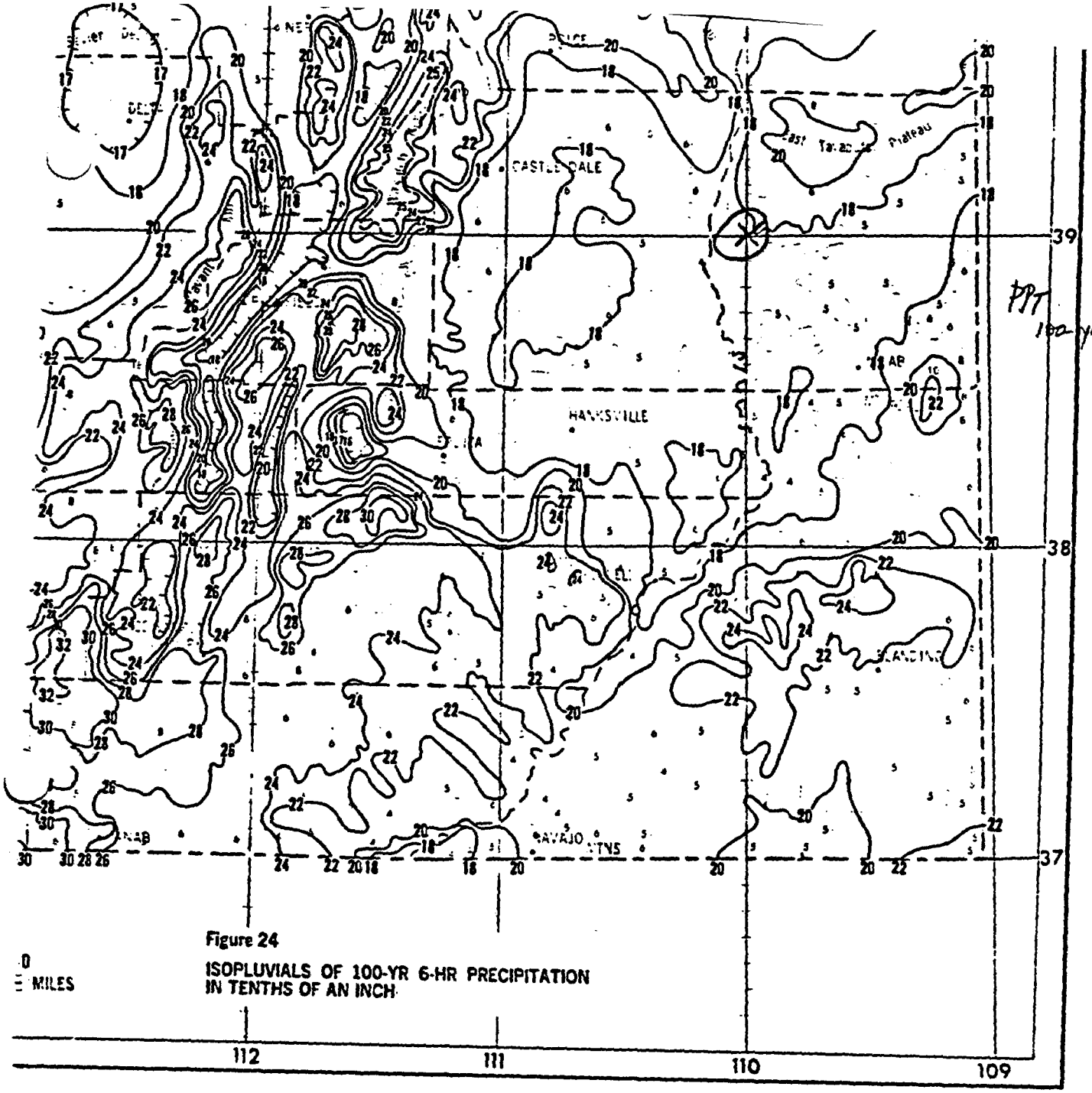


Figure 24

ISOPLUVIALS OF 100-YR 6-HR PRECIPITATION IN TENTHS OF AN INCH

Sh. 17

ref (2)

JTK 4/29/

HM 6/18/

PPT

100-yr 6-hr.

= 1.8 "

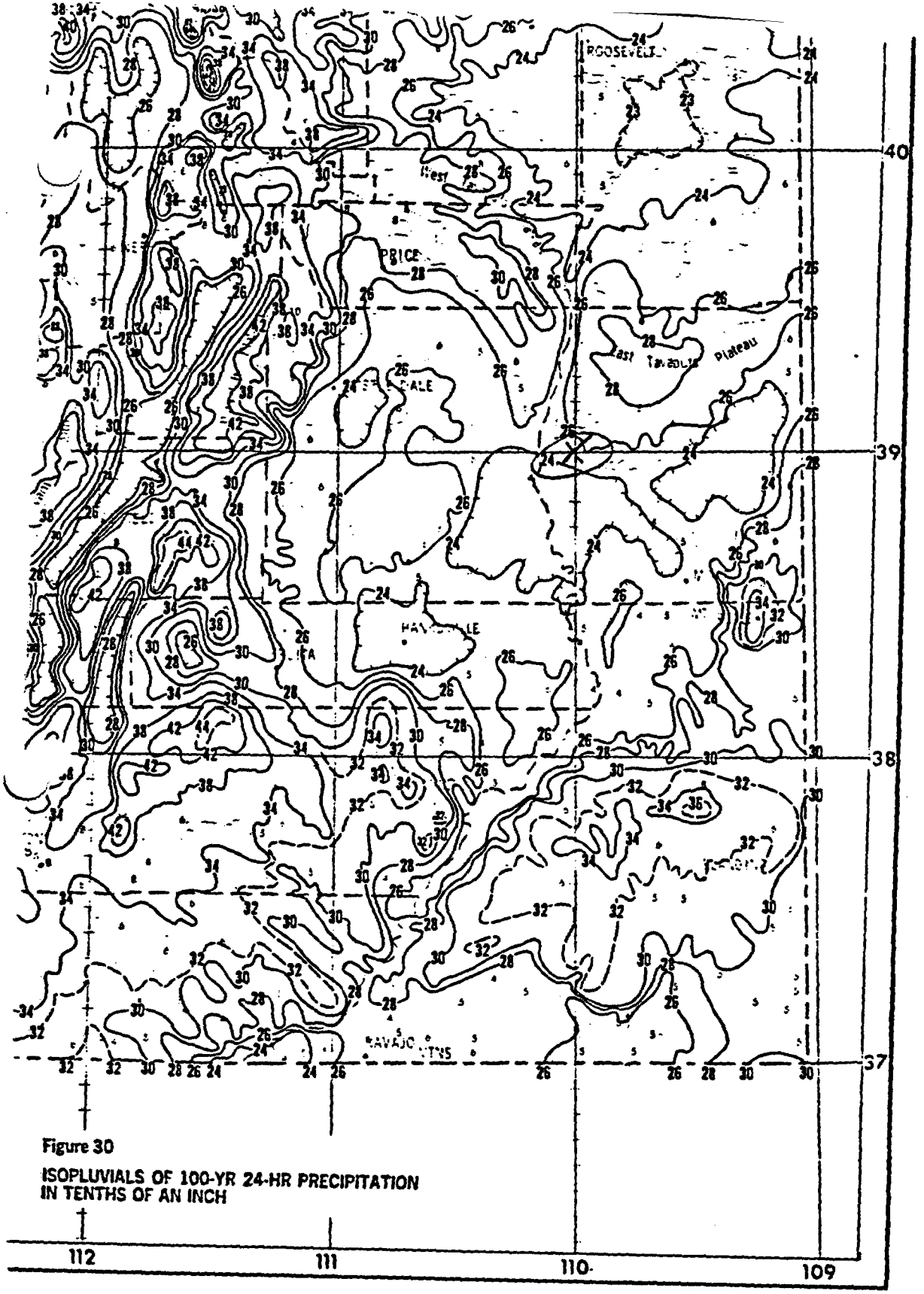


Figure 30

ISOPLUVIALS OF 100-YR 24-HR PRECIPITATION IN TENTHS OF AN INCH

Sh. 18

ref (2)

FTK 4/29/8

HM 6/18/8

$PPT_{100\text{-}yr.\,24h.} = 2.5$ ✓

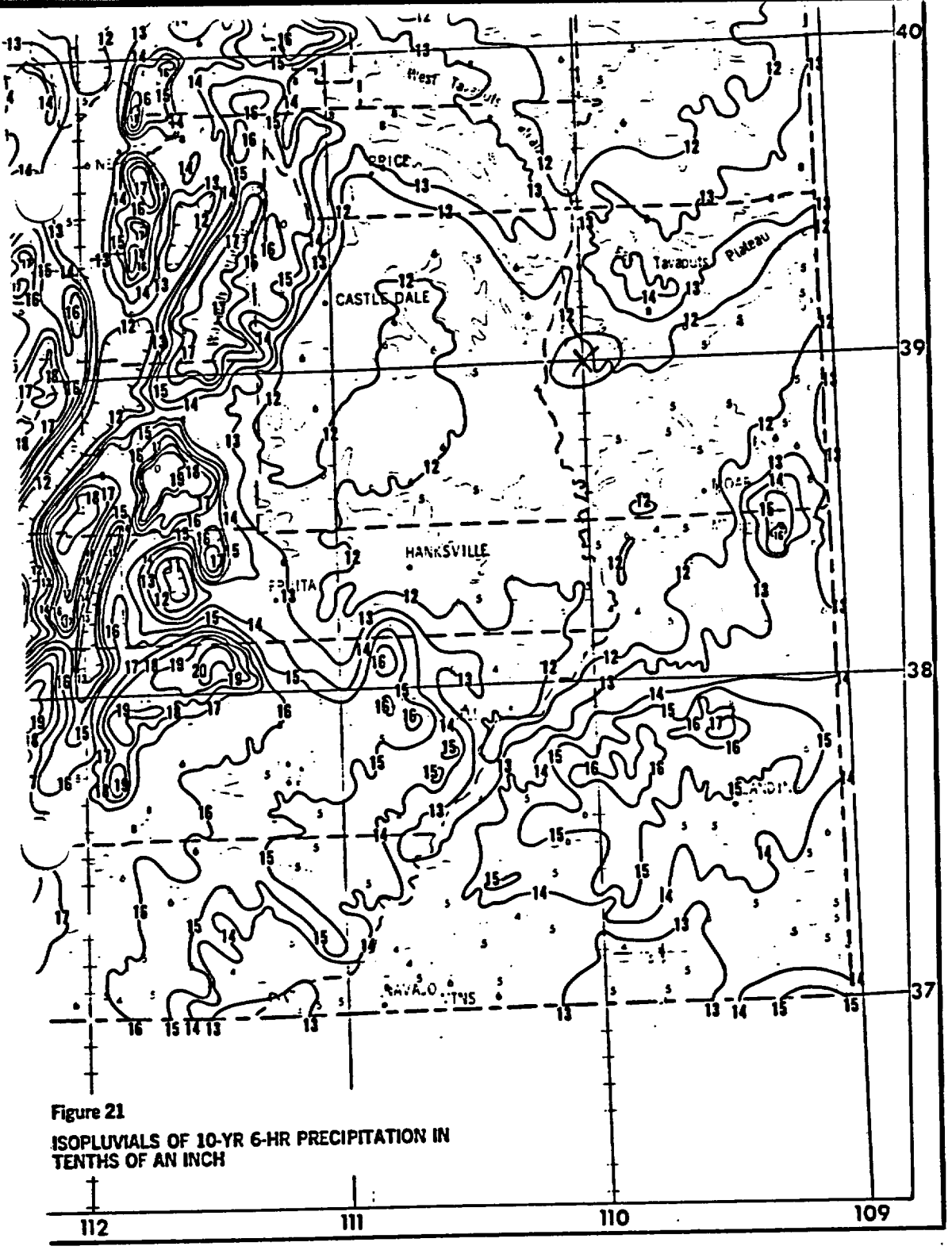


Figure 21

ISOPLUVIALS OF 10-YR 6-HR PRECIPITATION IN TENTHS OF AN INCH

Sh: 19

ref. (2)

JTK 4/29/9
HM 6/18/8

PPT 10+6hr = 1.2" ✓

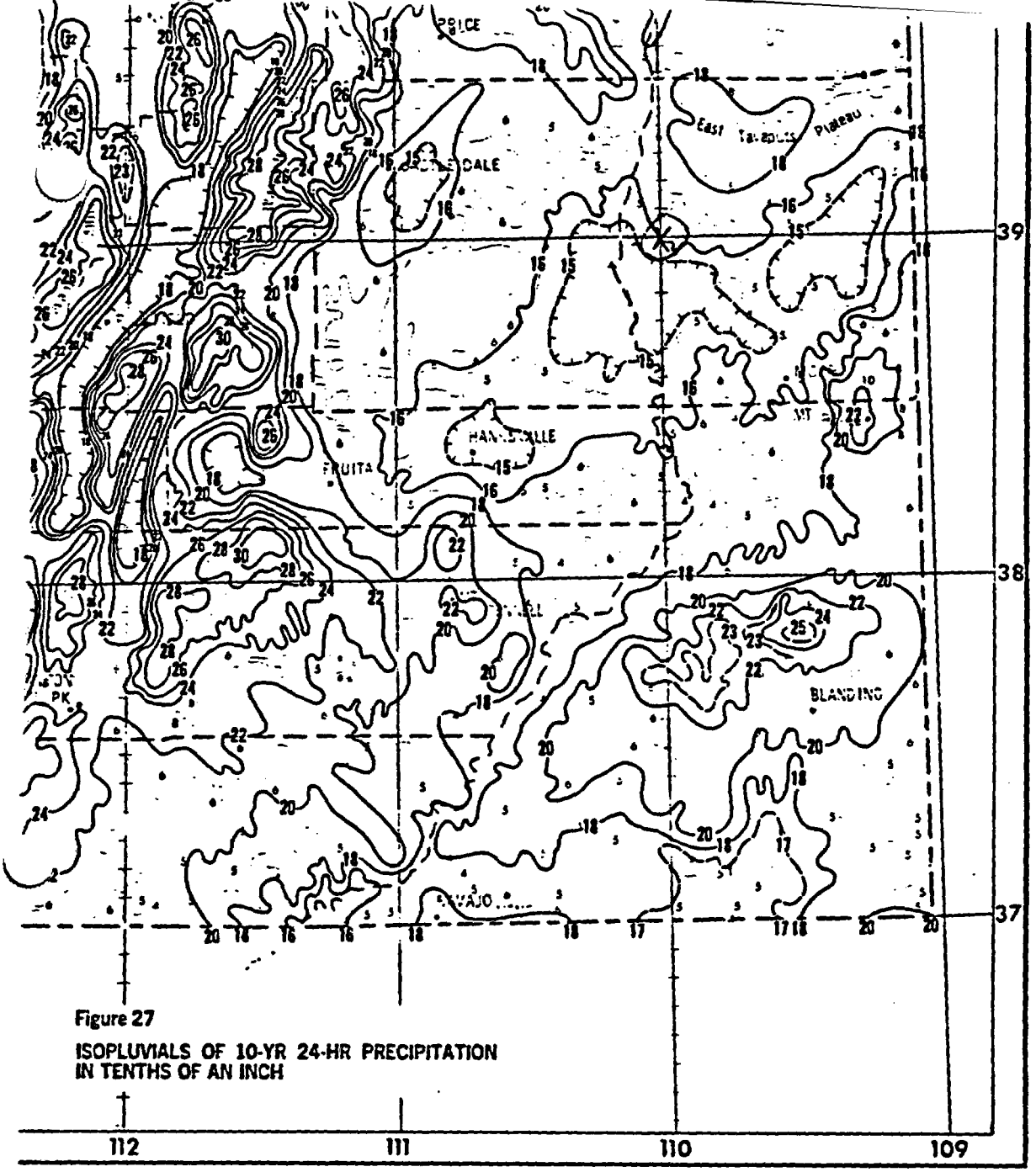


Figure 27

ISOPLUVIALS OF 10-YR 24-HR PRECIPITATION
IN TENTHS OF AN INCH

Sh. 20 A
ref (2)
JTK 4/29/
PPT 10 yr. 24 hr = 1.6 "
HM 6/18/87

Using the precipitation data derived on Sh. 52-5e, the same drainage model and time of concentration from MKE Calc. No. 10-539-02-00 on sheet 5 the peak discharges for the 10-yr and 25-yr 24 hr. storms are computed using the computer program HEC 1. The results of the computer runs are presented on Sh. 21A – 23D.

To perform a sensitivity analysis of the model, the times of concentration for the sub-basins 6, 7, & and 9 are adjusted (see Sh. 25) and the discharge for the 10-yr flood recomputed (see Sh. 24A-24F) As a result, the peak discharge became 10,900 cfs compared with the previous 11,300 cfs. Since the difference is insignificant, the more conservative 11,300 cfs was used to derive the water surface profile at the site.
In addition, the flow length for routing the combined flow from Subbasins 7 and 8 to station 9 is actually 21,000 ft instead of 32736 ft (used in earlier computer runs) (see Map, Sh. 25). Results using 21,000 ft are printed on Sh. 25B-25E indicating insignificant difference in the peak flow rate at the disposal sites. In all cases, storm 11,300 cfs will be a conservative value for the 10-yr; likewise for the 25-yr storm with estimated flow of 15,300 cfs.

Using peak discharges of 11,3000 and 15,300 cfs for the 10-yr and 25-yr storms respectively, a water surface profile analysis was done using HEC2 at the vicinity of the site using the same cross sections as those in MKE Calc. No. 10-539-02-00.

In addition, New cross sections 0.6, 0.8, 6.5 and 6.8 are incorporated into the model to simulate flow through the upstream railroad crossing and the downstream culverts shown respectively on sh. 19 of MKE calc. No. 10-539-02-00. The geometry of the above new cross sections are shown on sh 26 and sh. 29 Results show that the water level for sections 5.5 and 6.0 will reach approx. 4077', thus will inundate the downstream side of the existing pile and in the area where the retention basin will be located (See sh. 32 and 33). Therefore, a berm is proposed to be built to elevation 4080' as indicated on sh. 19 MKE Calc. No. 10-539-02-00, to keep the flood water out. The HEC2 runs were repeated assuming the existence of the berm at sections 5.5 and 6.0. Results of the analysis are shown on sh. 34 and 35 and the water surface profiles are plotted on sh. 30 and 31.

It was shown, by building a berm to elevation 4080', that the maximum water level during the peak 10-yr and 25-yr storms will be retained in the main channel of Brown's Wash with a residual freeboard of about 2 feet.

1

****

FLOOD HYDROGRAPH PACKAGE HEC-1 (IBM XT 512K VERSION) -FEB 1,1985

U.S. ARMY CORPS OF ENGINEERS, THE HYDROLOGIC ENGINEERING CENTER, 609 SECOND STREET, DAVIS, CA. 95616

****

UMTRA - GreenRiver

Sh. 21 A

THIS HEC-1 VERSION CONTAINS ALL OPTIONS EXCEPT ECONOMICS, AND THE NUMBER OF PLANS ARE REDUCED TO 3

FTK 4/30/87

HM 6/19/87

1 HEC-1 INPUT PAGE 1

LINE	ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
1	ID UMTRA - GREEN RIVER - BROWN WASH
2	ID 10 - YR 24-HR STORM
3	IT 5 ✓ 300 ✓
4	IN 5 ✓
5	ID 5 ✓
6	KK BAS1 SUB-BASIN 1 ✓
7	KM 10-YR 24-HR ✓
8	BA 2.6 ✓
9	PB 1.6 ✓
10	PI .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139
11	PI .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139
12	PI .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139
13	PI .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139
14	PI .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139
15	PI .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139
16	PI .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139
17	PI .00139 .00139 .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417
18	PI .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417
19	PI .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417
20	PI .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417
21	PI .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417
22	PI .00833 .00833 .00833 .00833 .00833 .00833 .00833 .00833 .00833 .00833
23	PI .00833 .00833 .02 .03 .03 .03 .04 .04 .06 .07
24	PI .07 .10 .15 .26 .00278 .00278 .00278 .00278 .00278 .00278
25	PI .00278 .00278 .00278 .00278 .00278 .00278 .00278 .00278 .00278 .00278
26	PI .00278 .00278 .00278 .00278 .00278 .00278 .00278 .00278 .00278 .00278
27	PI .00278 .00278 .00278 .00278 .00278 .00278 .00278 .00278 .00278 .00278
28	PI .00278 .00278 .00278 .00278 .00278 .00278 .00278 .00278 .00278 .00278
29	PI .00278 .00278 .00278 .00278 .00278 .00278 .00278 .00278 .00278 .00278
30	PI .00278 .00278 .00278 .00278 .00278 .00278 .00278 .00278 .00278 .00278
31	PI .00278 .00278 .00278 .00278 .00278 .00278 .00139 .00139 .00139 .00139
32	PI .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139
33	PI .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139
34	PI .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139
35	PI .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139
36	PI .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139
37	PI .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139
38	PI .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139
39	LU 0 0.2 ✓
40	UD .66 ✓
41	KK BAS2 ✓
42	KM 10YR 24HR ✓
43	BA 5.5 ✓

```
44        LU      0 ✓   0.2 ✓
45        UD    0.73 ✓

46        KK    ST12    COMBINE BAS. 1&2 FLOWS ✓
47        HC       2 ✓
```


JTK 4/30/87 HM 7/16/87

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

48        KK    3,4       FLOW 1,2 FROM STA.1,2 TO 3,4
49        RK  26400   .032 ✓  .04 ✓          TRAP       0    0.45

50        KK    BAS4 ✓
51        KM         10YR 24HR ✓
52        BA     6.4 ✓
53        LU       0 ✓   0.2 ✓
54        UD    0.75

55        KK    BAS3 ✓
56        KM         10YR 24HR ✓
57        BA    12.1 ✓
58        LU       0 ✓   0.2 ✓
59        UD     .96 ✓

60        KK    ST34    COMBINE FLOWS 3,4
61        HC       3 ✓

62        KK    5,6       FLOW 3,4 FROM STA.3,4 TO 5,6
63        RK  53856   .015 ✓  .04 ✓          TRAP ✓     0    0.03

64        KK    BAS5 ✓
65        KM         10YR 24HR
66        BA    20.7 ✓
67        LU       0 ✓   0.2 ✓
68        UD    1.73

69        KK    BAS6 ✓
70        KM         10YR 24HR ✓
71        BA    11.8 ✓
72        LU       0 ✓   0.2 ✓
73        UD    0.95

74        KK    ST56 ✓  COMBINE FLOWS 5,6 ✓
75        HC       3 ✓

76        KK    7,8       FLOW 5,6 FROM STA.5,6 TO 7,8
77        RK   6336  0.005    .04 ✓          TRAP       0    0.025

78        KK    BAS8
79        KM         10YR 24HR
80        BA     0.5 ✓
81        LU       0     0.2 ✓
82        UD    0.52

83        KK    BAS7
84        KM         10YR 24HR
85        BA    12.2 ✓
86        LU       0     0.2 ✓
87        UD    1.22
```



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

88        KK    ST78    COMBINE FLOWS 7,8
89        HC       3 ✓
```

```
88          KK    ST78    COMBINE FLOWS 7,8
89          HC      3 ✓

90          KK    9         FLOWS 7,8 FROM STA.7,8 TO 9
91          RK    32736 ?  0.01    .04          TRAP      0    0.05

92          KK    BAS9
93          KM        10YR 24HR
94          BA    11.3 ✓
95          LU      0     0.2
96          UD    1.39

97          KK    ST9   COMBINE FLOWS
98          HC      2
99          ZZ
```

Sh. 21C

FTK 4/30/87
HM 7/16/87

1 ****

FLOOD HYDROGRAPH PACKAGE HEC-1 (IBM XT 512K VERSION) -FEB 1,1985
U.S. ARMY CORPS OF ENGINEERS, THE HYDROLOGIC ENGINEERING CENTER, 609 SECOND STREET, DAVIS, CA. 95616
****

UMTRA - GREEN RIVER - BROWN WASH
10 - YR 24-HR STORM

5 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	1	0	STARTING DATE
ITIME		0000	STARTING TIME
NQ		300	NUMBER OF HYDROGRAPH ORDINATES
NDDATE	2	0	ENDING DATE
NDTIME		0055	ENDING TIME

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 24.92 HOURS

ENGLISH UNITS

1

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	BAS1	1100.	12.50	196.	49.	47.	2.60		
HYDROGRAPH AT	BAS2	2151.	12.58	414.	103.	100.	5.50		
2 COMBINED AT	ST12	3234.	12.50	610.	152.	147.	8.10		
ROUTED TO	3,4	2963.	12.83	609.	153.	147.	8.10		
HYDROGRAPH AT	BAS4	2456.	12.58	482.	120.	116.	6.40		

Sh. 21 D

FTK 4/30/8
HM 7/16/87

+ HYDROGRAPH AT	BAS3	3799.	12.75	911.	228.	219.	12.10
+ 3 COMBINED AT	ST34	9828.	12.75	2001.	501.	482.	26.60
ROUTED TO	5,6	6387.	14.17	1958.	501.	483.	26.60
+ HYDROGRAPH AT	BAS5	3857.	13.50	1535.	389.	375.	20.70
+ HYDROGRAPH AT	BAS6	3738.	12.75	888.	222.	214.	11.80
+ 3 COMBINED AT	ST56	10307.	14.00	4312.	1113.	1072.	59.10
+ ROUTED TO	7,8	10213.	14.17	4295.	1112.	1071.	59.10
+ HYDROGRAPH AT	BAS8	250.	12.33	38.	9.	9.	.50
+ HYDROGRAPH AT	BAS7	3117.	13.00	917.	230.	221.	12.20
+ 3 COMBINED AT	ST78	11283.	14.17	5226.	1351.	1301.	71.80
+ ROUTED TO	9	10640.	14.75	5119.	1346.	1297.	71.80
+ HYDROGRAPH AT	BAS9	2571.	13.17	847.	213.	205.	11.30
+ 2 COMBINED AT	ST9	11314.	14.67	5838.	1559.	1502.	83.10

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

1 ****

FLOOD HYDROGRAPH PACKAGE HEC-1 (IBM XT 512K VERSION) -FEB 1,1985
U.S. ARMY CORPS OF ENGINEERS, THE HYDROLOGIC ENGINEERING CENTER, 609 SECOND STREET, DAVIS, CA. 95616
****

UMTRA - Green River

Sh. 22 A

THIS HEC-1 VERSION CONTAINS ALL OPTIONS EXCEPT ECONOMICS, AND THE NUMBER OF PLANS ARE REDUCED TO 3

JTK 4/30/87

1 HEC-1 INPUT PAGE 1 HNI 7/13/87

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

  1       ID      UMTRA - GREEN RIVER - BROWN WASH
  2       ID      25 - YR 24-HR STORM
  3       IT      5                    300
  4       IN      5
  5       ID      5

  6       KK    BAS1 SUB-BASIN 1
  7       KM        25-YR 24-HR
  8       BA    2.6
  9       PB    1.95
 10       PI  .00208 .00208 .00208 .00208 .00208 .00208 .00208 .00208 .00208 .00208
 11       PI  .00208 .00208 .00208 .00208 .00208 .00208 .00208 .00208 .00208 .00208
 12       PI  .00208 .00208 .00208 .00208 .00208 .00208 .00208 .00208 .00208 .00208
 13       PI  .00208 .00208 .00208 .00208 .00208 .00208 .00208 .00208 .00208 .00208
 14       PI  .00208 .00208 .00208 .00208 .00208 .00208 .00208 .00208 .00208 .00208
 15       PI  .00208 .00208 .00208 .00208 .00208 .00208 .00208 .00208 .00208 .00208
 16       PI  .00208 .00208 .00208 .00208 .00208 .00208 .00208 .00208 .00208 .00208
 17       PI  .00208 .00208 .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417
 18       PI  .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417
 19       PI  .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417
 20       PI  .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417
 21       PI  .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417
 22       PI  .00833 .00833 .00833 .00833 .00833 .00833 .00833 .00833 .00833 .00833
 23       PI  .00833 .00833   .03    .04    .04    .04    .04    .04    .08    .08
 24       PI    .08    .13    .18    .32 .00417 .00417 .00417 .00417 .00417 .00417
 25       PI  .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417
 26       PI  .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417
 27       PI  .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417
 28       PI  .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417
 29       PI  .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417
 30       PI  .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417 .00417
 31       PI  .00417 .00417 .00417 .00417 .00417 .00417 .00139 .00139 .00139 .00139
 32       PI  .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139
 33       PI  .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139
 34       PI  .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139
 35       PI  .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139
 36       PI  .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139
 37       PI  .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139
 38       PI  .00139 .00139 .00139 .00139 .00139 .00139 .00139 .00139
 39       LU      0    0.2
 40       UD    .66

 41       KK    BAS2
 42       KM        2EYR 24HR
 43       BA    5.5
```

```
44          LU      0     0.2
45          UD    0.73

46          KK    ST12    COMBINE BAS. 1&2 FLOWS
47          HC       2
```

Sh. 22 B

JTK 4/87
HM 7/15/87

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

48          KK    3,4         FLOW 1,2 FROM STA.1,2 TO 3,4
49          RK  26400   .032     .04            TRAP       0    0.45

50          KK    BAS4
51          KM          25YR 24HR
52          BA     5.4
53          LU       0     0.2
54          UD    0.75

55          KK    BAS3
56          KM          25YR 24HR
57          BA    12.1
58          LU       0     0.2
59          UD     .96

60          KK    ST34    COMBINE FLOWS 3,4
61          HC       3

62          KK    5,6         FLOW 3,4 FROM STA.3,4 TO 5,6
63          RK  53856   .015     .04            TRAP       0    0.03

64          KK    BAS5
65          KM          25YR 24HR
66          BA    20.7
67          LU       0     0.2
68          UD    1.73

69          KK    BAS6
70          KM          25YR 24HR
71          BA    11.8
72          LU       0     0.2
73          UD    0.95

74          KK    ST56    COMBINE FLOWS 5,6
75          HC       3

76          KK    7,8         FLOW 5,6 FROM STA.5,6 TO 7,8
77          RK   6336   0.005     .04            TRAP       0   0.025

78          KK    BAS8
79          KM          25YR 24HR
80          BA     0.5
81          LU       0     0.2
82          UD    0.52

83          KK    BAS7
84          KM          25YR 24HR
85          BA    12.2
86          LU       0     0.2
87          UD    1.22
```



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

88          KK    ST78    COMBINE FLOWS 7,8
89          HC       3
```

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88          KK    ST78    COMBINE FLOWS 7,8
89          HC       3

90          KK    9          FLOWS 7,8 FROM STA.7,8 TO 9
91          RK    32736   0.01     .04           TRAP       0    0.05

92          KK    BAS9
93          KM          25YR 24HR
94          BA    11.3
95          LU       0     0.2
96          UD    1.39

97          KK    ST9   COMBINE FLOWS
98          HC       2
99          ZZ
```

Sh. 22 C

JTK 4/30/87
HM 7/1.. 7

1 ****

FLOOD HYDROGRAPH PACKAGE HEC-1 (IBM XT 512K VERSION) -FEB 1,1985
U.S. ARMY CORPS OF ENGINEERS, THE HYDROLOGIC ENGINEERING CENTER, 609 SECOND STREET, DAVIS, CA. 95616
****

UNTRA - GREEN RIVER - BROWN WASH
25 - YR 24-HR STORM

5 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	1	0	STARTING DATE
ITIME		0000	STARTING TIME
NQ		300	NUMBER OF HYDROGRAPH ORDINATES
NDDATE	2	0	ENDING DATE
NDTIME		0055	ENDING TIME

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 24.92 HOURS

ENGLISH UNITS

1

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	BAS1	1391.	12.50	252.	63.	61.	2.60		
+	HYDROGRAPH AT	BAS2	2720.	12.50	532.	133.	128.	5.50		
	2 COMBINED AT	ST12	4093.	12.50	784.	196.	189.	8.10		
+	ROUTED TO	3,4	3818.	12.75	783.	196.	189.	8.10		
+	HYDROGRAPH AT	BAS4	3107.	12.50	619.	155.	149.	6.40		

+	HYDROGRAPH AT	BAS3	4827.	12.75	1171.	293.	282.	12.10
+	3 COMBINED AT	ST34	11516.	12.75	2573.	644.	620.	26.60
	ROUTED TO	5,6	8063.	14.00	2518.	645.	621.	26.60
+	HYDROGRAPH AT	BAS5	4938.	13.50	1973.	501.	482.	20.70
+	HYDROGRAPH AT	BAS6	4746.	12.75	1142.	286.	275.	11.80
+	3 COMBINED AT	ST56	13491.	13.92	5555.	1431.	1378.	59.10
+	ROUTED TO	7,8	13388.	14.00	5538.	1430.	1378.	59.10
+	HYDROGRAPH AT	BAS8	316.	12.33	48.	12.	12.	.50
+	HYDROGRAPH AT	BAS7	3975.	13.00	1179.	295.	284.	12.20
+	3 COMBINED AT	ST78	15083.	14.00	6738.	1737.	1674.	71.80
+	ROUTED TO	9	14159.	14.50	6592.	1732.	1669.	71.80
+	HYDROGRAPH AT	BAS9	3285.	13.17	1088.	273.	263.	11.30
+	2 COMBINED AT	ST9	15289.	14.42	7554.	2006.	1932.	83.10

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

Sh. 22D

JTK 4/30/97
HM 7/16/

1

****

FLOOD HYDROGRAPH PACKAGE HEC-1 (IBM XT 512K VERSION) -FEB 1,1985
U.S. ARMY CORPS OF ENGINEERS, THE HYDROLOGIC ENGINEERING CENTER, 609 SECOND STREET, DAVIS, CA. 95616

****

UMTRA – Green River

Sh. 23 A

JTK 5/1/87
HM 7/17/87

THIS HEC-1 VERSION CONTAINS ALL OPTIONS EXCEPT ECONOMICS, AND THE NUMBER OF PLANS ARE REDUCED TO 3

1 HEC-1 INPUT PAGE 1

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

  1       ID       UMTRA - GREEN RIVER - BROWN WASH
  2       ID       50 - YR 24-HR STORM
  3       IT     5                    300
  4       IN     5
  5       ID     5

  6       KK    BAS1 SUB-BASIN 1
  7       KM         50-YR 24-HR
  8       BA     2.6
  9       PB    2.25
 10       PI  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278
 11       PI  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278
 12       PI  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278
 13       PI  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278
 14       PI  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278
 15       PI  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278
 16       PI  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278
 17       PI  .00278  .00278  .00500  .005    .005    .005    .005    .005    .005    .005
 18       PI  .005    .005    .005    .005    .00583  .00583  .00583  .00583  .00583  .00583
 19       PI  .00583  .00583  .00583  .00583  .00583  .00583  .00583  .00583  .00583  .00583
 20       PI  .00583  .00583  .00583  .00583  .00583  .00583  .00583  .00583  .00833  .00833
 21       PI  .00833  .00833  .00833  .00833  .00833  .00833  .00833  .00833  .00833  .00833
 22       PI  .00833  .00833  .00833  .00833  .00833  .00833  .00833  .00833  .00833  .00833
 23       PI  .00833  .00833    .04     .04     .04     .04     .04     .05     .09     .09
 24       PI    .09     .14     .19     .35  .00417  .00417  .00417  .00417  .00417  .00417
 25       PI  .00417  .00417  .00417  .00417  .00417  .00417  .00417  .00417  .00417  .00417
 26       PI  .00417  .00417  .00417  .00417  .00417  .00417  .00417  .00417  .00417  .00417
 27       PI  .00417  .00417  .00417  .00417  .00417  .00417  .00417  .00417  .00417  .00417
 28       PI  .00417  .00417  .00417  .00417  .00417  .00417  .00417  .00417  .00417  .00417
 29       PI  .00417  .00417  .00417  .00417  .00417  .00417  .00417  .00417  .00417  .00417
 30       PI  .00417  .00417  .00417  .00417  .00417  .00417  .00417  .00417  .00417  .00417
 31       PI  .00417  .00417  .00417  .00417  .00417  .00417  .00208  .00208  .00208  .00208
 32       PI  .00208  .00208  .00208  .00208  .00208  .00208  .00208  .00208  .00208  .00208
 33       PI  .00208  .00208  .00208  .00208  .00208  .00208  .00208  .00208  .00208  .00208
 34       PI  .00208  .00208  .00208  .00208  .00208  .00208  .00208  .00208  .00208  .00208
 35       PI  .00208  .00208  .00208  .00208  .00208  .00208  .00208  .00208  .00208  .00208
 36       PI  .00208  .00208  .00208  .00208  .00208  .00208  .00208  .00208  .00208  .00208
 37       PI  .00208  .00208  .00208  .00208  .00208  .00208  .00208  .00208  .00208  .00208
 38       PI  .00208  .00208  .00208  .00208  .00208  .00208  .00208  .00208
 39       LU     0    0.2
 40       UD    .66

 41       KK    BAS2
 42       KM         50YR 24HR
 43       BA     5.5
```

Sh. 23 B.

FTK 5/1/87
HM 7/17/87


```
44        LU      0     0.2
45        UD    0.73

46        KK    ST12    COMBINE BAS. 1&2 FLOWS
47        HC       2
```

1 HEC-1 INPUT

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

48        KK    3,4         FLOW 1,2 FROM STA.1,2 TO 3,4
49        RK   26400   .032     .04            TRAP       0    0.45

50        KK    BAS4
51        KM          50YR 24HR
52        BA     6.4
53        LU       0     0.2
54        UD    0.75

55        KK    BAS3
56        KM          50YR 24HR
57        BA    12.1
58        LU       0     0.2
59        UD     .96

60        KK    ST34    COMBINE FLOWS 3,4
61        HC       3

62        KK    5,6         FLOW 3,4 FROM STA.3,4 TO 5,6
63        RK   53856    .015     .04            TRAP       0    0.03

64        KK    BAS5
65        KM          50YR 24HR
66        BA    20.7
67        LU       0     0.2
68        UD    1.73

69        KK    BAS6
70        KM          50YR 24HR
71        BA    11.8
72        LU       0     0.2
73        UD    0.95

74        KK    ST56    COMBINE FLOWS 5,6
75        HC       3

76        KK    7,8         FLOW 5,6 FROM STA.5,6 TO 7,8
77        RK    6336   0.005     .04            TRAP       0   0.025

78        KK    BAS8
79        KM          50YR 24HR
80        BA     0.5
81        LU       0     0.2
82        UD    0.52

83        KK    BAS7
84        KM          50YR 24HR
85        BA    12.2
86        LU       0     0.2
87        UD    1.22
```


1 HEC-1 INPUT

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

88        KK    ST78    COMBINE FLOWS 7,8
```

```
 89          HC      3

 90          KK    9          FLOWS 7,8 FROM STA.7,8 TO 9
 91          RK  32736   0.01     .04           TRAP       0    0.05

 92          KK    BAS9
 93          KM         50YR 24HR
 94          BA    11.3
 95          LU       0     0.2
 96          UD    1.39

 97          KK    ST9   COMBINE FLOWS
 98          HC      2
 99          ZZ
```

Sh. 23 C

JTK 5/1/87
HM 7/17/87

1 ****

FLOOD HYDROGRAPH PACKAGE HEC-1 (IBM XT 512K VERSION) -FEB 1,1985
U.S. ARMY CORPS OF ENGINEERS, THE HYDROLOGIC ENGINEERING CENTER, 609 SECOND STREET, DAVIS, CA. 95616
****

UMTRA - GREEN RIVER - BROWN WASH
50 - YR 24-HR STORM

5 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	1	0	STARTING DATE
ITIME		0000	STARTING TIME
NQ		300	NUMBER OF HYDROGRAPH ORDINATES
NDDATE	2	0	ENDING DATE
NDTIME		0055	ENDING TIME

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 24.92 HOURS

ENGLISH UNITS

1

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	BAS1	1538.	12.50	280.	70.	67.	2.60		
+	HYDROGRAPH AT	BAS2	3010.	12.58	592.	148.	142.	5.50		
	2 COMBINED AT	ST12	4533.	12.50	871.	218.	210.	8.10		
+	ROUTED TO	3,4	4271.	12.83	871.	218.	210.	8.10		
+	HYDROGRAPH AT	BAS4	3440.	12.58	688.	172.	166.	6.40		

	HYDROGRAPH AT						
+		BAS3	5349.	12.75	1301.	325.	313.	12.10
	3 COMBINED AT						
+		ST34	12773.	12.75	2860.	715.	689.	26.60
	ROUTED TO						
		5,6	9155.	14.00	2803.	716.	690.	26.60
	HYDROGRAPH AT						
+		BAS5	5482.	13.50	2192.	557.	536.	20.70
	HYDROGRAPH AT						
+		BAS6	5260.	12.75	1269.	317.	306.	11.80
	3 COMBINED AT						
+		ST56	15248.	13.92	6181.	1590.	1532.	59.10
	ROUTED TO						
+		7,8	15197.	14.00	6164.	1589.	1531.	59.10
	HYDROGRAPH AT						
+		BAS8	349.	12.33	54.	13.	13.	.50
	HYDROGRAPH AT						
+		BAS7	4409.	13.00	1310.	328.	316.	12.20
	3 COMBINED AT						
+		ST78	17160.	13.92	7499.	1931.	1860.	71.80
	ROUTED TO						
		9	16068.	14.50	7348.	1926.	1855.	71.80
	HYDROGRAPH AT						
+		BAS9	3644.	13.17	1209.	304.	293.	11.30
	2 COMBINED AT						
+		ST9	17385.	14.42	8424.	2230.	2148.	83.10

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

Sh. 23 D

TK 5/1/87

HM 7/17/87

UMTRA - Green River

Sh. 24A

1 ****

FLOOD HYDROGRAPH PACKAGE HEC-1 (IBM XT 512K VE
.ON) -FEB 1,1985
U.S. ARMY CORPS OF ENGINEERS, THE HYDROLOGIC ENGINEERING CENTER
, 609 SECOND STREET, DAVIS, CA. 95616
****

JTic 6/11/87
HM 7/17/87

THIS HEC-1 VERSION CONTAINS ALL OPTIONS EXCEPT ECONOMICS, AND TH
E NUMBER OF PLANS ARE REDUCED TO 3

1 HEC-1 INPUT

PAGE 1

LINE	ID	1	2	3	4	5	6	7	8	9	10
1	ID	UMTRA - GREEN RIVER - BROWN WASH									
2	ID	10 - YR 24-HR STORM									
3	IT	5					300				
4	IN	5									
5	IO	5									
6	KK	BAS1 SUB-BASIN 1									
7	KM	10-YR 24-HR									
8	BA	2.6									
9	PB	1.6									
10	PI	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139
11	PI	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139
12	PI	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139
13	PI	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139
14	PI	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139
15	PI	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139
16	PI	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139
17	PI	.00139	.00139	.00417	.00417	.00417	.00417	.00417	.00417	.00417	.00417
18	PI	.00417	.00417	.00417	.00417	.00417	.00417	.00417	.00417	.00417	.00417

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                19          PI   .00417   .00417   .00417   .00417   .00417   .004 7   .0
.0417   .00417   .00417   .00417
                20          PI   .00417   .00417   .00417   .00417   .00417   .00417   .0
 "      .00417   .00417   .00417
                21          PI   .00417   .00417   .00417   .00417   .00417   .00417   .0
 '      .00417   .00417   .00417
                22          PI   .00833   .00833   .00833   .00833   .00833   .00833   .0
 .33    .00833   .00833   .00833
                23          PI   .00833   .00833     .02      .03      .03      .03
  .04      .04      .06      .07
                24          PI     .07      .10      .15      .26   .00278   .00278   .0
00278   .00278   .00278   .00278
                25          PI   .00278   .00278   .00278   .00278   .00278   .00278   .0
00278   .00278   .00278   .00278
                26          PI   .00278   .00278   .00278   .00278   .00278   .00278   .0
00278   .00278   .00278   .00278
                27          PI   .00278   .00278   .00278   .00278   .00278   .00278   .0
00278   .00278   .00278   .00278
                28          PI   .00278   .00278   .00278   .00278   .00278   .00278   .0
00278   .00278   .00278   .00278
                29          PI   .00278   .00278   .00278   .00278   .00278   .00278   .0
00278   .00278   .00278   .00278
                30          PI   .00278   .00278   .00278   .00278   .00278   .00278   .0
00278   .00278   .00278   .00278
                31          PI   .00278   .00278   .00278   .00278   .00278   .00278   .0
00139   .00139   .00139   .00139
                32          PI   .00139   .00139   .00139   .00139   .00139   .00139   .0
00139   .00139   .00139   .00139
                33          PI   .00139   .00139   .00139   .00139   .00139   .00139   .0
00139   .00139   .00139   .00139
                34          PI   .00139   .00139   .00139   .00139   .00139   .00139   .0
 9      .00139   .00139   .00139
                35          PI   .00139   .00139   .00139   .00139   .00139   .00139   .0
00139   .00139   .00139   .00139
                36          PI   .00139   .00139   .00139   .00139   .00139   .00139   .0
00139   .00139   .00139   .00139
                37          PI   .00139   .00139   .00139   .00139   .00139   .00139   .0
00139   .00139   .00139   .00139
                38          PI   .00139   .00139   .00139   .00139   .00139   .00139   .0
00139   .00139
                39          LU         0       0.2

                40          UD       .66

                41          KK      BAS2

                42          KM                  10YR 24HR

                43          BA       5.5

                44          LU         0       0.2

                45          UD      0.73

                46          KK      ST12    COMBINE BAS. 1&2 FLOWS

                47          HC         2
```

Sh. 24B

JTK 6/11/87

HM 7/17/87


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

48	KK	3,4	FLOW 1,2 FROM STA.1,2 TO 3,4			
49	RK	26400	.032	.04	TRAP	0
50	KK	BAS4				
51	KM		10YR 24HR			
52	BA	6.4				
53	LU	0	0.2			
54	UD	0.75				
55	KK	BAS3				
56	KM		10YR 24HR			
57	BA	12.1				
58	LU	0	0.2			
59	UD	.96				
60	KK	ST34	COMBINE FLOWS 3,4			
61	HC	3				
62	KK	5,6	FLOW 3,4 FROM STA.3,4 TO 5,6			
63	RK	53856	.015	.04	TRAP	0
64	KK	BAS5				
65	KM		10YR 24HR			
66	BA	20.7				
67	LU	0	0.2			
68	UD	1.73				
69	KK	BAS6				
70	KM		10YR 24HR			
71	BA	11.8				
72	LU	0	0.2			
73	UD	0.84				
74	KK	ST56	COMBINE FLOWS 5,6			
75	HC	3				

Sh. 24c
TK 4/11/87
HM 7/17/87

.025

```
         78          KK    BAS8
         79          KM          10YR 24HR
         80          BA     0.5
         81          LU       0      0.2
         82          UD    0.42

         83          KK    BAS7
         84          KM          10YR 24HR
         85          BA    12.2
         86          LU       0      0.2
         87          UD    1.09
```

1 HEC-1 INPUT


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

         88          KK    ST78    COMBINE FLOWS 7,8
         89          HC       3

         90          KK    9          FLOWS 7,8 FROM STA.7,8 TO 9
         91          RK    32736    0.01      .04              TRAP        0
0.05

         92          KK    BAS9
         93          KM          10YR 24HR
         94          BA    11.3
         95          LU       0      0.2
         96          UD    1.47

         97          KK    ST9   COMBINE FLOWS
         98          HC       2
         99          ZZ
```

1 ****

FLOOD HYDROGRAPH PACKAGE HEC-1 (IBM XT 512K VERSION) -FEB 1,1985

U.S. ARMY CORPS OF ENGINEERS, THE HYDROLOGIC ENGINEERING CENTER, 609 SECOND STREET, DAVIS, CA. 95616

****

Sh. 24-E

UMTRA - GREEN RIVER - BROWN WASH

10 - YR 24-HR STORM

JTK 6/11/87
HM 7/17/87

5 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	1 0	STARTING DATE
ITIME	0000	STARTING TIME
NQ	300	NUMBER OF HYDROGRAPH ORDINATES
NDDATE	2 0	ENDING DATE
NDTIME	0055	ENDING TIME

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 24.92 HOURS

ENGLISH UNITS

1

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

PERIOD	BASIN OPERATION	AREA	MAXIMUM STATION	STAGE	PEAK TIME OF FLOW	MAX STAGE	TIME OF PEAK	AVERAGE FLOW FOR MAXIM 6-HOUR	24-HOUR	72-HOUR
+	HYDROGRAPH AT		BAS1		1100.		12.50	196.	49.	
	47.	2.60								
+	HYDROGRAPH AT		BAS2		2151.		12.58	414.	103.	
	100.	5.50								
+	2 COMBINED AT		ST12		3234.		12.50	610.	152.	
	147.	8.10								
+	ROUTED TO		3,4		2963.		12.83	609.	153.	
	147.	8.10								
+	HYDROGRAPH AT		BAS4		2454.		12.58	482.	120.	
	116.	6.40								
+	HYDROGRAPH AT		BAS3		3799.		12.75	911.	228.	
	219.	12.10								
+	3 COMBINED AT		ST34		9028.		12.75	2001.	501.	
	486.	26.60								

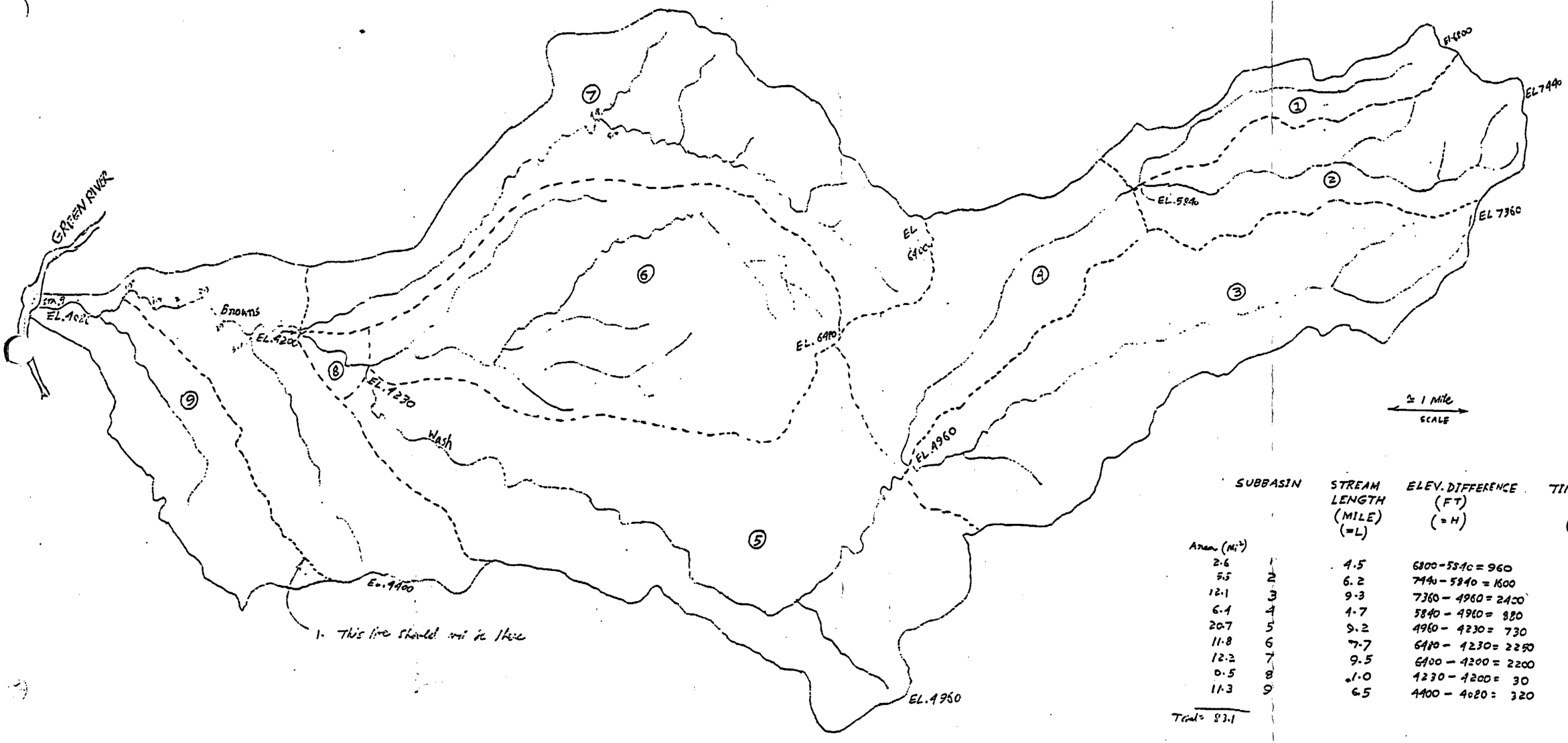
+		ROUTED TO	5,6	6387.	14.17	1958.	501.
	483.	26.60					
+		HYDROGRAPH AT	BAS5	3857.	13.50	1535.	389.
	375.	20.70					
+		HYDROGRAPH AT	BAS6	4136.	12.67	888.	222.
	214.	11.80					
+		3 COMBINED AT	ST56	10090.	14.00	4308.	1113.
	1072.	59.10					
+		ROUTED TO	7,8	9999.	14.17	4292.	1112.
	1071.	59.10					
+		HYDROGRAPH AT	BAS8	289.	12.25	38.	9.
	9.	.50					
+		HYDROGRAPH AT	BAS7	3438.	12.92	918.	230.
	221.	12.20					
+		3 COMBINED AT	ST78	10838.	14.17	5220.	1351.
	1301.	71.80					
+		ROUTED TO	9	10150.	14.75	5111.	1346.
	1297.	71.80					
+		HYDROGRAPH AT	BAS9	2446.	13.25	845.	213.
	205.	11.30					
+		2 COMBINED AT	ST9	10882.	14.75	5847.	1559.
	1502.	83.10					

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

S1.24

JPK 1/11/87
HM 7/17/87

Sh. 25A
HM 6/11/87
FTK 7/4/87



≃ 1 Mile
SCALE

SUBBASIN	Area (Mi^2)	STREAM LENGTH (MILE) (=L)	ELEV. DIFFERENCE (FT) (=H)	TIME OF CONC. (HR) $(=Tc) = \left(\frac{11.9L^3}{H}\right)^{0.385}$	
1	2.6	4.5	6800 − 5840 = 960	1.04	
2	5.5	6.2	7440 − 5840 = 1600	1.25	
3	12.1	9.3	7360 − 4960 = 2400	1.70	
4	6.4	4.7	5840 − 4960 = 880	1.14	
5	20.7	9.2	4960 − 4230 = 730	2.66	
6	11.8	7.7	6480 − 4230 = 2250	1.40	0.84 ⟷ 0.95
7	12.2	9.5	6400 − 4200 = 2200	1.81	1.09 ⟷ 1.22
8	0.5	1.0	4230 − 4200 = 30	0.70	0.42 ⟷ 0.47
9	11.3	6.5	4400 − 4080 = 320	2.45	1.47 ⟷ 1.65
Total =	83.1				

Sh. 25B

1

****
FLOOD HYDROGRAPH PACKAGE HEC-1 (IBM XT 512K VERSION) -FEB 1,1985
U.S. ARMY CORPS OF ENGINEERS, THE HYDROLOGIC ENGINEERING CENTER, 609 SECOND STREET, DAVIS, CA. 95616
****

JTK 6/26/87
HM 7/17/87

THIS HEC-1 VERSION CONTAINS ALL OPTIONS EXCEPT ECONOMICS, AND THE NUMBER OF PLANS ARE REDUCED TO 3

1

HEC-1 INPUT

LINE	ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10										
1	ID	UMTRA - GREEN RIVER - BROWN WASH									
2	ID	10 - YR 24-HR STORM									
3	IT	5			300						
4	IN	5									
5	IO	5									
6	KK	BAS1 SUB-BASIN 1									
7	KM	10-YR 24-HR									
8	BA	2.6									
9	PB	1.6									
10	PI	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139
11	PI	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139
12	PI	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139
13	PI	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139
14	PI	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139
15	PI	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139
16	PI	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139
17	PI	.00139	.00139	.00417	.00417	.00417	.00417	.00417	.00417	.00417	.00417
18	PI	.00417	.00417	.00417	.00417	.00417	.00417	.00417	.00417	.00417	.00417
19	PI	.00417	.00417	.00417	.00417	.00417	.00417	.00417	.00417	.00417	.00417
20	PI	.00417	.00417	.00417	.00417	.00417	.00417	.00417	.00417	.00417	.00417
21	PI	.00417	.00417	.00417	.00417	.00417	.00417	.00417	.00417	.00417	.00417
22	PI	.00833	.00833	.00833	.00833	.00833	.00833	.00833	.00833	.00833	.00833
23	PI	.00833	.00833	.02	.03	.03	.03	.04	.04	.06	.07
24	PI	.07	.10	.15	.26	.00278	.00278	.00278	.00278	.00278	.00278
25	PI	.00278	.00278	.00278	.00278	.00278	.00278	.00278	.00278	.00278	.00278
26	PI	.00278	.00278	.00278	.00278	.00278	.00278	.00278	.00278	.00278	.00278
27	PI	.00278	.00278	.00278	.00278	.00278	.00278	.00278	.00278	.00278	.00278
28	PI	.00278	.00278	.00278	.00278	.00278	.00278	.00278	.00278	.00278	.00278
29	PI	.00278	.00278	.00278	.00278	.00278	.00278	.00278	.00278	.00278	.00278
30	PI	.00278	.00278	.00278	.00278	.00278	.00278	.00278	.00278	.00278	.00278
31	PI	.00278	.00278	.00278	.00278	.00278	.00278	.00139	.00139	.00139	.00139
32	PI	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139
33	PI	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139
34	PI	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139
35	PI	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139
36	PI	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139
37	PI	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139
38	PI	.00139	.00139	.00139	.00139	.00139	.00139	.00139	.00139		
39	LU	0	0.2								
40	UD	.66									
41	KK	BAS2									
42	KM	10YR 24HR									

```
          42          KM           10YR 24HR
          43          BA       5.[illegible]
          44          LU          0      0.2
          45          UD       0.7[illegible]

          46          KK        ST12    COMBINE BAS. 1&2 FLOWS
          47          HC           2
1                                              HEC-1 INPUT                                  PAGE  2

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

          48          KK       3,4         FLOW 1,2 FROM STA.1,2 TO 3,4
          49          RK     26400     .032      .04             TRAP        0     0.45

          50          KK        BAS4
          51          KM           10YR 24HR
          52          BA         6.4
          53          LU           0      0.2
          54          UD        0.75

          55          KK        BAS3
          56          KM           10YR 24HR
          57          BA        12.1
          58          LU           0      0.2
          59          UD         .76

          60          KK        ST34    COMBINE FLOWS 3,4
          61          HC           3

          62          KK       5,6         FLOW 3,4 FROM STA.3,4 TO 5,6
          63          RK     53856     .015      .04             TRAP        0     0.03

          64          KK        BAS5
          65          KM           10YR 24HR
          66          BA        20.7
          67          LU           0      0.2
          68          UD        1.73

          69          KK        BAS6
          70          KM           10YR 24HR
          71          BA        11.8
          72          LU           0      0.2
          73          UD        0.84

          74          KK        ST56    COMBINE FLOWS 5,6
          75          HC           3

          76          KK       7,8         FLOW 5,6 FROM STA.5,6 TO 7,8
          77          RK      6336    0.005      .04             TRAP        0    0.025

          78          KK        BAS8
          79          KM           10YR 24HR
          80          BA         0.5
          81          LU           0      0.2
          82          UD        0.42

          83          KK        BAS7
          84          KM           10YR 24HR
          85          BA        12.2
          86          LU           0      0.2
          87          UD        1.09
1                                              HEC-1 INPUT                                  PAGE  3
```

Sh. 25C

JTK 6/26/87
HM 7/17/87

Sh. 25

JTK 6/26/87
HM 7/17/87

```
[illegible]   [illegible]   ST78   COMBINE FLOWS 7,8
[illegible]   HC        2

[illegible]   [illegible]   9          FLOWS 7,8 FROM STA.7,8 TO 9
[illegible]   [illegible]  21000    0.01     .04                TRAP       0    0.05

[illegible]   [illegible]   BAS9
[illegible]   KM             10YR 24HR
[illegible]   BA    11.8
[illegible]   [illegible]      0      0.2
[illegible]   UD     1.47

[illegible]   [illegible]   ST9   COMBINE FLOWS
[illegible]   HC        2
[illegible]   ZZ
```

1

****

FLOOD HYDROGRAPH PACKAGE HEC-1 (IBM XT 512K VERSION) -FEB 1,1985
U.S. ARMY CORPS OF ENGINEERS, THE HYDROLOGIC ENGINEERING CENTER, 609 SECOND STREET, DAVIS, CA. 95616

****

UMTRA - GREEN RIVER - BROWN WASH
10 - YR 24-HR STORM

```
5 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       1   0  STARTING DATE
                ITIME        0000  STARTING TIME
                  NQ          300  NUMBER OF HYDROGRAPH ORDINATES
              NDDATE        2   0  ENDING DATE
              NDTIME         0055  ENDING TIME

            COMPUTATION INTERVAL     .08 HOURS
                 TOTAL TIME BASE   24.92 HOURS

       ENGLISH UNITS
```

1

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

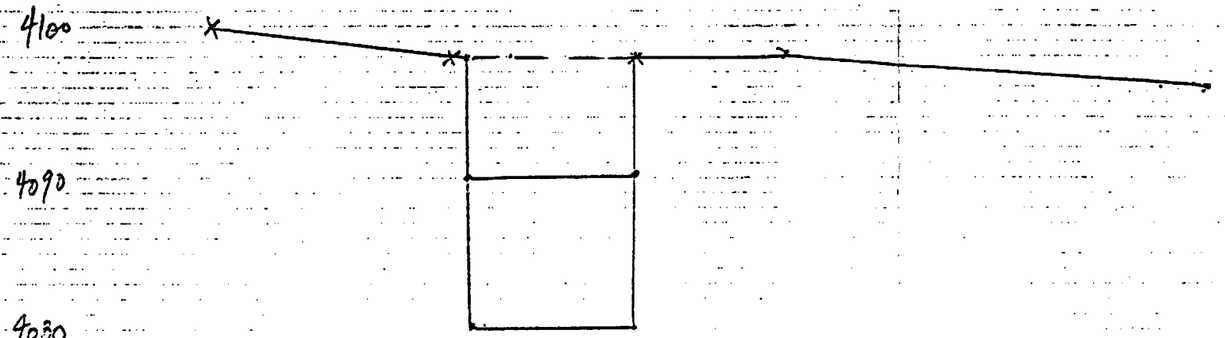
	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	BAS1	1100.	12.50	196.	49.	47.	2.60		
+	HYDROGRAPH AT	BAS2	2151.	12.50	414.	103.	100.	5.50		
+	2 COMBINED AT	ST12	3234.	12.50	610.	152.	147.	8.10		
+	ROUTED TO	3,4	2963.	12.83	609.	153.	147.	8.10		

+	HYDROGRAPH AT	BAS4	2496.	12.50	482.	120.	116.	6.40
+	HYDROGRAPH AT	BAS3	3779.	12.75	911.	228.	219.	12.10
+	3 COMBINED AT	ST34	9028.	12.75	2001.	501.	482.	26.60
+	ROUTED TO	5,6	6387.	14.17	1958.	501.	483.	26.60
+	HYDROGRAPH AT	BAS5	3857.	13.50	1535.	389.	375.	20.70
+	HYDROGRAPH AT	BAS6	4136.	12.67	888.	222.	214.	11.80
+	3 COMBINED AT	ST56	10070.	14.00	4308.	1113.	1072.	59.10
+	ROUTED TO	7,8	9999.	14.17	4292.	1112.	1071.	59.10
+	HYDROGRAPH AT	BAS8	289.	12.25	38.	9.	9.	.50
+	HYDROGRAPH AT	BAS7	3438.	12.92	918.	230.	221.	12.20
+	3 COMBINED AT	ST78	10838.	14.17	5220.	1351.	1301.	71.80
+	ROUTED TO	9	10224.	14.50	5140.	1349.	1299.	71.80
+	HYDROGRAPH AT	BAS9	2446.	13.25	845.	213.	205.	11.30
+	2 COMBINED AT	ST9	11240.	14.42	5945.	1561.	1504.	83.10

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

Sh. 25 C.
JTK
6/26/87
HM 7/17/87

Sections 0.6 & 0.8



JTK 6/8/87
HM 7/17/87

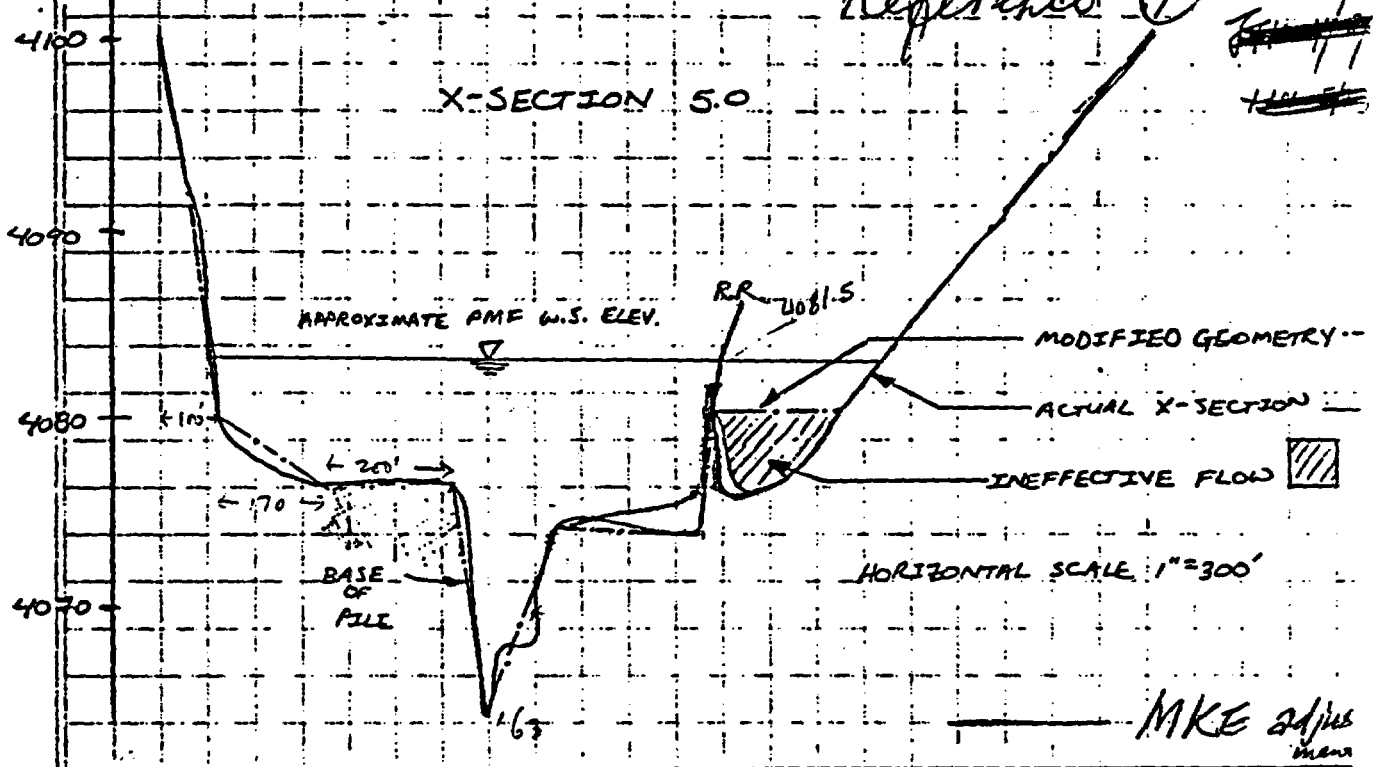
JACOBS ENGINEERING

DATE 2/7/87 SUBJECT GRN SURFACE WATER FLOOD STUDIES HYDRAULIC ANALYSIS SHEET NO. 7

BY RP CHKD. JOB NO.

Sh. 27

Reference (4)



FTK 6/8/87
HM 7/17/87

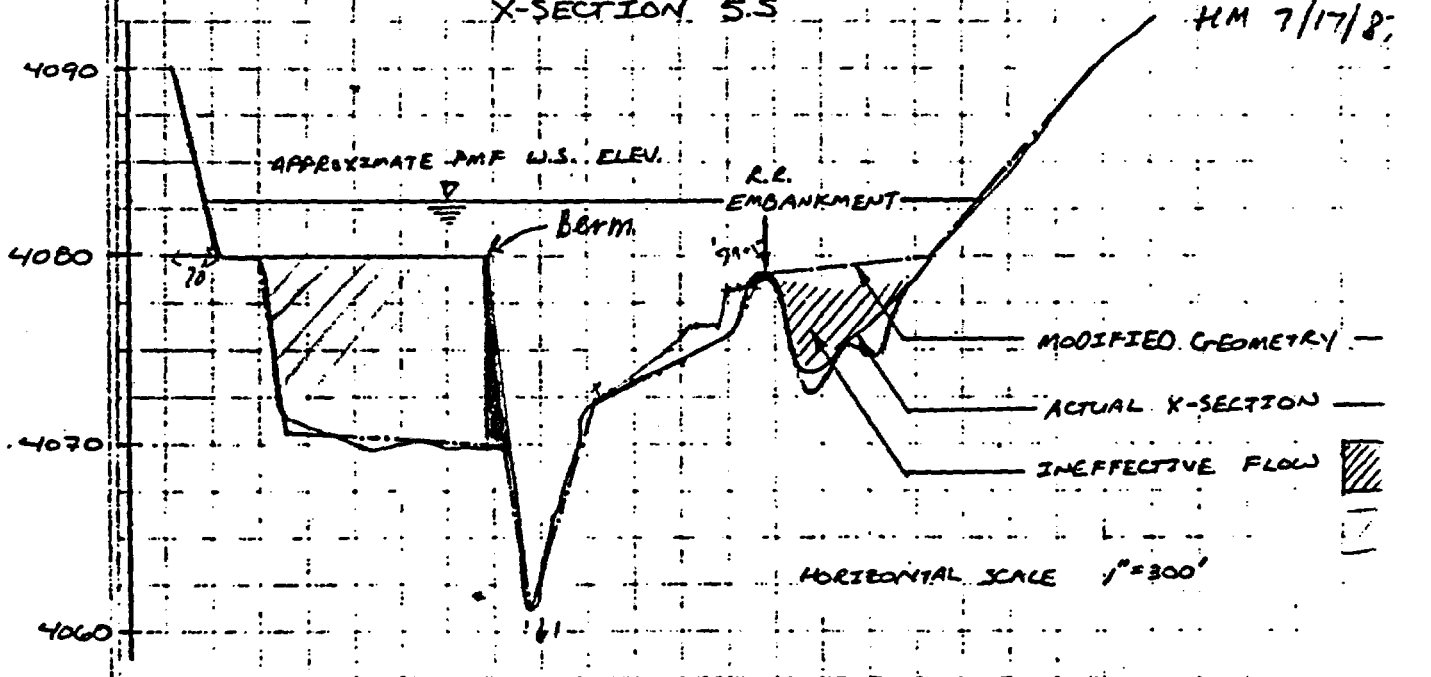


FIGURE 4.0 X-SECTION PLOTS

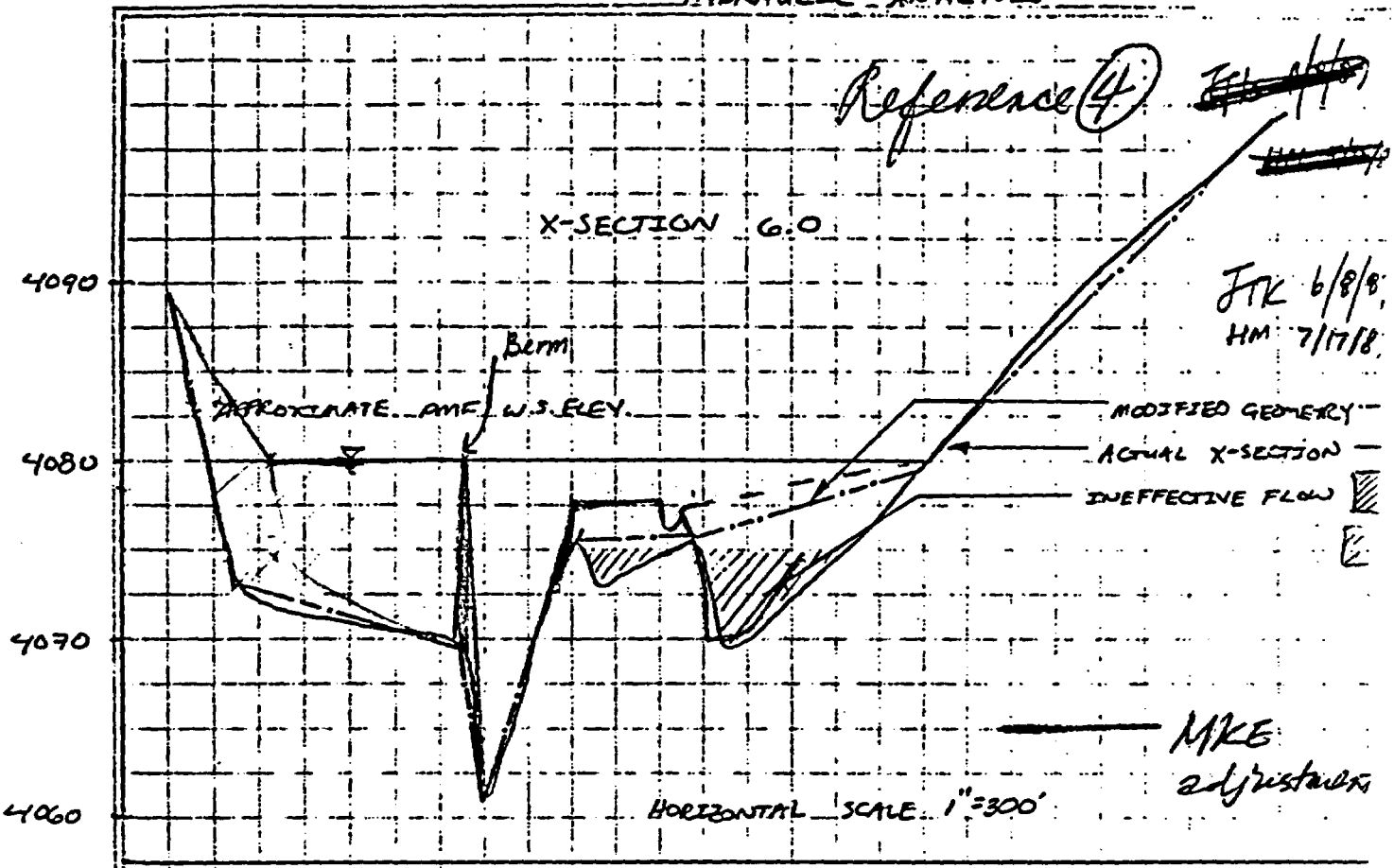
FORM 91-005-1 (4/81)

JACOBS ENGINEERING

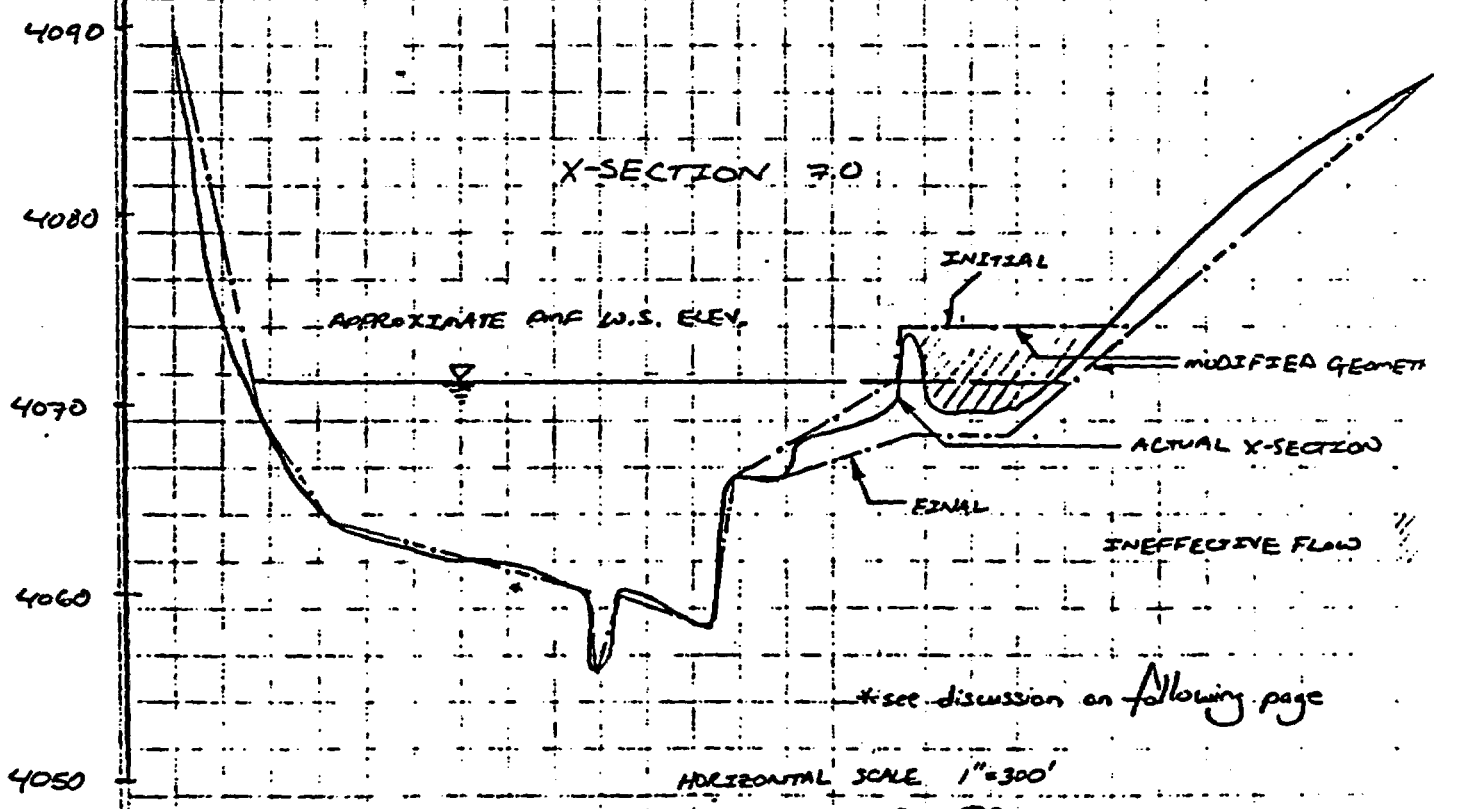
DATE 2/7/87 SUBJECT GRN, SURFACE-WATER FLOOD STUDIES HYDRAULIC ANALYSIS SHEET NO. 28

BY RP CHKD. JOB NO.

Reference (4)



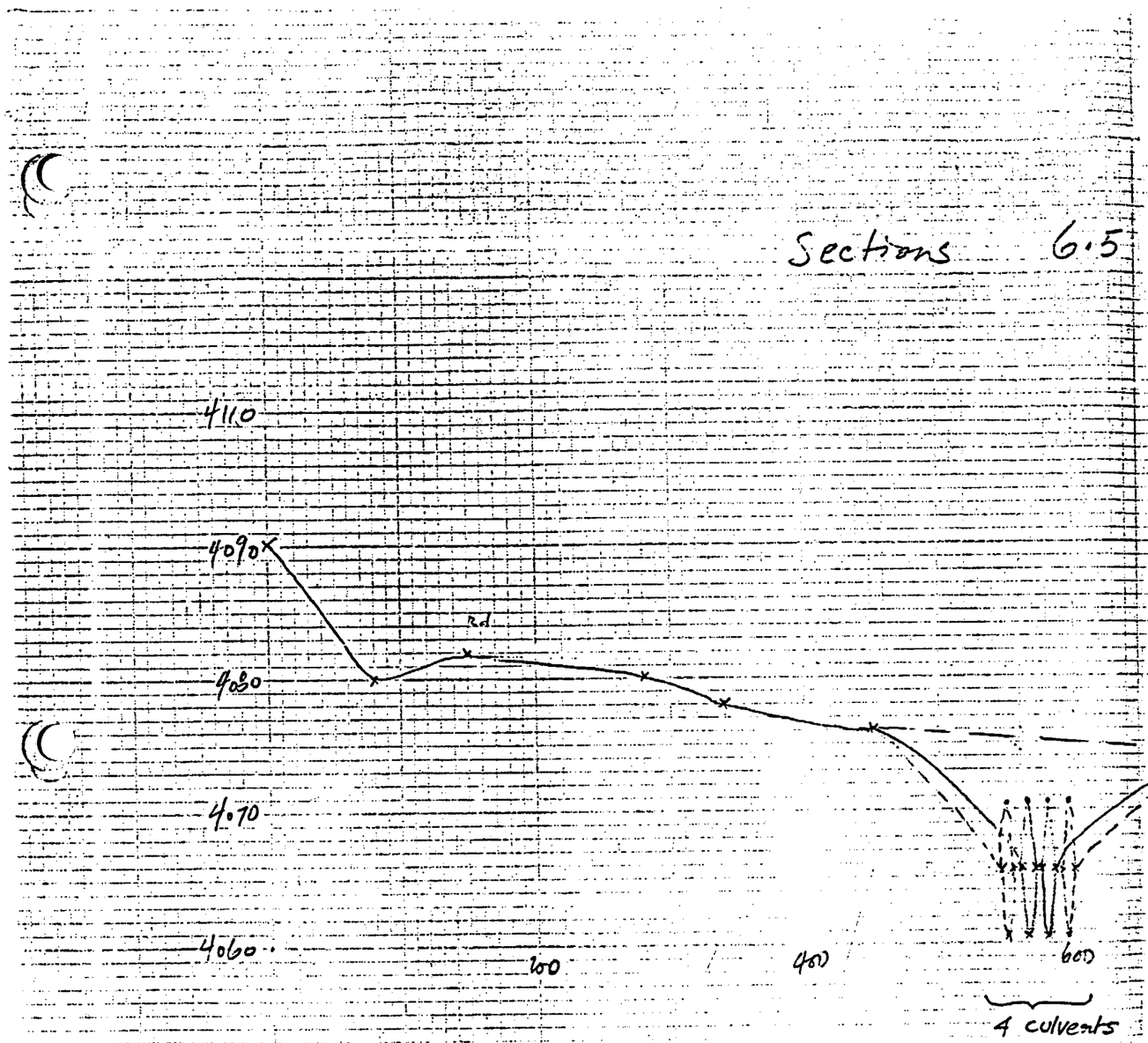
JTK 6/8/87
HM 7/17/87

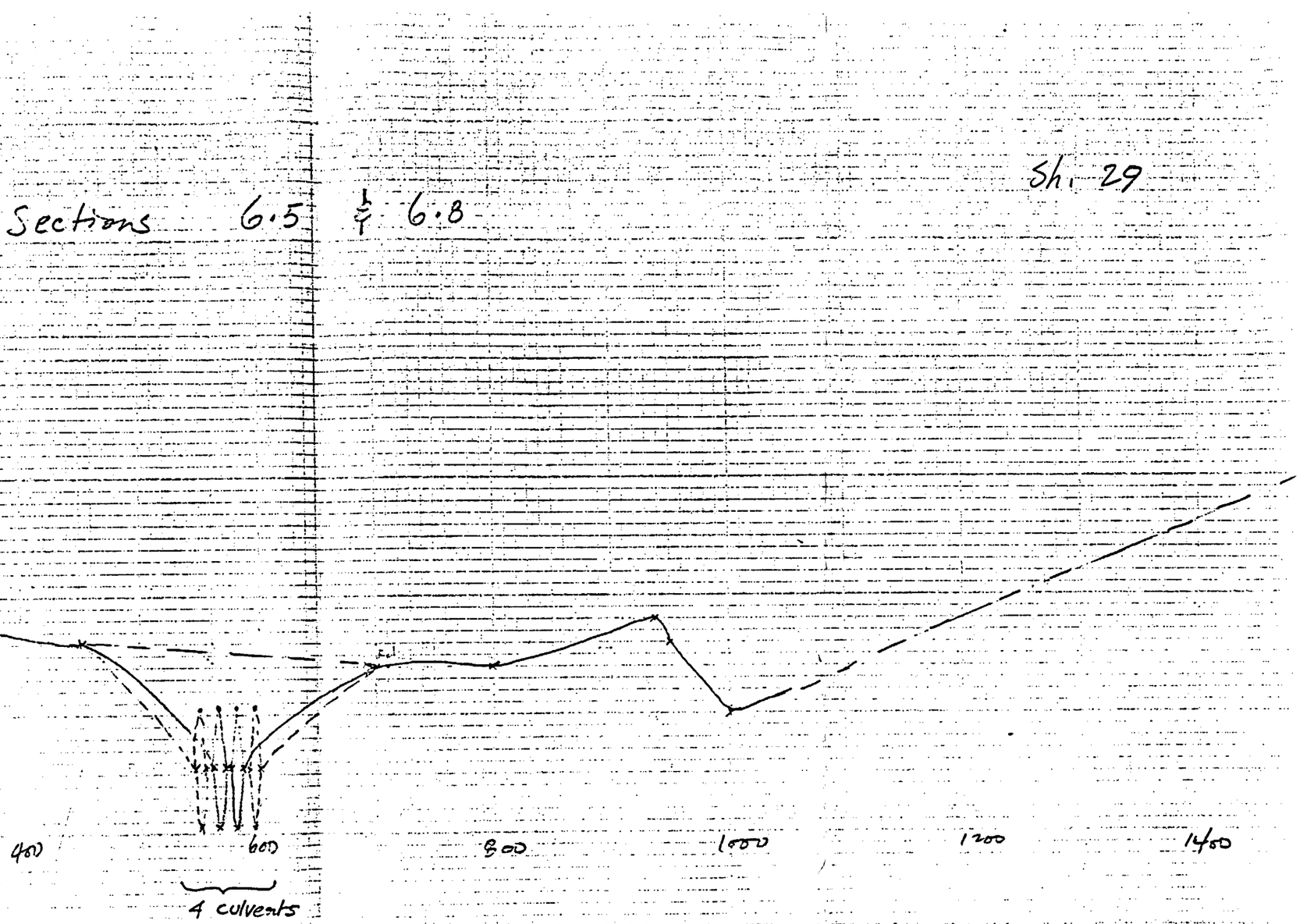


*see discussion on following page

--- -- --- X-SECTION PLOTS

Sections 6.5 & 6.8





JTK 6/?/87
HM 7/17/87

10-yr-24hr.

Q = 11,300 cfs

HEC-2 Water Surface Profile on Browns Wash

Railroad Crossing

Culverts

Elevation, ft MSL

4100
4090
4080
4070
4060

1000
2000
3000

Distance in ft. from downstream reference station

6.0 6.5 6.8 5.5 5.0 4.0 3.0 2.5 2.0 0.6 0.8

— — — Actual (without berm)

× Subcritical

⊙ Supercritical

— · — · — Critical (without berm)

—△— With berm (4080') @ stations 5.5 & 6.0

—△—△— Critical (with berm)

JK 6/8/87

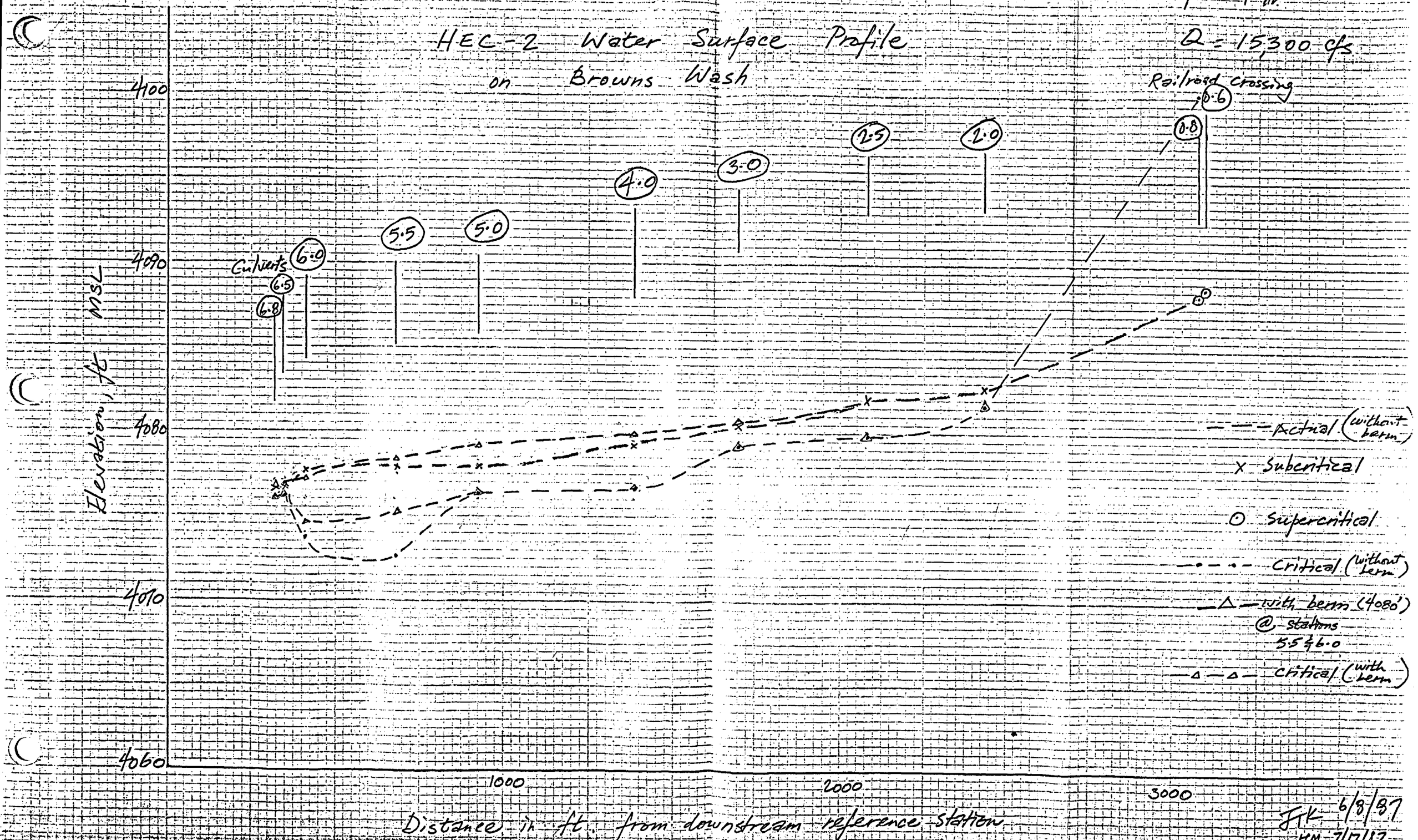
HM 7/17/87

25-yr 24 hr

Q = 15,300 cfs

HEC-2 Water Surface Profile

on Browns Wash



JK- 6/8/87

HM 7/17/87

Sh. 5L A

11-JUN-87 09:05:31 PAGE 1

Subcritical profile with upstream railroad crossing and downstream culverts (4 functioning)

FTK 6/11/87
HM 7/17/87

```
**************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01.02.03.04.05.06
  MODIFICATION -  50.51.52.53.54.55.56
**************************************************

T1      UMTRA - GREEN RIVER - 10-YR 24 HR
T2      WATER SURFACE PROFILE IN BROWN WASH
T3      DISCHARGE =  11300 CFS

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ
       0.       0.        0.        0.  0.009000      0.00      0.0   11300.  4074.000     0.000
J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE
    -1.000     0.000     0.000     0.000     0.000     0.000    -1.000     0.000     0.000     0.000
J3  VARIABLE CODES FOR SUMMARY PRINTOUT
    38.000    43.000     1.000     2.000    13.000    14.000    15.000    35.000    60.000    59.000
    55.000    26.000    56.000     0.000    38.000    58.000    25.000     1.000    42.000     8.000
    51.000    10.000     4.000    53.000    54.000    33.000     5.000     0.000     0.000     0.000

NC      0.045     0.050     0.024     0.300     0.500     0.000     0.000     0.000     0.000     0.000
X1      6.800    25.000   150.000   700.000     0.000     0.000     0.000     0.000     0.000     0.000
BT     25.000     0.000  4090.000  4090.000    80.000  4080.000  4080.000   150.000  4082.000  4082.000
BT    280.000  4080.000  4080.000   340.000  4078.000  4078.000   450.000  4076.000  4076.000   545.000
BT   4075.500  4065.500   550.000  4075.500  4070.500   555.000  4075.200  4065.500   560.000  4075.200
BT   4065.500   565.000  4075.000  4070.500   570.000  4075.000  4065.500   575.000  4075.000  4065.500
BT    580.000  4075.000  4070.500   585.000  4075.000  4065.500   590.000  4074.900  4065.500   595.000
BT   4074.900  4070.500   600.000  4074.800  4065.500   700.000  4074.000  4074.000   800.000  4074.000
BT   4074.000   936.000  4078.000  4078.000   950.000  4076.000  4076.000  1000.000  4070.000  4070.000
BT   1070.000  4070.000  4070.000  1885.000  4100.000  4100.000     0.000     0.000     0.000     0.000
GR   4090.000     0.000  4080.000    80.000  4082.000   150.000  4080.000   280.000  4078.000   340.000
GR   4076.000   450.000  4065.500   545.000  4060.500   550.000  4065.500   555.000  4065.500   560.000
GR   4060.500   565.000  4065.500   570.000  4065.500   575.000  4060.500   580.000  4065.500   585.000
GR   4065.500   590.000  4060.500   595.000  4065.500   600.000  4074.000   700.000  4074.000   800.000
GR   4078.000   936.000  4076.000   950.000  4070.000  1000.000  4070.000  1070.000  4100.000  1885.000

X1      6.500     0.000     0.000     0.000    20.000    20.000    20.000     0.000     0.400     0.000
X2      0.000     0.000     0.000     0.000     0.000     0.000     1.000     0.000     0.000     0.000
```

Sh. 2 of 2 B

JTK 6/11/87
HM 7/17/87

NC	0.045	0.050	0.035	0.100	0.300	0.000	0.000	0.000	0.000	0.000
X1	6.000	8.000	110.000	890.000	70.000	70.000	70.000	0.000	0.000	0.000
QR	4090.000	0.000	4074.000	110.000	4070.000	490.000	4062.000	525.000	4078.000	685.000
QR	4078.000	890.000	4080.000	1265.000	4100.000	1885.000	0.000	0.000	0.000	0.000
X1	5.500	11.000	180.000	890.000	150.000	280.000	270.000	0.000	0.000	0.000
QR	4090.000	0.000	4080.000	80.000	4080.000	140.000	4071.000	180.000	4070.000	530.000
QR	4062.000	570.000	4073.000	680.000	4076.000	890.000	4079.000	940.000	4080.000	1200.000
QR	4090.000	1460.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NC	0.000	0.000	0.000	0.200	0.500	0.000	0.000	0.000	0.000	0.000
X1	5.000	10.000	270.000	876.000	230.000	290.000	250.000	0.000	0.000	0.000
QR	4100.000	0.000	4080.000	95.000	4076.000	270.000	4076.000	470.000	4064.000	530.000
QR	4074.000	635.000	4076.000	876.000	4082.000	890.000	4082.000	1090.000	4110.000	1885.000
X1	4.000	9.000	385.000	840.000	470.000	440.000	460.000	0.000	0.000	1.000
QR	4130.000	0.000	4090.000	100.000	4080.000	385.000	4068.000	530.000	4078.000	750.000
QR	4090.000	840.000	4086.000	870.000	4090.000	1165.000	4120.000	1930.000	0.000	0.000
X1	3.000	12.000	400.000	880.000	315.000	320.000	318.000	0.000	0.000	1.000
QR	4130.000	0.000	4100.000	80.000	4090.000	170.000	4080.000	400.000	4074.000	455.000
QR	4072.000	570.000	4076.000	620.000	4080.000	880.000	4088.000	925.000	4090.000	1150.000
QR	4110.000	1640.000	4120.000	1820.000	0.000	0.000	0.000	0.000	0.000	0.000
NC	0.000	0.000	0.000	0.100	0.300	0.000	0.000	0.000	0.000	0.000
X1	2.500	12.000	300.000	960.000	365.000	380.000	380.000	0.000	0.000	0.000
QR	4110.000	0.000	4090.000	250.000	4080.000	300.000	4073.000	420.000	4076.000	500.000
QR	4076.000	560.000	4078.000	620.000	4078.000	800.000	4080.000	960.000	4091.000	1000.000
QR	4096.000	1330.000	4110.000	1700.000	0.000	0.000	0.000	0.000	0.000	0.000
X1	2.000	11.000	380.000	900.000	350.000	300.000	350.000	0.000	0.000	0.000
QR	4114.000	0.000	4090.000	200.000	4080.000	380.000	4074.000	400.000	4074.000	430.000
QR	4078.000	510.000	4080.000	600.000	4080.000	900.000	4094.000	990.000	4094.000	1170.000
QR	4120.000	1890.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NC	0.015	0.015	0.015	0.300	0.500	0.000	0.000	0.000	0.000	0.000
X1	0.800	8.000	85.000	140.000	650.000	400.000	650.000	0.000	0.000	0.000
BT	8.000	0.000	4100.000	4100.000	80.000	4098.000	4098.000	85.000	4098.000	4098.000
BT	86.000	4098.000	4090.000	139.000	4098.000	4090.000	140.000	4098.000	4098.000	190.000
BT	4098.000	4098.000	330.000	4096.000	4096.000	0.000	0.000	0.000	0.000	0.000
QR	4100.000	0.000	4098.000	80.000	4098.000	85.000	4080.000	86.000	4080.000	139.000
QR	4098.000	140.000	4098.000	190.000	4096.000	330.000	0.000	0.000	0.000	0.000
X1	0.600	0.000	0.000	0.000	20.000	20.000	20.000	0.000	0.400	0.000
X2	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000
EJ	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Sh. 32C

JTK 6/11/87
HM 7/17/87

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	GLOB	GCH	GROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*PROF 1

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

CCHV= 0.300 CEHV= 0.500
*SECNO 6.800

3265 DIVIDED FLOW

3370 NORMAL BRIDGE, NRD= 25 MIN ELTRD= 4070.00 MAX ELLC= 4100.00

6.80	15.44	4075.94	4075.30	4074.00	4076.61	0.67	0.00	0.00	4082.00
11300.	0.	2777.	8523.	0.	420.	1301.	0.	0.	4074.00
0.00	0.00	6.61	6.55	0.000	0.024	0.050	0.000	4060.50	450.53
0.009005	0	0.	0.	0	14	4	-1366.45	696.38	1231.40

*SECNO 6.500

3265 DIVIDED FLOW

3370 NORMAL BRIDGE, NRD= 25 MIN ELTRD= 4070.00 MAX ELLC= 4100.40

6.50	15.19	4076.09	4075.53	0.00	4076.85	0.77	0.19	0.05	4082.40
11300.	0.	3134.	8166.	0.	422.	1188.	1.	0.	4074.40
0.00	0.00	7.43	6.87	0.000	0.024	0.050	0.000	4060.90	452.85
0.010362	20.	20.	20.	2	18	0	-1301.00	676.28	1224.45

CCHV= 0.100 CEHV= 0.300
*SECNO 6.000

3301 HV CHANGED MORE THAN HVINS

6.00	14.84	4076.84	4072.83	0.00	4077.02	0.18	0.11	0.06	4074.00
11300.	28.	11272.	0.	28.	3321.	0.	5.	1.	4078.00
0.01	1.02	3.39	0.00	0.045	0.035	0.000	0.000	4062.00	90.46
0.000602	70.	70.	70.	2	14	0	0.00	582.97	673.43

Sh. 32 D

FTK 6/11/87
HM 7/17/87

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	GLOB	GCH	GROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 5.500
5.50 15.04 4077.04 4071.85 0.00 4077.15 0.10 0.12 0.01 4071.00
11300. 101. 11196. 3. 81. 4317. 9. 29. 5. 4076.00
0.04 1.25 2.59 0.35 0.045 0.035 0.050 0.000 4062.00 153.14
0.000337 150. 270. 280. 2 17 0 0.00 754.27 907.41

CCHV= 0.200 CEHV= 0.500
*SECNO 5.000
5.00 13.04 4077.04 4075.68 0.00 4077.55 0.51 0.20 0.20 4076.00
11300. 31. 11267. 1. 24. 1968. 1. 47. 9. 4076.00
0.05 1.32 5.73 1.12 0.045 0.035 0.050 0.000 4064.00 224.40
0.003797 230. 250. 290. 2 13 0 0.00 654.03 878.43

*SECNO 4.000
4.00 10.38 4078.38 4075.67 0.00 4078.97 0.59 1.38 0.04 4080.00
11300. 0. 11300. 0. 0. 1837. 0. 67. 15. 4080.00
0.07 0.00 6.15 0.00 0.000 0.035 0.000 0.000 4068.00 404.61
0.002417 470. 460. 440. 2 14 0 0.00 362.37 766.97

*SECNO 3.000
3.00 7.38 4079.38 4078.40 0.00 4080.26 0.88 1.15 0.14 4080.00
11300. 0. 11300. 0. 0. 1504. 0. 79. 18. 4080.00
0.08 0.00 7.51 0.00 0.000 0.035 0.000 0.000 4072.00 405.74
0.005974 315. 318. 320. 1 14 0 0.00 433.54 839.28

CCHV= 0.100 CEHV= 0.300
*SECNO 2.500

3301 HV CHANGED MORE THAN HVINS

2.50 8.15 4081.15 4079.17 0.00 4081.45 0.30 1.13 0.06 4080.00
11300. 3. 11295. 2. 3. 2556. 2. 97. 23. 4080.00
0.10 0.95 4.42 0.84 0.045 0.035 0.050 0.000 4073.00 294.28
0.001783 365. 380. 380. 2 9 0 0.00 669.89 964.16

*SECNO 2.000
2.00 7.88 4081.88 4081.21 0.00 4082.60 0.73 1.03 0.13 4080.00
11300. 77. 11199. 24. 32. 1630. 11. 114. 27. 4080.00
0.12 2.40 6.87 2.14 0.045 0.035 0.050 0.000 4074.00 346.08
0.005724 350. 350. 300. 2 10 0 0.00 566.03 912.11

Sh. 32E

FTK 6/11/87
HM 7/17/87

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

CCHV= 0.300 CEHV= 0.500
*SECNO 0.600
3280 CROSS SECTION 0.80 EXTENDED 3.41 FEET

3301 HV CHANGED MORE THAN HVINS

3370 NORMAL BRIDGE, NRD= 8 MIN ELTRD= 4096.00 MAX ELLC= 4100.00

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

0.80	19.41	4099.41	4099.41	0.00	4101.23	1.82	2.59	0.55	4098.00
11300.	231.	7156.	3913.	47.	618.	408.	133.	33.	4098.00
0.13	4.92	11.59	9.58	0.015	0.015	0.015	0.000	4080.00	23.52
0.003311	650.	650.	400.	0	10	0	-432.00	306.49	330.00

*SECNO 0.600
3280 CROSS SECTION 0.60 EXTENDED 3.38 FEET

3370 NORMAL BRIDGE, NRD= 8 MIN ELTRD= 4096.00 MAX ELLC= 4100.40

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

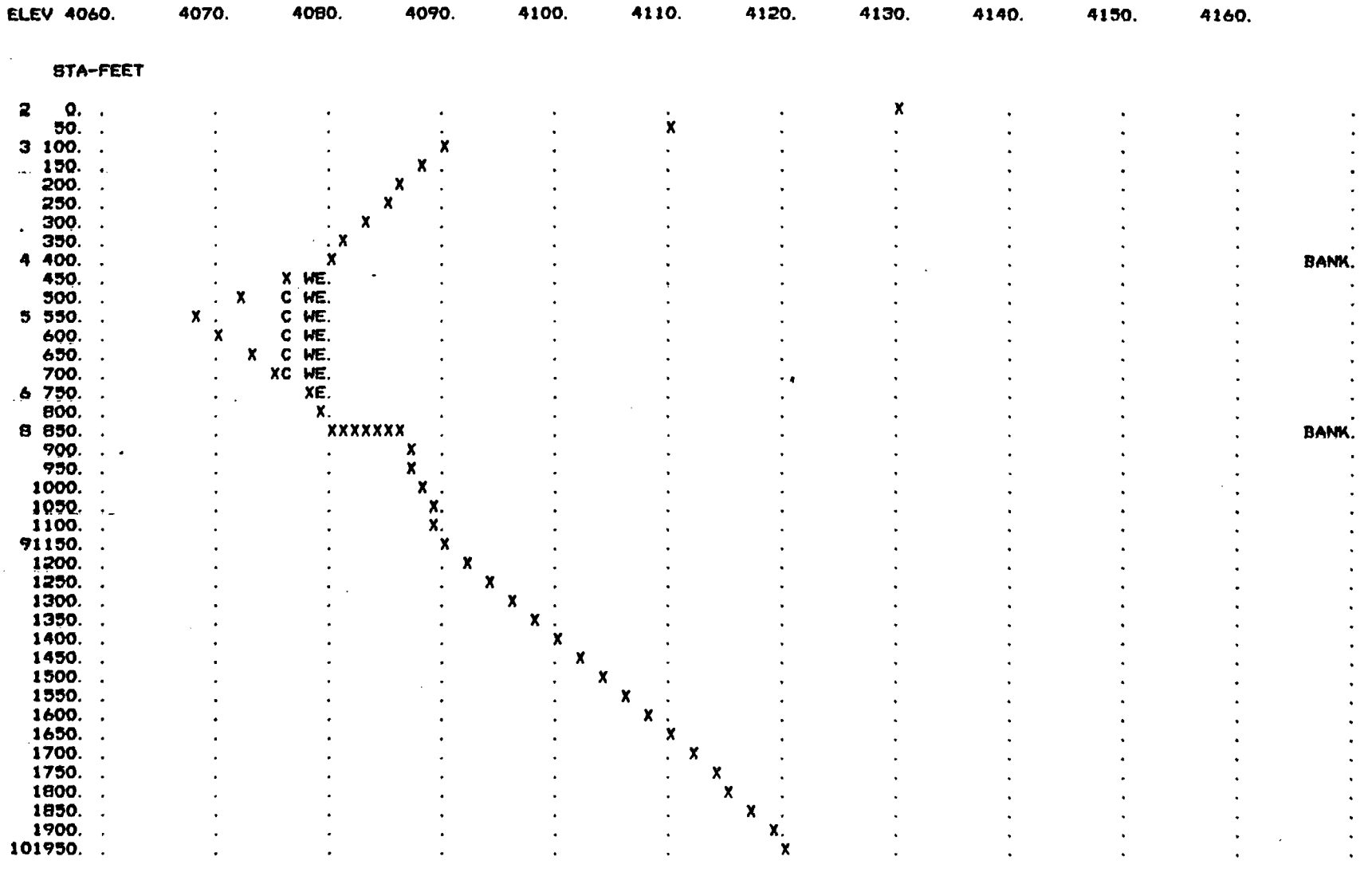
0.60	19.38	4099.78	4099.78	0.00	4101.57	1.80	0.06	0.01	4098.40
11300.	212.	7365.	3723.	45.	637.	402.	134.	34.	4098.40
0.13	4.73	11.56	9.27	0.015	0.015	0.015	0.000	4080.40	24.94
0.003163	20.	20.	20.	0	10	0	-410.41	305.06	330.00

Sh.32 F

JTK 6/11/87
HM 7/17/87

CROSS SECTION 4.00
STREAM DISCHARGE = 11300 CFS
DISCHARGE= 11300.

PLOTTED POINTS (BY PRIORITY)-B=BOTTOM BRIDGE, T=TOP BRIDGE, X=GROUND, W=WATER SUR, E=ENERGY GRADIENT, C=CRITICAL WSEL



NRD= 0 ELLC= 9999999.00 ELTRD= 9999999.00

EL(I), STA(I)

4130.00	0.00	4090.00	100.00	4080.00	385.00	4068.00	530.00	4078.00	750.00
4080.00	840.00	4086.00	870.00	4090.00	1165.00	4120.00	1930.00		

Sh. 32 G

JTK 6/11/07
HM 7/11/07

CROSS SECTION 3.00
STREAM DISCHARGE = 11300 CFS
DISCHARGE= 11300.

PLOTTED POINTS (BY PRIORITY)-B=BOTTOM BRIDGE, T=TOP BRIDGE, X=GROUND, W=WATER SUR, E=ENERGY GRADIENT, C=CRITICAL WSEL

```
ELEV 4070.      4080.      4090.      4100.      4110.      4120.      4130.      4140.      4150.      4160.      4170.

    STA-FEET

 2   0.  .                  .          .          .          .          X          .          .          .          .          .
    50.  .                  .          .          .       X  .          .          .          .          .          .          .
 3 100.  .                  .          .          X          .          .          .          .          .          .          .
 4 150.  .                  .          X          .          .          .          .          .          .          .          .
   200.  .                  .       X  .          .          .          .          .          .          .          .          .
   250.  .                  .    X     .          .          .          .          .          .          .          .          .
   300.  .                  . X        .          .          .          .          .          .          .          .          .
   350.  .                  X          .          .          .          .          .          .          .          .          .
 5 400.  .                  X          .          .          .          .          .          .          .          .          .  BANK.
 6 450.  .    X   CWE       .          .          .          .          .          .          .          .          .          .
   500.  .  X     CWE       .          .          .          .          .          .          .          .          .          .
 7 550.  .X       CWE       .          .          .          .          .          .          .          .          .          .
 8 600.  .        X CWE     .          .          .          .          .          .          .          .          .          .
   650.  .        XCWE      .          .          .          .          .          .          .          .          .          .
   700.  .        XWE       .          .          .          .          .          .          .          .          .          .
   750.  .        XWE       .          .          .          .          .          .          .          .          .          .
   800.  .         XE       .          .          .          .          .          .          .          .          .          .
   850.  .         X        .          .          .          .          .          .          .          .          .          .
10 900.  .         XXXXXXXXX  .          .          .          .          .          .          .          .          .  BANK.
   950.  .                  X  .          .          .          .          .          .          .          .          .          .
  1000.  .                  X.            .          .          .          .          .          .          .          .          .
  1050.  .                  X.            .          .          .          .          .          .          .          .          .
  1100.  .                  X             .          .          .          .          .          .          .          .          .
111150.  .                  X             .          .          .          .          .          .          .          .          .
  1200.  .                  .  X          .          .          .          .          .          .          .          .          .
  1250.  .                  .     X       .          .          .          .          .          .          .          .          .
  1300.  .                  .        X    .          .          .          .          .          .          .          .          .
  1350.  .                  .           X .          .          .          .          .          .          .          .          .
  1400.  .                  .             X          .          .          .          .          .          .          .          .
  1450.  .                  .             .  X       .          .          .          .          .          .          .          .
  1500.  .                  .             .     X    .          .          .          .          .          .          .          .
  1550.  .                  .             .        X .          .          .          .          .          .          .          .
  1600.  .                  .             .           X          .          .          .          .          .          .          .
121650.  .                  .             .              X       .          .          .          .          .          .          .
  1700.  .                  .             .                 X    .          .          .          .          .          .          .
  1750.  .                  .             .                    X .          .          .          .          .          .          .
131800.  .                  .             .                      X          .          .          .          .          .          .

NRD=       0 ELLC=  9999999.00 ELTRD=  9999999.00

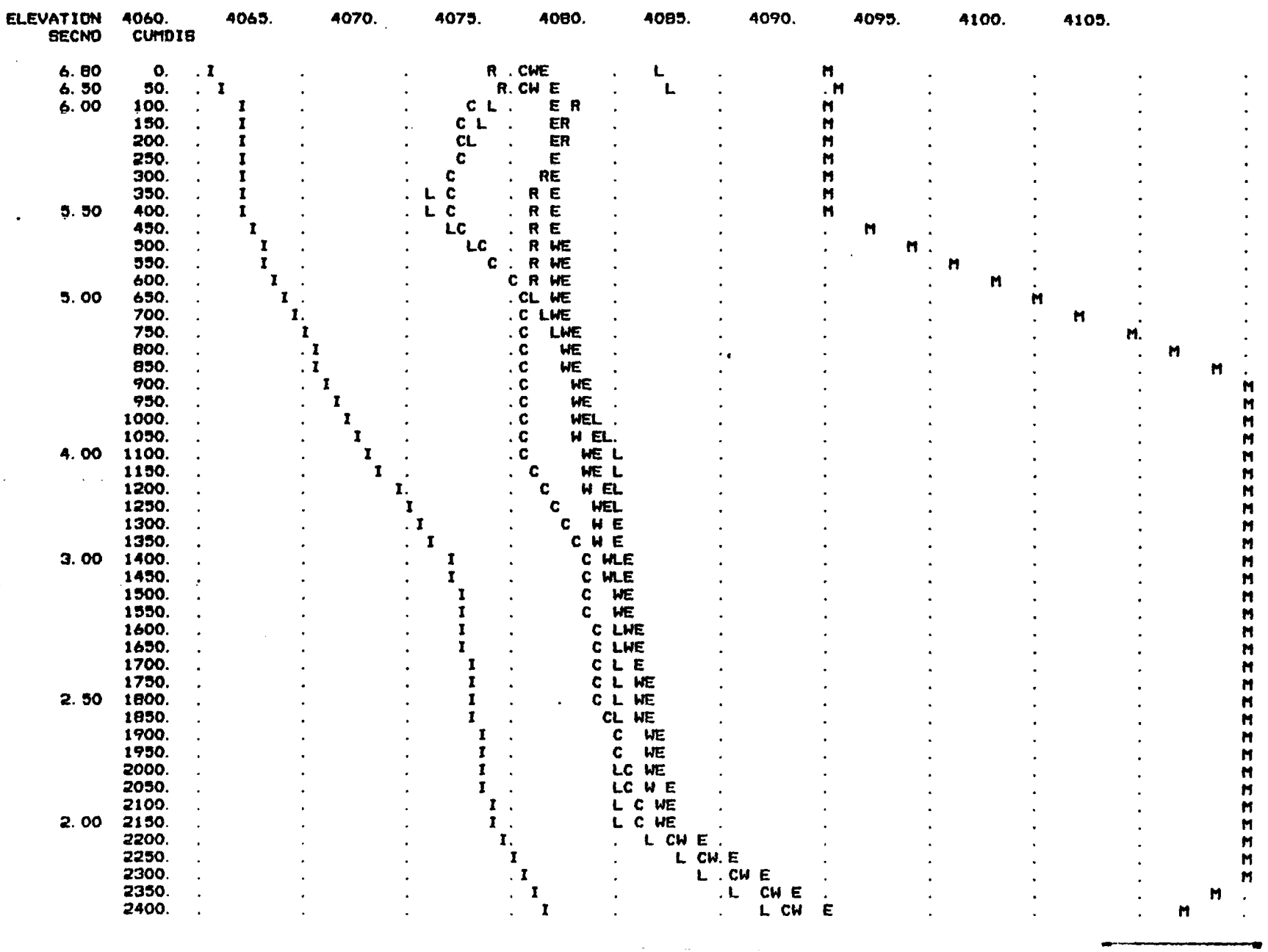
  EL(I),STA(I)
    4130.00        0.00     4100.00       80.00     4090.00      170.00     4080.00      400.00    -4074.00      455.00
    4072.00      570.00     4076.00      620.00     4080.00      880.00     4088.00      925.00     4090.00     1150.00
    4110.00     1640.00     4120.00     1820.00
```

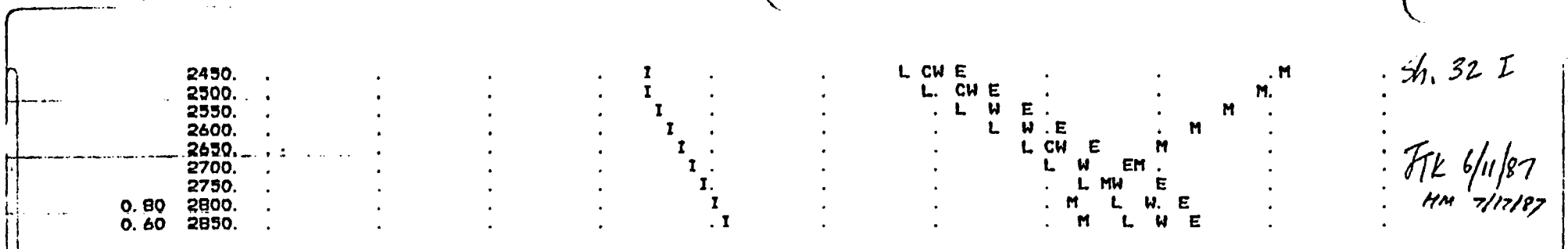
Sh. 32 H

FTK 6/11/87
HM 7/17/87

PROFILE FOR STREAM DISCHARGE = 11300 CFS

PLOTTED POINTS (BY PRIORITY)-E-ENERGY, W-WATER SURFACE, I-INVERT, C-CRITICAL W.S., L-LEFT BANK, R-RIGHT BANK, M-LOWER END STA




2450.
2500.
2550.
2600.
2650.
2700.
2750.
0.80 2800.
0.60 2850.
L CW E
L. CW E
. L W E
L W .E
L CW E M
L W EM
. L MW E
. M L W. E
. M L W E
M.
M
Sh. 32 I
FTK 6/11/87
HM 7/17/87

Sh. 32 J

FTW 6/11/87
HM 7/17/87

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**************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
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NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

DISCHARGE = 11300 CFS

SUMMARY PRINTOUT

	SECNO	Q	CWSEL	CRIWS	GLOB	GCH	GROB	GLOBP	GCHP	GROBP	VLOB	VCH	VROB
	6.800	11300.00	4075.94	4075.30	0.00	2777.36	8522.64	0.00	24.58	75.42	0.00	6.61	6.55
	6.500	11300.00	4076.09	4075.53	0.00	3134.29	8165.71	0.00	27.74	72.26	0.00	7.43	6.87
	6.000	11300.00	4076.84	4072.83	28.26	11271.75	0.00	0.25	99.75	0.00	1.02	3.39	0.00
	5.500	11300.00	4077.04	4071.85	101.23	11195.56	3.21	0.90	99.08	0.03	1.25	2.59	0.35
	5.000	11300.00	4077.04	4075.68	31.29	11267.29	1.42	0.28	99.71	0.01	1.32	5.73	1.12
	4.000	11300.00	4078.38	4075.67	0.00	11300.00	0.00	0.00	100.00	0.00	0.00	6.15	0.00
	3.000	11300.00	4079.38	4078.40	0.00	11300.00	0.00	0.00	100.00	0.00	0.00	7.51	0.00
	2.500	11300.00	4081.15	4079.17	3.11	11294.88	2.01	0.03	99.95	0.02	0.95	4.42	0.84
	2.000	11300.00	4081.88	4081.21	76.65	11198.89	24.47	0.68	99.11	0.22	2.40	6.87	2.14
*	0.800	11300.00	4099.41	4099.41	230.87	7155.75	3913.39	2.04	63.33	34.63	4.92	11.59	9.58
*	0.600	11300.00	4099.78	4099.78	211.88	7364.91	3723.21	1.88	65.18	32.95	4.73	11.56	9.27

Sh. 32 K

JTK 6/11/87
HM 7/17/87

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DISCHARGE = 11300 CFS

SUMMARY PRINTOUT

	SECNO	KRATIO	AREA	CWSEL	ELMIN	DEPTH	DIFWSX	HV	TOPWID	SSTA	ENDST	K*CHSL	10K*S
	6.800	0.00	1720.64	4075.94	4060.50	15.44	0.00	0.67	696.38	450.53	1231.40	0.00	90.05
	6.500	0.93	1610.49	4076.09	4060.90	15.19	0.14	0.77	676.28	452.85	1224.45	20.00	103.62
	6.000	4.15	3348.91	4076.84	4062.00	14.84	0.76	0.18	582.97	90.46	673.43	15.72	6.02
	5.500	1.34	4406.83	4077.04	4062.00	15.04	0.20	0.10	754.27	153.14	907.41	0.00	3.37
	5.000	0.30	1992.62	4077.04	4064.00	13.04	0.00	0.51	654.03	224.40	878.43	8.00	37.97
	4.000	1.25	1836.77	4078.38	4068.00	10.38	1.34	0.59	362.37	404.61	766.97	8.70	24.17
	3.000	0.64	1503.85	4079.38	4072.00	7.38	1.00	0.88	433.54	405.74	839.28	12.58	59.74
	2.500	1.83	2561.21	4081.15	4073.00	8.15	1.76	0.30	669.89	294.28	964.16	2.63	17.83
	2.000	0.56	1673.19	4081.88	4074.00	7.88	0,73	0.73	566.03	346.08	912.11	2.86	57.24
*	0.800	1.31	1072.91	4099.41	4080.00	19.41	17.53	1.82	306.49	23.52	330.00	9.23	33.11
*	0.600	1.02	1083.59	4099.78	4080.40	19.38	0.36	1.80	305.06	24.94	330.00	20.00	31.63

Sh. 32L

JTIC 6/11/87
KM 7/17/87

SUMMARY OF ERRORS AND SPECIAL NOTES

```
CAUTION  SECNO=     0.800  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=     0.800  PROFILE= 1  MINIMUM SPECIFIC ENERGY

CAUTION  SECNO=     0.600  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=     0.600  PROFILE= 1  MINIMUM SPECIFIC ENERGY
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5h. 32 M

FTK 6/11/87
HM 7/17/87

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**************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
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Sh. 33A

FTK 6/11/87
HM 7/14/87

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**************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
**************************************************

T1      UMTRA - GREEN RIVER - 25-YR 24 HR
T2      WATER SURFACE PROFILE IN BROWN WASH
T3      DISCHARGE =  15300 CFS

J1  ICHECK     INQ        NINV       IDIR       STRT       METRIC     HVINS      Q          WSEL       FQ
       0.        0.         0.         0.   0.009000       0.00       0.0    15300.   4074.000       0.000
J2  NPROF      IPLOT      PRFVS      XSECV      XSECH      FN         ALLDC      IBW        CHNIM      ITRACE
    -1.000     0.000      0.000      0.000      0.000      0.000     -1.000      0.000      0.000      0.000
J3  VARIABLE CODES FOR SUMMARY PRINTOUT
    38.000     43.000     1.000      2.000      13.000     14.000     15.000     35.000     60.000     59.000
    55.000     26.000     56.000     0.000      38.000     58.000     25.000     1.000      42.000     8.000
    51.000     10.000     4.000      53.000     54.000     33.000     5.000      0.000      0.000      0.000

NC      0.045      0.050      0.024      0.300      0.500      0.000      0.000      0.000      0.000      0.000
X1      6.800      25.000     150.000    700.000    0.000      0.000      0.000      0.000      0.000      0.000
BT      25.000     0.000      4090.000   4090.000   80.000     4080.000   4080.000   150.000    4082.000   4082.000
BT      280.000    4080.000   4080.000   340.000    4078.000   4078.000   450.000    4076.000   4076.000   545.000
BT      4075.500   4065.500   550.000    4075.500   4070.500   555.000    4075.200   4065.500   560.000    4075.200
BT      4065.500   565.000    4075.000   4070.500   570.000    4075.000   4065.500   575.000    4075.000   4065.500
BT      580.000    4075.000   4070.500   585.000    4075.000   4065.500   590.000    4074.900   4065.500   595.000
BT      4074.900   4070.500   600.000    4074.800   4065.500   700.000    4074.000   4074.000   800.000    4074.000
BT      4074.000   936.000    4078.000   4078.000   950.000    4076.000   4076.000   1000.000   4070.000   4070.000
BT      1070.000   4070.000   4070.000   1885.000   4100.000   4100.000   0.000      0.000      0.000      0.000
QR      4090.000   0.000      4080.000   80.000     4082.000   150.000    4080.000   280.000    4078.000   340.000
QR      4076.000   450.000    4065.500   545.000    4060.500   550.000    4065.500   555.000    4065.500   560.000
QR      4060.500   565.000    4065.500   570.000    4065.500   575.000    4060.500   580.000    4065.500   585.000
QR      4065.500   590.000    4060.500   595.000    4065.500   600.000    4074.000   700.000    4074.000   800.000
QR      4078.000   936.000    4076.000   950.000    4070.000   1000.000   4070.000   1070.000   4100.000   1885.000

X1      6.500      0.000      0.000      0.000      20.000     20.000     20.000     0.000      0.400      0.000
X2      0.000      0.000      0.000      0.000      0.000      0.000      1.000      0.000      0.000      0.000
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Sh. 33 B

JTK 6/11/87 HM 7/17/87

NC	0.045	0.050	0.035	0.100	0.300	0.000	0.000	0.000	0.000	0.000
X1	6.000	8.000	110.000	890.000	70.000	70.000	70.000	0.000	0.000	0.000
QR	4090.000	0.000	4074.000	110.000	4070.000	490.000	4062.000	525.000	4078.000	685.000
QR	4078.000	890.000	4080.000	1265.000	4100.000	1885.000	0.000	0.000	0.000	0.000
X1	5.500	11.000	180.000	890.000	150.000	280.000	270.000	0.000	0.000	0.000
QR	4090.000	0.000	4080.000	80.000	4080.000	140.000	4071.000	180.000	4070.000	530.000
QR	4062.000	570.000	4073.000	680.000	4076.000	890.000	4079.000	940.000	4080.000	1200.000
QR	4090.000	1460.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NC	0.000	0.000	0.000	0.200	0.500	0.000	0.000	0.000	0.000	0.000
X1	5.000	10.000	270.000	876.000	230.000	290.000	250.000	0.000	0.000	0.000
QR	4100.000	0.000	4080.000	95.000	4076.000	270.000	4076.000	470.000	4064.000	530.000
QR	4074.000	635.000	4076.000	876.000	4082.000	890.000	4082.000	1090.000	4110.000	1885.000
X1	4.000	9.000	385.000	840.000	470.000	440.000	460.000	0.000	0.000	1.000
QR	4130.000	0.000	4090.000	100.000	4080.000	385.000	4068.000	530.000	4078.000	750.000
QR	4080.000	840.000	4086.000	870.000	4090.000	1165.000	4120.000	1930.000	0.000	0.000
X1	3.000	12.000	400.000	880.000	315.000	320.000	318.000	0.000	0.000	1.000
QR	4130.000	0.000	4100.000	80.000	4090.000	170.000	4080.000	400.000	4074.000	455.000
QR	4072.000	570.000	4076.000	620.000	4080.000	880.000	4088.000	925.000	4090.000	1150.000
QR	4110.000	1640.000	4120.000	1820.000	0.000	0.000	0.000	0.000	0.000	0.000
NC	0.000	0.000	0.000	0.100	0.300	0.000	0.000	0.000	0.000	0.000
X1	2.500	12.000	300.000	960.000	365.000	380.000	380.000	0.000	0.000	0.000
QR	4110.000	0.000	4090.000	250.000	4080.000	300.000	4073.000	420.000	4076.000	500.000
QR	4076.000	560.000	4078.000	620.000	4078.000	800.000	4080.000	960.000	4091.000	1000.000
QR	4096.000	1330.000	4110.000	1700.000	0.000	0.000	0.000	0.000	0.000	0.000
X1	2.000	11.000	380.000	900.000	350.000	300.000	350.000	0.000	0.000	0.000
QR	4114.000	0.000	4090.000	200.000	4080.000	380.000	4074.000	400.000	4074.000	430.000
QR	4078.000	510.000	4080.000	600.000	4080.000	900.000	4094.000	990.000	4094.000	1170.000
QR	4120.000	1890.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NC	0.015	0.015	0.015	0.300	0.500	0.000	0.000	0.000	0.000	0.000
X1	0.800	8.000	85.000	140.000	650.000	400.000	650.000	0.000	0.000	0.000
BT	8.000	0.000	4100.000	4100.000	80.000	4098.000	4098.000	85.000	4098.000	4098.000
BT	86.000	4098.000	4090.000	139.000	4098.000	4090.000	140.000	4098.000	4098.000	190.000
BT	4098.000	4098.000	330.000	4096.000	4096.000	0.000	0.000	0.000	0.000	0.000
QR	4100.000	0.000	4098.000	80.000	4098.000	85.000	4080.000	86.000	4080.000	139.000
QR	4098.000	140.000	4098.000	190.000	4096.000	330.000	0.000	0.000	0.000	0.000
X1	0.600	0.000	0.000	0.000	20.000	20.000	20.000	0.000	0.400	0.000
X2	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000
EJ	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Sh. 33C

JTC 6/11/87
HM 7/17/87

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	GLOB	GCH	GROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*PROF 1

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

CCHV= 0.300 CEHV= 0.500
*SECNO 6.800

3265 DIVIDED FLOW

3370 NORMAL BRIDGE, NRD= 25 MIN ELTRD= 4070.00 MAX ELLC= 4100.00

6.80	16.03	4076.53	4075.90	4074.00	4077.32	0.79	0.00	0.00	4082.00
15300.	0.	4358.	10942.	0.	574.	1575.	0.	0.	4074.00
0.00	0.00	7.59	6.95	0.000	0.024	0.050	0.000	4060.50	420.94
0.009036	0.	0.	0.	0	13	5	-1366.77	766.07	1247.35

*SECNO 6.500

3265 DIVIDED FLOW

3370 NORMAL BRIDGE, NRD= 25 MIN ELTRD= 4070.00 MAX ELLC= 4100.40

6.50	15.77	4076.67	4076.14	0.00	4077.57	0.91	0.20	0.06	4082.40
15300.	0.	4686.	10614.	0.	564.	1449.	1.	0.	4074.40
0.00	0.00	8.31	7.32	0.000	0.024	0.050	0.000	4060.90	435.36
0.010556	20.	20.	20.	2	13	0	-1305.78	733.78	1240.23

CCHV= 0.100 CEHV= 0.300
*SECNO 6.000

3301 HV CHANGED MORE THAN HVINS

6.00	15.51	4077.51	4073.52	0.00	4077.77	0.26	0.14	0.06	4074.00
15300.	56.	15244.	0.	42.	3699.	0.	6.	1.	4078.00
0.01	1.33	4.12	0.00	0.045	0.035	0.000	0.000	4062.00	85.88
0.000782	70.	70.	70.	2	13	0	0.00	594.21	680.09

Sh. 33D

FTL 6/11/87
HM 7/17/87

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	QLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

```
*SECNO 5.500
      5.50      15.78   4077.78   4072.56      0.00   4077.93      0.15      0.15      0.01   4071.00
     15300.       154.     15131.       15.       102.      4842.       27.       32.       6.   4076.00
      0.03      1.50      3.13      0.56     0.045     0.035     0.050     0.000   4062.00    149.85
  0.000420       150.       270.       280.         2        18         0      0.00    769.89    919.74

CCHV=  0.200 CEHV=  0.500
*SECNO 5.000
      5.00      13.79   4077.79   4076.38      0.00   4078.39      0.61      0.23      0.23   4076.00
     15300.       126.     15169.        6.        70.      2419.        4.       54.      10.   4076.00
      0.04      1.80      6.27      1.53     0.045     0.035     0.050     0.000   4064.00    191.85
  0.003459       230.       250.       290.         2        13         0      0.00    688.32    880.17

*SECNO 4.000
      4.00      11.19   4079.19   4076.66      0.00   4079.98      0.78      1.50      0.09   4080.00
     15300.         0.     15300.         0.         0.      2153.        0.       78.      16.   4080.00
      0.06      0.00      7.11      0.00     0.000     0.035     0.000     0.000   4068.00    394.71
  0.003069       470.       460.       440.         2        14         0      0.00    409.11    803.82

*SECNO 3.000
      3.00       8.36   4080.36   4079.23      0.00   4081.30      0.94      1.24      0.08   4080.00
     15300.         1.     15299.         0.         1.      1963.        0.       93.      19.   4080.00
      0.07      0.76      7.80      0.67     0.045     0.035     0.050     0.000   4072.00    391.73
  0.005163       315.       318.       320.         2        14         0      0.00    490.29    882.02

CCHV=  0.100 CEHV=  0.300
*SECNO 2.500

3301 HV CHANGED MORE THAN HVINS

      2.50       9.02   4082.02   4079.80      0.00   4082.39      0.37      1.03      0.06   4080.00
     15300.         14.     15278.         9.        10.      3131.        7.      116.      24.   4080.00
      0.09      1.33      4.88      1.19     0.045     0.035     0.050     0.000   4073.00    289.91
  0.001657       365.       380.       380.         2        16         0      0.00    677.42    967.34

*SECNO 2.000
      2.00       8.62   4082.62   4081.64      0.00   4083.47      0.86      0.94      0.15   4080.00
     15300.       175.     15069.       56.       62.      2015.       22.      137.      29.   4080.00
      0.10      2.83      7.48      2.53     0.045     0.035     0.050     0.000   4074.00    332.74
  0.005108       350.       350.       300.         2         9         0      0.00    584.14    916.88
```

Sh. 33E
JTL 6/11/87
HM 7/17/87

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	QLOSS	BANK ELEV
Q	GLOB	GCH	GROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

CCHV= 0.300 CEHV= 0.500
*SECNO 0.800
3280 CROSS SECTION 0.80 EXTENDED 4.21 FEET

3301 HV CHANGED MORE THAN HVINS

3370 NORMAL BRIDGE, NRD= 8 MIN ELTRD= 4096.00 MAX ELLC= 4100.00

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

0.80	20.21	4100.21	4100.21	0.00	4102.35	2.14	2.43	0.64	4098.00
15300.	731.	8033.	6536.	108.	661.	560.	161.	35.	4098.00
0.12	6.79	12.14	11.68	0.015	0.015	0.015	0.000	4080.00	0.00
0.003320	650.	650.	400.	0	11	0	-432.00	330.00	330.00

*SECNO 0.600
3280 CROSS SECTION 0.60 EXTENDED 4.16 FEET

3370 NORMAL BRIDGE, NRD= 8 MIN ELTRD= 4096.00 MAX ELLC= 4100.40

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

0.60	20.16	4100.56	4100.56	0.00	4102.69	2.13	0.07	0.00	4098.40
15300.	679.	8328.	6293.	103.	680.	550.	161.	35.	4098.40
0.12	6.56	12.24	11.44	0.015	0.015	0.015	0.000	4080.40	0.00
0.003253	20.	20.	20.	0	11	0	-410.41	330.00	330.00

CROSS SECTION 4.00
STREAM DISCHARGE = 15300 CFS
DISCHARGE= 15300.

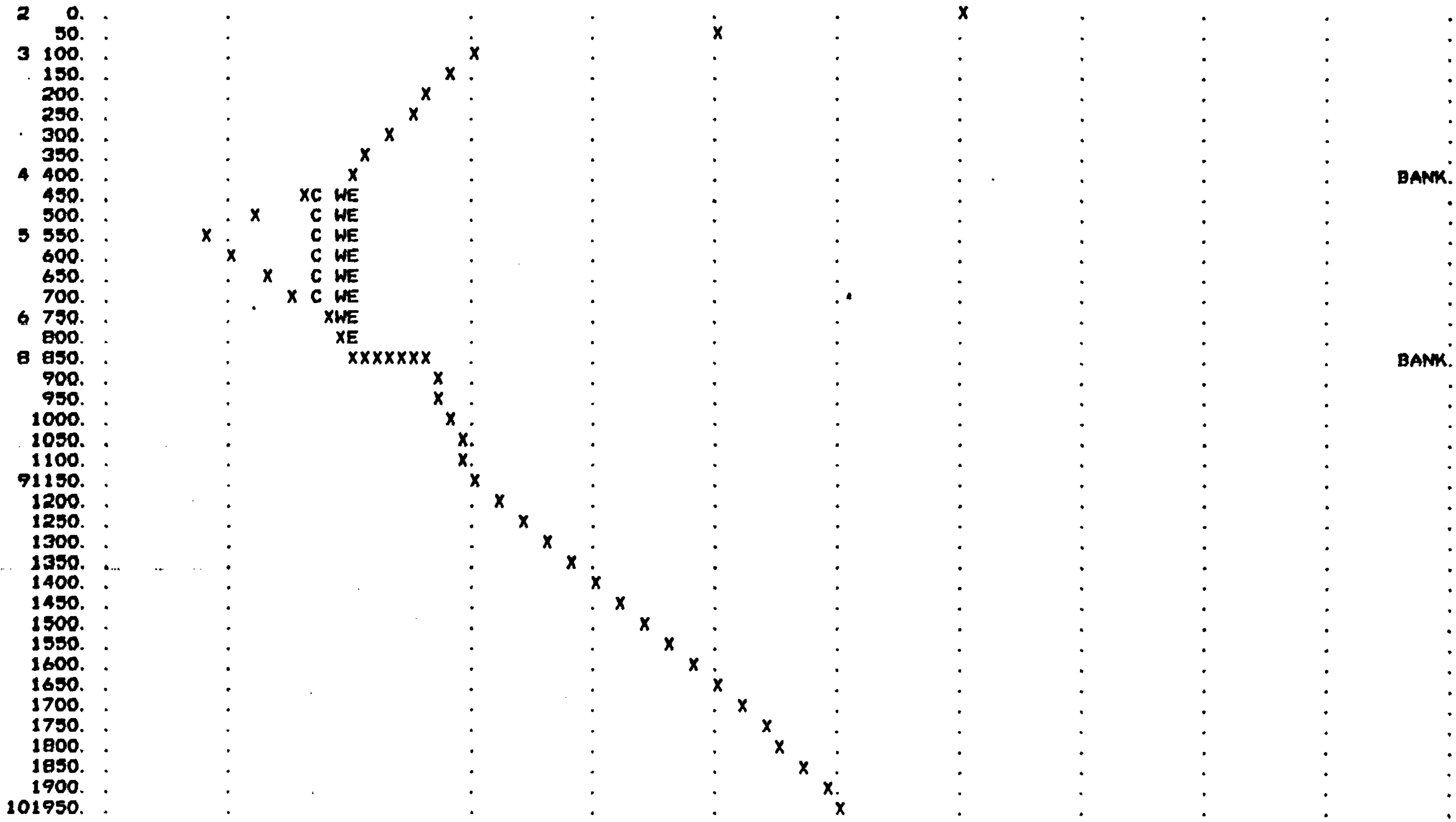
Sh. 33 F

PLOTTED POINTS (BY PRIORITY)-B=BOTTOM BRIDGE, T=TOP BRIDGE, X=GROUND, W=WATER SUR, E=ENERGY GRADIENT, C=CRITICAL WSEL

JTK 6/11/87
MM 7/17/87

ELEV 4060. 4070. 4080. 4090. 4100. 4110. 4120. 4130. 4140. 4150. 4160.

STA-FEET



NRD= 0 ELLC= 9999999.00 ELTRD= 9999999.00

EL(I), STA(I)

4130.00	0.00	4090.00	100.00	4080.00	385.00	4068.00	530.00	4078.00	750.00
4080.00	840.00	4086.00	870.00	4090.00	1165.00	4120.00	1930.00		

Sh. 33G

JTK 6/11/87
HM 7/17/87

CROSS SECTION 3.00
STREAM DISCHARGE = 15300 CFS
DISCHARGE= 15300.

PLOTTED POINTS (BY PRIORITY)-B=BOTTOM BRIDGE, T=TOP BRIDGE, X=GROUND, W=WATER SUR, E=ENERGY GRADIENT, C=CRITICAL WSEL

```
ELEV 4070.      4080.      4090.      4100.      4110.      4120.      4130.      4140.      4150.      4160.      4170.

    STA-FEET

 2   0.  .                  .          .          .          .          X          .          .          .          .          .
    50.  .                  .          .          .          X          .          .          .          .          .          .
 3 100.  .                  .          .          X          .          .          .          .          .          .          .
 4 150.  .                  .          X          .          .          .          .          .          .          .          .
   200.  .                  .          X          .          .          .          .          .          .          .          .
   250.  .                  .          X          .          .          .          .          .          .          .          .
   300.  .                  .          X          .          .          .          .          .          .          .          .
   350.  .                  .          X          .          .          .          .          .          .          .          .
 5 400.  .                  .          XE         .          .          .          .          .          .          .          BANK.
 6 450.  .                  .          CWE        .          .          .          .          .          .          .          .
   500.  .                  .          CWE        .          .          .          .          .          .          .          .
 7 550.  .                  .          CWE        .          .          .          .          .          .          .          .
 8 600.  .                  .          CWE        .          .          .          .          .          .          .          .
   650.  .                  .          CWE        .          .          .          .          .          .          .          .
   700.  .                  .          XCWE       .          .          .          .          .          .          .          .
   750.  .                  .          XCWE       .          .          .          .          .          .          .          .
   800.  .                  .          XWE        .          .          .          .          .          .          .          .
   850.  .                  .          XE         .          .          .          .          .          .          .          .
10 900.  .                  .          XXXXXXXXX  .          .          .          .          .          .          .          BANK.
   950.  .                  .          .          X          .          .          .          .          .          .          .
  1000.  .                  .          .          X.         .          .          .          .          .          .          .
  1050.  .                  .          .          X.         .          .          .          .          .          .          .
  1100.  .                  .          .          X          .          .          .          .          .          .          .
111150.  .                  .          .          X          .          .          .          .          .          .          .
  1200.  .                  .          .          .          X          .          .          .          .          .          .
  1250.  .                  .          .          .          .          X          .          .          .          .          .
  1300.  .                  .          .          .          .          .          X          .          .          .          .
  1350.  .                  .          .          .          .          .          .          X          .          .          .
  1400.  .                  .          .          .          .          .          .          .          X          .          .
  1450.  .                  .          .          .          .          .          .          .          .          X          .
  1500.  .                  .          .          .          .          .          .          .          .          .          .
  1550.  .                  .          .          .          .          .          .          .          .          .          .
  1600.  .                  .          .          .          .          .          .          .          .          .          .
121650.  .                  .          .          .          .          X          .          .          .          .          .
  1700.  .                  .          .          .          .          .          X          .          .          .          .
  1750.  .                  .          .          .          .          .          .          X          .          .          .
131800.  .                  .          .          .          .          .          .          .          .          .          .
```

NRD= 0 ELLC= 9999999.00 ELTRD= 9999999.00

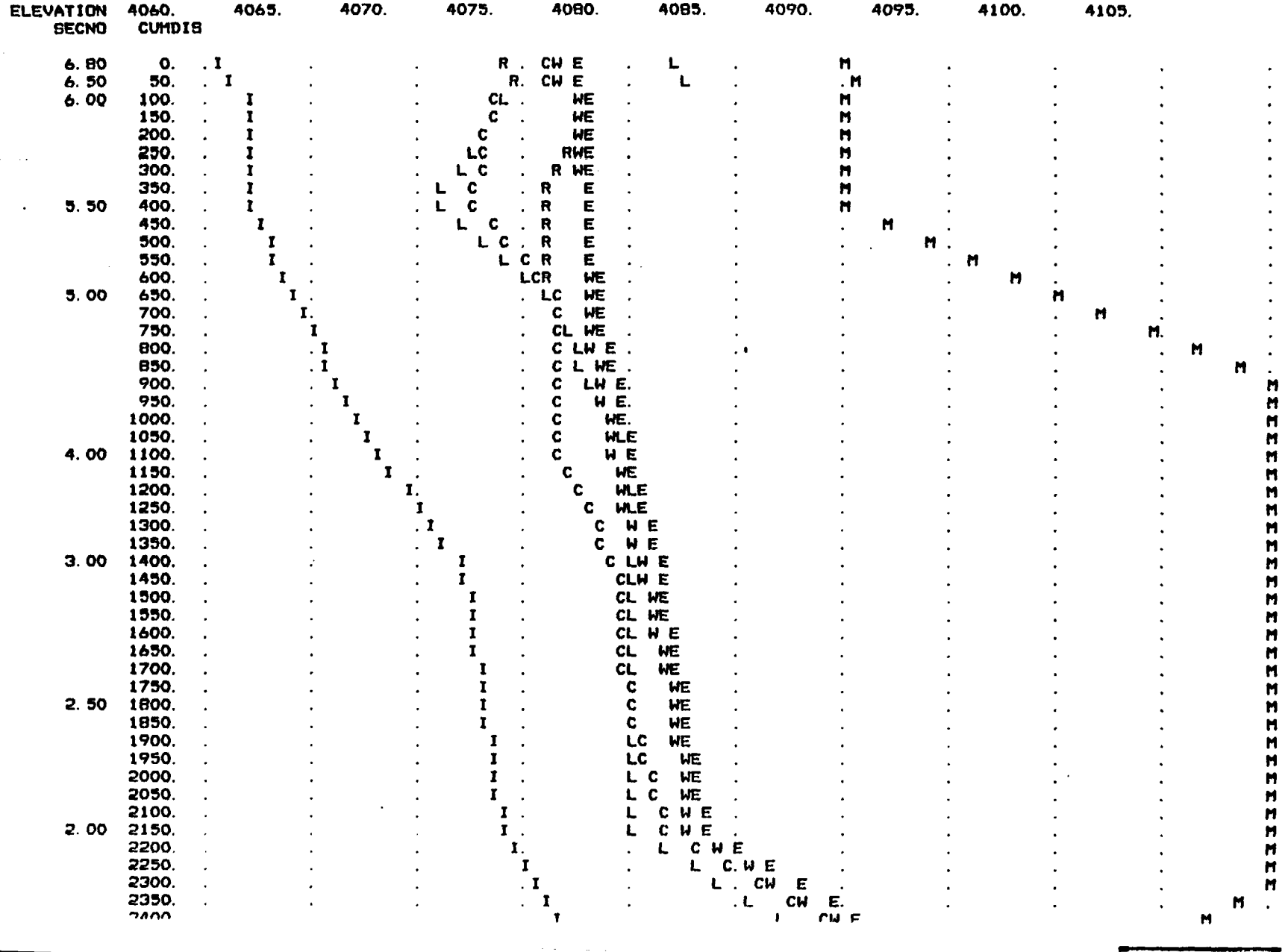
EL(I), STA(I)									
4130.00	0.00	4100.00	80.00	4090.00	170.00	4080.00	400.00	4074.00	455.00
4072.00	570.00	4076.00	620.00	4080.00	880.00	4088.00	925.00	4090.00	1150.00
4110.00	1640.00	4120.00	1820.00						

Sh. 33 H

PROFILE FOR STREAM DISCHARGE = 15300 CFS

JTK 6/11/87
HM 7/17/87

PLOTTED POINTS (BY PRIORITY)-E-ENERGY, W-WATER SURFACE, I-INVERT, C-CRITICAL W.S., L-LEFT BANK, R-RIGHT BANK, M-LOWER END STA



```
          2400.  .     .     .     .  I   .     .   L   CW. E      .
          2450.  .     .     .     .  I   .     .     L  CW  E      .     .      .M      .
          2500.  .     .     .     .  I   .     .       L.  CW  E   .     .     M.      .
          2550.  .     .     .     .   I  .     .     . L   CW  E       .     M  .      .
          2600.  .     .     .     .    I .     .     .    L   CW  E    .  M     .      .
          2650.  .     .     .     .     I.     .     .       L . W   E  M       .      .
          2700.  .     .     .     .      I.    .     .         L   W  ME.       .      .
          2750.  .     .     .     .       I.   .     .         . L M  W . E     .      .
     0.80 2800.  .     .     .     .        I   .     .         . M   L  W   E   .      .
     0.60 2850.  .     .     .     .        .I  .     .         .  M   L .W   E  .      .
```

Sh. 33 I

JTK 6/11/97
HM 7/17/97

Sh.33 J

FTIC 6/11/87
HM 7/17/87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**************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
**************************************************
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NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

DISCHARGE = 15300 CFS

SUMMARY PRINTOUT

	SECNO	Q	CWSEL	CRIWS	GLOB	GCH	GROB	GLOBP	GCHP	GROBP	VLOB	VCH	VROB
	6.800	15300.00	4076.53	4075.90	0.00	4357.75	10942.25	0.00	28.48	71.52	0.00	7.59	6.95
	6.500	15300.00	4076.67	4076.14	0.00	4685.81	10614.19	0.00	30.63	69.37	0.00	8.31	7.32
	6.000	15300.00	4077.51	4073.52	56.44	15243.56	0.00	0.37	99.63	0.00	1.33	4.12	0.00
	5.500	15300.00	4077.78	4072.56	153.72	15131.33	14.95	1.00	98.90	0.10	1.50	3.13	0.56
	5.000	15300.00	4077.79	4076.38	125.69	15168.60	5.70	0.82	99.14	0.04	1.80	6.27	1.53
	4.000	15300.00	4079.19	4076.66	0.00	15300.00	0.00	0.00	100.00	0.00	0.00	7.11	0.00
	3.000	15300.00	4080.36	4079.23	1.12	15298.63	0.24	0.01	99.99	0.00	0.76	7.80	0.67
	2.500	15300.00	4082.02	4079.80	13.57	15277.64	8.79	0.09	99.85	0.06	1.33	4.88	1.19
	2.000	15300.00	4082.62	4081.64	175.36	15068.67	55.98	1.15	98.49	0.37	2.83	7.48	2.53
*	0.800	15300.00	4100.21	4100.21	731.39	8032.54	6536.07	4.78	52.50	42.72	6.79	12.14	11.68
*	0.600	15300.00	4100.56	4100.56	678.74	8328.02	6293.25	4.44	54.43	41.13	6.56	12.24	11.44

Sh. 33 K

JTK 6/11/87
HM 7/17/87

11-JUN-87 09:02:18

DISCHARGE = 15300 CFS

SUMMARY PRINTOUT

	SECNO	KRATIO	AREA	CWSEL	ELMIN	DEPTH	DIFWSX	HV	TOPWID	SSTA	ENDST	K*CHSL	10K*S
	6.800	0.00	2149.03	4076.53	4060.50	16.03	0.00	0.79	766.07	420.94	1247.35	0.00	90.36
	6.500	0.93	2013.38	4076.67	4060.90	15.77	0.14	0.91	733.78	435.36	1240.23	20.00	105.56
	6.000	3.67	3741.08	4077.51	4062.00	15.51	0.84	0.26	594.21	85.68	680.09	15.72	7.82
	5.500	1.36	4970.57	4077.78	4062.00	15.78	0.27	0.15	769.89	149.85	919.74	0.00	4.20
	5.000	0.35	2492.06	4077.79	4064.00	13.79	0.00	0.61	688.32	191.85	880.17	8.00	34.59
	4.000	1.06	2152.63	4079.19	4068.00	11.19	1.41	0.78	409.11	394.71	803.82	8.70	30.69
	3.000	0.77	1964.47	4080.36	4072.00	8.36	1.17	0.94	490.29	391.73	882.02	12.58	51.63
	2.500	1.77	3149.01	4082.02	4073.00	9.02	1.66	0.37	677.42	289.91	967.34	2.63	16.57
	2.000	0.57	2099.45	4082.62	4074.00	8.62	0.60	0.86	584.14	332.74	916.88	2.86	51.08
*	0.800	1.24	1328.64	4100.21	4080.00	20.21	17.59	2.14	330.00	0.00	330.00	9.23	33.20
*	0.600	1.01	1333.96	4100.56	4080.40	20.16	0.35	2.13	330.00	0.00	330.00	20.00	32.53

Sh. 33 L

JTK 6/11/87
HM 7/17/87

SUMMARY OF ERRORS AND SPECIAL NOTES

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CAUTION  SECNO=     0.800  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=     0.800  PROFILE= 1  MINIMUM SPECIFIC ENERGY

CAUTION  SECNO=     0.600  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=     0.600  PROFILE= 1  MINIMUM SPECIFIC ENERGY
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Sh. 33M

JTK 6/11/87
HM 7/17/87

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**************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
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Sh. 34/A

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FTK 6/11/87
HM 7/17/87

Subcritical profile
with upstream railroad crossing
and downstream culverts (2 functioning)
with berm @ 4080' for sections 5.5 & 6.0

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**************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
**************************************************

T1      UMTRA - GREEN RIVER -  10-YR 24 HR
T2      WATER SURFACE PROFILE IN BROWN WASH
T3      DISCHARGE =  11300 CFS

J1  ICHECK     INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ
       0.        0.        0.        0.  0.009000      0.00      0.0   11300.  4074.000     0.000
J2  NPROF      IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE
    -1.000     0.000     0.000     0.000     0.000     0.000    -1.000     0.000     0.000     0.000
J3  VARIABLE CODES FOR SUMMARY PRINTOUT
    38.000    43.000     1.000     2.000    13.000    14.000    15.000    35.000    60.000    59.000
    55.000    26.000    56.000     0.000    38.000    58.000    25.000     1.000    42.000     8.000
    51.000    10.000     4.000    53.000    54.000    33.000     5.000     0.000     0.000     0.000

NC      0.045     0.050     0.024     0.300     0.500     0.000     0.000     0.000     0.000     0.000
X1      6.800    19.000   150.000   700.000     0.000     0.000     0.000     0.000     0.000     0.000
BT     19.000     0.000  4090.000  4090.000    80.000  4080.000  4080.000   150.000  4082.000  4082.000
BT    280.000  4080.000  4080.000   340.000  4078.000  4078.000   450.000  4076.000  4076.000   560.000
BT   4075.200  4065.500   565.000  4075.000  4070.500   570.000  4075.000  4065.500   575.000  4075.000
BT   4065.500   580.000  4075.000  4070.500   585.000  4075.000  4065.500   700.000  4074.000  4074.000
BT    800.000  4074.000  4074.000   936.000  4078.000  4078.000   950.000  4076.000  4076.000  1000.000
BT   4070.000  4070.000  1070.000  4070.000  4070.000  1885.000  4100.000  4100.000     0.000     0.000
QR   4090.000     0.000  4080.000    80.000  4082.000   150.000  4080.000   280.000  4078.000   340.000
QR   4076.000   450.000  4065.500   560.000  4060.500   565.000  4065.500   570.000  4065.500   575.000
QR   4060.500   580.000  4065.500   585.000  4074.000   700.000  4074.000   800.000  4078.000   936.000
QR   4076.000   950.000  4070.000  1000.000  4070.000  1070.000  4100.000  1885.000     0.000     0.000

X1      6.500     0.000     0.000     0.000    20.000    20.000    20.000     0.000     0.400     0.000
X2      0.000     0.000     0.000     0.000     0.000     0.000     1.000     0.000     0.000     0.000

NC      0.045     0.050     0.035     0.100     0.300     0.000     0.000     0.000     0.000     0.000
X1      6.000     9.000   180.000   890.000    70.000    70.000    70.000     0.000     0.000     0.000
GR   4090.000     0.000  4083.000   110.000  4080.000   180.000  4080.000   500.000  4062.000   540.000
GR   4074.000   685.000  4078.000   890.000  4080.000  1265.000  4100.000  1885.000     0.000     0.000
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Sh. 34B

FTC 6/11/87
HM 7/17/87

X1	5.500	11.000	180.000	890.000	150.000	280.000	270.000	0.000	0.000	0.000
QR	4090.000	0.000	4080.000	80.000	4080.000	140.000	4080.000	180.000	4080.000	510.000
QR	4062.000	570.000	4073.000	680.000	4076.000	890.000	4079.000	940.000	4080.000	1200.000
QR	4090.000	1460.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NC	0.000	0.000	0.000	0.200	0.500	0.000	0.000	0.000	0.000	0.000
X1	5.000	10.000	270.000	876.000	230.000	290.000	250.000	0.000	0.000	0.000
QR	4100.000	0.000	4080.000	95.000	4076.000	270.000	4076.000	470.000	4064.000	530.000
QR	4074.000	635.000	4076.000	876.000	4081.000	900.000	4080.000	1090.000	4110.000	1885.000
X1	4.000	9.000	385.000	840.000	470.000	440.000	460.000	0.000	0.000	1.000
QR	4130.000	0.000	4090.000	100.000	4080.000	385.000	4068.000	530.000	4078.000	750.000
QR	4080.000	840.000	4086.000	870.000	4090.000	1165.000	4120.000	1930.000	0.000	0.000
X1	3.000	12.000	400.000	880.000	315.000	320.000	318.000	0.000	0.000	1.000
QR	4130.000	0.000	4100.000	80.000	4090.000	170.000	4080.000	400.000	4074.000	455.000
QR	4072.000	570.000	4076.000	620.000	4080.000	880.000	4088.000	925.000	4090.000	1150.000
QR	4110.000	1640.000	4120.000	1820.000	0.000	0.000	0.000	0.000	0.000	0.000
NC	0.000	0.000	0.000	0.100	0.300	0.000	0.000	0.000	0.000	0.000
X1	2.500	12.000	300.000	960.000	365.000	380.000	380.000	0.000	0.000	0.000
QR	4110.000	0.000	4090.000	250.000	4080.000	300.000	4073.000	420.000	4076.000	500.000
QR	4076.000	560.000	4078.000	620.000	4078.000	800.000	4080.000	960.000	4091.000	1000.000
QR	4096.000	1330.000	4110.000	1700.000	0.000	0.000	0.000	0.000	0.000	0.000
X1	2.000	11.000	380.000	900.000	350.000	300.000	350.000	0.000	0.000	0.000
QR	4114.000	0.000	4090.000	200.000	4080.000	380.000	4074.000	400.000	4074.000	430.000
QR	4078.000	510.000	4080.000	600.000	4080.000	900.000	4094.000	990.000	4094.000	1170.000
QR	4120.000	1890.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NC	0.015	0.015	0.015	0.300	0.500	0.000	0.000	0.000	0.000	0.000
X1	0.800	8.000	85.000	140.000	650.000	400.000	650.000	0.000	0.000	0.000
BT	8.000	0.000	4100.000	4100.000	80.000	4098.000	4098.000	85.000	4098.000	4098.000
BT	86.000	4098.000	4090.000	139.000	4098.000	4090.000	140.000	4098.000	4098.000	190.000
BT	4098.000	4098.000	330.000	4096.000	4096.000	0.000	0.000	0.000	0.000	0.000
QR	4100.000	0.000	4098.000	80.000	4098.000	85.000	4080.000	86.000	4080.000	139.000
QR	4098.000	140.000	4098.000	190.000	4096.000	330.000	0.000	0.000	0.000	0.000
X1	0.600	0.000	0.000	0.000	20.000	20.000	20.000	0.000	0.400	0.000
X2	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000
EJ	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Sh. 34 c

JTK 6/11/87
HM 7/17/87

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	GLOB	GCH	GROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

#PROF 1

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

CCHV= 0.300 CEHV= 0.500
#SECNO 6.800

3265 DIVIDED FLOW

3370 NORMAL BRIDGE, NRD= 19 MIN ELTRD= 4070.00 MAX ELLC= 4100.00

6.80	15.56	4076.06	4075.46	4074.00	4076.74	0.68	0.00	0.00	4082.00
11300.	0.	2307.	8993.	0.	357.	1356.	0.	0.	4074.00
0.00	0.00	6.46	6.63	0.000	0.024	0.050	0.000	4060.50	446.46
0.009008	0.	0.	0.	0	14	4	-1267.76	708.94	1234.75

#SECNO 6.500

3265 DIVIDED FLOW

3370 NORMAL BRIDGE, NRD= 19 MIN ELTRD= 4070.00 MAX ELLC= 4100.40

6.50	15.31	4076.21	4075.78	0.00	4076.99	0.78	0.20	0.05	4082.40
11300.	0.	2540.	8760.	0.	349.	1241.	1.	0.	4074.40
0.00	0.00	7.27	7.06	0.000	0.024	0.050	0.000	4060.90	452.03
0.010704	20.	20.	20.	2	14	0	-1211.22	685.52	1227.74

CCHV= 0.100 CEHV= 0.300
#SECNO 6.000

6.00	14.62	4076.62	4072.91	0.00	4077.34	0.72	0.34	0.01	4080.00
11300.	0.	11300.	0.	0.	1665.	0.	3.	1.	4078.00
0.00	0.00	6.79	0.00	0.000	0.035	0.000	0.000	4062.00	507.50
0.002783	70.	70.	70.	2	20	0	0.00	312.10	819.59

#SECNO 5.500

5.50	15.48	4077.48	4073.65	0.00	4077.92	0.44	0.55	0.03	4080.00
11300.	0.	11283.	17.	0.	2123.	18.	15.	3.	4076.00
0.02	0.00	5.32	0.96	0.000	0.035	0.050	0.000	4062.00	518.40
0.001551	150.	270.	280.	2	12	0	0.00	396.24	914.65

Sh. 34 D

JTK 6/11/87
HM 7/17/87

11-JUN-87 09:21:44

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	QLOSS	BANK ELEV
Q	GLOB	GCH	GROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

CCHV= 0.200 CEHV= 0.500

*SECNO 5.000									
5.00	14.04	4078.04	4075.34	0.00	4078.33	0.29	0.39	0.03	4076.00
11300.	118.	11170.	12.	90.	2569.	10.	29.	6.	4076.00
0.03	1.31	4.35	1.16	0.045	0.035	0.050	0.000	4064.00	181.02
0.001535	230.	250.	290.	0	14	0	0.00	704.75	885.76
*SECNO 4.000									
4.00	10.74	4078.74	4075.69	0.00	4079.25	0.51	0.81	0.11	4080.00
11300.	0.	11300.	0.	0.	1974.	0.	53.	12.	4080.00
0.06	0.00	5.72	0.00	0.000	0.035	0.000	0.000	4068.00	400.17
0.002049	470.	460.	440.	0	11	0	0.00	383.35	783.52
*SECNO 3.000									
3.00	7.59	4079.59	4078.40	0.00	4080.36	0.78	0.98	0.13	4080.00
11300.	0.	11300.	0.	0.	1599.	0.	67.	15.	4080.00
0.07	0.00	7.07	0.00	0.000	0.035	0.000	0.000	4072.00	403.77
0.005110	315.	318.	320.	2	14	0	0.00	449.51	853.28

CCHV= 0.100 CEHV= 0.300

*SECNO 2.500									
2.50	8.17	4081.17	4079.32	0.00	4081.47	0.30	1.06	0.05	4080.00
11300.	3.	11295.	2.	3.	2570.	2.	85.	20.	4080.00
0.09	0.95	4.39	0.85	0.045	0.035	0.050	0.000	4073.00	294.17
0.001750	365.	380.	380.	2	10	0	0.00	670.08	964.24
*SECNO 2.000									
2.00	7.88	4081.88	4081.10	0.00	4082.61	0.72	1.01	0.13	4080.00
11300.	77.	11198.	25.	32.	1632.	11.	102.	25.	4080.00
0.11	2.40	6.86	2.14	0.045	0.035	0.050	0.000	4074.00	345.99
0.005693	350.	350.	300.	2	9	0	0.00	566.16	912.15

CCHV= 0.300 CEHV= 0.500
*SECNO 0.800
3280 CROSS SECTION 0.80 EXTENDED 3.41 FEET

Sh. 34 E

FTK 6/11/87
HM 7/17/87

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	QLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

3301 HV CHANGED MORE THAN HVINS

3370 NORMAL BRIDGE, NRD= 8 MIN ELTRD= 4096.00 MAX ELLC= 4100.00

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

0.80	19.41	4099.41	4099.41	0.00	4101.23	1.82	2.58	0.55	4098.00
11300.	231.	7156.	3913.	47.	618.	408.	121.	31.	4098.00
0.12	4.92	11.59	9.58	0.015	0.015	0.015	0.000	4080.00	23.52
0.003311	650.	650.	400.	0	10	0	-432.00	306.49	330.00

*SECNO 0.600
3280 CROSS SECTION 0.60 EXTENDED 3.38 FEET

3370 NORMAL BRIDGE, NRD= 8 MIN ELTRD= 4096.00 MAX ELLC= 4100.40

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

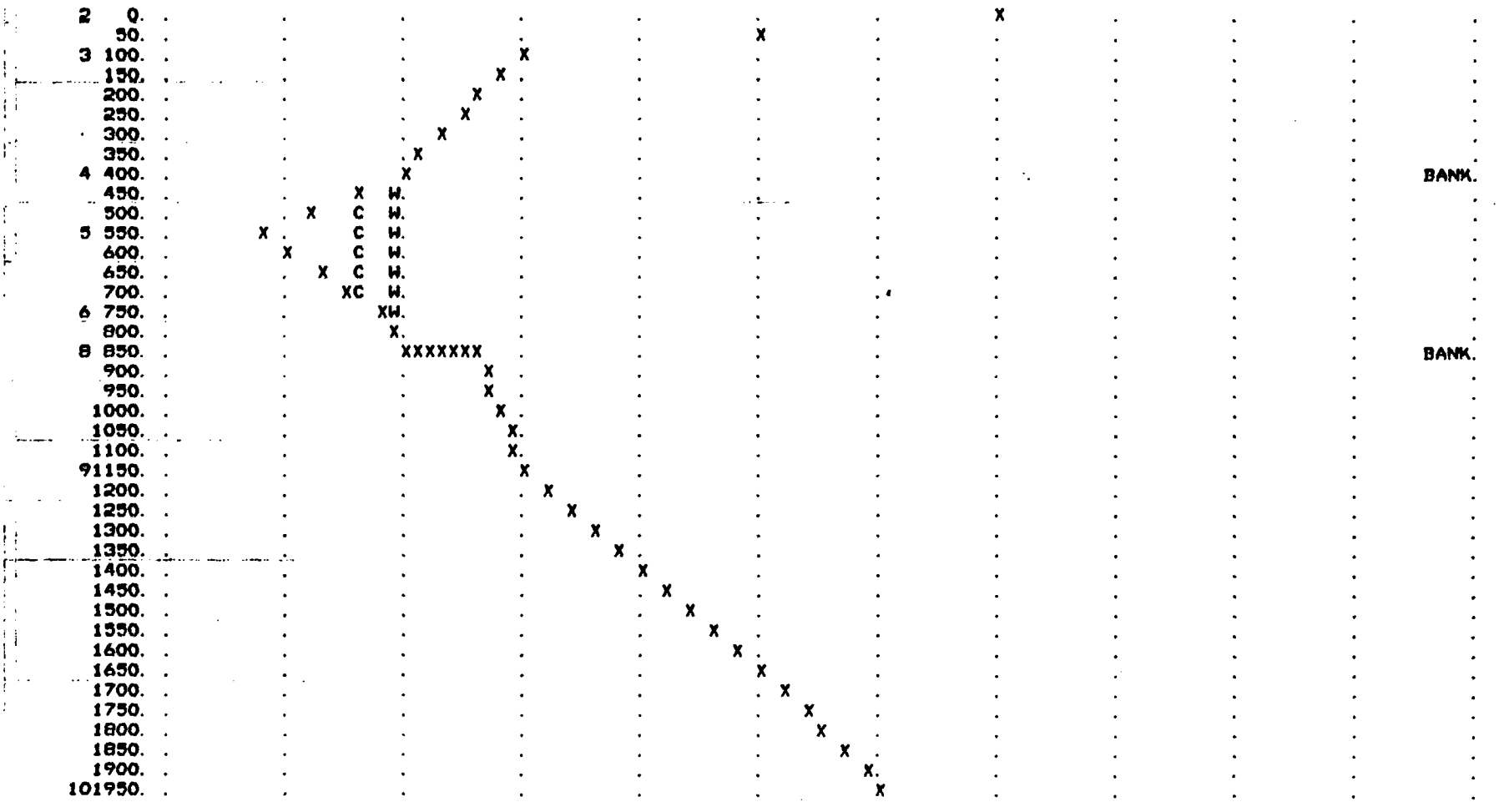
0.60	19.38	4099.78	4099.78	0.00	4101.57	1.80	0.06	0.01	4098.40
11300.	212.	7365.	3723.	45.	637.	402.	122.	31.	4098.40
0.12	4.73	11.56	9.27	0.015	0.015	0.015	0.000	4080.40	24.94
0.003163	20.	20.	20.	0	10	0	-410.41	305.06	330.00

Sh. 34 F

FTK 6/11/87
HM 7/17/87

CROSS SECTION 4.00
STREAM DISCHARGE = 11300 CFS
DISCHARGE= 11300.

PLOTTED POINTS (BY PRIORITY)-B=BOTTOM BRIDGE, T=TOP BRIDGE, X=GROUND, W=WATER SUR, E=ENERGY GRADIENT, C=CRITICAL WSEL



NRD= 0 ELLC= 9999999.00 ELTRD= 9999999.00

EL(I), STA(I)

4130.00	0.00	4090.00	100.00	4080.00	385.00	4068.00	530.00	4078.00	750.00
4080.00	840.00	4086.00	870.00	4090.00	1165.00	4120.00	1930.00		

Sh. 34 G

JTK 6/11/87
HM 7/17/87

CROSS SECTION 3.00
STREAM DISCHARGE = 11300 CFS
DISCHARGE= 11300.

PLOTTED POINTS (BY PRIORITY)-B=BOTTOM BRIDGE, T=TOP BRIDGE, X=GROUND, W=WATER SUR, E=ENERGY GRADIENT, C=CRITICAL WSEL

```
ELEV 4070.     4080.     4090.     4100.     4110.     4120.     4130.     4140.     4150.     4160.     4170.

    STA-FEET

2      0. .                   .         .         .         .         X         .         .         .         .         .
      50. .                   .         .         .X        .         .         .         .         .         .         .
3    100. .                   .         X         .         .         .         .         .         .         .         .
4    150. .                   X         .         .         .         .         .         .         .         .         .
     200. .                 X .         .         .         .         .         .         .         .         .         .
     250. .               X   .         .         .         .         .         .         .         .         .         .
     300. .            X      .         .         .         .         .         .         .         .         .         .
     350. .          X        .         .         .         .         .         .         .         .         .         .
5    400. .         X         .         .         .         .         .         .         .         .         .     BANK.
6    450. .   X   C W         .         .         .         .         .         .         .         .         .         .
     500. .  X    C W         .         .         .         .         .         .         .         .         .         .
7    550. . X     C W         .         .         .         .         .         .         .         .         .         .
8    600. .     X C W         .         .         .         .         .         .         .         .         .         .
     650. .      XC W         .         .         .         .         .         .         .         .         .         .
     700. .       X W         .         .         .         .         .         .         .         .         .         .
     750. .       X W         .         .         .         .         .         .         .         .         .         .
     800. .        XW         .         .         .         .         .         .         .         .         .         .
     850. .         X         .         .         .         .         .         .         .         .         .         .
10   900. .         XXXXXXXXX .         .         .         .         .         .         .         .         .     BANK.
     950. .                 X .         .         .         .         .         .         .         .         .         .
    1000. .                  X.         .         .         .         .         .         .         .         .         .
    1050. .                  X.         .         .         .         .         .         .         .         .         .
    1100. .                   X         .         .         .         .         .         .         .         .         .
  111150. .                   X         .         .         .         .         .         .         .         .         .
    1200. .                   . X       .         .         .         .         .         .         .         .         .
    1250. .                   .   X     .         .         .         .         .         .         .         .         .
    1300. .                   .     X   .         .         .         .         .         .         .         .         .
    1350. .                   .       X .         .         .         .         .         .         .         .         .
    1400. .                   .         X         .         .         .         .         .         .         .         .
    1450. .                   .         . X       .         .         .         .         .         .         .         .
    1500. .                   .         .   X     .         .         .         .         .         .         .         .
    1550. .                   .         .     X   .         .         .         .         .         .         .         .
    1600. .                   .         .       X .         .         .         .         .         .         .         .
  121650. .                   .         .         X         .         .         .         .         .         .         .
    1700. .                   .         .         .  X      .         .         .         .         .         .         .
    1750. .                   .         .         .     X   .         .         .         .         .         .         .
  131800. .                   .         .         .         X         .         .         .         .         .         .
```

NRD= 0 ELLC= 9999999.00 ELTRD= 9999999.00

EL(I), STA(I)

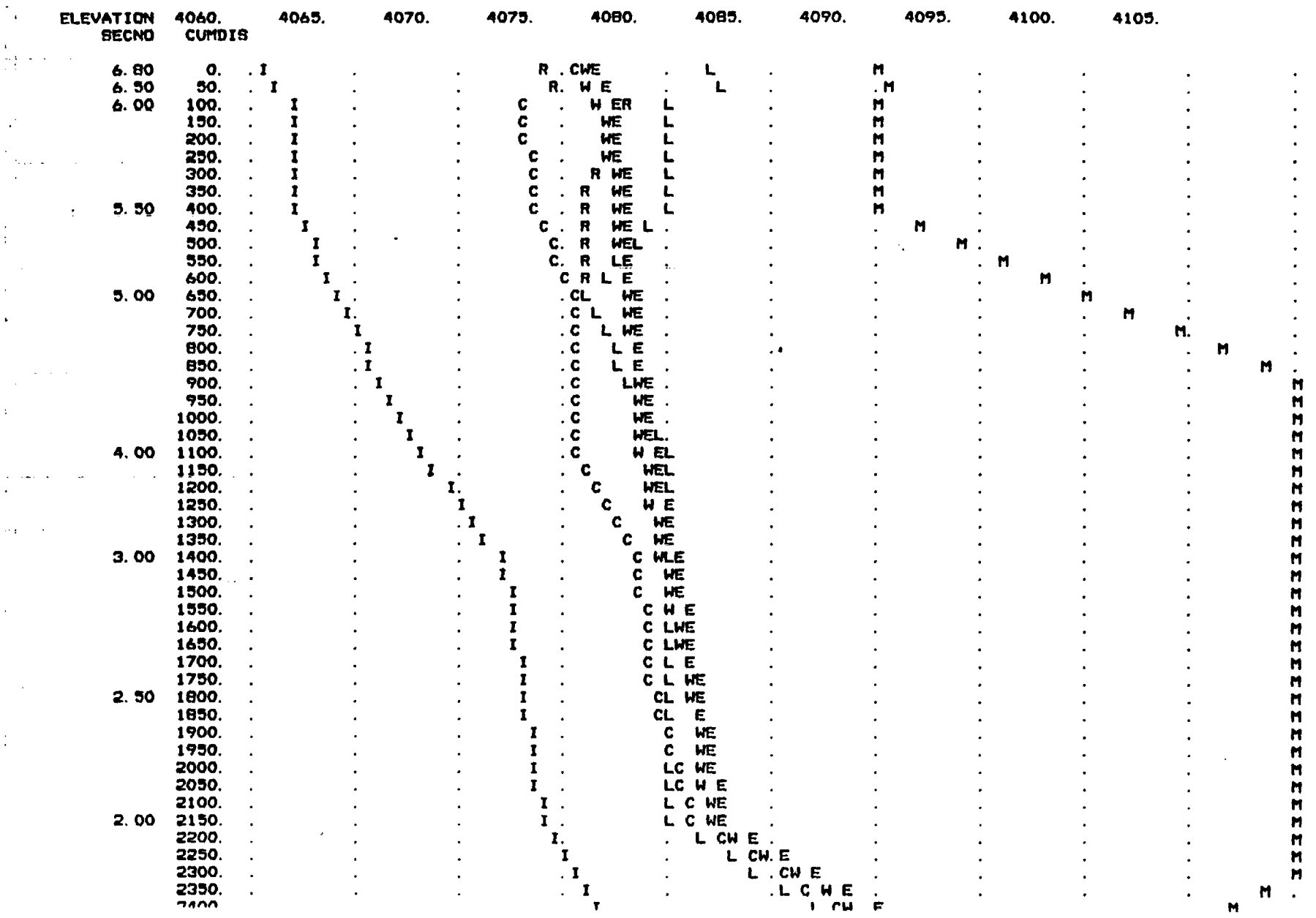
4130.00	0.00	4100.00	80.00	4090.00	170.00	4080.00	400.00	4074.00	455.00
4072.00	570.00	4076.00	620.00	4080.00	880.00	4088.00	925.00	4090.00	1150.00
4110.00	1640.00	4120.00	1820.00						

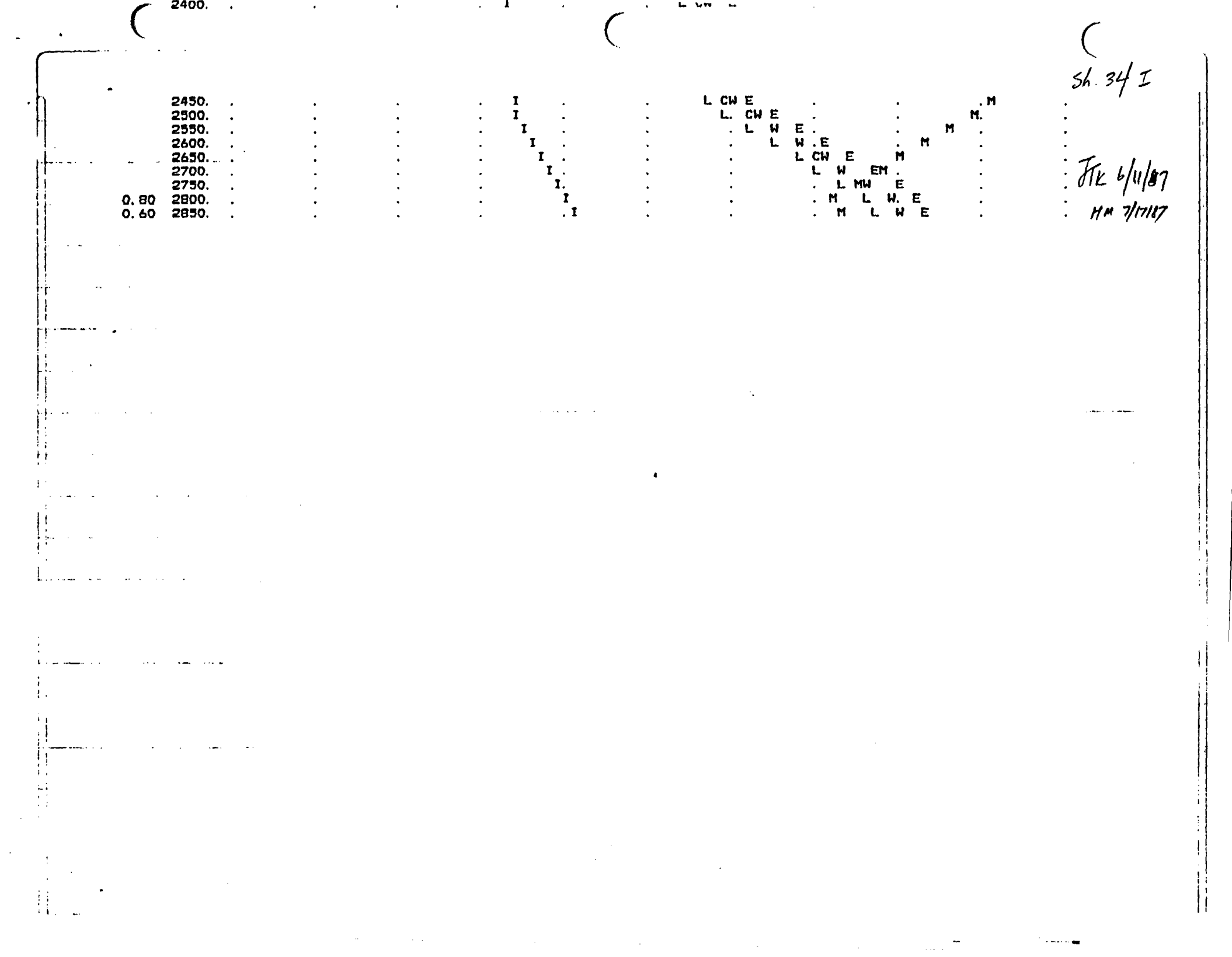
Sh. 34 H

JTK 6/11/87
MM 7/17/87

PROFILE FOR STREAM DISCHARGE = 11300 CFS

PLOTTED POINTS (BY PRIORITY)-E-ENERGY, W-WATER SURFACE, I-INVERT, C-CRITICAL W.S., L-LEFT BANK, R-RIGHT BANK, M-LOWER END STA




2400.
2450.
2500.
2550.
2600.
2650.
2700.
2750.
0.80 2800.
0.60 2850.
Sh. 34 I
JTK 6/11/87
HM 7/17/87

Sh. 34 J

JTK 6/11/87
HM 7/17/87

****
HEC2 RELEASE DATED NOV 76 UPDATED MAY 1984
ERROR CORR - 01,02,03,04,05,06
MODIFICATION - 50,51,52,53,54,55,56
****

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

DISCHARGE = 11300 CFS

SUMMARY PRINTOUT

	SECNO	Q	CWSEL	CRIWS	GLOB	GCH	GROB	GLOBR	GCHP	GROBP	VLOB	VCH	VROB
	6.800	11300.00	4076.06	4075.46	0.00	2306.61	8993.39	0.00	20.41	79.59	0.00	6.46	6.63
	6.500	11300.00	4076.21	4075.78	0.00	2540.02	8759.98	0.00	22.48	77.52	0.00	7.27	7.06
	6.000	11300.00	4076.62	4072.91	0.00	11300.00	0.00	0.00	100.00	0.00	0.00	6.79	0.00
	5.500	11300.00	4077.48	4073.65	0.00	11282.59	17.41	0.00	99.85	0.15	0.00	5.32	0.96
	5.000	11300.00	4078.04	4075.34	118.35	11170.12	11.52	1.05	98.85	0.10	1.31	4.35	1.16
	4.000	11300.00	4078.74	4075.69	0.00	11300.00	0.00	0.00	100.00	0.00	0.00	5.72	0.00
	3.000	11300.00	4079.59	4078.40	0.00	11300.00	0.00	0.00	100.00	0.00	0.00	7.07	0.00
	2.500	11300.00	4081.17	4079.32	3.24	11294.67	2.10	0.03	99.95	0.02	0.95	4.39	0.85
	2.000	11300.00	4081.88	4081.10	76.98	11198.45	24.57	0.68	99.10	0.22	2.40	6.86	2.14
*	0.800	11300.00	4099.41	4099.41	230.87	7155.75	3913.39	2.04	63.33	34.63	4.92	11.59	9.58
*	0.600	11300.00	4099.78	4099.78	211.88	7364.91	3723.21	1.88	65.18	32.95	4.73	11.56	9.27

Sh. 34 K

11-JUN-87 09:21:44 PAGE 7

JTK 6/11/87
KM 7/17/87

DISCHARGE = 11300 CFS

SUMMARY PRINTOUT

	SECND	KRATIO	AREA	CWSEL	ELMIN	DEPTH	DIFWSX	HV	TOPWID	SSTA	ENDST	K*CHSL	10K*S
	6.800	0.00	1713.43	4076.06	4060.50	15.56	0.00	0.68	708.94	446.46	1234.75	0.00	90.08
	6.500	0.92	1590.26	4076.21	4060.90	15.31	0.14	0.78	685.52	452.03	1227.74	20.00	107.04
	6.000	1.96	1665.21	4076.62	4062.00	14.62	0.42	0.72	312.10	507.50	819.59	15.72	27.83
	5.500	1.34	2140.74	4077.48	4062.00	15.48	0.85	0.44	396.24	518.40	914.65	0.00	15.51
	5.000	1.01	2668.98	4078.04	4064.00	14.04	0.56	0.29	704.75	181.02	885.76	8.00	15.35
	4.000	0.87	1973.86	4078.74	4068.00	10.74	0.70	0.51	383.35	400.17	783.52	8.70	20.49
	3.000	0.63	1598.92	4079.59	4072.00	7.59	0.84	0.78	449.51	403.77	853.28	12.58	51.10
	2.500	1.71	2575.93	4081.17	4073.00	8.17	1.58	0.30	670.08	294.17	964.24	2.63	17.50
	2.000	0.55	1676.09	4081.88	4074.00	7.88	0.72	0.72	566.16	345.99	912.15	2.86	56.93
*	0.800	1.31	1072.91	4099.41	4080.00	19.41	17.53	1.82	306.49	23.52	330.00	9.23	33.11
*	0.600	1.02	1083.59	4099.78	4080.40	19.38	0.36	1.80	305.06	24.94	330.00	20.00	31.63

SUMMARY OF ERRORS AND SPECIAL NOTES

Sh. 34 L

JTK 6/11/87
HM 7/17/87

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CAUTION  SECNO=     0.800  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=     0.800  PROFILE= 1  MINIMUM SPECIFIC ENERGY

CAUTION  SECNO=     0.600  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=     0.600  PROFILE= 1  MINIMUM SPECIFIC ENERGY
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Sh. 34M

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**************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
**************************************************
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JTC 6/11/87
HM 7/17/87

 Sh. 35A

JTK 6/11/87
HM 7/17/87

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**************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
**************************************************

T1      UMTRA - GREEN RIVER -  25-YR 24 HR
T2      WATER SURFACE PROFILE IN BROWN WASH
T3      DISCHARGE =  15300 CFS

J1  ICHECK     INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ
       0.       0.        0.        0.  0.009000      0.00      0.0   15300.  4074.000     0.000
J2  NPROF      IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE
    -1.000     0.000     0.000     0.000     0.000     0.000    -1.000     0.000     0.000     0.000
J3  VARIABLE CODES FOR SUMMARY PRINTOUT
    38.000    43.000     1.000     2.000    13.000    14.000    15.000    35.000    60.000    59.000
    55.000    26.000    56.000     0.000    38.000    58.000    25.000     1.000    42.000     8.000
    51.000    10.000     4.000    53.000    54.000    33.000     5.000     0.000     0.000     0.000

NC      0.045     0.050     0.024     0.300     0.500     0.000     0.000     0.000     0.000     0.000
X1      6.800    19.000   150.000   700.000     0.000     0.000     0.000     0.000     0.000     0.000
BT     19.000     0.000  4090.000  4090.000    80.000  4080.000  4080.000   150.000  4082.000  4082.000
BT    280.000  4080.000  4080.000   340.000  4078.000  4078.000   450.000  4076.000  4076.000   560.000
BT   4075.200  4065.500   565.000  4075.000  4070.500   570.000  4075.000  4065.500   575.000  4075.000
BT   4065.500   580.000  4075.000  4070.500   585.000  4075.000  4065.500   700.000  4074.000  4074.000
BT    800.000  4074.000  4074.000   936.000  4078.000  4078.000   950.000  4076.000  4076.000  1000.000
BT   4070.000  4070.000  1070.000  4070.000  4070.000  1885.000  4100.000  4100.000     0.000     0.000
QR   4090.000     0.000  4080.000    80.000  4082.000   150.000  4080.000   280.000  4078.000   340.000
QR   4076.000   450.000  4065.500   560.000  4060.500   565.000  4065.500   570.000  4065.500   575.000
QR   4060.500   580.000  4065.500   585.000  4074.000   700.000  4074.000   800.000  4078.000   936.000
QR   4076.000   950.000  4070.000  1000.000  4070.000  1070.000  4100.000  1885.000     0.000     0.000

X1      6.500     0.000     0.000     0.000    20.000    20.000    20.000     0.000     0.400     0.000
X2      0.000     0.000     0.000     0.000     0.000     0.000     1.000     0.000     0.000     0.000

NC      0.045     0.050     0.035     0.100     0.300     0.000     0.000     0.000     0.000     0.000
X1      6.000     9.000   180.000   890.000    70.000    70.000    70.000     0.000     0.000     0.000
QR   4090.000     0.000  4083.000   110.000  4080.000   180.000  4080.000   500.000  4062.000   540.000
QR   4074.000   685.000  4078.000   890.000  4080.000  1265.000  4100.000  1885.000     0.000     0.000
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Sh. 35B

JTK 6/11/87
HM 7/17/87

X1	5.500	11.000	180.000	890.000	150.000	280.000	270.000	0.000	0.000	0.000
QR	4090.000	0.000	4080.000	80.000	4080.000	140.000	4080.000	180.000	4080.000	510.000
QR	4062.000	570.000	4073.000	680.000	4076.000	890.000	4079.000	940.000	4080.000	1200.000
QR	4090.000	1460.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NC	0.000	0.000	0.000	0.200	0.500	0.000	0.000	0.000	0.000	0.000
X1	5.000	10.000	270.000	876.000	230.000	290.000	250.000	0.000	0.000	0.000
QR	4100.000	0.000	4080.000	95.000	4076.000	270.000	4076.000	470.000	4064.000	530.000
QR	4074.000	635.000	4076.000	876.000	4081.000	900.000	4080.000	1090.000	4110.000	1885.000
X1	4.000	9.000	385.000	840.000	470.000	440.000	460.000	0.000	0.000	1.000
QR	4130.000	0.000	4090.000	100.000	4080.000	385.000	4068.000	530.000	4078.000	750.000
QR	4080.000	840.000	4086.000	870.000	4090.000	1165.000	4120.000	1930.000	0.000	0.000
X1	3.000	12.000	400.000	880.000	315.000	320.000	318.000	0.000	0.000	1.000
QR	4130.000	0.000	4100.000	80.000	4090.000	170.000	4080.000	400.000	4074.000	455.000
QR	4072.000	570.000	4076.000	620.000	4080.000	880.000	4088.000	925.000	4090.000	1150.000
QR	4110.000	1640.000	4120.000	1820.000	0.000	0.000	0.000	0.000	0.000	0.000
NC	0.000	0.000	0.000	0.100	0.300	0.000	0.000	0.000	0.000	0.000
X1	2.500	12.000	300.000	960.000	365.000	380.000	380.000	0.000	0.000	0.000
QR	4110.000	0.000	4090.000	250.000	4080.000	300.000	4073.000	420.000	4076.000	500.000
QR	4076.000	560.000	4078.000	620.000	4078.000	800.000	4080.000	960.000	4091.000	1000.000
QR	4096.000	1330.000	4110.000	1700.000	0.000	0.000	0.000	0.000	0.000	0.000
X1	2.000	11.000	380.000	900.000	350.000	300.000	350.000	0.000	0.000	0.000
QR	4114.000	0.000	4090.000	200.000	4080.000	380.000	4074.000	400.000	4074.000	430.000
QR	4078.000	510.000	4080.000	600.000	4080.000	900.000	4094.000	990.000	4094.000	1170.000
QR	4120.000	1890.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NC	0.015	0.015	0.015	0.300	0.500	0.000	0.000	0.000	0.000	0.000
X1	0.800	8.000	85.000	140.000	650.000	400.000	650.000	0.000	0.000	0.000
BT	8.000	0.000	4100.000	4100.000	80.000	4098.000	4098.000	85.000	4098.000	4098.000
BT	86.000	4098.000	4090.000	139.000	4098.000	4090.000	140.000	4098.000	4098.000	190.000
BT	4098.000	4098.000	330.000	4096.000	4096.000	0.000	0.000	0.000	0.000	0.000
QR	4100.000	0.000	4098.000	80.000	4098.000	85.000	4080.000	86.000	4080.000	139.000
QR	4098.000	140.000	4098.000	190.000	4096.000	330.000	0.000	0.000	0.000	0.000
X1	0.600	0.000	0.000	0.000	20.000	20.000	20.000	0.000	0.400	0.000
X2	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000
EJ	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Sh. 35 C

FTK 6/11/87
MM 7/17/87

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*PROF 1

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

CCHV= 0.300 CEHV= 0.500
*SECNO 6.800

3265 DIVIDED FLOW

3370 NORMAL BRIDGE, NRD= 19 MIN ELTRD= 4070.00 MAX ELLC= 4100.00

6.80	16.13	4076.63	4076.01	4074.00	4077.43	0.80	0.00	0.00	4082.00
15300.	0.	3907.	11393.	0.	508.	1622.	0.	0.	4074.00
0.00	0.00	7.69	7.02	0.000	0.024	0.050	0.000	4060.50	415.60
0.009061	0.	0.	0.	0	17	5	-1267.76	778.04	1249.99

*SECNO 6.500

3265 DIVIDED FLOW

3370 NORMAL BRIDGE, NRD= 19 MIN ELTRD= 4070.00 MAX ELLC= 4100.40

6.50	15.86	4076.76	4076.30	0.00	4077.69	0.93	0.20	0.06	4082.40
15300.	0.	4129.	11171.	0.	489.	1494.	1.	0.	4074.40
0.00	0.00	8.44	7.48	0.000	0.024	0.050	0.000	4060.90	430.22
0.010814	20.	20.	20.	2	17	0	-1212.77	745.29	1242.77

CCHV= 0.100 CEHV= 0.300
*SECNO 6.000

6.00	15.09	4077.09	4074.57	0.00	4078.19	1.10	0.45	0.05	4080.00
15300.	0.	15300.	0.	0.	1816.	0.	4.	1.	4078.00
0.00	0.00	8.42	0.00	0.000	0.035	0.000	0.000	4062.00	506.46
0.004227	70.	70.	70.	2	12	0	0.00	336.99	843.45

*SECNO 5.500

3301 HV CHANGED MORE THAN HVINS

Sh. 35 D

JTL 6/11/87
MM 7/17/87

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EQ	HV	HL	QLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST
5.50	16.35	4078.35	4075.14	0.00	4078.95	0.60	0.71	0.05	4080.00
15300.	0.	15236.	64.	0.	2447.	46.	17.	4.	4076.00
0.02	0.00	6.23	1.39	0.000	0.035	0.050	0.000	4062.00	515.50
0.001779	150.	270.	280.	2	9	0	0.00	413.64	929.15
CCHV= 0.200	CEHV= 0.500								
*SECNO 5.000									
5.00	15.05	4079.05	4076.48	0.00	4079.38	0.33	0.38	0.05	4076.00
15300.	326.	14942.	32.	203.	3184.	22.	34.	7.	4076.00
0.03	1.60	4.69	1.42	0.045	0.035	0.050	0.000	4064.00	136.57
0.001342	230.	250.	290.	2	17	0	0.00	754.07	890.64
*SECNO 4.000									
4.00	11.71	4079.71	4076.71	0.00	4080.36	0.65	0.81	0.16	4080.00
15300.	0.	15300.	0.	0.	2370.	0.	65.	13.	4080.00
0.05	0.00	6.46	0.00	0.000	0.035	0.000	0.000	4068.00	388.53
0.002443	470.	460.	440.	2	11	0	0.00	438.33	826.86
*SECNO 3.000									
3.00	8.62	4080.62	4079.22	0.00	4081.45	0.83	1.00	0.09	4080.00
15300.	4.	15295.	1.	4.	2086.	1.	81.	17.	4080.00
0.06	0.98	7.33	0.87	0.045	0.035	0.050	0.000	4072.00	385.82
0.004211	315.	318.	320.	2	14	0	0.00	497.65	883.47
CCHV= 0.100	CEHV= 0.300								
*SECNO 2.500									
2.50	9.07	4082.07	4079.80	0.00	4082.43	0.36	0.93	0.05	4080.00
15300.	14.	15277.	9.	11.	3164.	8.	104.	22.	4080.00
0.08	1.33	4.83	1.19	0.045	0.035	0.050	0.000	4073.00	289.67
0.001600	365.	380.	380.	2	16	0	0.00	677.85	967.52
*SECNO 2.000									
2.00	8.64	4082.64	4081.66	0.00	4083.49	0.85	0.91	0.15	4080.00
15300.	177.	15066.	57.	63.	2026.	23.	125.	27.	4080.00
0.10	2.82	7.44	2.52	0.045	0.035	0.050	0.000	4074.00	332.36
0.005014	350.	350.	300.	2	9	0	0.00	584.66	917.01

Sh. 35 E

JTC 6/11/87
HM 7/17/87

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	QLOSS	BANK ELEV
Q	GLOB	GCH	GROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

CCHV= 0.300 CEHV= 0.500
*SECNO 0.800
3280 CROSS SECTION 0.80 EXTENDED 4.21 FEET

3301 HV CHANGED MORE THAN HVINS

3370 NORMAL BRIDGE. NRD= 8 MIN ELTRD= 4096.00 MAX ELLC= 4100.00

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

0.80	20.21	4100.21	4100.21	0.00	4102.35	2.14	2.41	0.65	4098.00
15300.	731.	8033.	6536.	108.	661.	560.	149.	33.	4098.00
0.11	6.79	12.14	11.68	0.015	0.015	0.015	0.000	4080.00	0.00
0.003320	650.	650.	400.	0	11	0	-432.00	330.00	330.00

*SECNO 0.600
3280 CROSS SECTION 0.60 EXTENDED 4.16 FEET

3370 NORMAL BRIDGE. NRD= 8 MIN ELTRD= 4096.00 MAX ELLC= 4100.40

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

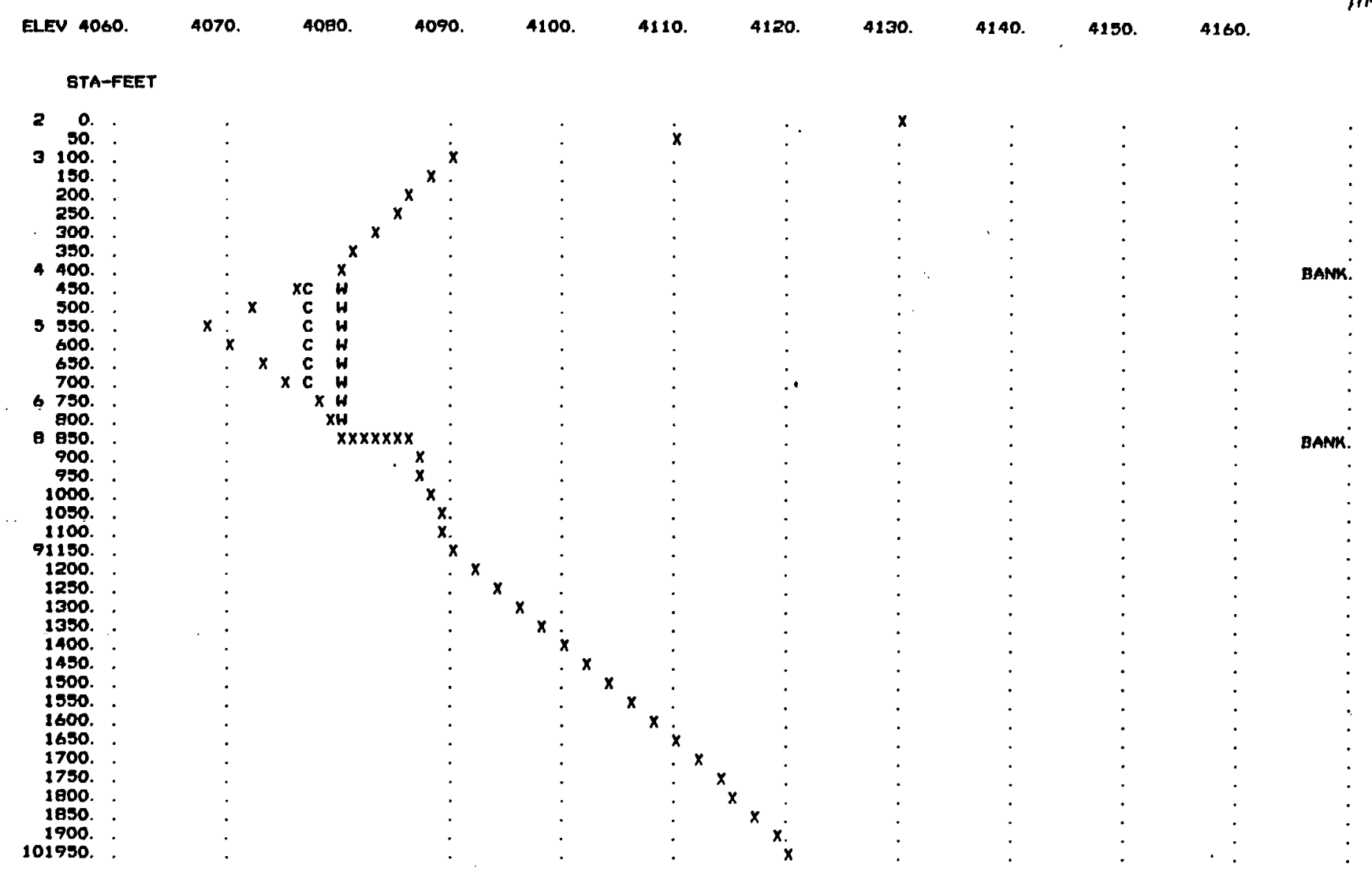
0.60	20.16	4100.56	4100.56	0.00	4102.69	2.13	0.07	0.00	4098.40
15300.	679.	8328.	6293.	103.	680.	550.	150.	33.	4098.40
0.11	6.56	12.24	11.44	0.015	0.015	0.015	0.000	4080.40	0.00
0.003253	20.	20.	20.	0	11	0	-410.41	330.00	330.00

Sh. 35 F

JTK 6/11/87
11M 7/11/87

CROSS SECTION 4.00
STREAM DISCHARGE = 15300 CFS
DISCHARGE= 15300.

PLOTTED POINTS (BY PRIORITY)-B=BOTTOM BRIDGE, T=TOP BRIDGE, X=GROUND, W=WATER SUR, E=ENERGY GRADIENT, C=CRITICAL WSEL



NRD= 0 ELLC= 9999999.00 ELTRD= 9999999.00

EL(I), STA(I)

4130.00	0.00	4090.00	100.00	4080.00	385.00	4068.00	530.00	4078.00	750.00
4080.00	840.00	4086.00	870.00	4090.00	1165.00	4120.00	1930.00		

Sh. 35G

JTV 6/14/87
JM 7/17/87

CROSS SECTION 3.00
STREAM DISCHARGE = 15300 CFS
DISCHARGE= 15300.

PLOTTED POINTS (BY PRIORITY)-B=BOTTOM BRIDGE, T=TOP BRIDGE, X=GROUND, W=WATER SUR, E=ENERGY GRADIENT, C=CRITICAL WSEL

```
ELEV 4070.      4080.      4090.      4100.      4110.      4120.      4130.      4140.      4150.      4160.      4170.

    STA-FEET

 2   0.  .          .          .          .          .          .          X          .          .          .          .          .
    50.  .          .          .          .          .          X          .          .          .          .          .          .
 3 100.  .          .          .          .          X          .          .          .          .          .          .          .
 4 150.  .          .          .          X          .          .          .          .          .          .          .          .
   200.  .          .          X          .          .          .          .          .          .          .          .          .
   250.  .          .       X  .          .          .          .          .          .          .          .          .          .
   300.  .          .    X     .          .          .          .          .          .          .          .          .          .
   350.  .          .  X       .          .          .          .          .          .          .          .          .          .
 5 400.  .          .  XW      .          .          .          .          .          .          .          .          .          BANK.
 6 450.  .       X  C.W        .          .          .          .          .          .          .          .          .          .
   500.  .    X     C.W        .          .          .          .          .          .          .          .          .          .
 7 550.  . X        C.W        .          .          .          .          .          .          .          .          .          .
 8 600.  .       X  C.W        .          .          .          .          .          .          .          .          .          .
   650.  .        X C.W        .          .          .          .          .          .          .          .          .          .
   700.  .         XC.W        .          .          .          .          .          .          .          .          .          .
   750.  .         XC.W        .          .          .          .          .          .          .          .          .          .
   800.  .          X.W        .          .          .          .          .          .          .          .          .          .
   850.  .          XW         .          .          .          .          .          .          .          .          .          .
10 900.  .          XXXXXXXXX  .          .          .          .          .          .          .          .          .          BANK.
   950.  .          .       X  .          .          .          .          .          .          .          .          .          .
  1000.  .          .       X. .          .          .          .          .          .          .          .          .          .
  1050.  .          .       X. .          .          .          .          .          .          .          .          .          .
  1100.  .          .        X .          .          .          .          .          .          .          .          .          .
111150.  .          .        X .          .          .          .          .          .          .          .          .          .
  1200.  .          .         X.          .          .          .          .          .          .          .          .          .
  1250.  .          .          X          .          .          .          .          .          .          .          .          .
  1300.  .          .          X          .          .          .          .          .          .          .          .          .
  1350.  .          .           X         .          .          .          .          .          .          .          .          .
  1400.  .          .           X         .          .          .          .          .          .          .          .          .
  1450.  .          .            X        .          .          .          .          .          .          .          .          .
  1500.  .          .            X        .          .          .          .          .          .          .          .          .
  1550.  .          .             X       .          .          .          .          .          .          .          .          .
  1600.  .          .             X       .          .          .          .          .          .          .          .          .
121650.  .          .              X      .          .          .          .          .          .          .          .          .
  1700.  .          .              X      .          .          .          .          .          .          .          .          .
  1750.  .          .               X     .          .          .          .          .          .          .          .          .
131800.  .          .               X     .          .          .          .          .          .          .          .          .
```

NRD= 0 ELLC= 9999999.00 ELTRD= 9999999.00

EL(I), STA(I)

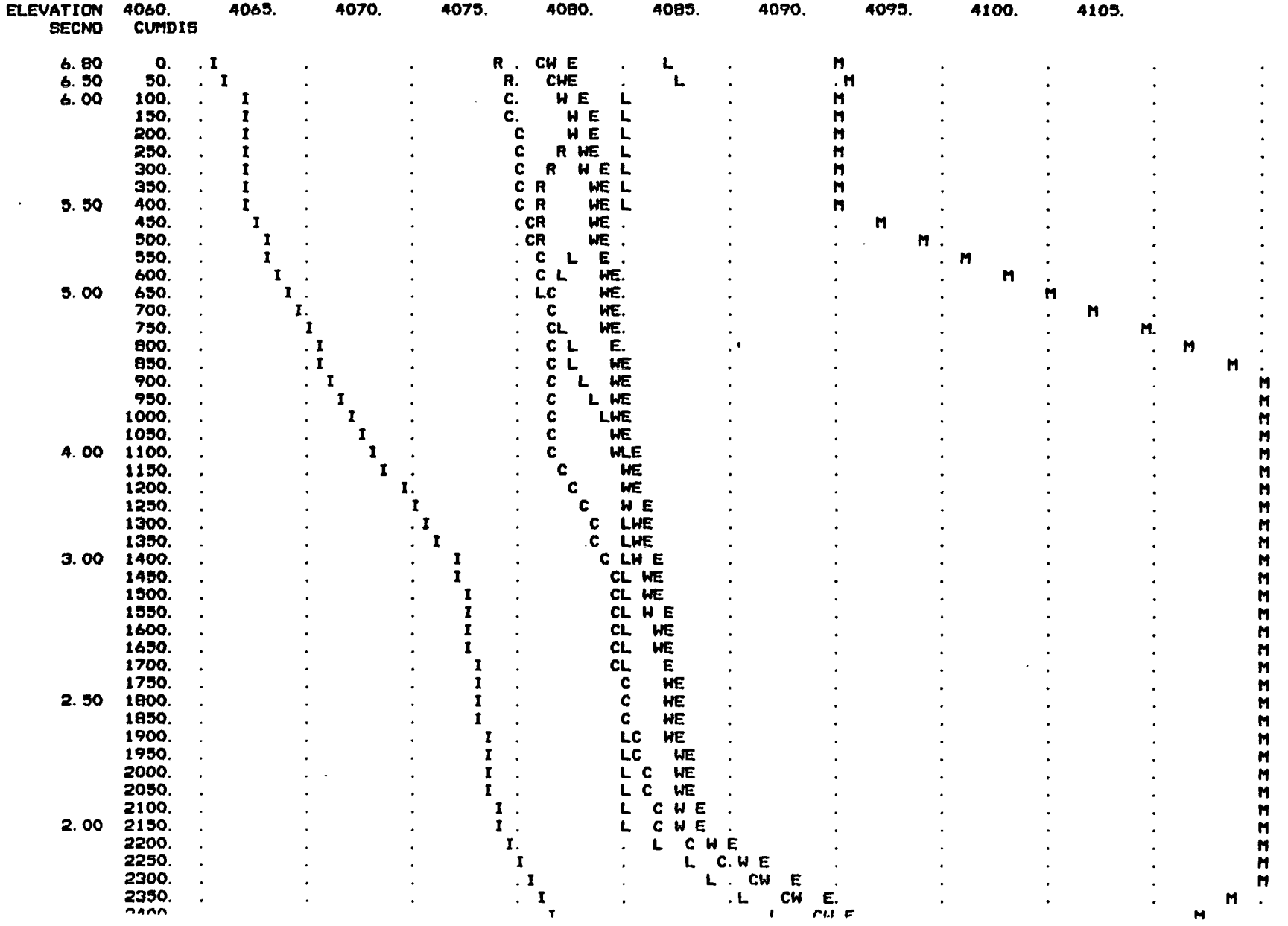
4130.00	0.00	4100.00	80.00	4090.00	170.00	4080.00	400.00	4074.00	455.00
4072.00	570.00	4076.00	620.00	4080.00	880.00	4088.00	925.00	4090.00	1150.00
4110.00	1640.00	4120.00	1820.00						

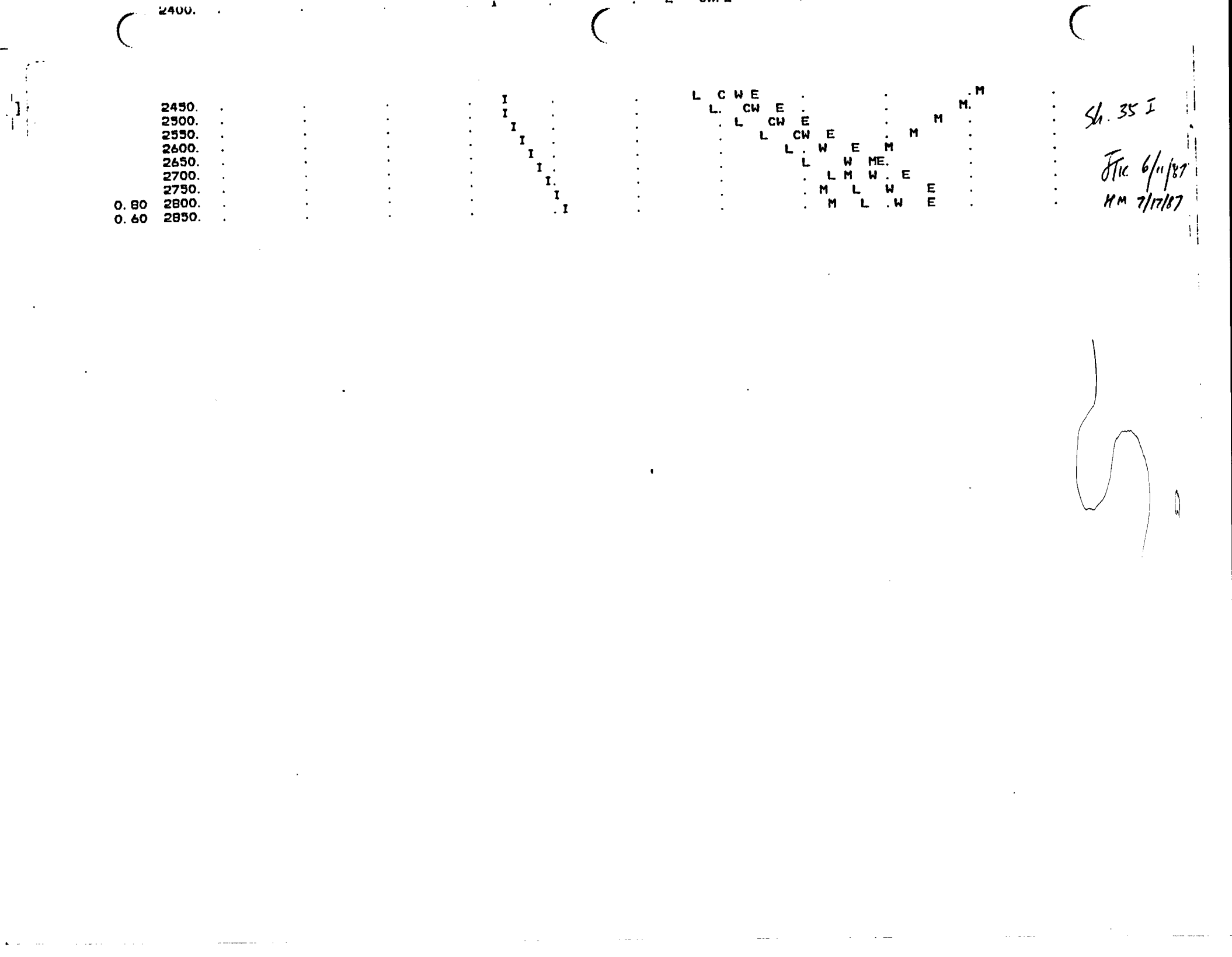
Sh. 35 H

JTK 6/11/87

PROFILE FOR STREAM DISCHARGE = 15300 CFS

PLOTTED POINTS (BY PRIORITY)-E-ENERGY, W-WATER SURFACE, I-INVERT, C-CRITICAL W.S., L-LEFT BANK, R-RIGHT BANK, M-LOWER END STA HM 7/17/87




2400.
2450.
2500.
2550.
2600.
2650.
2700.
2750.
0.80 2800.
0.60 2850.
Sh. 35 I
FTic 6/11/87
HM 7/17/87

Sh. 35 J

JTE 6/11/87
HM 7/17/87

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**************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
**************************************************
```

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

DISCHARGE = 15300 CFS

SUMMARY PRINTOUT

	SECNO	Q	CWSEL	CRIWS	QLOB	QCH	QROB	QLOBP	QCHP	QROBP	VLOB	VCH	VROB
	6.800	15300.00	4076.63	4076.01	0.00	3907.04	11392.96	0.00	25.54	74.46	0.00	7.69	7.02
	6.500	15300.00	4076.76	4076.30	0.00	4128.80	11171.20	0.00	26.99	73.01	0.00	8.44	7.48
	6.000	15300.00	4077.09	4074.57	0.00	15300.00	0.00	0.00	100.00	0.00	0.00	8.42	0.00
	5.500	15300.00	4078.35	4075.14	0.00	15235.94	64.06	0.00	99.58	0.42	0.00	6.23	1.39
	5.000	15300.00	4079.05	4076.48	326.05	14942.21	31.75	2.13	97.66	0.21	1.60	4.69	1.42
	4.000	15300.00	4079.71	4076.71	0.00	15300.00	0.00	0.00	100.00	0.00	0.00	6.46	0.00
	3.000	15300.00	4080.62	4079.22	4.27	15294.80	0.93	0.03	99.97	0.01	0.98	7.33	0.87
	2.500	15300.00	4082.07	4079.80	14.23	15276.55	9.21	0.09	99.85	0.06	1.33	4.83	1.19
	2.000	15300.00	4082.64	4081.66	177.48	15065.86	56.65	1.16	98.47	0.37	2.82	7.44	2.52
*	0.800	15300.00	4100.21	4100.21	731.39	8032.54	6536.07	4.78	52.50	42.72	6.79	12.14	11.68
*	0.600	15300.00	4100.56	4100.56	678.74	8328.02	6293.25	4.44	54.43	41.13	6.56	12.24	11.44

Sh. 35 K

FTK 6/11/87
HM 7/17/87

DISCHARGE = 15300 CFS

SUMMARY PRINTOUT

	SECNO	KRATIO	AREA	CWSEL	ELMIN	DEPTH	DIFWSX	HV	TOPWID	SSTA	ENDST	K*CHSL	10K*S
	6.800	0.00	2130.55	4076.63	4060.50	16.13	0.00	0.80	778.04	415.60	1249.99	0.00	90.61
	6.500	0.92	1983.00	4076.76	4060.90	15.86	0.13	0.93	745.29	430.22	1242.77	20.00	108.14
	6.000	1.60	1816.33	4077.09	4062.00	15.09	0.33	1.10	336.99	506.46	843.45	15.72	42.27
	5.500	1.54	2493.08	4078.35	4062.00	16.35	1.26	0.60	413.64	515.50	929.15	0.00	17.79
	5.000	1.15	3409.97	4079.05	4064.00	15.05	0.70	0.33	754.07	136.57	890.64	8.00	13.42
	4.000	0.74	2369.58	4079.71	4068.00	11.71	0.66	0.65	438.33	388.53	826.86	8.70	24.43
	3.000	0.76	2091.46	4080.62	4072.00	8.62	0.91	0.83	497.65	385.82	883.47	12.58	42.11
	2.500	1.62	3182.60	4082.07	4073.00	9.07	1.45	0.36	677.85	289.67	967.52	2.63	16.00
	2.000	0.56	2111.85	4082.64	4074.00	8.64	0.57	0.85	584.66	332.36	917.01	2.86	50.14
*	0.800	1.23	1328.64	4100.21	4080.00	20.21	17.57	2.14	330.00	0.00	330.00	9.23	33.20
*	0.600	1.01	1333.96	4100.56	4080.40	20.16	0.35	2.13	330.00	0.00	330.00	20.00	32.53

Sh. 35 L

SUMMARY OF ERRORS AND SPECIAL NOTES

```
CAUTION  SECNO=     0.800  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=     0.800  PROFILE= 1  MINIMUM SPECIFIC ENERGY

CAUTION  SECNO=     0.600  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=     0.600  PROFILE= 1  MINIMUM SPECIFIC ENERGY
```

JTC 6/11/87
HM 7/17/87

SG.35 A1

JTK 6/11/87
HM 7/17/87

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**************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
**************************************************
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Calculation Cover Sheet

Contract No. 5057 Discipline Earth Sci Calc. No. 10-551-01-00
No. of Sheets 42 43 AN

Project
UMTRA – Green River

Feature
Flood Analysis – Brown's Wash

Item
Hydrologic and Hydraulic analysis of 100 yr. storm

Sources of Data

Sources of Formulae & References

① Flood Analysis – Brown Wash (Hydrologic and Hydraulic analysis of PMF) MKE DOC. NO. 5057-GRN-C-01-00215-00, calc. NO. 10-539-02-00

③ Miller J.F. et al. "Precipitation-Frequency Atlas of the Western United States, NOAA ATLAS 2 Vol. VI – Utah – U.S. Dept. of Commerce, NOAA, National Weather Service", 1973.

② Flood Frequency Analysis (10-yr & 25-yr) MKE DOC. NO. 5057-GRN-C-01-00216-00, Calc. No. 10-534-01-00.

Preliminary Calc. ☐ Final Calc. ☒ Supersedes Calc. No. _____

Rev. No.	Revision	Calculation By	Date	Checked By	Date	Approved By	Date
		James Kam	10/8/87	HM	10/02/87	D.K. Kam	11/3/87

Form 42-110

MORRISON-KNUDSEN ENGINEERS, INC.
A MORRISON KNUDSEN COMPANY

Project UMTRA - Green River | Contract No. 5057 | Sheet 1
Feature Hydrology | Designed FK | File No.
Item Flooding Potential at Browns Wash | Checked HM | Date 10/7/87 | Date 04/19/88

Purpose: To determine the discharge in the Brown's Wash resulting from the 100-yr 24-hr. storm at the vicinity of the existing tailings pile. Based on the computed peak discharge, the maximum water level was derived.

Summary of Results:

Peak flow resulting from the 100-yr 24 hr. at the tailings pile location has been determined to be 24,510 cfs. Maximum water level elevations at different Stations are listed as follows:-

Sta.	Water level elevations (ft) without berm	with berm (4080') @ Sta. 5.5 & 6.0
6.0	4078.8	4077.7
5.5	4079.2	4080.7
5.0	4079.2	4081.4
4.0	4080.6	4081.8
3.0	4081.9	4082.5
2.5	4083.7	4083.9

The precipitations for the 100 yr storm with different durations were taken from ref. (3) and are listed on sh. 3. Precipitation distribution is derived on sh. 4 thru. 7. and is used in the HEC1 analysis of flood routing through the Browns Wash Watershed upstream of the tailing pile. The watershed characteristics used in the simulation is identical to that described in ref. (1) for the PMF analysis.

Based on the HEC1 analysis (see sh. 12 - 16) a peak flow of 24,510 cfs was computed for the 100 yr - 24 hr. storm. This flow was entered into the HEC2 computer run to determine the maximum water surface profile. Description of the cross sections used in the HEC2 analysis is contained in ref. (2). The water surface profiles with and without the berm (4080') @ Sta. 5.5 & 6.0 are presented on sh. 38 and sh. 26 respectively. The extent of the inundated areas is shown on Plate 1.

MORRISON-KNUDSEN ENGINEERS, INC.
A MORRISON KNUDSEN COMPANY

Project UMTRA – Green River | Contract No. 5057 | Sheet 3
Feature Hydrology | Designed FK | File No.
Item Flood Frequency Analysis | Checked HM | Date 4/28/87 | Date 7/14/87

MKE Doc.# 5057-GRN-C-01-00216-00 Ref. (2) FK 10/7/87

From figures on Sh. 11-18, the following precipitation values are tabulated: HM 10/9/87

Precipitation (inches)		Return Period				
		2-yr.	10-yr.	25-yr.	50-yr.	100-yr.
Duration	1-hr.	.58 1)	.90 3)	1.10 3)	1.20 3)	1.47 2)
	6-hr.	.75	1.20	1.40	1.60	1.80
	24-hr.	.90	1.60	1.95	2.25	2.50

from sh. 8a ref. (3)

1) Y_2 = 2-yr 1-hr. estimated value
$= -0.011 + 0.942 [.75 (.75/.90)]$
$= 0.58$"

2) Y_{100} = 100-yr 1-hr. estimated value
$= 0.494 + 0.755 [1.80 (1.80/2.50)]$
$= 1.47$"

3) from plot on sh. 11 : Precipitation depth vs. return period

Using data on sh. 3, plot data on precipitation depth – duration diagram on sh. 8b and 9

HM 10/14/87

Precipitation (inches)

Hr.	Cumulative 25-yr.	50-yr.	100-yr.	Incremental 25-yr.	50-yr.	100-yr.	Incre. Sequence 25-yr.	50-yr.	100-yr.
6	1.40	1.60	1.80	1.40	1.60	1.80	0.15	0.20	0.20
							1.40	1.60	1.80
12	1.70	1.90	2.20	0.30	0.30	0.40			
							0.30	0.30	0.40
18	1.80	2.10	2.30	0.10	0.20	0.10			
							0.10	0.15	0.10
24	1.95	2.25	2.50	0.15	0.15	0.20			
7				1.10	1.20	1.47	0.05	1.06	0.05
8				0.10	0.10	0.10	0.05	0.07	0.05
9	from chart on Sh. 8b			0.05	0.10	0.08	0.05	0.07	0.05
10				0.05	0.07	0.05	0.05	1.10	0.08
11				0.05	0.07	0.05	0.10	0.10	0.10
							1.10	1.20	1.47
12				0.05	0.06	0.05			

							100-yr.
11:05	.32	.35	.32	.35	.03	.04	.05
11:10	.50	.54	.18	.19	.04	.04	.05
11:15	.63	.66	.13	.14	.04	.04	.05
11:20	.71	.77	.08	.09	.04	.04	.05
11:25	.79	.86	.08	.09	.04	.04	.06
11:30	.87	.95	.08	.09	.04	.05	.10
11:35	.91	1.00	.04	.05	.08	.09	.11
11:40	.95	1.04	.04	.04	.08	.09	.12
11:45	.99	1.08	.04	.04	.08	.09	.18
11:50	1.03	1.12	.04	.04	.13	.14	.23
11:55	1.07	1.16	.04	.04	.18	.19	.43
12:00	1.10	1.20	.03	.04	.32	.35	

from Table: adjustment factors to obtain n-minute estimate from 1-hr value Sh. 10

$\Delta t = 5$ min.

0 - 0:50

.00278 ——————————→

0:55 - 1:40

.00278 .00278 ——————————→

1:45 - 2:30

.00278 ——————————→

2:35 - 3:20

.00278 ——————————→

3:25 - 4:10

.00278 ——————————→

4:15 - 5:00

.00278 ——————————→

5:05 - 5:50

.00278 ——————————→

5:55 - 6:40

.00278 .00278 .0042 .0042 ——————————→

6:45 - 7:30

0.0042 ——————————→

7:35 - 8:20

0.0042 ——————————→

8:25 - 9:10

0.0042 ——————————→ 0.0067 0.0067

MORRISON-KNUDSEN ENGINEERS, INC.
A MORRISON KNUDSEN COMPANY

Project UMTRA - Green River | Contract No. 5057 | Sheet 6
Feature Hydrology | Designed FK | File No.
Item Flood Frequency Analysis | Checked HM | Date 10/2/87 | Date Oct 19/87

Precipitation distribution for 100 yr-24 hr.

9:15 - 10.00

0.0067 →

10:05-10:50

.00833 →

10:55-11:40

.00833 .00833 .05 .05 .05 .05 .05 .06 .10 .11

11:45-12:30

.11 .18 .23 .43 .00556 .00556 .00556 .00556 .00556 .00556

12:35-13:20

.00556 →

13:25-14:10

.00556 →

14:15-15:00

.00556 →

15:05-15:50

.00556 →

15:55-16:40

.00556 →

16:45-17:30

.00556 →

17:35-18:20

.00556 .00556 .00556 .00556 .00556 .00556 .00139 .00139 .00139 .00139

MORRISON-KNUDSEN ENGINEERS, INC.
A MORRISON KNUDSEN COMPANY

Project UMTRA-Green River | Contract No. 5057 | Sheet 7
Feature Hydrology | Designed JTL | File No.
Item Flood Frequency Analysis | Checked HM | Date 10/2/87 | Date 10/19/87

18:25 – 19:10

.00139 →

19:15 – 20:00

.00139 →

20:05 – 20:50

.00139 →

20:55 – 21:40

.00139 →

21:45 – 22:30

.00139 →

22:35 – 23:20

.00139 →

23:25 – 24:10

.00139 →

Table 11. *Equations for estimating 1-hr values in Utah with statistical parameters for each equation*

Region of applicability*	Equation	Corr. coeff.	No. of stations	Mean of computed stn. values (inches)	Standard error of estimate (inches)
Utah south of the Unitas east of Wasatch, and east and south of Boulder and Pine Valley Mountains (1)	$Y_2 = -0.011 + 0.942[(X_1)(X_1/X_3)]$	0.95	86	0.72	0.085
	$Y_{100} = 0.494 + 0.755[(X_3)(X_3/X_4)]$	.90	85	1.96	.290
Most of western Utah (2)	$Y_2 = 0.005 + 0.852[(X_1)(X_1/X_2)]$	.89	65	0.41	.047
	$Y_{100} = 0.322 + 0.789[(X_3)(X_3/X_4)]$	.87	65	1.25	.196
Northeast and northwest corners of Utah (3)	$Y_2 = 0.019 + 0.711[(X_1)(X_1/X_2)] + 0.001Z$	.82	98	0.40	.031
	$Y_{100} = 0.338 + 0.670[(X_3)(X_3/X_4)] + 0.001Z$	.80	79	1.04	.141

* Numbers in parentheses refer to geographic regions shown in figure 18. See text for more complete description.

List of variables
Y_2 = 2-yr 1-hr estimated value
Y_{100} = 100-yr 1-hr estimated value
X_1 = 2-yr 6-hr value from precipitation-frequency maps
X_2 = 2-yr 24-hr value from precipitation-frequency maps
X_3 = 100-yr 6-hr value from precipitation-frequency maps
X_4 = 100-yr 24-hr value from precipitation-frequency maps
Z = point elevation in hundreds of feet

Procedures for estimating 1-hr (60-min) precipitation-frequency values. Multiple-regression screening techniques were used to develop equations for estimating 1-hr values. Factors considered in the screening process were restricted to those that could be determined easily from the maps of this Atlas or from generally available topographic maps.

the Wasatch Range, and east and south of the Boulder and Pine Valley Mountains (Region 1, fig. 18). The second region is most of western Utah and is labeled Region 2 on figure 18. Northeastern Utah north of the Unitas and the northwestern tip of Utah (Region 3, fig. 18) comprises the third region. Equations to provide estimates for the 1-hr duration for 2- and 100-yr return periods are shown in table 11. Also listed are the statistical parameters associated with each equation. In these equations, the variable $[(X_1)(X_1/X_2)]$ or $[(X_3)(X_3/X_4)]$ can be regarded as the 6-hr value times the slope of the line connecting the 6- and 24-hr values for the appropriate return period.

As with any separation into regions, the boundary can only be regarded as the sharpest portion of a zone of transition between

precipitation occurring within these months, but the investigations mentioned in the preceding paragraph indicate that these maps will approximate the values that would be obtained by using a data series made up of precipitation events that are exclusively rain. Since data for only part of the year were used, these maps have been labeled with the appropriate probabilities rather than with a return period in years (figs. 31–42).

Procedures for Estimating Values for Durations Other Than 6 and 24 Hrs

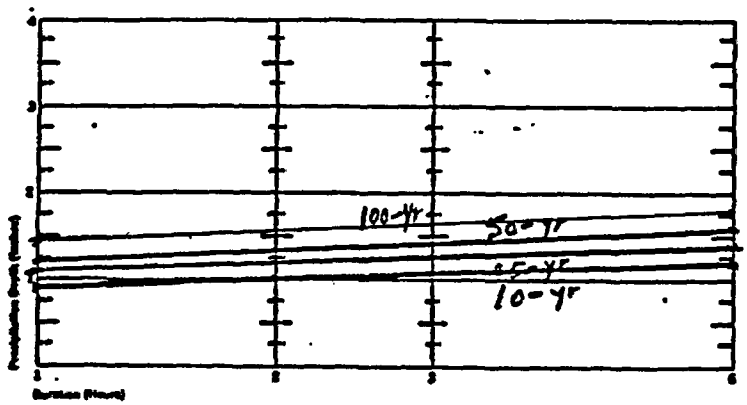
The isopluvial maps in this Atlas are for 6- and 24-hr durations. For many hydrologic purposes, values for other durations are necessary. Such values can be estimated using the 6- and 24-hr maps and the empirical methods outlined in the following sections. The procedures detailed below for obtaining 1-, 2-, and 3-hr estimates were developed specifically for this Atlas. The procedures for obtaining estimates for less than 1-hr duration and for 12-hr duration were adopted from *Weather Bureau Technical Paper* No. 40 (U.S. Weather Bureau 1961) only after investigation demonstrated their applicability to data from the area covered by this Atlas.

Y_2 = 2-yr 1-hr estimated value
Y_{100} = 100-yr 1-hr estimated value
X_1 = 2-yr 6-hr value from precipitation-fre
X_2 = 2-yr 24-hr value from precipitation-fi
X_3 = 100-yr 6-hr value from precipitation-
X_4 = 100-yr 24-hr value from precipitation
Z = point elevation in hundreds of feet

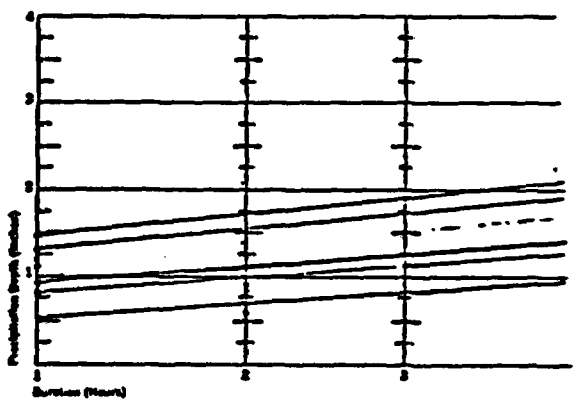
Sh. 8b.

Procedures for estimating 1-hr (60-min quency values. Multiple-regression screening te to develop equations for estimating 1-hr values. in the screening process were restricted to th determined easily from the maps of this Atlas available topographic maps.

The 11 western states were separated into regions. The regions were chosen on the basis and climatological homogeneity and are generall river basins separated by prominent divides. Th graphic regions are partially within Utah. For use as an overlay on the precipitation-freque regions are outlined in figure 18. The first region is that portion of the State south of the Unita M



(A)



(B)

Figure 15. *Precipitation depth-duration diagram (1- to 6-hr). a. Utah south of the Unita Mountains, east of the Wasatch Range, and east and south of the Boulder and Pine Valley Mountains. (Region 1, fig. 18).*

b. Most of western Utah. (Region 2, fi

JTK 10/7/87
HM ok 10/87

Ref. (3)

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HM 8/12/87

Sh. 9

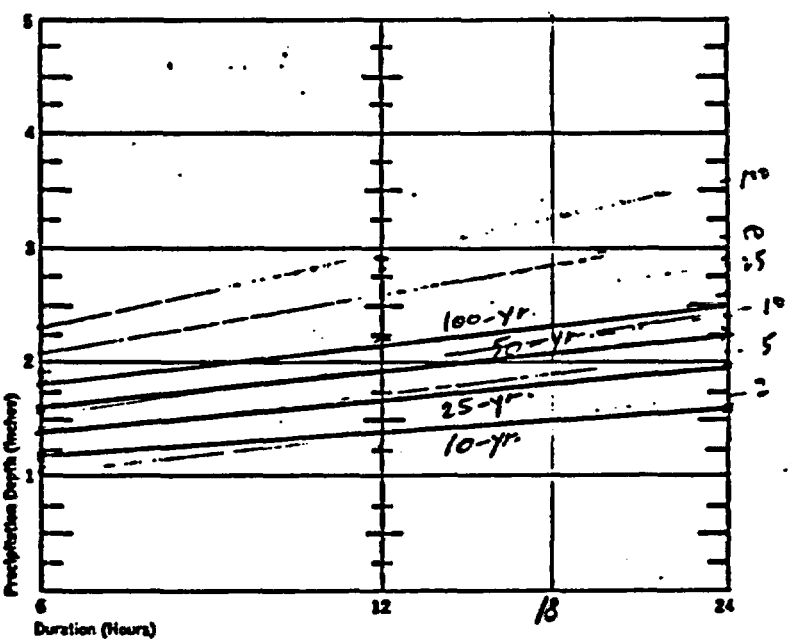
FTK 10/7/87 (3)

HM ok 10/14/87

Figure 16. *Precipitation depth-duration diagram (6- to 24-hr).*

FTC 4/27/87

HM 5/13/87



Estimates of 1-hr precipitation-frequency values for return periods between 2 and 100 yrs. The 1-hr values for the 2- and 100-yr return periods can be plotted on the nomogram of figure 6 to obtain values for return periods greater than 2 yrs or less than 100 yrs. Draw a straight line connecting the 2- and 100-yr values and read the desired return-period value from the nomogram.

Estimates for 2- and 3-hr (120- and 180-min) precipitation-frequency values. To obtain estimates of precipitation-frequency values for 2 or 3 hrs, plot the 1- and 6-hr values from the Atlas on the appropriate nomogram of figure 15. Draw a straight line connecting the 1- and 6-hr values, and read the 2- and 3-hr values from the nomogram. This nomogram is independent of return period. It was developed using data from the same regions used to develop the 1-hr equations.

The mathematical solution from the data used to develop figure 15 gives the following equations for estimating the 2- and 3-hr values:

For Region 1, figure 18

$$2\text{-hr} = 0.341\ (6\text{-hr}) + 0.659\ (1\text{-hr}) \quad (3)$$

$$3\text{-hr} = 0.569\ (6\text{-hr}) + 0.431\ (1\text{-hr}) \quad (4)$$

For Region 2,

$$2\text{-hr} = 0.299\ (6\text{-hr}) + 0.701\ (1\text{-hr}) \quad (5)$$

Illustration of Use Maps, Diagrams, a

To illustrate the use figures 19 to 30 for the do These values are shown i read from the maps should of figure 6 because (1) n series of maps as are labe registration differences in between isolines is difficu values in table 13 (fig. 17. subjectively. On this nom what above the line, so th (as shown by the strikeout adopted in preference to th

The 2- and 100-yr 1 from the equations applic The 2-yr 1-hr value is es values from table 13); the (100-yr 6- and 24-hr valu values on figure 6 and co can obtain estimates for re

The 2- and 3-hr valu gram of figure 15 or equat for the desired return pe points on the nomogram straight line. Read the esti of the connecting line a example is shown in figur 100-yr 2-hr (1.82 in.) an italics on table 13.

values for return
es for the 2- and
iogram of figure 6
2 yrs or less than
ind 100-yr values
he nomogram.
in) precipitation-
pitation-frequency
es from the Atlas
ew a straight line
- and 3-hr values
endent of return
ne regions used to

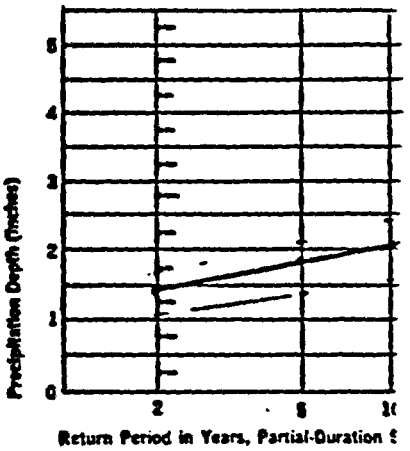
used to develop
nating the 2- and

.659 (1-hr) (3)
).431 (1-hr) (4)
.701 (1-hr) (5)
.474 (1-hr) (6)
.750 (1-hr) (7)
33 (1-hr) (8)
equency values.
values from the
r estimates at the
with the 12-hr

stimates for dura-
le 12 to the 1-hr

can obtain estimates for return periods of 5, 10, 25, and 50 yrs.

The 2- and 3-hr values can be estimated by using the nomogram of figure 15 or equations (3) and (4). The 1- and 6-hr values for the desired return period are obtained as above. Plot these points on the nomogram of figure 15 and connect them with a straight line. Read the estimates for 2 or 3 hrs at the intersections of the connecting line and the 2- and 3-hr vertical lines. An example is shown in figure 17b for the 100-yr return period. The 100-yr 2-hr (1.82 in.) and 100-yr 3-hr (1.95 in.) values are in italics on table 13.



(A)

Sh. 10

ref. (3)

File 4/29
HM 6/18/85

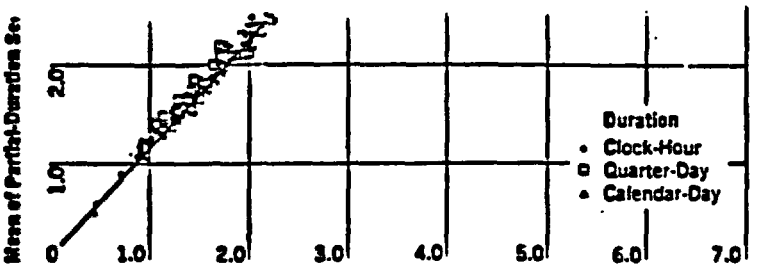
	.29	.16	.12	
Duration (min)	5	10	15	30
Ratio to 1-hr	0.29	0.45	0.57	0.79

(Adopted from *U.S. Weather Bureau Technical Paper* No. 40, 1961.)

	1-hr	2-hr
2-yr	0.65	
5-yr		
10-yr		
25-yr		
50-yr		
100-yr	*1.63*	*1.82*

Table 12. *Adjustment factors to obtain n-min estimates from 1-hr values*

Table 13. *Precipitation data fc computed for town*



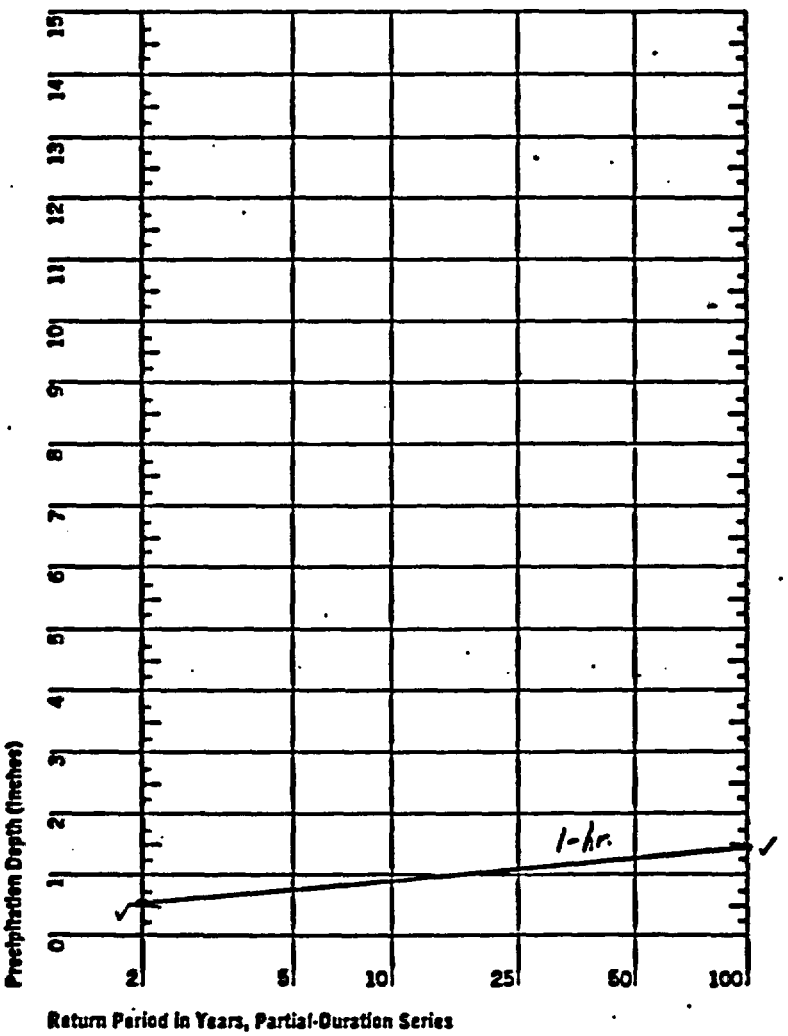
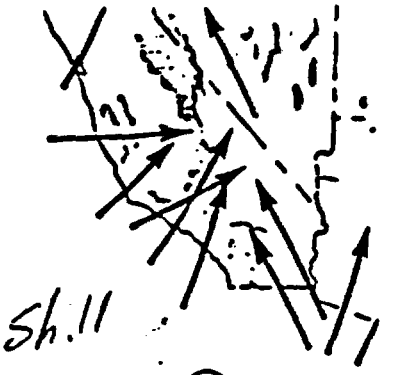


Figure 6. *Precipitation depth versus return period for partial-duration series.*



portant. Next, an examination wa: topographic and meteorologic con: direction to moisture sources. Eac! ure of some physical reality, and to variation in the precipitation-fre:

Finally, various climatological could be indexes of variation of th were considered. The procedure u equations was a multiple-regressio: ess was done by computer using computer program was capable of pendent variables for as many lo- The number of variables screened between 60 and 100. This does n: pletely different factors could be i factors might involve different mea measures of slope might be over di ent orientations. In each instance, computer to select the most critical factor.

Although the computer progr: ear during the regression analysis, i computations to use logarithms, po: binations of any or all of the fa selected the single variable most hig tation-frequency value under inves select the variable that, combined lected, would explain the greatest v: quency values. The third, fourth, fi selected in a similar manner. The

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4/29/57
HM 6/18/87

Sh. 12

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HM oct 14/87

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
    1     ID    UMTRA - GREEN RIVER - BROWN WASH
    2     ID    100 - YR 24 - HR STORM
    3     IT    5                     300
    4     IN    5
    5     IO    5

    6     KK    BAS1 SUB-BASIN 1
    7     KM    100-YR 24-HR
    8     BA    2.6
    9     PB    2.5
   10     PI  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278
   11     PI  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278
   12     PI  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278
   13     PI  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278
   14     PI  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278
   15     PI  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278
   16     PI  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278  .00278
   17     PI  .00278  .00278  .00420  .00420  .00420  .00420  .00420  .00420  .00420  .00420
   18     PI  .00420  .00420  .00420  .00420  .00420  .00420  .00420  .00420  .00420  .00420
   19     PI  .00420  .00420  .00420  .00420  .00420  .00420  .00420  .00420  .00420  .00420
   20     PI  .00420  .00420  .00420  .00420  .00420  .00420  .00420  .00420  .00670  .00670
   21     PI  .00670  .00670  .00670  .00670  .00670  .00670  .00670  .00670  .00670  .00670
   22     PI  .00833  .00833  .00833  .00833  .00833  .00833  .00833  .00833  .00833  .00833
   23     PI  .00833  .00833    .05     .05     .05     .05     .05     .06     .10     .11
   24     PI    .11     .18     .23     .43  .00556  .00556  .00556  .00556  .00556  .00556
   25     PI  .00556  .00556  .00556  .00556  .00556  .00556  .00556  .00556  .00556  .00556
   26     PI  .00556  .00556  .00556  .00556  .00556  .00556  .00556  .00556  .00556  .00556
   27     PI  .00556  .00556  .00556  .00556  .00556  .00556  .00556  .00556  .00556  .00556
   28     PI  .00556  .00556  .00556  .00556  .00556  .00556  .00556  .00556  .00556  .00556
   29     PI  .00556  .00556  .00556  .00556  .00556  .00556  .00556  .00556  .00556  .00556
   30     PI  .00556  .00556  .00556  .00556  .00556  .00556  .00556  .00556  .00556  .00556
   31     PI  .00556  .00556  .00556  .00556  .00556  .00556  .00139  .00139  .00139  .00139
   32     PI  .00139  .00139  .00139  .00139  .00139  .00139  .00139  .00139  .00139  .00139
   33     PI  .00139  .00139  .00139  .00139  .00139  .00139  .00139  .00139  .00139  .00139
   34     PI  .00139  .00139  .00139  .00139  .00139  .00139  .00139  .00139  .00139  .00139
   35     PI  .00139  .00139  .00139  .00139  .00139  .00139  .00139  .00139  .00139  .00139
   36     PI  .00139  .00139  .00139  .00139  .00139  .00139  .00139  .00139  .00139  .00139
   37     PI  .00139  .00139  .00139  .00139  .00139  .00139  .00139  .00139  .00139  .00139
   38     PI  .00139  .00139  .00139  .00139  .00139  .00139  .00139  .00139  .00139  .00139
   39     LU    0     0.2
   40     UD   .66

   41     KK    BAS2
   42     KM    100YR 24HR
   43     BA    5.5
   44     LU    0     0.2
   45     UD   0.73

   46     KK    ST12    COMBINE BAS. 1&2 FLOWS
   47     HC    2
```

5h, 13

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
   48     KK      3,4        FLOW 1,2 FROM STA. 1,2 TO 3,4
   49     RK   26400    .032      .04              TRAP        0     0.45

   50     KK    BAS4
   51     KM         100YR 24HR
   52     BA     6.4
   53     LU       0       0.2
   54     UD    0.75

   55     KK    BAS3
   56     KM         100YR 24HR
   57     BA    12.1
   58     LU       0       0.2
   59     UD     .96

   60     KK    ST34     COMBINE FLOWS 3,4
   61     HC       3

   62     KK    5,6        FLOW 3,4 FORM STA. 3,4 TO 5,6
   63     RK   53856    .015      .04              TRAP        0     0.03

   64     KK    BAS5
   65     KM         100YR 24HR
   66     BA    20.7
   67     LU       0       0.2
   68     UD    1.73

   69     KK    BAS6
   70     KM         100YR 24HR
   71     BA    11.8
   72     LU       0       0.2
   73     UD    0.95

   74     KK    ST56     COMBINE FLOWS 5,6
   75     HC       3

   76     KK    7,8        FLOW 5,6 FROM STA. 5,6 TO 7,8
   77     RK    6336   0.005      .04              TRAP        0     0.025

   78     KK    BAS8
   79     KM         100YR 24HR
   80     BA     0.5
   81     LU       0       0.2
   82     UD    0.52

   83     KK    BAS7
   84     KM         100YR 24HR
   85     BA    12.2
   86     LU       0       0.2
   87     UD    1.22
```

FK 10/5/87
HM 10/14/87

Sh. 14

FTK 10/5/87
HM 06/19/87

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
   88     KK    ST78    COMBINE FLOWS 7,8
   89     HC       3
   90     KK    9          FLOWS 7,8 FROM STA. 7,8 TO 9
   91     RK   32736   0.01      .04              TRAP       0     0.05
   92     KK    BAS9
   93     KM         100YR 24HR
   94     BA    11.3
   95     LU       0      0.2
   96     UD    1.39
   97     KK    ST9  COMBINE FLOWS
   98     HC       2
   99     ZZ
```

```
*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             FEBRUARY 1981             *
*           REVISED 30 OCT 81           *
*                                       *
* RUN DATE
```

UMTRA - GREEN RIVER - BROWN WASH
100 - YR 24 - HR STORM

5 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	1	0	STARTING DATE
	ITIME		0000	STARTING TIME
	NQ		300	NUMBER OF HYDROGRAPH ORDINATES
	NDDATE	2	0	ENDING DATE
	NDTIME		0055	ENDING TIME
	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

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*  THE HYDROLOGIC ENGINEERING CENTER    *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*                                       *
*****************************************
```

Sh. 15

FTK 10/5/87
HM 10/14/87

Sh. 16

FTK 10/5/87

HM ad 14/87

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	BAS1	1932.	12.50	354.	89.	85.	2.60		
HYDROGRAPH AT	BAS2	3782.	12.58	750.	187.	181.	5.50		
2 COMBINED AT	ST12	5702.	12.50	1104.	276.	266.	8.10		
ROUTED TO	3,4	5411.	12.75	1103.	276.	266.	8.10		
HYDROGRAPH AT	BAS4	4325.	12.58	872.	218.	210.	6.40		
HYDROGRAPH AT	BAS3	6743.	12.75	1649.	412.	397.	12.10		
3 COMBINED AT	ST34	16194.	12.67	3624.	906.	873.	26.60		
ROUTED TO	5,6	12835.	13.83	3571.	908.	875.	26.60		
HYDROGRAPH AT	BAS5	6932.	13.50	2777.	705.	679.	20.70		
HYDROGRAPH AT	BAS6	6628.	12.75	1608.	402.	387.	11.80		
3 COMBINED AT	ST56	21136.	13.75	7866.	2016.	1941.	59.10		
ROUTED TO	7,8	21058.	13.92	7848.	2015.	1941.	59.10		
HYDROGRAPH AT	BAS8	438.	12.33	68.	17.	16.	0.50		
HYDROGRAPH AT	BAS7	5566.	13.00	1660.	416.	400.	12.20		
3 COMBINED AT	ST78	23980.	13.83	9544.	2448.	2357.	71.80		
ROUTED TO	9	22675.	14.33	9411.	2443.	2353.	71.80		
HYDROGRAPH AT	BAS9	4605.	13.17	1532.	385.	371.	11.30		
2 COMBINED AT	ST9	24510.	14.33	10780.	2828.	2724.	83.10		

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

Sh. 17

Subcritical profile
with upstream railroad crossing
and downstream culverts
(4 functioning)

FTK 10/6/87
HM oct 14/87

```
**************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
**************************************************

T1      UMTRA - GREEN RIVER - 100-YR 24 HR
T2      WATER SURFACE PROFILE IN BROWN WASH
T3      DISCHARGE =  24510 CFS

J1  ICHECK     INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ
       0.       0.        0.        0.  0.009000      0.00      0.0    24510.  4074.000     0.000

J2  NPROF      IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE
    -1.000     0.000     0.000     0.000     0.000     0.000    -1.000     0.000     0.000     0.000

J3  VARIABLE CODES FOR SUMMARY PRINTOUT
    38.000    43.000     1.000     2.000    13.000    14.000    15.000    35.000    60.000    59.000

    55.000    26.000    56.000     0.000    38.000    58.000    25.000     1.000    42.000     8.000

    51.000    10.000     4.000    53.000    54.000    33.000     5.000     0.000     0.000     0.000

NC      0.045     0.050     0.024     0.300     0.500     0.000     0.000     0.000     0.000     0.000
X1      6.800    25.000   150.000   700.000     0.000     0.000     0.000     0.000     0.000     0.000
BT     25.000     0.000  4090.000  4090.000    80.000  4080.000  4080.000   150.000  4082.000  4082.000
BT    280.000  4080.000  4080.000   340.000  4078.000  4078.000   450.000  4076.000  4076.000   545.000
BT   4075.500  4065.500   550.000  4075.500  4070.500   555.000  4075.200  4065.500   560.000  4075.200
BT   4065.500   565.000  4075.000  4070.500   570.000  4075.000  4065.500   575.000  4075.000  4065.500
BT    580.000  4075.000  4070.500   585.000  4075.000  4065.500   590.000  4074.900  4065.500   595.000
BT   4074.900  4070.500   600.000  4074.800  4065.500   700.000  4074.000  4074.000   800.000  4074.000
BT   4074.000   936.000  4078.000  4078.000   950.000  4076.000  4076.000  1000.000  4070.000  4070.000
BT   1070.000  4070.000  4070.000  1885.000  4100.000  4100.000     0.000     0.000     0.000     0.000
GR   4090.000     0.000  4080.000    80.000  4082.000   150.000  4080.000   280.000  4078.000   340.000
GR   4076.000   450.000  4065.500   545.000  4060.500   550.000  4065.500   555.000  4065.500   560.000
GR   4060.500   565.000  4065.500   570.000  4065.500   575.000  4060.500   580.000  4065.500   585.000
GR   4065.500   590.000  4060.500   595.000  4065.500   600.000  4074.000   700.000  4074.000   800.000
GR   4078.000   936.000  4076.000   950.000  4070.000  1000.000  4070.000  1070.000  4100.000  1885.000

X1      6.500     0.000     0.000     0.000    20.000    20.000    20.000     0.000     0.400     0.000
X2      0.000     0.000     0.000     0.000     0.000     0.000     1.000     0.000     0.000     0.000
```

JTK 10/6/87 HM ok 10/7/87

NC	0.045	0.050	0.035	0.100	0.300	0.000	0.000	0.000	0.000	0.000
X1	6.000	8.000	110.000	890.000	70.000	70.000	70.000	0.000	0.000	0.000
GR	4090.000	0.000	4074.000	110.000	4070.000	490.000	4062.000	525.000	4078.000	685.000
GR	4078.000	890.000	4080.000	1265.000	4100.000	1885.000	0.000	0.000	0.000	0.000
X1	5.500	11.000	180.000	890.000	150.000	280.000	270.000	0.000	0.000	0.000
GR	4090.000	0.000	4080.000	80.000	4080.000	140.000	4071.000	180.000	4070.000	530.000
GR	4062.000	570.000	4073.000	680.000	4076.000	890.000	4079.000	940.000	4080.000	1200.000
GR	4090.000	1460.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NC	0.000	0.000	0.000	0.200	0.500	0.000	0.000	0.000	0.000	0.000
X1	5.000	10.000	270.000	876.000	230.000	290.000	250.000	0.000	0.000	0.000
GR	4100.000	0.000	4080.000	95.000	4076.000	270.000	4076.000	470.000	4064.000	530.000
GR	4074.000	635.000	4076.000	876.000	4082.000	890.000	4082.000	1090.000	4110.000	1885.000
X1	4.000	9.000	385.000	840.000	470.000	440.000	460.000	0.000	0.000	1.000
GR	4130.000	0.000	4090.000	100.000	4080.000	385.000	4068.000	530.000	4078.000	750.000
GR	4080.000	840.000	4086.000	870.000	4090.000	1165.000	4120.000	1930.000	0.000	0.000
X1	3.000	12.000	400.000	880.000	315.000	320.000	318.000	0.000	0.000	1.000
GR	4130.000	0.000	4100.000	80.000	4090.000	170.000	4080.000	400.000	4074.000	455.000
GR	4072.000	570.000	4076.000	620.000	4080.000	880.000	4088.000	925.000	4090.000	1150.000
GR	4110.000	1640.000	4120.000	1820.000	0.000	0.000	0.000	0.000	0.000	0.000
NC	0.000	0.000	0.000	0.100	0.300	0.000	0.000	0.000	0.000	0.000
X1	2.500	12.000	300.000	960.000	365.000	380.000	380.000	0.000	0.000	0.000
GR	4110.000	0.000	4090.000	250.000	4080.000	300.000	4073.000	420.000	4076.000	500.000
GR	4076.000	560.000	4078.000	620.000	4078.000	800.000	4080.000	960.000	4091.000	1000.000
GR	4096.000	1330.000	4110.000	1700.000	0.000	0.000	0.000	0.000	0.000	0.000
X1	2.000	11.000	380.000	900.000	350.000	300.000	350.000	0.000	0.000	0.000
GR	4114.000	0.000	4090.000	200.000	4080.000	380.000	4074.000	400.000	4074.000	430.000
GR	4078.000	510.000	4080.000	600.000	4080.000	900.000	4094.000	990.000	4094.000	1170.000
GR	4120.000	1890.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NC	0.015	0.015	0.015	0.300	0.500	0.000	0.000	0.000	0.000	0.000
X1	0.800	8.000	85.000	140.000	650.000	400.000	650.000	0.000	0.000	0.000
BT	8.000	0.000	4100.000	4100.000	80.000	4098.000	4098.000	85.000	4098.000	4098.000
BT	86.000	4098.000	4090.000	139.000	4098.000	4090.000	140.000	4098.000	4098.000	190.000
BT	4098.000	4098.000	330.000	4096.000	4096.000	0.000	0.000	0.000	0.000	0.000
GR	4100.000	0.000	4098.000	80.000	4098.000	85.000	4080.000	86.000	4080.000	139.000
GR	4098.000	140.000	4098.000	190.000	4096.000	330.000	0.000	0.000	0.000	0.000
X1	0.600	0.000	0.000	0.000	20.000	20.000	20.000	0.000	0.400	0.000
X2	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000
EJ	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

FTK 10/6/87
HM Oct 14/87

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	GLOB	GCH	GROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

#PROF 1

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

CCHV= 0.300 CEHV= 0.500
#SECNO 6.800

3265 DIVIDED FLOW

3370 NORMAL BRIDGE, NRD= 25 MIN ELTRD= 4070.00 MAX ELLC= 4100.00

6.80	17.08	4077.58	4076.91	4074.00	4078.63	1.05	0.00	0.00	4082.00
24510.	0.	8355.	16155.	0.	899.	2127.	0.	0.	4074.00
0.00	0.00	9.29	7.60	0.000	0.024	0.050	0.000	4060.50	362.88
0.008946	0.	0.	0.	0	13	6	-1366.77	896.09	1276.03

#SECNO 6.500

3265 DIVIDED FLOW

3370 NORMAL BRIDGE, NRD= 25 MIN ELTRD= 4070.00 MAX ELLC= 4100.40

6.50	16.80	4077.70	4077.23	0.00	4078.90	1.20	0.19	0.08	4082.40
24510.	0.	8703.	15807.	0.	867.	1971.	1.	0.	4074.40
0.00	0.00	10.04	8.02	0.000	0.024	0.050	0.000	4060.90	378.44
0.010460	20.	20.	20.	2	13	0	-1305.78	861.24	1268.34

CCHV= 0.100 CEHV= 0.300
#SECNO 6.000

3301 HV CHANGED MORE THAN HVINS

6.00	16.76	4078.76	4074.75	0.00	4079.20	0.44	0.22	0.08	4074.00
24510.	176.	24302.	33.	78.	4575.	54.	7.	2.	4078.00
0.00	2.25	5.31	0.60	0.045	0.035	0.050	0.000	4062.00	77.26
0.001484	70.	70.	70.	2	14	0	0.00	955.70	1032.96

sh. 20

JK 10/6/87
HM ok 10/7/87

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	QLOSS	BANK ELEV
Q	GLOB	GCH	GROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST
*SECNO 5.500									
5.50	17.19	4079.19	4073.92	0.00	4079.45	0.26	0.23	0.02	4071.00
24510.	296.	24128.	86.	149.	5837.	89.	41.	7.	4076.00
0.02	1.99	4.13	0.96	0.045	0.035	0.050	0.000	4062.00	143.62
0.000573	150.	270.	280.	2	14	0	0.00	844.88	988.50
CCHV= 0.200 CEHV= 0.500									
*SECNO 5.000									
3301 HV CHANGED MORE THAN HVINS									
5.00	15.19	4079.19	4077.52	0.00	4080.00	0.81	0.28	0.28	4076.00
24510.	564.	23921.	26.	223.	3270.	12.	68.	12.	4076.00
0.03	2.53	7.31	2.15	0.045	0.035	0.050	0.000	4064.00	130.34
0.003146	230.	250.	290.	2	14	0	0.00	753.10	883.45
*SECNO 4.000									
4.00	12.60	4080.60	4078.58	0.00	4081.81	1.21	1.61	0.20	4080.00
24510.	5.	24505.	1.	5.	2772.	1.	101.	18.	4080.00
0.05	0.92	8.84	0.82	0.045	0.035	0.050	0.000	4068.00	367.94
0.003902	470.	460.	440.	2	16	0	0.00	475.05	842.99
*SECNO 3.000									
3.00	9.91	4081.91	4080.54	0.00	4083.17	1.26	1.33	0.02	4080.00
24510.	90.	24401.	20.	42.	2706.	10.	121.	22.	4080.00
0.06	2.15	9.02	1.91	0.045	0.035	0.050	0.000	4072.00	356.13
0.004504	315.	318.	320.	2	19	0	0.00	534.60	890.73
CCHV= 0.100 CEHV= 0.300									
*SECNO 2.500									
3301 HV CHANGED MORE THAN HVINS									
2.50	10.66	4083.66	4080.87	0.00	4084.18	0.52	0.94	0.07	4080.00
24510.	65.	24403.	42.	34.	4218.	24.	152.	27.	4080.00
0.07	1.93	5.79	1.72	0.045	0.035	0.050	0.000	4073.00	281.68
0.001567	365.	380.	380.	2	14	0	0.00	691.64	973.32

Sh. 21

JTK 10/6/87
HM OCT 14/87

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	QLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

```
*SECNO 2.000

3301 HV CHANGED MORE THAN HVINS

     2.00     10.11   4084.11   4082.94      0.00   4085.21      1.10      0.85      0.18   4080.00
   24510.       534.     23805.       170.       152.      2790.        54.       181.        33.   4080.00
     0.09      3.50      8.53      3.13     0.045     0.035     0.050     0.000   4074.00    305.93
 0.004311       350.       350.       300.          2         10          0      0.00    620.53    926.46


CCHV=   0.300 CEHV=   0.500
*SECNO 0.800
3280 CROSS SECTION       0.80 EXTENDED       5.71 FEET


3301 HV CHANGED MORE THAN HVINS


3370 NORMAL BRIDGE, NRD=  8 MIN ELTRD= 4096.00 MAX ELLC= 4100.00

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
     0.80     21.71   4101.71   4101.71      0.00   4104.60      2.89      2.14      0.89   4098.00
   24510.      2547.      9498.     12464.       235.       744.       844.       215.        39.   4098.00
     0.10     10.84     12.77     14.76     0.015     0.015     0.015     0.000   4080.00      0.00
 0.003139       650.       650.       400.          0         10          0   -432.00    330.00    330.00


*SECNO 0.600
3280 CROSS SECTION       0.60 EXTENDED       5.64 FEET


3370 NORMAL BRIDGE, NRD=  8 MIN ELTRD= 4096.00 MAX ELLC= 4100.40

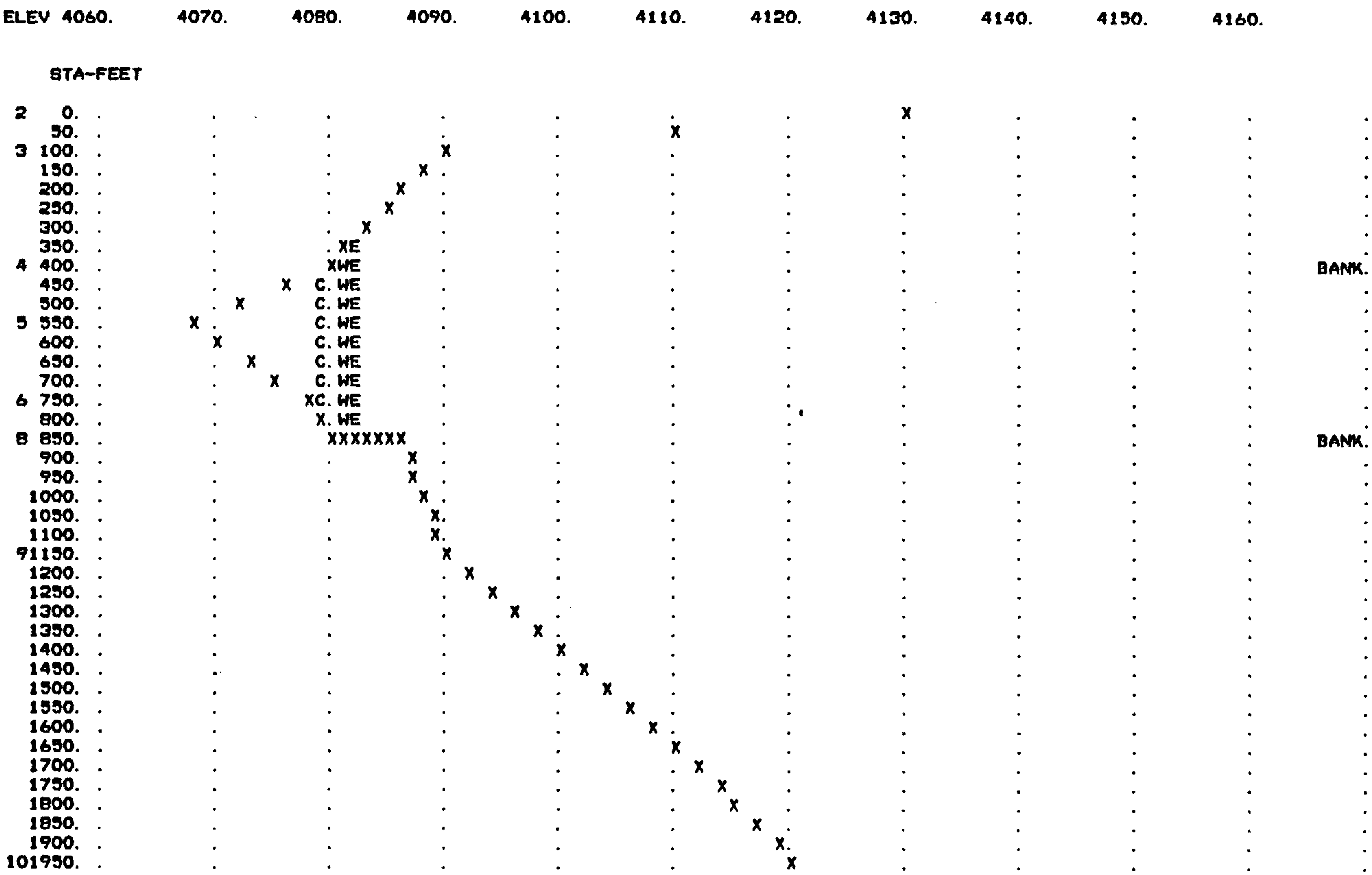
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
     0.60     21.64   4102.04   4102.04      0.00   4104.92      2.88      0.06      0.00   4098.40
   24510.      2452.      9884.     12174.       230.       762.       832.       215.        39.   4098.40
     0.10     10.68     12.97     14.63     0.015     0.015     0.015     0.000   4080.40      0.00
 0.003140        20.        20.        20.          0         10          0   -410.41    330.00    330.00
```

Sh. 22

JJK 10/6/87
HM oct 14/87

CROSS SECTION 4.00
STREAM DISCHARGE = 24510 CFS
DISCHARGE= 24510.

PLOTTED POINTS (BY PRIORITY)-B=BOTTOM BRIDGE, T=TOP BRIDGE, X=GROUND, W=WATER SUR, E=ENERGY GRADIENT, C=CRITICAL WSEL



NRD= 0 ELLC= 9999999.00 ELTRD= 9999999.00

EL(I),STA(I)

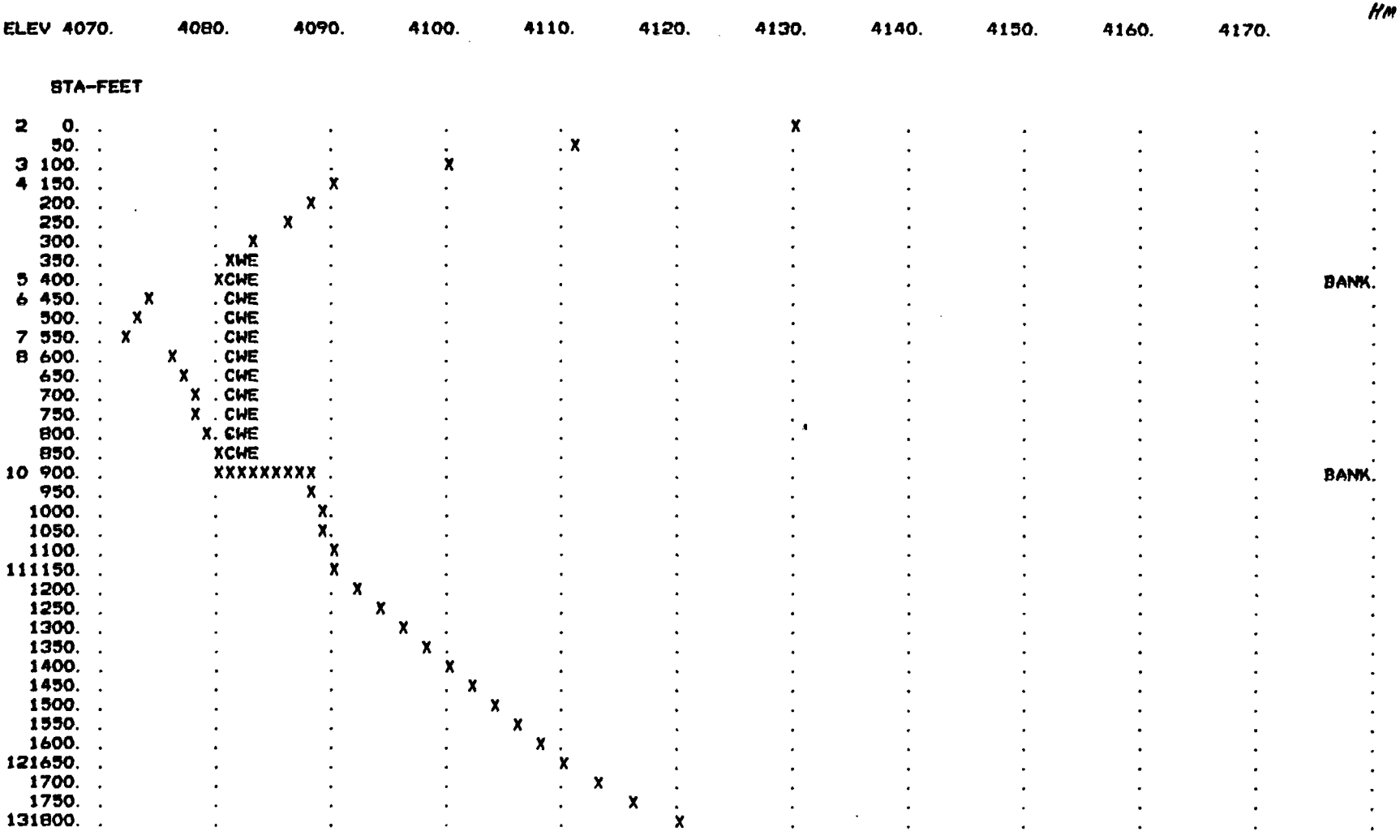
4130.00	0.00	4090.00	100.00	4080.00	385.00	4068.00	530.00	4078.00	750.00
4080.00	840.00	4086.00	870.00	4090.00	1165.00	4120.00	1930.00		

Sh. 23

JTK 10/6/87
HM oct 14/87

CROSS SECTION 3.00
STREAM DISCHARGE = 24510 CFS
DISCHARGE= 24510.

PLOTTED POINTS (BY PRIORITY)-B=BOTTOM BRIDGE, T=TOP BRIDGE, X=GROUND, W=WATER SUR, E=ENERGY GRADIENT, C=CRITICAL WSEL



NRD= 0 ELLC= 9999999.00 ELTRD= 9999999.00

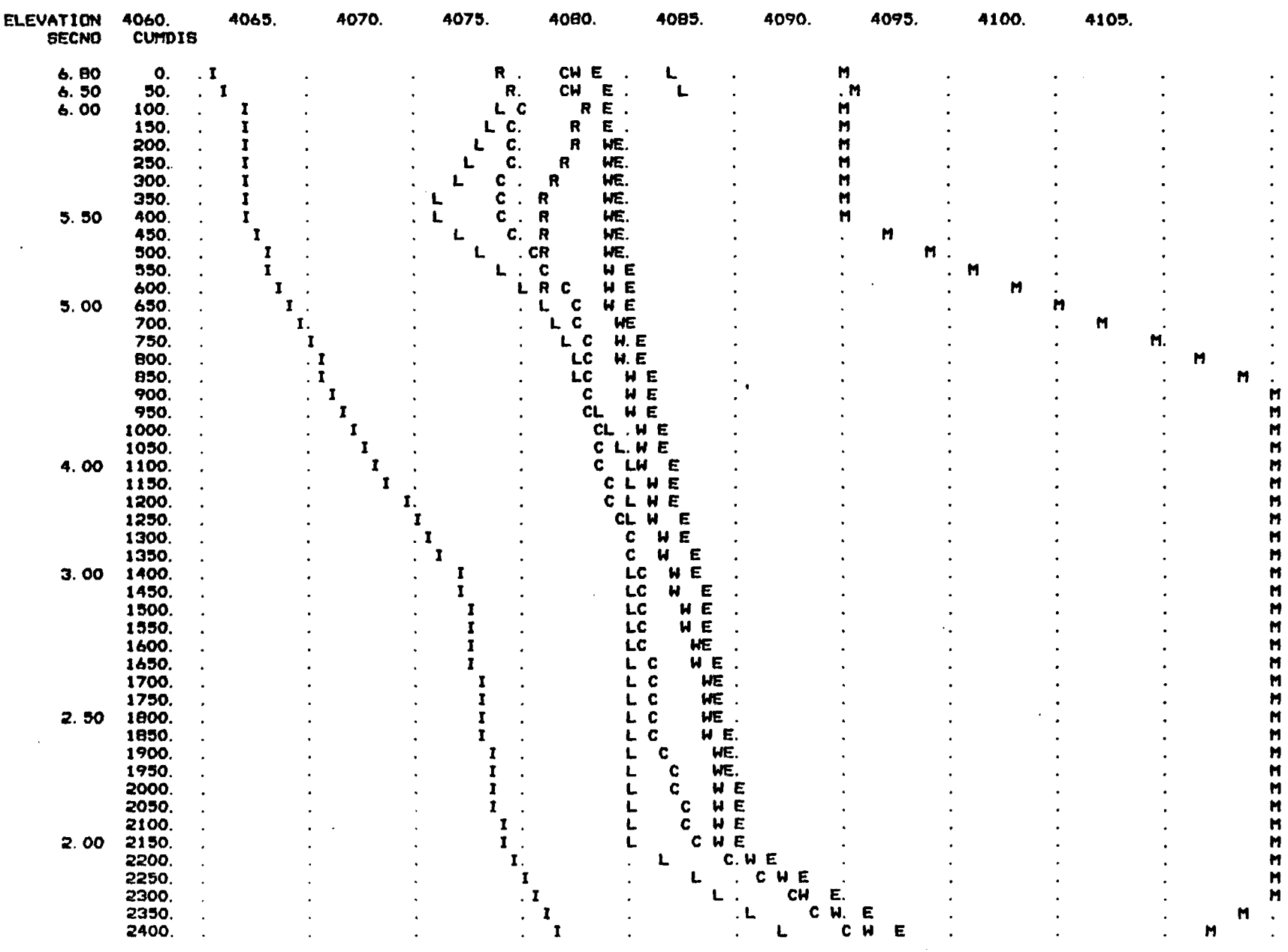
EL(I), STA(I)

4130.00	0.00	4100.00	80.00	4090.00	170.00	4080.00	400.00	4074.00	455.00
4072.00	570.00	4076.00	620.00	4080.00	880.00	4088.00	925.00	4090.00	1150.00
4110.00	1640.00	4120.00	1820.00						

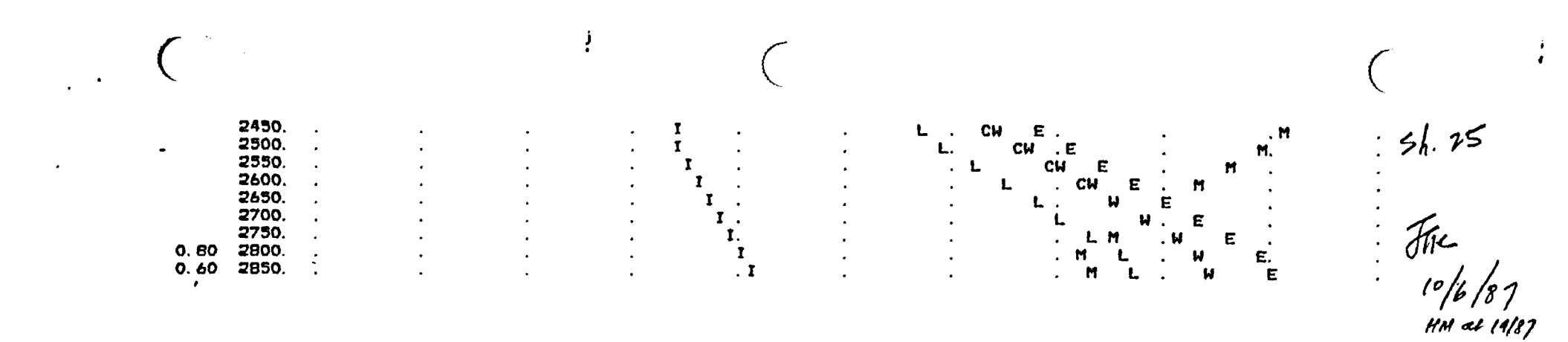
PROFILE FOR STREAM DISCHARGE = 24510 CFS

Sh. 24

PLOTTED POINTS (BY PRIORITY)-E-ENERGY, W-WATER SURFACE, I-INVERT, C-CRITICAL W.S., L-LEFT BANK, R-RIGHT BANK, M-LOWER END STA



JTK 10/6/87
HM oct 14/87



Sh. 25

JHC
10/6/87
HM at 10/87

Sh. 26

JTK 10/6/87
HM Oct 14/87

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HEC2 RELEASE DATED NOV 76 UPDATED MAY 1984
ERROR CORR - 01,02,03,04,05,06
MODIFICATION - 50,51,52,53,54,55,56
****

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

DISCHARGE = 24510 CFS

SUMMARY PRINTOUT

	SECNO	Q	CWSEL	CRIWS	GLOB	GCH	GROB	GLOBP	GCHP	GROBP	VLOB	VCH	VROB
	6.800	24510.00	4077.58	4076.91	0.00	8355.28	16154.72	0.00	34.09	65.91	0.00	9.29	7.60
	6.500	24510.00	4077.70	4077.23	0.00	8703.36	15806.64	0.00	35.51	64.49	0.00	10.04	8.02
	6.000	24510.00	4078.76	4074.75	175.63	24301.58	32.79	0.72	99.15	0.13	2.25	5.31	0.60
	5.500	24510.00	4079.19	4073.92	296.22	24128.26	85.53	1.21	98.44	0.35	1.99	4.13	0.96
	5.000	24510.00	4079.19	4077.52	563.72	23920.70	25.58	2.30	97.60	0.10	2.53	7.31	2.15
	4.000	24510.00	4080.60	4078.58	4.71	24504.56	0.73	0.02	99.98	0.00	0.92	8.84	0.82
	3.000	24510.00	4081.91	4080.54	89.77	24400.66	19.57	0.37	99.55	0.08	2.15	9.02	1.91
	2.500	24510.00	4083.66	4080.87	64.79	24403.28	41.93	0.26	99.56	0.17	1.93	5.79	1.72
	2.000	24510.00	4084.11	4082.94	534.06	23805.47	170.47	2.18	97.13	0.70	3.50	8.53	3.13
*	0.800	24510.00	4101.71	4101.71	2547.30	9498.32	12464.39	10.39	38.75	50.85	10.84	12.77	14.76
*	0.600	24510.00	4102.04	4102.04	2452.07	9883.73	12174.20	10.00	40.33	49.67	10.68	12.97	14.63

Sh. 27
JTK 10/6/87
HM 10/19/87

DISCHARGE = 24510 CFS

SUMMARY PRINTOUT

	SECNO	KRATIO	AREA	CWSEL	ELMIN	DEPTH	DIFWSX	HV	TOPWID	SSTA	ENDST	K*CHSL	10K*S
	6.800	0.00	3026.37	4077.58	4060.50	17.08	0.00	1.05	896.09	362.88	1276.03	0.00	89.46
	6.500	0.92	2838.68	4077.70	4060.90	16.80	0.12	1.20	861.24	378.44	1268.34	20.00	104.60
	6.000	2.65	4707.16	4078.76	4062.00	16.76	1.06	0.44	955.70	77.26	1032.96	15.72	14.84
	5.500	1.61	6075.21	4079.19	4062.00	17.19	0.42	0.26	844.88	143.62	988.50	0.00	5.73
	5.000	0.43	3505.21	4079.19	4064.00	15.19	0.01	0.81	753.10	130.34	883.45	8.00	31.46
	4.000	0.90	2778.38	4080.60	4068.00	12.60	1.41	1.21	475.05	367.94	842.99	8.70	39.02
	3.000	0.93	2757.65	4081.91	4072.00	9.91	1.31	1.26	534.60	356.13	890.73	12.58	45.04
	2.500	1.70	4275.74	4083.66	4073.00	10.66	1.76	0.52	691.64	281.68	973.32	2.63	15.67
	2.000	0.60	2996.77	4084.11	4074.00	10.11	0.44	1.10	620.53	305.93	926.46	2.86	43.11
*	0.800	1.17	1823.16	4101.71	4080.00	21.71	17.60	2.89	330.00	0.00	330.00	9.23	31.39
*	0.600	1.00	1823.65	4102.04	4080.40	21.64	0.34	2.88	330.00	0.00	330.00	20.00	31.40

SUMMARY OF ERRORS AND SPECIAL NOTES

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CAUTION  SECNO=     0.800  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=     0.800  PROFILE= 1  MINIMUM SPECIFIC ENERGY

CAUTION  SECNO=     0.600  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=     0.600  PROFILE= 1  MINIMUM SPECIFIC ENERGY
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Sh. 28

JTK 10/6/87
HM Oct 14/87

Subcritical run

Sh. 29

Jam @ Sta. 6.0 & 5.5 (4080')

JCK 10/4/87
HM NOV 02/87

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**************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
**************************************************

T1      UMTRA - GREEN RIVER - 100 YR
T2      WATER SURFACE PROFILE IN BROWN WASH
T3      DISCHARGE = 24510 CFS

J1  ICHECK     INQ        NINV       IDIR       STRT       METRIC     HVINS      Q          WSEL       FQ

       0.         0.         0.         0.  0.009000       0.00       0.0    24510.  4074.000      0.000

J2  NPROF      IPLOT      PRFVS      XSECV      XSECH      FN         ALLDC      IBW        CHNIM      ITRACE

    -1.000      0.000      0.000      0.000      0.000      0.000     -1.000      0.000      0.000      0.000

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

    38.000     43.000      1.000      2.000     13.000     14.000     15.000     35.000     60.000     59.000

    55.000     26.000     56.000      0.000     38.000     58.000     25.000      1.000     42.000      8.000

    51.000     10.000      4.000     53.000     54.000     33.000      5.000      0.000      0.000      0.000

NC      0.045      0.050      0.024      0.300      0.500      0.000      0.000      0.000      0.000      0.000
X1      6.800     19.000    150.000    700.000      0.000      0.000      0.000      0.000      0.000      0.000
BT     19.000      0.000   4090.000   4090.000     80.000   4080.000   4080.000    150.000   4082.000   4082.000
BT    280.000   4080.000   4080.000    340.000   4078.000   4078.000    450.000   4076.000   4076.000    560.000
BT   4075.200   4065.500    565.000   4075.000   4070.500    570.000   4075.000   4065.500    575.000   4075.000
BT   4065.500    580.000   4075.000   4070.500    585.000   4075.000   4065.500    700.000   4074.000   4074.000
BT    800.000   4074.000   4074.000    936.000   4078.000   4078.000    950.000   4076.000   4076.000   1000.000
BT   4070.000   4070.000   1070.000   4070.000   4070.000   1885.000   4100.000   4100.000      0.000      0.000
GR   4090.000      0.000   4080.000     80.000   4082.000    150.000   4080.000    280.000   4078.000    340.000
GR   4076.000    450.000   4065.500    560.000   4060.500    565.000   4065.500    570.000   4065.500    575.000
GR   4060.500    580.000   4065.500    585.000   4074.000    700.000   4074.000    800.000   4078.000    936.000
GR   4076.000    950.000   4070.000   1000.000   4070.000   1070.000   4100.000   1885.000      0.000      0.000

X1      6.500      0.000      0.000      0.000     20.000     20.000     20.000      0.000      0.400      0.000
X2      0.000      0.000      0.000      0.000      0.000      0.000      1.000      0.000      0.000      0.000

NC      0.045      0.050      0.035      0.100      0.300      0.000      0.000      0.000      0.000      0.000
X1      6.000      9.000    180.000    890.000     70.000     70.000     70.000      0.000      0.000      0.000
GR   4090.000      0.000   4083.000    110.000   4080.000    180.000   4080.000    500.000   4062.000    540.000
GR   4074.000    685.000   4078.000    890.000   4080.000   1265.000   4100.000   1885.000      0.000      0.000
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Sh. 30

FTK 10/6/87
HM Nov 04/87

X1	5.500	11.000	180.000	890.000	150.000	280.000	270.000	0.000	0.000	0.000
CR	4090.000	0.000	4080.000	80.000	4080.000	140.000	4080.000	180.000	4080.000	510.000
CR	4062.000	570.000	4073.000	680.000	4076.000	890.000	4079.000	940.000	4080.000	1200.000
CR	4090.000	1460.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NC	0.000	0.000	0.000	0.200	0.500	0.000	0.000	0.000	0.000	0.000
X1	5.000	10.000	270.000	876.000	230.000	290.000	250.000	0.000	0.000	0.000
CR	4100.000	0.000	4080.000	95.000	4076.000	270.000	4076.000	470.000	4064.000	530.000
CR	4074.000	635.000	4076.000	876.000	4081.000	900.000	4080.000	1090.000	4110.000	1885.000
X1	4.000	9.000	385.000	840.000	470.000	440.000	460.000	0.000	0.000	1.000
CR	4130.000	0.000	4090.000	100.000	4080.000	385.000	4068.000	530.000	4078.000	750.000
CR	4080.000	840.000	4086.000	870.000	4090.000	1165.000	4120.000	1930.000	0.000	0.000
X1	3.000	12.000	400.000	880.000	315.000	320.000	318.000	0.000	0.000	1.000
CR	4130.000	0.000	4100.000	80.000	4090.000	170.000	4080.000	400.000	4074.000	455.000
CR	4072.000	570.000	4076.000	620.000	4080.000	880.000	4088.000	925.000	4090.000	1150.000
CR	4110.000	1640.000	4120.000	1820.000	0.000	0.000	0.000	0.000	0.000	0.000
NC	0.000	0.000	0.000	0.100	0.300	0.000	0.000	0.000	0.000	0.000
X1	2.500	12.000	300.000	960.000	365.000	380.000	380.000	0.000	0.000	0.000
CR	4110.000	0.000	4090.000	250.000	4080.000	300.000	4073.000	420.000	4076.000	500.000
CR	4076.000	560.000	4078.000	620.000	4078.000	800.000	4080.000	960.000	4091.000	1000.000
CR	4096.000	1330.000	4110.000	1700.000	0.000	0.000	0.000	0.000	0.000	0.000
X1	2.000	11.000	380.000	900.000	350.000	300.000	350.000	0.000	0.000	0.000
CR	4114.000	0.000	4090.000	200.000	4080.000	380.000	4074.000	400.000	4074.000	430.000
CR	4078.000	510.000	4080.000	600.000	4080.000	900.000	4094.000	990.000	4094.000	1170.000
CR	4120.000	1890.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NC	0.015	0.015	0.015	0.300	0.500	0.000	0.000	0.000	0.000	0.000
X1	0.800	8.000	85.000	140.000	650.000	400.000	650.000	0.000	0.000	0.000
BT	8.000	0.000	4100.000	4100.000	80.000	4098.000	4098.000	85.000	4098.000	4098.000
BT	86.000	4098.000	4090.000	139.000	4098.000	4090.000	140.000	4098.000	4098.000	190.000
BT	4098.000	4098.000	330.000	4096.000	4096.000	0.000	0.000	0.000	0.000	0.000
CR	4100.000	0.000	4098.000	80.000	4098.000	85.000	4080.000	86.000	4080.000	139.000
CR	4098.000	140.000	4098.000	190.000	4096.000	330.000	0.000	0.000	0.000	0.000
X1	0.600	0.000	0.000	0.000	20.000	20.000	20.000	0.000	0.400	0.000
X2	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000
EJ	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Sh. 31

JTK 10/6/87
HM MY 04/87

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	GLOB	GCH	GROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*PROF 1

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

CCHV= 0.300 CEHV= 0.500
*SECNO 6.800

3265 DIVIDED FLOW

3370 NORMAL BRIDGE, NRD= 19 MIN ELTRD= 4070.00 MAX ELLC= 4100.00

6.80	17.16	4077.66	4077.01	4074.00	4078.73	1.07	0.00	0.00	4082.00
24510.	0.	7950.	16560.	0.	831.	2169.	0.	0.	4074.00
0.00	0.00	9.56	7.64	0.000	0.024	0.050	0.000	4060.50	358.79
0.008931	0.	0.	0.	0	13	6	-1267.76	905.27	1278.05

*SECNO 6.500

3265 DIVIDED FLOW

3370 NORMAL BRIDGE, NRD= 19 MIN ELTRD= 4070.00 MAX ELLC= 4100.40

6.50	16.87	4077.77	4077.34	0.00	4079.01	1.24	0.19	0.08	4082.40
24510.	0.	8185.	16325.	0.	790.	2009.	1.	0.	4074.40
0.00	0.00	10.36	8.13	0.000	0.024	0.050	0.000	4060.90	374.64
0.010618	20.	20.	20.	2	13	0	-1212.77	869.75	1270.22

CCHV= 0.100 CEHV= 0.300
*SECNO 6.000

3301 HV CHANGED MORE THAN HVINS

6.00	15.73	4077.73	4077.14	0.00	4079.96	2.23	0.66	0.30	4080.00
24510.	0.	24510.	0.	0.	2043.	0.	5.	1.	4078.00
0.00	0.00	11.99	0.00	0.000	0.035	0.000	0.000	4062.00	505.04
0.008328	70.	70.	70.	3	12	0	0.00	371.29	876.32

Sh. 32

JTK 10/6/87
HM MM 02/87

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	QLOSS	BANK ELEV
Q	GLOB	GCH	GROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 5.500

3301 HV CHANGED MORE THAN HVINS

5.50	18.69	4080.69	4076.98	0.00	4081.33	0.64	1.21	0.16	4080.00
24510.	96.	23319.	1095.	71.	3562.	476.	24.	6.	4076.00
0.01	1.35	6.55	2.30	0.045	0.035	0.050	0.000	4062.00	74.45
0.002784	150.	270.	280.	9	10	0	0.00	1143.57	1218.03

CCHV= 0.200 CEHV= 0.500
*SECNO 5.000

5.00	17.39	4081.39	4077.39	0.00	4081.76	0.36	0.37	0.05	4076.00
24510.	1348.	22876.	287.	599.	4607.	266.	52.	12.	4076.00
0.03	2.25	4.97	1.08	0.045	0.035	0.050	0.000	4064.00	88.36
0.000919	230.	250.	290.	2	13	0	0.00	1038.66	1127.02

*SECNO 4.000

4.00	13.77	4081.77	4078.53	0.00	4082.62	0.85	0.62	0.24	4080.00
24510.	63.	24437.	10.	45.	3306.	8.	99.	21.	4080.00
0.05	1.41	7.39	1.26	0.045	0.035	0.050	0.000	4068.00	334.48
0.002157	470.	460.	440.	2	14	0	0.00	514.38	848.86

*SECNO 3.000

3.00	10.51	4082.51	4080.54	0.00	4083.53	1.02	0.83	0.08	4080.00
24510.	157.	24318.	34.	73.	2996.	18.	122.	25.	4080.00
0.06	2.17	8.12	1.93	0.045	0.035	0.050	0.000	4072.00	342.20
0.003184	315.	318.	320.	2	14	0	0.00	551.93	894.14

CCHV= 0.100 CEHV= 0.300
*SECNO 2.500

3301 HV CHANGED MORE THAN HVINS

2.50	10.87	4083.87	4080.71	0.00	4084.35	0.49	0.77	0.05	4080.00
24510.	71.	24393.	46.	37.	4353.	27.	155.	30.	4080.00
0.08	1.90	5.60	1.69	0.045	0.035	0.050	0.000	4073.00	280.66
0.001410	365.	380.	380.	2	19	0	0.00	693.40	974.06

Sh. 33

FK 10/6/87
HM NOV 02/87

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	QLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

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*SECNO 2.000

3301 HV CHANGED MORE THAN HVINS

     2.00     10.25  4084.25  4083.02     0.00  4085.29     1.04     0.77     0.17  4080.00
    24510.     558.    23774.      178.     163.     2862.     58.     185.     35.     4080.00
     0.09     3.43     8.31     3.06    0.045    0.035    0.050    0.000  4074.00   303.44
 0.003950      350.     350.      300.        2       10        0     0:00   623.90   927.34

CCHV=  0.300 CEHV=  0.500
*SECNO 0.800
3280 CROSS SECTION      0.80 EXTENDED      5.71 FEET

3301 HV CHANGED MORE THAN HVINS

3370 NORMAL BRIDGE, NRD=  8 MIN ELTRD= 4096.00 MAX ELLC= 4100.00

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
     0.80     21.71  4101.71  4101.71     0.00  4104.60     2.89     2.05     0.92  4098.00
    24510.     2547.     9498.    12464.     235.      744.     844.     219.      42.     4098.00
     0.10     10.84    12.77    14.76    0.015    0.015    0.015    0.000  4080.00     0.00
 0.003139      650.     650.      400.        0       10        0  -432.00   330.00   330.00

*SECNO 0.600
3280 CROSS SECTION      0.60 EXTENDED      5.64 FEET

3370 NORMAL BRIDGE, NRD=  8 MIN ELTRD= 4096.00 MAX ELLC= 4100.40

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
     0.60     21.64  4102.04  4102.04     0.00  4104.92     2.88     0.06     0.00  4098.40
    24510.     2452.     9884.    12174.     230.      762.     832.     220.      42.     4098.40
     0.10     10.68    12.97    14.63    0.015    0.015    0.015    0.000  4080.40     0.00
 0.003140       20.      20.       20.        0       10        0  -410.41   330.00   330.00
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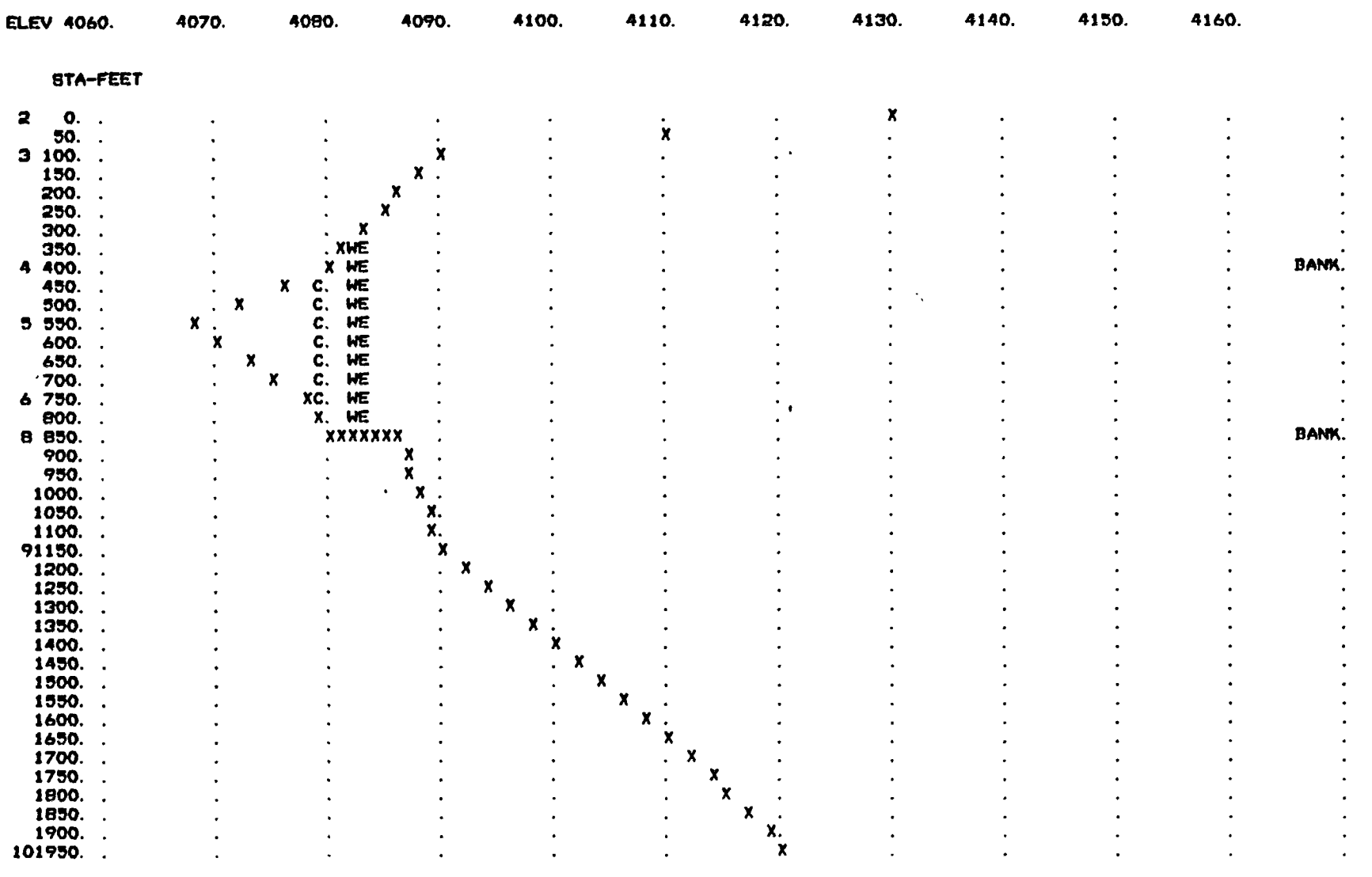
Sh. 34

FTK 10/6/87
HM NOV 02/87

CROSS SECTION 4.00
STREAM DISCHARGE = 24510 CFS
DISCHARGE= 24510.

PLOTTED POINTS (BY PRIORITY)-B=BOTTOM BRIDGE, T=TOP BRIDGE, X=GROUND, W=WATER SUR, E=ENERGY GRADIENT, C=CRITICAL WSEL



NRD= 0 ELLC= 9999999.00 ELTRD= 9999999.00

EL(I), STA(I)									
4130.00	0.00	4090.00	100.00	4080.00	385.00	4068.00	530.00	4078.00	750.00
4080.00	840.00	4086.00	870.00	4090.00	1165.00	4120.00	1930.00		

4.35

JTK 10/6/87

HM MY 02/87

CROSS SECTION 3.00
STREAM DISCHARGE = 24510 CFS
DISCHARGE= 24510.

PLOTTED POINTS (BY PRIORITY)-B=BOTTOM BRIDGE, T=TOP BRIDGE, X=GROUND, W=WATER SUR, E=ENERGY GRADIENT, C=CRITICAL WSEL

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ELEV 4070.      4080.      4090.      4100.      4110.      4120.      4130.      4140.      4150.      4160.      4170.

    STA-FEET

 2   0.  .          .          .          .          .          .          X          .          .          .          .
    50.  .          .          .          .          .          X          .          .          .          .          .
 3 100.  .          .          .          .          X          .          .          .          .          .          .
 4 150.  .          .          .          X          .          .          .          .          .          .          .
   200.  .          .          .          X          .          .          .          .          .          .          .
   250.  .          .          .          X          .          .          .          .          .          .          .
   300.  .          .          XE         .          .          .          .          .          .          .          .
   350.  .          .          X WE       .          .          .          .          .          .          .          .
 5 400.  .          .          XC WE      .          .          .          .          .          .          .          . BANK.
 6 450.  .          X          .C WE      .          .          .          .          .          .          .          .
   500.  .          X          .C WE      .          .          .          .          .          .          .          .
 7 550.  .          X          .C WE      .          .          .          .          .          .          .          .
 8 600.  .          .  X       .C WE      .          .          .          .          .          .          .          .
   650.  .          .   X      .C WE      .          .          .          .          .          .          .          .
   700.  .          .    X     .C WE      .          .          .          .          .          .          .          .
   750.  .          .    X     .C WE      .          .          .          .          .          .          .          .
   800.  .          .     X    .C WE      .          .          .          .          .          .          .          .
   850.  .          .     X    C WE       .          .          .          .          .          .          .          .
10 900.  .          .     XXXXXXXXX       .          .          .          .          .          .          .          . BANK.
   950.  .          .          .          X          .          .          .          .          .          .          .
  1000.  .          .          .          X.         .          .          .          .          .          .          .
  1050.  .          .          .          X.         .          .          .          .          .          .          .
  1100.  .          .          .          X          .          .          .          .          .          .          .
111150.  .          .          .          X          .          .          .          .          .          .          .
  1200.  .          .          .          .  X       .          .          .          .          .          .          .
  1250.  .          .          .          .   X      .          .          .          .          .          .          .
  1300.  .          .          .          .    X     .          .          .          .          .          .          .
  1350.  .          .          .          .     X    .          .          .          .          .          .          .
  1400.  .          .          .          .      X   .          .          .          .          .          .          .
  1450.  .          .          .          .       X  .          .          .          .          .          .          .
  1500.  .          .          .          .        X .          .          .          .          .          .          .
  1550.  .          .          .          .         X.          .          .          .          .          .          .
  1600.  .          .          .          .          X          .          .          .          .          .          .
121650.  .          .          .          .          X          .          .          .          .          .          .
  1700.  .          .          .          .          .  X       .          .          .          .          .          .
  1750.  .          .          .          .          .     X    .          .          .          .          .          .
131800.  .          .          .          .          .        X .          .          .          .          .          .
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NRD= 0 ELLC= 9999999.00 ELTRD= 9999999.00

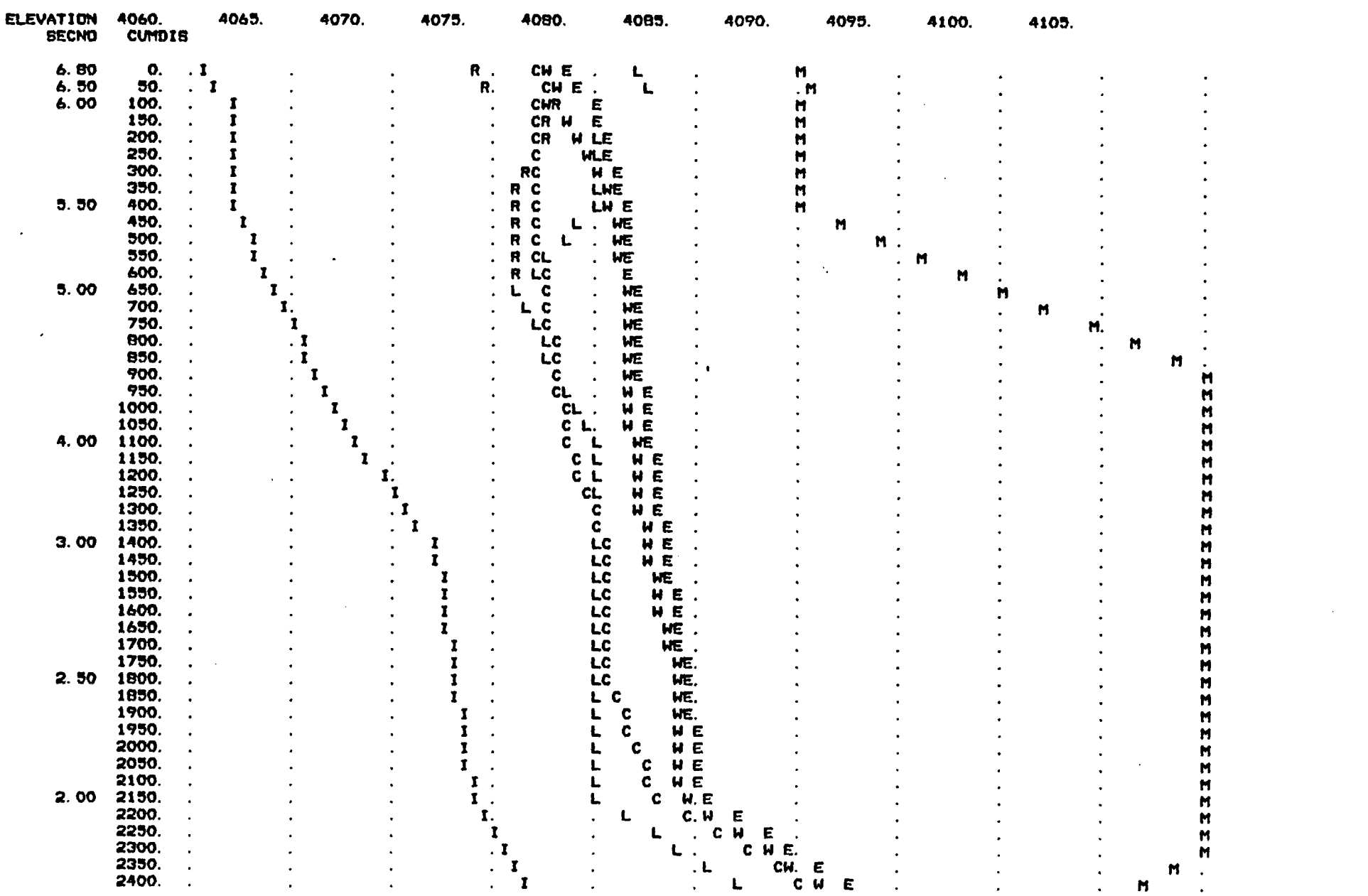
EL(I), STA(I)									
4130.00	0.00	4100.00	80.00	4090.00	170.00	4080.00	400.00	4074.00	455.00
4072.00	570.00	4076.00	620.00	4080.00	880.00	4088.00	925.00	4090.00	1150.00
4110.00	1640.00	4120.00	1820.00						

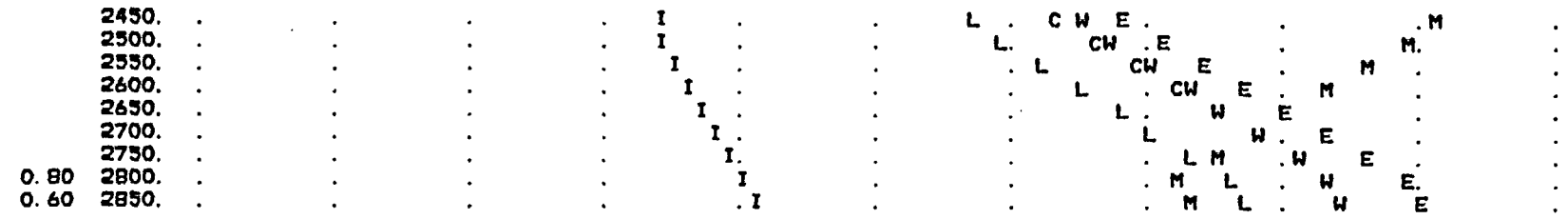
Sh. 36

FTK 10/6/87

PROFILE FOR STREAM DISCHARGE = 24510 CFS

PLOTTED POINTS (BY PRIORITY)-E-ENERGY, W-WATER SURFACE, I-INVERT, C-CRITICAL W.S., L-LEFT BANK, R-RIGHT BANK, M-LOWER END STA HM Nov 02/87





Sh. 37

FJK 10/6/87
HM NM 02/87

Sh. 38

JTK 10/6/87
HM NOV 02/87

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HEC2 RELEASE DATED NOV 76 UPDATED MAY 1984
ERROR CORR - 01,02,03,04,05,06
MODIFICATION - 50,51,52,53,54,55,56
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NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

DISCHARGE = 24510 CFS

SUMMARY PRINTOUT

	SECNO	Q	CWSEL	CRIWS	GLOB	GCH	GROB	GLOBP	GCHP	GROBP	VLOB	VCH	VROB
	6.800	24510.00	4077.66	4077.01	0.00	7949.83	16560.17	0.00	32.44	67.56	0.00	9.56	7.64
	6.500	24510.00	4077.77	4077.34	0.00	8184.58	16325.42	0.00	33.39	66.61	0.00	10.36	8.13
	6.000	24510.00	4077.73	4077.14	0.00	24510.00	0.00	0.00	100.00	0.00	0.00	11.99	0.00
	5.500	24510.00	4080.69	4076.98	96.28	23319.14	1094.57	0.39	95.14	4.47	1.35	6.55	2.30
	5.000	24510.00	4081.39	4077.39	1347.86	22875.57	286.58	5.50	93.33	1.17	2.25	4.97	1.08
	4.000	24510.00	4081.77	4078.53	63.32	24436.81	9.87	0.26	99.70	0.04	1.41	7.39	1.26
	3.000	24510.00	4082.51	4080.54	157.44	24318.25	34.32	0.64	99.22	0.14	2.17	8.12	1.93
	2.500	24510.00	4083.87	4080.71	71.02	24393.02	45.96	0.29	99.52	0.19	1.90	5.60	1.69
	2.000	24510.00	4084.25	4083.02	558.18	23773.65	178.17	2.28	97.00	0.73	3.43	8.31	3.06
*	0.800	24510.00	4101.71	4101.71	2547.30	9498.32	12464.39	10.39	38.75	50.85	10.84	12.77	14.76
*	0.600	24510.00	4102.04	4102.04	2452.07	9883.73	12174.20	10.00	40.33	49.67	10.68	12.97	14.63

Sh. 39

JHK 10/6/87 HM ph.

DISCHARGE = 24510 CFS

SUMMARY PRINTOUT

	SECNO	KRATIO	AREA	CWSEL	ELMIN	DEPTH	DIFWSX	HV	TOPWID	SSTA	ENDST	K*CHSL	10K*S
	6.800	0.00	2999.89	4077.66	4060.50	17.16	0.00	1.07	905.27	358.79	1278.05	0.00	89.31
	6.500	0.92	2799.03	4077.77	4060.90	16.87	0.11	1.24	869.75	374.64	1270.22	20.00	106.18
	6.000	1.13	2043.44	4077.73	4062.00	15.73	-0.04	2.23	371.29	505.04	876.32	15.72	83.28
	5.500	1.73	4109.74	4080.69	4062.00	18.69	2.96	0.64	1143.57	74.45	1218.03	0.00	27.84
	5.000	1.74	5471.48	4081.39	4064.00	17.39	0.70	0.36	1038.66	88.36	1127.02	8.00	9.19
	4.000	0.65	3359.09	4081.77	4068.00	13.77	0.38	0.85	514.38	334.48	848.86	8.70	21.57
	3.000	0.82	3086.58	4082.51	4072.00	10.51	0.74	1.02	551.93	342.20	894.14	12.58	31.84
	2.500	1.50	4417.09	4083.87	4073.00	10.87	1.36	0.49	693.40	280.66	974.06	2.63	14.10
	2.000	0.60	3082.59	4084.25	4074.00	10.25	0.38	1.04	623.90	303.44	927.34	2.86	39.50
*	0.800	1.12	1823.16	4101.71	4080.00	21.71	17.46	2.89	330.00	0.00	330.00	9.23	31.39
*	0.600	1.00	1823.65	4102.04	4080.40	21.64	0.34	2.88	330.00	0.00	330.00	20.00	31.40

Sh. 40

SUMMARY OF ERRORS AND SPECIAL NOTES

CAUTION SECNO= 0.800 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 0.800 PROFILE= 1 MINIMUM SPECIFIC ENERGY

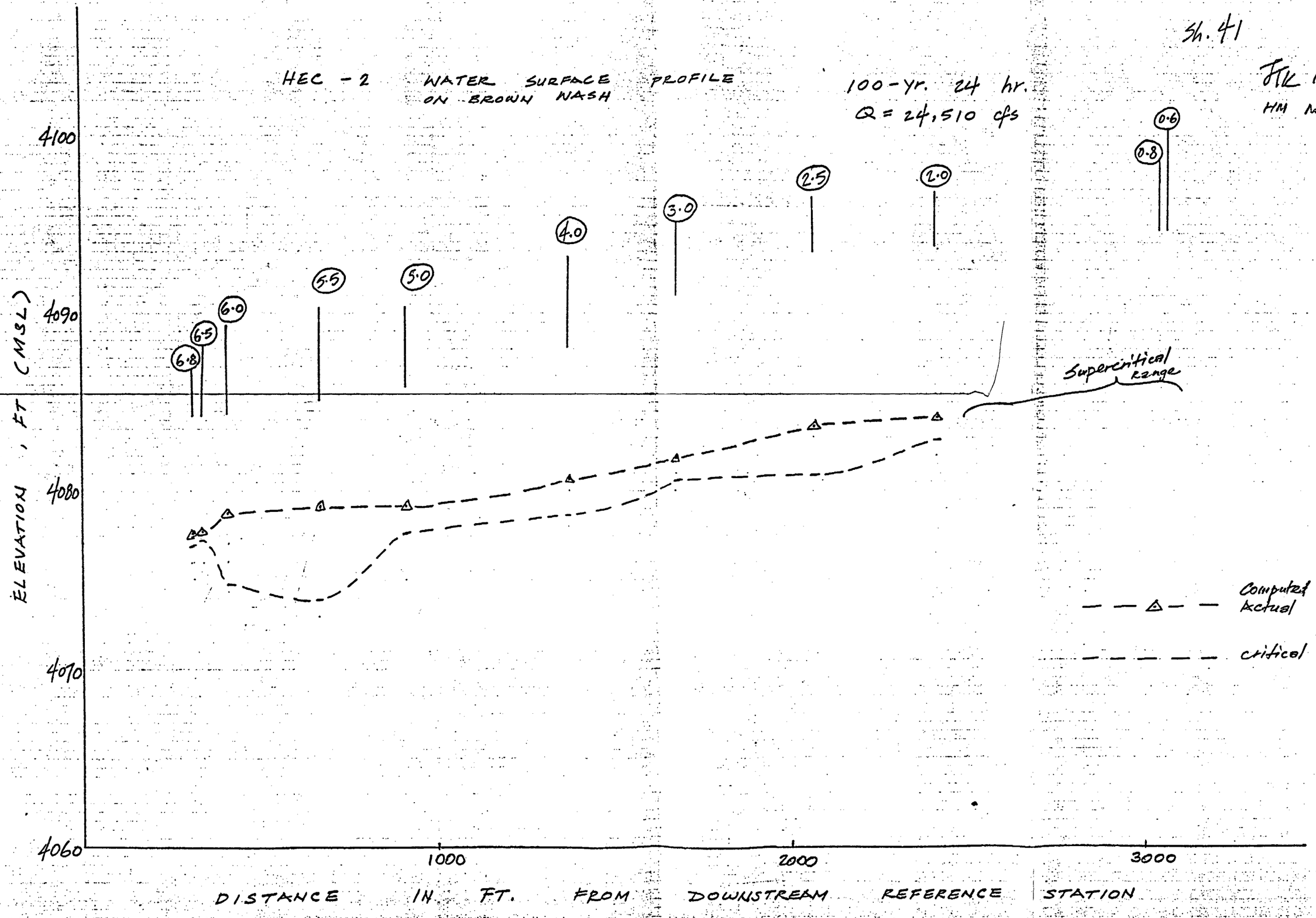
CAUTION SECNO= 0.600 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 0.600 PROFILE= 1 MINIMUM SPECIFIC ENERGY

JTK 10/6/87
HM NOV 02/87

FTK 10/6/81
HM NOV 02/87

HEC - 2 WATER SURFACE PROFILE ON BROWN NASH

100-Yr. 24 hr.
Q = 24,510 cfs

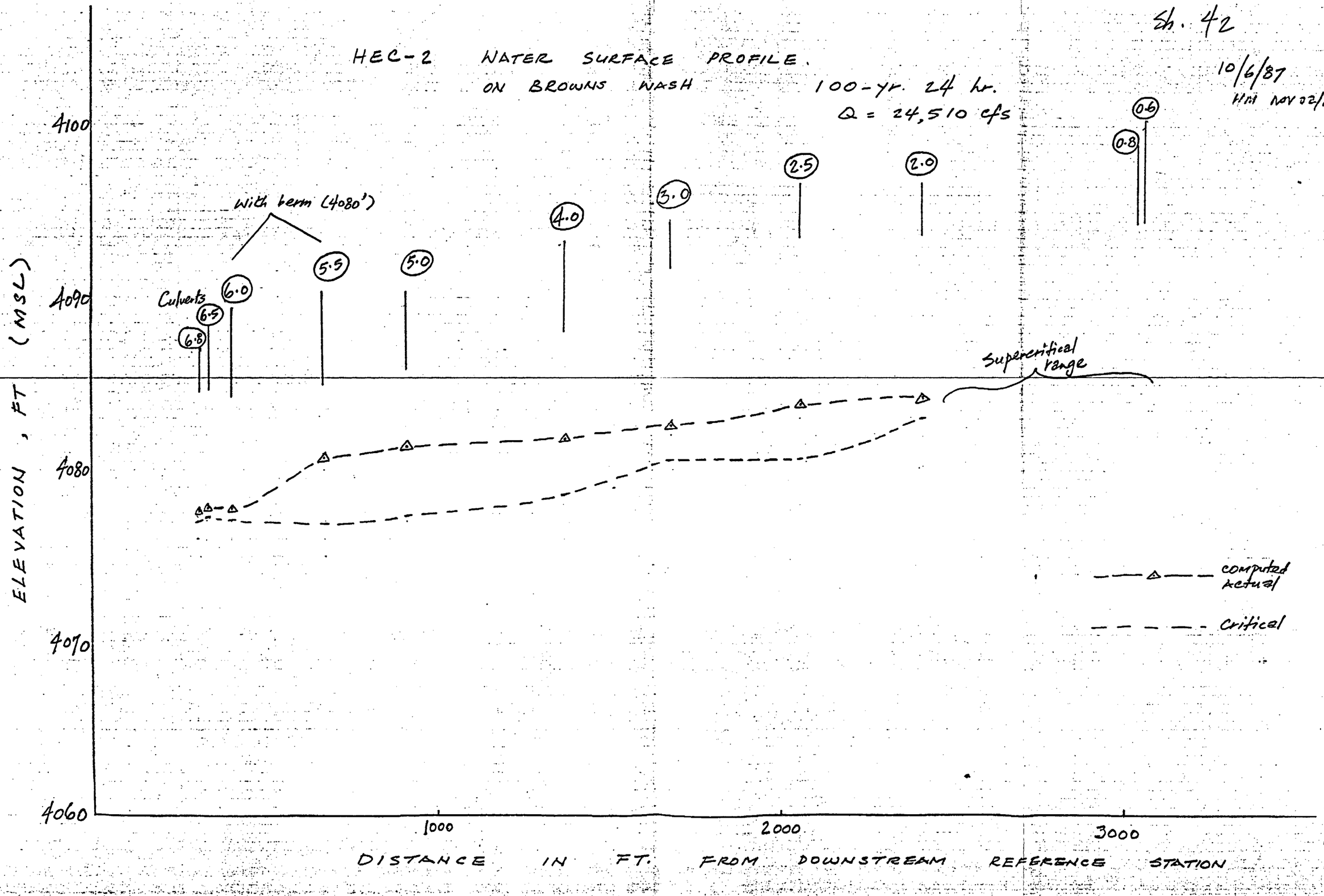


Sh. 42

10/6/87
Hni Nov 02/87

HEC-2 WATER SURFACE PROFILE.
ON BROWNS WASH

100-yr. 24 hr.
Q = 24,510 cfs



E 7,500 E 8,000 E 8,500 E 9,000 E 9,500 E 10,000 E 10,208

N 11,000 N 10,500 N 10,000 N 9,500

6.8 6.5 6.0 5.5 5.0 4.5 4.0 3.0 1.5 2.0 0.8 0.6

GRU 87-6
EL TOP 4071.14
GROUND 4069.5

GRU 87-5
EL TOP 4018.51
GROUND 4017.7

GRU 87-4
EL TOP 4083.31
GROUND 4080.5

GRU 87-3
EL TOP 4087.84
GROUND 4081.6

GRU 87-2
EL TOP 4082.89
GROUND 4081.9

GRU 87-1
EL TOP 4088.25
GROUND 4087.2

GRU 87-7
EL TOP 4083.20
GROUND 4081.9
NOTE: GRU 87-7 NOT PLOTTED TO HORZ. SCALE

STA. 6 EL. 4072.34
STA. 9
STA. 10 EL. 4080.98
STA. 6 EL. 4081.39
STA. 5
STA. 2 EL. 4138.30
STA. 1 EL. 4137.2
EXIT WALL
WATER TOWER

Plate 1 Sheet 23

Flood line for 100 yr-24 hr. Storm

without berm

—— with berm @ Elev. = 4010.0

PLATE D.7.1 (SHEET 1)

FH 10/7/87

GREEN RIVER

HH and 02/87

SHEET INDEX

SCALE 1" = 100'

CONTOUR INTERVAL 2'

PHOTOGRAPHY DATE JUL. 10, 1982

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