PROFESSIONAL
ENGINEERING
CONSULTANTS
PROFESSIONAL ASSOCIATION

September 14, 1994

Mr. Michael E. Lindebak, P.E.
City Engineer
City Hall - 7th Floor
455 N. Main
Wichita, KS 67202

Reference: Construction of Dam in Reserve "A" of Fairfield Estates
PEC Project No. 36-94575-2185

Dear Mr. Lindebak:

In a May 26, 1994 letter to Mr. Ralph Rudy, Polo Sales Center and Development, you informed Mr. Rudy that the dam structure built in Reserve "A" is not in compliance with the submitted drainage plan, and may increase the risk of flooding in the area. In accordance with your request, Mr. Rudy hired PEC to perform a hydraulic analysis of the drainage system as it was constructed.

The addition of the dam clearly altered the stage-storage and stage-discharge relationships of the drainage system. A field survey of the reserve and drainage structures was performed to provide the information necessary to redefine the aforementioned relationships, which were subsequently revised in the original HEC-1 data input. An as-built contour map of the reserve is enclosed as Figure 1. The HEC-1 program was then run with the new storage and discharge data. The output from the original HEC-1 run and the revised run are included herein. The results of the revised run are as follows:

1. The peak 100-year discharge for developed conditions increased from 427 cfs to 455 cfs. However, this peak is still less than 493 cfs, the 100-year peak for pre-developed conditions.

2. The 100-year design water surface elevation rose from 171.04 to 171.46 feet, city datum.

The low-opening of houses surrounding the pond were also surveyed. The lowest opening was found to be 173.09. This allows 1.63 feet of freeboard between the 100-year high water elevation and minimum opening on this house.

303 S. TOPEKA
WICHITA, KANSAS 67202
(316) 262-2691
FAX (316) 262-3003

Given that the dam did not increase the post-developed flow beyond the pre-developed discharge, and that the 100-year water elevation did not rise significantly, we request that the dam be allowed to stay without any liability for damages caused by flooding being placed on Mr. Rudy.

Very truly yours,

PROFESSIONAL ENGINEERING CONSULTANTS, P.A.

Darwin R. Cronk

Darwin R. Cronk, E.I.T.
Design Engineer

DRC:blc

cc: Ralph Rudy
Bruce Pedersen, President
Hartmoor Homeowner Association
1308 N. Rutland Circle
Wichita, KS 67206

Encl.: As noted

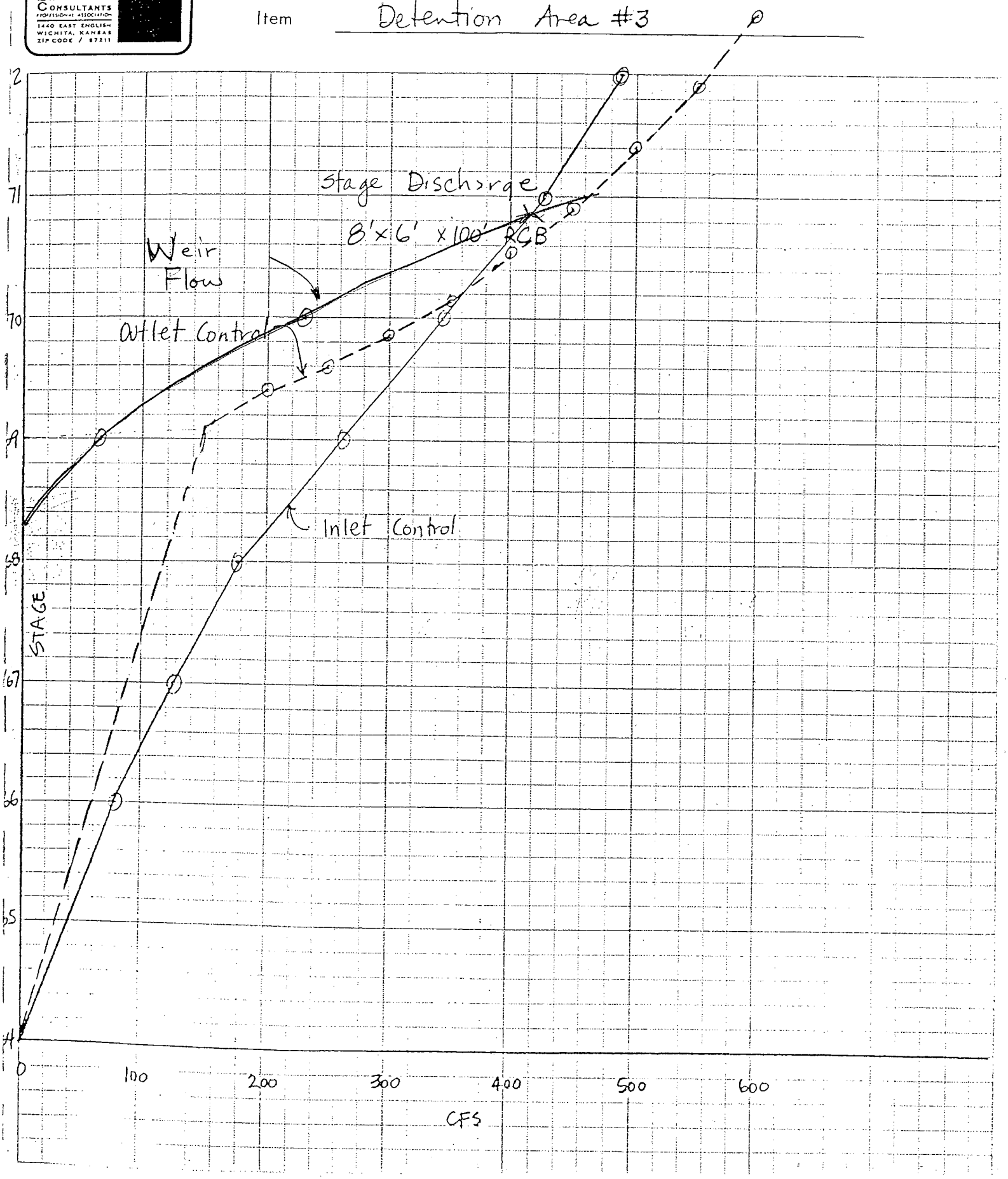
All lots around the lake have been developed.

PROFESSIONAL ENGINEERING CONSULTANTS
PROFESSIONAL ASSOCIATION
1440 EAST ENGLISH
WICHITA, KANSAS
ZIP CODE / 67211

Date 11-8-85 Page 21 of 36

Project Fairfield Estates

Item Detention Area #3



PROPOSED
8x6x100' RCB

HEC-1 INPUT

 W/ HYD.

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
    1     ID   FAIRFIELD ESTATES DRAINAGE PLAN
    2     ID   DETENTION AREA NO 3 RESERVOIR STAGE STORAGE ANALYSIS
    3     ID   100 YEAR DEVELOPED CONDITIONS
*** LIST ***
*** FREE ***
    4     IT       6 08NOV85      800         0 08NOV85     1600
    5     IO       4         0         0
    6     JP       1

    7     KK    1100 OUTFLOW HYDROGRAPH FROM COLEMAN DETENTION BASIN
    8     IN      15 08NOV85     1100
    9     QI      12        13        23        75       210       225       222       207        60        44
   10     QI      35        28        24        21        20        18        18        18        18        17
   11     QI      17

   12     KK     100 SYSTEM 100
   13     IN       5 08NOV85     1130
   14     QI       0        16        30        44        35        25        15         5         0

   15     KK     200 SYSTEM 200
   16     QI       0         9        18        27        22        16        10         4         0

   17     KK     300SYSTEM 300
   18     QI       0         9        18        27        22        16        10         4         0

   19     KK     400 SYSTEM 400
   20     QI       0         8        17        25        19        14         9         4         0

   21     KK     500 SYSTEM 500
   22     QI       0        18        35        54        51        40        28        17         6         0

   23     KK     600 SYSTEM 600
   24     QI       0        55       120       190       200       155       113        70        27         0

   25     KK     900 SYSTEM 900
   26     QI       0        20        40        60        47        34        20         7         0

   27     KK    1000 SYSTEM 1000
   28     QI       0        18        38        56        43        32        19         6         0

   29     KK    1200 DEVELOP COND. INFLOW HYDROGRAPH COMBINATION
   30     KO       3         2         0         0         0         0         0         0
   31     HC       9         0

   32     KK    1300 STAGE-STORAGE THRU RESERVOIR
   33     KM   PLAN1   8'X6'X100' RCB OUTFALL
   34     KP       1
   35     KO       3         2         0         0         0         0         0         0
   36     RS       1      ELEV     164.0         0
   37     SA       0      0.07      0.19      0.41      0.94      1.52      1.96      2.18      2.36
   38     SQ       0        29        58        88       120       150       325       425       490
   39     SE     164       165       166       167       168       169       170       171       172
   40     SS     172       250       3.0       1.5
   41     ZZ
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ORIGINAL HEC-1 RUN

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                                        ****
                FLOOD HYDROGRAPH PACKAGE HEC-1 (IBM XT 512K VERSION) -OCT 1,1984
          U.S. ARMY CORPS OF ENGINEERS, THE HYDROLOGIC ENGINEERING CENTER, 609 SECOND STREET, DAVIS, CA. 95616
                                        ****

                     FAIRFIELD ESTATES DRAINAGE PLAN
                     DETENTION AREA NO 3 RESERVOIR STAGE STORAGE ANALYSIS
                     100 YEAR DEVELOPED CONDITIONS

  5 IO          OUTPUT CONTROL VARIABLES
                     IPRNT        4  PRINT CONTROL
                     IPLOT        0  PLOT CONTROL
                     QSCAL       0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                     NMIN         6  MINUTES IN COMPUTATION INTERVAL
                     IDATE    8NOV85  STARTING DATE
                     ITIME      0800  STARTING TIME
                       NQ        81  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE    8NOV85  ENDING DATE
                    NDTIME      1600  ENDING TIME

                  COMPUTATION INTERVAL      .10 HOURS
                    TOTAL TIME BASE     8.00 HOURS
          ENGLISH UNITS

    JP          MULTI-PLAN OPTION
                     NPLAN        1  NUMBER OF PLANS

    JR          MULTI-RATIO OPTION
                    RATIOS OF RUNOFF
                   1.00


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


               ***************
               *             *
  7 KK         *     1100    *      OUTFLOW HYDROGRAPH FROM COLEMAN DETENTION BASIN
               *             *
               ***************

  8 IN          TIME DATA FOR INPUT TIME SERIES
                     JXMIN       15  TIME INTERVAL IN MINUTES
                    JXDATE    8NOV85  STARTING DATE
                    JXTIME      1100  STARTING TIME

                SUBBASIN RUNOFF DATA

  0 BA          SUBBASIN CHARACTERISTICS
                     TAREA      .00  SUBBASIN AREA

                                        ***

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

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

              ***************
              *               *
12 KK         *       100     *       SYSTEM 100
              *               *
              ***************

13 IN                 TIME DATA FOR INPUT TIME SERIES
                        JXMIN           5  TIME INTERVAL IN MINUTES
                       JXDATE      8NOV85  STARTING DATE
                       JXTIME        1130  STARTING TIME

                    SUBBASIN RUNOFF DATA

 0 BA               SUBBASIN CHARACTERISTICS
                        TAREA         .00  SUBBASIN AREA

                                                        ***

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

              ***************
              *               *
15 KK         *       200     *       SYSTEM 200
              *               *
              ***************

13 IN                 TIME DATA FOR INPUT TIME SERIES
                        JXMIN           5  TIME INTERVAL IN MINUTES
                       JXDATE      8NOV85  STARTING DATE
                       JXTIME        1130  STARTING TIME

                    SUBBASIN RUNOFF DATA

 0 BA               SUBBASIN CHARACTERISTICS
                        TAREA         .00  SUBBASIN AREA

                                                        ***

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

              ***************
              *               *
17 KK         *       300     *       SYSTEM 300
              *               *
              ***************

13 IN                 TIME DATA FOR INPUT TIME SERIES
                        JXMIN           5  TIME INTERVAL IN MINUTES
                       JXDATE      8NOV85  STARTING DATE
                       JXTIME        1130  STARTING TIME

                    SUBBASIN RUNOFF DATA

 0 BA               SUBBASIN CHARACTERISTICS
                        TAREA         .00  SUBBASIN AREA
```

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

              **************
              *            *
 19 KK        *     400    *      SYSTEM 400
              *            *
              **************

 13 IN              TIME DATA FOR INPUT TIME SERIES
                       JXMIN          5  TIME INTERVAL IN MINUTES
                      JXDATE     8NOV85  STARTING DATE
                      JXTIME       1130  STARTING TIME

                 SUBBASIN RUNOFF DATA

  0 BA           SUBBASIN CHARACTERISTICS
                      TAREA        .00  SUBBASIN AREA

                                                ***

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


              **************
              *            *
 21 KK        *     500    *      SYSTEM 500
              *            *
              **************

 13 IN              TIME DATA FOR INPUT TIME SERIES
                       JXMIN          5  TIME INTERVAL IN MINUTES
                      JXDATE     8NOV85  STARTING DATE
                      JXTIME       1130  STARTING TIME

                 SUBBASIN RUNOFF DATA

  0 BA           SUBBASIN CHARACTERISTICS
                      TAREA        .00  SUBBASIN AREA

                                                ***

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

              **************
              *            *
 23 KK        *     600    *      SYSTEM 600
              *            *
              **************

 13 IN              TIME DATA FOR INPUT TIME SERIES
                       JXMIN          5  TIME INTERVAL IN MINUTES
                      JXDATE     8NOV85  STARTING DATE
                      JXTIME       1130  STARTING TIME

                 SUBBASIN RUNOFF DATA

  0 BA           SUBBASIN CHARACTERISTICS
                      TAREA        .00  SUBBASIN AREA
```

```
 0 BA          SUBBASIN CHARACTERISTICS
                 TAREA          .00  SUBBASIN AREA

                                  ***

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


               ***************
               *             *
 25 KK         *       900   *      SYSTEM 900
               *             *
               ***************

 13 IN               TIME DATA FOR INPUT TIME SERIES
                       JXMIN          5  TIME INTERVAL IN MINUTES
                      JXDATE      8NOV85  STARTING DATE
                      JXTIME        1130  STARTING TIME

                   SUBBASIN RUNOFF DATA

 0 BA              SUBBASIN CHARACTERISTICS
                       TAREA          .00  SUBBASIN AREA

                                  ***

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


               ***************
               *             *
 27 KK         *      1000   *      SYSTEM 1000
               *             *
               ***************

 13 IN               TIME DATA FOR INPUT TIME SERIES
                       JXMIN          5  TIME INTERVAL IN MINUTES
                      JXDATE      8NOV85  STARTING DATE
                      JXTIME        1130  STARTING TIME

                   SUBBASIN RUNOFF DATA

 0 BA              SUBBASIN CHARACTERISTICS
                       TAREA          .00  SUBBASIN AREA

                                  ***

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


               ***************
               *             *
 29 KK         *      1200   *      DEVELOP COND. INFLOW HYDROGRAPH COMBINATION
               *             *
               ***************

 30 KO               OUTPUT CONTROL VARIABLES
                       IPRNT          3  PRINT CONTROL
                       IPLOT          2  PLOT CONTROL
                       PSCAL          0  HYDROGRAPH PLOT SCALE
```

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ICOMP 9 NUMBER OF HYDROGRAPHS TO COMBINE

***

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

HYDROGRAPH AT STATION 1200
FOR PLAN 1, RATIO = 1.00

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW	6-HR	24-HR	72-HR	8.00-HR
559.	3.80	(CFS)	125.	97.	97.	97.
		(INCHES)	.000	.000	.000	.000
		(AC-FT)	62.	64.	64.	64.

CUMULATIVE AREA = .00 SQ MI

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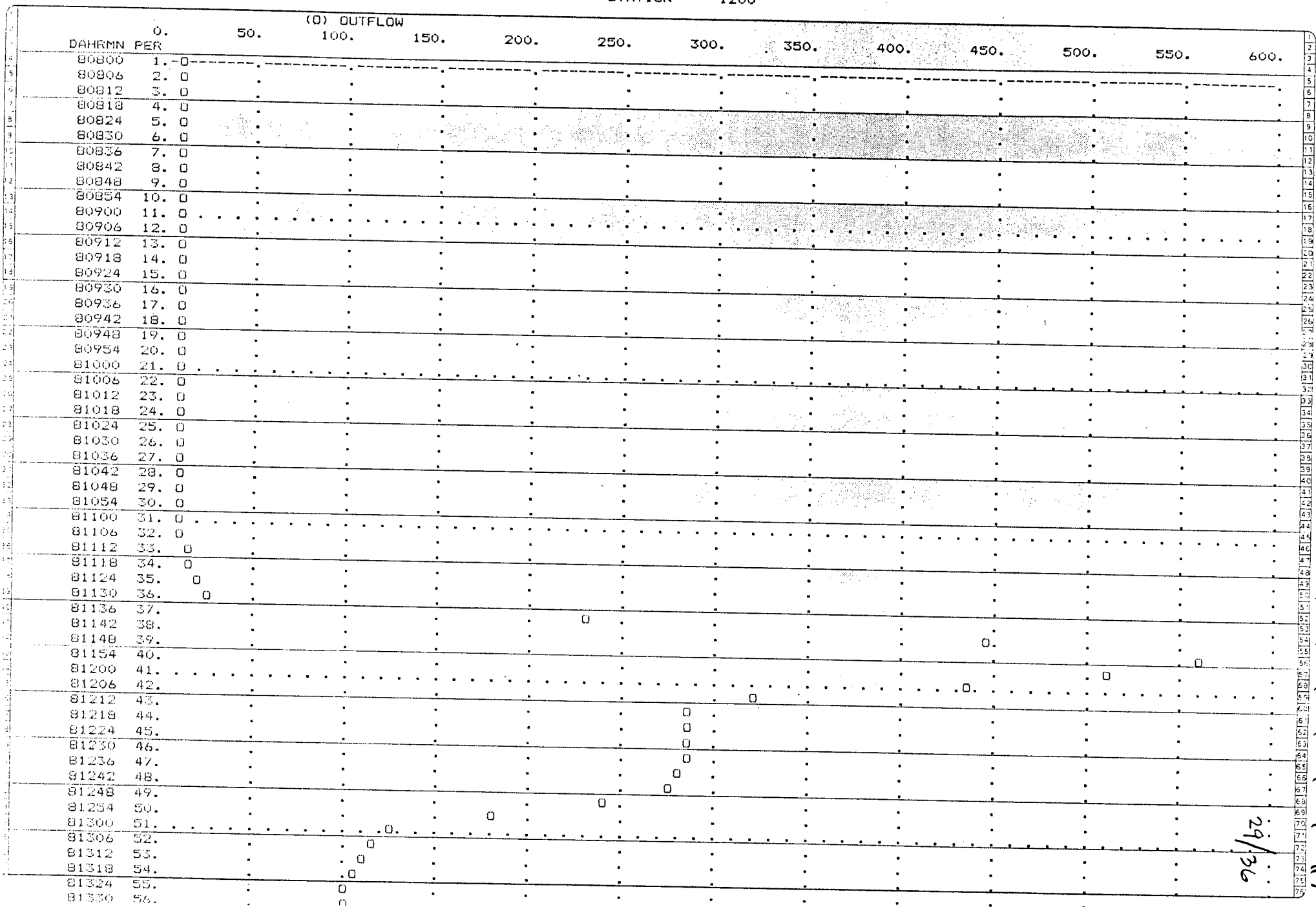
STATION 1200



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81348 59.
81354 60.
81400 61.
81406 62.
81412 63.
81418 64.
81424 65.
81430 66.
81436 67.
81442 68.
81448 69.
81454 70.
81500 71.
81506 72.
81512 73.
81518 74.
81524 75.
81530 76.
81536 77.
81542 78.
81548 79.
81554 80.
81600 81.

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

              **************
              *            *
 32 KK        *    1300    *      STAGE-STORAGE THRU RESERVOIR
              *            *
              **************
                        PLAN1   8'X6'X100' RCB OUTFALL

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

 34 KP          PLAN  1 FOR STATION      1300          STAGE-STORAGE THRU RESERVOIR
 35 KO          OUTPUT CONTROL VARIABLES
                     IPRNT         3  PRINT CONTROL
                     IPLOT         2  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE

                HYDROGRAPH ROUTING DATA

 36 RS          STORAGE ROUTING
                     NSTPS         1  NUMBER OF SUBREACHES
                      ITYP      ELEV  TYPE OF INITIAL CONDITION
                     RSVRIC    164.00  INITIAL CONDITION
                          X       .00 WORKING R AND D COEFFICIENT

 37 SA          AREA          .0      .1      .2      .4      .9     1.5     2.0     2.2     2.4
 38 SO          DISCHARGE     0.      29.     58.     88.     120.   150.    325.    425.    490.
 39 SE          ELEVATION   164.00  165.00  166.00  167.00  168.00 169.00  170.00  171.00  172.00
 40 SS          SPILLWAY
                     CREL    172.00  SPILLWAY CREST ELEVATION
                     SPWID   250.00  SPILLWAY WIDTH
                     COQW      3.00  WEIR COEFFICIENT
                     EXPW      1.50  EXPONENT OF HEAD

                                     ***

                                COMPUTED STORAGE-ELEVATION DATA

                STORAGE       .00     .02     .15     .44    1.10    2.32    4.05    6.12    8.39
                ELEVATION   164.00  165.00  166.00  167.00  168.00 169.00  170.00  171.00  172.00

                                COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

                STORAGE       .00     .02     .15     .44    1.10    2.32    4.05    6.12    8.39
                OUTFLOW       .00   29.00   58.00   88.00  120.00 150.00  325.00  425.00  490.00
                ELEVATION   164.00  165.00  166.00  167.00  168.00 169.00  170.00  171.00  172.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN          0. TO       29.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)
```

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HYDROGRAPH AT STATION 1300
FOR PLAN 1, RATIO = 1.00

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	8.00-HR
		(CFS)				
427.	4.00		125.	97.	97.	97.
		(INCHES)	.000	.000	.000	.000
		(AC-FT)	62.	64.	64.	64.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	8.00-HR
6.	4.00	1.	1.	1.	1.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	8.00-HR
171.04	4.00	167.17	166.48	166.48	166.48

CUMULATIVE AREA = .00 SQ MI

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STATION 1300

(I) INFLOW, (O) OUTFLOW

	0.	100.	200.	300.	400.	500.	600.
	0.	0.	0.	0.	0.	0.	0.
DAHRMN	PER						
80800	101						S
80806	2.IO						S
80812	3.I						S
80818	4.IO						S
80824	5.I						S
80830	6.I						S
80836	7.I						S
80842	8.I						S
80848	9.I						S
80854	10.I						S
80900	11.I						S
80906	12.I						S
80912	13.I						S
80918	14.I						S
80924	15.I						S
80930	16.I						S
80936	17.I						S
80942	18.I						S
80948	19.I						S
80954	20.I						S
81000	21.I						S
81006	22.I						S
81012	23.I						S
81018	24.I						S
81024	25.I						S
81030	26.I						S
81036	27.I						S
81042	28.I						S
81048	29.I						S
81054	30.I						S
81100	31.I						S
81106	32.I						S
81112	33.I						S
81118	34.OI						S
81124	35. I						S
81130	36. I						S
81136	37.	O.	I				S
81142	38.		O			I	
81148	39.				O		I
81154	40.					O	I
81200	41.						I.
81206	42.				I	.O	
81212	43.			I.		O	
81218	44.			I.	O		
81224	45.			I.	O		
81230	46.			IO			
81236	47.			IO.			
81242	48.			IO			
81248	49.		I	O			
81254	50.		I .	O			
81300	51.	I	.O.				
81306	52.	I	O				
81312	53.	I	O				

(S) STORAGE

	0.	2.	4.	6.	8.	0.	0.
80800	101	S					
80806	2.IO						
80812	3.I						
80818	4.IO						
80824	5.I						
80830	6.I						
80836	7.I						
80842	8.I						
80848	9.I						
80854	10.I						
80900	11.I						
80906	12.I						
80912	13.I						
80918	14.I						
80924	15.I						
80930	16.I						
80936	17.I						
80942	18.I						
80948	19.I						
80954	20.I						
81000	21.I						
81006	22.I						
81012	23.I						
81018	24.I						
81024	25.I						
81030	26.I						
81036	27.I						
81042	28.I						
81048	29.I						
81054	30.I						
81100	31.I						
81106	32.I						
81112	33.I						
81118	34.OI						
81124	35. I						
81130	36. I						
81136	37.						
81142	38.						
81148	39.	S					
81154	40.		S				
81200	41.			S			
81206	42.				S		
81212	43.				S		
81218	44.			S			
81224	45.		S				
81230	46.	S					
81236	47.	S					
81242	48.	S					
81248	49.	S					
81254	50.	S					
81300	51.	S					
81306	52.	S					
81312	53.	S					

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81336  57.        I O                                    S
81342  58.       I.O                                     S
81348  59.       IO                                     S
81354  60.       IO                                    S
81400  61. . . . .IO . . . . . . . . . . . . . . . . . S. . . . . . . . . . . .
81406  62.        I.                                   S
81412  63.       IO.                                  S
81418  64.       IO.                                  S
81424  65.       IO.                                  S
81430  66.       I .                                  S
81436  67.       I .                                  S
81442  68.       I .                                  S
81448  69.       I .                                  S
81454  70.       I .                                  S
81500  71. . . . I . . . . . . . . . . . . . . . . . S . . . . . . . . . . . .
81506  72.       I .                                  S
81512  73.       I .                                  S
81518  74.       I .                                  S
81524  75.       I .                                  S
81530  76.       I .                                  S
81536  77.       I .                                  S
81542  78.       I .                                  S
81548  79.       I .                                  S
81554  80.       I .                                  S
81600  81.-------I-.----------.----------.----------.-S--------.----------.----------.----------.
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PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO FLOWS RATIO 1 1.00
HYDROGRAPH AT	1100	.00	1	FLOW	224.
				TIME	4.30
HYDROGRAPH AT	100	.00	1	FLOW	39.
				TIME	3.80
HYDROGRAPH AT	200	.00	1	FLOW	24.
				TIME	3.80
HYDROGRAPH AT	300	.00	1	FLOW	24.
				TIME	3.80
HYDROGRAPH AT	400	.00	1	FLOW	21.
				TIME	3.80
HYDROGRAPH AT	500	.00	1	FLOW	52.
				TIME	3.80
HYDROGRAPH AT	600	.00	1	FLOW	196.
				TIME	3.80
HYDROGRAPH AT	900	.00	1	FLOW	52.
				TIME	3.80
HYDROGRAPH AT	1000	.00	1	FLOW	48.
				TIME	3.80
9 COMBINED AT	1200	.00	1	FLOW	559.
				TIME	3.80
ROUTED TO	1300	.00	1	FLOW	427.
				TIME	4.00
			** PEAK STAGES IN FEET **		
			1	STAGE	171.04
				TIME	4.00

96/35

REVISED HEC-1 RUN

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             MAY  1991                 *
*           VERSION 4.0.1E              *
*     Lahey F77L-EM/32 version 5.01     *
*       Dodson & Associates, Inc.       *
*  RUN DATE  09/12/94  TIME  16:44:09   *
*****************************************
```

```
*****************************************
*                                       *
*   U.S. ARMY CORPS OF ENGINEERS        *
*   HYDROLOGIC ENGINEERING CENTER       *
*         609 SECOND STREET             *
*       DAVIS, CALIFORNIA 95616         *
*         (916) 551-1748                *
*                                       *
*****************************************
```

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

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

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

1 HEC-1 INPUT PAGE 1

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

  1           ID       FAIRFEILD ESTATES DRAINAGE STUDY 9-13-94
  2           ID       REVISED FROM FAIRFIELD ESTATES DRAINAGE PLAN  1985
  3           ID       100 YEAR DEVELOPED CONDITIONS
  4           IT      6 08NOV85     800       0 08NOV85    1600
  5           IO      4       0       0
  6           JP      1

  7           KK    1100         OUTFLOW HYDROGRAPH FROM COLEMAN DETENTION BASIN
  8           IN      15 08NOV85    1100
  9           QI      12      13      23      75     210     225     222     207      60      44
 10           QI      35      28      24      21      20      18      18      18      18      17
 11           QI      17

 12           KK     100        SYSTEM 100
 13           IN       5 08NOV85    1130
 14           QI       0      16      30      44      35      25      15       5       0

 15           KK     200        SYSTEM 200
 16           QI       0       9      18      27      22      16      10       4       0

 17           KK     300        SYSTEM 300
 18           QI       0       9      18      27      22      16      10       4       0

 19           KK     400        SYSTEM 400
 20           QI       0       8      17      25      19      14       9       4       0

 21           KK     500        SYSTEM 500
 22           QI       0      18      35      54      51      40      28      17       6       0

 23           KK     600        SYSTEM 600
 24           QI       0      55     120     190     200     155     113      70      27       0

 25           KK     900        SYSTEM 900
 26           QI       0      20      40      60      47      34      20       7       0

 27           KK    1000        SYSTEM 1000
 28           QI       0      18      38      56      43      32      19       6       0

 29           KK    1200        DEVELOP COND. INFLOW HYDROGRAPH COMBINATION
 30           KO       3       2
 31           HC       9
```

```
          32          KK    1300       STAGE-STORAGE THRU RESERVIOR
          33          KM   PLAN1       8'x 6' x 100' RCB OUTFALL
          34          KP       1
          35          KO       3      2
          36          RS       1    ELEV   168.0
          37          SA    1.22    1.43    1.61    1.79    2.01
          38          SE     168     169     170     171     172
          39          SQ       0      65     233     425     490
          40          SE  168.25     169     170     171     172
          41          SS     172     250       3     1.5
          42          ZZ
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             MAY   1991                *
*          VERSION 4.0.1E               *
*     Lahey F77L-EM/32 version 5.01     *
*       Dodson & Associates, Inc.       *
*  RUN DATE  09/12/94  TIME  16:44:09   *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*         609 SECOND STREET             *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 551-1748              *
*                                       *
*****************************************
```

FAIRFEILD ESTATES DRAINAGE STUDY 9-13-94
REVISED FROM FAIRFIELD ESTATES DRAINAGE PLAN 1985
100 YEAR DEVELOPED CONDITIONS

```
  5 IO        OUTPUT CONTROL VARIABLES
                   IPRNT          4  PRINT CONTROL
                   IPLOT          0  PLOT CONTROL
                   QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT         HYDROGRAPH TIME DATA
                    NMIN          6  MINUTES IN COMPUTATION INTERVAL
                   IDATE      8NOV85  STARTING DATE
                   ITIME        0800  STARTING TIME
                      NQ          81  NUMBER OF HYDROGRAPH ORDINATES
                  NDDATE      8NOV85  ENDING DATE
                  NDTIME        1600  ENDING TIME
                  ICENT          19  CENTURY MARK

               COMPUTATION INTERVAL    0.10 HOURS
                   TOTAL TIME BASE    8.00 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

   JP         MULTI-PLAN OPTION
                   NPLAN          1  NUMBER OF PLANS

   JR         MULTI-RATIO OPTION
                 RATIOS OF RUNOFF
               1.00
```

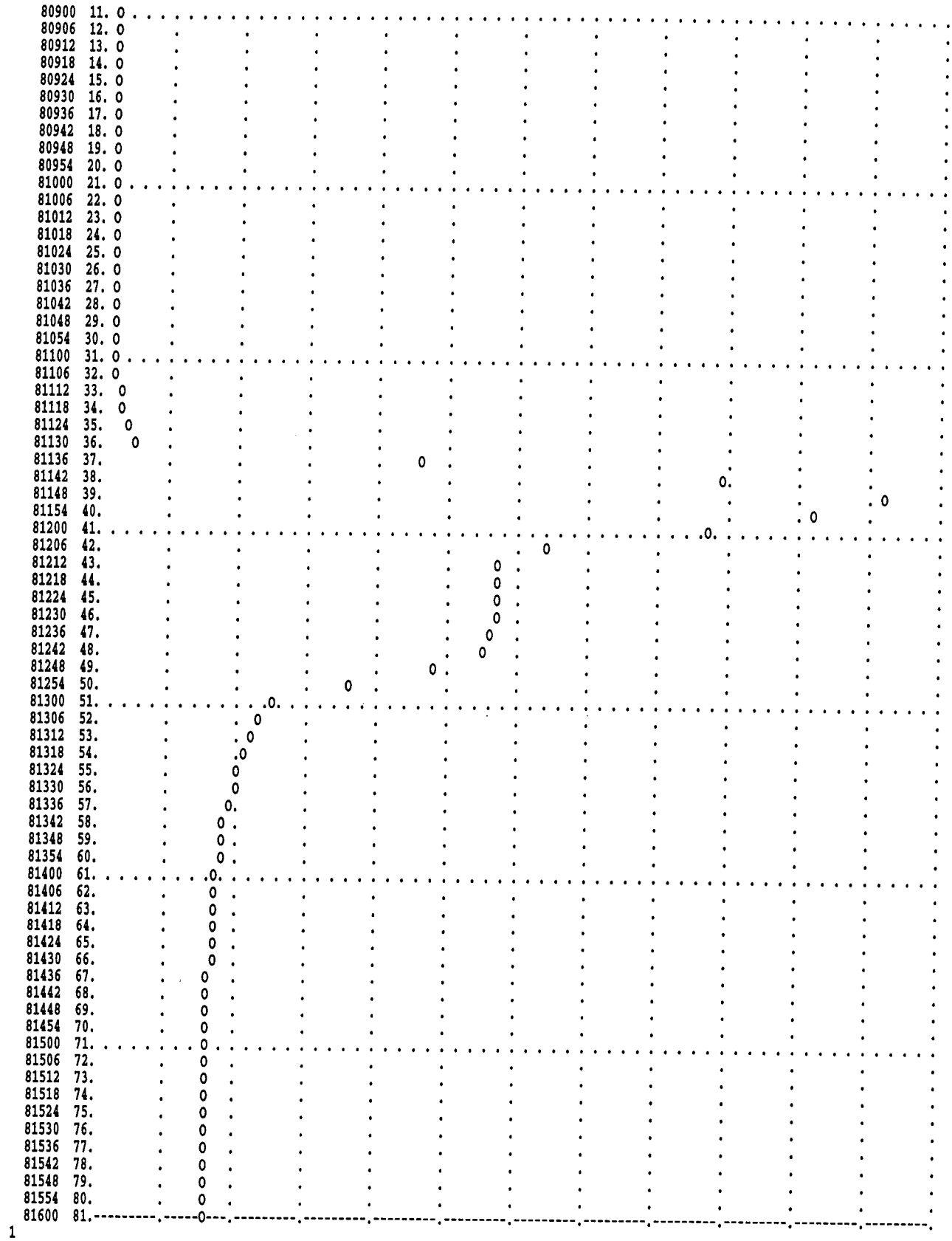
*** ***

```
          **************
          *            *
  7 KK    *      1100  *          OUTFLOW HYDROGRAPH FROM COLEMAN DETENTION BASIN
          *            *
          **************

  8 IN        TIME DATA FOR INPUT TIME SERIES
                   JXMIN         15  TIME INTERVAL IN MINUTES
                  JXDATE      8NOV85  STARTING DATE
                  JXTIME        1100  STARTING TIME

           SUBBASIN RUNOFF DATA
```

```
 0 BA          SUBBASIN CHARACTERISTICS
                    TAREA        0.00  SUBBASIN AREA

                                                    ***


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


          **************
          *            *
 12 KK    *       100  *             SYSTEM 100
          *            *
          **************

 13 IN          TIME DATA FOR INPUT TIME SERIES
                     JXMIN           5  TIME INTERVAL IN MINUTES
                    JXDATE      8NOV85  STARTING DATE
                    JXTIME        1130  STARTING TIME

              SUBBASIN RUNOFF DATA

 0 BA           SUBBASIN CHARACTERISTICS
                     TAREA        0.00  SUBBASIN AREA

                                                    ***


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


          **************
          *            *
 15 KK    *       200  *             SYSTEM 200
          *            *
          **************

 13 IN          TIME DATA FOR INPUT TIME SERIES
                     JXMIN           5  TIME INTERVAL IN MINUTES
                    JXDATE      8NOV85  STARTING DATE
                    JXTIME        1130  STARTING TIME

              SUBBASIN RUNOFF DATA

 0 BA           SUBBASIN CHARACTERISTICS
                     TAREA        0.00  SUBBASIN AREA

                                                    ***


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


          **************
          *            *
 17 KK    *       300  *             SYSTEM 300
          *            *
          **************

 13 IN          TIME DATA FOR INPUT TIME SERIES
                     JXMIN           5  TIME INTERVAL IN MINUTES
                    JXDATE      8NOV85  STARTING DATE
                    JXTIME        1130  STARTING TIME

              SUBBASIN RUNOFF DATA

 0 BA           SUBBASIN CHARACTERISTICS
                     TAREA        0.00  SUBBASIN AREA

                                                    ***


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


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

```
          *          *
 19 KK    *      400 *            SYSTEM 400
          *          *
          **************

 13 IN        TIME DATA FOR INPUT TIME SERIES
                   JXMIN          5  TIME INTERVAL IN MINUTES
                  JXDATE      8NOV85  STARTING DATE
                  JXTIME        1130  STARTING TIME

           SUBBASIN RUNOFF DATA

  0 BA        SUBBASIN CHARACTERISTICS
                  TAREA        0.00  SUBBASIN AREA

                                                        ***


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


          **************
          *          *
 21 KK    *      500 *            SYSTEM 500
          *          *
          **************

 13 IN        TIME DATA FOR INPUT TIME SERIES
                   JXMIN          5  TIME INTERVAL IN MINUTES
                  JXDATE      8NOV85  STARTING DATE
                  JXTIME        1130  STARTING TIME

           SUBBASIN RUNOFF DATA

  0 BA        SUBBASIN CHARACTERISTICS
                  TAREA        0.00  SUBBASIN AREA

                                                        ***


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


          **************
          *          *
 23 KK    *      600 *            SYSTEM 600
          *          *
          **************

 13 IN        TIME DATA FOR INPUT TIME SERIES
                   JXMIN          5  TIME INTERVAL IN MINUTES
                  JXDATE      8NOV85  STARTING DATE
                  JXTIME        1130  STARTING TIME

           SUBBASIN RUNOFF DATA

  0 BA        SUBBASIN CHARACTERISTICS
                  TAREA        0.00  SUBBASIN AREA

                                                        ***


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


          **************
          *          *
 25 KK    *      900 *            SYSTEM 900
          *          *
          **************

 13 IN        TIME DATA FOR INPUT TIME SERIES
                   JXMIN          5  TIME INTERVAL IN MINUTES
                  JXDATE      8NOV85  STARTING DATE
                  JXTIME        1130  STARTING TIME

           SUBBASIN RUNOFF DATA
```

```
 0 BA          SUBBASIN CHARACTERISTICS
                    TAREA        0.00  SUBBASIN AREA

                                                                                ***

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


            **************
            *            *
 27 KK      *      1000  *            SYSTEM 1000
            *            *
            **************

 13 IN          TIME DATA FOR INPUT TIME SERIES
                     JXMIN          5  TIME INTERVAL IN MINUTES
                    JXDATE      8NOV85  STARTING DATE
                    JXTIME        1130  STARTING TIME

               SUBBASIN RUNOFF DATA

 0 BA           SUBBASIN CHARACTERISTICS
                    TAREA        0.00  SUBBASIN AREA

                                                                                ***

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


            **************
            *            *
 29 KK      *      1200  *            DEVELOP COND. INFLOW HYDROGRAPH COMBINATION
            *            *
            **************

 30 KO          OUTPUT CONTROL VARIABLES
                    IPRNT          3  PRINT CONTROL
                    IPLOT          2  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

 31 HC          HYDROGRAPH COMBINATION
                    ICOMP          9  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                                ***

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

                      HYDROGRAPH AT STATION     1200
                        FOR PLAN 1, RATIO = 1.00

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR       72-HR      8.00-HR
+   (CFS)       (HR)
                          (CFS)
+     559.      3.80                  125.         97.         97.         97.
                        (INCHES)     0.000       0.000       0.000       0.000
                        (AC-FT)         62.         64.         64.         64.

                      CUMULATIVE AREA =    0.00 SQ MI

1                                                     STATION     1200

                          (O) OUTFLOW
          0.       50.      100.      150.      200.      250.      300.      350.      400.      450.      500.      550.      600.
 DAHRMN PER
  80800   1.-O-------.---------.---------.---------.---------.---------.---------.---------.---------.---------.---------.---------.
  80806   2. O       .         .         .         .         .         .         .         .         .         .         .         .
  80812   3. O       .         .         .         .         .         .         .         .         .         .         .         .
  80818   4. O       .         .         .         .         .         .         .         .         .         .         .         .
  80824   5. O       .         .         .         .         .         .         .         .         .         .         .         .
  80830   6. O       .         .         .         .         .         .         .         .         .         .         .         .
  80836   7. O       .         .         .         .         .         .         .         .         .         .         .         .
  80842   8. O       .         .         .         .         .         .         .         .         .         .         .         .
  80848   9. O       .         .         .         .         .         .         .         .         .         .         .         .
  80854  10. O       .         .         .         .         .         .         .         .         .         .         .         .
```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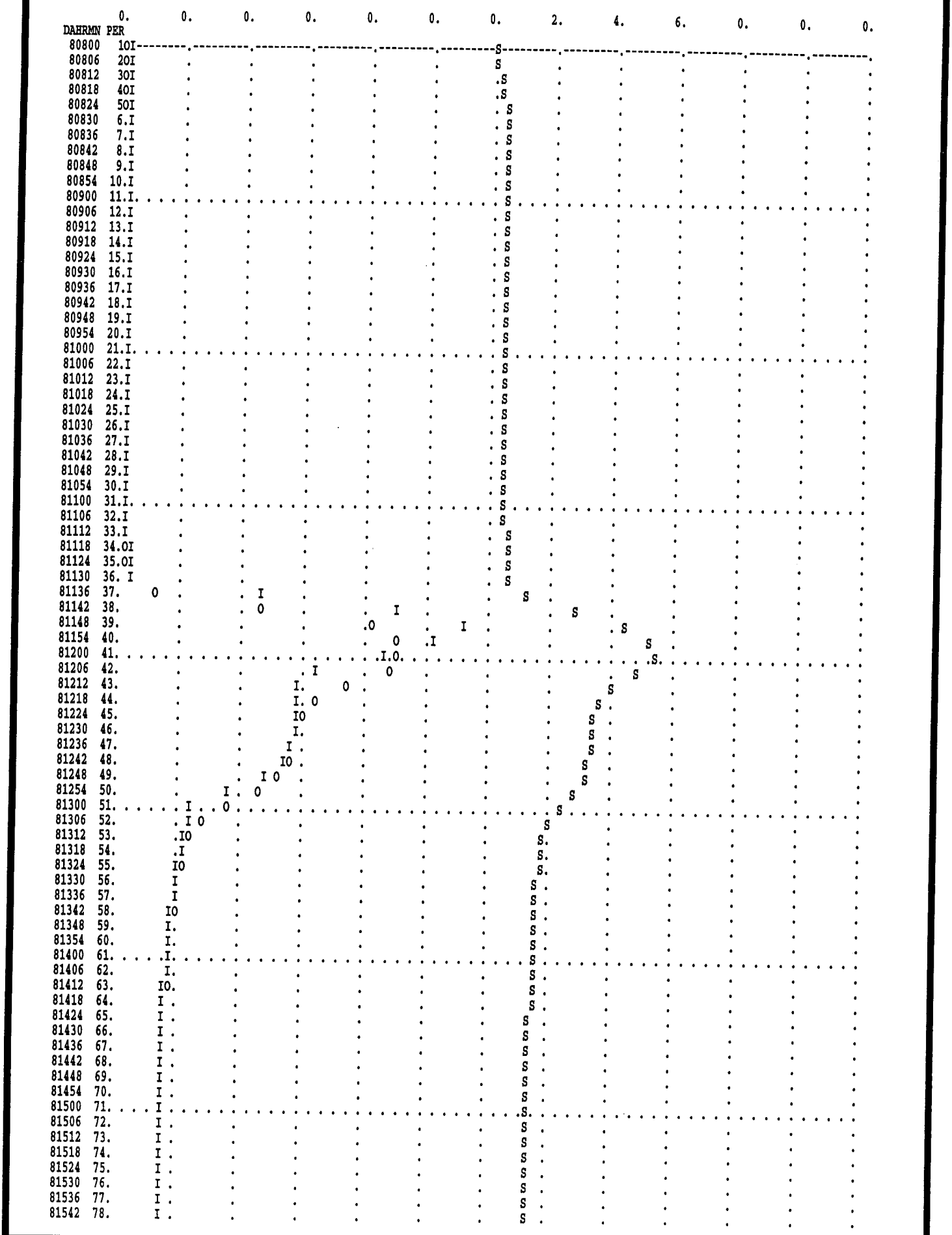
80906 12.
80912 13.
80918 14.
80924 15.
80930 16.
80936 17.
80942 18.
80948 19.
80954 20.
81000 21.
81006 22.
81012 23.
81018 24.
81024 25.
81030 26.
81036 27.
81042 28.
81048 29.
81054 30.
81100 31.
81106 32.
81112 33.
81118 34.
81124 35.
81130 36.
81136 37.
81142 38.
81148 39.
81154 40.
81200 41.
81206 42.
81212 43.
81218 44.
81224 45.
81230 46.
81236 47.
81242 48.
81248 49.
81254 50.
81300 51.
81306 52.
81312 53.
81318 54.
81324 55.
81330 56.
81336 57.
81342 58.
81348 59.
81354 60.
81400 61.
81406 62.
81412 63.
81418 64.
81424 65.
81430 66.
81436 67.
81442 68.
81448 69.
81454 70.
81500 71.
81506 72.
81512 73.
81518 74.
81524 75.
81530 76.
81536 77.
81542 78.
81548 79.
81554 80.
81600 81.
1

*** ***

****
* *

```
 32 KK     *      1300  *            STAGE-STORAGE THRU RESERVIOR
           *            *
           **************
                        PLAN1        8'x 6' x 100' RCB OUTFALL

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

 34 KP        PLAN  1 FOR STATION     1300                STAGE-STORAGE THRU RESERVIOR

 35 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          3  PRINT CONTROL
                     IPLOT          2  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE

                HYDROGRAPH ROUTING DATA

 36 RS          STORAGE ROUTING
                     NSTPS          1  NUMBER OF SUBREACHES
                      ITYP       ELEV  TYPE OF INITIAL CONDITION
                    RSVRIC     168.00  INITIAL CONDITION
                         X       0.00 WORKING R AND D COEFFICIENT

 37 SA              AREA        1.2       1.4       1.6       1.8       2.0

 38 SE          ELEVATION     168.00    169.00    170.00    171.00    172.00

 39 SQ          DISCHARGE       0.        65.      233.      425.      490.

 40 SE          ELEVATION     168.25    169.00    170.00    171.00    172.00

 41 SS          SPILLWAY
                     CREL      172.00  SPILLWAY CREST ELEVATION
                    SPWID      250.00  SPILLWAY WIDTH
                     COQW        3.00  WEIR COEFFICIENT
                     EXPW        1.50  EXPONENT OF HEAD

                                                  ***

                                          COMPUTED STORAGE-ELEVATION DATA

                STORAGE       0.00      1.32      2.84      4.54      6.44
              ELEVATION     168.00    169.00    170.00    171.00    172.00

                                     COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

                STORAGE       0.00      0.31      1.32      2.84      4.54      6.44
                OUTFLOW       0.00      0.00     65.00    233.00    425.00    490.00
              ELEVATION     168.00    168.25    169.00    170.00    171.00    172.00

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

                        HYDROGRAPH AT STATION     1300
                          FOR PLAN 1, RATIO = 1.00

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR       72-HR       8.00-HR
+   (CFS)       (HR)
                          (CFS)
+    455.       4.00                  124.         95.         95.          95.
                          (INCHES)   0.000       0.000       0.000        0.000
                          (AC-FT)       61.         63.         63.          63.

  PEAK STORAGE  TIME                          MAXIMUM AVERAGE STORAGE
                                      6-HR        24-HR       72-HR       8.00-HR
+  (AC-FT)      (HR)
        5.      4.00                    2.          1.          1.           1.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                      6-HR        24-HR       72-HR       8.00-HR
+   (FEET)      (HR)
    171.46      4.00                169.27      169.03      169.03       169.03

                        CUMULATIVE AREA =    0.00 SQ MI

1                                                   STATION     1300

                          (I) INFLOW,   (O) OUTFLOW
          0.      100.      200.      300.      400.      500.      600.        0.        0.        0.        0.        0.        0.
                                                                                (S) STORAGE
```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DAHRMN PER
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80806 20I
80812 30I
80818 40I
80824 50I
80830 6.I
80836 7.I
80842 8.I
80848 9.I
80854 10.I
80900 11.I
80906 12.I
80912 13.I
80918 14.I
80924 15.I
80930 16.I
80936 17.I
80942 18.I
80948 19.I
80954 20.I
81000 21.I
81006 22.I
81012 23.I
81018 24.I
81024 25.I
81030 26.I
81036 27.I
81042 28.I
81048 29.I
81054 30.I
81100 31.I
81106 32.I
81112 33.I
81118 34.OI
81124 35.OI
81130 36. I
81136 37.
81142 38.
81148 39.
81154 40.
81200 41.
81206 42.
81212 43.
81218 44.
81224 45.
81230 46.
81236 47.
81242 48.
81248 49.
81254 50.
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81430 66.
81436 67.
81442 68.
81448 69.
81454 70.
81500 71.
81506 72.
81512 73.
81518 74.
81524 75.
81530 76.
81536 77.
81542 78.

```
  81548  79.      I .       .       .       .       .       .     S .       .       .       .       .       .
  81554  80.      I .       .       .       .       .       .     S .       .       .       .       .       .
  81600  81.------I-.---------.---------.---------.---------.---------.-----S--.---------.---------.---------.---------.---------.
1
1
```

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO FLOWS RATIO 1 1.00
HYDROGRAPH AT					
+	1100	0.00	1	FLOW	224.
				TIME	4.30
HYDROGRAPH AT					
+	100	0.00	1	FLOW	39.
				TIME	3.80
HYDROGRAPH AT					
+	200	0.00	1	FLOW	24.
				TIME	3.80
HYDROGRAPH AT					
+	300	0.00	1	FLOW	24.
				TIME	3.80
HYDROGRAPH AT					
+	400	0.00	1	FLOW	21.
				TIME	3.80
HYDROGRAPH AT					
+	500	0.00	1	FLOW	52.
				TIME	3.80
HYDROGRAPH AT					
+	600	0.00	1	FLOW	196.
				TIME	3.80
HYDROGRAPH AT					
+	900	0.00	1	FLOW	52.
				TIME	3.80
HYDROGRAPH AT					
+	1000	0.00	1	FLOW	48.
				TIME	3.80
9 COMBINED AT					
+	1200	0.00	1	FLOW	559.
				TIME	3.80
ROUTED TO					
+	1300	0.00	1	FLOW	455.
				TIME	4.00

** PEAK STAGES IN FEET **

1	STAGE	171.46
	TIME	4.00

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

CONTOUR MAP
RESERVE A
FAIRFIELD
ESTATES