

ENGINEERING, SURVEYING & LAND PLANNING

**S R B**  
SAVOY, RUGGLES & BOHM, P.A.

**FINAL DRAINAGE PLAN  
FOR  
TARA FALLS  
SEDGWICK COUNTY, KANSAS  
AND SUPPLEMENTAL CALCULATIONS**

**MAY 2, 2000**



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SAVOY, RUGGLES & BOHM, P.A.  
ENGINEERING & SURVEYING

May 2, 2000

Mr. Chris Carrier, P.E.  
Storm Water Management  
City Hall - 8<sup>th</sup> Floor  
455 N. Main  
Wichita, KS 67202

Re: Tara Falls Addition, Sedgwick County, Kansas

Dear Mr. Carrier,

At your request, I have run hydrologic models of the Tara Falls detention pond system for the 5, 10, 25, 50, and 100-year return period storm events in order to demonstrate the discharge characteristics of the developed basin. In each run, the undeveloped model has been calculated in conjunction with the developed model, so that a comparison may be made between the undeveloped and developed discharges from the site. These discharges are tabulated on the following page for your convenience.

Please note that the HEC-1 model used for the original drainage calculations has been modified only with regard to rainfall for each of the design storms. The rainfall totals for each design storm are gleaned from ESSA Weather Bureau Technical Paper 40 Modified to NWS Hydro-35, 1977, using the SCS Type II rainfall distribution.

Also included with this report is a copy of the original drainage plan for your files.

I hope this information proves helpful.

Regards,

Christopher M. Bohm, P.E.

Encl.

Summary of Pond Routing Trials  
 Tara Falls Addition  
 2-May-00

Return Peroid (years)	Rainfall (24 hour) (inches)	Existing Runoff (Undeveloped) (cfs)	Pond Outflow (Developed) (cfs)	Percentage of Undeveloped Flow (percent)
5	4.8"	153	168	109.8%
10	5.52"	200	203	101.5%
25	6.48"	258	250	96.9%
50	7.44"	325	296	91.1%
100	7.8"	351	313	89.2%

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1-9-98

### Ters Falls

Upstream Basin (Existing) Exiting @ NE  
Corner of Site (Meier Property)

Upstream Drainage Area = 107 Act 27 Acres  
= 134 Acres

(From Site Survey; USGS Quad. Sheets)

Hydrological Soil Group "D" (Sedgwick County  
Soil Survey).

Time of Concentration: Beg. @ U.S. of Basin;  
Existing Subdivision:

Tc<sub>1</sub>: 300' Grass lawn @ 2%; V = 0.45 f/s  
Tc<sub>1</sub> = 11.1 min

Tc<sub>2</sub>: 900' Shallow Curb flow; V = 0.91 f/s  
@ 0.40%; Tc<sub>2</sub> = 16.4 min

Tc<sub>3</sub>: Full Pavement flow; L = 1350'; S = 0.40%  
V = 3.5 f/sec (see other calcs).  
Tc<sub>3</sub> = 6.43 min.

Tc<sub>4</sub>: Channel flow; Use V = 2.5 f/sec (Natural Chan)  
L = 2400'  
Tc<sub>4</sub> = 16.0 min

(Note: Tc<sub>4</sub> @ Dam face).

Ignore Dam for  $T_c$ ; Continue to Harry

$T_{c5}$ :  $L = 1500'$ . Use  $V = 3.0$  f/s

$$T_{c5} = 8.3 \text{ min}$$

$T_{c \text{ Total}} := 58 \text{ min}$  (Velocity Method).

Check w/ other  $T_c$  Formulas:

Kirpich:  $T_c = 0.00781 L^{0.77} S^{-0.385}$

$$L = 6450' \quad \bar{S} = \frac{1370 - 1318}{6450} = 0.806\%$$

$$T_c = 0.00781 (6450)^{0.77} (0.00806)^{-0.385}$$

$$T_c = 42.9 \text{ minutes (Use 43)}$$

SCS Curve No:

Residential: 29 Acres @  $CN = 93$  (0.216)

Balance Pasture 105 Acres @  $CN = 80$  (0.784)

$$\bar{CN} = 82.8; \text{ Use } 83.0$$

$$\text{SCS Lag} = 0.6 T_c; \quad T_c = \frac{58 + 43}{2} = 50.5$$

$$\text{SCS Lag} = (0.6) \left( \frac{50 \text{ min}}{60 \text{ min/hr}} \right) = 0.50 \text{ hours}$$

$$BA = 134 \text{ Ac} / 640 = 0.209 \text{ sq. miles}$$

$T_{in}$  HEC-1 (taraml.hcl)

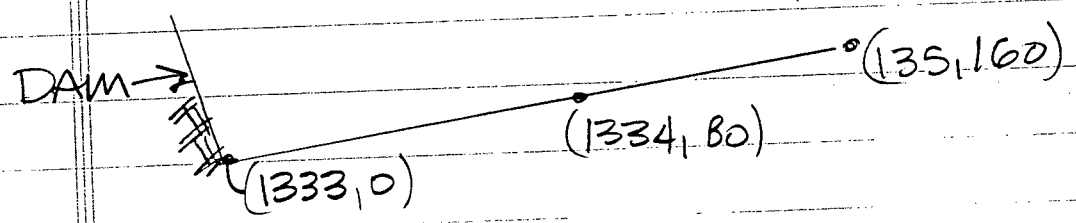
Results w/o Pond: (Existing Condition)

$$Q_{100} = 443 \text{ cfs}$$

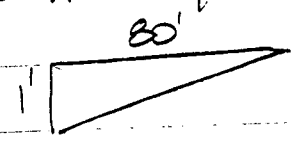
Add Pond Into Routing:

Pond has no defined spillway, One small trickle pipe to hold static pool.

East Side of Dam is "Flat" @ 1333 Elevation, Grassed, and Slopes to S.E. As Follows:



Assume Triangular Channel



$$A = 40'{}^2 \quad n = 0.03 \text{ (grass)}$$

$$w_p = 81 \text{ feet} \quad s = 0.005 \text{ (assumed)}$$

$$V @ D=1': \quad V = \frac{1.49}{0.03} \left( \frac{40}{81} \right)^{0.167} (0.005)^{1/2} = 2.18 \text{ f/s}$$

$$Q = V \cdot A = (2.18 \times 40) = 87.2 \text{ cfs}$$

$$V @ D=2': \quad A = (2 \times 160) / 2 = 160 \text{ ft}{}^2$$

$$w_p = 162 \text{ ft}$$

$$V = (1.49 / 0.03) \left( \frac{160}{162} \right)^{0.167} (0.005)^{1/2} = 3.48 \text{ cfs}$$

$$Q = V \cdot A = 160 \times 3.48 = 557 \text{ cfs}$$

NEED TO RATE @ 0.5' Increments for detail of Outflow vs Storage.

- ELEV                      Q  
 @1333                      0                      → Controlling Elevation  
 @1333.5    D=0.5; A=10ft<sup>2</sup>; WP=40.5  
    V=1.37; Q=14 cfs  
 @1334                      Q=87 cfs (previous)  
 @1334.5    D=1.5; A=(120\*1.5/2)=90ft<sup>2</sup>  
    WP=121.5  
    V=2.87; Q=258.5  
 @1335                      Q=557 cfs (previous).

West Side of Pond Also can discharge across grass at Elev. 1334's Above. To be conservative, this outflow will be ignored to maximize the pond storage.

Existing Pond Stage-Storage:  
 (From other Calculations - SRB Survey)

<u>Elev</u>	<u>Area</u> (ft <sup>2</sup> )	<u>Area</u> (Ac)
1333	217599	5.0
1334	321695	7.4
1335	426678	9.8

To Model Through Pond - Separate U.S. Pond Drainage Area for Routing.

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Area to Pond = 107 Acres

$T_{c\text{pond}} = 50$  minutes (from previous calc's - Velocity Method). To Be consistent, subtract 8 minutes (from Dam to Harry) since other  $T_c$  was Averaged.  
Use  $T_c = 42$  minutes

$$\text{SCS Lag} = 0.6T_c = (0.6) \frac{42 \text{ m}}{60 \text{ m/hr}} = 0.42 \text{ hours}$$

To HEC-1:  $BA = 107/640 = 0.167$  sq. miles  
 $CN = 83$  (As Before)

SCS Lag = 0.42 hrs

Stage Storage / Stage Discharge As Calculated.

file = taram2.hcl

To this routed hydrograph; add the additional 27 Acres (HC card).

For this Area, use  $T_c = 15$  minutes and SCS CN of 80 (pasture).

$$BA = 27/640 = 0.042 \text{ sq miles}$$

SCS Lag = 0.15 hours

CN = 80

To HEC-1 (taram2.hcl)



Results: (See Output for detailed results)

$$Q_{in\ pond} = 388\ cfs$$

$$Q_{out\ Pond} = 317\ cfs\ (after\ routing)$$

$$Q_{downstream\ area} = 128\ cfs$$

$$Q_{combined} = 351\ cfs\ (hydrograph\ addition).$$

The determined  $Q_{100\ c\ Harry}$  (Meier Property)  
= 351 cfs as modeled.

For A Quick Check; Use Rational Method  
(Ignoring Pond Storage)

$$A = 134\ Ac$$

$$T_c = 50\ min; i_{100} = 4.13\ "/in$$

Use  $C = 0.65$  (C of Wichtz); Type D 1-4% slope)

$$Q = CIA = (0.65)(4.13)(134) = 359.7\ cfs$$

FOR THE DEVELOPED SITE; NO MORE THAN  
350 cfs MAY EXIT C HARRY. (100 yr storm).

FOR UPSTREAM (EXISTING) POND:

$$DA = 107\ ACRES$$

NEW CURVE NUMBER DUE TO DEVELOPMENT.

$$29 + 37\ (on\ site) = 66\ Acres\ Residential$$

$$107 - 66 = 41\ Ac\ Pasture$$

$$CN = \left(\frac{66}{107}\right)(93) + \left(\frac{41}{107}\right)(80) = \underline{\underline{88}}$$

7/9  
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 11/9/98

Since the main basin drainage is via a grass channel (some natural - some man made) the  $T_c$  will not change. A Box Culvert will be necessary Under Bluestem St Near the NW corner of the Plat; And detention storage here will be omitted (conservative).

Existing Pond will be controlled with outlet weirs to force the 100 year W.S. Elevation.

Weir Elevation = 1332.50

East weir = 50' length

West weir = 20' length

Concrete; Rip-Rap Bag; or Rip Rap Weirs to Be Used.

For Such Weirs;  $Q = CLH^{1.5}$  where  $C = 3.0$

Total length = 70 feet (65')

Elev	H	Q	
		(w=70')	(w=65')
1332.5	0	0	0
1332.75	0.25	26	24
1333	0.5	74	69
1333.25	0.75	136	127
1333.5	1.0	210	195
1333.75	1.25	293	272
1334	1.5	385	358
1334.25	1.75	486	451

Use 65' Weirs  
 (Total width)  
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 CMB

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As Before; Stage-Storage Remains the Same: See sheet # \_\_\_\_\_ (Existing Pond).

To HEC-1: BA = 0.167 sq. miles  
SCS Lag = 0.42 hrs  
CN = 88

Route through Modified Pond  
file = taram3.hcl

Results:

Q<sub>in</sub> Pond = 420 cfs

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Q<sub>out</sub> Pond = ~~353~~ 348 cfs @ Elev = ~~1333.91~~ 1333.97 < 1334  
OK ✓

This hydrograph will be added to the D.S. Basin (Improved Condition) and then routed through the new detention pond.

D.S. BASIN = 27 Acres

CN = 93

T<sub>c</sub> = 15 min; SCS Lag = 0.15 hours.

New Detention Pond:

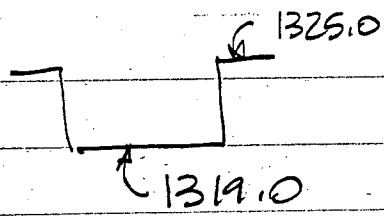
This pond will utilize the existing D.S. Channel, just u.s. of the Meier Property.

To control outflow, a Rip-Rap or concrete Weir will be used.

9/9

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Use weir; L = 13 feet



ELEV	Q	STORAGE (ACRFS)
1319	—	1.9
1319.5	14	
1320	39	2.1
1320.5	71	
1321.0	110	2.3
1321.5	154	
1322.0	202	2.5
1322.5	255	
1323.0	312	2.7
1323.5	372.3	

ROUTE NEW SYSTEM:  
HEC-1 tar2m3.1c1

RESULTS: Comb Q<sub>max</sub> to New Pond = 341 cfs  
 Through New Detention Pond = 343 cfs  
 Elevation Max = 1323.01

386

341 cfs

1323.3

Allow 1.0 foot of freeboard; Top  
 Weir Elevation = 1324.0

1324.3

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1-27-98

10/11

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T22 Falls NW Corner Pond "Reserve C"

Pond 3

Outlet from Site = 36" RCP

Flow = 132310 ; Road Elev = 1329.0

Max Head Avail = 29.0 - 23.1 = 4.9 feet

Area to N.W. Corner = 28 Acres

1/4 Ac developed  $C_{100} = 0.74$

1/4 Ac Pasture  $C_{100} = 0.65$

$\bar{C} = 0.71$ ,  $A = 28$  Ac;  $T_c = 20$  min

$i_{100} = 6.53$ "/hr.

$Q_{100} = (0.71)(28)(6.53) = 130$  cfs

Check w/ HEC-1

SCS Lag = 0.20 hours

$CN = 93 + 80/2 = 87$

100 yr - 24 hr storm

$BA = 28/640 = 0.0438$  sq. miles

(over)

Tarz Falls 1-27-98

11/11

Route through New Pond in Res "C"

Elev	Area	HW/D (1323.10 #)	Q pipe (Highway Culvert Ckt.)
1329	1.05	1.97	73
1328	0.96	1.6	65
1327	-	1.3	52
1326	0.78	1.0	37
1325	-	0.6	16
1324	0.62	0.3	4
1323.5	0.51	-	-

### Results

$$Q_{in} = 140 \text{ cfs}$$

$$Q_{out} = 70 \text{ cfs (culvert)}$$

$$100 \text{ yr W.S.} = 1328.58; \text{ Use } 1329.0$$

Check 100 yr W.S. on Spring Branch Four  
Mile Creek on N. Side Harry.

$$\text{Elev @ w. Culvert} = 1325.5 < 1329.0 \text{ O.K.}$$

Culvert Controls.

tarz 3.1.c1

HEC1 S/N: 1343000364      HWVersion: 6.33      Data File: taram3.hc1

\*\*\*\*\*  
\* FLOOD HYDROGRAPH PACKAGE (HEC-1) \*  
\* MAY 1991 \*  
\* VERSION 4.0.1E \*  
\* RUN DATE 01/20/1998 TIME 14:59:23 \*  
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\*\*\*\*\*  
\* U.S. ARMY CORPS OF ENGINEERS \*  
\* HYDROLOGIC ENGINEERING CENTER \*  
\* 609 SECOND STREET \*  
\* DAVIS, CALIFORNIA 95616 \*  
\* (916) 756-1104 \*  
\*\*\*\*\*

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X X X X X
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X X X X X
X X X X X
X X XXXXXXXX XXXX XXX
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Full Microcomputer Implementation
by
Haestad Methods, Inc.
```

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

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KM.  
THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.  
THE DEFINITION OF -AMSK- 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



HEC1 S/N: 1343000364

HMVersion: 6.33

Data File: taram3.hcl

```

*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* MAY 1991 *
* VERSION 4.0.1E *
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* RUN DATE 01/20/1998 TIME 14:59:23 *
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* DAVIS, CALIFORNIA 95616 *
* (916) 756-1104 *
*
*****

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Tara Falls - Modified Existing Pond with new DS detention pond

4 IO

OUTPUT CONTROL VARIABLES

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IPRNT 4 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
NO 289 NUMBER OF HYDROGRAPH ORDINATES
NDDATE 2 0 ENDING DATE
NDTIME 0000 ENDING TIME
ICENT 19 CENTURY MARK

```

```

COMPUTATION INTERVAL 0.08 HOURS
TOTAL TIME BASE 24.00 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

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 \*  
 \* DPOND \*  
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HYDROGRAPH ROUTING DATA

27 RS STORAGE ROUTING  
 NSTPS 1 NUMBER OF SUBREACHES  
 ITYP ELEV TYPE OF INITIAL CONDITION  
 RSVRIC 1319.00 INITIAL CONDITION  
 X 0.00 WORKING R AND D COEFFICIENT

AREA	1.9	2.1	2.3	2.5	2.7					
28 SA										
29 SE	ELEVATION	1319.00	1320.00	1321.00	1322.00	1323.00				
30 SQ	DISCHARGE	0.	14.	39.	71.	110.	154.	202.	255.	312.
31 SE	ELEVATION	1319.00	1319.50	1320.00	1320.50	1321.00	1321.50	1322.00	1322.50	1323.00

COMPUTED STORAGE-ELEVATION DATA  
 STORAGE 0.00 2.00 4.20 6.60 9.20  
 ELEVATION 1319.00 1320.00 1321.00 1322.00 1323.00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA  
 STORAGE 0.00 0.97 2.00 3.07 4.20 5.37 6.60 7.87 9.20  
 OUTFLOW 0.10 14.00 39.00 71.00 110.00 154.00 202.00 255.00 312.00  
 ELEVATION 1319.00 1319.50 1320.00 1320.50 1321.00 1321.50 1322.00 1322.50 1323.00

WARNING --- ROUTED OUTFLOW ( 313. ) IS GREATER THAN MAXIMUM OUTFLOW ( 312. ) IN STORAGE-OUTFLOW TABLE

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	BASIN AREA	MAXIMUM STAGE 6-HOUR	TIME OF MAX STAGE 24-HOUR	72-HOUR
HYDROGRAPH AT	BASINA	420.	12.25	89.	28.	28.	0.17	
ROUTED TO	POND	307.	12.50	88.	28.	28.	0.17	1334.30
HYDROGRAPH AT	BASINB	151.	12.00	24.	8.	8.	0.04	
2 COMBINED AT	COMB	341.	12.50	112.	36.	36.	0.21	
ROUTED TO	DPOND	313.	12.67	111.	36.	36.	0.21	1323.01

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

```
*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* MAY 1991 *
* VERSION 4.0.1E *
* RUN DATE 01/20/1998 TIME 15:00:13 *
*****
```

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* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
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*****
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X X X XXXXXXXX XXXXX X
X X X X X XX
X X X X X X
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X X X X X X
X X X X X X
X X XXXXXXXX XXXXX XXX
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\*\*\* FREE \*\*\*

LINE	ID	1	2	3	4	5	6	7	8	9	10
1	ID	1	2	3	4	5	6	7	8	9	10
2	IT	5									
3	IN	30									
4	IO	4									
5	KK	BASINA									
6	BA	0.167									
7	PC	0	0.04	0.08	.12	.17	.22	.27	.32	.37	.43
8	PC	.49	.56	.62	.69	.77	.85	.94	1.04	1.15	1.27
9	PC	1.41	1.59	1.83	2.21	5.17	5.73	6.02	6.23	6.40	6.54
10	PC	6.65	6.76	6.86	6.95	7.02	7.09	7.16	7.23	7.29	7.36
11	PC	7.43	7.49	7.54	7.59	7.63	7.68	7.72	7.76	7.80	
12	UD	0.42									
13	LS	0	83								
14	KK	POND									
15	RS	1	ELEV	1333							
16	SA	5	7.4	9.8							
17	SE	1333	1334	1335							
18	SO	0.1	14	87	258.5	557					
19	SE	1333	1333.5	1334	1334.5	1335					
20	KK	BASINB									
21	BA	0.042									
22	UD	0.15									
23	LS	0	80								
24	KK	COMB									
25	HC	2									
26	ZZ										

Tara Falls Existing Basin to Harry with existing pond modeled.

FLOOD HYDROGRAPH PACKAGE (HEC-1)
MAY 1991
VERSION 4.0.1E
RUN DATE 01/20/1998 TIME 15:00:13

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

Tara Falls Existing Basin to Harry with existing pond modeled.

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

IT HYDROGRAPH TIME DATA
NMIN 5 MINUTES IN COMPUTATION INTERVAL
IDATE 1 0 STARTING DATE
ITIME 0000 STARTING TIME
NO 289 NUMBER OF HYDROGRAPH ORDINATES
NDDATE 2 0 ENDING DATE
NDTIME 0000 ENDING TIME
ICENT 19 CENTURY MARK

COMPUTATION INTERVAL 0.08 HOURS
TOTAL TIME BASE 24.00 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

\*\*\*\*\*
5 KK
\*\*\*\*\*
\*\*\*\*\*



27 END-OF-PERIOD ORDINATES

15.	46.	96.	147.	173.	173.	155.	129.	94.	68.
50.	38.	28.	21.	16.	12.	9.	7.	5.	4.
3.	2.	2.	1.	1.	1.	0.			

14 KK POND \* \* \* \* \*

HYDROGRAPH ROUTING DATA

15 RS STORAGE ROUTING

NSDPS	1	NUMBER OF SUBREACHES
ITYP		ELEV TYPE OF INITIAL CONDITION
RSVRC	1333.00	INITIAL CONDITION
X	0.00	WORKING R AND D COEFFICIENT

16 SA	AREA	5.0	7.4	9.8
17 SE	ELEVATION	1333.00	1334.00	1335.00
18 SQ	DISCHARGE	0.	14.	87.
19 SE	ELEVATION	1333.00	1333.50	1334.00
			1334.50	1335.00

COMPUTED STORAGE-ELEVATION DATA

STORAGE	0.00	6.16	14.73
ELEVATION	1333.00	1334.00	1335.00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	2.78	6.16	10.15	14.73
OUTFLOW	0.10	14.00	87.00	258.50	557.00
ELEVATION	1333.00	1333.50	1334.00	1334.50	1335.00

20 KK BASINB \* \* \* \* \*

SUBBASIN RUNOFF DATA

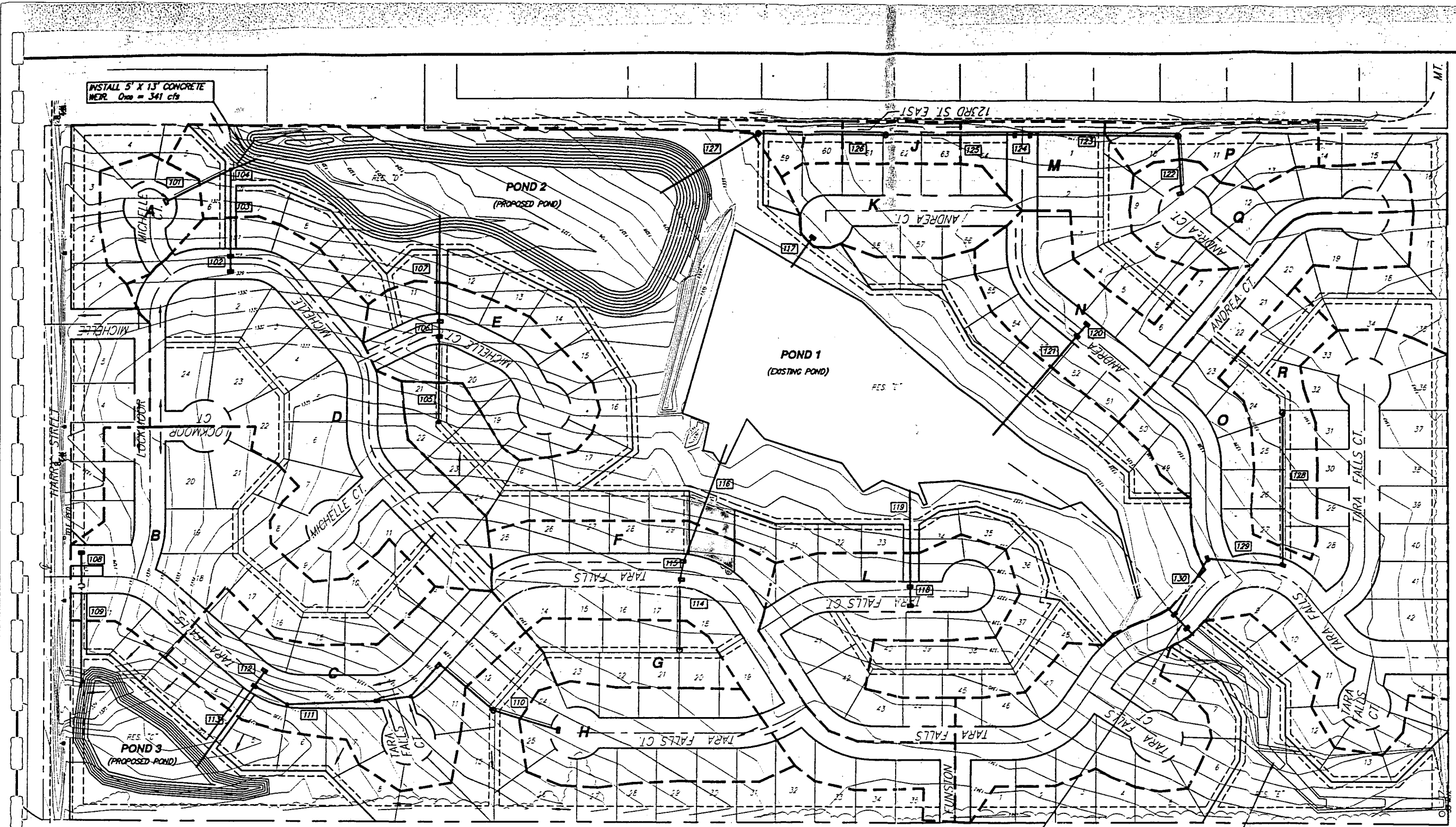
21 BA SUBBASIN CHARACTERISTICS  
 TAREA 0.04 SUBBASIN AREA  
 PRECIPITATION DATA



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			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
				6-HOUR	24-HOUR	72-HOUR			
HYDROGRAPH AT	BASINA	388.	12.25	82.	26.	26.	0.17		
ROUTED TO	POND	317.	12.42	80.	25.	25.	0.17	1334.60	
HYDROGRAPH AT	BASINB	128.	12.00	20.	6.	6.	0.04	12.42	
2 COMBINED AT	COMB	351.	12.42	99.	31.	31.	0.21		

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



**POND SUMMARY**

- Pond 1:  $Q_p$  (100 yr) = 420 cfs  
 Outlet (100 yr) = 348 cfs  
 Outlet = 65" Man  
 Static Pool = 1322.5  
 100 yr. Water Surface = 1334.0
- Pond 2:  $Q_p$  (100 yr) = 386 cfs  
 Outlet (100 yr) = 341 cfs  
 Outlet = 5' X 15" Notched Weir  
 Static Pool = 1320.0  
 100 yr. Water Surface = 1324.3
- Pond 3:  $Q_p$  (100 yr) = 140 cfs  
 Outlet (100 yr) = 70 cfs  
 Outlet = Existing 36" RCP  
 Static Pool = 1323.5  
 100 yr. Water Surface = 1329.0

**DRAINAGE BASIN SUMMARY**

Basin	Area (Ac)	$T_c$	$T_p$	$T_m$	$C_p$	$C_m$	$C_t$	$Q_p$	$Q_m$
A	0.79	15	1.83	2.37	0.57	0.79	1.7	2.0	20.6
B	1.93	15	1.83	2.37	0.57	0.79	4.2	4.8	48.3
C	1.15	15	1.83	2.37	0.57	0.79	6.2	7.1	71.3
D	2.39	15	1.83	2.37	0.57	0.79	11.3	12.9	129.3
E	2.01	15	1.83	2.37	0.57	0.79	4.4	5.1	51.3
F	1.40	15	1.83	2.37	0.57	0.79	7.4	8.4	84.3
G	0.87	15	1.83	2.37	0.41	0.67	1.2	1.4	14.3
H	1.52	15	1.83	2.37	0.57	0.79	4.2	4.8	48.3
I	0.34	15	1.83	2.37	0.41	0.67	0.5	0.6	6.3
J	0.41	15	1.83	2.37	0.41	0.67	0.6	0.7	7.3
K	1.19	15	1.83	2.37	0.57	0.79	3.3	3.8	38.3
L	2.73	15	1.83	2.37	0.57	0.79	6.0	6.9	69.3
M	1.65	15	1.83	2.37	0.41	0.67	2.8	3.2	32.3
N	2.05	15	1.83	2.37	0.57	0.79	4.5	5.1	51.3
O	10.78	15	1.83	2.37	0.57	0.79	20.0	23.2	232.3
P	0.64	15	1.83	2.37	0.41	0.67	1.1	1.3	13.3
Q	1.58	15	1.83	2.37	0.57	0.79	3.4	3.9	39.3
R	1.36	15	1.83	2.37	0.41	0.67	2.2	2.6	26.3
S	1.40	15	1.83	2.37	0.41	0.67	2.4	2.8	28.3
T	22.14	30	2.67	5.40	0.41	0.67	24.7	28.1	281.3

**PIPE SUMMARY**

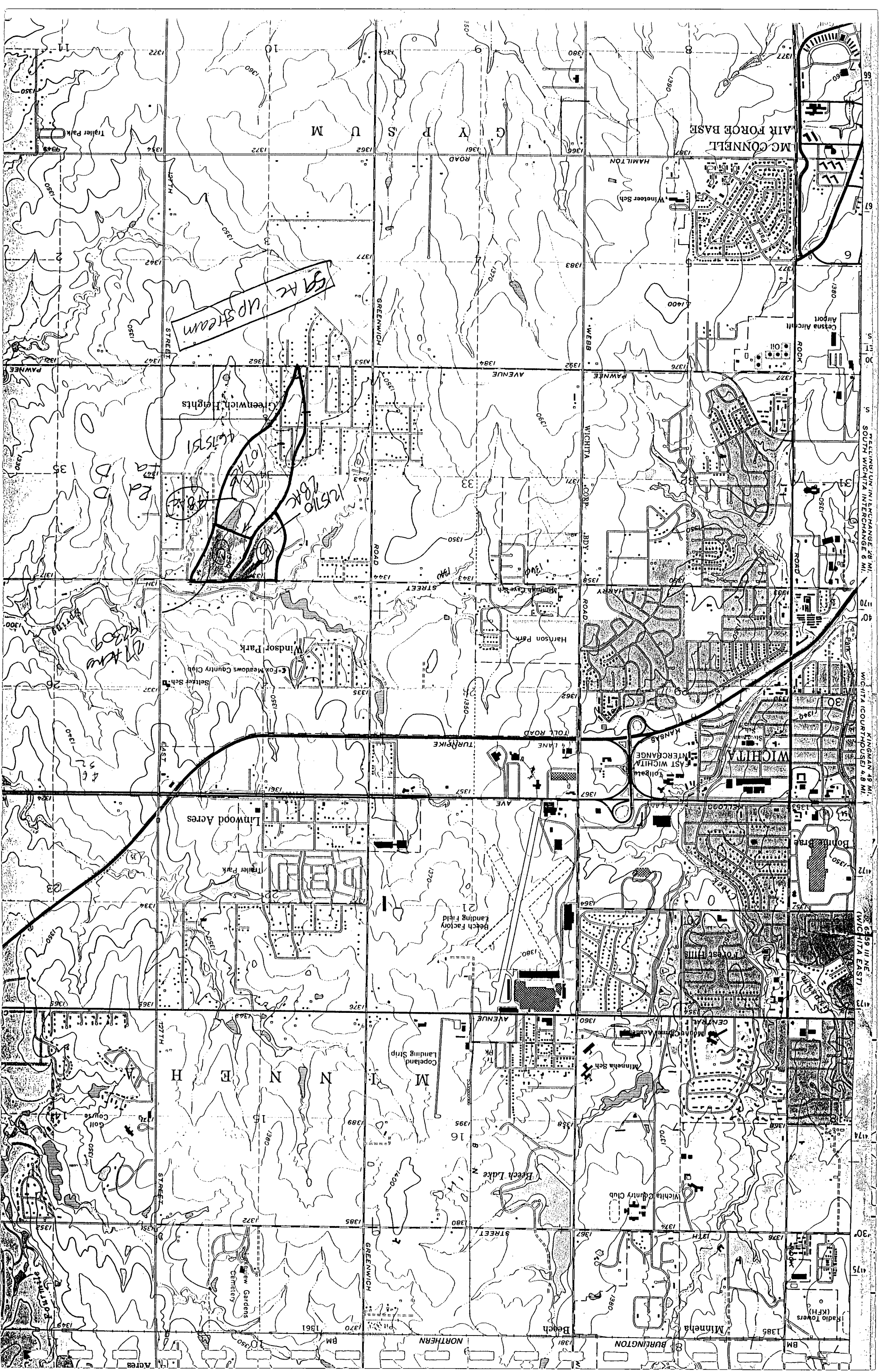
Pipe	Size	Length (ft)	Flow (cfs)
101	18"	1.6	0.50X
102	24"	18.1	0.50X
103	24"	30.3	2.00X
104	30"	14.9	1.00X
105	18"	3.6	0.50X
106	18"	8.6	0.90X
107	18"	10.0	1.00X
108	18"	10.0	1.00X
109	24"	20.0	0.80X
110	24"	15.7	0.50X
111	24"	15.7	0.50X
112	18"	3.7	1.00X
113	18"	8.7	1.00X
114	18"	8.7	0.50X
115	18"	8.7	0.50X
116	24"	11.9	4.00X
117	18"	8.7	1.00X
118	18"	8.7	0.50X
119	24"	15.7	0.50X
120	18"	6.0	0.50X
121	24"	11.9	2.00X
122	18"	8.7	1.00X
123	24"	11.9	0.40X
124	24"	11.9	0.20X
125	24"	21.9	1.00X
126	24"	21.9	1.00X
127	24"	21.9	1.40X
128	18"	6.8	0.50X
129	24"	12.1	0.40X
130	24"	12.1	0.20X

\* 100 year storm overtop into drainage swale

**DRAINAGE PLAN  
TARA FALLS ADDITION  
SEDGWICK COUNTY, KANSAS**

<b>SRB</b>	324 NORTH MAIN WICHITA, KANSAS 67203 Phone: 620-622-4431 http://www.srb.com	316-284-8000 Fax: 284-4431 Email: srbsales@srb.com
	<b>SAVOY, RUGGLES &amp; BOHANNON, P.A. ENGINEERING &amp; SURVEYING</b>	
PROJECT NUMBER		
DATE	DATE	DATE
CHKD/ATL	DRWN/ATL	UTLTM
REVISED	DATE	REVISED
	Dec. 3, 1997	

SHEET 1 OF 1



```

*****
*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* MAY 1991 *
* VERSION 4.0.1E *
* RUN DATE 05/02/2000 TIME 13:32:00 *
*****
*****

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

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X X XXXXXXX XXXXX X
X X X X X XX
X X X X X X
XXXXXXXX XXXX X XXXXX X
X X X X X X
X X X X X X
X X XXXXXXX XXXXX XXX

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

```

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

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.  
 THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.  
 THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION  
 NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,  
 DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION  
 KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

☐ HEC-1 INPUT PAGE 1

```

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
*** FREE ***
1 ID Tara Falls Existing Basin to Harry with existng pond modeled, 5 year, 24 hour
2 IT 5 289
3 IN 30
4 IO 4
5 KK BASINA
6 BA 0.167
7 PC 0 0.02 0.05 0.08 0.11 0.14 0.17 0.20 0.23 0.27
8 PC 0.30 0.34 0.38 0.43 0.47 0.52 0.58 0.64 0.71 0.78
9 PC 0.87 0.98 1.13 1.36 3.18 3.53 3.71 3.84 3.94 4.02
10 PC 4.09 4.16 4.22 4.28 4.32 4.36 4.41 4.45 4.49 4.53
11 PC 4.57 4.61 4.64 4.67 4.70 4.72 4.75 4.78 4.80
12 UD 0.42
13 LS 0 83
14 KK POND
15 RS 1 ELEV 1333
16 SA 5 7.4 9.8
17 SE 1333 1334 1335
18 SQ 0.1 14 87 258.5 557
19 SE 1333 1333.5 1334 1334.5 1335
20 KK BASINB
21 BA 0.042
22 UD 0.15
23 LS 0 80
24 KK COMB
25 HC 2

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26      KK  BASINA
27      BA  0.167
28      UD  0.42
29      LS   0      88

30      KK  POND
31      RS   1      ELEV 1332.50
32      SA  4.3      5      7.4      9.8
33      SE 1332.5    1333    1334    1335
34      SQ  0.1      15      45      82      127      177      233      294
35      SE 1332.5    1332.75  1333    1333.25  1333.5  1333.75  1334    1334.25

36      KK  BASINA
37      BA  0.042
38      UD  0.15
39      LS   0      93

40      KK  COMB
41      HC   2

```

HEC-1 INPUT

PAGE 2

□□

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

```

42      KK  DPOND
43      RS   1      ELEV 1319
44      SA  1.9      2.1      2.3      2.5      2.7
45      SE 1319    1320    1321    1322    1323
46      SQ  0.1      14      39      71      110      154      202      255      312
47      SE 1319    1319.5  1320    1320.5  1321    1321.5  1322    1322.5  1323
48      ZZ

```

HMVersion: 6.33 Data File: tf5.hcl

□□HEC1 S/N: 1343000364

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*****
*****
*
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
*
* MAY 1991 *
*
* VERSION 4.0.1E *
*
*
*
* RUN DATE 05/02/2000 TIME 13:32:00 *
*
*
*
*****
*****

```

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

```

Tara Falls Existing Basin to Harry with existng pond modeled, 5 year, 24 hour

```

4 IO  OUTPUT CONTROL VARIABLES
      IPRNT 4 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 289 NUMBER OF HYDROGRAPH ORDINATES
      NDDATE 2 0 ENDING DATE
      NDTIME 0000 ENDING TIME
      ICENT 19 CENTURY MARK

      COMPUTATION INTERVAL 0.08 HOURS
      TOTAL TIME BASE 24.00 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

```

\*\*\*\*\*

```

*****
*
* 5 KK BASINA *
*
*
*****

```

3 IN TIME DATA FOR INPUT TIME SERIES  
 JXMIN 30 TIME INTERVAL IN MINUTES  
 JXDATE 1 0 STARTING DATE  
 JXTIME 0 STARTING TIME

SUBBASIN RUNOFF DATA

6 BA SUBBASIN CHARACTERISTICS  
 TAREA 0.17 SUBBASIN AREA

PRECIPITATION DATA

6 PB STORM 4.80 BASIN TOTAL PRECIPITATION

6 PI INCREMENTAL PRECIPITATION PATTERN  
 0.00 0.00 0.00 0.00 0.00 0.00 0.01 0.01 0.00 0.01  
 0.00 0.00 0.00 0.00 0.00 0.01 0.01 0.01 0.00 0.01 0.00  
 0.01 0.01 0.01 0.00 0.01 0.00 0.01 0.01 0.00 0.01 0.00  
 0.00 0.01 0.00 0.00 0.01 0.00 0.00 0.00 0.01 0.00 0.00  
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 0.02 0.02 0.04 0.04 0.04 0.04 0.04 0.04 0.04 0.04 0.03  
 0.30 0.30 0.30 0.30 0.06 0.06 0.06 0.06 0.06 0.06 0.06  
 0.03 0.03 0.03 0.03 0.03 0.03 0.02 0.02 0.02 0.02 0.02  
 0.02 0.02 0.02 0.02 0.02 0.02 0.02 0.02 0.02 0.01 0.01  
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 0.00 0.01 0.01 0.01 0.01 0.01 0.00 0.01 0.01 0.01 0.01  
 0.01 0.01 0.00 0.01 0.00 0.00 0.01 0.01 0.01 0.01 0.00  
 0.01 0.01 0.01 0.01 0.00 0.01 0.01 0.01 0.01 0.01 0.01  
 0.01 0.01 0.00 0.00 0.01 0.01 0.01 0.01 0.01 0.01 0.00

13 LS SCS LOSS RATE  
 STRFL 0.41 INITIAL ABSTRACTION  
 CRVNBR 83.00 CURVE NUMBER  
 RTIMP 0.00 PERCENT IMPERVIOUS AREA

12 UD SCS DIMENSIONLESS UNITGRAPH  
 TLAG 0.42 LAG

\*\*\*  
 UNIT HYDROGRAPH  
 27 END-OF-PERIOD ORDINATES  
 15. 46. 96. 147. 173. 173. 155. 129. 94. 68.  
 50. 38. 28. 21. 16. 12. 9. 7. 5. 4.  
 3. 2. 2. 1. 1. 1. 0.

.....

14 KK  
 \*\*\*\*\*  
 \* POND \*  
 \*\*\*\*\*

HYDROGRAPH ROUTING DATA

15 RS STORAGE ROUTING  
 NSTPS 1 NUMBER OF SUBREACHES  
 ITYP ELEV TYPE OF INITIAL CONDITION  
 RSVRIC 1333.00 INITIAL CONDITION  
 X 0.00 WORKING R AND D COEFFICIENT

16 SA AREA 5.0 7.4 9.6  
 17 SE ELEVATION 1333.00 1334.00 1335.00  
 18 SQ DISCHARGE 0. 14. 67. 259. 557.  
 19 SE ELEVATION 1333.00 1333.50 1334.00 1334.50 1335.00

\*\*\*

COMPUTED STORAGE-ELEVATION DATA

STORAGE 0.00 6.16 14.73  
 ELEVATION 1333.00 1334.00 1335.00



26 KK

\*\*\*\*\*  
\* BASINA \*  
\*\*\*\*\*

SUBBASIN RUNOFF DATA

27 BA

SUBBASIN CHARACTERISTICS  
TAREA 0.17 SUBBASIN AREA

PRECIPITATION DATA

6 PB

STORM 4.80 BASIN TOTAL PRECIPITATION

6 PI

INCREMENTAL PRECIPITATION PATTERN

0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01
0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.00
0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.00
0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00
0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.01
0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.00
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.02	0.01
0.02	0.02	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.02
0.30	0.30	0.30	0.30	0.06	0.06	0.06	0.06	0.06	0.30	0.30
0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02
0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.01
0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.00
0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00
0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00

29 LS

SCS LOSS RATE  
STRFL 0.27 INITIAL ABSTRACTION  
CRVNR 88.00 CURVE NUMBER  
RTIMP 0.00 PERCENT IMPERVIOUS AREA

28 UD

SCS DIMENSIONLESS UNITGRAPH  
TLAG 0.42 LAG

\*\*\*

UNIT HYDROGRAPH  
27 END-OF-PERIOD ORDINATES

15.	46.	96.	147.	173.	173.	155.	129.	94.	68.
50.	38.	28.	21.	16.	12.	9.	7.	5.	4.
3.	2.	2.	1.	1.	1.	0.			

30 KK

\*\*\*\*\*  
\* POND \*  
\*\*\*\*\*

HYDROGRAPH ROUTING DATA

31 RS

STORAGE ROUTING  
NSTPS 1 NUMBER OF SUBREACHES  
ITYP ELEV TYPE OF INITIAL CONDITION  
RSVRIC 1332.50 INITIAL CONDITION  
X 0.00 WORKING R AND D COEFFICIENT

32 SA

AREA 4.3 5.0 7.4 9.8

33 SE

ELEVATION 1332.50 1333.00 1334.00 1335.00

34 SQ

DISCHARGE 0. 15. 45. 82. 127. 177. 233. 294.

35 SE

ELEVATION 1332.50 1332.75 1333.00 1333.25 1333.50 1333.75 1334.00 1334.25

\*\*\*

COMPUTED STORAGE-ELEVATION DATA

STORAGE	0.00	2.32	8.48	17.06
---------	------	------	------	-------



42 KK

\*\*\*\*\*  
 \* DPOND \*  
 \*\*\*\*\*

HYDROGRAPH ROUTING DATA

43 RS	STORAGE ROUTING	1 NUMBER OF SUBREACHES								
	NSTPS	ELEV TYPE OF INITIAL CONDITION								
	ITYP	INITIAL CONDITION								
	RSVRIC	1319.00	0.00 WORKING R AND D COEFFICIENT							
	X									
44 SA	AREA	1.9	2.1	2.3	2.5	2.7				
45 SE	ELEVATION	1319.00	1320.00	1321.00	1322.00	1323.00				
46 SQ	DISCHARGE	0.	14.	39.	71.	110.	154.	202.	255.	312.
47 SE	ELEVATION	1319.00	1319.50	1320.00	1320.50	1321.00	1321.50	1322.00	1322.50	1323.00

\*\*\*

COMPUTED STORAGE-ELEVATION DATA

STORAGE	0.00	2.00	4.20	6.60	9.20
ELEVATION	1319.00	1320.00	1321.00	1322.00	1323.00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	0.97	2.00	3.07	4.20	5.37	6.60	7.87	9.20
OUTFLOW	0.10	14.00	39.00	71.00	110.00	154.00	202.00	255.00	312.00
ELEVATION	1319.00	1319.50	1320.00	1320.50	1321.00	1321.50	1322.00	1322.50	1323.00

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

6-HOUR	OPERATION 24-HOUR	STATION 72-HOUR	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
	HYDROGRAPH AT			BASINA	203.	12.25	43.	13.	13.	0.17
1334.15	ROUTED TO			POND	138.	12.58	40.	13.	13.	0.17
	HYDROGRAPH AT			BASINB	65.	12.00	10.	3.	3.	0.04
	2 COMBINED AT			COMB	153.	12.50	50.	16.	16.	0.21
	HYDROGRAPH AT			BASINA	234.	12.25	49.	16.	16.	0.17
1333.71	ROUTED TO			POND	168.	12.50	49.	15.	15.	0.17
	HYDROGRAPH AT			BASINB	90.	12.00	14.	5.	5.	0.04
	2 COMBINED AT			COMB	189.	12.50	62.	20.	20.	0.21
1321.65	ROUTED TO			DPOND	168.	12.75	62.	20.	20.	0.21

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

5 year Storm

SCS TYPE RAINFALL DISTRIBUTION - 24 HOUR STORM  
FOR A TOTAL RAINFALL OF 4.8 INCHES

HOUR	% RAINFALL	INCHES
0.00	0.00	0.00
0.50	0.52	0.02
1.00	1.05	0.05
1.50	1.60	0.08
2.00	2.20	0.11
2.50	2.84	0.14
3.00	3.49	0.17
3.50	4.13	0.20
4.00	4.80	0.23
4.50	5.53	0.27
5.00	6.32	0.30
5.50	7.14	0.34
6.00	8.00	0.38
6.50	8.90	0.43
7.00	9.85	0.47
7.50	10.85	0.52
8.00	12.00	0.58
8.50	13.28	0.64
9.00	14.70	0.71
9.50	16.30	0.78
10.00	18.10	0.87
10.50	20.40	0.98
11.00	23.50	1.13
11.50	28.30	1.36
12.00	66.30	3.18
12.50	73.50	3.53
13.00	77.20	3.71
13.50	79.90	3.84
14.00	82.00	3.94
14.50	83.79	4.02
15.00	85.28	4.09
15.50	86.68	4.16
16.00	88.00	4.22
16.50	89.12	4.28
17.00	90.04	4.32
17.50	90.93	4.36
18.00	91.81	4.41
18.50	92.67	4.45
19.00	93.52	4.49
19.50	94.37	4.53
20.00	95.20	4.57
20.50	95.97	4.61
21.00	96.65	4.64
21.50	97.26	4.67
22.00	97.84	4.70
22.50	98.40	4.72
23.00	98.95	4.75
23.50	99.48	4.78
24.00	100.00	4.80

SOURCE: 'HYDROLOGY FOR ENGINEERS AND PLANNERS', HJELMFELT AND CASSIDY  
PUBLISHED 1975, TABLE 4.7 - ACCUMULATION OF RAINFALL TO 24 HOURS  
U.S. SOIL CONSERVATION SERVICE

```

*****
*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
*
* MAY 1991 *
*
* VERSION 4.0.1E *
*
*
* RUN DATE 05/02/2000 TIME 13:51:43 *
*
*
*****
*****

```

```

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

```

```

X X XXXXXXX XXXXX X
X X X X X XX
X X X X X X
XXXXXXXX XXXX X XXXXX X
X X X X X X
X X X X X X
X X XXXXXXX XXXXX XXX

```

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

```

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

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.  
 THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.  
 THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION  
 NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE, SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,  
 DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION  
 KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

□□

HEC-1 INPUT

PAGE 1

```

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
*** FREE ***
1 ID Tara Falls Existing Basin to Harry with existng pond modeled, 10 year, 24 hou
2 IT 5 289
3 IN 30
4 IO 4
5 KK BASINA
6 BA 0.167
7 PC 0 0.03 0.06 0.09 0.12 0.16 0.19 0.23 0.26 0.31
8 PC 0.35 0.39 0.44 0.49 0.54 0.60 0.66 0.73 0.81 0.90
9 PC 1.00 1.13 1.30 1.56 3.66 4.06 4.26 4.41 4.53 4.63
10 PC 4.71 4.78 4.86 4.92 4.97 5.02 5.07 5.12 5.16 5.21
11 PC 5.26 5.30 5.34 5.37 5.40 5.43 5.46 5.49 5.52
12 UD 0.42
13 LS 0 83
14 KK POND
15 RS 1 ELEV 1333
16 SA 5 7.4 9.8
17 SE 1333 1334 1335
18 SQ 0.1 14 87 258.5 557
19 SE 1333 1333.5 1334 1334.5 1335
20 KK BASINB
21 BA 0.042
22 UD 0.15
23 LS 0 80
24 KK COMB
25 HC 2

```

```

26      KK  BASINA
27      BA  0.167
28      UD  0.42
29      LS      0      88

30      KK  POND
31      RS      1      ELEV 1332.50
32      SA  4.3      5      7.4      9.8
33      SE 1332.5    1333    1334    1335
34      SQ  0.1      15      45      82      127      177      233      294
35      SE 1332.5    1332.75  1333  1333.25  1333.5  1333.75  1334  1334.25

36      KK  BASINB
37      BA  0.042
38      UD  0.15
39      LS      0      93

40      KK  COMB
41      HC      2

```

HEC-1 INPUT

PAGE 2

□□

```

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

42      KK  DPOND
43      RS      1      ELEV 1319
44      SA  1.9      2.1      2.3      2.5      2.7
45      SE 1319    1320    1321    1322    1323
46      SQ  0.1      14      39      71      110      154      202      255      312
47      SE 1319    1319.5  1320  1320.5  1321  1321.5  1322  1322.5  1323
48      ZZ

```

HMVersion: 6.33 Data File: tf10.hcl

□□HEC1 S/N: 1343000364

```

*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
*
*      MAY 1991 *
*
*      VERSION 4.0.1E *
*
*
* RUN DATE 05/02/2000 TIME 13:51:43 *
*
*
*****

```

```

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

```

Tara Falls Existing Basin to Harry with existng pond modeled, 10 year, 24 hou

```

4 IO      OUTPUT CONTROL VARIABLES
          IPRNT      4      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        289    NUMBER OF HYDROGRAPH ORDINATES
          NDDATE     2      0      ENDING DATE
          NDTIME     0000    ENDING TIME
          ICENT      19     CENTURY MARK

          COMPUTATION INTERVAL 0.08 HOURS
          TOTAL TIME BASE      24.00 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

```

5 KK

```

*****
*      BASINA *
*****

```

3 IN TIME DATA FOR INPUT TIME SERIES  
 JXMIN 30 TIME INTERVAL IN MINUTES  
 JXDATE 1 0 STARTING DATE  
 JXTIME 0 STARTING TIME

SUBBASIN RUNOFF DATA

6 BA SUBBASIN CHARACTERISTICS  
 TAREA 0.17 SUBBASIN AREA

PRECIPITATION DATA

6 PB STORM 5.52 BASIN TOTAL PRECIPITATION

6 PI INCREMENTAL PRECIPITATION PATTERN

0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.01
0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01
0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01
0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02
0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03
0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
0.35	0.35	0.35	0.35	0.35	0.07	0.07	0.07	0.07	0.07	0.07
0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.07	0.07	0.07
0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.01
0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01

13 LS SCS LOSS RATE  
 STRTL 0.41 INITIAL ABSTRACTION  
 CRVNBR 83.00 CURVE NUMBER  
 RTIMP 0.00 PERCENT IMPERVIOUS AREA

12 UD SCS DIMENSIONLESS UNITGRAPH  
 TLAG 0.42 LAG

UNIT HYDROGRAPH

15.	46.	96.	147.	173.	173.	155.	129.	94.	68.
50.	38.	28.	21.	16.	12.	9.	7.	5.	4.
3.	2.	2.	1.	1.	1.	0.			

.....

14 KK POND

HYDROGRAPH ROUTING DATA

15 RS STORAGE ROUTING  
 NSTPS 1 NUMBER OF SUBREACHES  
 ITYP ELEV TYPE OF INITIAL CONDITION  
 RSVRIC 1333.00 INITIAL CONDITION  
 X 0.00 WORKING R AND D COEFFICIENT

16 SA AREA 5.0 7.4 9.8

17 SE ELEVATION 1333.00 1334.00 1335.00

18 SQ DISCHARGE 0. 14. 87. 259. 557.

19 SE ELEVATION 1333.00 1333.50 1334.00 1334.50 1335.00

\*\*\*

COMPUTED STORAGE-ELEVATION DATA

STORAGE	0.00	6.16	14.73
ELEVATION	1333.00	1334.00	1335.00



26 KK

\*\*\*\*\*  
\* BASINA \*  
\*\*\*\*\*

SUBBASIN RUNOFF DATA

27 BA

SUBBASIN CHARACTERISTICS  
TAREA 0.17 SUBBASIN AREA

PRECIPITATION DATA

6 PB

STORM 5.52 BASIN TOTAL PRECIPITATION

6 FI

INCREMENTAL PRECIPITATION PATTERN

0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.00
0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01
0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01
0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.01	0.01
0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03
0.35	0.35	0.35	0.35	0.35	0.07	0.04	0.04	0.04	0.35	0.35
0.03	0.03	0.03	0.03	0.03	0.03	0.07	0.07	0.07	0.07	0.07
0.02	0.03	0.02	0.02	0.03	0.03	0.03	0.03	0.02	0.03	0.03
0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01
0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

29 LS

SCS LOSS RATE  
STRTL 0.27 INITIAL ABSTRACTION  
CRVNBR 88.00 CURVE NUMBER  
RTIMP 0.00 PERCENT IMPERVIOUS AREA

28 UD

SCS DIMENSIONLESS UNITGRAPH  
TLAG 0.42 LAG

\*\*\*

UNIT HYDROGRAPH  
27 END-OF-PERIOD ORDINATES

15.	46.	96.	147.	173.	173.	155.	129.	94.	68.
50.	38.	28.	21.	16.	12.	9.	7.	5.	4.
3.	2.	2.	1.	1.	1.	0.			

\*\*\*\*\*

30 KK

\*\*\*\*\*  
\* POND \*  
\*\*\*\*\*

HYDROGRAPH ROUTING DATA

31 RS

STORAGE ROUTING  
NSTPS 1 NUMBER OF SUBREACHES  
ITYP ELEV TYPE OF INITIAL CONDITION  
RSVRIC 1332.50 INITIAL CONDITION  
X 0.00 WORKING R AND D COEFFICIENT

32 SA

AREA 4.3 5.0 7.4 9.8

33 SE

ELEVATION 1332.50 1333.00 1334.00 1335.00

34 SQ

DISCHARGE 0. 15. 45. 82. 127. 177. 233. 294.

35 SE

ELEVATION 1332.50 1332.75 1333.00 1333.25 1333.50 1333.75 1334.00 1334.25

\*\*\*

COMPUTED STORAGE-ELEVATION DATA

STORAGE	0.00	2.32	8.48	17.06
---------	------	------	------	-------

ELEVATION 1332.50 1333.00 1334.00 1335.00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	1.12	2.32	3.64	5.10	6.71	8.48	10.40	17.06
OUTFLOW	0.10	15.00	45.00	82.00	127.00	177.00	233.00	294.00	477.00
ELEVATION	1332.50	1332.75	1333.00	1333.25	1333.50	1333.75	1334.00	1334.25	1335.00

\*\*\*

36 KK \*\*\*\*\*  
\* BASIN \*  
\*\*\*\*\*

SUBBASIN RUNOFF DATA

37 BA SUBBASIN CHARACTERISTICS  
TAREA 0.04 SUBBASIN AREA

PRECIPITATION DATA

6 PB STORM 5.52 BASIN TOTAL PRECIPITATION

6 PI INCREMENTAL PRECIPITATION PATTERN

0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.01
0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.00
0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01
0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01
0.01	0.01	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.02	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.01
0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.02	0.02
0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03
0.35	0.35	0.35	0.35	0.07	0.07	0.07	0.04	0.35	0.35
0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.07	0.07	0.07
0.02	0.03	0.02	0.02	0.03	0.03	0.03	0.02	0.03	0.03
0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01
0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.01
0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01

39 LS SCS LOSS RATE  
STRFL 0.15 INITIAL ABSTRACTION  
CRVNBR 93.00 CURVE NUMBER  
RTIMP 0.00 PERCENT IMPERVIOUS AREA

38 UD SCS DIMENSIONLESS UNITGRAPH  
TLAG 0.15 LAG

\*\*\*

UNIT HYDROGRAPH  
11 END-OF-PERIOD ORDINATES  
39. 104. 91. 46. 23. 11. 6. 3. 1. 1.  
0.

\*\*\*

40 KK \*\*\*\*\*  
\* COMB \*  
\*\*\*\*\*

41 HC HYDROGRAPH COMBINATION  
ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

\*\*\*

\*\*\*

42 KK

\*\*\*\*\*  
 \* DPOND \*  
 \*\*\*\*\*

HYDROGRAPH ROUTING DATA

43 RS	STORAGE ROUTING	1	NUMBER OF SUBREACHES			
	NSTPS	ELEV	TYPE OF INITIAL CONDITION			
	ITYP	1319.00	INITIAL CONDITION			
	RSVVIC	0.00	WORKING R AND D COEFFICIENT			
	X					
44 SA	AREA	1.9	2.1	2.3	2.5	2.7
45 SE	ELEVATION	1319.00	1320.00	1321.00	1322.00	1323.00
46 SQ	DISCHARGE	0.	14.	39.	71.	110.
47 SE	ELEVATION	1319.00	1319.50	1320.00	1320.50	1321.00
					1321.50	1322.00
						1322.50
						1323.00

\*\*\*

COMPUTED STORAGE-ELEVATION DATA

STORAGE	0.00	2.00	4.20	6.60	9.20
ELEVATION	1319.00	1320.00	1321.00	1322.00	1323.00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	0.97	2.00	3.07	4.20	5.37	6.60	7.87	9.20
OUTFLOW	0.10	14.00	39.00	71.00	110.00	154.00	202.00	255.00	312.00
ELEVATION	1319.00	1319.50	1320.00	1320.50	1321.00	1321.50	1322.00	1322.50	1323.00

RUNOFF SUMMARY

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

6-HOUR	OPERATION	STATION	PEAK	TIME OF	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN	MAXIMUM	TIME OF
	24-HOUR	72-HOUR	FLOW	PEAK	TIME IN HOURS	AREA IN SQUARE MILES	AREA	STAGE	MAX STAGE	
	HYDROGRAPH AT			BASINA	248.	12.25	52.	16.	16.	0.17
1334.27	ROUTED TO			POND	180.	12.50	50.	16.	16.	0.17
	HYDROGRAPH AT			BASINB	80.	12.00	12.	4.	4.	0.04
	2 COMBINED AT			COMB	200.	12.50	61.	19.	19.	0.21
	HYDROGRAPH AT			BASINA	279.	12.25	59.	19.	19.	0.17
1333.86	ROUTED TO			POND	203.	12.50	58.	18.	18.	0.17
	HYDROGRAPH AT			BASINB	105.	12.00	16.	5.	5.	0.04
	2 COMBINED AT			COMB	226.	12.50	74.	24.	24.	0.21
1322.01	ROUTED TO			DPOND	203.	12.75	74.	23.	23.	0.21

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

SCS TYPE RAINFALL DISTRIBUTION - 24 HOUR STORM  
 FOR A TOTAL RAINFALL OF 5.52 INCHES

10 year event

HOUR	% RAINFALL	INCHES
0.00	0.00	0.00
0.50	0.52	0.03
1.00	1.05	0.06
1.50	1.60	0.09
2.00	2.20	0.12
2.50	2.84	0.16
3.00	3.49	0.19
3.50	4.13	0.23
4.00	4.80	0.26
4.50	5.53	0.31
5.00	6.32	0.35
5.50	7.14	0.39
6.00	8.00	0.44
6.50	8.90	0.49
7.00	9.85	0.54
7.50	10.85	0.60
8.00	12.00	0.66
8.50	13.28	0.73
9.00	14.70	0.81
9.50	16.30	0.90
10.00	18.10	1.00
10.50	20.40	1.13
11.00	23.50	1.30
11.50	28.30	1.56
12.00	66.30	3.66
12.50	73.50	4.06
13.00	77.20	4.26
13.50	79.90	4.41
14.00	82.00	4.53
14.50	83.79	4.63
15.00	85.28	4.71
15.50	86.68	4.78
16.00	88.00	4.86
16.50	89.12	4.92
17.00	90.04	4.97
17.50	90.93	5.02
18.00	91.81	5.07
18.50	92.67	5.12
19.00	93.52	5.16
19.50	94.37	5.21
20.00	95.20	5.26
20.50	95.97	5.30
21.00	96.65	5.34
21.50	97.26	5.37
22.00	97.84	5.40
22.50	98.40	5.43
23.00	98.95	5.46
23.50	99.48	5.49
24.00	100.00	5.52

SOURCE: 'HYDROLOGY FOR ENGINEERS AND PLANNERS', HJELMFELT AND CASSIDY  
 PUBLISHED 1975, TABLE 4.7 - ACCUMULATION OF RAINFALL TO 24 HOURS  
 U.S. SOIL CONSERVATION SERVICE

```

*****
*****
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* MAY 1991 *
* VERSION 4.0.1E *
* RUN DATE 05/02/2000 TIME 13:59:45 *
*****
*****

```

```

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

```

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

```

```

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

```

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

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.  
 THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.  
 THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION  
 NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE, SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,  
 DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION  
 KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

□□

HEC-1 INPUT

PAGE 1

LINE	ID	1	2	3	4	5	6	7	8	9
*** FREE ***										
1	ID	Tara Falls Existing Basin to Harry with existng pond modeled, 25 year, 24 hou								
2	IT	5	289							
3	IN	30								
4	IO	4								
5	KK	BASINA								
6	BA	0.167								
7	PC	0	0.03	0.07	0.10	0.14	0.18	0.23	0.27	0.31
8	PC	0.41	0.46	0.52	0.58	0.64	0.70	0.78	0.86	0.95
9	PC	1.17	1.32	1.52	1.83	4.30	4.76	5.00	5.18	5.31
10	PC	5.53	5.62	5.70	5.77	5.83	5.89	5.95	6.01	6.06
11	PC	6.17	6.22	6.26	6.30	6.34	6.38	6.41	6.45	6.48
12	UD	0.42								
13	LS	0	83							
14	KK	POND								
15	RS	1	ELEV	1333						
16	SA	5	7.4	9.8						
17	SE	1333	1334	1335						
18	SQ	0.1	14	87	258.5	557				
19	SE	1333	1333.5	1334	1334.5	1335				
20	KK	BASINE								
21	BA	0.042								
22	UD	0.15								
23	LS	0	80							
24	KK	COMB								
25	HC	2								

```
26      KK  BASINA
27      BA  0.167
28      UD  0.42
29      LS   0      88

30      KK  POND
31      RS   1      ELEV 1332.50
32      SA  4.3      5      7.4      9.8
33      SE 1332.5    1333    1334    1335
34      SQ  0.1      15      45      82      127      177      233      294
35      SE 1332.5    1332.75  1333  1333.25  1333.5  1333.75  1334  1334.25
```

```
36      KK  BASINE
37      BA  0.042
38      UD  0.15
39      LS   0      93
```

```
40      KK  COMB
41      HC   2
```

HEC-1 INPUT

PAGE, 2

□□

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

```
42      KK  DPOND
43      RS   1      ELEV 1319
44      SA  1.9      2.1      2.3      2.5      2.7
45      SE 1319    1320    1321    1322    1323
46      SQ  0.1      14      39      71      110      154      202      255      312
47      SE 1319    1319.5  1320    1320.5  1321    1321.5  1322    1322.5  1323
48      ZZ
```

HMVersion: 6.33 Data File: tf25.hcl

□□HEC1 S/N: 1343000364

```
*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
*
* MAY 1991 *
*
* VERSION 4.0.1E *
*
* RUN DATE 05/02/2000 TIME 13:59:45 *
*
*
*****
```

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

Tara Falls Existing Basin to Harry with existng pond modeled, 25 year, 24 hou

```
4 IO OUTPUT CONTROL VARIABLES
      IPRNT 4 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 289 NUMBER OF HYDROGRAPH ORDINATES
  NDDATE 2 0 ENDING DATE
  NDTIME 0000 ENDING TIME
  ICENT 19 CENTURY MARK

COMPUTATION INTERVAL 0.08 HOURS
TOTAL TIME BASE 24.00 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
```

.....

```
*****
* 5 KK BASINA *
*****
```









42 KK

```

*****
*   DPOND   *
*****
  
```

HYDROGRAPH ROUTING DATA

```

43 RS   STORAGE ROUTING
        NSTPS      1  NUMBER OF SUBREACHES
        ITYP      ELEV TYPE OF INITIAL CONDITION
        RSVRIC    1319.00 INITIAL CONDITION
        X         0.00 WORKING R AND D COEFFICIENT

44 SA   AREA      1.9   2.1   2.3   2.5   2.7

45 SE   ELEVATION 1319.00 1320.00 1321.00 1322.00 1323.00

46 SQ   DISCHARGE 0.    14.   39.   71.   110.   154.   202.   255.   312.

47 SE   ELEVATION 1319.00 1319.50 1320.00 1320.50 1321.00 1321.50 1322.00 1322.50 1323.00
  
```

\*\*\*

COMPUTED STORAGE-ELEVATION DATA

```

STORAGE      0.00   2.00   4.20   6.60   9.20
ELEVATION    1319.00 1320.00 1321.00 1322.00 1323.00
  
```

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

```

STORAGE      0.00   0.97   2.00   3.07   4.20   5.37   6.60   7.87   9.20
OUTFLOW      0.10   14.00  39.00  71.00  110.00  154.00  202.00  255.00  312.00
ELEVATION    1319.00 1319.50 1320.00 1320.50 1321.00 1321.50 1322.00 1322.50 1323.00
  
```

RUNOFF SUMMARY

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

6-HOUR	OPERATION 24-HOUR	STATION 72-HOUR	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
	HYDROGRAPH AT			BASINA	308.	12.25	65.	20.	20.	0.17
1334.43	ROUTED TO			POND	234.	12.50	62.	19.	19.	0.17
	HYDROGRAPH AT			BASINB	101.	12.00	15.	5.	5.	0.04
	2 COMBINED AT			COMB	258.	12.50	77.	24.	24.	0.21
	HYDROGRAPH AT			BASINA	339.	12.25	71.	23.	23.	0.17
1334.06	ROUTED TO			POND	248.	12.50	71.	22.	22.	0.17
	HYDROGRAPH AT			BASINB	125.	12.00	19.	6.	6.	0.04
	2 COMBINED AT			COMB	276.	12.50	90.	29.	29.	0.21
1322.45	ROUTED TO			DPOND	250.	12.67	90.	28.	28.	0.21

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

SCS TYPE RAINFALL DISTRIBUTION - 24 HOUR STORM  
 FOR A TOTAL RAINFALL OF 6.48 INCHES

*25 year event*

HOUR	% RAINFALL	INCHES
0.00	0.00	0.00
0.50	0.52	0.03
1.00	1.05	0.07
1.50	1.60	0.10
2.00	2.20	0.14
2.50	2.84	0.18
3.00	3.49	0.23
3.50	4.13	0.27
4.00	4.80	0.31
4.50	5.53	0.36
5.00	6.32	0.41
5.50	7.14	0.46
6.00	8.00	0.52
6.50	8.90	0.58
7.00	9.85	0.64
7.50	10.85	0.70
8.00	12.00	0.78
8.50	13.28	0.86
9.00	14.70	0.95
9.50	16.30	1.06
10.00	18.10	1.17
10.50	20.40	1.32
11.00	23.50	1.52
11.50	28.30	1.83
12.00	66.30	4.30
12.50	73.50	4.76
13.00	77.20	5.00
13.50	79.90	5.18
14.00	82.00	5.31
14.50	83.79	5.43
15.00	85.28	5.53
15.50	86.68	5.62
16.00	88.00	5.70
16.50	89.12	5.77
17.00	90.04	5.83
17.50	90.93	5.89
18.00	91.81	5.95
18.50	92.67	6.01
19.00	93.52	6.06
19.50	94.37	6.12
20.00	95.20	6.17
20.50	95.97	6.22
21.00	96.65	6.26
21.50	97.26	6.30
22.00	97.84	6.34
22.50	98.40	6.38
23.00	98.95	6.41
23.50	99.48	6.45
24.00	100.00	6.48

SOURCE: 'HYDROLOGY FOR ENGINEERS AND PLANNERS', HJELMFELT AND CASSIDY  
 PUBLISHED 1975, TABLE 4.7 - ACCUMULATION OF RAINFALL TO 24 HOURS  
 U.S. SOIL CONSERVATION SERVICE

```

*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
*
*     MAY 1991 *
*
*     VERSION 4.0.1E *
*
*
* RUN DATE 05/02/2000 TIME 14:18:32 *
*
*
*****
  
```

```

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

```

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

```

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

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

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.  
 THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.  
 THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION  
 NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,  
 DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION  
 KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

□□ HEC-1 INPUT PAGE 1

LINE	ID	1	2	3	4	5	6	7	8	9	10
*** FREE ***											
1	ID	Tara Falls Existing Basin to Harry with existng pond modeled, 50 year, 24 hou									
2	IT	5	289								
3	IN	30									
4	IO	4									
5	KK	BASINA									
6	BA	0.167									
7	PC	0	0.04	0.08	0.12	0.16	0.21	0.26	0.31	0.36	0.41
8	PC	0.47	0.53	0.60	0.66	0.73	0.81	0.89	0.99	1.09	1.21
9	PC	1.35	1.52	1.75	2.11	4.93	5.47	5.74	5.94	6.10	6.23
10	PC	6.34	6.45	6.55	6.63	6.70	6.77	6.83	6.89	6.96	7.02
11	PC	7.08	7.14	7.19	7.24	7.28	7.32	7.36	7.40	7.44	
12	UD	0.42									
13	LS	0	83								
14	KK	POND									
15	RS	1	ELEV	1333							
16	SA	5	7.4	9.8							
17	SE	1333	1334	1335							
18	SQ	0.1	14	87	258.5	557					
19	SE	1333	1333.5	1334	1334.5	1335					
20	KK	BASINB									
21	BA	0.042									
22	UD	0.15									
23	LS	0	80								
24	KK	COMB									
25	HC	2									

```

26      KK  BASINA
27      BA  0.167
28      UD  0.42
29      LS   0      88

30      KK  POND
31      RS   1      ELEV 1332.50
32      SA  4.3      5      7.4      9.8
33      SE 1332.5    1333    1334    1335
34      SQ  0.1      15      45      82      127      177      233      294
35      SE 1332.5    1332.75  1333  1333.25  1333.5  1333.75  1334  1334.25

36      KK  BASTNB
37      BA  0.042
38      UD  0.15
39      LS   0      93

40      KK  COMB
41      HC   2

```

HEC-1 INPUT

PAGE 2

□□

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

```

42      KK  DPOND
43      RS   1      ELEV 1319
44      SA  1.9      2.1      2.3      2.5      2.7
45      SE 1319    1320    1321    1322    1323
46      SQ  0.1      14      39      71      110      154      202      255      312
47      SE 1319    1319.5  1320  1320.5  1321  1321.5  1322  1322.5  1323
48      ZZ

```

HMVersion: 6.33 Data File: tf50.hcl

□□HEC1 S/N: 1343000364

```

*****
*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
*
* MAY 1991 *
*
* VERSION 4.0.1E *
*
*
* RUN DATE 05/02/2000 TIME 14:18:32 *
*
*
*****
*****

```

```

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

```

Tara Falls Existing Basin to Harry with existng pond modeled, 50 year, 24 hou

```

4 IO      OUTPUT CONTROL VARIABLES
          IPRNT      4 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        289 NUMBER OF HYDROGRAPH ORDINATES
          NDDATE    2 0 ENDING DATE
          NDTIME    0000 ENDING TIME
          ICENT     19 CENTURY MARK

          COMPUTATION INTERVAL 0.08 HOURS
          TOTAL TIME BASE 24.00 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

```

\*\*\*

```

*****
*
* 5 KK BASINA *
*
*****

```

3 IN TIME DATA FOR INPUT TIME SERIES  
 JXMIN 30 TIME INTERVAL IN MINUTES  
 JXDATE 1 0 STARTING DATE  
 JXTIME 0 STARTING TIME

SUBBASIN RUNOFF DATA

6 BA SUBBASIN CHARACTERISTICS  
 TAREA 0.17 SUBBASIN AREA

PRECIPITATION DATA

6 PB STORM 7.44 BASIN TOTAL PRECIPITATION

6 PI INCREMENTAL PRECIPITATION PATTERN

0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04
0.04	0.04	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.47	0.47
0.47	0.47	0.47	0.47	0.47	0.09	0.09	0.09	0.09	0.09	0.09
0.05	0.05	0.05	0.04	0.05	0.05	0.05	0.03	0.03	0.03	0.03
0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02
0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

13 LS SCS LOSS RATE  
 STRTL 0.41 INITIAL ABSTRACTION  
 CRVNR 83.00 CURVE NUMBER  
 RTIMP 0.00 PERCENT IMPERVIOUS AREA

12 UD SCS DIMENSIONLESS UNITGRAPH  
 TLAG 0.42 LAG

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UNIT HYDROGRAPH  
 27 END-OF-PERIOD ORDINATES

15.	46.	96.	147.	173.	173.	155.	129.	94.	68.
50.	38.	28.	21.	16.	12.	9.	7.	5.	4.
3.	2.	2.	1.	1.	1.	0.			

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14 KK \*\*\*\*\*  
 \* POND \*  
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HYDROGRAPH ROUTING DATA

15 RS STORAGE ROUTING  
 NSTPS 1 NUMBER OF SUBREACHES  
 ITYP ELEV TYPE OF INITIAL CONDITION  
 RSVRIC 1333.00 INITIAL CONDITION  
 X 0.00 WORKING R AND D COEFFICIENT

16 SA AREA 5.0 7.4 9.8

17 SE ELEVATION 1333.00 1334.00 1335.00

18 SQ DISCHARGE 0. 14. 87. 259. 557.

19 SE ELEVATION 1333.00 1333.50 1334.00 1334.50 1335.00

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COMPUTED STORAGE-ELEVATION DATA

STORAGE	0.00	6.16	14.73
ELEVATION	1333.00	1334.00	1335.00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	2.78	6.16	10.15	14.73
OUTFLOW	0.10	14.00	87.00	258.50	557.00
ELEVATION	1333.00	1333.50	1334.00	1334.50	1335.00

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20 KK  
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 \* BASINB \*  
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SUBBASIN RUNOFF DATA

21 BA SUBBASIN CHARACTERISTICS  
 TAREA 0.04 SUBBASIN AREA

PRECIPITATION DATA

6 PB STORM 7.44 BASIN TOTAL PRECIPITATION

6 PI INCREMENTAL PRECIPITATION PATTERN

0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04
0.04	0.04	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
0.47	0.47	0.47	0.47	0.09	0.09	0.09	0.09	0.09	0.09	0.09
0.05	0.05	0.05	0.04	0.05	0.05	0.03	0.03	0.03	0.03	0.03
0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

23 LS SCS LOSS RATE  
 STRTL 0.50 INITIAL ABSTRACTION  
 CRVNR 80.00 CURVE NUMBER  
 RTIMP 0.00 PERCENT IMPERVIOUS AREA

22 UD SCS DIMENSIONLESS UNITGRAPH  
 TLAG 0.15 LAG

UNIT HYDROGRAPH  
 11 END-OF-PERIOD ORDINATES  
 39. 104. 91. 46. 23. 11. 6. 3. 1. 1.

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24 KK  
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 \* COMB \*  
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25 HC HYDROGRAPH COMBINATION  
 ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

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26 KK

\*\*\*\*\*  
\* BASINA \*  
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SUBBASIN RUNOFF DATA

27 BA

SUBBASIN CHARACTERISTICS  
TAREA 0.17 SUBBASIN AREA

PRECIPITATION DATA

6 PB

STORM 7.44 BASIN TOTAL PRECIPITATION

6 PI

INCREMENTAL PRECIPITATION PATTERN

0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04
0.04	0.04	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.47	0.47
0.47	0.47	0.47	0.47	0.09	0.09	0.09	0.09	0.09	0.09	0.09
0.05	0.05	0.05	0.04	0.05	0.05	0.05	0.03	0.03	0.03	0.03
0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02
0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

29 LS

SCS LOSS RATE  
STRTL 0.27 INITIAL ABSTRACTION  
CRVNER 88.00 CURVE NUMBER  
RTIMP 0.00 PERCENT IMPERVIOUS AREA

28 UD

SCS DIMENSIONLESS UNITGRAPH  
TLAG 0.42 LAG

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UNIT HYDROGRAPH  
27 END-OF-PERIOD ORDINATES

15.	46.	96.	147.	173.	173.	155.	129.	94.	68.
50.	38.	28.	21.	16.	12.	9.	7.	5.	4.
3.	2.	2.	1.	1.	1.	0.			

\*\*\*\*\*

30 KK

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\* POND \*  
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HYDROGRAPH ROUTING DATA

31 RS

STORAGE ROUTING  
NSTPS 1 NUMBER OF SUBREACHES  
ITYP ELEV TYPE OF INITIAL CONDITION  
RSVRIC 1332.50 INITIAL CONDITION  
X 0.00 WORKING R AND D COEFFICIENT

32 SA

AREA 4.3 5.0 7.4 9.8

33 SE

ELEVATION 1332.50 1333.00 1334.00 1335.00

34 SQ

DISCHARGE 0. 15. 45. 82. 127. 177. 233. 294.

35 SE

ELEVATION 1332.50 1332.75 1333.00 1333.25 1333.50 1333.75 1334.00 1334.25

\*\*\*  
COMPUTED STORAGE-ELEVATION DATA

STORAGE	0.00	2.32	8.48	17.06
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ELEVATION 1332.50 1333.00 1334.00 1335.00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	1.12	2.32	3.64	5.10	6.71	8.48	10.40	17.06
OUTFLOW	0.10	15.00	45.00	82.00	127.00	177.00	233.00	294.00	477.00
ELEVATION	1332.50	1332.75	1333.00	1333.25	1333.50	1333.75	1334.00	1334.25	1335.00

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36 KK \*\*\*\*\*  
\* BASINB \*  
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SUBBASIN RUNOFF DATA

37 BA SUBBASIN CHARACTERISTICS  
TAREA 0.04 SUBBASIN AREA

PRECIPITATION DATA

6 PB STORM 7.44 BASIN TOTAL PRECIPITATION

6 PI INCREMENTAL PRECIPITATION PATTERN

0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
0.04	0.04	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
0.47	0.47	0.47	0.47	0.09	0.09	0.09	0.09	0.09	0.09	0.09
0.05	0.05	0.05	0.04	0.05	0.05	0.05	0.03	0.03	0.03	0.03
0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02
0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

39 LS SCS LOSS RATE  
STRTL 0.15 INITIAL ABSTRACTION  
CRVNER 93.00 CURVE NUMBER  
RTIMP 0.00 PERCENT IMPERVIOUS AREA

38 UD SCS DIMENSIONLESS UNITGRAPH  
TLAG 0.15 LAG

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UNIT HYDROGRAPH  
11 END-OF-PERIOD ORDINATES  
39. 104. 91. 46. 23. 11. 6. 3. 1. 1.

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40 KK \*\*\*\*\*  
\* COMB \*  
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41 HC HYDROGRAPH COMBINATION  
ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

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 \* DPOND \*  
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HYDROGRAPH ROUTING DATA

43 RS	STORAGE ROUTING	NSTPS	1	NUMBER OF SUBREACHES						
	ITYP	ELEV	TYPE OF INITIAL CONDITION							
	RSVRIC	1319.00	INITIAL CONDITION							
	X	0.00	WORKING R AND D COEFFICIENT							
44 SA	AREA	1.9	2.1	2.3	2.5	2.7				
45 SE	ELEVATION	1319.00	1320.00	1321.00	1322.00	1323.00				
46 SQ	DISCHARGE	0.	14.	39.	71.	110.	154.	202.	255.	312.
47 SE	ELEVATION	1319.00	1319.50	1320.00	1320.50	1321.00	1321.50	1322.00	1322.50	1323.00

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COMPUTED STORAGE-ELEVATION DATA

STORAGE	0.00	2.00	4.20	6.60	9.20
ELEVATION	1319.00	1320.00	1321.00	1322.00	1323.00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	0.97	2.00	3.07	4.20	5.37	6.60	7.87	9.20
OUTFLOW	0.10	14.00	39.00	71.00	110.00	154.00	202.00	255.00	312.00
ELEVATION	1319.00	1319.50	1320.00	1320.50	1321.00	1321.50	1322.00	1322.50	1323.00

RUNOFF SUMMARY

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

6-HOUR	OPERATION	STATION	PEAK	TIME OF	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN	MAXIMUM	TIME OF
	24-HOUR	72-HOUR	FLOW	PEAK	TIME	AREA	AREA	STAGE	MAX STAGE	
	HYDROGRAPH AT			BASINA	366.	12.25	77.	24.	24.	0.17
1334.56	ROUTED TO			POND	292.	12.42	75.	23.	23.	0.17
	HYDROGRAPH AT			BASINB	120.	12.00	18.	6.	6.	0.04
	2 COMBINED AT			COMB	325.	12.42	93.	29.	29.	0.21
	HYDROGRAPH AT			BASINA	397.	12.25	84.	27.	27.	0.17
1334.24	ROUTED TO			POND	292.	12.50	84.	27.	27.	0.17
	HYDROGRAPH AT			BASINB	144.	12.00	23.	7.	7.	0.04
	2 COMBINED AT			COMB	325.	12.50	106.	34.	34.	0.21
1322.86	ROUTED TO			DPOND	296.	12.67	105.	34.	34.	0.21

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

50 year event

SCS TYPE RAINFALL DISTRIBUTION - 24 HOUR STORM  
FOR A TOTAL RAINFALL OF 7.44 INCHES

HOUR	% RAINFALL	INCHES
0.00	0.00	0.00
0.50	0.52	0.04
1.00	1.05	0.08
1.50	1.60	0.12
2.00	2.20	0.16
2.50	2.84	0.21
3.00	3.49	0.26
3.50	4.13	0.31
4.00	4.80	0.36
4.50	5.53	0.41
<hr/>		
5.00	6.32	0.47
5.50	7.14	0.53
6.00	8.00	0.60
6.50	8.90	0.66
7.00	9.85	0.73
7.50	10.85	0.81
8.00	12.00	0.89
8.50	13.28	0.99
9.00	14.70	1.09
9.50	16.30	1.21
<hr/>		
10.00	18.10	1.35
10.50	20.40	1.52
11.00	23.50	1.75
11.50	28.30	2.11
12.00	66.30	4.93
12.50	73.50	5.47
13.00	77.20	5.74
13.50	79.90	5.94
14.00	82.00	6.10
14.50	83.79	6.23
<hr/>		
15.00	85.28	6.34
15.50	86.68	6.45
16.00	88.00	6.55
16.50	89.12	6.63
17.00	90.04	6.70
17.50	90.93	6.77
18.00	91.81	6.83
18.50	92.67	6.89
19.00	93.52	6.96
19.50	94.37	7.02
<hr/>		
20.00	95.20	7.08
20.50	95.97	7.14
21.00	96.65	7.19
21.50	97.26	7.24
22.00	97.84	7.28
22.50	98.40	7.32
23.00	98.95	7.36
23.50	99.48	7.40
24.00	100.00	7.44

SOURCE: 'HYDROLOGY FOR ENGINEERS AND PLANNERS', HJELMFELT AND CASSIDY  
PUBLISHED 1975, TABLE 4.7 - ACCUMULATION OF RAINFALL TO 24 HOURS  
U.S. SOIL CONSERVATION SERVICE

FLOOD HYDROGRAPH PACKAGE (HEC-1) ENGINEERS CENTER MAY 1991 VERSION 4.0.1E 95616 RUN DATE 05/02/2000 TIME 14:46:42

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

X X XXXXXXX XXXXX X
X X X X X XX
X X X X X X
XXXXXXXX XXXX X XXXXX X
X X X X X X
X X X X X X
X X XXXXXXX XXXXX XXXX

Full Microcomputer Implementation by Haestad Methods, Inc.

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

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW. THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION. NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE, SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY, DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

HEC-1 INPUT PAGE 1

Table with columns: LINE, ID, and various parameters (KK, BA, PC, UD, LS, RS, SA, SE, SQ, HC). Includes descriptions like 'Tara Falls Existing Basin to Harry with existng pond modeled, 100 year, 24 ho' and 'BASINA', 'POND', 'BASINS', 'COMB'.

```

29      LS      0      88
30      KK      POND
31      RS      1      ELEV 1332.50
32      SA      4.3     5      7.4     9.8
33      SE      1332.5  1333   1334   1335
34      SQ      0.1     15     45     82
35      SE      1332.5  1332.75  1333  1333.25  1333.5  1333.75  1334  1334.25
36      KK      BASINB
37      BA      0.042
38      UD      0.15
39      LS      0      93
40      KK      COMB
41      HC      2

```

HEC-1 INPUT

PAGE 2

□□

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

```

42      KK      DPOND
43      RS      1      ELEV 1319
44      SA      1.9     2.1     2.3     2.5     2.7
45      SE      1319   1320   1321   1322   1323
46      SQ      0.1     14     39     71
47      SE      1319   1319.5  1320   1320.5  1321   1321.5  1322   1322.5  1323
48      ZZ

```

1343000364

HMVersion: 6.33 Data File: tf100.hcl

□□HEC1 S/N:

```

*****
*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* ENGINEERS *
*      MAY 1991 *
* CENTER *
*      VERSION 4.0.1E *
*
* 95616 *
* RUN DATE 05/02/2000 TIME 14:46:42 *
*
*
*****
*****

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```

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

```

Tara Falls Existing Basin to Harry with existng pond modeled, 100 year, 24 ho

```

4 IO      OUTPUT CONTROL VARIABLES
          IPRNT      4      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         289   NUMBER OF HYDROGRAPH ORDINATES
          NDDATE     2      0      ENDING DATE
          NDTIME     0000   ENDING TIME
          ICENT      19     CENTURY MARK

          COMPUTATION INTERVAL 0.08 HOURS
          TOTAL TIME BASE 24.00 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

```

5 KK

```

*****
*
* BASINA *
*
*****

```

3 IN

```

TIME DATA FOR INPUT TIME SERIES
JXMIN      30      TIME INTERVAL IN MINUTES
JXDATE     1      0      STARTING DATE
JXTIME     0      STARTING TIME

```

SUBBASIN RUNOFF DATA









STORAGE	0.00	2.00	4.20	6.60	9.20
ELEVATION	1319.00	1320.00	1321.00	1322.00	1323.00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	0.97	2.00	3.07	4.20	5.37	6.60	7.87	9.20
OUTFLOW	0.10	14.00	39.00	71.00	110.00	154.00	202.00	255.00	312.00
ELEVATION	1319.00	1319.50	1320.00	1320.50	1321.00	1321.50	1322.00	1322.50	1323.00

WARNING --- ROUTED OUTFLOW ( 313.) IS GREATER THAN MAXIMUM OUTFLOW ( 312.) IN STORAGE-OUTFLOW TABLE

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

OF STAGE	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME MAX
					6-HOUR	24-HOUR	72-HOUR			
0.17	HYDROGRAPH AT			BASINA	388.	12.25	82.	26.	26.	
1334.60	ROUTED TO			POND	317.	12.42	80.	25.	25.	0.17
0.04	HYDROGRAPH AT			BASINB	128.	12.00	20.	6.	6.	
0.21	2 COMBINED AT			COMB	351.	12.42	99.	31.	31.	
0.17	HYDROGRAPH AT			BASINA	420.	12.25	89.	28.	28.	
1334.30	ROUTED TO			POND	307.	12.50	88.	28.	28.	0.17
0.04	HYDROGRAPH AT			BASINB	151.	12.00	24.	6.	8.	
0.21	2 COMBINED AT			COMB	341.	12.50	112.	36.	36.	
1323.01	ROUTED TO			DPOND	313.	12.67	111.	36.	36.	0.21

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