Professional Engineering Consultants, P.A.
303 S. TOPEKA ▪ WICHITA, KANSAS 67202 ▪ 316-262-2691 ▪ FAX 316-262-3003 ▪ www.pec1.com ▪ designers@pec1.com

Angel Acres
Wichita, Sedgwick County, Kansas
02/18/99

Angel Acres is a residential development in Wichita, Sedgwick County, Kansas. The plat encompasses approximately 24 acres, comprised of 56 - ¼ acre lots. The drainage plan, supporting computations and data for the Angel Acres drainage plan are presented herein.

Hydrology

The proposed plat lies in the SE ¼, SE ¼, Section 13, T28S, R1W. The existing landscape is grass and trees, with an apparent waterway along the western side of the property. The property drains primarily to the south.

Runoff coefficients were estimated based on tables presented in the Design Aids section and existing land use. Two large basins from the north and west drain to this site and under 47th Street South. The drainage plan for the plat directly north of Angel Acres (The Legacy) was used to model the two basins converging on this site. Angel Acres was incorporated into the HEC-1 run for The Legacy as a sub-basin draining to the two culverts under 47th Street South. A map showing the basin boundaries, drainage calculations and the pre and post HEC-1 models are included.

The Legacy drainage plan output along with additional flows from Angel Acres was used to size the drainage channel along the western property line of this plat. A 35' wide bottom, trapezoidal channel was used for the northern portion and a 60' wide bottom, trapezoidal channel was used for the southern section.

Calculating the peak runoff, it was realized that the 100 year storm volumes would not fit into the 2 - 36" RCP' s under 47th Street South. In the case of an extreme storm, water would back up until it could flow over 47th Street South. Weir flow was assumed over the road for approximately 175 feet. A high-water elevation was determined by the height of the road plus the height of the water over the road. This high-water elevation was calculated as 93.8 City Datum. A minimum opening elevations of 95.0 City Datum was used on most of the platted lots.

The 100-yr runoff that is being directed from the Legacy and Angel Acres to the existing 18" CMP under Meridian is in excess of the pipe's capacity. Due to this constriction at Meridian, minimum openings on Lots 13-20, Block 6 and Lots 2-5, Block 5 should be set at least 1' above the centerline of Meridian.

The analysis made is based on the available site data which includes the following: 1" = 100' topographic map with 2' contours of the site and adjacent areas, The Legacy drainage plan by MKEC, USGS topographic map, Sedgwick County Soil Survey Map and references noted herein.

Storm Sewer Design

Storm sewer systems were designed using Haestad Methods StormCAD program and a design storm of 2-years. Inlets were sized using City of Wichita Type 1A Curb Inlets and the FHWA's chart for depressed curb-opening inlet capacity in sump locations. The basins in this area included the unplatted land in the middle of the development in the anticipation that portion would be developed at a later date.

Culvert Sizing

For culvert control structures, the FHWA's Hydraulic Charts for the Selection of Highway Culverts was used. Culverts under the four proposed streets were sized using the estimated 100-yr storm runoff values.

The FHWA's Culvert program was used to aid in the design of the triple 10' x 4' RCB culvert under Angel Street at the drainage easement. This culvert was sized to fit in the designed channel and not overly constrict the 100-yr flow.

Design Aids

This section includes material used to assist in designing the drainage system. A 1"=100' scale drainage plan map is enclosed in the pocket.

References

Design of Urban Highway Drainage - The State of the Art, by Reitz & Jens, Inc., April 1980.

Drainage of Highway Pavements, Hydraulic Engineering Circular #12, by Tye Engineering, Inc., March 1984.

Hydraulic Charts for the Selection of Highway Culverts, Hydraulic Engineering Circular #5 by Hydraulics Branch, Bridge Division, Office of Engineering, Federal Highway Administration, December 1965.

Interim Drainage and Storm Sewer Policy for Design Criteria and Documentation, City of Wichita, Kansas, 1985.

Preliminary Drainage Report, The Legacy, Mid-Kansas Engineering Consultants, Inc., MKEC Project 95138, June 24, 1998.

Soil Survey of Sedgwick County, Kansas, US Department of Agriculture, Soil Conservation Service, 1979.

Angel Acres
100-yr Storm Calculations
36-98696-4649

100-yr storm runoff is routed to the drainage easement along the western property boundary.

Basin Area (Angel Acres Addition) 30.6 Acres
0.048 Sq. miles

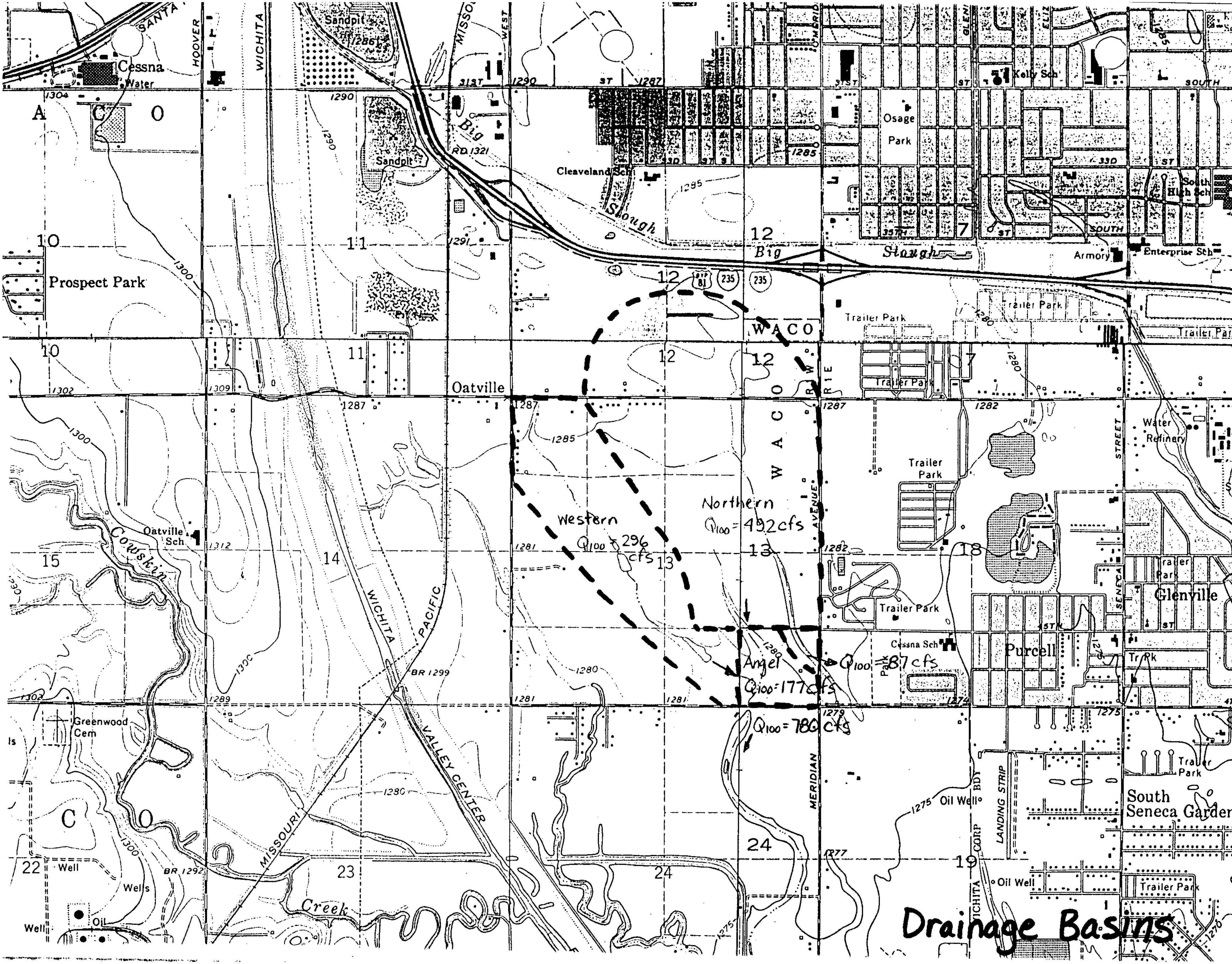
Time of Concentration = 15 minutes

Existing Conditions
Agricultural CN = 76
50% B Soils
50% D Soils

Developed Conditions
1/4 Ac. Residential CN = 81
50% B Soils
50% D Soils

Basin	Q_{100} Pre-Development	Q_{100} Post-Development
Northern (The Legacy)	508	492
Western (James Place)	308	296
Angel	164	177
Peak at 47th St. South	812 cfs	780 cfs

From HEC-1
See Attached


Drainage Basins
Northern
Q_{100}=492cfs
Western
Q_{100}=296 cfs
Angel
Q_{100}=177cfs
Q_{100}=87cfs
Q_{100}=780 cfs
Oatville
Prospect Park
Cessna
Purcell
Glenville
South Seneca Garden
WACO
MERIDIAN
Big Slough
Cowskin Creek
WICHITA VALLEY CENTER
MISSOURI PACIFIC

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*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              MAY   1991               *
*           VERSION 4.0.1E              *
*     Lahey F77L-EM/32 version 5.01     *
*       Dodson & Associates, Inc.       *
*  RUN DATE  02/17/99  TIME  13:54:26   *
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*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*          (916) 551-1748               *
*                                       *
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X    X  XXXXXXX   XXXXX          X
X    X  X        X     X        XX
X    X  X        X              X
XXXXXX  XXXX     X        XXXXX  X
X    X  X        X              X
X    X  X        X     X        X
X    X  XXXXXXX   XXXXX         XXX
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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


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

  1       ID     THE LEGAGY PRE-DEVELOPMENT FILENAME LEGPRE.DAT 6/12/98 TKM
  2       ID          SCS 24 HR 15 MIN DISTRIBUTION.
  3       ID        2, 5, 10, 25, 50 & 100 YEAR STORMS
  4       IT      15                    300
  5       IO       3       0
  6       JR    PREC    .457    .600    .686    .800    .914       1
          *DIAGRAM

  7       KK      10
  8       KM     RUNOFF TO COTTONWOOD POND WEST OF SITE
  9       BA   0.231
 10       PB    7.80
          *    STANDARD SCS 24-HOUR TYPE II DIMENSIONLESS 15 MIN CUMULATIVE DISTRIBUTION
 11       PC       0    .002    .005    .008    .011    .014    .017    .020    .023    .026
 12       PC    .029    .032    .035    .038    .041    .044    .048    .052    .056    .060
 13       PC    .064    .068    .072    .076    .080    .085    .090    .095    .100    .105
 14       PC    .110    .115    .120    .126    .133    .140    .147    .155    .163    .172
 15       PC    .181    .191    .203    .218    .236    .257    .283    .387    .663    .707
 16       PC    .735    .758    .776    .791    .804    .815    .825    .834    .842    .849
 17       PC    .856    .863    .869    .875    .881    .887    .893    .898    .903    .908
 18       PC    .913    .918    .922    .926    .930    .934    .938    .942    .946    .950
 19       PC    .953    .956    .959    .962    .965    .968    .971    .974    .977    .980
 20       PC    .983    .986    .989    .992    .995    .998   1.00
 21       LS       0   78.0       0
 22       UD    0.68

 23       KK    POND
 24       RS       1    ELEV    89.5
 25       SA    2.28    2.35    2.49    2.64    2.78
 26       SE    89.5      90      91      92      93
 27       SQ     0.1      76     112     148     184     220     256     292     328     364
 28       SE    89.5   89.61   89.88   90.39   90.86   91.31   91.90   92.60   93.24   93.53

 29       KK     OS1
 30       KM     ONSITE WATERSHED #1
 31       BA   .0280
 32       LS       0      82       0
 33       UD    0.45

 34       KK    SWSE
 35       KM     COMBINED FLOW TO SW QUARTER OF SE QUARTER
 36       HC       2

 37       KK    OFF2
 38       KM     OFFSITE FLOW TO NORTH PERIMETER OF PARCEL
 39       BA  0.5594
 40       LS       0      73       0
 41       UD    1.44

 42       KK     OS2
 43       KM     ONSITE WATERSHED #2
 44       BA   .0473
 45       LS       0      77       0
 46       UD    0.47
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LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  47      KK     OS3
  48      KM     ONSITE WATERSHED #3
  49      BA   .0308
  50      LS      0      73       0
  51      UD    0.58

  52      KK    SOUT
  53      KM    SOUTH SIDE OUTFLOW COMBINED
  54      HC      3

  55      KK   ANGEL
  56      KM  ADDITIONAL FLOW FROM ANGEL ACRES
  57      BA   0.048
  58      LS      0      76      20
  59      UD    0.15

  60      KK    47TH
  61      KM     APPROXIMATE FLOW TO 2-3 FT RCPS AT 47TH ST
  62      HC      3

  63      KK     OS4
  64      KM     ONSITE WATERSHED #4
  65      BA   .0198
  66      LS      0      73       0
  67      UD    0.62
  68      ZZ
```
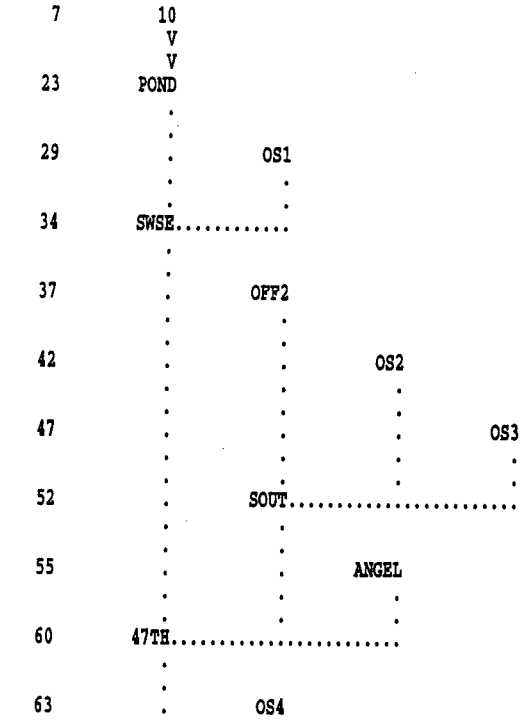

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE NO.

(V) ROUTING
(.) CONNECTOR
(---->) DIVERSION OR PUMP FLOW
(<----) RETURN OF DIVERTED OR PUMPED FLOW



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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**********************************************
*                                            *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)        *
*              MAY   1991                    *
*           VERSION 4.0.1E                   *
*     Lahey F77L-EM/32 version 5.01          *
*       Dodson & Associates, Inc.            *
*  RUN DATE  02/17/99  TIME  13:54:26        *
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*    HYDROLOGIC ENGINEERING CENTER           *
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*           (916) 551-1748                   *
*                                            *
**********************************************
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THE LEGAGY PRE-DEVELOPMENT FILENAME LEGPRE.DAT 6/12/98 TKM
SCS 24 HR 15 MIN DISTRIBUTION.
2, 5, 10, 25, 50 & 100 YEAR STORMS

5 IO OUTPUT CONTROL VARIABLES

IPRNT	3	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

NMIN	15	MINUTES IN COMPUTATION INTERVAL
IDATE	1 0	STARTING DATE
ITIME	0000	STARTING TIME
NQ	300	NUMBER OF HYDROGRAPH ORDINATES
NDDATE	4 0	ENDING DATE
NDTIME	0245	ENDING TIME
ICENT	19	CENTURY MARK

COMPUTATION INTERVAL 0.25 HOURS
TOTAL TIME BASE 74.75 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 PRECIPITATION
0.46 0.60 0.69 0.80 0.91 1.00

*** ***

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*            *
*        10  *
*            *
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7 KK

RUNOFF TO COTTONWOOD POND WEST OF SITE

SUBBASIN RUNOFF DATA

9 BA SUBBASIN CHARACTERISTICS
TAREA 0.23 SUBBASIN AREA

PRECIPITATION DATA

10 PB STORM 7.80 BASIN TOTAL PRECIPITATION

11 PI INCREMENTAL PRECIPITATION PATTERN

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	0.00	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	0.03	0.10	0.28	0.04	0.03
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	0.00	0.00	0.00	0.00

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00				

21 LS SCS LOSS RATE

STRTL	0.56	INITIAL ABSTRACTION
CRVNBR	78.00	CURVE NUMBER
RTIMP	0.00	PERCENT IMPERVIOUS AREA

22 UD SCS DIMENSIONLESS UNITGRAPH

TLAG 0.68 LAG

***

UNIT HYDROGRAPH
16 END-OF-PERIOD ORDINATES

28.	96.	138.	125.	86.	49.	30.	18.	11.	7.
4.	2.	1.	1.	0.	0.				

TOTAL RAINFALL = 7.80, TOTAL LOSS = 2.59, TOTAL EXCESS = 5.21

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	74.75-HR
+ 356.	12.50	(CFS)	103.	32.	11.	10.
		(INCHES)	4.151	5.206	5.206	5.206
		(AC-FT)	51.	64.	64.	64.

CUMULATIVE AREA = 0.23 SQ MI

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

HYDROGRAPH AT STATION 10
FOR PLAN 1, RATIO = 0.46

TOTAL RAINFALL = 3.56, TOTAL LOSS = 2.02, TOTAL EXCESS = 1.55

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	74.75-HR
+ 101.	12.50	(CFS)	31.	10.	3.	3.
		(INCHES)	1.250	1.547	1.547	1.547
		(AC-FT)	15.	19.	19.	19.

CUMULATIVE AREA = 0.23 SQ MI

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

HYDROGRAPH AT STATION 10
FOR PLAN 1, RATIO = 0.60

TOTAL RAINFALL = 4.68, TOTAL LOSS = 2.24, TOTAL EXCESS = 2.44

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	74.75-HR
+ 164.	12.50	(CFS)	49.	15.	5.	5.
		(INCHES)	1.972	2.442	2.442	2.442
		(AC-FT)	24.	30.	30.	30.

CUMULATIVE AREA = 0.23 SQ MI

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

HYDROGRAPH AT STATION 10
FOR PLAN 1, RATIO = 0.69

TOTAL RAINFALL = 5.35, TOTAL LOSS = 2.34, TOTAL EXCESS = 3.01

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	74.75-HR
+ 204.	12.50	(CFS)	60.	19.	6.	6.

```
                      (INCHES)    2.426      3.012      3.012      3.012
                       (AC-FT)      30.        37.        37.        37.

                      CUMULATIVE AREA =    0.23 SQ MI

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

                      HYDROGRAPH AT STATION       10
                        FOR PLAN 1, RATIO = 0.80

       TOTAL RAINFALL =    6.24, TOTAL LOSS =    2.45, TOTAL EXCESS =    3.79

     PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                   6-HR        24-HR       72-HR     74.75-HR
  +   (CFS)        (HR)
                           (CFS)
  +     259.      12.50                76.         24.          8.          8.
                       (INCHES)    3.043       3.792       3.792       3.792
                        (AC-FT)      37.         47.         47.         47.

                      CUMULATIVE AREA =    0.23 SQ MI

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

                      HYDROGRAPH AT STATION       10
                        FOR PLAN 1, RATIO = 0.91

       TOTAL RAINFALL =    7.13, TOTAL LOSS =    2.54, TOTAL EXCESS =    4.59

     PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                   6-HR        24-HR       72-HR     74.75-HR
  +   (CFS)        (HR)
                           (CFS)
  +     314.      12.50                91.         29.         10.          9.
                       (INCHES)    3.672       4.592       4.592       4.592
                        (AC-FT)      45.         57.         57.         57.

                      CUMULATIVE AREA =    0.23 SQ MI

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

                      HYDROGRAPH AT STATION       10
                        FOR PLAN 1, RATIO = 1.00

       TOTAL RAINFALL =    7.80, TOTAL LOSS =    2.59, TOTAL EXCESS =    5.21

     PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                   6-HR        24-HR       72-HR     74.75-HR
  +   (CFS)        (HR)
                           (CFS)
  +     356.      12.50               103.         32.         11.         10.
                       (INCHES)    4.151       5.206       5.206       5.206
                        (AC-FT)      51.         64.         64.         64.

                      CUMULATIVE AREA =    0.23 SQ MI


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

              **************
              *            *
    23 KK     *    POND    *
              *            *
              **************

                HYDROGRAPH ROUTING DATA

    24 RS         STORAGE ROUTING
                       NSTPS          1  NUMBER OF SUBREACHES
                        ITYP       ELEV  TYPE OF INITIAL CONDITION
                      RSVRIC      89.50  INITIAL CONDITION
                           X       0.00  WORKING R AND D COEFFICIENT

    25 SA                AREA       2.3       2.3       2.5       2.6       2.8
```

26 SE	ELEVATION	89.50	90.00	91.00	92.00	93.00					
27 SQ	DISCHARGE	0.	76.	112.	148.	184.	220.	256.	292.	328.	364.
28 SE	ELEVATION	89.50	89.61	89.88	90.39	90.86	91.31	91.90	92.60	93.24	93.53

***

COMPUTED STORAGE-ELEVATION DATA

STORAGE	0.00	1.16	3.58	6.14	8.85
ELEVATION	89.50	90.00	91.00	92.00	93.00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	0.25	0.88	1.16	2.08	3.23	3.58	4.36	5.88	6.14
OUTFLOW	0.10	76.00	112.00	120.47	148.00	184.00	195.20	220.00	256.00	261.14
ELEVATION	89.50	89.61	89.88	90.00	90.39	90.86	91.00	91.31	91.90	92.00

STORAGE	7.75	8.85	9.52	10.34
OUTFLOW	292.00	314.50	328.00	364.00
ELEVATION	92.60	93.00	93.24	93.53

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 0. TO 76.
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.)

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

HYDROGRAPH AT STATION POND
FOR PLAN 1, RATIO = 0.46

PEAK FLOW + (CFS)	TIME (HR)
97.	12.75

PEAK STORAGE + (AC-FT)	TIME (HR)
1.	12.75

PEAK STAGE + (FEET)	TIME (HR)
89.76	12.75

MAXIMUM AVERAGE FLOW

	6-HR	24-HR	72-HR	74.75-HR
(CFS)	31.	10.	3.	3.
(INCHES)	1.250	1.551	1.583	1.585
(AC-FT)	15.	19.	20.	20.

MAXIMUM AVERAGE STORAGE

6-HR	24-HR	72-HR	74.75-HR
0.	0.	0.	0.

MAXIMUM AVERAGE STAGE

6-HR	24-HR	72-HR	74.75-HR
89.56	89.52	89.51	89.51

CUMULATIVE AREA = 0.23 SQ MI

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

HYDROGRAPH AT STATION POND
FOR PLAN 1, RATIO = 0.60

PEAK FLOW + (CFS)	TIME (HR)
142.	13.00

PEAK STORAGE + (AC-FT)	TIME (HR)
2.	12.75

PEAK STAGE + (FEET)	TIME (HR)
90.30	13.00

MAXIMUM AVERAGE FLOW

	6-HR	24-HR	72-HR	74.75-HR
(CFS)	49.	15.	5.	5.
(INCHES)	1.972	2.446	2.478	2.480
(AC-FT)	24.	30.	31.	31.

MAXIMUM AVERAGE STORAGE

6-HR	24-HR	72-HR	74.75-HR
0.	0.	0.	0.

MAXIMUM AVERAGE STAGE

6-HR	24-HR	72-HR	74.75-HR
89.66	89.54	89.51	89.51

CUMULATIVE AREA = 0.23 SQ MI

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

HYDROGRAPH AT STATION POND
FOR PLAN 1, RATIO = 0.69

PEAK FLOW + (CFS)	TIME (HR)
173.	13.00

PEAK STORAGE + (AC-FT)	TIME (HR)
3.	13.00

PEAK STAGE + (FEET)	TIME (HR)
90.71	13.00

MAXIMUM AVERAGE FLOW	6-HR	24-HR	72-HR	74.75-HR
(CFS)	60.	19.	6.	6.
(INCHES)	2.426	3.015	3.047	3.049
(AC-FT)	30.	37.	38.	38.

MAXIMUM AVERAGE STORAGE	6-HR	24-HR	72-HR	74.75-HR
	1.	0.	0.	0.

MAXIMUM AVERAGE STAGE	6-HR	24-HR	72-HR	74.75-HR
	89.75	89.57	89.52	89.52

CUMULATIVE AREA = 0.23 SQ MI

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

HYDROGRAPH AT STATION POND
FOR PLAN 1, RATIO = 0.80

PEAK FLOW + (CFS)	TIME (HR)
216.	13.00

PEAK STORAGE + (AC-FT)	TIME (HR)
4.	13.00

PEAK STAGE + (FEET)	TIME (HR)
91.26	13.00

MAXIMUM AVERAGE FLOW	6-HR	24-HR	72-HR	74.75-HR
(CFS)	76.	24.	8.	8.
(INCHES)	3.043	3.794	3.826	3.828
(AC-FT)	37.	47.	47.	47.

MAXIMUM AVERAGE STORAGE	6-HR	24-HR	72-HR	74.75-HR
	1.	0.	0.	0.

MAXIMUM AVERAGE STAGE	6-HR	24-HR	72-HR	74.75-HR
	89.89	89.60	89.53	89.53

CUMULATIVE AREA = 0.23 SQ MI

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

HYDROGRAPH AT STATION POND
FOR PLAN 1, RATIO = 0.91

PEAK FLOW + (CFS)	TIME (HR)
255.	13.00

PEAK STORAGE + (AC-FT)	TIME (HR)
6.	13.00

PEAK STAGE + (FEET)	TIME (HR)
91.88	13.00

MAXIMUM AVERAGE FLOW	6-HR	24-HR	72-HR	74.75-HR
(CFS)	91.	29.	10.	9.
(INCHES)	3.672	4.594	4.627	4.628
(AC-FT)	45.	57.	57.	57.

MAXIMUM AVERAGE STORAGE	6-HR	24-HR	72-HR	74.75-HR
	1.	0.	0.	0.

MAXIMUM AVERAGE STAGE	6-HR	24-HR	72-HR	74.75-HR
	90.05	89.65	89.55	89.55

CUMULATIVE AREA = 0.23 SQ MI

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HYDROGRAPH AT STATION POND
FOR PLAN 1, RATIO = 1.00

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)					
		(CFS)				
+ 281.	13.00		103.	32.	11.	10.
		(INCHES)	4.150	5.208	5.240	5.242
		(AC-FT)	51.	64.	65.	65.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	74.75-HR
+ (AC-FT)	(HR)				
7.	13.00	2.	0.	0.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	74.75-HR
+ (FEET)	(HR)				
92.39	13.00	90.19	89.68	89.56	89.56

CUMULATIVE AREA = 0.23 SQ MI

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              *            *
29 KK         *    OS1     *
              *            *
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ONSITE WATERSHED #1

SUBBASIN RUNOFF DATA

31 BA SUBBASIN CHARACTERISTICS
TAREA 0.03 SUBBASIN AREA

PRECIPITATION DATA

10 PB STORM 7.80 BASIN TOTAL PRECIPITATION

11 PI INCREMENTAL PRECIPITATION PATTERN

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	0.00	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	0.03	0.10	0.28	0.04	0.03
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	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00				

32 LS SCS LOSS RATE
STRTL 0.44 INITIAL ABSTRACTION
CRVNBR 82.00 CURVE NUMBER
RTIMP 0.00 PERCENT IMPERVIOUS AREA

33 UD SCS DIMENSIONLESS UNITGRAPH
TLAG 0.45 LAG

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UNIT HYDROGRAPH
11 END-OF-PERIOD ORDINATES

9.	23.	20.	10.	5.	3.	1.	1.	0.	0.
0.									

TOTAL RAINFALL = 7.80, TOTAL LOSS = 2.13, TOTAL EXCESS = 5.67

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)					
		(CFS)				

			6-HR	24-HR	72-HR	74.75-HR
+	60.	12.25	14.	4.	1.	1.
		(INCHES)	4.490	5.670	5.670	5.670
		(AC-FT)	7.	8.	8.	8.

CUMULATIVE AREA = 0.03 SQ MI

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

HYDROGRAPH AT STATION OS1
FOR PLAN 1, RATIO = 0.46

TOTAL RAINFALL = 3.56, TOTAL LOSS = 1.73, TOTAL EXCESS = 1.84

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+	(CFS)	(HR)	(CFS)			
+	19.	12.25	4.	1.	0.	0.
		(INCHES)	1.488	1.836	1.836	1.836
		(AC-FT)	2.	3.	3.	3.

CUMULATIVE AREA = 0.03 SQ MI

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HYDROGRAPH AT STATION OS1
FOR PLAN 1, RATIO = 0.60

TOTAL RAINFALL = 4.68, TOTAL LOSS = 1.89, TOTAL EXCESS = 2.79

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+	(CFS)	(HR)	(CFS)			
+	29.	12.25	7.	2.	1.	1.
		(INCHES)	2.251	2.795	2.795	2.795
		(AC-FT)	3.	4.	4.	4.

CUMULATIVE AREA = 0.03 SQ MI

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

HYDROGRAPH AT STATION OS1
FOR PLAN 1, RATIO = 0.69

TOTAL RAINFALL = 5.35, TOTAL LOSS = 1.96, TOTAL EXCESS = 3.39

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+	(CFS)	(HR)	(CFS)			
+	36.	12.25	8.	3.	1.	1.
		(INCHES)	2.724	3.395	3.395	3.395
		(AC-FT)	4.	5.	5.	5.

CUMULATIVE AREA = 0.03 SQ MI

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

HYDROGRAPH AT STATION OS1
FOR PLAN 1, RATIO = 0.80

TOTAL RAINFALL = 6.24, TOTAL LOSS = 2.03, TOTAL EXCESS = 4.21

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+	(CFS)	(HR)	(CFS)			
+	44.	12.25	10.	3.	1.	1.
		(INCHES)	3.360	4.208	4.208	4.208
		(AC-FT)	5.	6.	6.	6.

CUMULATIVE AREA = 0.03 SQ MI

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                        HYDROGRAPH AT STATION      OS1
                         FOR PLAN 1, RATIO = 0.91

     TOTAL RAINFALL =    7.13, TOTAL LOSS =    2.09, TOTAL EXCESS =    5.04

   PEAK FLOW      TIME                         MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR       72-HR      74.75-HR
 +   (CFS)        (HR)
                             (CFS)
 +     53.       12.25
                                      12.          4.          1.          1.
                           (INCHES)  4.003       5.037       5.037       5.037
                            (AC-FT)     6.          8.          8.          8.

                          CUMULATIVE AREA =     0.03 SQ MI

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

                        HYDROGRAPH AT STATION      OS1
                         FOR PLAN 1, RATIO = 1.00

     TOTAL RAINFALL =    7.80, TOTAL LOSS =    2.13, TOTAL EXCESS =    5.67

   PEAK FLOW      TIME                         MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR       72-HR      74.75-HR
 +   (CFS)        (HR)
                             (CFS)
 +     60.       12.25
                                      14.          4.          1.          1.
                           (INCHES)  4.490       5.670       5.670       5.670
                            (AC-FT)     7.          8.          8.          8.

                          CUMULATIVE AREA =     0.03 SQ MI


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              **************
              *            *
   34 KK      *    SWSE    *
              *            *
              **************
                         COMBINED FLOW TO SW QUARTER OF SE QUARTER

   36 HC          HYDROGRAPH COMBINATION
                      ICOMP           2   NUMBER OF HYDROGRAPHS TO COMBINE

                                                          ***

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

                        HYDROGRAPH AT STATION     SWSE
                         FOR PLAN 1, RATIO = 0.46

   PEAK FLOW      TIME                         MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR       72-HR      74.75-HR
 +   (CFS)        (HR)
                             (CFS)
 +    109.       12.75
                                      35.         11.          4.          4.
                           (INCHES)  1.274       1.582       1.611       1.612
                            (AC-FT)    18.         22.         22.         22.

                          CUMULATIVE AREA =     0.26 SQ MI

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

                        HYDROGRAPH AT STATION     SWSE
                         FOR PLAN 1, RATIO = 0.60

   PEAK FLOW      TIME                         MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR       72-HR      74.75-HR
 +   (CFS)        (HR)
                             (CFS)
 +    159.       12.75
                                      56.         17.          6.          6.
                           (INCHES)  2.001       2.484       2.512       2.514
                            (AC-FT)    28.         34.         35.         35.
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CUMULATIVE AREA = 0.26 SQ MI

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

HYDROGRAPH AT STATION SWSE
FOR PLAN 1, RATIO = 0.69

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)					
		(CFS)				
+ 192.	12.75		68.	21.	7.	7.
		(INCHES)	2.456	3.056	3.085	3.087
		(AC-FT)	34.	42.	43.	43.

CUMULATIVE AREA = 0.26 SQ MI

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

HYDROGRAPH AT STATION SWSE
FOR PLAN 1, RATIO = 0.80

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)					
		(CFS)				
+ 239.	12.75		86.	27.	9.	9.
		(INCHES)	3.076	3.839	3.868	3.869
		(AC-FT)	42.	53.	53.	53.

CUMULATIVE AREA = 0.26 SQ MI

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

HYDROGRAPH AT STATION SWSE
FOR PLAN 1, RATIO = 0.91

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)					
		(CFS)				
+ 280.	12.75		103.	32.	11.	10.
		(INCHES)	3.705	4.642	4.671	4.673
		(AC-FT)	51.	64.	65.	65.

CUMULATIVE AREA = 0.26 SQ MI

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

HYDROGRAPH AT STATION SWSE
FOR PLAN 1, RATIO = 1.00

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)					
		(CFS)				
+ 308.	12.75		117.	37.	12.	12.
		(INCHES)	4.186	5.258	5.287	5.289
		(AC-FT)	58.	73.	73.	73.

CUMULATIVE AREA = 0.26 SQ MI

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         *            *
37 KK    *    OFF2    *
         *            *
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OFFSITE FLOW TO NORTH PERIMETER OF PARCEL

SUBBASIN RUNOFF DATA

39 BA SUBBASIN CHARACTERISTICS
TAREA 0.56 SUBBASIN AREA

PRECIPITATION DATA

10 PB STORM 7.80 BASIN TOTAL PRECIPITATION

11 PI INCREMENTAL PRECIPITATION PATTERN

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	0.00	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	0.03	0.10	0.28	0.04	0.03
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	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00				

40 LS SCS LOSS RATE
STRTL 0.74 INITIAL ABSTRACTION
CRVNBR 73.00 CURVE NUMBER
RTIMP 0.00 PERCENT IMPERVIOUS AREA

41 UD SCS DIMENSIONLESS UNITGRAPH
TLAG 1.44 LAG

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UNIT HYDROGRAPH
31 END-OF-PERIOD ORDINATES

12.	37.	75.	125.	160.	172.	169.	151.	128.	97.
73.	56.	44.	34.	26.	20.	15.	12.	9.	7.
5.	4.	3.	2.	2.	2.	1.	1.	1.	0.
0.									

TOTAL RAINFALL = 7.80, TOTAL LOSS = 3.17, TOTAL EXCESS = 4.63

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+	(CFS)	(HR)	(CFS)			
+	466.	13.50	219.	70.	23.	22.
			(INCHES) 3.647	4.633	4.633	4.633
			(AC-FT) 109.	138.	138.	138.

CUMULATIVE AREA = 0.56 SQ MI

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HYDROGRAPH AT STATION OFF2
FOR PLAN 1, RATIO = 0.46

TOTAL RAINFALL = 3.56, TOTAL LOSS = 2.34, TOTAL EXCESS = 1.22

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+	(CFS)	(HR)	(CFS)			
+	115.	13.50	57.	18.	6.	6.
			(INCHES) 0.940	1.223	1.223	1.223
			(AC-FT) 28.	36.	36.	36.

CUMULATIVE AREA = 0.56 SQ MI

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HYDROGRAPH AT STATION OFF2
FOR PLAN 1, RATIO = 0.60

TOTAL RAINFALL = 4.68, TOTAL LOSS = 2.65, TOTAL EXCESS = 2.03

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+	(CFS)	(HR)	(CFS)			

+	199.	13.50		96.	31.	10.	10.
			(INCHES)	1.590	2.032	2.032	2.032
			(AC-FT)	47.	61.	61.	61.

CUMULATIVE AREA = 0.56 SQ MI

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HYDROGRAPH AT STATION OFF2
FOR PLAN 1, RATIO = 0.69

TOTAL RAINFALL = 5.35, TOTAL LOSS = 2.79, TOTAL EXCESS = 2.56

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	74.75-HR
+	(CFS)	(HR)					
			(CFS)				
+	253.	13.50		121.	38.	13.	12.
			(INCHES)	2.012	2.559	2.559	2.559
			(AC-FT)	60.	76.	76.	76.

CUMULATIVE AREA = 0.56 SQ MI

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

HYDROGRAPH AT STATION OFF2
FOR PLAN 1, RATIO = 0.80

TOTAL RAINFALL = 6.24, TOTAL LOSS = 2.95, TOTAL EXCESS = 3.29

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	74.75-HR
+	(CFS)	(HR)					
			(CFS)				
+	329.	13.50		156.	49.	16.	16.
			(INCHES)	2.592	3.289	3.289	3.289
			(AC-FT)	77.	98.	98.	98.

CUMULATIVE AREA = 0.56 SQ MI

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HYDROGRAPH AT STATION OFF2
FOR PLAN 1, RATIO = 0.91

TOTAL RAINFALL = 7.13, TOTAL LOSS = 3.08, TOTAL EXCESS = 4.05

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	74.75-HR
+	(CFS)	(HR)					
			(CFS)				
+	406.	13.50		192.	61.	20.	20.
			(INCHES)	3.188	4.047	4.047	4.047
			(AC-FT)	95.	121.	121.	121.

CUMULATIVE AREA = 0.56 SQ MI

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

HYDROGRAPH AT STATION OFF2
FOR PLAN 1, RATIO = 1.00

TOTAL RAINFALL = 7.80, TOTAL LOSS = 3.17, TOTAL EXCESS = 4.63

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	74.75-HR
+	(CFS)	(HR)					
			(CFS)				
+	466.	13.50		219.	70.	23.	22.
			(INCHES)	3.647	4.633	4.633	4.633
			(AC-FT)	109.	138.	138.	138.

CUMULATIVE AREA = 0.56 SQ MI

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                   *            *
  42 KK            *     OS2    *
                   *            *
                   **************
                                 ONSITE WATERSHED #2

                    SUBBASIN RUNOFF DATA

  44 BA               SUBBASIN CHARACTERISTICS
                            TAREA        0.05  SUBBASIN AREA

                      PRECIPITATION DATA

  10 PB                     STORM         7.80  BASIN TOTAL PRECIPITATION

  11 PI                 INCREMENTAL PRECIPITATION PATTERN
                          0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                          0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     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     0.00     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     0.03     0.10     0.28     0.04     0.03
                          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     0.00     0.00     0.00     0.00
                          0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                          0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                          0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00

  45 LS               SCS LOSS RATE
                           STRTL         0.60  INITIAL ABSTRACTION
                          CRVNBR        77.00  CURVE NUMBER
                           RTIMP         0.00  PERCENT IMPERVIOUS AREA

  46 UD               SCS DIMENSIONLESS UNITGRAPH
                            TLAG         0.47  LAG

                                                  ***

                                             UNIT HYDROGRAPH
                                        11 END-OF-PERIOD ORDINATES
                13.      37.      34.      19.       9.       5.       2.       1.       1.       0.
                 0.

      TOTAL RAINFALL =    7.80, TOTAL LOSS =    2.71, TOTAL EXCESS =    5.09

    PEAK FLOW     TIME                         MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR      74.75-HR
  +   (CFS)       (HR)
                               (CFS)
  +     87.      12.25                  21.          6.          2.          2.
                           (INCHES)    4.076       5.091       5.091       5.091
                            (AC-FT)      10.         13.         13.         13.

                           CUMULATIVE AREA =     0.05 SQ MI

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

                              HYDROGRAPH AT STATION       OS2
                                FOR PLAN 1, RATIO = 0.46

      TOTAL RAINFALL =    3.56, TOTAL LOSS =    2.09, TOTAL EXCESS =    1.48

    PEAK FLOW     TIME                         MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR      74.75-HR
  +   (CFS)       (HR)
                               (CFS)
  +     24.      12.25                   6.          2.          1.          1.
                           (INCHES)    1.200       1.479       1.479       1.479
                            (AC-FT)       3.          4.          4.          4.

                           CUMULATIVE AREA =     0.05 SQ MI

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HYDROGRAPH AT STATION OS2
FOR PLAN 1, RATIO = 0.60

TOTAL RAINFALL = 4.68, TOTAL LOSS = 2.32, TOTAL EXCESS = 2.36

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)				
		(CFS)			
+ 40.	12.25	10.	3.	1.	1.
		(INCHES) 1.910	2.358	2.358	2.358
		(AC-FT) 5.	6.	6.	6.

CUMULATIVE AREA = 0.05 SQ MI

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HYDROGRAPH AT STATION OS2
FOR PLAN 1, RATIO = 0.69

TOTAL RAINFALL = 5.35, TOTAL LOSS = 2.43, TOTAL EXCESS = 2.92

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)				
		(CFS)			
+ 50.	12.25	12.	4.	1.	1.
		(INCHES) 2.361	2.919	2.919	2.919
		(AC-FT) 6.	7.	7.	7.

CUMULATIVE AREA = 0.05 SQ MI

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

HYDROGRAPH AT STATION OS2
FOR PLAN 1, RATIO = 0.80

TOTAL RAINFALL = 6.24, TOTAL LOSS = 2.55, TOTAL EXCESS = 3.69

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)				
		(CFS)			
+ 63.	12.25	15.	5.	2.	2.
		(INCHES) 2.972	3.689	3.689	3.689
		(AC-FT) 7.	9.	9.	9.

CUMULATIVE AREA = 0.05 SQ MI

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HYDROGRAPH AT STATION OS2
FOR PLAN 1, RATIO = 0.91

TOTAL RAINFALL = 7.13, TOTAL LOSS = 2.65, TOTAL EXCESS = 4.48

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)				
		(CFS)			
+ 77.	12.25	18.	6.	2.	2.
		(INCHES) 3.599	4.482	4.482	4.482
		(AC-FT) 9.	11.	11.	11.

CUMULATIVE AREA = 0.05 SQ MI

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

HYDROGRAPH AT STATION OS2
FOR PLAN 1, RATIO = 1.00

TOTAL RAINFALL = 7.80, TOTAL LOSS = 2.71, TOTAL EXCESS = 5.09

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)				

```
                              (CFS)
  +      87.      12.25
                                       21.          6.          2.           2.
                            (INCHES)  4.076       5.091       5.091        5.091
                             (AC-FT)    10.         13.         13.          13.

                            CUMULATIVE AREA =      0.05 SQ MI


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

                **************
                *            *
   47 KK        *      OS3   *
                *            *
                **************
                                   ONSITE WATERSHED #3

                  SUBBASIN RUNOFF DATA

   49 BA           SUBBASIN CHARACTERISTICS
                         TAREA         0.03   SUBBASIN AREA

                   PRECIPITATION DATA

   10 PB                 STORM         7.80   BASIN TOTAL PRECIPITATION

   11 PI            INCREMENTAL PRECIPITATION PATTERN
                      0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                      0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     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     0.00     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     0.03     0.10     0.28     0.04     0.03
                      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     0.00     0.00     0.00     0.00
                      0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                      0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                      0.00     0.00     0.00     0.00     0.00     0.00

   50 LS           SCS LOSS RATE
                        STRTL          0.74   INITIAL ABSTRACTION
                       CRVNBR         73.00   CURVE NUMBER
                        RTIMP          0.00   PERCENT IMPERVIOUS AREA

   51 UD           SCS DIMENSIONLESS UNITGRAPH
                         TLAG          0.58   LAG

                                                 ***

                                              UNIT HYDROGRAPH
                                          14 END-OF-PERIOD ORDINATES
                5.       17.      21.      16.       9.        5.        3.        2.        1.        0.
                0.        0.       0.       0.

    TOTAL RAINFALL =      7.80, TOTAL LOSS =     3.17, TOTAL EXCESS =     4.63

  PEAK FLOW     TIME                           MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR        72-HR      74.75-HR
+   (CFS)       (HR)
                           (CFS)
+      47.     12.50
                                         12.          4.           1.          1.
                          (INCHES)     3.728       4.633        4.633       4.633
                           (AC-FT)        6.          8.           8.          8.

                          CUMULATIVE AREA =     0.03 SQ MI

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

                            HYDROGRAPH AT STATION      OS3
                              FOR PLAN 1, RATIO = 0.46

    TOTAL RAINFALL =      3.56, TOTAL LOSS =     2.34, TOTAL EXCESS =     1.22

  PEAK FLOW     TIME                           MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR        72-HR      74.75-HR
+   (CFS)       (HR)
                           (CFS)
```

+	11.	12.50		3.	1.	0.	0.
			(INCHES)	0.984	1.223	1.223	1.223
			(AC-FT)	2.	2.	2.	2.

CUMULATIVE AREA = 0.03 SQ MI

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

HYDROGRAPH AT STATION OS3
FOR PLAN 1, RATIO = 0.60

TOTAL RAINFALL = 4.68, TOTAL LOSS = 2.65, TOTAL EXCESS = 2.03

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	74.75-HR
+	(CFS)	(HR)	(CFS)				
+	20.	12.50		5.	2.	1.	1.
			(INCHES)	1.645	2.032	2.032	2.032
			(AC-FT)	3.	3.	3.	3.

CUMULATIVE AREA = 0.03 SQ MI

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

HYDROGRAPH AT STATION OS3
FOR PLAN 1, RATIO = 0.69

TOTAL RAINFALL = 5.35, TOTAL LOSS = 2.79, TOTAL EXCESS = 2.56

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	74.75-HR
+	(CFS)	(HR)	(CFS)				
+	25.	12.50		7.	2.	1.	1.
			(INCHES)	2.073	2.559	2.559	2.559
			(AC-FT)	3.	4.	4.	4.

CUMULATIVE AREA = 0.03 SQ MI

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

HYDROGRAPH AT STATION OS3
FOR PLAN 1, RATIO = 0.80

TOTAL RAINFALL = 6.24, TOTAL LOSS = 2.95, TOTAL EXCESS = 3.29

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	74.75-HR
+	(CFS)	(HR)	(CFS)				
+	33.	12.50		9.	3.	1.	1.
			(INCHES)	2.658	3.289	3.289	3.289
			(AC-FT)	4.	5.	5.	5.

CUMULATIVE AREA = 0.03 SQ MI

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

HYDROGRAPH AT STATION OS3
FOR PLAN 1, RATIO = 0.91

TOTAL RAINFALL = 7.13, TOTAL LOSS = 3.08, TOTAL EXCESS = 4.05

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	74.75-HR
+	(CFS)	(HR)	(CFS)				
+	41.	12.50		11.	3.	1.	1.
			(INCHES)	3.263	4.047	4.047	4.047
			(AC-FT)	5.	7.	7.	7.

CUMULATIVE AREA = 0.03 SQ MI

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

HYDROGRAPH AT STATION OS3
FOR PLAN 1, RATIO = 1.00

TOTAL RAINFALL = 7.80, TOTAL LOSS = 3.17, TOTAL EXCESS = 4.63

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)					
		(CFS)				
+ 47.	12.50		12.	4.	1.	1.
		(INCHES)	3.728	4.633	4.633	4.633
		(AC-FT)	6.	8.	8.	8.

CUMULATIVE AREA = 0.03 SQ MI

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          **************
          *            *
52 KK     *     SOUT   *
          *            *
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SOUTH SIDE OUTFLOW COMBINED

54 HC HYDROGRAPH COMBINATION
ICOMP 3 NUMBER OF HYDROGRAPHS TO COMBINE

***

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

HYDROGRAPH AT STATION SOUT
FOR PLAN 1, RATIO = 0.46

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)					
		(CFS)				
+ 125.	13.50		65.	21.	7.	7.
		(INCHES)	0.955	1.242	1.242	1.242
		(AC-FT)	32.	42.	42.	42.

CUMULATIVE AREA = 0.64 SQ MI

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

HYDROGRAPH AT STATION SOUT
FOR PLAN 1, RATIO = 0.60

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)					
		(CFS)				
+ 216.	13.25		110.	35.	12.	11.
		(INCHES)	1.607	2.057	2.057	2.057
		(AC-FT)	55.	70.	70.	70.

CUMULATIVE AREA = 0.64 SQ MI

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

HYDROGRAPH AT STATION SOUT
FOR PLAN 1, RATIO = 0.69

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)					
		(CFS)				
+ 275.	13.25		139.	44.	15.	14.
		(INCHES)	2.030	2.585	2.585	2.585
		(AC-FT)	69.	88.	88.	88.

CUMULATIVE AREA = 0.64 SQ MI

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

HYDROGRAPH AT STATION SOUT
FOR PLAN 1, RATIO = 0.80

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	74.75-HR
+	(CFS)	(HR)					
			(CFS)				
+	358.	13.25		179.	57.	19.	18.
			(INCHES)	2.613	3.318	3.318	3.318
			(AC-FT)	89.	113.	113.	113.

CUMULATIVE AREA = 0.64 SQ MI

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

HYDROGRAPH AT STATION SOUT
FOR PLAN 1, RATIO = 0.91

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	74.75-HR
+	(CFS)	(HR)					
			(CFS)				
+	443.	13.25		220.	70.	23.	22.
			(INCHES)	3.212	4.079	4.079	4.079
			(AC-FT)	109.	139.	139.	139.

CUMULATIVE AREA = 0.64 SQ MI

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

HYDROGRAPH AT STATION SOUT
FOR PLAN 1, RATIO = 1.00

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	74.75-HR
+	(CFS)	(HR)					
			(CFS)				
+	508.	13.25		252.	80.	27.	26.
			(INCHES)	3.673	4.667	4.667	4.667
			(AC-FT)	125.	159.	159.	159.

CUMULATIVE AREA = 0.64 SQ MI

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      **************
      *            *
55 KK *   ANGEL    *
      *            *
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ADDITIONAL FLOW FROM ANGEL ACRES

SUBBASIN RUNOFF DATA

57 BA SUBBASIN CHARACTERISTICS
TAREA 0.05 SUBBASIN AREA

PRECIPITATION DATA

10 PB STORM 7.80 BASIN TOTAL PRECIPITATION

11 PI INCREMENTAL PRECIPITATION PATTERN

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.01
0.01	0.01	0.02	0.02	0.02	0.03	0.01	0.01	0.01	0.01
0.02	0.02	0.01	0.01	0.01	0.01	0.10	0.28	0.04	0.03
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	0.00	0.00	0.00	0.00	0.00	0.00	0.00

```
              0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
              0.00     0.00     0.00     0.00     0.00     0.00

  58 LS          SCS LOSS RATE
                     STRTL          0.63  INITIAL ABSTRACTION
                     CRVNBR        76.00  CURVE NUMBER
                     RTIMP         20.00  PERCENT IMPERVIOUS AREA

  59 UD          SCS DIMENSIONLESS UNITGRAPH
                   . TLAG           0.15  LAG

                                              ***

                                            UNIT HYDROGRAPH
                                         5 END-OF-PERIOD ORDINATES
          83.       32.        7.        2.        0.

   TOTAL RAINFALL =    7.80, TOTAL LOSS =    2.26, TOTAL EXCESS =    5.54

  PEAK FLOW     TIME                         MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR       72-HR      74.75-HR
+   (CFS)       (HR)
                          (CFS)
+    164.      12.00                   22.          7.          2.          2.
                       (INCHES)      4.284       5.536       5.541       5.541
                        (AC-FT)        11.         14.         14.         14.

                        CUMULATIVE AREA =     0.05 SQ MI

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

                       HYDROGRAPH AT STATION     ANGEL
                        FOR PLAN 1, RATIO = 0.46

   TOTAL RAINFALL =    3.56, TOTAL LOSS =    1.72, TOTAL EXCESS =    1.84

  PEAK FLOW     TIME                         MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR       72-HR      74.75-HR
+   (CFS)       (HR)
                          (CFS)
+     53.      12.00                    7.          2.          1.          1.
                       (INCHES)      1.400       1.841       1.843       1.843
                        (AC-FT)         4.          5.          5.          5.

                        CUMULATIVE AREA =     0.05 SQ MI

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

                       HYDROGRAPH AT STATION     ANGEL
                        FOR PLAN 1, RATIO = 0.60

   TOTAL RAINFALL =    4.68, TOTAL LOSS =    1.92, TOTAL EXCESS =    2.76

  PEAK FLOW     TIME                         MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR       72-HR      74.75-HR
+   (CFS)       (HR)
                          (CFS)
+     81.      12.00                   11.          4.          1.          1.
                       (INCHES)      2.121       2.753       2.755       2.755
                        (AC-FT)         5.          7.          7.          7.

                        CUMULATIVE AREA =     0.05 SQ MI

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

                       HYDROGRAPH AT STATION     ANGEL
                        FOR PLAN 1, RATIO = 0.69

   TOTAL RAINFALL =    5.35, TOTAL LOSS =    2.02, TOTAL EXCESS =    3.33

  PEAK FLOW     TIME                         MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR       72-HR      74.75-HR
+   (CFS)       (HR)
                          (CFS)
+     98.      12.00                   13.          4.          1.          1.
                       (INCHES)      2.572       3.329       3.332       3.332
                        (AC-FT)         7.          9.          9.          9.
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                    CUMULATIVE AREA =    0.05 SQ MI

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

                     HYDROGRAPH AT STATION    ANGEL
                      FOR PLAN 1, RATIO = 0.80

        TOTAL RAINFALL =    6.24, TOTAL LOSS =    2.12, TOTAL EXCESS =    4.12

      PEAK FLOW      TIME                         MAXIMUM AVERAGE FLOW
                                          6-HR        24-HR       72-HR      74.75-HR
   +   (CFS)         (HR)
                                (CFS)
   +     122.       12.00                 16.          5.          2.          2.
                             (INCHES)    3.185       4.115       4.118       4.118
                              (AC-FT)      8.         11.         11.         11.

                    CUMULATIVE AREA =    0.05 SQ MI

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

                     HYDROGRAPH AT STATION    ANGEL
                      FOR PLAN 1, RATIO = 0.91

        TOTAL RAINFALL =    7.13, TOTAL LOSS =    2.21, TOTAL EXCESS =    4.92

      PEAK FLOW      TIME                         MAXIMUM AVERAGE FLOW
                                          6-HR        24-HR       72-HR      74.75-HR
   +   (CFS)         (HR)
                                (CFS)
   +     146.       12.00                 20.          6.          2.          2.
                             (INCHES)    3.809       4.919       4.924       4.924
                              (AC-FT)     10.         13.         13.         13.

                    CUMULATIVE AREA =    0.05 SQ MI

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

                     HYDROGRAPH AT STATION    ANGEL
                      FOR PLAN 1, RATIO = 1.00

        TOTAL RAINFALL =    7.80, TOTAL LOSS =    2.26, TOTAL EXCESS =    5.54

      PEAK FLOW      TIME                         MAXIMUM AVERAGE FLOW
                                          6-HR        24-HR       72-HR      74.75-HR
   +   (CFS)         (HR)
                                (CFS)
   +     164.       12.00                 22.          7.          2.          2.
                             (INCHES)    4.284       5.536       5.541       5.541
                              (AC-FT)     11.         14.         14.         14.

                    CUMULATIVE AREA =    0.05 SQ MI


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

           **************
           *            *
  60 KK    *     47TH   *
           *            *
           **************

                    APPROXIMATE FLOW TO 2-3 FT RCPS AT 47TH ST

  62 HC        HYDROGRAPH COMBINATION
                  ICOMP              3  NUMBER OF HYDROGRAPHS TO COMBINE

                                                          ***

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

                     HYDROGRAPH AT STATION    47TH
                      FOR PLAN 1, RATIO = 0.46
```

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+	(CFS)	(HR)				
			(CFS)			
+	222.	13.00	107.	35.	12.	11.
			(INCHES) 1.058	1.364	1.374	1.374
			(AC-FT) 53.	69.	69.	69.

CUMULATIVE AREA = 0.94 SQ MI

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

HYDROGRAPH AT STATION 47TH
FOR PLAN 1, RATIO = 0.60

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+	(CFS)	(HR)				
			(CFS)			
+	368.	13.00	176.	56.	19.	18.
			(INCHES) 1.731	2.206	2.217	2.218
			(AC-FT) 87.	111.	112.	112.

CUMULATIVE AREA = 0.94 SQ MI

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

HYDROGRAPH AT STATION 47TH
FOR PLAN 1, RATIO = 0.69

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+	(CFS)	(HR)				
			(CFS)			
+	461.	13.00	220.	70.	23.	23.
			(INCHES) 2.161	2.749	2.760	2.761
			(AC-FT) 109.	138.	139.	139.

CUMULATIVE AREA = 0.94 SQ MI

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

HYDROGRAPH AT STATION 47TH
FOR PLAN 1, RATIO = 0.80

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+	(CFS)	(HR)				
			(CFS)			
+	590.	13.00	280.	89.	30.	29.
			(INCHES) 2.753	3.498	3.510	3.510
			(AC-FT) 139.	176.	177.	177.

CUMULATIVE AREA = 0.94 SQ MI

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

HYDROGRAPH AT STATION 47TH
FOR PLAN 1, RATIO = 0.91

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+	(CFS)	(HR)				
			(CFS)			
+	717.	13.00	341.	108.	36.	35.
			(INCHES) 3.360	4.272	4.284	4.285
			(AC-FT) 169.	215.	216.	216.

CUMULATIVE AREA = 0.94 SQ MI

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

HYDROGRAPH AT STATION 47TH
FOR PLAN 1, RATIO = 1.00

```
 PEAK FLOW     TIME                       MAXIMUM AVERAGE FLOW
                                  6-HR       24-HR      72-HR      74.75-HR
+  (CFS)       (HR)
                         (CFS)
+    812.      13.00
                                  388.       124.        41.         40.
                        (INCHES)  3.824      4.868      4.881       4.882
                        (AC-FT)   193.       245.       246.        246.

                       CUMULATIVE AREA =    0.94 SQ MI


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

              **************
              *            *
  63 KK       *     OS4    *
              *            *
              **************
                        ONSITE WATERSHED #4

                SUBBASIN RUNOFF DATA

  65 BA          SUBBASIN CHARACTERISTICS
                    TAREA          0.02   SUBBASIN AREA

                 PRECIPITATION DATA

  10 PB             STORM          7.80   BASIN TOTAL PRECIPITATION

  11 PI           INCREMENTAL PRECIPITATION PATTERN
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      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      0.00      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      0.03      0.10      0.28      0.04      0.03
                    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      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00

  66 LS          SCS LOSS RATE
                    STRTL          0.74   INITIAL ABSTRACTION
                   CRVNBR         73.00   CURVE NUMBER
                    RTIMP          0.00   PERCENT IMPERVIOUS AREA

  67 UD          SCS DIMENSIONLESS UNITGRAPH
                    TLAG           0.62   LAG

                                              ***

                                       UNIT HYDROGRAPH
                                   14 END-OF-PERIOD ORDINATES
               3.        10.       13.       11.        6.        4.        2.        1.        1.        0.
               0.         0.        0.        0.

   TOTAL RAINFALL =     7.80, TOTAL LOSS =     3.17, TOTAL EXCESS =     4.63

 PEAK FLOW     TIME                       MAXIMUM AVERAGE FLOW
                                  6-HR       24-HR      72-HR      74.75-HR
+  (CFS)       (HR)
                         (CFS)
+     29.      12.50
                                    8.          2.         1.          1.
                        (INCHES)  3.726      4.633      4.633       4.633
                        (AC-FT)     4.          5.         5.          5.

                       CUMULATIVE AREA =    0.02 SQ MI


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

                       HYDROGRAPH AT STATION      OS4
                         FOR PLAN 1, RATIO = 0.46

   TOTAL RAINFALL =     3.56, TOTAL LOSS =     2.34, TOTAL EXCESS =     1.22

 PEAK FLOW     TIME                       MAXIMUM AVERAGE FLOW
```

+	PEAK FLOW (CFS)	TIME (HR)		6-HR	24-HR	72-HR	74.75-HR
			(CFS)				
+	7.	12.50		2.	1.	0.	0.
			(INCHES)	0.983	1.223	1.223	1.223
			(AC-FT)	1.	1.	1.	1.

CUMULATIVE AREA = 0.02 SQ MI

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

HYDROGRAPH AT STATION OS4
FOR PLAN 1, RATIO = 0.60

TOTAL RAINFALL = 4.68, TOTAL LOSS = 2.65, TOTAL EXCESS = 2.03

+	PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	74.75-HR
			(CFS)				
+	12.	12.50		4.	1.	0.	0.
			(INCHES)	1.644	2.032	2.032	2.032
			(AC-FT)	2.	2.	2.	2.

CUMULATIVE AREA = 0.02 SQ MI

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

HYDROGRAPH AT STATION OS4
FOR PLAN 1, RATIO = 0.69

TOTAL RAINFALL = 5.35, TOTAL LOSS = 2.79, TOTAL EXCESS = 2.56

+	PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	74.75-HR
			(CFS)				
+	16.	12.50		4.	1.	0.	0.
			(INCHES)	2.071	2.559	2.559	2.559
			(AC-FT)	2.	3.	3.	3.

CUMULATIVE AREA = 0.02 SQ MI

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

HYDROGRAPH AT STATION OS4
FOR PLAN 1, RATIO = 0.80

TOTAL RAINFALL = 6.24, TOTAL LOSS = 2.95, TOTAL EXCESS = 3.29

+	PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	74.75-HR
			(CFS)				
+	20.	12.50		6.	2.	1.	1.
			(INCHES)	2.657	3.289	3.289	3.289
			(AC-FT)	3.	3.	3.	3.

CUMULATIVE AREA = 0.02 SQ MI

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

HYDROGRAPH AT STATION OS4
FOR PLAN 1, RATIO = 0.91

TOTAL RAINFALL = 7.13, TOTAL LOSS = 3.08, TOTAL EXCESS = 4.05

+	PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	74.75-HR
			(CFS)				
+	25.	12.50		7.	2.	1.	1.
			(INCHES)	3.261	4.047	4.047	4.047
			(AC-FT)	3.	4.	4.	4.

CUMULATIVE AREA = 0.02 SQ MI

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

HYDROGRAPH AT STATION OS4
FOR PLAN 1, RATIO = 1.00

TOTAL RAINFALL = 7.80, TOTAL LOSS = 3.17, TOTAL EXCESS = 4.63

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+	(CFS)	(HR)				
			(CFS)			
+	29.	12.50	8.	2.	1.	1.
			(INCHES) 3.726	4.633	4.633	4.633
			(AC-FT) 4.	5.	5.	5.

CUMULATIVE AREA = 0.02 SQ MI

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 PRECIPITATION RATIO 1 0.46	RATIO 2 0.60	RATIO 3 0.69	RATIO 4 0.80	RATIO 5 0.91	RATIO 6 1.00
HYDROGRAPH AT										
+	10	0.23	1	FLOW	101.	164.	204.	259.	314.	356.
				TIME	12.50	12.50	12.50	12.50	12.50	12.50
ROUTED TO										
+	POND	0.23	1	FLOW	97.	142.	173.	216.	255.	281.
				TIME	12.75	13.00	13.00	13.00	13.00	13.00
			** PEAK STAGES IN FEET **							
			1	STAGE	89.76	90.30	90.71	91.26	91.88	92.39
				TIME	12.75	13.00	13.00	13.00	13.00	13.00
HYDROGRAPH AT										
+	OS1	0.03	1	FLOW	19.	29.	36.	44.	53.	60.
				TIME	12.25	12.25	12.25	12.25	12.25	12.25
2 COMBINED AT										
+	SWSE	0.26	1	FLOW	109.	159.	192.	239.	280.	308.
				TIME	12.75	12.75	12.75	12.75	12.75	12.75
HYDROGRAPH AT										
+	OFF2	0.56	1	FLOW	115.	199.	253.	329.	406.	466.
				TIME	13.50	13.50	13.50	13.50	13.50	13.50
HYDROGRAPH AT										
+	OS2	0.05	1	FLOW	24.	40.	50.	63.	77.	87.
				TIME	12.25	12.25	12.25	12.25	12.25	12.25
HYDROGRAPH AT										
+	OS3	0.03	1	FLOW	11.	20.	25.	33.	41.	47.
				TIME	12.50	12.50	12.50	12.50	12.50	12.50
3 COMBINED AT										
+	SOUT	0.64	1	FLOW	125.	216.	275.	358.	443.	508.
				TIME	13.50	13.25	13.25	13.25	13.25	13.25
HYDROGRAPH AT										
+	ANGEL	0.05	1	FLOW	53.	81.	98.	122.	146.	164.
				TIME	12.00	12.00	12.00	12.00	12.00	12.00
3 COMBINED AT										
+	47TH	0.94	1	FLOW	222.	368.	461.	590.	717.	812.
				TIME	13.00	13.00	13.00	13.00	13.00	13.00
HYDROGRAPH AT										
+	OS4	0.02	1	FLOW	7.	12.	16.	20.	25.	29.
				TIME	12.50	12.50	12.50	12.50	12.50	12.50

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

```
*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              MAY   1991               *
*           VERSION 4.0.1E              *
*     Lahey F77L-EM/32 version 5.01     *
*       Dodson & Associates, Inc.       *
*  RUN DATE  02/17/99  TIME  14:10:39   *
*                                       *
*****************************************
```


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

HEC-1 INPUT


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

  1       ID     THE LEGAGY POST DEVELOPMENT FILENAME LEGPOST.DAT TKM 6/12/98
  2       ID          SCS 24 HR 15 MIN DISTRIBUTION.
  3       ID        2, 5, 10, 25, 50 & 100 YEAR STORMS
  4       IT      15                    300
  5       IO       3       0
  6       JR    PREC     .457     .600     .686     .800     .914       1
          *DIAGRAM

  7       KK       10
  8       KM      RUNOFF TO COTTONWOOD POND WEST OF SITE
  9       BA    0.231
 10       PB    7.80
          *    STANDARD SCS 24-HOUR TYPE II DIMENSIONLESS 15 MIN CUMULATIVE DISTRIBUTION
 11       PC       0    .002    .005    .008    .011    .014    .017    .020    .023    .026
 12       PC    .029    .032    .035    .038    .041    .044    .048    .052    .056    .060
 13       PC    .064    .068    .072    .076    .080    .085    .090    .095    .100    .105
 14       PC    .110    .115    .120    .126    .133    .140    .147    .155    .163    .172
 15       PC    .181    .191    .203    .218    .236    .257    .283    .387    .663    .707
 16       PC    .735    .758    .776    .791    .804    .815    .825    .834    .842    .849
 17       PC    .856    .863    .869    .875    .881    .887    .893    .898    .903    .908
 18       PC    .913    .918    .922    .926    .930    .934    .938    .942    .946    .950
 19       PC    .953    .956    .959    .962    .965    .968    .971    .974    .977    .980
 20       PC    .983    .986    .989    .992    .995    .998   1.00
 21       LS       0   78.0       0
 22       UD    0.68

 23       KK    POND
 24       RS       1    ELEV    89.5
 25       SA    2.28    2.35    2.49    2.64    2.78
 26       SE    89.5      90      91      92      93
 27       SQ     0.1      76     112     148     184     220     256     292     328     364
 28       SE    89.5   89.61   89.88   90.39   90.86   91.31   91.90   92.60   93.24   93.53

 29       KK     OS1
 30       KM     ONSITE WATERSHED #1
 31       BA   .0280
 32       LS       0      85       0
 33       UD    0.26

 34       KK    SWSE
 35       KM     COMBINED FLOW TO SW QUARTER OF SE QUARTER
 36       HC       2

 37       KK    OFF2
 38       KM     OFFSITE FLOW TO NORTH PERIMETER OF PARCEL
 39       BA  0.5594
 40       LS       0      73       0
 41       UD    1.44

 42       KK     OS2
 43       KM     ONSITE WATERSHED #2
 44       BA   .0473
 45       LS       0      80       0
 46       UD    0.27
```

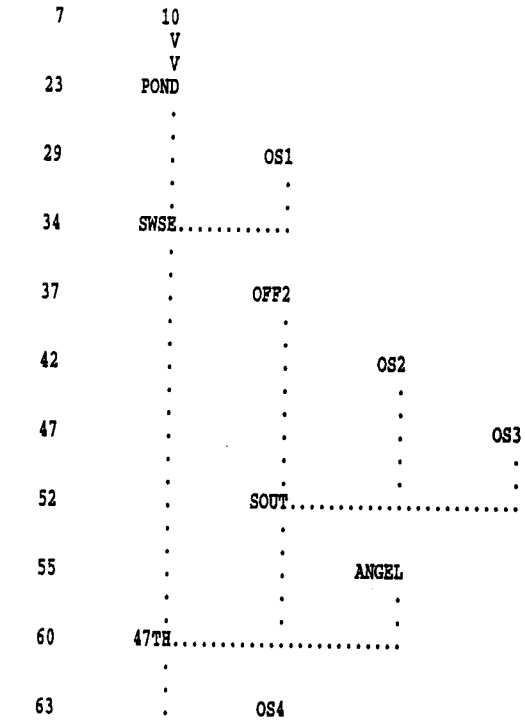
```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  47      KK     OS3
  48      KM     ONSITE WATERSHED #3
  49      BA   .0308
  50      LS      0      75       0
  51      UD    0.33

  52      KK    SOUT
  53      KM    SOUTH SIDE OUTFLOW COMBINED
  54      HC       3

  55      KK   ANGEL
  56      KM    RUNOFF FROM ANGEL ACRES TO DRAINAGE DITCH
  57      BA   0.048
  58      LS       0      81      20
  59      UD    0.15

  60      KK    47TH
  61      KM     APPROXIMATE FLOW TO 2-3 FT RCPS AT 47TH ST
  62      HC       3

  63      KK     OS4
  64      KM     ONSITE WATERSHED #4
  65      BA   .0198
  66      LS       0      75       0
  67      UD    0.35
  68      ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE NO.

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

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



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
**********************************************
*                                            *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)        *
*              MAY   1991                    *
*            VERSION 4.0.1E                  *
*     Lahey F77L-EM/32 version 5.01          *
*       Dodson & Associates, Inc.            *
*  RUN DATE  02/17/99  TIME  14:10:39        *
**********************************************
```

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

THE LEGAGY POST DEVELOPMENT FILENAME LEGPOST.DAT TKM 6/12/98
SCS 24 HR 15 MIN DISTRIBUTION.
2, 5, 10, 25, 50 & 100 YEAR STORMS

```
  5 IO        OUTPUT CONTROL VARIABLES
                IPRNT          3  PRINT CONTROL
                IPLOT          0  PLOT CONTROL
                QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT        HYDROGRAPH TIME DATA
                NMIN          15  MINUTES IN COMPUTATION INTERVAL
                IDATE      1   0  STARTING DATE
                ITIME        0000  STARTING TIME
                  NQ          300  NUMBER OF HYDROGRAPH ORDINATES
              NDDATE       4   0  ENDING DATE
              NDTIME         0245  ENDING TIME
              ICENT           19  CENTURY MARK

            COMPUTATION INTERVAL    0.25 HOURS
               TOTAL TIME BASE   74.75 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 PRECIPITATION
             0.46      0.60      0.69      0.80      0.91      1.00
```

*** ***

```
          **************
          *            *
  7 KK    *       10   *
          *            *
          **************
```

RUNOFF TO COTTONWOOD POND WEST OF SITE

```
        SUBBASIN RUNOFF DATA

  9 BA      SUBBASIN CHARACTERISTICS
              TAREA        0.23  SUBBASIN AREA

            PRECIPITATION DATA

 10 PB          STORM        7.80  BASIN TOTAL PRECIPITATION

 11 PI       INCREMENTAL PRECIPITATION PATTERN
               0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
               0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    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    0.00    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    0.03    0.10    0.28    0.04    0.03
               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    0.00    0.00    0.00    0.00
```

```
               0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
               0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
               0.00      0.00      0.00      0.00      0.00      0.00

   21 LS         SCS LOSS RATE
                   STRTL        0.56  INITIAL ABSTRACTION
                  CRVNBR       78.00  CURVE NUMBER
                   RTIMP        0.00  PERCENT IMPERVIOUS AREA

   22 UD         SCS DIMENSIONLESS UNITGRAPH
                    TLAG        0.68  LAG

                                             ***

                                        UNIT HYDROGRAPH
                                   16 END-OF-PERIOD ORDINATES
          28.       96.     138.     125.      86.      49.      30.      18.      11.       7.
           4.        2.       1.       1.       0.       0.

     TOTAL RAINFALL =    7.80, TOTAL LOSS =    2.59, TOTAL EXCESS =    5.21

   PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR      74.75-HR
+   (CFS)        (HR)
                          (CFS)
+     356.      12.50                 103.         32.         11.         10.
                        (INCHES)     4.151       5.206       5.206       5.206
                         (AC-FT)       51.         64.         64.         64.

                       CUMULATIVE AREA =     0.23 SQ MI

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

                       HYDROGRAPH AT STATION       10
                         FOR PLAN 1, RATIO = 0.46

     TOTAL RAINFALL =    3.56, TOTAL LOSS =    2.02, TOTAL EXCESS =    1.55

   PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR      74.75-HR
+   (CFS)        (HR)
                          (CFS)
+     101.      12.50                  31.         10.          3.          3.
                        (INCHES)     1.250       1.547       1.547       1.547
                         (AC-FT)       15.         19.         19.         19.

                       CUMULATIVE AREA =     0.23 SQ MI

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

                       HYDROGRAPH AT STATION       10
                         FOR PLAN 1, RATIO = 0.60

     TOTAL RAINFALL =    4.68, TOTAL LOSS =    2.24, TOTAL EXCESS =    2.44

   PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR      74.75-HR
+   (CFS)        (HR)
                          (CFS)
+     164.      12.50                  49.         15.          5.          5.
                        (INCHES)     1.972       2.442       2.442       2.442
                         (AC-FT)       24.         30.         30.         30.

                       CUMULATIVE AREA =     0.23 SQ MI

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

                       HYDROGRAPH AT STATION       10
                         FOR PLAN 1, RATIO = 0.69

     TOTAL RAINFALL =    5.35, TOTAL LOSS =    2.34, TOTAL EXCESS =    3.01

   PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR      74.75-HR
+   (CFS)        (HR)
                          (CFS)
+     204.      12.50                  60.         19.          6.          6.
```

```
                   (INCHES)    2.426      3.012      3.012      3.012
                   (AC-FT)       30.        37.        37.        37.

                   CUMULATIVE AREA =    0.23 SQ MI

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

                    HYDROGRAPH AT STATION       10
                      FOR PLAN 1, RATIO = 0.80

  TOTAL RAINFALL =     6.24, TOTAL LOSS =    2.45, TOTAL EXCESS =    3.79

   PEAK FLOW     TIME                    MAXIMUM AVERAGE FLOW
                                  6-HR      24-HR      72-HR     74.75-HR
 +   (CFS)       (HR)
                         (CFS)
 +     259.     12.50               76.       24.         8.         8.
                        (INCHES)  3.043     3.792      3.792      3.792
                        (AC-FT)     37.       47.        47.        47.

                   CUMULATIVE AREA =    0.23 SQ MI

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

                    HYDROGRAPH AT STATION       10
                      FOR PLAN 1, RATIO = 0.91

  TOTAL RAINFALL =     7.13, TOTAL LOSS =    2.54, TOTAL EXCESS =    4.59

   PEAK FLOW     TIME                    MAXIMUM AVERAGE FLOW
                                  6-HR      24-HR      72-HR     74.75-HR
 +   (CFS)       (HR)
                         (CFS)
 +     314.     12.50               91.       29.        10.         9.
                        (INCHES)  3.672     4.592      4.592      4.592
                        (AC-FT)     45.       57.        57.        57.

                   CUMULATIVE AREA =    0.23 SQ MI

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

                    HYDROGRAPH AT STATION       10
                      FOR PLAN 1, RATIO = 1.00

  TOTAL RAINFALL =     7.80, TOTAL LOSS =    2.59, TOTAL EXCESS =    5.21

   PEAK FLOW     TIME                    MAXIMUM AVERAGE FLOW
                                  6-HR      24-HR      72-HR     74.75-HR
 +   (CFS)       (HR)
                         (CFS)
 +     356.     12.50              103.       32.        11.        10.
                        (INCHES)  4.151     5.206      5.206      5.206
                        (AC-FT)     51.       64.        64.        64.

                   CUMULATIVE AREA =    0.23 SQ MI


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

              **************
              *            *
 23 KK        *    POND    *
              *            *
              **************

               HYDROGRAPH ROUTING DATA

 24 RS           STORAGE ROUTING
                      NSTPS          1  NUMBER OF SUBREACHES
                       ITYP       ELEV  TYPE OF INITIAL CONDITION
                     RSVRIC      89.50  INITIAL CONDITION
                          X       0.00  WORKING R AND D COEFFICIENT

 25 SA                 AREA        2.3        2.3        2.5        2.6        2.8
```

26 SE	ELEVATION	89.50	90.00	91.00	92.00	93.00					
27 SQ	DISCHARGE	0.	76.	112.	148.	184.	220.	256.	292.	328.	364.
28 SE	ELEVATION	89.50	89.61	89.88	90.39	90.86	91.31	91.90	92.60	93.24	93.53

***

COMPUTED STORAGE-ELEVATION DATA

STORAGE	0.00	1.16	3.58	6.14	8.85
ELEVATION	89.50	90.00	91.00	92.00	93.00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	0.25	0.88	1.16	2.08	3.23	3.58	4.36	5.88	6.14
OUTFLOW	0.10	76.00	112.00	120.47	148.00	184.00	195.20	220.00	256.00	261.14
ELEVATION	89.50	89.61	89.88	90.00	90.39	90.86	91.00	91.31	91.90	92.00

STORAGE	7.75	8.85	9.52	10.34
OUTFLOW	292.00	314.50	328.00	364.00
ELEVATION	92.60	93.00	93.24	93.53

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 0. TO 76.
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.)

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

HYDROGRAPH AT STATION POND
FOR PLAN 1, RATIO = 0.46

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)				
		(CFS)			
+ 97.	12.75	31.	10.	3.	3.
		(INCHES) 1.250	1.551	1.583	1.585
		(AC-FT) 15.	19.	20.	20.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	74.75-HR
+ (AC-FT)	(HR)				
1.	12.75	0.	0.	0.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	74.75-HR
+ (FEET)	(HR)				
89.76	12.75	89.56	89.52	89.51	89.51

CUMULATIVE AREA = 0.23 SQ MI

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

HYDROGRAPH AT STATION POND
FOR PLAN 1, RATIO = 0.60

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)				
		(CFS)			
+ 142.	13.00	49.	15.	5.	5.
		(INCHES) 1.972	2.446	2.478	2.480
		(AC-FT) 24.	30.	31.	31.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	74.75-HR
+ (AC-FT)	(HR)				
2.	12.75	0.	0.	0.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	74.75-HR
+ (FEET)	(HR)				
90.30	13.00	89.66	89.54	89.51	89.51

CUMULATIVE AREA = 0.23 SQ MI

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

HYDROGRAPH AT STATION POND
FOR PLAN 1, RATIO = 0.69

PEAK FLOW + (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	74.75-HR
		(CFS)				
+ 173.	13.00		60.	19.	6.	6.
		(INCHES)	2.426	3.015	3.047	3.049
		(AC-FT)	30.	37.	38.	38.

PEAK STORAGE + (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	74.75-HR
3.	13.00	1.	0.	0.	0.

PEAK STAGE + (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	74.75-HR
90.71	13.00	89.75	89.57	89.52	89.52

CUMULATIVE AREA = 0.23 SQ MI

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

HYDROGRAPH AT STATION POND
FOR PLAN 1, RATIO = 0.80

PEAK FLOW + (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	74.75-HR
		(CFS)				
+ 216.	13.00		76.	24.	8.	8.
		(INCHES)	3.043	3.794	3.826	3.828
		(AC-FT)	37.	47.	47.	47.

PEAK STORAGE + (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	74.75-HR
4.	13.00	1.	0.	0.	0.

PEAK STAGE + (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	74.75-HR
91.26	13.00	89.89	89.60	89.53	89.53

CUMULATIVE AREA = 0.23 SQ MI

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

HYDROGRAPH AT STATION POND
FOR PLAN 1, RATIO = 0.91

PEAK FLOW + (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	74.75-HR
		(CFS)				
+ 255.	13.00		91.	29.	10.	9.
		(INCHES)	3.672	4.594	4.627	4.628
		(AC-FT)	45.	57.	57.	57.

PEAK STORAGE + (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	74.75-HR
6.	13.00	1.	0.	0.	0.

PEAK STAGE + (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	74.75-HR
91.88	13.00	90.05	89.65	89.55	89.55

CUMULATIVE AREA = 0.23 SQ MI

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

                    HYDROGRAPH AT STATION     POND
                     FOR PLAN 1, RATIO = 1.00

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR       72-HR     74.75-HR
+   (CFS)       (HR)
                           (CFS)
+     281.     13.00                 103.         32.         11.         10.
                         (INCHES)   4.150       5.208       5.240       5.242
                          (AC-FT)     51.         64.         65.         65.

  PEAK STORAGE  TIME                          MAXIMUM AVERAGE STORAGE
                                     6-HR        24-HR       72-HR     74.75-HR
+  (AC-FT)      (HR)
        7.     13.00                   2.          0.          0.          0.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                     6-HR        24-HR       72-HR     74.75-HR
+   (FEET)      (HR)
      92.39    13.00                90.19       89.68       89.56       89.56

                         CUMULATIVE AREA =     0.23 SQ MI


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

              **************
              *            *
  29 KK       *     OS1    *
              *            *
              **************
                              ONSITE WATERSHED #1

                SUBBASIN RUNOFF DATA

  31 BA           SUBBASIN CHARACTERISTICS
                        TAREA         0.03  SUBBASIN AREA

                  PRECIPITATION DATA

  10 PB                 STORM         7.80  BASIN TOTAL PRECIPITATION

  11 PI             INCREMENTAL PRECIPITATION PATTERN
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      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      0.00      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      0.03      0.10      0.28      0.04      0.03
                      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      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00

  32 LS           SCS LOSS RATE
                        STRTL         0.35  INITIAL ABSTRACTION
                       CRVNBR        85.00  CURVE NUMBER
                        RTIMP         0.00  PERCENT IMPERVIOUS AREA

  33 UD           SCS DIMENSIONLESS UNITGRAPH
                        TLAG          0.26  LAG

                                                ***

                                            UNIT HYDROGRAPH
                                       7 END-OF-PERIOD ORDINATES
                26.       30.       11.        4.        1.        0.        0.

     TOTAL RAINFALL =     7.80, TOTAL LOSS =    1.78, TOTAL EXCESS =     6.02

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR       72-HR     74.75-HR
+   (CFS)       (HR)
                           (CFS)
+      74.     12.25                  14.          5.          2.          1.
```

(INCHES)	4.730	6.020	6.020	6.020
(AC-FT)	7.	9.	9.	9.

CUMULATIVE AREA = 0.03 SQ MI

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

HYDROGRAPH AT STATION OS1
FOR PLAN 1, RATIO = 0.46

TOTAL RAINFALL = 3.56, TOTAL LOSS = 1.49, TOTAL EXCESS = 2.07

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)				
		(CFS)			
+ 26.	12.25	5.	2.	1.	1.
		(INCHES) 1.674	2.073	2.073	2.073
		(AC-FT) 3.	3.	3.	3.

CUMULATIVE AREA = 0.03 SQ MI

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

HYDROGRAPH AT STATION OS1
FOR PLAN 1, RATIO = 0.60

TOTAL RAINFALL = 4.68, TOTAL LOSS = 1.61, TOTAL EXCESS = 3.07

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)				
		(CFS)			
+ 39.	12.25	7.	2.	1.	1.
		(INCHES) 2.463	3.074	3.074	3.074
		(AC-FT) 4.	5.	5.	5.

CUMULATIVE AREA = 0.03 SQ MI

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

HYDROGRAPH AT STATION OS1
FOR PLAN 1, RATIO = 0.69

TOTAL RAINFALL = 5.35, TOTAL LOSS = 1.66, TOTAL EXCESS = 3.69

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)				
		(CFS)			
+ 46.	12.25	9.	3.	1.	1.
		(INCHES) 2.946	3.694	3.694	3.694
		(AC-FT) 4.	6.	6.	6.

CUMULATIVE AREA = 0.03 SQ MI

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

HYDROGRAPH AT STATION OS1
FOR PLAN 1, RATIO = 0.80

TOTAL RAINFALL = 6.24, TOTAL LOSS = 1.71, TOTAL EXCESS = 4.53

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)				
		(CFS)			
+ 56.	12.25	11.	3.	1.	1.
		(INCHES) 3.591	4.529	4.529	4.529
		(AC-FT) 5.	7.	7.	7.

CUMULATIVE AREA = 0.03 SQ MI

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

HYDROGRAPH AT STATION OS1
FOR PLAN 1, RATIO = 0.91

TOTAL RAINFALL = 7.13, TOTAL LOSS = 1.75, TOTAL EXCESS = 5.38

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)					
		(CFS)				
+ 66.	12.25		13.	4.	1.	1.
		(INCHES)	4.239	5.376	5.376	5.376
		(AC-FT)	6.	8.	8.	8.

CUMULATIVE AREA = 0.03 SQ MI

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

HYDROGRAPH AT STATION OS1
FOR PLAN 1, RATIO = 1.00

TOTAL RAINFALL = 7.80, TOTAL LOSS = 1.78, TOTAL EXCESS = 6.02

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)					
		(CFS)				
+ 74.	12.25		14.	5.	2.	1.
		(INCHES)	4.730	6.020	6.020	6.020
		(AC-FT)	7.	9.	9.	9.

CUMULATIVE AREA = 0.03 SQ MI

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              **************
              *            *
  34 KK       *    SWSE    *
              *            *
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COMBINED FLOW TO SW QUARTER OF SE QUARTER

36 HC HYDROGRAPH COMBINATION
ICOMP 2 NUMBER OF HYDROGRAPHS TO COMBINE

***

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

HYDROGRAPH AT STATION SWSE
FOR PLAN 1, RATIO = 0.46

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)					
		(CFS)				
+ 105.	12.75		36.	11.	4.	4.
		(INCHES)	1.291	1.608	1.636	1.638
		(AC-FT)	18.	22.	23.	23.

CUMULATIVE AREA = 0.26 SQ MI

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

HYDROGRAPH AT STATION SWSE
FOR PLAN 1, RATIO = 0.60

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)					
		(CFS)				
+ 154.	12.75		56.	18.	6.	6.
		(INCHES)	2.020	2.514	2.542	2.544
		(AC-FT)	28.	35.	35.	35.

CUMULATIVE AREA = 0.26 SQ MI

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

HYDROGRAPH AT STATION SWSE
FOR PLAN 1, RATIO = 0.69

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	74.75-HR
+	(CFS)	(HR)					
			(CFS)				
+	185.	12.75		69.	22.	7.	7.
			(INCHES)	2.476	3.088	3.117	3.119
			(AC-FT)	34.	43.	43.	43.

CUMULATIVE AREA = 0.26 SQ MI

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

HYDROGRAPH AT STATION SWSE
FOR PLAN 1, RATIO = 0.80

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	74.75-HR
+	(CFS)	(HR)					
			(CFS)				
+	230.	12.75		86.	27.	9.	9.
			(INCHES)	3.096	3.874	3.902	3.904
			(AC-FT)	43.	54.	54.	54.

CUMULATIVE AREA = 0.26 SQ MI

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

HYDROGRAPH AT STATION SWSE
FOR PLAN 1, RATIO = 0.91

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	74.75-HR
+	(CFS)	(HR)					
			(CFS)				
+	269.	12.75		104.	33.	11.	11.
			(INCHES)	3.727	4.679	4.708	4.709
			(AC-FT)	51.	65.	65.	65.

CUMULATIVE AREA = 0.26 SQ MI

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

HYDROGRAPH AT STATION SWSE
FOR PLAN 1, RATIO = 1.00

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	74.75-HR
+	(CFS)	(HR)					
			(CFS)				
+	296.	13.00		117.	37.	12.	12.
			(INCHES)	4.208	5.296	5.325	5.326
			(AC-FT)	58.	73.	74.	74.

CUMULATIVE AREA = 0.26 SQ MI

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              *            *
37 KK         *    OFF2    *
              *            *
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OFFSITE FLOW TO NORTH PERIMETER OF PARCEL

SUBBASIN RUNOFF DATA

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 39 BA          SUBBASIN CHARACTERISTICS
                     TAREA       0.56  SUBBASIN AREA

                PRECIPITATION DATA

 10 PB               STORM       7.80  BASIN TOTAL PRECIPITATION

 11 PI           INCREMENTAL PRECIPITATION PATTERN
                   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00
                   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   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   0.00   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   0.03   0.10   0.28   0.04   0.03
                   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   0.00   0.00   0.00   0.00
                   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00
                   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00   0.00
                   0.00   0.00   0.00   0.00   0.00   0.00

 40 LS          SCS LOSS RATE
                     STRTL       0.74  INITIAL ABSTRACTION
                    CRVNBR      73.00  CURVE NUMBER
                     RTIMP       0.00  PERCENT IMPERVIOUS AREA

 41 UD          SCS DIMENSIONLESS UNITGRAPH
                     TLAG       1.44  LAG

                                                  ***

                                                UNIT HYDROGRAPH
                                          31 END-OF-PERIOD ORDINATES
                  12.     37.     75.    125.    160.    172.    169.    151.    128.     97.
                  73.     56.     44.     34.     26.     20.     15.     12.      9.      7.
                   5.      4.      3.      2.      2.      2.      1.      1.      1.      0.
                   0.

    TOTAL RAINFALL =   7.80, TOTAL LOSS =   3.17, TOTAL EXCESS =   4.63

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                    6-HR       24-HR       72-HR     74.75-HR
+   (CFS)       (HR)
                          (CFS)
+    466.     13.50                219.        70.         23.         22.
                        (INCHES)  3.647      4.633       4.633       4.633
                        (AC-FT)    109.       138.        138.        138.

                        CUMULATIVE AREA =   0.56 SQ MI


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

                      HYDROGRAPH AT STATION     OFF2
                        FOR PLAN 1, RATIO = 0.46

    TOTAL RAINFALL =   3.56, TOTAL LOSS =   2.34, TOTAL EXCESS =   1.22

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                    6-HR       24-HR       72-HR     74.75-HR
+   (CFS)       (HR)
                          (CFS)
+    115.     13.50                 57.        18.          6.          6.
                        (INCHES)  0.940      1.223       1.223       1.223
                        (AC-FT)     28.        36.         36.         36.

                        CUMULATIVE AREA =   0.56 SQ MI


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

                      HYDROGRAPH AT STATION     OFF2
                        FOR PLAN 1, RATIO = 0.60

    TOTAL RAINFALL =   4.68, TOTAL LOSS =   2.65, TOTAL EXCESS =   2.03

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                    6-HR       24-HR       72-HR     74.75-HR
+   (CFS)       (HR)
                          (CFS)
+    199.     13.50                 96.        31.         10.         10.
```

(INCHES)	1.590	2.032	2.032	2.032
(AC-FT)	47.	61.	61.	61.

CUMULATIVE AREA = 0.56 SQ MI

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

HYDROGRAPH AT STATION OFF2
FOR PLAN 1, RATIO = 0.69

TOTAL RAINFALL = 5.35, TOTAL LOSS = 2.79, TOTAL EXCESS = 2.56

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)				
		(CFS)			
+ 253.	13.50	121.	38.	13.	12.
	(INCHES)	2.012	2.559	2.559	2.559
	(AC-FT)	60.	76.	76.	76.

CUMULATIVE AREA = 0.56 SQ MI

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

HYDROGRAPH AT STATION OFF2
FOR PLAN 1, RATIO = 0.80

TOTAL RAINFALL = 6.24, TOTAL LOSS = 2.95, TOTAL EXCESS = 3.29

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)				
		(CFS)			
+ 329.	13.50	156.	49.	16.	16.
	(INCHES)	2.592	3.289	3.289	3.289
	(AC-FT)	77.	98.	98.	98.

CUMULATIVE AREA = 0.56 SQ MI

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

HYDROGRAPH AT STATION OFF2
FOR PLAN 1, RATIO = 0.91

TOTAL RAINFALL = 7.13, TOTAL LOSS = 3.08, TOTAL EXCESS = 4.05

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)				
		(CFS)			
+ 406.	13.50	192.	61.	20.	20.
	(INCHES)	3.188	4.047	4.047	4.047
	(AC-FT)	95.	121.	121.	121.

CUMULATIVE AREA = 0.56 SQ MI

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

HYDROGRAPH AT STATION OFF2
FOR PLAN 1, RATIO = 1.00

TOTAL RAINFALL = 7.80, TOTAL LOSS = 3.17, TOTAL EXCESS = 4.63

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)				
		(CFS)			
+ 466.	13.50	219.	70.	23.	22.
	(INCHES)	3.647	4.633	4.633	4.633
	(AC-FT)	109.	138.	138.	138.

CUMULATIVE AREA = 0.56 SQ MI

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

            **************
            *            *
  42 KK     *     OS2    *
            *            *
            **************
                          ONSITE WATERSHED #2

              SUBBASIN RUNOFF DATA

  44 BA         SUBBASIN CHARACTERISTICS
                   TAREA         0.05  SUBBASIN AREA

                PRECIPITATION DATA

  10 PB            STORM         7.80  BASIN TOTAL PRECIPITATION

  11 PI          INCREMENTAL PRECIPITATION PATTERN
                   0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                   0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     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     0.00     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     0.03     0.10     0.28     0.04     0.03
                   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     0.00     0.00     0.00     0.00
                   0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                   0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                   0.00     0.00     0.00     0.00     0.00     0.00

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

  46 UD         SCS DIMENSIONLESS UNITGRAPH
                   TLAG          0.27  LAG

                                          ***

                                       UNIT HYDROGRAPH
                                    7 END-OF-PERIOD ORDINATES
              41.      51.      19.       7.       2.       1.       0.

    TOTAL RAINFALL =    7.80, TOTAL LOSS =    2.36, TOTAL EXCESS =    5.44

  PEAK FLOW    TIME                          MAXIMUM AVERAGE FLOW
                                   6-HR       24-HR       72-HR      74.75-HR
+   (CFS)      (HR)
                         (CFS)
+     116.     12.25                 22.         7.          2.          2.
                       (INCHES)    4.332       5.438       5.438       5.438
                        (AC-FT)      11.         14.         14.         14.

                        CUMULATIVE AREA =    0.05 SQ MI

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

                         HYDROGRAPH AT STATION      OS2
                          FOR PLAN 1, RATIO = 0.46

    TOTAL RAINFALL =    3.56, TOTAL LOSS =    1.88, TOTAL EXCESS =    1.69

  PEAK FLOW    TIME                          MAXIMUM AVERAGE FLOW
                                   6-HR       24-HR       72-HR      74.75-HR
+   (CFS)      (HR)
                         (CFS)
+      36.     12.25                  7.         2.          1.          1.
                       (INCHES)    1.373       1.688       1.688       1.688
                        (AC-FT)       3.          4.          4.          4.

                        CUMULATIVE AREA =    0.05 SQ MI

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

                         HYDROGRAPH AT STATION      OS2
                          FOR PLAN 1, RATIO = 0.60
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TOTAL RAINFALL = 4.68, TOTAL LOSS = 2.06, TOTAL EXCESS = 2.62

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)				
		(CFS)			
+ 57.	12.25	11.	3.	1.	1.
		(INCHES) 2.117	2.616	2.616	2.616
		(AC-FT) 5.	7.	7.	7.

CUMULATIVE AREA = 0.05 SQ MI

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

HYDROGRAPH AT STATION OS2
FOR PLAN 1, RATIO = 0.69

TOTAL RAINFALL = 5.35, TOTAL LOSS = 2.15, TOTAL EXCESS = 3.20

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)				
		(CFS)			
+ 69.	12.25	13.	4.	1.	1.
		(INCHES) 2.582	3.201	3.201	3.201
		(AC-FT) 7.	8.	8.	8.

CUMULATIVE AREA = 0.05 SQ MI

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

HYDROGRAPH AT STATION OS2
FOR PLAN 1, RATIO = 0.80

TOTAL RAINFALL = 6.24, TOTAL LOSS = 2.24, TOTAL EXCESS = 4.00

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)				
		(CFS)			
+ 86.	12.25	16.	5.	2.	2.
		(INCHES) 3.211	3.998	3.998	3.998
		(AC-FT) 8.	10.	10.	10.

CUMULATIVE AREA = 0.05 SQ MI

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

HYDROGRAPH AT STATION OS2
FOR PLAN 1, RATIO = 0.91

TOTAL RAINFALL = 7.13, TOTAL LOSS = 2.32, TOTAL EXCESS = 4.81

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)				
		(CFS)			
+ 103.	12.25	20.	6.	2.	2.
		(INCHES) 3.848	4.814	4.814	4.814
		(AC-FT) 10.	12.	12.	12.

CUMULATIVE AREA = 0.05 SQ MI

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

HYDROGRAPH AT STATION OS2
FOR PLAN 1, RATIO = 1.00

TOTAL RAINFALL = 7.80, TOTAL LOSS = 2.36, TOTAL EXCESS = 5.44

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)				
		(CFS)			
+ 116.	12.25	22.	7.	2.	2.

```
                    (INCHES)     4.332       5.438       5.438       5.438
                     (AC-FT)      11.         14.         14.         14.

                    CUMULATIVE AREA =    0.05 SQ MI


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


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          *            *
 47 KK    *      OS3   *
          *            *
          **************
                        ONSITE WATERSHED #3

            SUBBASIN RUNOFF DATA

 49 BA        SUBBASIN CHARACTERISTICS
                   TAREA        0.03  SUBBASIN AREA

              PRECIPITATION DATA

 10 PB             STORM        7.80  BASIN TOTAL PRECIPITATION

 11 PI          INCREMENTAL PRECIPITATION PATTERN
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      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      0.00      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      0.03      0.10      0.28      0.04      0.03
                  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      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00

 50 LS        SCS LOSS RATE
                   STRTL        0.67  INITIAL ABSTRACTION
                  CRVNBR       75.00  CURVE NUMBER
                   RTIMP        0.00  PERCENT IMPERVIOUS AREA

 51 UD        SCS DIMENSIONLESS UNITGRAPH
                   TLAG        0.33  LAG

                                                    ***

                                                  UNIT HYDROGRAPH
                                                9 END-OF-PERIOD ORDINATES
                19.       33.       17.        7.        3.        1.        0.        0.        0.

    TOTAL RAINFALL =    7.80, TOTAL LOSS =    2.94, TOTAL EXCESS =    4.86

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR     74.75-HR
+   (CFS)       (HR)
                             (CFS)
+      67.     12.25                    13.         4.         1.         1.
                           (INCHES)    3.909      4.862      4.862      4.862
                            (AC-FT)      6.         8.         8.         8.

                           CUMULATIVE AREA =    0.03 SQ MI


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

                          HYDROGRAPH AT STATION      OS3
                            FOR PLAN 1, RATIO = 0.46

    TOTAL RAINFALL =    3.56, TOTAL LOSS =    2.22, TOTAL EXCESS =    1.35

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR     74.75-HR
+   (CFS)       (HR)
                             (CFS)
+      18.     12.25                     4.         1.         0.         0.
                           (INCHES)    1.096      1.348      1.348      1.348
                            (AC-FT)      2.         2.         2.         2.
```

CUMULATIVE AREA = 0.03 SQ MI

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

HYDROGRAPH AT STATION OS3
FOR PLAN 1, RATIO = 0.60

TOTAL RAINFALL = 4.68, TOTAL LOSS = 2.49, TOTAL EXCESS = 2.19

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+	(CFS)	(HR)				
			(CFS)			
+	30.	12.25	6.	2.	1.	1.
			(INCHES) 1.782	2.192	2.192	2.192
			(AC-FT) 3.	4.	4.	4.

CUMULATIVE AREA = 0.03 SQ MI

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

HYDROGRAPH AT STATION OS3
FOR PLAN 1, RATIO = 0.69

TOTAL RAINFALL = 5.35, TOTAL LOSS = 2.61, TOTAL EXCESS = 2.74

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+	(CFS)	(HR)				
			(CFS)			
+	38.	12.25	7.	2.	1.	1.
			(INCHES) 2.221	2.737	2.737	2.737
			(AC-FT) 4.	4.	4.	4.

CUMULATIVE AREA = 0.03 SQ MI

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

HYDROGRAPH AT STATION OS3
FOR PLAN 1, RATIO = 0.80

TOTAL RAINFALL = 6.24, TOTAL LOSS = 2.75, TOTAL EXCESS = 3.49

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+	(CFS)	(HR)				
			(CFS)			
+	48.	12.25	9.	3.	1.	1.
			(INCHES) 2.822	3.488	3.488	3.488
			(AC-FT) 5.	6.	6.	6.

CUMULATIVE AREA = 0.03 SQ MI

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

HYDROGRAPH AT STATION OS3
FOR PLAN 1, RATIO = 0.91

TOTAL RAINFALL = 7.13, TOTAL LOSS = 2.87, TOTAL EXCESS = 4.26

	PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+	(CFS)	(HR)				
			(CFS)			
+	59.	12.25	11.	4.	1.	1.
			(INCHES) 3.438	4.263	4.263	4.263
			(AC-FT) 6.	7.	7.	7.

CUMULATIVE AREA = 0.03 SQ MI

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

HYDROGRAPH AT STATION OS3
FOR PLAN 1, RATIO = 1.00

TOTAL RAINFALL = 7.80, TOTAL LOSS = 2.94, TOTAL EXCESS = 4.86

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)				
		(CFS)			
+ 67.	12.25	13.	4.	1.	1.
		(INCHES) 3.909	4.862	4.862	4.862
		(AC-FT) 6.	8.	8.	8.

CUMULATIVE AREA = 0.03 SQ MI

*** ***

52 KK SOUT

SOUTH SIDE OUTFLOW COMBINED

54 HC HYDROGRAPH COMBINATION
ICOMP 3 NUMBER OF HYDROGRAPHS TO COMBINE

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

HYDROGRAPH AT STATION SOUT
FOR PLAN 1, RATIO = 0.46

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)				
		(CFS)			
+ 123.	13.50	66.	22.	7.	7.
		(INCHES) 0.966	1.264	1.264	1.264
		(AC-FT) 33.	43.	43.	43.

CUMULATIVE AREA = 0.64 SQ MI

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

HYDROGRAPH AT STATION SOUT
FOR PLAN 1, RATIO = 0.60

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)				
		(CFS)			
+ 211.	13.50	111.	36.	12.	11.
		(INCHES) 1.623	2.083	2.083	2.083
		(AC-FT) 55.	71.	71.	71.

CUMULATIVE AREA = 0.64 SQ MI

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

HYDROGRAPH AT STATION SOUT
FOR PLAN 1, RATIO = 0.69

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)				
		(CFS)			
+ 268.	13.50	140.	45.	15.	14.
		(INCHES) 2.046	2.615	2.615	2.615
		(AC-FT) 70.	89.	89.	89.

CUMULATIVE AREA = 0.64 SQ MI

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

Angel Acres Drainage Plan - Developed Conditions

HYDROGRAPH AT STATION SOUT
FOR PLAN 1, RATIO = 0.80

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)					
		(CFS)				
+ 347.	13.50		180.	57.	19.	18.
		(INCHES)	2.628	3.351	3.351	3.351
		(AC-FT)	89.	114.	114.	114.

CUMULATIVE AREA = 0.64 SQ MI

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

HYDROGRAPH AT STATION SOUT
FOR PLAN 1, RATIO = 0.91

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)					
		(CFS)				
+ 428.	13.25		221.	71.	24.	23.
		(INCHES)	3.226	4.114	4.114	4.114
		(AC-FT)	110.	140.	140.	140.

CUMULATIVE AREA = 0.64 SQ MI

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

HYDROGRAPH AT STATION SOUT
FOR PLAN 1, RATIO = 1.00

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)					
		(CFS)				
+ 492.	13.25		253.	81.	27.	26.
		(INCHES)	3.684	4.704	4.704	4.704
		(AC-FT)	125.	160.	160.	160.

CUMULATIVE AREA = 0.64 SQ MI

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             **************
             *            *
55 KK        *   ANGEL    *
             *            *
             **************
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RUNOFF FROM ANGEL ACRES TO DRAINAGE DITCH

SUBBASIN RUNOFF DATA

57 BA SUBBASIN CHARACTERISTICS
TAREA 0.05 SUBBASIN AREA

PRECIPITATION DATA

10 PB STORM 7.80 BASIN TOTAL PRECIPITATION

11 PI INCREMENTAL PRECIPITATION PATTERN

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	0.00	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	0.03	0.10	0.28	0.04	0.03
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	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00				

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 58 LS        SCS LOSS RATE
                 STRTL        0.47  INITIAL ABSTRACTION
                 CRVNBR      81.00  CURVE NUMBER
                 RTIMP       20.00  PERCENT IMPERVIOUS AREA

 59 UD        SCS DIMENSIONLESS UNITGRAPH
                 TLAG         0.15  LAG

                                                       ***

                                                  UNIT HYDROGRAPH
                                              5 END-OF-PERIOD ORDINATES
              83.      32.       7.       2.       0.

   TOTAL RAINFALL =    7.80, TOTAL LOSS =    1.80, TOTAL EXCESS =    6.00

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                  6-HR       24-HR       72-HR      74.75-HR
+   (CFS)       (HR)
                         (CFS)
+     177.     12.00               24.          8.          3.           2.
                       (INCHES)   4.623       5.998       6.003        6.003
                        (AC-FT)     12.         15.         15.          15.

                         CUMULATIVE AREA =     0.05 SQ MI

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

                        HYDROGRAPH AT STATION    ANGEL
                          FOR PLAN 1, RATIO = 0.46

   TOTAL RAINFALL =    3.56, TOTAL LOSS =    1.44, TOTAL EXCESS =    2.12

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                  6-HR       24-HR       72-HR      74.75-HR
+   (CFS)       (HR)
                         (CFS)
+      62.     12.00                8.          3.          1.           1.
                       (INCHES)   1.634       2.119       2.122        2.122
                        (AC-FT)      4.          5.          5.           5.

                         CUMULATIVE AREA =     0.05 SQ MI

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

                        HYDROGRAPH AT STATION    ANGEL
                          FOR PLAN 1, RATIO = 0.60

   TOTAL RAINFALL =    4.68, TOTAL LOSS =    1.58, TOTAL EXCESS =    3.10

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                  6-HR       24-HR       72-HR      74.75-HR
+   (CFS)       (HR)
                         (CFS)
+      92.     12.00               12.          4.          1.           1.
                       (INCHES)   2.397       3.097       3.100        3.100
                        (AC-FT)      6.          8.          8.           8.

                         CUMULATIVE AREA =     0.05 SQ MI

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

                        HYDROGRAPH AT STATION    ANGEL
                          FOR PLAN 1, RATIO = 0.69

   TOTAL RAINFALL =    5.35, TOTAL LOSS =    1.64, TOTAL EXCESS =    3.71

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                  6-HR       24-HR       72-HR      74.75-HR
+   (CFS)       (HR)
                         (CFS)
+     110.     12.00               15.          5.          2.           2.
                       (INCHES)   2.868       3.705       3.708        3.708
                        (AC-FT)      7.          9.          9.           9.

                         CUMULATIVE AREA =     0.05 SQ MI
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*** *** *** *** ***

HYDROGRAPH AT STATION ANGEL
FOR PLAN 1, RATIO = 0.80

TOTAL RAINFALL = 6.24, TOTAL LOSS = 1.71, TOTAL EXCESS = 4.53

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)					
		(CFS)				
+ 134.	12.00		18.	6.	2.	2.
		(INCHES)	3.500	4.526	4.530	4.530
		(AC-FT)	9.	12.	12.	12.

CUMULATIVE AREA = 0.05 SQ MI

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

HYDROGRAPH AT STATION ANGEL
FOR PLAN 1, RATIO = 0.91

TOTAL RAINFALL = 7.13, TOTAL LOSS = 1.76, TOTAL EXCESS = 5.37

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)					
		(CFS)				
+ 158.	12.00		21.	7.	2.	2.
		(INCHES)	4.139	5.362	5.366	5.366
		(AC-FT)	11.	14.	14.	14.

CUMULATIVE AREA = 0.05 SQ MI

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

HYDROGRAPH AT STATION ANGEL
FOR PLAN 1, RATIO = 1.00

TOTAL RAINFALL = 7.80, TOTAL LOSS = 1.80, TOTAL EXCESS = 6.00

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)					
		(CFS)				
+ 177.	12.00		24.	8.	3.	2.
		(INCHES)	4.623	5.998	6.003	6.003
		(AC-FT)	12.	15.	15.	15.

CUMULATIVE AREA = 0.05 SQ MI

*** ***

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              **************
              *            *
   60 KK      *    47TH    *
              *            *
              **************
                              APPROXIMATE FLOW TO 2-3 FT RCPS AT 47TH ST

   62 HC          HYDROGRAPH COMBINATION
                      ICOMP          3  NUMBER OF HYDROGRAPHS TO COMBINE
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*** *** *** *** ***

HYDROGRAPH AT STATION 47TH
FOR PLAN 1, RATIO = 0.46

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)				

			(CFS)				
+	215.	13.00		110.	36.	12.	11.
			(INCHES)	1.083	1.399	1.410	1.410
			(AC-FT)	55.	70.	71.	71.

CUMULATIVE AREA = 0.94 SQ MI

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

HYDROGRAPH AT STATION 47TH
FOR PLAN 1, RATIO = 0.60

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)					
		(CFS)				
+ 355.	13.00		179.	57.	19.	18.
		(INCHES)	1.760	2.250	2.261	2.261
		(AC-FT)	89.	113.	114.	114.

CUMULATIVE AREA = 0.94 SQ MI

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

HYDROGRAPH AT STATION 47TH
FOR PLAN 1, RATIO = 0.69

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)					
		(CFS)				
+ 444.	13.00		223.	71.	24.	23.
		(INCHES)	2.193	2.797	2.808	2.809
		(AC-FT)	110.	141.	141.	141.

CUMULATIVE AREA = 0.94 SQ MI

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

HYDROGRAPH AT STATION 47TH
FOR PLAN 1, RATIO = 0.80

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)					
		(CFS)				
+ 568.	13.00		283.	90.	30.	29.
		(INCHES)	2.786	3.550	3.562	3.563
		(AC-FT)	140.	179.	179.	179.

CUMULATIVE AREA = 0.94 SQ MI

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

HYDROGRAPH AT STATION 47TH
FOR PLAN 1, RATIO = 0.91

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)					
		(CFS)				
+ 690.	13.00		345.	110.	37.	35.
		(INCHES)	3.393	4.328	4.341	4.341
		(AC-FT)	171.	218.	219.	219.

CUMULATIVE AREA = 0.94 SQ MI

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

HYDROGRAPH AT STATION 47TH
FOR PLAN 1, RATIO = 1.00

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)				

```
                          (CFS)
+     780.     13.00                392.        125.        42.        40.
                        (INCHES)   3.857       4.927       4.940      4.941
                         (AC-FT)    194.        248.        249.       249.

                        CUMULATIVE AREA =    0.94 SQ MI


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

                **************
                *            *
    63 KK       *      OS4   *
                *            *
                **************
                          ONSITE WATERSHED #4

                 SUBBASIN RUNOFF DATA

    65 BA         SUBBASIN CHARACTERISTICS
                        TAREA        0.02  SUBBASIN AREA

                  PRECIPITATION DATA

    10 PB               STORM        7.80  BASIN TOTAL PRECIPITATION

    11 PI           INCREMENTAL PRECIPITATION PATTERN
                       0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
                       0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    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    0.00    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    0.03    0.10    0.28    0.04    0.03
                       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    0.00    0.00    0.00    0.00
                       0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
                       0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
                       0.00    0.00    0.00    0.00    0.00    0.00

    66 LS            SCS LOSS RATE
                        STRTL        0.67  INITIAL ABSTRACTION
                       CRVNBR       75.00  CURVE NUMBER
                        RTIMP        0.00  PERCENT IMPERVIOUS AREA

    67 UD            SCS DIMENSIONLESS UNITGRAPH
                         TLAG        0.35  LAG

                                                ***

                                           UNIT HYDROGRAPH
                                       9 END-OF-PERIOD ORDINATES
                11.      20.      12.      5.      2.      1.      0.      0.      0.

      TOTAL RAINFALL =    7.80, TOTAL LOSS =    2.94, TOTAL EXCESS =    4.86

   PEAK FLOW     TIME                           MAXIMUM AVERAGE FLOW
                                       6-HR        24-HR       72-HR     74.75-HR
 +   (CFS)       (HR)
                          (CFS)
 +      42.     12.25                    8.          3.          1.          1.
                        (INCHES)     3.908       4.862       4.862       4.862
                         (AC-FT)        4.          5.          5.          5.

                       CUMULATIVE AREA =    0.02 SQ MI


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

                         HYDROGRAPH AT STATION      OS4
                           FOR PLAN 1, RATIO = 0.46

      TOTAL RAINFALL =    3.56, TOTAL LOSS =    2.22, TOTAL EXCESS =    1.35

   PEAK FLOW     TIME                           MAXIMUM AVERAGE FLOW
                                       6-HR        24-HR       72-HR     74.75-HR
 +   (CFS)       (HR)
                          (CFS)
 +      11.     12.25                    2.          1.          0.          0.
```

(INCHES)	1.095	1.348	1.348	1.348
(AC-FT)	1.	1.	1.	1.

CUMULATIVE AREA = 0.02 SQ MI

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

HYDROGRAPH AT STATION OS4
FOR PLAN 1, RATIO = 0.60

TOTAL RAINFALL = 4.68, TOTAL LOSS = 2.49, TOTAL EXCESS = 2.19

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)				
		(CFS)			
+ 19.	12.25	4.	1.	0.	0.
		(INCHES) 1.781	2.192	2.192	2.192
		(AC-FT) 2.	2.	2.	2.

CUMULATIVE AREA = 0.02 SQ MI

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

HYDROGRAPH AT STATION OS4
FOR PLAN 1, RATIO = 0.69

TOTAL RAINFALL = 5.35, TOTAL LOSS = 2.61, TOTAL EXCESS = 2.74

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)				
		(CFS)			
+ 24.	12.25	5.	1.	0.	0.
		(INCHES) 2.220	2.737	2.737	2.737
		(AC-FT) 2.	3.	3.	3.

CUMULATIVE AREA = 0.02 SQ MI

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

HYDROGRAPH AT STATION OS4
FOR PLAN 1, RATIO = 0.80

TOTAL RAINFALL = 6.24, TOTAL LOSS = 2.75, TOTAL EXCESS = 3.49

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)				
		(CFS)			
+ 30.	12.25	6.	2.	1.	1.
		(INCHES) 2.821	3.488	3.488	3.488
		(AC-FT) 3.	4.	4.	4.

CUMULATIVE AREA = 0.02 SQ MI

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

HYDROGRAPH AT STATION OS4
FOR PLAN 1, RATIO = 0.91

TOTAL RAINFALL = 7.13, TOTAL LOSS = 2.87, TOTAL EXCESS = 4.26

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)				
		(CFS)			
+ 37.	12.25	7.	2.	1.	1.
		(INCHES) 3.437	4.263	4.263	4.263
		(AC-FT) 4.	5.	5.	5.

CUMULATIVE AREA = 0.02 SQ MI

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

HYDROGRAPH AT STATION OS4
FOR PLAN 1, RATIO = 1.00

TOTAL RAINFALL = 7.80, TOTAL LOSS = 2.94, TOTAL EXCESS = 4.86

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	74.75-HR
+ (CFS)	(HR)				
	(CFS)				
+ 42.	12.25	8.	3.	1.	1.
	(INCHES)	3.908	4.862	4.862	4.862
	(AC-FT)	4.	5.	5.	5.

CUMULATIVE AREA = 0.02 SQ MI

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 PRECIPITATION RATIO 1 0.46	RATIO 2 0.60	RATIO 3 0.69	RATIO 4 0.80	RATIO 5 0.91	RATIO 6 1.00
HYDROGRAPH AT										
+	10	0.23	1	FLOW	101.	164.	204.	259.	314.	356.
				TIME	12.50	12.50	12.50	12.50	12.50	12.50
ROUTED TO										
+	POND	0.23	1	FLOW	97.	142.	173.	216.	255.	281.
				TIME	12.75	13.00	13.00	13.00	13.00	13.00
			** PEAK STAGES IN FEET **							
			1	STAGE	89.76	90.30	90.71	91.26	91.88	92.39
				TIME	12.75	13.00	13.00	13.00	13.00	13.00
HYDROGRAPH AT										
+	OS1	0.03	1	FLOW	26.	39.	46.	56.	66.	74.
				TIME	12.25	12.25	12.25	12.25	12.25	12.25
2 COMBINED AT										
+	SWSE	0.26	1	FLOW	105.	154.	185.	230.	269.	296.
				TIME	12.75	12.75	12.75	12.75	12.75	13.00
HYDROGRAPH AT										
+	OFF2	0.56	1	FLOW	115.	199.	253.	329.	406.	466.
				TIME	13.50	13.50	13.50	13.50	13.50	13.50
HYDROGRAPH AT										
+	OS2	0.05	1	FLOW	36.	57.	69.	86.	103.	116.
				TIME	12.25	12.25	12.25	12.25	12.25	12.25
HYDROGRAPH AT										
+	OS3	0.03	1	FLOW	18.	30.	38.	48.	59.	67.
				TIME	12.25	12.25	12.25	12.25	12.25	12.25
3 COMBINED AT										
+	SOUT	0.64	1	FLOW	123.	211.	268.	347.	428.	492.
				TIME	13.50	13.50	13.50	13.50	13.25	13.25
HYDROGRAPH AT										
+	ANGEL	0.05	1	FLOW	62.	92.	110.	134.	158.	177.
				TIME	12.00	12.00	12.00	12.00	12.00	12.00
3 COMBINED AT										
+	47TH	0.94	1	FLOW	215.	355.	444.	568.	690.	780.
				TIME	13.00	13.00	13.00	13.00	13.00	13.00
HYDROGRAPH AT										
+	OS4	0.02	1	FLOW	11.	19.	24.	30.	37.	42.
				TIME	12.25	12.25	12.25	12.25	12.25	12.25

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

Angel Acres
Storm Sewer Design
36-98696-4649

Basin	Area (acres)	Q_2 (cfs)	Q_{100} (cfs)
A	0.96	1.71	4.88
B	1.45	2.59	7.36
C	1.46	2.61	7.41
D	2.48	4.43	12.59
E	4.36	7.79	22.14
F	5.69	10.16	28.90
G	1.8	3.21	9.14
H	7.36	13.14	37.38
J	1.25	2.23	6.35
K	4.09	7.30	20.77
L	2.76	4.93	14.02

1/4 Acre Residential
50% B Soils
50% D Soils
$C_2 = 0.47$
$C_{100} = 0.69$

Time of Concentration = 15 minutes
$i_2 = 3.80$
$i_{100} = 7.36$

Angel Acres
Inlet Sizing
36-98696-4649

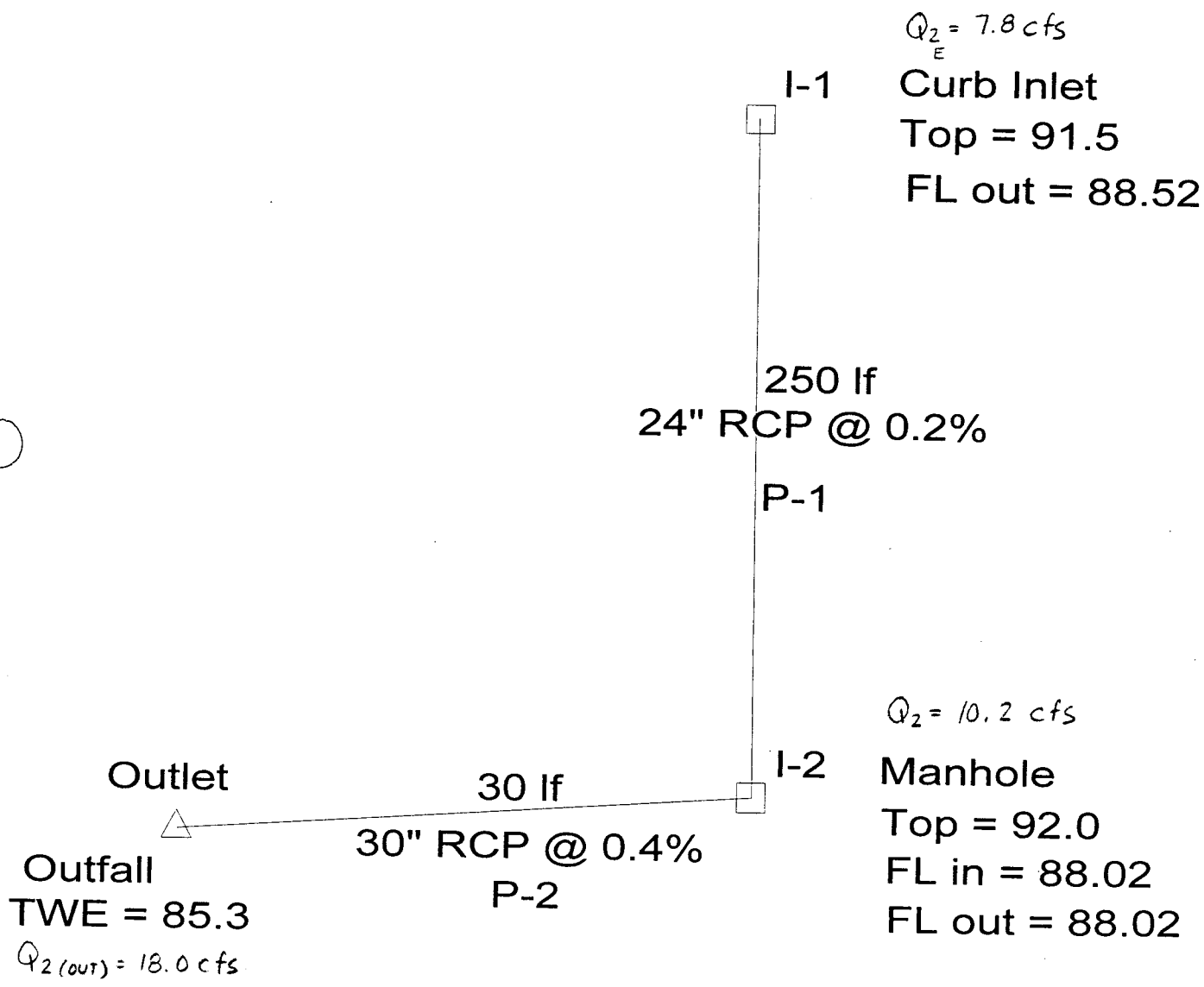
2-year Storm

Inlet Location			Q_2 (cfs)	Size of Type 1A Inlet (L)	Ponding Depth (ft)	Remarks
West side of Richmond	Line #1	Sump	7.8	6'-4"	0.58	<0.9' OK
East side of Edwards	Line #2	Sump	4.4	6'-4"	0.38	OK
West side of Edwards	Line #2	Sump	2.6	6'-4"	0.26	OK
East side of Gordon	Line #3	Sump	2.6	6'-4"	0.26	OK
West Side of Gordon	Line #3	Sump	1.7	6'-4"	0.21	OK
North Side of Angel		Sump	7.3	6'-4"	0.56	OK
South Side of Angel		Sump	2.2	6'-4"	0.21	OK

Note: Used City of Wichita Type 1A Curb Inlet for Inlet Sizing

2-yr storm

Line #1



```
------------------ Beginning Calculation Cycle ------------------
Discharge: 7.80 cfs  at node I-1
Discharge: 18.00 cfs  at node I-2
Discharge: 18.00 cfs  at node Outlet
Beginning iteration 1
Discharge: 7.80 cfs  at node I-1
Discharge: 18.00 cfs  at node I-2
Discharge: 18.00 cfs  at node Outlet
Discharge Convergence Achieved in 1 iterations: relative error:  0.0
Warning: No Duration data exists in IDF Table
--------------------- Calculations Complete ---------------------

** Analysis Options **
Friction method:  Manning's Formula
HGL Convergence Test:  0.001000
Maximum Network Traversals:  5
Number of Pipe Profile Steps:  5
Discharge Convergence Test:  0.001000
Maximum Design Passes:  3


----------------- Network Quick View -----------------------
```

Label	Length	Size	Discharge	Hydraulic Grade Upstream	Hydraulic Grade Downstream
P-1	250.00	24 inch	7.80	90.06	89.80
P-2	30.00	30 inch	18.00	89.54	89.34

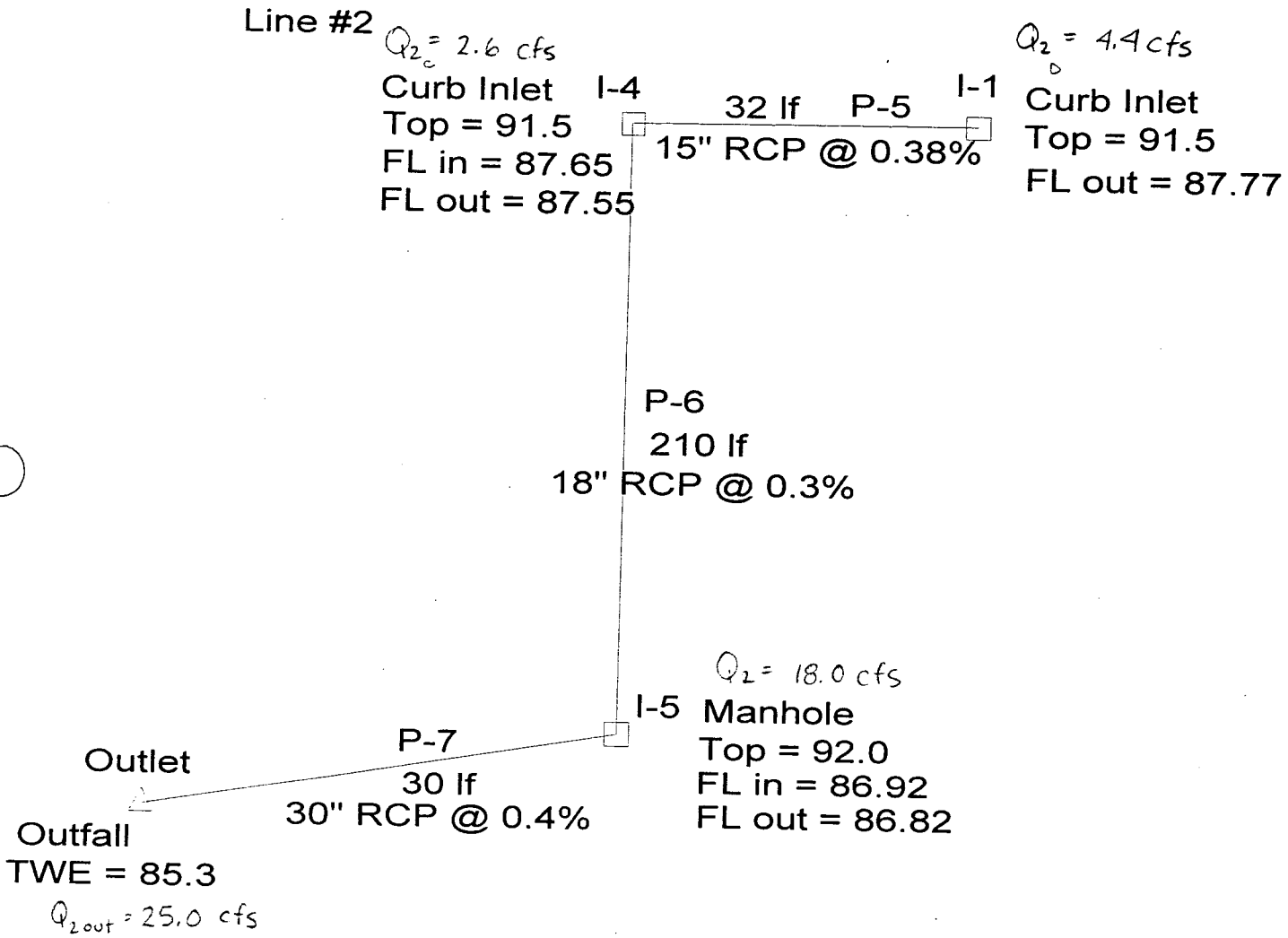
Label	Discharge	Elevations Ground	Elevations Upstream HGL	Elevations Downstream HGL
I-1	7.80	91.50	90.06	90.06
I-2	18.00	92.00	89.80	89.54
Outlet	18.00	92.00	85.30	85.30

```
Elapsed: 0 minute(s) 0 second(s)
```

DOT Report

Pipe	-Node- Upstream Downstream	Inlet Area (acres)	Inlet CA (acres)	Total CA (acres)	-Ground- Upstream (ft) Downstream	-HGL- Upstream (ft) Downstream	-Slope- Energy Constructed (ft/ft)	-Section- Discharge Capacity (cfs)	Section Shape Size	Length (ft)	Average Velocity (ft/s)	Description
P-1	I-1	0.00	0.00	0.00	91.50	90.06	0.001184	7.80	Circular	50.00	2.82	
	I-2				92.00	89.80	0.002000	10.12	24 inch			
P-2	I-2	0.00	0.00	0.00	92.00	89.54	0.004275	18.00	Circular	30.00	5.96	
	Outlet				92.00	89.34	0.004000	25.94	30 inch			

2-yr storm


Line #2
Q_{2_c} = 2.6 cfs
Curb Inlet I-4
Top = 91.5
FL in = 87.65
FL out = 87.55
32 lf P-5
15" RCP @ 0.38%
I-1
Q_{2_D} = 4.4 cfs
Curb Inlet
Top = 91.5
FL out = 87.77
P-6
210 lf
18" RCP @ 0.3%
Q_2 = 18.0 cfs
I-5 Manhole
Top = 92.0
FL in = 86.92
FL out = 86.82
P-7
30 lf
30" RCP @ 0.4%
Outlet
Outfall
TWE = 85.3
$Q_{2\,out}$ = 25.0 cfs

```
------------------ Beginning Calculation Cycle -------------------
Discharge: 4.43 cfs  at node I-1
Discharge: 7.04 cfs  at node I-4
Discharge: 25.04 cfs  at node I-5
Discharge: 25.04 cfs  at node Outlet
Beginning iteration 1
Discharge: 4.43 cfs  at node I-1
Discharge: 7.04 cfs  at node I-4
Discharge: 25.04 cfs  at node I-5
Discharge: 25.04 cfs  at node Outlet
Discharge Convergence Achieved in 1 iterations: relative error:  0.0
Warning: No Duration data exists in IDF Table
Information: P-6 Surcharged condition
Information: P-5 Surcharged condition
--------------------- Calculations Complete ---------------------

** Analysis Options **
Friction method:  Manning's Formula
HGL Convergence Test:  0.001000
Maximum Network Traversals:  5
Number of Pipe Profile Steps:  5
Discharge Convergence Test:  0.001000
Maximum Design Passes:  3


 ----------------- Network Quick View  ------------------------
```

Label	Length	Size	Discharge	Hydraulic Grade Upstream	Hydraulic Grade Downstream
P-5	32.00	15 inch	4.43	90.22	90.07
P-6	210.00	18 inch	7.04	89.94	89.00
P-7	30.00	30 inch	25.04	88.69	88.41

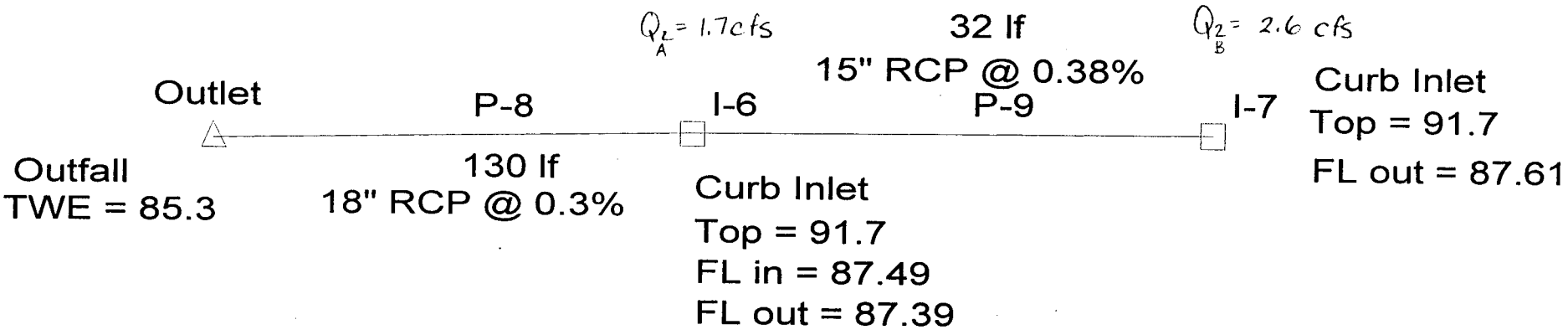
Label	Discharge	Elevations Ground	Elevations Upstream HGL	Elevations Downstream HGL
I-1	4.43	91.50	90.22	90.22
Outlet	25.04	92.00	85.30	85.30
I-4	7.04	91.50	90.07	89.94
I-5	25.04	92.00	89.00	88.69

```
Elapsed: 0 minute(s) 1 second(s)
```

DOT Report

Pipe	-Node- Upstream Downstream	Inlet Area (acres)	Inlet CA (acres)	Total CA (acres)	-Ground- Upstream Downstream (ft)	-HGL- Upstream Downstream (ft)	-Slope- Energy Constructed (ft/ft)	-Section- Discharge Capacity (cfs)	-Section- Shape Size	Length (ft)	Average Velocity (ft/s)	Description
P-5	I-1	0.00	0.00	0.00	91.50	90.22	0.004703	4.43	Circular	32.00	3.61	
	I-4				91.50	90.07	0.003750	3.96	15 inch			
P-6	I-4	0.00	0.00	0.00	91.50	89.94	0.004492	7.04	Circular	10.00	3.98	
	I-5				92.00	89.00	0.003000	5.75	18 inch			
P-7	I-5	0.00	0.00	0.00	92.00	88.69	0.004854	25.04	Circular	30.00	6.70	
	Outlet				92.00	88.41	0.004000	25.94	30 inch			

Line #3



2-yr storm

```
------------------ Beginning Calculation Cycle ------------------
Discharge: 2.60 cfs  at node I-7
Discharge: 4.31 cfs  at node I-6
Discharge: 4.31 cfs  at node Outlet
Beginning iteration 1
Discharge: 2.60 cfs  at node I-7
Discharge: 4.31 cfs  at node I-6
Discharge: 4.31 cfs  at node Outlet
Discharge Convergence Achieved in 1 iterations: relative error:  0.0
Warning: No Duration data exists in IDF Table
--------------------- Calculations Complete ---------------------

** Analysis Options **
Friction method:  Manning's Formula
HGL Convergence Test:  0.001000
Maximum Network Traversals:  5
Number of Pipe Profile Steps:  5
Discharge Convergence Test:  0.001000
Maximum Design Passes:  3


----------------- Network Quick View -----------------------
```

Label	Length	Size	Discharge	Hydraulic Grade Upstream	Hydraulic Grade Downstream
P-8	130.00	18 inch	4.31	88.36	87.80
P-9	32.00	15 inch	2.60	88.50	88.46

Label	Discharge	Elevations Ground	Elevations Upstream HGL	Elevations Downstream HGL
Outlet	4.31	91.00	85.30	85.30
I-6	4.31	91.70	88.46	88.36
I-7	2.60	91.70	88.50	88.50

```
Elapsed: 0 minute(s) 1 second(s)
```

DOT Report

Pipe	-Node- Upstream Downstream	Inlet Area (acres)	Inlet CA (acres)	Total CA (acres)	-Ground- Upstream Downstream (ft)	-HGL- Upstream Downstream (ft)	-Slope- Energy Constructed (ft/ft)	-Section- Discharge Capacity (cfs)	-Section- Shape Size	Length (ft)	Average Velocity (ft/s)	Description
P-9	I-7	0.00	0.00	0.00	91.70	88.50	0.002007	2.60	Circular	32.00	2.67	
	I-6				91.70	88.46	0.003750	3.96	15 inch			
P-8	I-6	0.00	0.00	0.00	91.70	88.36	0.003393	4.31	Circular	130.00	4.05	
	Outlet				91.00	87.80	0.003000	5.75	18 inch			

Northern Channel (along Lots 1-4, Block 6 & Lot 5, Block 4)

$Q_{100} := 492$ cfs

- From The Legacy Drainage Plan, HEC-1, Basin SOUT

Side Slopes 3:1
Class C-D Vegetative
Permissible shear stress = 1 lb/sq. ft

$\tau := \gamma \cdot D \cdot S$

$\gamma := 62.4$

$D :=$ depth

$S :=$ slope

$S := 0.002$

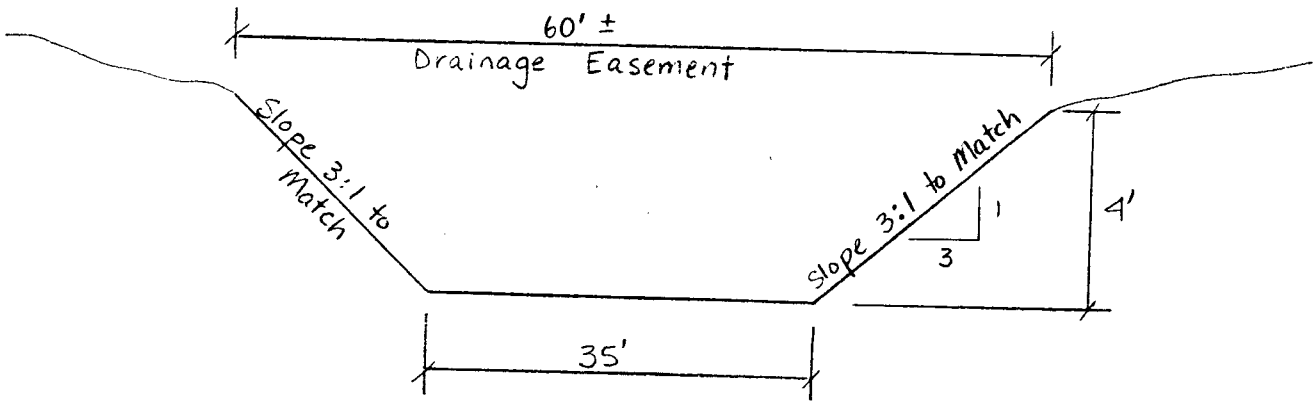
Class C Vegetative:

$$n := \frac{R^{\frac{1}{6}}}{30.2 + 19.97 \cdot \log\left(R^{1.4} \cdot S^{0.4}\right)}$$

R = Hydraulic Radius

n ~ 0.05

Using FEMA's Quick2 Program:
Ditch slope = 0.002



Southern Channel (along Lots 1-4, Block 4)

$Q_{100} := 780$ cfs

- From The Legacy Drainage Plan, HEC-1, Basins SOUT & SWSE
- Additional runoff from Angel Acres

Side Slopes 3:1
Class C-D Vegetative
Permissible shear stress = 1 lb/sq. ft

$\tau := \gamma \cdot D \cdot S$

$\gamma := 62.4$

D := depth

S := slope

$S := 0.002$

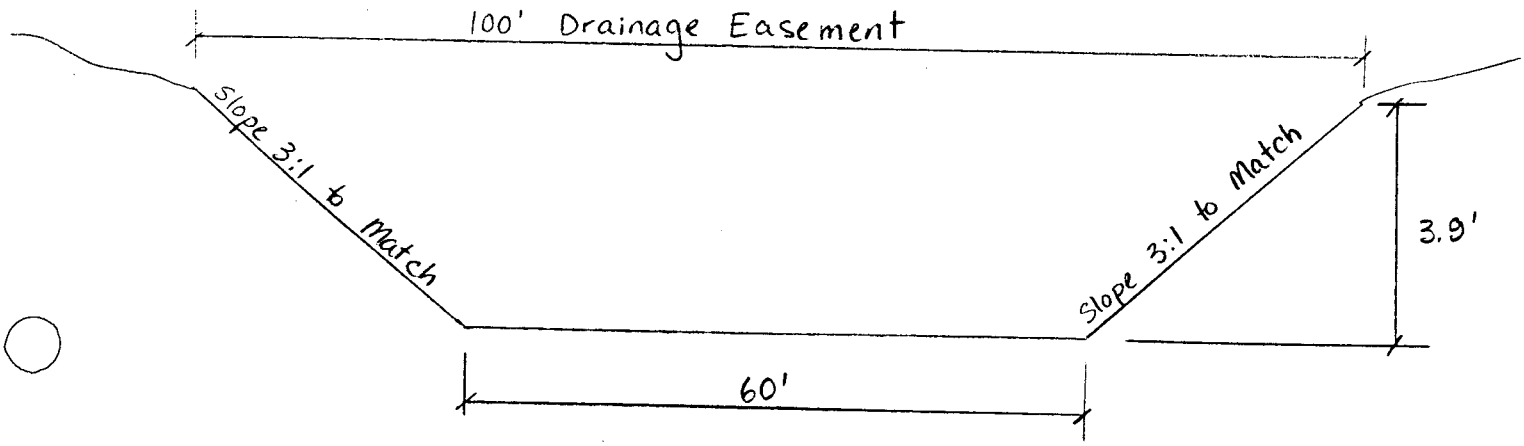
Class C Vegetative:

$$n := \frac{R^{\frac{1}{6}}}{30.2 + 19.97 \cdot \log\left(R^{1.4} \cdot S^{0.4}\right)}$$

R = Hydraulic Radius

n ~ 0.05

Using FEMA's Quick2 Program:
Ditch slope = 0.002



Ange[illegible]res
Channel Design
from Quick2 program

Channel from The Legacy

Side Slopes of 3.5:1

Bottom Width	n (estimated)	slope of channel	Q	Depth	Hydraulic Radius R	Shear Stress	n(calc)	Total Channel Width
35	0.055	0.002	413	3.6	2.8	0.44928	0.056153	60.2
35	0.054	0.002	492	3.93	3	0.490464	0.054638	62.5

Side Slopes of 3:1

35	0.054	0.002	492	4	3.1	0.4992	0.05396	59

Combined Channel

Side Slope of 3:1

Bottom Width	n (estimated)	slope of channel	Q	Depth	Hydraulic Radius R	Shear Stress	n(calc)	Total Channel Width
55	0.054	0.002	780	4.13	3.4	0.5154	0.0522	79.8
60	0.052	0.002	780	3.86	3.3	0.4817	0.0527	83.2
65	0.053	0.002	780	3.74	3.2	0.4668	0.0533	87.4
70	0.053	0.002	780	3.59	3.1	0.4480	0.0540	91.5

Angel Acres
Box Culvert Design
36-98696-4649

Box Culvert under Angel at drainage easement

Concrete n = 0.013

Size 10' x 4'

Quantity 3

Inlet Elevation = 87.00

Outlet Elevation = 86.88

Length 60 feet

Tailwater Rating Curve based on:
- 35' bottom on trapazoidal channel
- 3:1 Side slopes
- Q = 492 cfs

From FHWA Culvert Program

Q	HWE	TWE	Velocity
(cfs)	(feet)	(feet)	(ft/sec)
0	87.00	86.88	0.00
80	88.40	88.30	1.88
160	89.17	89.00	2.52
240	89.79	89.55	3.00
320	90.32	90.02	3.40
400	90.80	90.44	3.75
480	91.24	90.82	4.06
492	91.30	90.87	4.11
640	92.23	91.49	5.33
720	92.74	91.79	6.00
800	93.24	92.08	6.67

PROJECT: Angel Acres

DESIGNER: KER

DATE: 2/17/99

HYDROLOGIC AND CHANNEL INFORMATION

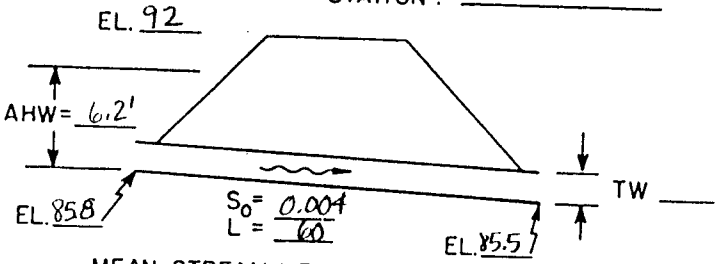
Gordon
100-yr storm

Q_1 = 80.18 TW_1 = _____
Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION : _____



MEAN STREAM VELOCITY = _____
MAX. STREAM VELOCITY = _____

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION										CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			INLET CONT.		OUTLET CONTROL HW=H + h_o - LS_o											
			HW/D	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
36" RCP	80	3	2	6	0.5						0.24					
2-30" RCP	40	2.5	1.5	3.75	.5	2.1	2.2	2.35	-	2.35	.24	4.2				OK
42" RCP	80	3.5	1.35	4.73	.5	1.85	2.75	3.13	—	3.13	.24	4.74				OK

SUMMARY & RECOMMENDATIONS:

Use 42" RCP under Gordon

Figure 7

PROJECT: Angel Acres

DESIGNER: KER

DATE: 2/17/99

HYDROLOGIC AND CHANNEL INFORMATION

Edwards

100-yr storm

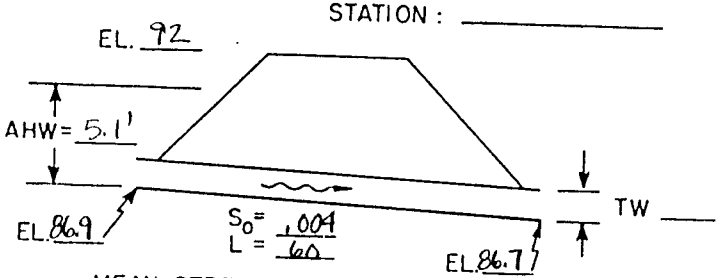
Q_1 = 51.0 cfs TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION : _____



MEAN STREAM VELOCITY = _____

MAX. STREAM VELOCITY = _____

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION										CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			INLET CONT.		OUTLET CONTROL HW=H + h_o - LS_o											
			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
30" RCP	51	2.5	2	5							.24					
36" RCP	51	3	1.2	3.6	0.5	1.6	2.3	2.3	-	2.3	0.24	3.66				OK

SUMMARY & RECOMMENDATIONS:

Use 36" RCP under Edwards

-revise SWS outfall on Line #2 to 36" RCP

Figure 7

PROJECT: Angel Acres

DESIGNER: KER

DATE: 2/17/99

HYDROLOGIC AND CHANNEL INFORMATION

Richmond

100-yr Storm

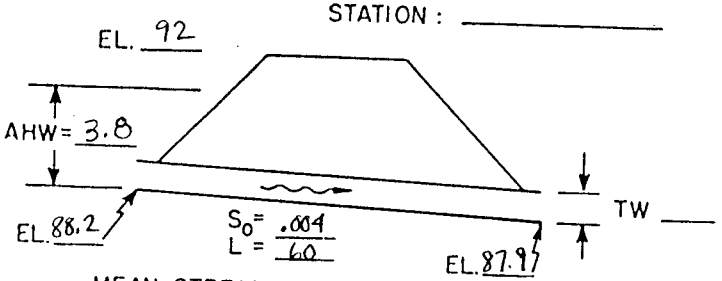
Q_1 = 28.9 cfs TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION : _____



MEAN STREAM VELOCITY = _____

MAX. STREAM VELOCITY = _____

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION										CONTROLLING H.W.	OUTLET VELOCITY	COST	COMMENTS
			INLET CONT.		OUTLET CONTROL HW=H + h_o - LS_o											
			$\frac{H.W.}{D}$	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
30" RCP	28.9	2.5	1.15	2.9	.5	1.1	1.8	2.15	–	2.15	.24	3				OK

SUMMARY & RECOMMENDATIONS:

Use 30" RCP under Richmond

Figure 7

PROJECT: Angel Acres

DESIGNER: KER

DATE: 2/16/99

HYDROLOGIC AND CHANNEL INFORMATION

Angel 100-yr storm

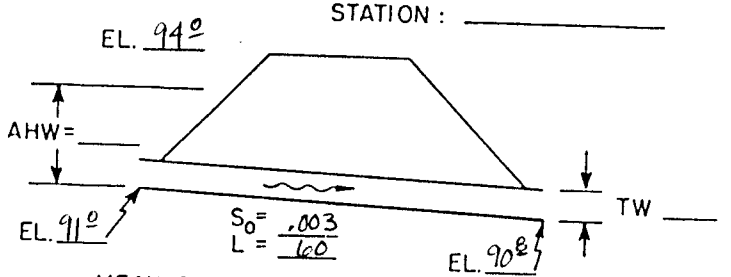
Q_1 = 87.4 cfs TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION : _____



MEAN STREAM VELOCITY = _____

MAX. STREAM VELOCITY = _____

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION										CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
			INLET CONT.		OUTLET CONTROL $HW = H + h_o - LS_o$											
			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW				
2-30" RCP	43.7	2.5	1.73	4.3							.18					
2-36" RCP	43.7	3	1.1	3.3												36" Pipe will not fit in ditch

SUMMARY & RECOMMENDATIONS:

Since the 18" CMP under Meridian will cause a downstream constriction, → Use 24" RCP under Angel

Figure 7

Maximum Q through 2-36" RCP

Assume maximum velocity = 8 ft/sec

$D := 3$ ft

$velocity := 8$ ft/sec

$number\_of\_pipes := 2$

$$Area := \pi \left(\frac{D}{2}\right)^2$$

$$Q_{max} := Area \cdot velocity \cdot number\_of\_pipes$$

$Q_{max} = 113.097$ cfs

Since the 100-yr flow of 780 cfs will not fit in the 2-36" RCP, flow over 47th Street South has been assumed.

Assume sharp crested weir flow

$Length := 175$ ft

$Road\_Elevation := 92.5$ City Datum

$Q := 780$ cfs

$C := 3$

$$Q = C \cdot Length \cdot h^{\frac{3}{2}}$$

Assume total 100-yr Q with no detention and the 2-36" RCP's are plugged as the worst case scenario.

$$h := \left(\frac{Q}{C \cdot Length}\right)^{\frac{2}{3}}$$

$h = 1.302$ ft

$Highwater\_Elevation := Road\_Elevation + h$

$Highwater\_Elevation = 93.802$ City Datum

Minimum Openings for:

Lots 1-4, Block 1	95.0 City Datum
Lots 1-9, Block 2	95.0 City Datum
Lots 1-10, Block 3	95.0 City Datum
Lots 1-8, Block 4	95.0 City Datum
Lot 1, Block 5	95.0 City Datum
Lots 1-16, Block 6	95.0 City Datum

RAINFALL INTENSITY TABLE

SEDGWICK COUNTY
KANSAS

THIS TABLE CONTAINS AVERAGE RAINFALL INTENSITIES IN INCHES PER HOUR.

DURATION, HR:MIN	RETURN PERIOD 1 YR	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR
0:05	4.77	5.52	6.56	7.32	8.44	9.32	10.20
0:06	4.53	5.26	6.27	7.02	8.11	8.96	9.81
0:07	4.33	5.04	6.03	6.76	7.82	8.65	9.48
0:08	4.16	4.85	5.82	6.52	7.55	8.36	9.17
0:09	4.00	4.67	5.61	6.30	7.30	8.09	8.87
0:10	3.85	4.50	5.42	6.08	7.06	7.82	8.58
0:11	3.71	4.34	5.23	5.88	6.83	7.56	8.30
0:12	3.58	4.19	5.06	5.69	6.60	7.32	8.04
0:13	3.45	4.05	4.90	5.51	6.40	7.10	7.79
0:14	3.34	3.92	4.75	5.34	6.21	6.89	7.57
0:15	3.23	3.80	4.61	5.19	6.04	6.70	7.36
0:16	3.13	3.69	4.48	5.05	5.88	6.53	7.17
0:17	3.03	3.58	4.36	4.92	5.73	6.37	7.00
0:18	2.94	3.48	4.25	4.80	5.60	6.22	6.84
0:19	2.86	3.39	4.14	4.69	5.47	6.09	6.70
0:20	2.78	3.30	4.05	4.58	5.35	5.96	6.56
0:21	2.70	3.21	3.95	4.48	5.24	5.84	6.43
0:22	2.63	3.14	3.87	4.39	5.14	5.72	6.30
0:23	2.56	3.06	3.78	4.30	5.04	5.61	6.19
0:24	2.50	2.99	3.71	4.21	4.94	5.51	6.07
0:25	2.44	2.93	3.63	4.13	4.85	5.41	5.97
0:26	2.38	2.86	3.56	4.05	4.76	5.31	5.86
0:27	2.33	2.80	3.49	3.98	4.68	5.22	5.76
0:28	2.28	2.75	3.43	3.91	4.59	5.13	5.66
0:29	2.23	2.69	3.36	3.84	4.52	5.04	5.57
0:30	2.19	2.64	3.30	3.77	4.44	4.96	5.48
0:31	2.14	2.59	3.24	3.71	4.37	4.88	5.39
0:32	2.10	2.54	3.19	3.64	4.30	4.80	5.31
0:33	2.06	2.50	3.14	3.58	4.23	4.73	5.22
0:34	2.02	2.45	3.08	3.53	4.16	4.65	5.14
0:35	1.99	2.41	3.03	3.47	4.10	4.58	5.07
0:36	1.95	2.37	2.99	3.42	4.03	4.51	4.99
0:37	1.92	2.33	2.94	3.36	3.97	4.45	4.92
0:38	1.89	2.30	2.89	3.31	3.91	4.38	4.84
0:39	1.86	2.26	2.85	3.27	3.86	4.32	4.77
0:40	1.83	2.23	2.81	3.22	3.80	4.26	4.71
0:41	1.80	2.19	2.77	3.17	3.75	4.20	4.64
0:42	1.77	2.16	2.73	3.13	3.70	4.14	4.58
0:43	1.75	2.13	2.69	3.08	3.65	4.08	4.52
0:44	1.72	2.10	2.65	3.04	3.60	4.03	4.46
0:45	1.70	2.07	2.62	3.00	3.55	3.97	4.40

RAINFALL INTENSITY TABLE

SEDGWICK COUNTY
KANSAS

THIS TABLE CONTAINS AVERAGE RAINFALL INTENSITIES IN INCHES PER HOUR.

DURATION, HR:MIN	RETURN PERIOD 1 YR	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR
0:46	1.67	2.04	2.58	2.96	3.50	3.92	4.34
0:47	1.65	2.01	2.55	2.92	3.46	3.87	4.29
0:48	1.63	1.98	2.51	2.88	3.41	3.82	4.23
0:49	1.60	1.96	2.48	2.85	3.37	3.78	4.18
0:50	1.58	1.93	2.45	2.81	3.33	3.73	4.13
0:51	1.56	1.91	2.42	2.78	3.29	3.68	4.08
0:52	1.54	1.88	2.39	2.74	3.25	3.64	4.03
0:53	1.52	1.86	2.36	2.71	3.21	3.60	3.98
0:54	1.50	1.84	2.33	2.68	3.17	3.55	3.94
0:55	1.48	1.81	2.30	2.65	3.13	3.51	3.89
0:56	1.46	1.79	2.28	2.62	3.10	3.47	3.85
0:57	1.45	1.77	2.25	2.59	3.06	3.43	3.80
0:58	1.43	1.75	2.23	2.56	3.03	3.40	3.76
0:59	1.41	1.73	2.20	2.53	3.00	3.36	3.72
1:00	1.39	1.71	2.18	2.50	2.96	3.32	3.68
1:05	1.32	1.62	2.06	2.37	2.81	3.15	3.49
1:10	1.25	1.53	1.96	2.25	2.67	3.00	3.33
1:15	1.18	1.46	1.87	2.15	2.55	2.86	3.17
1:20	1.13	1.39	1.78	2.05	2.44	2.74	3.04
1:25	1.07	1.33	1.70	1.97	2.34	2.63	2.91
1:30	1.03	1.27	1.63	1.89	2.24	2.52	2.80
1:35	0.98	1.22	1.57	1.81	2.16	2.43	2.69
1:40	0.94	1.17	1.51	1.75	2.08	2.34	2.60
1:45	0.91	1.13	1.46	1.69	2.01	2.26	2.51
1:50	0.87	1.09	1.41	1.63	1.94	2.18	2.42
1:55	0.84	1.05	1.36	1.57	1.88	2.11	2.35
2:00	0.81	1.02	1.32	1.52	1.82	2.05	2.28
2:05	0.79	0.98	1.28	1.48	1.76	1.99	2.21
2:10	0.76	0.95	1.24	1.43	1.71	1.93	2.14
2:15	0.74	0.92	1.20	1.39	1.67	1.88	2.08
2:20	0.72	0.90	1.17	1.36	1.62	1.82	2.03
2:25	0.70	0.87	1.14	1.32	1.58	1.78	1.98
2:30	0.68	0.85	1.11	1.29	1.54	1.73	1.93
2:35	0.66	0.83	1.08	1.25	1.50	1.69	1.88
2:40	0.64	0.81	1.05	1.22	1.46	1.65	1.83
2:45	0.62	0.79	1.03	1.19	1.43	1.61	1.79
2:50	0.61	0.77	1.00	1.17	1.40	1.57	1.75
2:55	0.59	0.75	0.98	1.14	1.37	1.54	1.71
3:00	0.58	0.73	0.96	1.12	1.34	1.51	1.68

RAINFALL INTENSITY TABLE

SEDGWICK COUNTY
KANSAS

THIS TABLE CONTAINS AVERAGE RAINFALL INTENSITIES
IN INCHES PER HOUR.

DURATION, HR:MIN	RETURN PERIOD 1 YR	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR
3:15	0.54	0.69	0.90	1.05	1.26	1.42	1.58
3:30	0.51	0.65	0.85	0.99	1.19	1.34	1.49
3:45	0.48	0.61	0.80	0.94	1.12	1.27	1.41
4:00	0.46	0.58	0.76	0.89	1.07	1.21	1.34
4:15	0.44	0.55	0.73	0.85	1.02	1.15	1.28
4:30	0.42	0.53	0.70	0.81	0.98	1.10	1.23
4:45	0.40	0.51	0.67	0.78	0.94	1.06	1.18
5:00	0.38	0.49	0.64	0.75	0.90	1.02	1.13
5:15	0.37	0.47	0.62	0.72	0.87	0.98	1.09
5:30	0.35	0.45	0.60	0.70	0.83	0.94	1.05
5:45	0.34	0.44	0.58	0.67	0.81	0.91	1.01
6:00	0.33	0.42	0.56	0.65	0.78	0.88	0.98
6:30	0.31	0.40	0.52	0.61	0.73	0.83	0.92
7:00	0.30	0.38	0.50	0.58	0.69	0.78	0.87
7:30	0.28	0.36	0.47	0.55	0.66	0.74	0.83
8:00	0.27	0.34	0.45	0.52	0.62	0.70	0.78
8:30	0.26	0.33	0.43	0.50	0.60	0.67	0.75
9:00	0.25	0.31	0.41	0.48	0.57	0.64	0.72
9:30	0.24	0.30	0.39	0.46	0.55	0.62	0.69
10:00	0.23	0.29	0.38	0.44	0.52	0.59	0.66
10:30	0.22	0.28	0.36	0.42	0.50	0.57	0.63
11:00	0.21	0.27	0.35	0.41	0.49	0.55	0.61
11:30	0.21	0.26	0.34	0.39	0.47	0.53	0.59
12:00	0.20	0.25	0.33	0.38	0.45	0.51	0.57
13:00	0.19	0.24	0.31	0.36	0.43	0.48	0.53
14:00	0.18	0.22	0.29	0.34	0.40	0.45	0.50
15:00	0.17	0.21	0.27	0.32	0.38	0.43	0.47
16:00	0.16	0.20	0.26	0.30	0.36	0.40	0.45
17:00	0.15	0.19	0.25	0.29	0.34	0.38	0.43
18:00	0.15	0.18	0.24	0.27	0.33	0.37	0.41
19:00	0.14	0.18	0.23	0.26	0.31	0.35	0.39
20:00	0.14	0.17	0.22	0.25	0.30	0.34	0.37
21:00	0.13	0.16	0.21	0.24	0.29	0.32	0.36
22:00	0.13	0.16	0.20	0.23	0.28	0.31	0.34
23:00	0.12	0.15	0.19	0.22	0.27	0.30	0.33
24:00	0.12	0.15	0.19	0.22	0.26	0.29	0.32

(3 pages)

ATTACHMENT D

DRAINAGE CRITERIA

CITY OF WICHITA, KANSAS

RECOMMENDED RUNOFF COEFFICIENTS FOR RATIONAL METHOD
AND PERCENT IMPERVIOUS FOR UNIT HYDROGRAPH METHOD

Land Use or Surface Characteristics	Percent Impervious	Frequency 2	5	10	100
1. Business:					
Downtown Areas	95	0.84	0.85	0.87	0.91
Neighborhood Areas	70	0.68	0.69	0.73	0.80
2. Residential:					
Single Family (Soil Group D)					
1/8 Acre	50	0.57	0.61	0.66	0.79
1/4 Acre	38	0.50	0.54	0.62	0.76
1/3 Acre	30	0.46	0.50	0.59	0.73
1/2 Acre	25	0.42	0.48	0.56	0.72
3/4 Acre	22	0.42	0.46	0.55	0.71
1 Acre	20	0.41	0.45	0.54	0.71
Multi-Family (Soil Group D)					
Multi-Unit (detached)	60	0.62	0.66	0.72	0.82
Multi-Unit (attached)	65	0.64	0.68	0.73	0.83
Apartments	75	0.70	0.73	0.79	0.86
Single Family (Soil Group C)					
1/8 Acre	50	0.55	0.58	0.64	0.73
1/4 Acre	38	0.48	0.51	0.57	0.68
1/3 Acre	30	0.43	0.46	0.53	0.65
1/2 Acre	25	0.40	0.43	0.50	0.63
3/4 Acre	22	0.39	0.42	0.49	0.62
1 Acre	20	0.37	0.40	0.48	0.61
Multi-Family (Soil Group C)					
Multi-Unit (detached)	60	0.60	0.63	0.69	0.77
Multi-Unit (attached)	65	0.63	0.66	0.71	0.79
Apartments	75	0.68	0.72	0.77	0.83
Single-Family (Soil Group B)					
1/8 Acre	50	0.52	0.54	0.59	0.67
1/4 Acre	38	0.44	0.46	0.52	0.61
1/3 Acre	30	0.39	0.41	0.47	0.57
1/2 Acre	25	0.36	0.38	0.44	0.54
3/4 Acre	22	0.34	0.36	0.42	0.52
1 Acre	20	0.33	0.35	0.40	0.51
Multi-Family (Soil Group B)					
Multi-Unit (detached)	60	0.58	0.60	0.65	0.72
Multi-Unit (attached)	65	0.61	0.64	0.68	0.75
Apartments	75	0.67	0.70	0.74	0.80

Land Use or Surface Characteristics	Percent Impervious	Frequency 2	5	10	100
Single Family (Soil Group A)					
1/8 Acre	50	0.47	0.50	0.54	0.60
1/4 Acre	38	0.39	0.41	0.45	0.52
1/3 Acre	30	0.33	0.35	0.39	0.47
1/2 Acre	25	0.30	0.31	0.35	0.44
3/4 Acre	22	0.28	0.29	0.33	0.42
1 Acre	20	0.26	0.28	0.32	0.40
Multi-Family (Soil Group A)					
Multi-Unit (detached)	60	0.55	0.57	0.61	0.67
Multi-Unit (attached)	65	0.58	0.60	0.64	0.70
Apartments	75	0.65	0.68	0.72	0.77
3. Industrial:					
Light Areas	70	0.68	0.69	0.73	0.80
Heavy Areas	80	0.74	0.76	0.79	0.84
4. Playgrounds:	15	0.33	0.35	0.42	0.55
Schools:	40	0.49	0.51	0.56	0.66
Railroad Yard Areas:	30	0.43	0.45	0.50	0.62
7. Undeveloped Urban Areas: Offsite Flow Analysis (when land use not defined)	45	0.52	0.54	0.59	0.68
8. Streets:					
Paved	99	0.87	0.88	0.90	0.93
Gravel	00	0.24	0.26	0.33	0.48
9. Drive, Parking Lots and Walks:	96	0.87	0.87	0.88	0.89
10. Roofs:	90	0.80	0.85	0.90	0.93
11. Urban Lawn Areas (See Note No. 1 below):					
Soil Group A					
Slope less than 1%	00	0.08	0.09	0.13	0.23
Slope 1% to 4%	00	0.12	0.13	0.17	0.27
Slope more than 4%	00	0.16	0.17	0.21	0.31
Soil Group B					
Slope less than 1%	00	0.26	0.18	0.24	0.37
Slope 1% to 4%	00	0.20	0.22	0.28	0.41
Slope more than 4%	00	0.24	0.26	0.32	0.45
Soil Group C					
Slope less than 1%	00	0.24	0.27	0.35	0.51
Slope 1% to 4%	00	0.26	0.29	0.37	0.53
Slope more than 4%.	00	0.28	0.31	0.39	0.55

Land Use or Surface Characteristics	Percent Impervious	Frequency 2	5	10	100
Soil Group D					
Slope less than 1%	00	0.28	0.33	0.43	0.63
Slope 1% to 4%	00	0.30	0.35	0.45	0.65
Slope more than 4%	00	0.32	0.37	0.47	0.67

Note No. 1: Coefficients shown in the above table are for pervious open space areas with thick turf which includes pervious areas in parks and cemeteries. Coefficients shown above must be increased 0.02 for use with agricultural pasture areas. Coefficients shown above must be reduced by 0.04 for use with agricultural cultivated areas. Group A soils are well-drained, coarse textured sands with high infiltration rates. Group B soils are moderately well-drained, moderately coarse textured soils with moderate infiltration rates. Group C soils are moderately poor-drained, moderately fine textured soils with slow infiltration rates. Group D soils are poor-drained, fine textured soils with very slow infiltration rates.

GENERAL NOTE: These Rational Formula Coefficients may not be valid for large basins.

ATTACHMENT E

DRAINAGE CRITERIA

CITY OF WICHITA, KANSAS

AVERAGE OVERLAND FLOW VELOCITY FOR USE WITH URBANIZED AREAS

Surface Type	VELOCITY IN FEET/SECOND FOR SLOPES IN PERCENT SHOWN																			
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	20.0
Forrest with Heavy Ground Litter or Meadow	0.08	0.11	0.14	0.16	0.18	0.19	0.20	0.22	0.23	0.25	0.35	0.42	0.50	0.55	0.60	0.66	0.70	0.75	0.80	1.10
Fallow or Minimum Tillage Cultivation	0.15	0.21	0.26	0.29	0.33	0.35	0.39	0.41	0.44	0.46	0.65	0.80	0.92	1.10	1.20	1.30	1.40	1.50	1.60	2.10
Short Grass Pasture or Lawns	0.23	0.32	0.38	0.44	0.50	0.53	0.58	0.62	0.66	0.70	1.00	1.20	1.40	1.60	1.80	1.90	2.00	2.10	2.20	3.20
Almost Bare Ground	0.32	0.44	0.53	0.62	0.69	0.75	0.82	0.87	0.92	0.98	1.40	1.70	1.90	2.10	2.30	2.50	2.70	2.90	3.10	4.40
Grassed Waterway	0.50	0.68	0.83	0.95	1.10	1.20	1.30	1.40	1.50	1.60	2.20	2.60	3.00	3.40	3.70	4.00	4.30	4.60	4.80	7.00
Paved Areas (Sheet Flow) or Shallow Gutter Flow	0.63	0.89	1.10	1.30	1.50	1.60	1.70	1.80	1.90	2.00	2.80	3.40	4.00	4.50	4.90	5.30	5.70	6.00	6.20	9.00

TABLE 16.--SOIL AND WATER FEATURES

[ence of an entry indicates the feature is not a concern. The definitions of "flooding" and "water table" in the Glossary explain such terms as "rare," "brief," and "perched." The symbol > means greater than]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness
					Ft			In	
Albion:									
[1]Aa:									
Albion part----	B	None---------	---	---	>6.0	---	---	>60	---
Shellabarger part----------	B	None---------	---	---	>6.0	---	---	>60	---
[1]Ab:									
Albion part----	B	None---------	---	---	>6.0	---	---	>60	---
Shellabarger part----------	B	None---------	---	---	>6.0	---	---	>60	---
Blanket:									
Ba, Bb----------	C	None---------	---	---	>6.0	---	---	>60	---
Canadian:									
Ca----------	B	Rare---------	---	---	>6.0	---	---	>60	---
[1]Cb:									
Canadian part--	B	Rare---------	---	---	>6.0	---	---	>60	---
Waldeck part---	C	Occasional	Brief-----	Mar-Oct	2.0-6.0	Apparent	Oct-Apr	>60	---
Carwile:									
Ca----------	D	Occasional	Brief to very long.	Apr-Oct	2.0-6.0	Apparent	Oct-Apr	>60	---
Clark:									
[1]Cd:									
Clark part-----	B	None---------	---	---	>6.0	---	---	>60	---
Ost part-------	B	None---------	---	---	>6.0	---	---	>60	---
Clime:									
Ce----------	C	None---------	---	---	>6.0	---	---	20-40	Rippable
Elandco:									
Ea, Eb, Ec-------	B	Rare to common.	Brief-----	Oct-May	>6.0	---	---	>60	---
Farnum:									
Fa, Fb, Fc-------	B	None---------	---	---	>6.0	---	---	>60	---
Goessel:									
Ga, Gb----------	D	None---------	---	---	>6.0	---	---	>60	---
Irwin:									
Ia, Ib, Ic-------	D	None---------	---	---	>6.0	---	---	>40	Hard
Lesho:									
La----------	C	Occasional	Very brief	Mar-Jul	2.0-6.0	Apparent	Jan-Dec	>60	---
Lincoln:									
Lb----------	A	Common------	Very brief to brief.	Apr-Oct	5.0-8.0	Apparent	Nov-May	>60	---
Milan:									
Ma, Mb, Mc-------	B	None---------	---	---	>6.0	---	---	>60	---

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness
					Ft			In	
Naron:									
Na	B	None	---	---	>6.0	---	---	>60	---
Owens:									
Oc	D	None	---	---	>6.0	---	---	10-20	Rippable
[1]Od:									
Owens part	D	None	---	---	>6.0	---	---	10-20	Rippable
Rock outcrop part.									
Pits:									
Pa.									
Plevna:									
Pb	D	Frequent	Brief to long.	Mar-Oct	0-4.0	Apparent	Jan-Dec	>60	---
Pratt:									
Pc	A	None	---	---	>6.0	---	---	>60	---
[1]Pd:									
Pratt part	A	None	---	---	>6.0	---	---	>60	---
Tivoli part	A	None	---	---	>6.0	---	---	>60	---
Renfrow:									
Ra, Rb	D	None	---	---	>6.0	---	---	>60	---
[1]Rc:									
Renfrow part	D	None	---	---	>6.0	---	---	>60	---
Owens part	D	None	---	---	>6.0	---	---	10-20	Rippable
Rosehill:									
Rd	D	None	---	---	>6.0	---	---	20-40	Rippable
Shellabarger:									
Sa, Sb, Sc	B	None	---	---	>6.0	---	---	>60	---
Tabler:									
Ta	D	None	---	---	2.5-3.5	Perched	Oct-Apr	>60	---
[1]Tb:									
Tabler part	D	None	---	---	2.5-3.5	Perched	Oct-Apr	>60	---
Drummond part	D	Rare	---	---	2.0-6.0	Apparent	Nov-Apr	>60	---
Urban land:									
[1]Ua:									
Urban land part.									
Canadian part	B	Rare	---	---	>6.0	---	---	>60	---
[1]Ub:									
Urban land part.									
Elandco part	B	Rare to common.	Brief	Oct-May	>6.0	---	---	>60	---
[1]Uc:									
Urban land part.									
Farnum part	B	None	---	---	>6.0	---	---	>60	---

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness
					Ft			In	
Urban land:									
[1]Ud:									
Urban land part.									
Irwin part-----	D	None---------	---	---	>6.	---	---	>40	Hard
[1]Ue:									
Urban land part.									
Tabler part----	D	None---------	---	---	2.5-3.5	Perched	Oct-Apr	>60	---
Vanoss:									
Va, Vb, Vc, Vd---	B	None---------	---	---	>6.0	---	---	>60	---
Vernon:									
Ve, Vf----------	D	None---------	---	---	>6.0	---	---	>60	---
Waldeck:									
Wa----------	C	Occasional	Brief-----	Mar-Oct	2.0-6.0	Apparent	Oct-Apr	>60	---
Waurika:									
Wb----------	D	None---------	---	---	1.0-2.0	Perched	Mar-May	>60	---

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior of the whole map unit.

Table 2-2.--Runoff curve numbers for selected agricultural, suburban, and urban land use. (Antecedent moisture condition II, and $I_a = 0.2S$)

LAND USE DESCRIPTION	HYDROLOGIC SOIL GROUP			
	A	B	C	D
Cultivated land[1]: without conservation treatment	72	81	88	91
: with conservation treatment	62	71	78	81
Pasture or range land: poor condition	68	79	86	89
good condition	39	61	74	80
Meadow: good condition	30	58	71	78
Wood or Forest land: thin stand, poor cover, no mulch	45	66	77	83
good cover[2]	25	55	70	77
Open Spaces, lawns, parks, golf courses, cemeteries, etc.				
good condition: grass cover on 75% or more of the area	39	61	74	80
fair condition: grass cover on 50% to 75% of the area	49	69	79	84
Commercial and business areas (85% impervious)	89	92	94	95
Industrial districts (72% impervious).	81	88	91	93
Residential:[3]				
Average lot size — Average % Impervious[4]				
1/8 acre or less — 65	77	85	90	92
1/4 acre — 38	61	75	83	87
1/3 acre — 30	57	72	81	86
1/2 acre — 25	54	70	80	85
1 acre — 20	51	68	79	84
Paved parking lots, roofs, driveways, etc.[5]	98	98	98	98
Streets and roads:				
paved with curbs and storm sewers[5]	98	98	98	98
gravel	76	85	89	91
dirt	72	82	87	89

[1] For a more detailed description of agricultural land use curve numbers refer to National Engineering Handbook, Section 4, Hydrology, Chapter 9, Aug. 1972.

[2] Good cover is protected from grazing and litter and brush cover soil.

[3] Curve numbers are computed assuming the runoff from the house and driveway is directed towards the street with a minimum of roof water directed to lawns where additional infiltration could occur.

[4] The remaining pervious areas (lawn) are considered to be in good pasture condition for these curve numbers.

[5] In some warmer climates of the country a curve number of 95 may be used.

TABLE 2. Runoff Curve Numbers for Hydrologic Soil-Cover Complexes
(Antecedent Moisture Condition II, and I_a = 0.2 S)

Land Use Description/Treatment/Hydrologic Condition			Hydrologic Soil Group			
			A	B	C	D
Residential:[1]						
Average lot size	Average % Impervious[2]					
1/8 acre or less	65		77	85	90	92
1/4 acre	38		61	75	83	87
1/3 acre	30		57	72	81	86
1/2 acre	25		54	70	80	85
1 acre	20		51	68	79	84
Paved parking lots, roofs, driveways, etc.[3]			98	98	98	98
Streets and roads:						
paved with curbs and storm sewers[3]			98	98	98	98
gravel			76	85	89	91
dirt			72	82	87	89
Commercial and business areas (85% impervious)			89	92	94	95
Industrial districts (72% impervious)			81	88	91	93
Open Spaces, lawns, parks, golf courses, cemeteries, etc.						
good condition: grass cover on 75% or more of the area			39	61	74	80
fair condition: grass cover on 50% to 75% of the area			49	69	79	84
Fallow	Straight row	---	77	86	91	94
Row crops	Straight row	Poor	72	81	88	91
	Straight row	Good	67	78	85	89
	Contoured	Poor	70	79	84	88
	Contoured	Good	65	75	82	86
	Contoured & terraced	Poor	66	74	80	82
	Contoured & terraced	Good	62	71	78	81
Small grain	Straight row	Poor	65	76	84	88
		Good	63	75	83	87
	Contoured	Poor	63	74	82	85
		Good	61	73	81	84
	Contoured & terraced	Poor	61	72	79	82
		Good	59	70	78	81
Close -seeded	Straight row	Poor	66	77	85	89
legumes[4]	Straight row	Good	58	72	81	85
or	Contoured	Poor	64	75	83	85
rotation	Contoured	Good	55	69	78	83
meadow	Contoured & terraced	Poor	63	73	80	83
	Contoured & terraced	Good	51	67	76	80
Pasture		Poor	68	79	86	89
or range		Fair	49	69	79	84
		Good	39	61	74	80
	Contoured	Poor	47	67	81	88
	Contoured	Fair	25	59	75	83
	Contoured	Good	6	35	70	79
Meadow		Good	30	58	71	78
Woods or		Poor	45	66	77	83
Forest land		Fair	36	60	73	79
		Good	25	55	70	77
Farmsteads		---	59	74	82	86

[1] Curve numbers are computed assuming the runoff from the house and driveway is directed towards the street with a minimum of roof water directed to lawns where additional infiltration could occur.

[2] The remaining pervious areas (lawn) are considered to be in good pasture condition for these curve numbers.

[3] In some warmer climates of the country a curve number of 95 may be used.

[4] Close -drilled or broadcast.

SECTION 7

ESTIMATING THE TIME-OF-CONCENTRATION

Time is an important element in hydrologic forecasting. This is reflected in the fact that most hydrologic methods include a time variable as input. The SCS methods are no different, and the time-of-concentration was selected as the best indicator of the effects of time.

The time-of-concentration (t_c) is a measure of the time for a particle of water to travel from the hydrologically most distant point in the watershed to the point where the design is to be made. Additionally, the following operational definition is sometimes used with respect to unit hydrographs: the time-of-concentration is the time from the end of rainfall excess to the point of inflection on the recession. While this operational definition will be used in developing the SCS unit hydrograph, the former definition should be understood for the computation of time-of-concentration estimates.

Hydrologists have developed numerous methods for estimating the time-of-concentration. Two methods are recommended within NEH-4 and TR-55, the lag method and the upland, or velocity, method. Almost all methods of estimating the time-of-concentration use the slope, the hydraulic length, and some measure of land use; the lag and velocity methods are no different in that they use these three factors. The hydraulic length is the distance from the hydrologically most distant point in the watershed to the point where the design is to be made.

The Lag Method

The lag method relates the time lag (L) which is defined as the time in hours from the center of mass of rainfall excess to the peak discharge, to the slope (Y) in percent, the hydraulic length (ℓ) in feet, and the maximum retention (S):

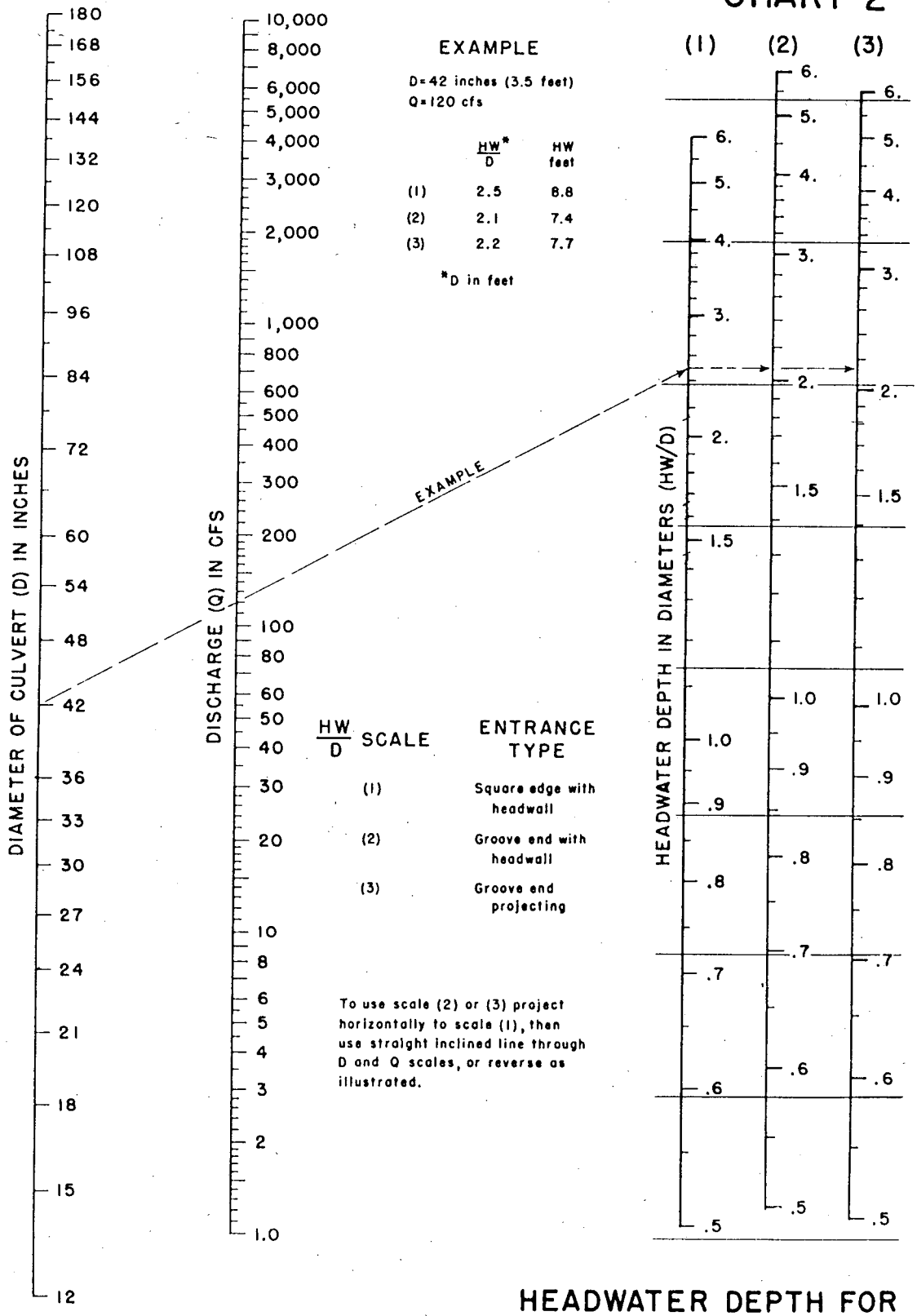
$$L = \frac{\ell^{0.8}(S+1)^{0.7}}{1900\,Y^{0.5}} \qquad (9)$$

in which S is given by Eq. 8. The time lag can also be determined from the nomograph of Fig. 7. Empirical evidence used in developing the SCS methods resulted in the following relationship between the time-of-concentration and the lag:

$$t_c = \frac{5}{3} L \qquad (10)$$

in which t_c is measured in hours.

CHART 2



EXAMPLE

D=42 inches (3.5 feet)
Q=120 cfs

	$\frac{HW}{D}$*	HW feet
(1)	2.5	8.8
(2)	2.1	7.4
(3)	2.2	7.7

*D in feet

$\frac{HW}{D}$ SCALE	ENTRANCE TYPE
(1)	Square edge with headwall
(2)	Groove end with headwall
(3)	Groove end projecting

To use scale (2) or (3) project horizontally to scale (1), then use straight inclined line through D and Q scales, or reverse as illustrated.

HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

HEADWATER SCALES 2&3
REVISED MAY 1964

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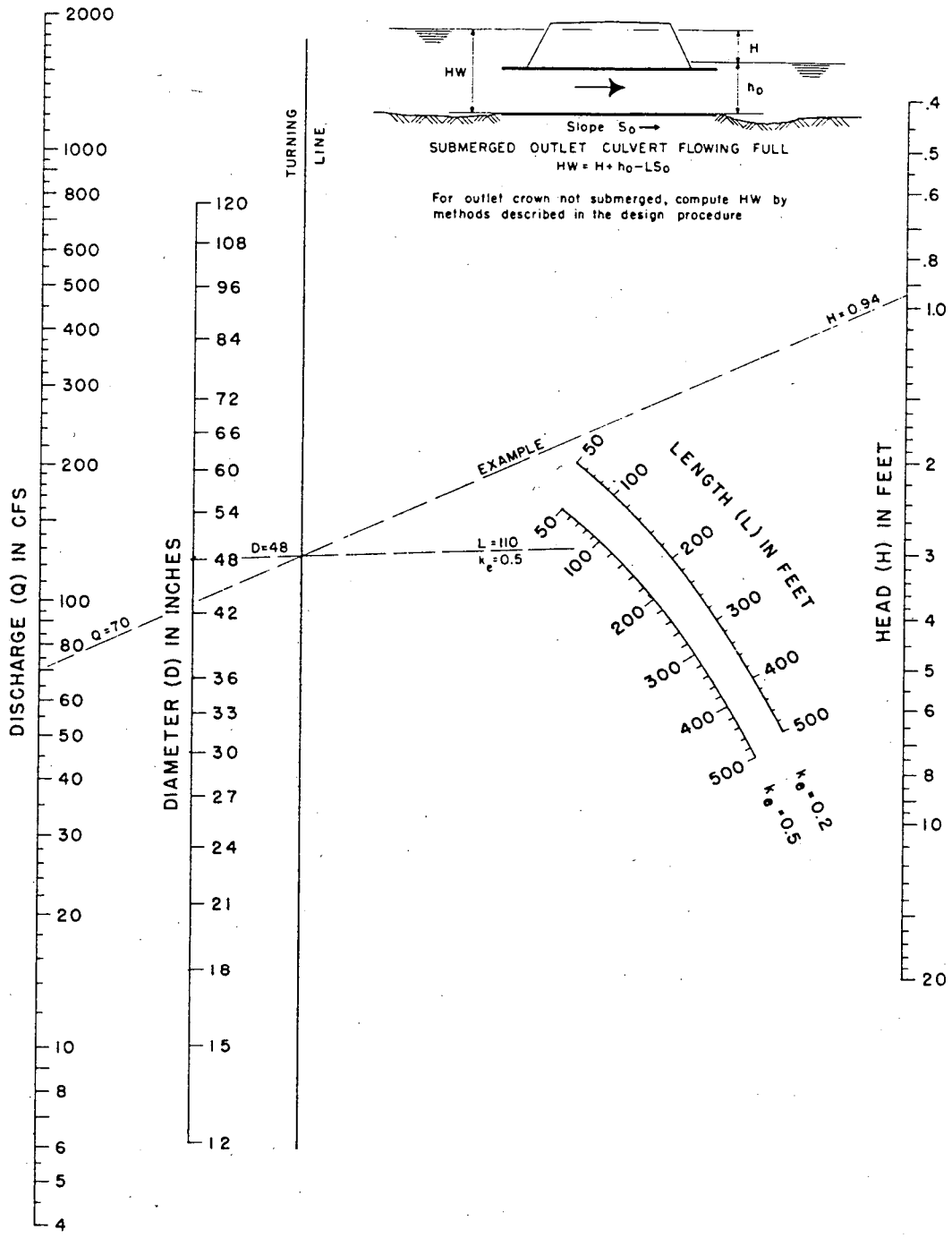
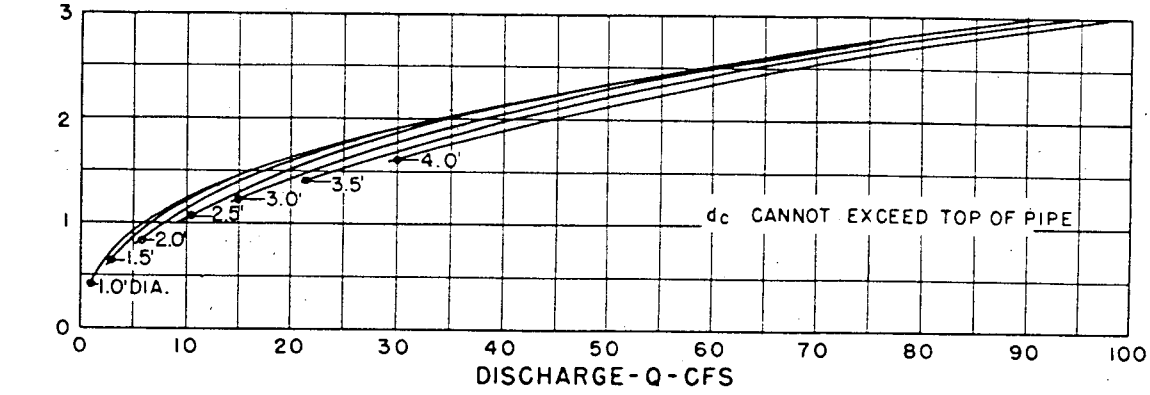
CHART 9

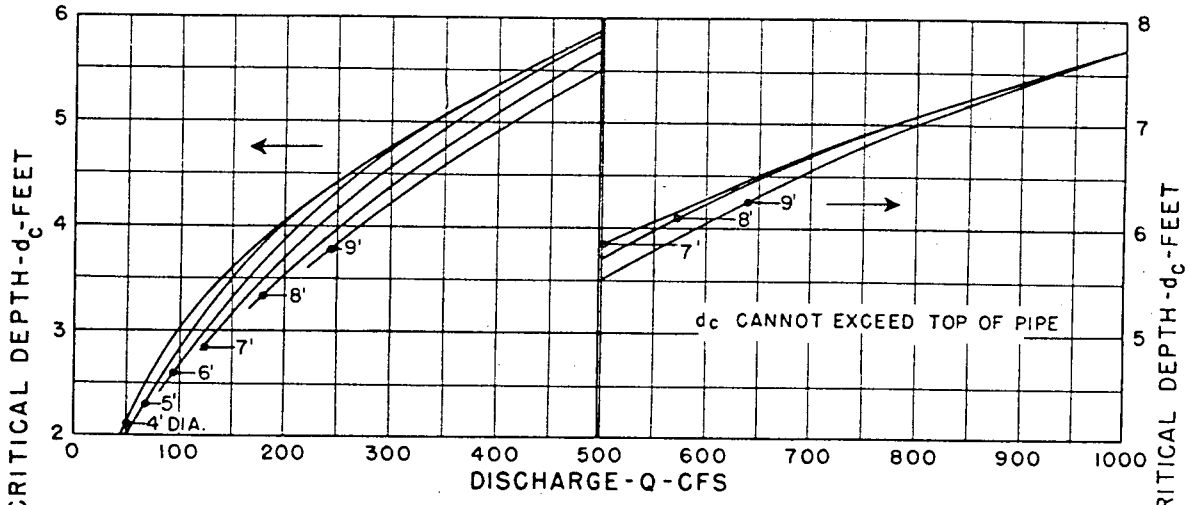


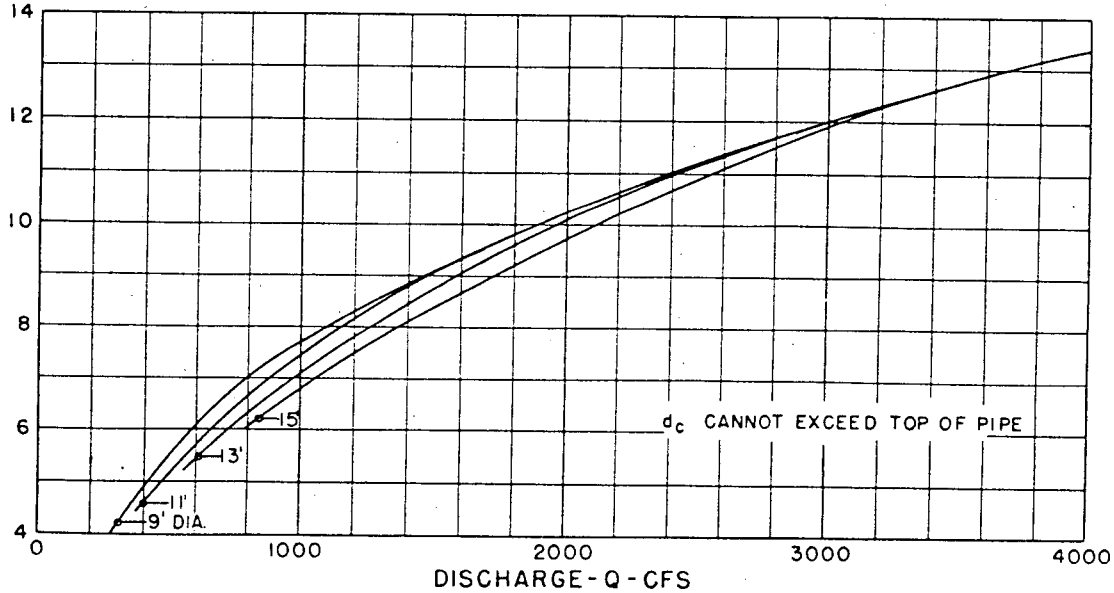
HEAD FOR CONCRETE PIPE CULVERTS FLOWING FULL n = 0.012

BUREAU OF PUBLIC ROADS JAN. 1963

CHART 16







BUREAU OF PUBLIC ROADS

JAN. 1964

CRITICAL DEPTH
CIRCULAR PIPE