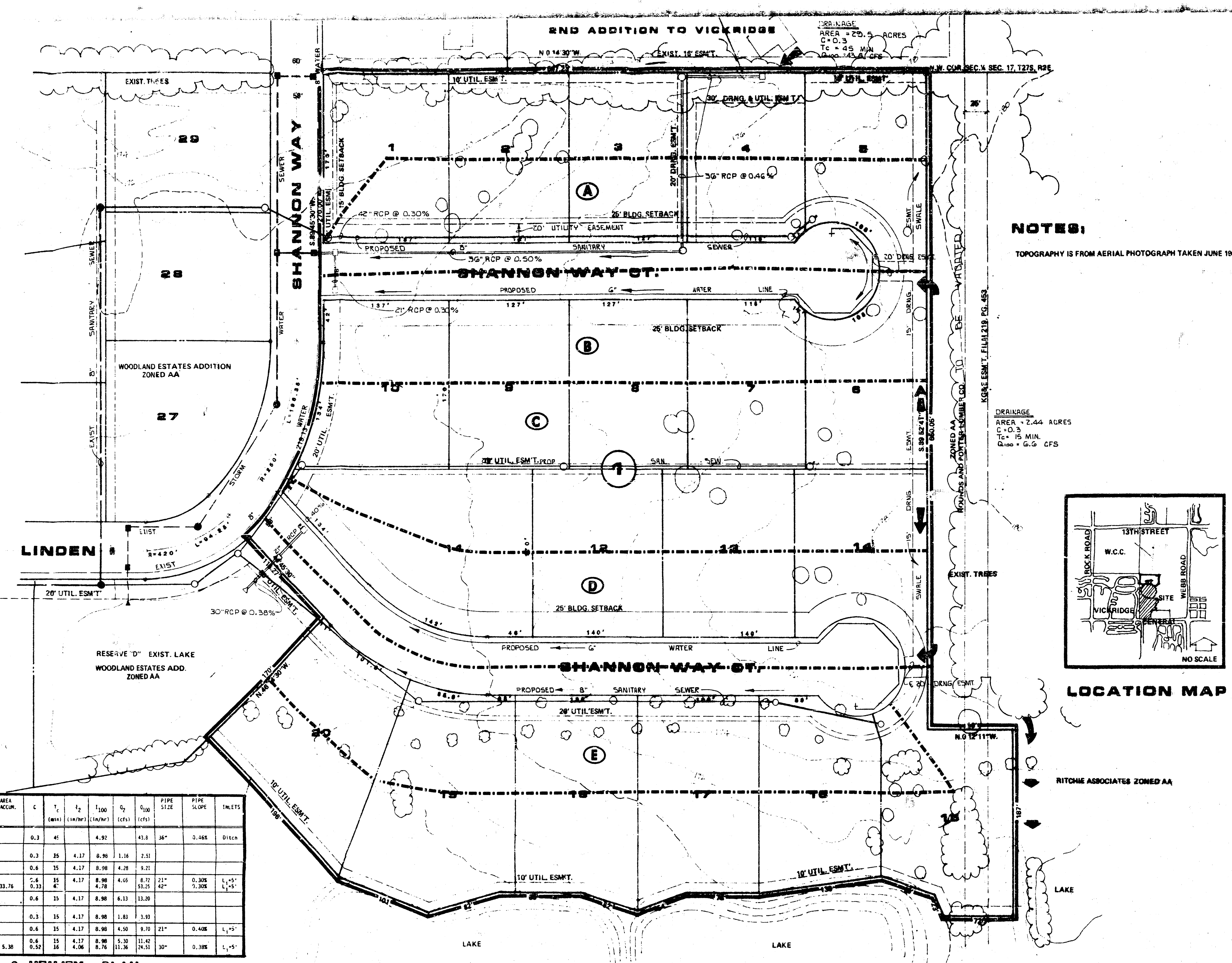


WOODLAND ESTATES II	AREA (acres)	AREA ACCUM.	C	T_c (min)	I_2 (in/hr)	I_{100} (in/hr)	Q_2 (cfs)	Q_{100} (cfs)	PIPE SIZE	PIPE SLOPE	INLETS
Drainage Area from Wichita Country Club	29.50		0.3	45		4.92		43.8	36"	0.46%	Ditch
Drainage Area to North	0.93		0.3	15	4.17	8.98	1.16	2.51			
A	1...		0.6	15	4.17	8.98	4.28	9.21			
B	1.62	33.76	0.6 0.33	15 47	4.17	8.98 4.78	4.05	8.72 53.25	21" 42"	0.30% 0.30%	L_1=5' L_1=5'
C	2.45		0.6	15	4.17	8.98	6.13	13.20			
Drainage Area to North	1.46		0.3	15	4.17	8.98	1.83	3.93			
D	1.80		0.6	15	4.17	8.98	4.50	9.70	21"	0.40%	L_1=5'
E	2.12	5.38	0.6 0.52	15 16	4.17 4.06	8.98 8.76	5.30 11.36	11.42 24.51	30"	0.38%	L_1=5'

DRAINAGE & UTILITY PLAN

WOODLAND ESTATES 2ND

OWNER: RITCHIE ASSOCIATES 8100 E. 22ND STREET NORTH BLDG. 500 WICHITA KANSAS 67226

2' CONTOUR INTERVALS

MID-KANSAS ENGINEERING CONSULTANTS PA
3500 N. ROCK ROAD
BUILDING 800
WICHITA, KANSAS 67226
682-4581

MID-KANSAS ENGINEERING CONSULTANTS, P.A.
3500 N. Rock Road, #800
Wichita, KS 67226

PROJECT: Woodland Estates Second & Third

PROJECT #: DATE: 01/12/87

TO: Carl Gipson
Engineering Department
455 N. Main, 7th Floor
Wichita, KS 67202

Mr. Frank Nelson has met with you regarding our storm sewer plans for the referenced additions. We have asked for a meeting with Mr. Bill Yung to understand or obtain plans for how Mr. Coulter will convey storm run off through his "platted" lots to tie with the proposed storm water sewer.

If the plans for Mr. Coulters lots cannot be solved within the next two weeks we will call a meeting with you to discuss our proposed solution, so as to permit the construction plans for Woodland Estates II to be bid.

MID-KANSAS ENGINEERING CONSULTANTS, P.A.

Kenneth H. Bengtson

Kenneth H. Bengtson, P.E.

KHB/dm

cc: Vicki Huang
Bill Yung
Jack Ritchie

MID-KANSAS ENGINEERING CONSULTANTS P.A.
CALCULATIONS & SKETCHES

By: KEW Date: 3/5/86 Sheet: 1

Location: Lake point
Reference: Lakes east of Woodland Estates 2nd

North Lake

Elev	Area (acres)	Storage (acre-ft)	Elev.	Storage
162	0.44			
163	0.51	0.48		
164	0.57	1.02		
165	0.62	1.62		
166	0.69	2.28	168	0
167	0.75	[illegible]	168.5	~~.44~~ .42
168	~~0.85~~	3.8	169	~~.93~~ .45
169	~~1.00~~	4.1	169.5	~~1.47~~ 1.37
170	~~1.17~~	5.82	170	~~2.07~~ 1.43

South Lake

Elev	Area (acres)	Storage (acre-ft)	Elev	Storage
160	0.61			
161	0.70	0.66		
162	0.76	1.39		
163	0.82	2.19	165	0
164	0.89	3.05	165.5	~~0.57~~
165	~~1.06~~	4.02	166.0	~~1.19~~ 1.07
166	~~1.57~~	5.21	166.5	~~1.79~~ 1.52
167	1.50	6.62	167	~~2.60~~

Drainage Area to Lake = 62.2 + 10.3 = 72.5 acres

$C = 0.76$, $CN = 87$ $l = 3300'$, $Y = 1.33$

$S = \frac{1000}{87} - 10 = 1.49$ $L = \frac{3300^{0.8}(1.49+1)^{0.7}}{1900(1.33)^{0.5}} = 0.56$ hrs

Time 100 $F_{time} = 0.55$ ... $T_c = 0.56(.55)(33) = 0.26$ hr = 16 min

$Q_{100} = (.76)(7.18)(72.5) = 395.6$ cfs $Q_2 = (.5)(3.7)(72.5) = 134.35$

Try Cipolatti Weir ; B = 40' ; B = 50' ; B = 60'

H	Q_{40}	Q_{50}	Q_{60}	H	Q_{40}	Q_{50}	Q_{60}
0.5	47.6	59.5	71.4	2.0	380.9	476.2	571.4
1.0	134.6	168.4	202.0	2.5	532.4	665.5	798.6
1.5	247.4	309.3	371.1	3.0			

MID-KANSAS ENGINEERING CONSULTANTS P.A.
CALCULATIONS & SKETCHES

By: KEW Date: 3/5/86 Sheet: 2

Location: Lake point
Reference: Lakes east of Woodland Estates 2nd

Try 80' Cipolatti Weir

H	Q_{80}
0.5	95.2
1.0	269.4
1.5	494.8
2.0	761.9
2.5	1064.9

For South Lake, assume contracted weir

Try $B = 25 + 25 + 40' = 90'$; $Y = 165 - 160 = 5'$

$C_1 = (.6035 + .0813(\frac{H}{Y}) + \frac{.000295}{Y})(1 + \frac{.00361}{H})^{3/2}$

$Q = \frac{2}{3}(C_1) b \sqrt{2g}(H)^{3/2}$ $b_{effective} = b_{actual} - (.1)(N)(H)$ N=2

H	C_1	b_{eff}	Q
0.5	.6183	89.9	105.1
1.0	.6232	89.8	299.4
1.5	.6302	89.7	555.0
2.0	.6378	89.6	864.7

Check Flow in Channel down with weir.

Per V.T. Chow, n = 0.030 for rip-rap d = 1', B = 40'

Try S = ..., Q = 191.79 cfs. N.G.

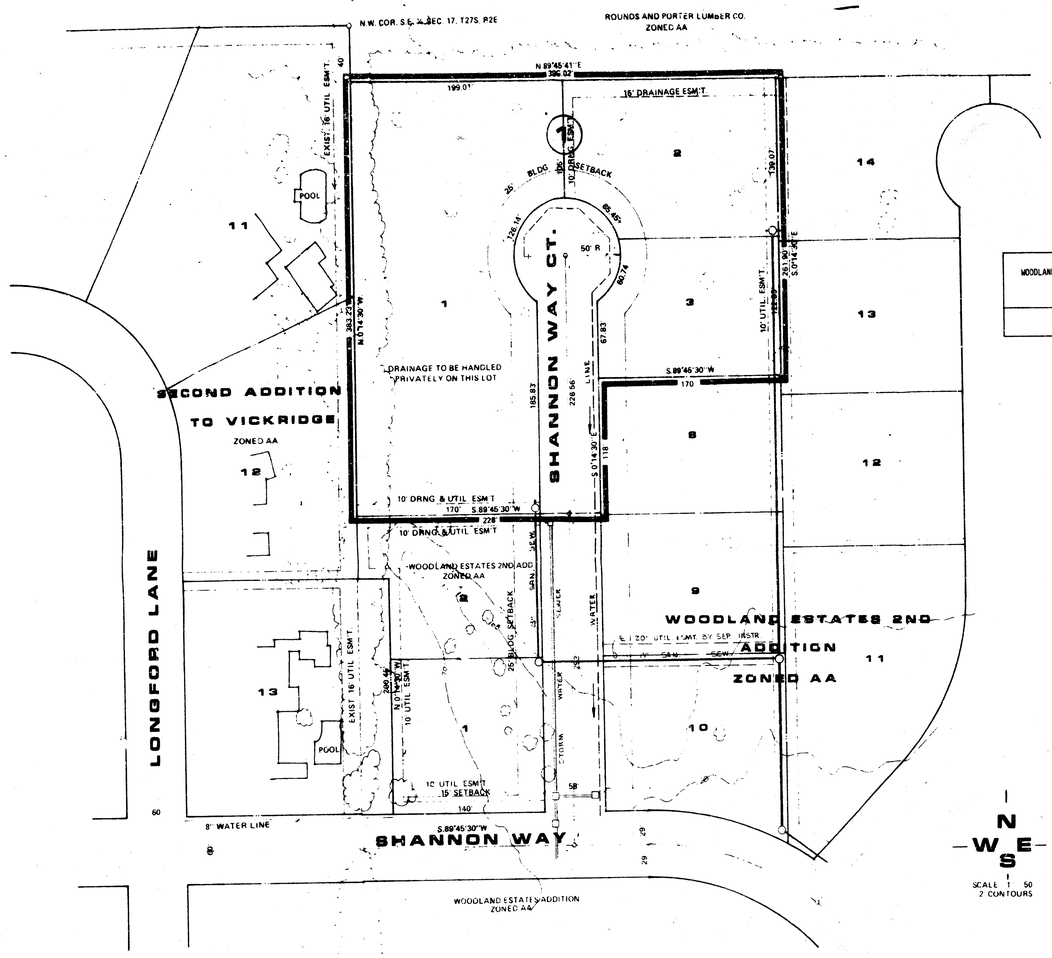
WOODLAND ESTATES 2ND ADD.

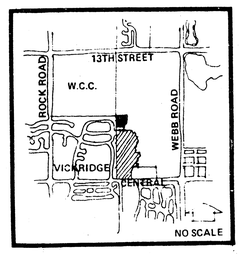
```
******************80-80 LIST OF INPUT DATA FOR TR-20 HYDROLOGY******************

JOB TR-20             FULLPRINT          SUMMARY   NOPLOTS                 10
TITLE 003 LAKEPOINT, N W  LAKES: 100 YEAR, 24 HOUR EVENT USING SCS         20
TITLE     TR-20, CURVE 2   80-FOOT WEIR                                    30
3 STRUCT     01                                                            40
8                      168.00       0.00     0.0                           50
8                      168.50      95.2      0.40                          60
8                      169.00     269.4      0.90                          70
8                      169.50     494.8      1.37                          80
8                      170.00     761.9      1.93                          90
9 ENDTBL                                                                  100
3 STRUCT     02                                                           110
8                      165.00       0.00     0.0                          120
8                      165.50      95 2      0.51                         130
8                      166.00     269.40     1.07                         140
8                      166.50     494.8      1.52                         150
8                      167.00     761.90     2.27                         160
9 ENDTBL                                                                  170
6 RUNOFF 1   01   5      0.113      87.0     0.26  1 1  1  1              180
6 RESVOR 2   01 5  6   168.00                      1 1 1 1  1             190
6 RESVOR 2   02 6  5   165.00                      1 1 1 1  1             200
  ENDATA                                                                  210
7 INCREM 6              0.10                                              220
7 COMPUT 7   01   02               7.8       1.0   2 2  01  06            230
  ENDCMP 1                                                                240
  ENDJOB 2                                                                250

************************************END OF 80-80 LIST************************************
```

```
TR20 XEQ        LAKEPOINT, N.W. LAKES: 100 YEAR, 24 HOUR EVENT USING SCS     30     JOB  1  PASS  1
REV 09/01/83    TR-20, CURVE 2   80-FOOT WEIR                                30             PAGE  1

FILE NO. 3

              COMPUTER PROGRAM FOR PROJECT FORMULATION - HYDROLOGY   USER NOTES

THE USERS MANUAL FOR THIS PROGRAM IS THE MAY 1982 DRAFT OF TR-20.  CHANGES FROM THE 2/14/74 VERSION INCLUDE:

REACH ROUTING - THE MODIFIED ATT-KIN ROUTING PROCEDURE REPLACES THE CONVEX METHOD.  INPUT DATA PREPARED FOR
   PREVIOUS PROGRAM VERSIONS USING CONVEX ROUTING COEFFICIENTS WILL NOT RUN ON THIS VERSION.

   THE PREFERRED TYPE OF DATA ENTRY IS CROSS SECTION DATA REPRESENTATIVE OF A REACH.  IT IS RECOMMENDED THAT
   THE OPTIONAL CROSS SECTION DISCHARGE-AREA PLOTS BE OBTAINED WHENEVER NEW CROSS SECTION DATA IS ENTERED.
   THE PLOTS SHOULD BE CHECKED FOR REASONABLENESS AND ADEQUACY OF INPUT DATA FOR THE COMPUTATION OF "M"
   VALUES USED IN THE ROUTING PROCEDURE.

   GUIDELINES FOR DETERMINING OR ANALYZING REACH LENGTHS AND COEFFICIENTS (X,M) ARE AVAILABLE IN THE USERS
   MANUAL.  SUMMARY TABLE 2 DISPLAYS REACH ROUTING RESULTS AND ROUTING PARAMETERS FOR COMPARISON AND CHECKING.

HYDROGRAPH GENERATION - THE PROCEDURE TO CALCULATE THE INTERNAL TIME INCREMENT AND PEAK TIME OF THE UNIT
   HYDROGRAPH HAVE BEEN IMPROVED.  PEAK DISCHARGES AND TIMES MAY DIFFER FROM THE PREVIOUS VERSION.  OUTPUT
   HYDROGRAPHS ARE STILL INTERPOLATED, PRINTED, AND ROUTED AT THE USER SELECTED MAIN TIME INCREMENT.

INTERMEDIATE PEAKS - METHOD ADDED TO PROVIDE DISCHARGES AT INTERMEDIATE POINTS WITHIN REACHES WITHOUT ROUTING.

OTHER - THIS VERSION CONTAINS SOME ADDITIONS TO THE INPUT AND NUMEROUS MODIFICATIONS TO THE OUTPUT.  USER
   OPTIONS HAVE BEEN MODIFIED AND AUGMENTED ON THE JOB RECORD, PRINTABLES ADDED, ERROR AND WARNING MESSAGES
   EXPANDED, AND THE SUMMARY TABLES COMPLETELY REVISED.  THE HOLDOUT OPTION IS NOT OPERATIONAL AT THIS TIME.

PROGRAM QUESTIONS OR PROBLEMS SHOULD BE DIRECTED TO HYDRAULIC ENGINEERS AT THE SCS NATIONAL TECHNICAL CENTERS:

   CHESTER, PA (NORTHEAST)  -- 215-499-3933,      FORT WORTH, TX (SOUTH) -- 334-5242 (FTS)
   LINCOLN, NE (MIDWEST)    -- 541-5318 (FTS),    PORTLAND, OR (WEST)    -- 423-4099 (FTS)
   OR HYDROLOGY UNIT, ENGINEERING DIVISION, LANHAM, MD -- 436-7383 (FTS).

PROGRAM CHANGES SINCE MAY 1982:

   12/17/82 - CORRECT PEAK RATE FACTOR FOR USER ENTERED DIMHYD
              CORRECT REACH ROUTING PEAK TRAVEL TIME PRINTED WITH FULLPRINT OPTION
   5/02/83  - CORRECT COMPUTATIONS FOR ---
                 1. DIVISION OF BASEFLOW IN DIVERT OPERATION
                 2. HYDROGRAPH VOLUME SPLIT BETWEEN BASEFLOW AND ABOVE BASEFLOW
                 3. CROSS SECTION DATA PLOTTING POSITION
                 4. INTERMEDIATE PEAK WHEN "FROM" AREA IS LARGER THAN "THRU" AREA
                 5. STORAGE ROUTED REACH TRAVEL TIME FOR MULTIPEAK HYDROGRAPH
                 6. ORDERING "FLOW-FREQ" FILE FROM SUMMARY TABLE #3 DATA
                 7. BASEFLOW ENTERED WITH READHYD
```

```
TR20 XEQ        LAKEPOINT, N W  LAKES: 100 YEAR, 24 HOUR EVENT USING SCS     30     JOB  1  PASS  1
REV 09/01/83    TR-20, CURVE 2   80-FOOT WEIR                                30             PAGE  2

STRUCTURE DATA,  STRUCTURE NO.  1
                 ELEVATION   DISCHARGE   STORAGE
8                 168.00        .00        .00
8                 168.50      95.20        .40
8                 169.00     269.40        .90
8                 169.50     494.80       1.37
8                 170.00     761.90       1.93
9 ENDTBL

STRUCTURE DATA,  STRUCTURE NO.  2
                 ELEVATION   DISCHARGE   STORAGE
8                 165.00        .00        .00
8                 165.50      95.20        .51
8                 166.00     269.46       1.07
8                 166.50     494.80       1.52
8                 167.00     761.90       2.27
9 ENDTBL

STANDARD CONTROL OPERATION RUNOFF   STRUCTURE  1                                        RECORD ID    180
   OUTPUT HYDROGRAPH = 5                                DATA FIELD VALUES =   .1130    87.0000    .2600
   OUTPUT OPTIONS IN EFFECT  PEAK  HYD   VOL   SUM

STANDARD CONTROL OPERATION RESVOR   STRUCTURE  1                                        RECORD ID    190
   INPUT HYDROGRAPH = 5     OUTPUT HYDROGRAPH = 6       DATA FIELD VALUES =  168.0000     .0000    .0000
   OUTPUT OPTIONS IN EFFECT  PEAK  HYD   ELEV  VOL   SUM

STANDARD CONTROL OPERATION RESVOR   STRUCTURE  2                                        RECORD ID    200
   INPUT HYDROGRAPH = 6     OUTPUT HYDROGRAPH = 5       DATA FIELD VALUES =  165.0000     .0000    .0000
   OUTPUT OPTIONS IN EFFECT  PEAK  HYD   ELEV  VOL   SUM
```

```
TR20 XEQ        LAKEPOINT, N W  LAKES: 100 YEAR, 24 HOUR EVENT USING SCS     30     JOB  1  PASS  1
REV 09/01/83    TR-20, CURVE 2   80-FOOT WEIR                                30             PAGE  3

EXECUTIVE CONTROL OPERATION INCREM     MAIN TIME INCREMENT =   .10 HOURS                RECORD ID    220

EXECUTIVE CONTROL OPERATION COMPUT     FROM STRUCTURE  1  TO STRUCTURE  2               RECORD ID    230
   STARTING TIME =   .00    RAIN DEPTH =  7.80   RAIN DURATION=  1.00   RAIN TABLE NO.= 2   ANT. MOIST. COND= 2
   ALTERNATE NO.= 1         STORM NO.= 6    MAIN TIME INCREMENT =   .10 HOURS

OPERATION RUNOFF   STRUCTURE  1
   OUTPUT HYDROGRAPH=  5
   AREA=   .11 SQ MI    INPUT RUNOFF CURVE= 87.    TIME OF CONCENTRATION=   .26 HOURS
   INTERNAL HYDROGRAPH TIME INCREMENT=  .0347 HOURS

   PEAK TIME(HRS)        PEAK DISCHARGE(CFS)        PEAK ELEVATION(FEET)
      12.05                    486.21                    (RUNOFF)
      16.45                     13.22                    (RUNOFF)
      17.65                     11.01                    (RUNOFF)
      19.65                      8.83                    (RUNOFF)
      23.65                      6.64                    (RUNOFF)

 TIME(HRS)     FIRST HYDROGRAPH POINT =   .00 HOURS    TIME INCREMENT =  .10 HOURS    DRAINAGE AREA =   .11 SQ.MI.
   3.00  DISCHG     .00     .00     .00     .00     .01     .05     .11     .19     .27     .49
   4.00  DISCHG     .56     .70     .84     .97    1.10    1.22    1.34    1.46    1.58    1.69
   5.00  DISCHG    1.80    1.91    2.01    2.12    2.22    2.32    2.41    2.51    2.60    2.69
   6.00  DISCHG    2.78    2.89    3.38    3.70    3.90    4.05    4.18    4.31    4.42    4.53
   7.00  DISCHG    4.64    4.75    4.85    4.96    5.06    5.15    5.25    5.34    5.43    5.52
   8.00  DISCHG    5.61    5.87    6.43    6.89    7.51    8.14    8.50    8.72    8.85    9.04
   9.00  DISCHG    9.18    9.52   10.13   10.70   10.59   11.15   11.57   12.31   12.87   13.19
  10.00  DISCHG   13.30   13.81   14.58   15.29   16.50   18.04   19.55   21.98   23.66   28.28
  11.00  DISCHG   28.73   30.83   33.68   35.35   39.55   44.33   69.77  125.44  186.31  317.10
  12.00  DISCHG  484.58  465.14  294.38  171.68  113.46   82.09   [illegible]   57.43   50.05   47.06
  13.00  DISCHG   42.43   39.44   36.01   33.73   31.65   29.72   28.20   26.14   24.75   23.57
  14.00  DISCHG   22.57   21.79   20.75   20.01   19.90   18.16   17.42   16.39   15.74   15.49
  15.00  DISCHG   15.39   15.26   15.35   15.26   14.58   13.76   13.39   13.25   13.20   13.18
  16.00  DISCHG   13.17   13.17   13.17   13.17   13.18   13.18   [illegible]   [illegible]   [illegible]   [illegible]
  17.00  DISCHG   11.05   11.01   11.00   [illegible]   11.00   11.00   11.00   11.00   [illegible]   [illegible]
  18.00  DISCHG    9.41   [illegible]   [illegible]   [illegible]   [illegible]   [illegible]   [illegible]   [illegible]   [illegible]   [illegible]
  19.00  DISCHG    [illegible]
  20.00  DISCHG    7.23   [illegible]
  21.00  DISCHG    6.62   [illegible]
```





LOCATION MAP

How to handle Drainage from West?

WOODLAND ESTATES 3RD	AREA (acres)	AREA ACCUM.	C_2	C_{100}	T_c (min)	I_2 (in/hr)	I_{100} (in/hr)	Q_2 (cfs)	Q_{100} (cfs)	PIPE SIZE	PIPE SLOPE	INLETS
	3.0	3.0	0.50	0.76	15	3.63	7.37	5.7	16.8			

NOTES:

TOPOGRAPHY IS FROM AERIAL TAKEN JUNE 1985

A DRAINAGE CONCEPT PLAN WILL BE PREPARED BY M.K.E.C. AND SUBMITTED TO CITY ENGINEER

BENCH MARK: SPIKE STEP IN CORNER FENCE POST, 90' S. OF N.W. CORNER LOT 15, BLOCK 1 WOODLAND ESTATES 2ND ADDITION. ELEV. 178.09

DRAINAGE & UTILITY PLAN (REPLAT OF A PORTION OF WOODLANDS ESTATES 2ND ADDITION)

WOODLAND ESTATES 3RD

OWNER: RITCHIE ASSOCIATES, 8100 E. 22ND NORTH, BLDG. 500, WICHITA, KS 67226

MID-KANSAS ENGINEERING CONSULTANTS PA
3500 NORTH ROCK ROAD
BUILDING 1400
WICHITA, KANSAS 67226
682-4561