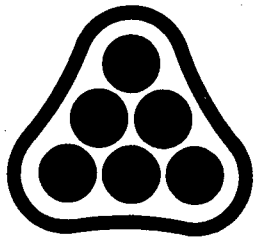

PROFESSIONAL
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CONSULTANTS
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DRAINAGE PLAN
AND
SUPPORTING CALCULATIONS

FOR

CROSS CREEK

AN ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS

PREPARED BY
PROFESSIONAL ENGINEERING CONSULTANTS, P.A.
ENGINEERS
WICHITA, KANSAS

NOVEMBER 20, 1987

1440 EAST ENGLISH
WICHITA, KANSAS 67211
(316) 262-2691

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Date 11-12-87 Page 1 of 8

Project Cross Creek Addition

Item Drainage Plan System 100

I HYDROLOGY

Use Rational Method $Q = cIA$

1. Determine "C"

Node	Soil Type	Hydrologic Group	Land Use	C_2	C_{100}
103	Ia, Rd	D	Res, 1/3 Ac.	0.46	0.73
102	Ia, Rd	D	Res, 1/3 Ac.	0.46	0.73
101	Ia, Rd	D	Res, 1/3 Ac.	0.46	0.73
100	(End Section)				

2. Determine "I"

Node	t_c	I_2	I_{100}
103	15	3.83	7.37
102	15	3.83	7.37
101	15	3.83	7.37
100	(End Section)		

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Project Cross Creek Addition

Item Drainage Plan System 100

3 Determine "A"

Node	Plan. Units	Area - SF	Area - Acres
103	621	99,360	2.28
102	1760	281,600	6.46
101	1813	290,080	6.66
100	(End Section)		

4. Determine "Q_2"

Node	C_2	I_2	A	Q_2
103	0.46	3.83	2.28	4.0
102	0.46	3.83	6.46	11.4
101	0.46	3.83	6.66	11.7
100	(End Section)			

5. Determine "Q_{100}"

Node	C_{100}	I_{100}	A	Q_{100}
103	0.76	7.37	2.28	12.8
102	0.76	7.37	6.46	36.2
101	0.76	7.37	6.66	37.3
100	(End Section)			

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Project Cross Creek Addition

Item Drainage Plan System 100

II INLET SIZING

Node	Inlet Condition	Q_2	Max. HW	Q max (5' Inlet)	Q max (10' Inlet)	USE L=
103	Sump	4.0	0.92'	11.0	22.0	5'
102	Sump	11.4	0.92'	11.0	22.0	10'
101	Sump	11.7	0.92'	11.0	22.0	10'
100	(End Section)					

III FLOOD ROUTING

Node	Inlet Condition	Q approach *	Q intercept ≠	Q_{bypass}	to Node #
103	Sump	4.0	4.0	0.0	-
102	Sump	11.4	11.4	0.0	-
101	Sump	11.7	11.7	0.0	-
100	(End Section)				

* = Q_2

≠ = Input Q in "storm" program.

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Date 11.13.87 Page 4 of 8

Project Cross Creek Addition

Item Drainage Plan System 100

IV STREET FLOW - 2YR

Node	Q_2	Distribution	street slope	d	d_{max}	Comment
103	4.0	≈ 100% (W) = 4.0	1.2%	0.28'	0.55'	OK
102	11.4	20% (W) = 2.3	1.2 %	0.23'	0.30'	OK
		80% (N) = 9.1	1.2 %	0.38'	0.55'	OK
101	11.7	5% (S) = 0.6	0.32%	0.18'	0.55'	OK
		95% (N) = 11.1	1.2%	0.42'	0.55'	OK

V STREET FLOW - 100 YR

$Q_{street} = Q_{100} - Q_{pipe}$

Location	Contributing Areas	Q_{100}	Q_{pipe}	Q_{street}	street slope	Q_{max} *	Comment
Approaching Nodes 101 & 102 from N.	95% 101 =	35.4					
	80% 102 =	29.0					
		64.4	0.0	64.4	1.2%	96.2	OK (Walk Grade = TC + 0.3')
Overtopping Crest south of Cross Creek Court	103	12.8					
	102	36.2					
	101	37.3					
		86.3	27.1	59.2	2.7%	144.3	OK (Walk Grade = T.C. + 0.3')

* From Page 5.

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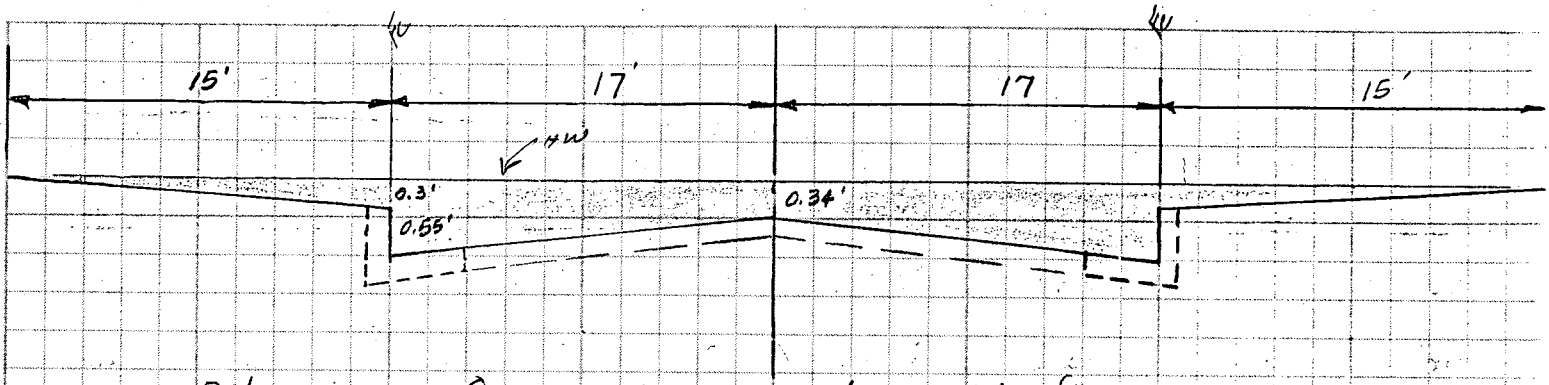
Project Cross Creek Addition

Item Drainage Plan System 100



Determine Q_{max} in street right-of-way.

Use Manning's Equation $Q = \frac{1.486}{n} AR^{2/3} S^{1/2}$

$$n = \frac{(2 \times 14.5 \times 0.03) + (2 \times 3.05 \times 0.013) + (2 \times 15 \times 0.016)}{65.1} = \frac{1.4293}{65.1}$$

$n = 0.021955$

$A = (2 \times 1/2 \times 15 \times 0.3) + (34 \times 0.34) + (2 \times 1/2 \times 17 \times 0.51)$

$A = 24.73$

$P = 65.1$

$R = A/P = 24.73/65.1 = 0.379877$

$R^{2/3} = (0.379877)^{2/3} = 0.5245$

$Q = \frac{1.486}{0.021955} \times 24.73 \times 0.5245 \times S^{1/2}$

$Q = 877.92\ S^{1/2}$

```
100 j,  168.0000  100    3    4    3
110 t,cross creek addition
120 t,drainage plan
130 t,storm water sewer system 100 analysis
140 i,  103     0.46     2.28     0.00     0.00     4.00    15.00   173.00
150 i,  102     0.46     6.46     0.00     0.00    11.40    15.00   173.00
160 i,  101     0.46     6.66     0.00     0.00    11.70    15.00   173.00
170 e,  100   163.00
180 p,  103  102    60.00   15 0.013 100.00   0.00
190 p,  102  101    38.00   24 0.013  10.00   0.00
200 p,  101  100   150.00   27 0.013  90.00   0.00
210 e
```

Date: 11-13-1997
Time: 13:25:19

Input File: ccreek100

cross creek addition
drainage plan
storm water sewer system 100 analysis

Storm Frequency = 2-Year

* * * HYDROLOGY * * *

Tributary Area									Hydrology Summation				Conduit Data				
Node to Node		C	Area (Ac)	Slope (%)	Length (Ft)	TC(@) (Min)	I(@) (In/Hr)	Q(@) (CFS)	TC (Min)	I (In/Hr)	Q (CFS)	Sum Q (CFS)	Size	Velocity (Ft/Sec)	Length (Ft)	TT (Min)	TT+TC (Min)
103	102	0.46	8.28	0.00	0.0	15.00	4.06	4.00	15.00	4.06	4.00	4.00	15"	3.26	30.00	0.41	15.41
10E	101	0.46	6.46	0.00	0.0	15.00	4.06	11.40	15.00	4.06	11.40	15.29	24"	4.37	98.00	0.13	15.13
101	100	0.46	6.66	0.00	0.0	15.00	4.06	11.70	15.13	4.05	11.66	26.95	27"	6.78	153.00	0.37	15.52

8/8

Date: 11-13-1987
Time: 13:25:19

Input File: ccreek100

cross creek addition
drainage plan
storm water sewer system 100 analysis

Storm Frequency = 2-Year

* * * HYDRAULICS * * *

Node	Hyd-Slope (Ft/Ft)	Friction (Ft)	Bend (Ft)	Transition (Ft)	Manhole (Ft)	Deflection (Ft)	Junction (Ft)	Total (Ft)	Hyd-Gl Elevation	Desired Elevation	Diff. (Ft)
103	0.00353	0.3067	0.0000	0.0000	0.0000	0.0000	0.0000	0.3067	171.6519	173.0000	1.35
102	0.00457	0.1737	0.0000	0.0293	0.0000	0.0936	0.8953	1.1833	171.3443	173.0000	1.66
101	0.00757	1.1362	0.0000	0.0346	0.0000	0.0132	0.9778	2.1609	170.1609	173.0000	2.84
100	0.00000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	168.0000	168.0000	0.00

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Project Cross Creek Addition

Item Drainage Plan System 200

I HYDROLOGY

Use Rational Method, $Q = cIA$

1. Determine "c"

Node	Soil Type	Hydrologic Group	Land Use	c_2	c_{100}
202	Ia, Rd	D	Res, 1/3 Ac.	0.46	0.73
201	Ia, Rd	D	Res, 1/3 Ac.	0.46	0.73
200	(End Section)				

2. Determine "I"

Node	t_c	I_2	I_{100}
202	15	3.83	7.37
201	15	3.83	7.37
200	(End Section)		

3. Determine "A"

Node	Plan. Units	Area - S.F.	Area - Acres
202	450	72,000	1.65
201	736	117,760	2.70
200	(End Section)		

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Project Cross Creek Addition

Item Drainage Plan System 200

4. Determine "Q_2"

Node	C_2	I_2	A	Q_2
202	0.46	3.83	1.65	2.9
201	0.46	3.83	2.70	4.8
200	(End Section)			

5. Determine "Q_{100}"

Node	C_{100}	I_{100}	A	Q_{100}
202	0.73	7.37	1.65	8.9
201	0.73	7.37	2.70	14.5
200	(End Section)			

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Project Cross Creek Addition

Item Drainage Plan System 200

II INLET SIZING

Node	Inlet Condition	Q_2	Max. HW	Qmax (5' inlet)	Qmax (10' inlet)	Use L=
202	Sump	2.9	0.92'	11.0'	22.0'	5'
201	Sump	4.8	0.92'	11.0'	22.0'	5'
200	(End Section)					

III FLOOD ROUTING

Node	Inlet Condition	Qapproach*	Qintercept#	Q bypass	to Node #
202	Sump	2.9	2.9	0.0	-
201	Sump	4.8	4.8	0.0	-
200	(End Section)				

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Project Cross Creek Addition

Item Drainage Plan System 200

IV STREET FLOW - 2 YR

Node	Q_2	Distribution	street slope	d	d_{max}	Comment
202	2.9	30%(SW) = 0.9	0.32%	0.20'	0.55'	OK
		70%(NE) = 2.0	0.5%	0.32'	0.55'	OK
201	4.8	30%(SW) = 1.4	0.32%	0.24'	0.55'	OK
		70%(NE) = 3.4	0.5%	0.31'	0.55	OK

I STREET FLOW - 100-YR

($Q_{street} = Q_{100} - Q_{pipe}$)

Location	Contributing Areas	Q_{100}	Q_{pipe}	Q_{street}	street slope	Q_{max} *	Comment
Approaching Nodes 201, 202 (from east)	70% 202	6.2					
	70% 201	10.2					
	overflow from system 100 ($Q_{100} - Q_2$) = 86.3 - 27.1	59.2					
		75.6	0.0	75.6	0.5%	83.9	OK (Walk Grade = TC + 0.4')

* From Page 5

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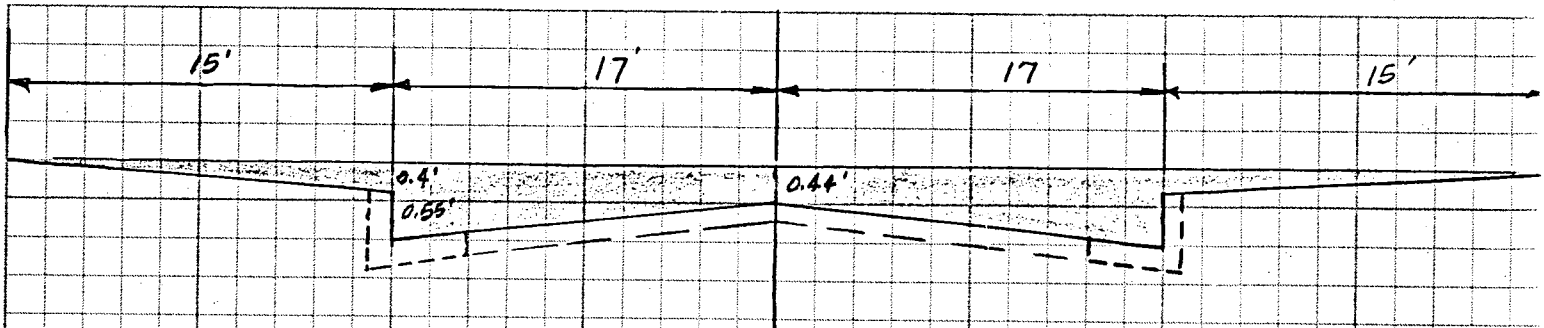
Project Cross Creek Addition

Item Drainage Plan System 200



Determine Q_{max} in street right-of-way.

Use Manning's Equation $Q = \frac{1.486}{n} AR^{2/3} S^{1/2}$

$$n = \frac{(2 \times 14.5 \times 0.03) + (2 \times 3.05 \times 0.013) + (2 \times 15 \times 0.016)}{65.1} = \frac{1.4293}{65.1}$$

$n = 0.021955$

$A = (2 \times 1/2 \times 15 \times 0.4) + (34 \times 0.44) + (2 \times 1/2 \times 17 \times 0.51)$

$A = 29.63$

$P = 65.1$

$R = A/P = 29.63/65.1 = 0.455146$

$R^{2/3} = (0.455146)^{2/3} = 0.5917$

$Q = \frac{1.486}{0.021955} \times 29.63 \times 0.5917 \times S^{1/2}$

$Q = 1,186.6\ S^{1/2}$

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Project Cross Creek Addition

Item Drainage Plan System 200

VI OVERFLOW CHANNEL

Design overflow channel at storm sewer location

ΣQ_{100} = 100% 202 = 8.9 cfs
100% 201 = 14.5
overflow from System 100 = 59.1
82.5

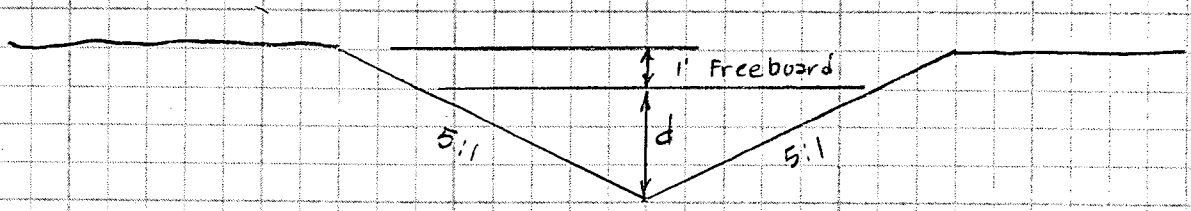
$Q_{pipe} = Q_2$ = 7.7

$Q_{overflow}$ = 74.8 cfs

Use Manning's Equation $Q = \frac{1.486}{n} AR^{2/3} S^{1/2}$

$AR^{2/3} = \frac{Q \times n}{1.486 \times S^{1/2}} = \frac{74.8 \times 0.03}{1.486 \times (0.01)^{1/2}}$

$AR^{2/3} = 15.10$



d	A	p	R	$R^{2/3}$	$AR^{2/3}$	
2.0	20.0	20.396	0.981	0.987	19.7	
1.9	18.05	19.376	0.932	0.9538	17.2	
1.8	16.20	18.356	0.883	0.920	14.9	← USE d = 1.8'

$V = Q/A = \frac{74.8}{16.2} = 4.6$

$W = (1.8 + 1.0) \times 5 \times 2 = 28'$

USE 30' EASEMENT

```
100 j,  165.0000  200    3    3    2
110 t,cross creek addition
120 t,drainage plan
130 t,storm water sewer system 200 analysis
140 i,  202     0.46     1.65     0.00     0.00     2.90    15.00   169.50
150 i,  201     0.46     5.70     0.00     0.00     4.30    15.00   169.50
160 m,  200   165.00
170 p,  202  201    40.00   15 0.013  20.00   0.60
180 p,  201  200   240.00   18 0.013  96.00   0.00
190 e
```

Date: 11-16-1987
Time: 09:26:01

Input File: creek200

cross creek addition
drainage plan
storm water sewer system 200 analysis

Storm Frequency = 2-Year

* * * HYDROLOGY * * *

Tributary Area									Hydrology Summation				Conduit Data				
Node to Node		C	Area (Ac)	Slope (%)	Length (Ft)	TC(@) (Min)	I(@) (In/Hr)	Q(@) (CFS)	TC (Min)	I (In/Hr)	Q (CFS)	Sum Q (CFS)	Size	Velocity (Ft/Sec)	Length (Ft)	TT (Min)	TT+TC (Min)
202	201	0.46	1.65	0.00	0.0	15.00	4.06	2.90	15.00	4.06	2.92	2.90	15"	2.36	40.00	0.28	15.28
201	200	0.46	2.79	0.00	0.0	15.00	4.06	4.80	15.28	4.03	4.77	7.67	18"	4.34	240.00	0.92	16.20

Date: 11-14-1997
Time: 09:26:01

Input File: ccreek200

cross creek addition
drainage plan
storm water sewer system 200 analysis

Storm Frequency = 2-Year

* * * HYDRAULICS * * *

Node	Hyd-Slope (Ft/Ft)	Friction (Ft)	Bend (Ft)	Transition (Ft)	Manhole (Ft)	Deflection (Ft)	Junction (Ft)	Total (Ft)	Hyd-Gl Elevation	Desired Elevation	Diff. (Ft)
202	0.00202	0.0306	0.0000	0.0000	0.0000	0.0000	0.0000	0.0306	166.7536	169.5000	2.55
201	0.00532	1.8780	0.0009	0.0205	0.0000	0.0071	0.5669	1.8726	166.8726	169.5000	2.63
200	0.00000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	165.0000	165.0000	0.00

1.0 INTRODUCTION

This study covers a small portion of the floodplain of the East Branch Gypsum Creek lying in the east one-half of Section 17, T27S, R2E of the Sixth Principal Meridian, Sedgwick County, Kansas. The study has been performed to establish the minimum floodway width and location for the platting of Cross Creek, an addition to Wichita, Sedgwick County, Kansas.

This property was previously studied as presented in the report prepared by Mid-Kansas Engineering Consultants (M.K.E.C.) for the Lakepoint Development. The current study was necessary (1) to extend the study further upstream and (2) to reflect the intent to maintain the stream valley in a more natural condition in its final developed state.

2.0 AREA STUDIED

The area studied lies within the corporate limits of the City of Wichita, Kansas, and is to be platted as Cross Creek. The tract is bounded by residential subdivisions on the south, and west, and by undeveloped land to the north, and by Beech Aircraft property on the east.

The flooding source studied in this report is the East Branch Gypsum Creek from its north crossing of Gatewood Street north to the west line of Webb Road.

3.0 ENGINEERING METHODS

3.1 Hydrology

The estimate of the 100-year flood discharge for the East Branch Gypsum Creek was established as 2000 cfs. This figure was taken from a previous report prepared by Mid-Kansas Engineering Consultants for the Lakepoint Development. The contributing area for the basin at a point 800 feet north of Central Avenue is 2.18 square miles.

3.2 Hydraulic Analyses

A. Cross-section information.

Data used in this study was taken from a 1"=100' topographic map using a two foot contour interval. This map was produced from aerial photographs taken June 28, 1985, and was prepared by Miles Air Photo and Survey, Manhattan, Kansas, with ground control by Professional Engineering Consultants, Wichita. Based on measurements made in the field, the stream channel proper was modeled as a twenty-foot flat bottom channel, two feet deep having nearly vertical banks.

Construction plans for the 5-10'x4' reinforced concrete beneath Gatewood Street also provided information.

B. Roughness Coefficients

The following values for Manning's roughness coefficient "n" were used:

0.035 - Lake sections (channel)

0.040 - Landscaped area adjacent to lake or channel. Brush and small trees are to be cleared. Scattered large trees will remain. All areas are to be mowed, as they will be in backyards.

0.070 - Natural channel section, which presently contains large trees within the channel.

C. Computation Method

Water surface profiles were computed using the computer program "HEC-2, Water Surface Profiles," as developed by the Corps of Engineers, U.S. Army.

The starting water-surface elevation for each profile was established analyzing the flow through the 5-10'x4' RCB culvert using the FHWA's Hydraulic Design Series #5, "Hydraulic Design of the Highway Culverts."

All elevations in this report are based on City of Wichita Datum.

The results of this study are valid only in the case of unobstructed flows, with floodplain conditions similar to those assumed in the report.

4.0 HYDRAULIC RESULTS

4.1 Floodway Limits

After several trials, the final computation models four profiles. The first is for the natural condition, the second and third are for encroached conditions using the equal conveyance reduction principle with targets of zero and one foot of rise, respectively, and the fourth being for encroached conditions with floodway limits fixed.

For the fourth profile, the floodway limits established by the third profile were used with the exception of Section 43.5. A slight adjustment to the south was required at this location to provide more buildable lot area on the north side.

The platted floodway limits will be as wide or wider as those computed by HEC-2.

4.2 Floodplain Limits

Floodplain limits were not delineated, as they are not a platting requirement. Minimum pad elevations for each lot abutting the East Branch Gypsum Creek were established as two feet above the natural stream profile elevations for the 100-year storm, which provides one foot of freeboard above the encroached condition.

4.3 Other Notes

The natural channel upstream from Station 57.1 is severely restricted. Man-made channel improvements will be required in this reach. This improved channel was modeled as a twenty foot flat bottom trapezoidal channel having 4:1 side slopes and an improved Manning's n of 0.040. The right-of-way requirements are estimated to be 140 feet wide as shown in Figure A.

It should be noted that under existing conditions, flows on the order of 2000 cfs would overtop Webb Road due to inadequate culvert capacity.

5.0 SUPPORTING INFORMATION

A printout of Computer results follows. A map showing the computed floodway limits is given as Exhibit 1.

FIGURE A

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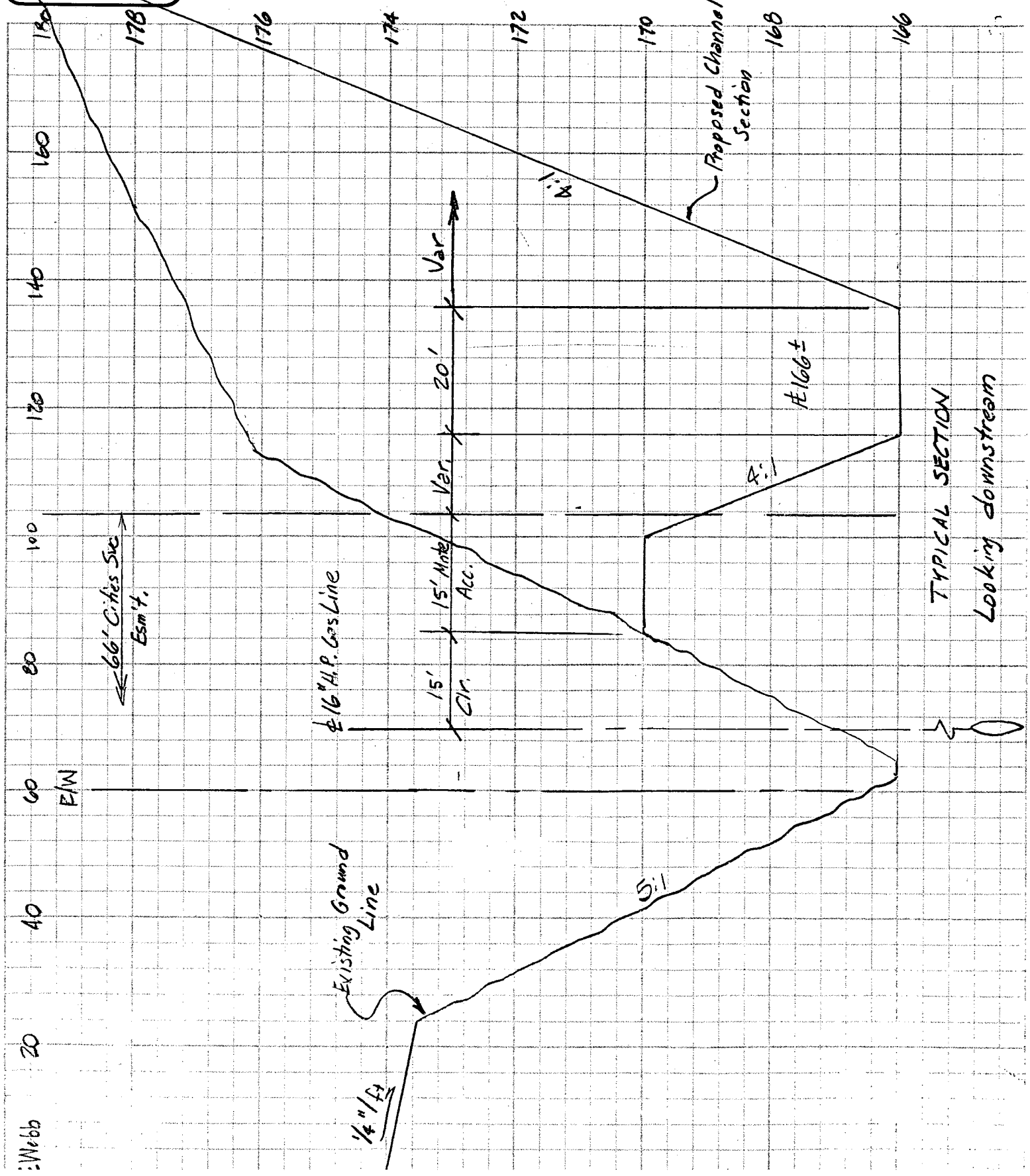
Date 11-17-87 Page ____ of ____

Project Cross Creek

Item Design Section - E. Br. Gypsum Creek



Webb

```
**********************************
*         E D I T  2             *
*  FOR HEC2 DATA PREPARATION     *
*  IBM VERSION (DECEMBER 1983)   *
**********************************
```

```
T1                  CROSS CREEK HYDRAULIC STUDY  PEC PROJ. NO.  36-87424-4
T2      NATURAL CONDITIONS; 100-YR. Q=2000 CFS; SET FLOODWAY LIMITS; BLOCK 2
T3           EAST BRANCH GYPSUM CREEK W/ CHIMP  MWB 11-17-87
J1   -10       2        0        0        0        0        0        0  167.20
J2     1                -1                                             0
J3   110     150      200

NC  0.04    0.04   0.035
QT     4    2000    2000     2000     2000
ET                   0.4     10.4      9.1                                915     1075
X1 37.55      10      915     1075       10       10       10
GR170.00     735   168.00      785   166.00      860   164.00      900   162.10      915
GR158.10     931   158.10     1059   162.10     1075   164.00     1125   170.00     1150

ET                   0.4     10.4      9.1                                835     1100
X1  39.6      13      835     1100      200      200      200
GR170.00     750   168.00      805   166.00      820   164.00      835   162.10      855
GR158.10     871   158.10      936   162.10      950   164.00     1100   166.00     1250
GR166.00    1250   166.00     1304   170.00     1320

NC                   0.070
ET                   0.4     10.4      9.1                                990     1175
X1  40.8       9      989     1011      215      195      210
X4     3  162.00      990   162.00     1010   164.00     1011
GR170.00     955   168.00      970   166.00      980   164.00      989   164.00     1115
GR164.00    1235   166.00     1300   166.00     1304   170.00     1320

ET                   9.1     10.4      9.1                                900     1120
X1  43.5      12      989     1011      170      170      170
GR170.00     855   168.00      870   166.00      885   164.00      900   164.00      989
GR162.00     990   162.00     1010   164.00     1011   164.00     1180   166.00     1235
GR166.00    1274   170.00     1290

ET                   0.4     10.4      9.1                                835     1025
X1  46.0      11      989     1011      250      250      250
GR170.00     740   168.00      760   166.00      775   164.00      800   164.00      989
GR162.00     990   162.00     1010   164.00     1011   166.00     1035   166.00     1174
GR170.00    1190

ET                   0.4     10.4      9.1                                990     1115
X1 46.75      12      989     1011       70       70       70
GR170.00     935   168.00      950   166.00      965   164.00      980   164.00      989
GR162.00     990   162.00     1010   164.00     1011   164.00     1030   166.00     1120
GR166.00    1264   170.00     1280

ET                   0.4     10.4      9.1                                970     1070
X1  48.8       9      970      990      210      200      205
X4     2  162.00      971   162.00      989
GR170.00     900   168.00      915   166.00      955   164.00      970   164.00      990
GR166.00    1100   168.00     1240   170.00     1275   172.00     1360

ET                   0.4     10.4      9.1                                985     1070
X1  51.1      11      989     1011      235      225      230
GR170.00     900   168.00      935   166.00      970   166.00      989   164.00      990
GR164.00    1010   166.00     1011   166.00     1070   168.00     1130   170.00     1160
GR172.00    1250

ET                   0.4     10.4      9.1                                990     1095
X1  52.5      11      989     1011      140      140      140
GR170.00     880   168.00      960   166.00      985   166.00      989   164.00      990
GR164.00    1010   166.00     1011   166.00     1100   168.00     1150   170.00     1165
GR172.00    1180

ET                   0.4     10.4      9.1                                975     1035
X1 54.75       8      989     1011      210      210      210
X4     3  164.00      990   164.00     1010   166.00      989
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GR170.00     940  168.00     950  166.00    1011  166.00    1025  168.00    1055
GR170.00    1065  172.00    1075  174.00    1100

ET                   0.4    10.4     9.1                              970    1105
X1  57.1       6     970    1000     235     235
GR170.00     970  168.00     980  166.00    1000  168.00    1185  170.00    1200
GR176.00    1225

NC 0.040   0.040   0.040
ET                   0.4    10.4     9.1                              965    1035
X1 58.35       7     965    1035     125     125     125
X4      3   168.0  1040.0   168.0  1080.0   174.0  1100.0
GR172.00     955  170.00     965  168.00     975  168.00    1035  170.00    1050
GR176.00    1140   180.0    1225

ET                   0.4    10.4     9.1                              975    1055
X1  60.0       9     975    1050     155     155     155
GR 174.0     935  172.00     970  170.00     975  168.00     985  168.00    1005
GR170.00    1050  168.00    1060  168.00    1080  177.00    1115
EJ

T1                   CROSS CREEK HYDRAULIC STUDY  PEC PROJ. NO.  36-87424-4
T2      F/W ENCR.-0'; 100-YR. Q=2000 CFS; SET FLOODWAY LIMITS; BLOCK 2
T3          EAST BRANCH GYPSUM CREEK W/ CHIMP  MWB 11-17-87
J1    -10        3        0        0        0        0        0   167.20
J2      2               -1                                      0

T1                   CROSS CREEK HYDRAULIC STUDY  PEC PROJ. NO.  36-87424-4
T2      F/W ENCR.-1'; 100-YR. Q=2000 CFS; SET FLOODWAY LIMITS; BLOCK 2
T3          EAST BRANCH GYPSUM CREEK W/ CHIMP  MWB 11-17-87
J1    -10        4        0        0        0        0        0   167.20
J2      3               -1                                      0

T1                   CROSS CREEK HYDRAULIC STUDY  PEC PROJ. NO.  36-87424-4
T2      SET F/W ENCR. STA'S.; 100-YR. Q=2000 CFS; SET FLOODWAY LIMITS; BLOCK 2
T3          EAST BRANCH GYPSUM CREEK W/ CHIMP  MWB 11-17-87
J1    -10        5        0        0        0        0        0   167.20
J2     15               -1                                      0
  ** BLANK CARD **
  ** BLANK CARD **
  ** BLANK CARD **
ER
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SUMMARY OF ERRORS

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T1                CROSS CREEK HYDRAULIC STUDY  PEC PROJ. NO.  36-87424-4
T2     NATURAL CONDITIONS; 100-YR. Q=2000 CFS; SET FLOODWAY LIMITS; BLOCK 2
T3         EAST BRANCH GYPSUM CREEK W/ CHIMP  MWB 11-17-87

T1                CROSS CREEK HYDRAULIC STUDY  PEC PROJ. NO.  36-87424-4
T2     F/W ENCR.-0'; 100-YR. Q=2000 CFS; SET FLOODWAY LIMITS; BLOCK 2
T3         EAST BRANCH GYPSUM CREEK W/ CHIMP  MWB 11-17-87

T1                CROSS CREEK HYDRAULIC STUDY  PEC PROJ. NO.  36-87424-4
T2     F/W ENCR.-1'; 100-YR. Q=2000 CFS; SET FLOODWAY LIMITS; BLOCK 2
T3         EAST BRANCH GYPSUM CREEK W/ CHIMP  MWB 11-17-87

T1                CROSS CREEK HYDRAULIC STUDY  PEC PROJ. NO.  36-87424-4
T2     SET F/W ENCR. STA'S.; 100-YR. Q=2000 CFS; SET FLOODWAY LIMITS; BLOCK 2
T3         EAST BRANCH GYPSUM CREEK W/ CHIMP  MWB 11-17-87
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**********************************************************
*  WATER SURFACE PROFILES                                *
*  VERSION OF NOVEMBER 1976                              *
*  UPDATED MAY 1984                                      *
*  IBM-PC-XT VERSION AUGUST 1985                         *
*  RUN DATE  11-17-87   TIME  20:20:02                     *
**********************************************************
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****************************************
*  U.S. ARMY CORPS OF ENGINEERS        *
*  THE HYDROLOGIC ENGINEERING CENTER   *
*  609 SECOND STREET, SUITE D          *
*  DAVIS, CALIFORNIA 95616             *
  *  (916) 440-2105 (FTS) 448-2105       *
****************************************
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X    X  XXXXXXX  XXXXX           XXXXX
X    X  X       X    X         X    X
X    X  X       X                   X
XXXXXXX  XXXX   X        XXXXX   XXXXX
X    X  X       X                 X
X    X  X       X    X            X
X    X  XXXXXXX  XXXXX           XXXXXXX
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THIS RUN EXECUTED 11-17-87

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**************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
  IBM-PC-XT VERSION AUGUST 1985
**************************************************

T1              CROSS CREEK HYDRAULIC STUDY  PEC PROJ. NO.  36-87424-4
T2     NATURAL CONDITIONS; 100-YR. Q=2000 CFS; SET FLOODWAY LIMITS; BLOCK 2
T3         EAST BRANCH GYPSUM CREEK W/ CHIMP  MWB 11-17-87

J1  ICHECK    INQ      NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

     -10.      2.        0.        0.   .000000       .00       .0       0.   167.200      .000

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

      1.000     .000    -1.000     .000      .000      .000      .000      .000      .000      .000

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

    110.000   150.000   200.000     .000      .000      .000      .000      .000      .000      .000
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SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST
*PROF 1									
*SECNO 37.550									
37.55	9.10	167.20	.00	167.20	167.22	.02	.00	.00	162.10
2000.	86.	1765.	149.	177.	1392.	229.	0.	0.	162.10
.00	.49	1.27	.65	.040	.035	.040	.000	158.10	815.00
.000050	10.	10.	10.	0	0	0	.00	323.33	1138.33
*SECNO 39.600									
39.60	9.12	167.22	.00	.00	167.23	.02	.01	.00	164.00
2000.	19.	1775.	206.	39.	1513.	400.	9.	2.	164.00
.05	.50	1.17	.51	.040	.035	.040	.000	158.10	810.92
.000075	200.	200.	200.	0	0	0	.00	497.92	1308.84
*SECNO 40.800									
40.80	5.21	167.21	.00	.00	167.27	.06	.03	.00	164.00
2000.	35.	176.	1789.	24.	113.	870.	16.	4.	164.00
.08	1.50	1.56	2.06	.040	.070	.040	.000	162.00	973.97
.000706	215.	210.	195.	2	0	0	.00	334.86	1308.83
*SECNO 43.500									
43.50	5.32	167.32	.00	.00	167.37	.04	.10	.00	164.00
2000.	592.	151.	1258.	337.	115.	745.	20.	5.	164.00
.11	1.75	1.31	1.69	.040	.070	.040	.000	162.00	875.07
.000483	170.	170.	170.	2	0	0	.00	404.22	1279.30
*SECNO 46.000									
46.00	5.45	167.45	.00	.00	167.50	.06	.14	.00	164.00
2000.	1483.	178.	340.	721.	118.	264.	26.	8.	164.00
.14	2.06	1.51	1.29	.040	.070	.040	.000	162.00	764.14
.000619	250.	250.	250.	2	0	0	.00	415.65	1179.79
*SECNO 46.750									
46.75	5.45	167.45	.00	.00	167.58	.13	.07	.00	164.00
2000.	248.	333.	1419.	76.	118.	498.	28.	8.	164.00
.15	3.29	2.82	2.85	.040	.070	.040	.000	162.00	954.15
.002174	70.	70.	70.	2	0	0	.00	315.64	1269.79

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SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST
*SECNO 48.800									
48.80	5.89	167.89	.00	.00	168.04	.15	.47	.00	164.00
2000.	225.	364.	1411.	79.	116.	443.	31.	10.	164.00
.17	2.84	3.14	3.18	.040	.070	.040	.000	162.00	917.17
.002459	210.	205.	200.	2	0	0	.00	315.25	1232.42
*SECNO 51.100									
51.10	4.55	168.55	.00	.00	168.86	.31	.82	.00	166.00
2000.	461.	397.	1142.	105.	98.	246.	34.	11.	166.00
.18	4.37	4.05	4.64	.040	.070	.040	.000	164.00	925.36
.005710	235.	230.	225.	2	0	0	.00	212.91	1138.27
*SECNO 52.500									
52.50	5.17	169.17	.00	.00	169.35	.18	.49	.00	166.00
2000.	248.	317.	1435.	94.	112.	396.	35.	12.	166.00
.19	2.63	2.84	3.62	.040	.070	.040	.000	164.00	913.16
.002361	140.	140.	140.	2	0	0	.00	245.62	1158.78
*SECNO 54.750									
54.75	5.64	169.64	.00	.00	170.11	.46	.76	.00	166.00
2000.	593.	595.	812.	110.	122.	137.	38.	13.	166.00
.20	5.39	4.87	5.92	.040	.070	.040	.000	164.00	941.76
.006158	210.	210.	210.	2	0	0	.00	121.47	1063.24
*SECNO 57.100									
3280 CROSS SECTION		57.10 EXTENDED		.50 FEET					
57.10	4.50	170.50	.00	.00	170.62	.12	.51	.00	170.00
2000.	0.	118.	1882.	0.	85.	671.	41.	14.	166.00
.23	.00	1.39	2.80	.040	.070	.040	.000	166.00	970.00
.001105	235.	235.	235.	2	0	0	.00	232.09	1202.09

*SECNO 58.350

3301 HV CHANGED MORE THAN HVINS

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY

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

3720 CRITICAL DEPTH ASSUMED

58.35	2.54	170.54	170.54	.00	171.55	1.00	.35	.00	170.00
2000.	1.	1435.	564.	1.	168.	85.	42.	14.	168.00
.23	1.98	8.53	6.61	.040	.040	.040	.000	168.00	962.28
.016471	125.	125.	125.	20	11	0	.00	126.20	1088.48

*SECNO 60.000

3301 HV CHANGED MORE THAN HVINS

60.00	4.17	172.17	.00	.00	172.54	.37	.99	.00	170.00
2000.	13.	1260.	726.	6.	258.	149.	43.	15.	170.00
.24	2.20	4.89	4.88	.040	.040	.040	.000	168.00	967.06
.003360	155.	155.	155.	3	0	0	.00	129.15	1096.21

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THIS RUN EXECUTED 11-17-87

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**************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
  IBM-PC-XT VERSION AUGUST 1985
**************************************************

T1               CROSS CREEK HYDRAULIC STUDY  PEC PROJ. NO.  36-87424-4
T2     F/W ENCR.-0'; 100-YR. Q=2000 CFS; SET FLOODWAY LIMITS; BLOCK 2
T3         EAST BRANCH GYPSUM CREEK W/ CHIMP  MWB 11-17-87

J1  ICHECK    INQ      NINV     IDIR     STRT     METRIC    HVINS     Q        WSEL     FQ

     -10.       3.       0.       0.  .000000      .00       .0       0.   167.200     .000

J2  NPROF     IPLOT    PRFVS    XSECV    XSECH    FN       ALLDC    IBW      CHNIM    ITRACE

     2.000     .000   -1.000     .000     .000     .000     .000     .000     .000     .000
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SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*PROF 2

*SECNO 37.550

37.55	9.10	167.20	.00	167.20	167.22	.02	.00	.00	162.10
2000.	86.	1765.	149.	177.	1392.	229.	0.	0.	162.10
.00	.49	1.27	.65	.040	.035	.040	.000	158.10	815.00
.000050	10.	10.	10.	0	0	0	.00	323.33	1138.33

*SECNO 39.600

2800 NAT Q1= 2304.96 WSEL= 167.22 ENC Q1= 2304.96 WSEL= 167.22 RATIO= .0000
NAT Q1= 2309. RATIOS LOB,CH,ROB= .0097 .8871 .1032 WSEL= 167.22

3470 ENCROACHMENT STATIONS= 819.5 1302.1 TYPE= 4 TARGET= .002

39.60	9.12	167.22	.00	167.22	167.23	.02	.01	.00	164.00
2000.	18.	1777.	205.	34.	1513.	395.	9.	2.	164.00
.05	.54	1.17	.52	.040	.035	.040	.000	158.10	819.49
.000075	200.	200.	200.	0	0	0	.00	482.58	1302.07

*SECNO 40.800

40.80	5.21	167.21	.00	167.21	167.27	.06	.03	.00	164.00
2000.	35.	176.	1789.	24.	113.	869.	15.	4.	164.00
.08	1.50	1.56	2.06	.040	.070	.040	.000	162.00	973.97
.000706	215.	210.	195.	0	0	0	.00	334.86	1308.83

*SECNO 43.500

3470 ENCROACHMENT STATIONS= 900.0 1120.0 TYPE= 1 TARGET= 220.000

43.50	5.31	167.31	.00	167.32	167.42	.11	.15	.00	164.00
2000.	794.	229.	977.	295.	115.	361.	19.	5.	164.00
.10	2.70	1.99	2.71	.040	.070	.040	.000	162.00	900.00
.001120	170.	170.	170.	2	0	0	.00	220.00	1120.00

*SECNO 46.000

46.00	5.56	167.56	.00	167.45	167.61	.05	.19	.00	164.00
2000.	1472.	173.	356.	745.	120.	282.	24.	7.	164.00
.14	1.98	1.44	1.26	.040	.070	.040	.000	162.00	763.33
.000548	250.	250.	250.	2	0	0	.00	416.89	1180.22

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

*SECNO 46.750

46.75	5.55	167.55	.00	167.45	167.67	.12	.06	.00	164.00
2000.	247.	319.	1434.	79.	120.	526.	26.	7.	164.00
.14	3.11	2.66	2.73	.040	.070	.040	.000	162.00	953.34
.001876	70.	70.	70.	2	0	0	.00	316.88	1270.22

*SECNO 48.800

48.80	5.95	167.95	.00	167.89	168.09	.14	.42	.00	164.00
2000.	227.	357.	1416.	82.	117.	457.	29.	9.	164.00
.16	2.76	3.05	3.10	.040	.070	.040	.000	162.00	916.04
.002288	210.	205.	200.	2	0	0	.00	320.31	1236.35

*SECNO 51.100

51.10	4.56	168.56	.00	168.55	168.87	.31	.78	.00	166.00
2000.	462.	396.	1142.	106.	98.	247.	32.	10.	166.00
.17	4.36	4.03	4.62	.040	.070	.040	.000	164.00	925.19
.005634	235.	230.	225.	2	0	0	.00	213.21	1138.41

*SECNO 52.500

2800 NAT Q1= 411.56 WSEL= 169.17 ENC Q1= 411.56 WSEL= 169.17 RATIO= .0000
NAT Q1= 412. RATIOS LOB,CH,ROB= .1240 .1587 .7173 WSEL= 169.17

3470 ENCROACHMENT STATIONS= 935.0 1155.3 TYPE= 4 TARGET= .000

52.50	5.17	169.17	.00	169.17	169.35	.18	.49	.00	166.00
2000.	248.	317.	1435.	89.	112.	395.	34.	11.	166.00
.19	2.80	2.84	3.63	.040	.070	.040	.000	164.00	934.97
.002357	140.	140.	140.	2	0	0	.00	220.38	1155.35

*SECNO 54.750

54.75	5.65	169.65	.00	169.64	170.11	.47	.76	.00	166.00
2000.	592.	596.	812.	110.	122.	137.	36.	12.	166.00
.20	5.39	4.88	5.93	.040	.070	.040	.000	164.00	941.78
.006184	210.	210.	210.	0	0	0	.00	121.43	1063.22

*SECNO 57.100

2800 NAT Q1= 601.61 WSEL= 170.50 ENC Q1= 601.61 WSEL= 170.50 RATIO= .0000
NAT Q1= 602. RATIOS LOB,CH,ROB= .0000 .0591 .9409 WSEL= 170.50

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

3280 CROSS SECTION     57.10 EXTENDED       .50 FEET

3470 ENCROACHMENT STATIONS=     970.0    1200.0  TYPE=     4  TARGET=        .000
    57.10     4.51   170.51      .00   170.50   170.63      .12      .51      .00   170.00
    2000.       0.     116.    1884.       0.       85.     671.      39.      13.    166.00
      .22      .00     1.36     2.81     .040     .070     .040     .000   166.00   970.00
  .001109     235.     235.     235.        0        0        0      .00   230.00  1200.00

*SECNO 58.350

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
    58.35     2.54   170.54   170.54   170.54   171.55     1.00      .35      .00   170.00
    2000.       1.     1435.     564.       1.      168.      85.      41.      13.    168.00
      .23     1.98     8.54     6.61     .040     .040     .040     .000   168.00   962.28
  .016478     125.     125.     125.       19       11        0      .00   126.20  1088.48

*SECNO 60.000

3301 HV CHANGED MORE THAN HVINS

    60.00     4.17   172.17      .00   172.17   172.54      .37      .99      .00   170.00
    2000.       13.     1260.     726.       6.      258.     149.      42.      14.    170.00
      .23     2.20     4.89     4.88     .040     .040     .040     .000   168.00   967.08
  .003364     155.     155.     155.        0        0        0      .00   129.12  1096.20
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THIS RUN EXECUTED 11-17-87

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**************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
  IBM-PC-XT VERSION AUGUST 1985
**************************************************

T1              CROSS CREEK HYDRAULIC STUDY  PEC PROJ. NO.  36-87424-4
T2     F/W ENCR.-1'; 100-YR. Q=2000 CFS; SET FLOODWAY LIMITS; BLOCK 2
T3         EAST BRANCH GYPSUM CREEK W/ CHIMP  MWB 11-17-87

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

     -10.       4.        0.        0.   .000000       .00       .0        0.   167.200      .000

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

     3.000      .000    -1.000      .000      .000      .000      .000      .000      .000      .000
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  SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOSS   BANK ELEV
  Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
  TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN      SSTA
  SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID     ENDST


*PROF 3

*SECNO 37.550
 2800 NAT Q1=   2821.37  WSEL=    167.20  ENC Q1=   2985.01  WSEL=    168.20  RATIO=  -.0580
 NAT Q1=   3518.  RATIOS LOB,CH,ROB=   .0643   .8484   .0873  WSEL=    168.20

3470 ENCROACHMENT STATIONS=     915.0    1075.0  TYPE=     4  TARGET=        .152
    37.55     9.10   167.20      .00   167.20   167.23      .03      .00      .00   162.10
    2000.       0.    2000.       0.       0.    1392.       0.       0.       0.   162.10
      .00      .00     1.44      .00     .040     .035     .040     .000   158.10   915.00
  .000070      10.      10.      10.        0        0        0      .00   160.00  1075.00

*SECNO 39.600
 2800 NAT Q1=   2304.96  WSEL=    167.22  ENC Q1=   2680.51  WSEL=    168.22  RATIO=  -.1629
 NAT Q1=   3197.  RATIOS LOB,CH,ROB=   .0146   .8385   .1469  WSEL=    168.22

3470 ENCROACHMENT STATIONS=     835.0    1100.0  TYPE=     4  TARGET=        .161
    39.60     9.12   167.22      .00   167.22   167.25      .03      .02      .00   164.00
    2000.       0.    2000.       0.       0.    1514.       0.       7.       1.   164.00
      .04      .00     1.32      .00     .040     .035     .040     .000   158.10   835.00
  .000098     200.     200.     200.        1        0        0      .00   265.00  1100.00

*SECNO 40.800
 2800 NAT Q1=    752.76  WSEL=    167.21  ENC Q1=    752.76  WSEL=    168.21  RATIO=   .0000
 NAT Q1=   1207.  RATIOS LOB,CH,ROB=   .0232   .0737   .9031  WSEL=    168.21

3470 ENCROACHMENT STATIONS=     989.0    1176.7  TYPE=     4  TARGET=        .376
    40.80     5.14   167.14      .00   167.21   167.30      .16      .05      .00   164.00
    2000.       0.     254.    1746.       0.     111.     520.      12.       2.   164.00
      .06      .00     2.29     3.36     .040     .070     .040     .000   162.00   989.00
  .001821     215.     210.     195.        2        0        0      .00   187.67  1176.67

*SECNO 43.500
 2800 NAT Q1=    910.01  WSEL=    167.32  ENC Q1=    910.01  WSEL=    168.32  RATIO=   .0000
 NAT Q1=   1456.  RATIOS LOB,CH,ROB=   .2948   .0631   .6421  WSEL=    168.32

3470 ENCROACHMENT STATIONS=     949.9    1169.2  TYPE=     4  TARGET=        .375
    43.50     5.43   167.43      .00   167.32   167.53      .10      .23      .00   164.00
    2000.      340.     225.    1435.     134.     117.     542.      15.       3.   164.00
      .08     2.54     1.92     2.65     .040     .070     .040     .000   162.00   949.89
  .001011     170.     170.     170.        2        0        0      .00   219.35  1169.24
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  SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOSS   BANK ELEV
  Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
  TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN     SSTA
  SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID    ENDST


*SECNO 46.000
 2800 NAT Q1=    803.88  WSEL=    167.45  ENC Q1=    803.88  WSEL=    168.45  RATIO=   .0000
 NAT Q1=   1327.  RATIOS LOB,CH,ROB=   .6991   .0715   .2294  WSEL=    168.45

3470 ENCROACHMENT STATIONS=     836.7    1025.1  TYPE=     4  TARGET=        .394
    46.00     5.67   167.67      .00   167.45   167.79      .12      .27      .00   164.00
    2000.    1639.     257.     103.     559.     123.      44.      19.       4.   164.00
      .10     2.93     2.10     2.37     .040     .070     .040     .000   162.00   836.71
  .001134     250.     250.     250.        2        0        0      .00   188.42  1025.13

*SECNO 46.750
 2800 NAT Q1=    428.94  WSEL=    167.45  ENC Q1=    428.94  WSEL=    168.45  RATIO=   .0000
 NAT Q1=    780.  RATIOS LOB,CH,ROB=   .1208   .1217   .7575  WSEL=    168.45

3470 ENCROACHMENT STATIONS=     989.0    1114.7  TYPE=     4  TARGET=        .450
    46.75     5.56   167.56      .00   167.45   167.94      .39      .15      .00   164.00
    2000.       0.     481.    1519.       0.     120.     289.      20.       4.   164.00
      .11      .00     4.00     5.25     .040     .070     .040     .000   162.00   989.00
  .005095      70.      70.      70.        2        0        0      .00   125.67  1114.67

*SECNO 48.800
 2800 NAT Q1=    403.36  WSEL=    167.89  ENC Q1=    403.36  WSEL=    168.89  RATIO=   .0000
 NAT Q1=    738.  RATIOS LOB,CH,ROB=   .1313   .1297   .7390  WSEL=    168.89

3470 ENCROACHMENT STATIONS=     970.0    1069.1  TYPE=     4  TARGET=        .453
    48.80     6.43   168.43      .00   167.89   168.81      .38      .86      .00   164.00
    2000.       0.     457.    1543.       0.     127.     293.      22.       5.   164.00
      .12      .00     3.61     5.26     .040     .070     .040     .000   162.00   970.00
  .003671     210.     205.     200.        2        0        0      .00    99.14  1069.14

*SECNO 51.100
 2800 NAT Q1=    264.68  WSEL=    168.55  ENC Q1=    264.68  WSEL=    169.55  RATIO=   .0000
 NAT Q1=    493.  RATIOS LOB,CH,ROB=   .2570   .1493   .5937  WSEL=    169.55

3470 ENCROACHMENT STATIONS=     983.7    1071.4  TYPE=     4  TARGET=        .463
    51.10     5.31   169.31      .00   168.55   169.91      .60     1.11      .00   166.00
    2000.       86.     565.    1349.      17.     115.     200.      24.       5.   166.00
      .13     4.93     4.92     6.74     .040     .070     .040     .000   164.00   983.74
  .006823     235.     230.     225.        2        0        0      .00    87.64  1071.38
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  SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOSS   BANK ELEV
  Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
  TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN     SSTA
  SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID    ENDST


*SECNO 52.500
 2800 NAT Q1=    411.56  WSEL=    169.17  ENC Q1=    411.56  WSEL=    170.17  RATIO=   .0000
 NAT Q1=    698.  RATIOS LOB,CH,ROB=   .1692   .1263   .7045  WSEL=    170.17
3280 CROSS SECTION     52.50 EXTENDED        .16 FEET


3470 ENCROACHMENT STATIONS=     989.0    1094.4  TYPE=     4  TARGET=        .410
    52.50     6.16   170.16      .00   169.17   170.45      .29      .54      .00   166.00
    2000.       0.     394.   1606.       0.     133.     347.      25.       6.   166.00
      .14      .00     2.95     4.63     .040     .070     .040     .000   164.00   989.00
  .002483     140.     140.     140.        2        0        0      .00   105.36  1094.36

*SECNO 54.750
 2800 NAT Q1=    254.86  WSEL=    169.64  ENC Q1=    254.86  WSEL=    170.64  RATIO=   .0000
 NAT Q1=    405.  RATIOS LOB,CH,ROB=   .3286   .2467   .4247  WSEL=    170.64
3280 CROSS SECTION     54.75 EXTENDED        .57 FEET


3470 ENCROACHMENT STATIONS=     973.0    1033.2  TYPE=     4  TARGET=        .370
    54.75     6.57   170.57      .00   169.64   171.26      .69      .80      .00   166.00
    2000.     453.     798.     749.      67.     143.      99.      27.       6.   166.00
      .15     6.80     5.60     7.55     .040     .070     .040     .000   164.00   972.97
  .006635     210.     210.     210.        2        0        0      .00    60.26  1033.23

*SECNO 57.100
 2800 NAT Q1=    601.61  WSEL=    170.50  ENC Q1=    601.61  WSEL=    171.50  RATIO=   .0000
 NAT Q1=    928.  RATIOS LOB,CH,ROB=   .0000   .0620   .9380  WSEL=    171.50
3280 CROSS SECTION     57.10 EXTENDED       1.59 FEET


3301 HV CHANGED MORE THAN HVINS


3470 ENCROACHMENT STATIONS=     970.0    1105.4  TYPE=     4  TARGET=        .352
    57.10     5.59   171.59      .00   170.50   171.76      .17      .51      .00   170.00
    2000.       0.     182.   1818.       0.     118.     529.      29.       6.   166.00
      .17      .00     1.54     3.44     .040     .070     .040     .000   166.00   970.00
  .001051     235.     235.     235.        2        0        0      .00   135.42  1105.42
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  SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOSS   BANK ELEV
  Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA   LEFT/RIGHT
  TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN      SSTA
  SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID     ENDST


*SECNO 58.350
 2800 NAT Q1=    155.83  WSEL=    170.54  ENC Q1=    199.72  WSEL=    171.54  RATIO= -.2816
 NAT Q1=    298.  RATIOS LOB,CH,ROB=   .0062   .6700   .3239  WSEL=    171.54

3301 HV CHANGED MORE THAN HVINS

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

3470 ENCROACHMENT STATIONS=     965.0    1035.0  TYPE=     4  TARGET=        .330
    58.35     3.07   171.07   171.07   170.54   172.55     1.48      .34      .00   170.00
    2000.       0.    2000.       0.       0.     205.       0.      31.       7.   168.00
      .17      .00     9.75      .00     .040     .040     .040     .000   168.00   965.00
  .017826     125.     125.     125.       20       11        0      .00    70.00  1035.00

*SECNO 60.000
 2800 NAT Q1=    345.03  WSEL=    172.17  ENC Q1=    345.03  WSEL=    173.17  RATIO=   .0000
 NAT Q1=    532.  RATIOS LOB,CH,ROB=   .0179   .6253   .3568  WSEL=    173.17

3301 HV CHANGED MORE THAN HVINS


3470 ENCROACHMENT STATIONS=     975.0    1055.5  TYPE=     4  TARGET=        .351
    60.00     5.11   173.11      .00   172.17   173.64      .52     1.09      .00   170.00
    2000.       0.    1926.      74.       0.     328.      20.      32.       7.   170.00
      .18      .00     5.88     3.66     .040     .040     .040     .000   168.00   975.00
  .003717     155.     155.     155.        2        0        0      .00    80.52  1055.52
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THIS RUN EXECUTED 11-17-87

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**************************************************
  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
  IBM-PC-XT VERSION AUGUST 1985
**************************************************

T1              CROSS CREEK HYDRAULIC STUDY  PEC PROJ. NO.  36-87424-4
T2     SET F/W ENCR. STA'S.; 100-YR. Q=2000 CFS; SET FLOODWAY LIMITS; BLOCK 2
T3         EAST BRANCH GYPSUM CREEK W/ CHIMP  MWB 11-17-87

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

     -10.       5.        0.        0.   .000000       .00        .0        0.   167.200      .000

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

     15.000     .000    -1.000     .000      .000      .000      .000      .000      .000      .000
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SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	LEFT/RIGHT
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*PROF 4

*SECNO 37.550

3470 ENCROACHMENT STATIONS=			915.0	1075.0	TYPE=	1	TARGET=	160.000	
37.55	9.10	167.20	.00	167.20	167.23	.03	.00	.00	162.10
2000.	0.	2000.	0.	0.	1392.	0.	0.	0.	100000.00
.00	.00	1.44	.00	.040	.035	.040	.000	158.10	915.00
.000070	10.	10.	10.	0	0	0	.00	160.00	1075.00

*SECNO 39.600

3470 ENCROACHMENT STATIONS=			835.0	1100.0	TYPE=	1	TARGET=	265.000	
39.60	9.12	167.22	.00	167.22	167.25	.03	.02	.00	164.00
2000.	0.	2000.	0.	0.	1514.	0.	7.	1.	100000.00
.04	.00	1.32	.00	.040	.035	.040	.000	158.10	835.00
.000098	200.	200.	200.	0	0	0	.00	265.00	1100.00

*SECNO 40.800

3470 ENCROACHMENT STATIONS=			990.0	1175.0	TYPE=	1	TARGET=	185.000	
40.80	5.13	167.13	.00	167.21	167.30	.17	.05	.00	100000.00
2000.	0.	244.	1756.	0.	107.	514.	12.	2.	164.00
.06	.00	2.29	3.42	.040	.070	.040	.000	162.00	990.00
.001891	215.	210.	195.	2	0	0	.00	185.00	1175.00

*SECNO 43.500

3470 ENCROACHMENT STATIONS=			900.0	1120.0	TYPE=	1	TARGET=	220.000	
43.50	5.43	167.43	.00	167.32	167.53	.10	.23	.00	164.00
2000.	796.	225.	979.	305.	117.	374.	14.	3.	164.00
.08	2.61	1.91	2.62	.040	.070	.040	.000	162.00	900.00
.001002	170.	170.	170.	2	0	0	.00	220.00	1120.00

*SECNO 46.000

3470 ENCROACHMENT STATIONS=			835.0	1025.0	TYPE=	1	TARGET=	190.000	
46.00	5.67	167.67	.00	167.45	167.79	.12	.26	.00	164.00
2000.	1643.	255.	102.	566.	123.	43.	19.	4.	164.00
.10	2.90	2.08	2.35	.040	.070	.040	.000	162.00	835.00
.001113	250.	250.	250.	2	0	0	.00	190.00	1025.00

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

*SECNO 46.750

3470 ENCROACHMENT STATIONS=     990.0    1115.0  TYPE=     1  TARGET=     125.000
    46.75      5.54    167.54      .00    167.45    167.94      .40       .15       .00100000.00
    2000.        0.       461.    1539.       0.      115.     288.       20.        4.     164.00
      .11       .00      3.99     5.34      .040      .070     .040      .000     162.00    990.00
  .005296       70.       70.      70.         2         0        0       .00     125.00   1115.00

*SECNO 48.800

3470 ENCROACHMENT STATIONS=     970.0    1070.0  TYPE=     1  TARGET=     100.000
    48.80      6.44    168.44      .00    167.89    168.81      .37       .87       .00     164.00
    2000.        0.       453.    1547.       0.      127.     297.       22.        5.     164.00
      .12       .00      3.58     5.21      .040      .070     .040      .000     162.00    970.00
  .003595       210.      205.     200.         2         0        0       .00     100.00   1070.00

*SECNO 51.100

3470 ENCROACHMENT STATIONS=     985.0    1070.0  TYPE=     1  TARGET=      85.000
    51.10      5.32    169.32      .00    168.55    169.94      .63      1.13       .00     166.00
    2000.       63.       591.    1346.      13.      115.     196.       24.        5.     166.00
      .13      4.77      5.14     6.88      .040      .070     .040      .000     164.00    985.00
  .007446       235.      230.     225.         2         0        0       .00      85.00   1070.00

*SECNO 52.500

3470 ENCROACHMENT STATIONS=     990.0    1095.0  TYPE=     1  TARGET=     105.000
    52.50      6.20    170.20      .00    169.17    170.49      .29       .55       .00100000.00
    2000.        0.       371.    1629.       0.      129.     353.       25.        6.     166.00
      .14       .00      2.87     4.62      .040      .070     .040      .000     164.00    990.00
  .002430       140.      140.     140.         2         0        0       .00     105.00   1095.00

*SECNO 54.750

3470 ENCROACHMENT STATIONS=     975.0    1035.0  TYPE=     1  TARGET=      60.000
    54.75      6.60    170.60      .00    169.64    171.28      .68       .79       .00     166.00
    2000.       397.       798.     805.       59.      143.     107.       27.        6.     166.00
      .15      6.67      5.57     7.51      .040      .070     .040      .000     164.00    975.00
  .006510       210.      210.     210.         2         0        0       .00      60.00   1035.00
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   SECNO    DEPTH    CWSEL    CRIWS    WSELK    EG       HV       HL       OLOSS    BANK ELEV
   Q        QLOB     QCH      QROB     ALOB     ACH      AROB     VOL      TWA    LEFT/RIGHT
   TIME     VLOB     VCH      VROB     XNL      XNCH     XNR      WTN      ELMIN       SSTA
   SLOPE    XLOBL    XLCH     XLOBR    ITRIAL   IDC      ICONT    CORAR    TOPWID      ENDST

*SECNO 57.100

3301 HV CHANGED MORE THAN HVINS


3470 ENCROACHMENT STATIONS=     970.0    1105.0  TYPE=     1  TARGET=     135.000
    57.10     5.61   171.61      .00   170.50   171.78      .17      .50      .00   170.00
    2000.       0.     182.    1818.       0.     118.     530.      29.       6.    166.00
      .17      .00     1.54     3.43     .040     .070     .040     .000   166.00   970.00
  .001043     235.     235.     235.        2        0        0      .00   135.00  1105.00

*SECNO 58.350

3301 HV CHANGED MORE THAN HVINS

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

3470 ENCROACHMENT STATIONS=     965.0    1035.0  TYPE=     1  TARGET=      70.000
    58.35     3.07   171.07   171.07   170.54   172.55     1.48      .34      .00   170.00
    2000.       0.    2000.       0.       0.     205.       0.      31.       7. 100000.00
      .17      .00     9.76      .00     .040     .040     .040     .000   168.00   965.00
  .017839     125.     125.     125.       20       11        0      .00    70.00  1035.00

*SECNO 60.000

3301 HV CHANGED MORE THAN HVINS


3470 ENCROACHMENT STATIONS=     975.0    1055.0  TYPE=     1  TARGET=      80.000
    60.00     5.11   173.11      .00   172.17   173.64      .53     1.09      .00   170.00
    2000.       0.    1936.      64.       0.     328.      18.      32.       7.    170.00
      .18      .00     5.90     3.55     .040     .040     .040     .000   168.00   975.00
  .003731     155.     155.     155.        3        0        0      .00    80.00  1055.00
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THIS RUN EXECUTED 11-17-87

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  HEC2 RELEASE DATED NOV 76 UPDATED MAY  1984
  ERROR CORR -  01,02,03,04,05,06
  MODIFICATION -  50,51,52,53,54,55,56
  IBM-PC-XT VERSION AUGUST 1985
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NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

EAST BRANCH GYPSUM CR

SUMMARY PRINTOUT TABLE 110

SECNO	CWSEL	DIFKWS	EG	TOPWID	QLOB	QCH	QROB	PERENC	STENCL	STCHL	STCHR	STENCR
37.550	167.20	.00	167.22	323.33	86.34	1765.06	148.60	.00	.00	915.00	1075.00	.00
37.550	167.20	.00	167.22	323.33	86.34	1765.06	148.60	.00	.00	915.00	1075.00	.00
37.550	167.20	.00	167.23	160.00	.00	2000.00	.00	.15	915.00	915.00	1075.00	1075.00
37.550	167.20	.00	167.23	160.00	.00	2000.00	.00	160.00	915.00	915.00	1075.00	1075.00
39.600	167.22	.00	167.23	497.92	19.28	1774.83	205.88	.00	.00	835.00	1100.00	.00
39.600	167.22	.00	167.23	482.58	18.17	1777.27	204.56	.00	819.49	835.00	1100.00	1302.07
39.600	167.22	.01	167.25	265.00	.00	2000.00	.00	.16	835.00	835.00	1100.00	1100.00
39.600	167.22	.01	167.25	265.00	.00	2000.00	.00	265.00	835.00	835.00	1100.00	1100.00
40.800	167.21	.00	167.27	334.86	35.23	175.57	1789.20	.00	.00	989.00	1011.00	.00
40.800	167.21	.00	167.27	334.86	35.23	175.57	1789.20	.00	.00	989.00	1011.00	.00
40.800	167.14	-.07	167.30	187.67	.00	254.43	1745.57	.38	989.00	989.00	1011.00	1176.67
40.800	167.13	-.07	167.30	185.00	.00	244.37	1755.63	185.00	990.00	989.00	1011.00	1175.00
43.500	167.32	.00	167.37	404.22	591.67	150.81	1257.52	.00	.00	989.00	1011.00	.00
43.500	167.31	-.01	167.42	220.00	794.28	228.68	977.05	220.00	900.00	989.00	1011.00	1120.00
43.500	167.43	.10	167.53	219.35	340.12	225.32	1434.56	.38	949.89	989.00	1011.00	1169.24
43.500	167.43	.11	167.53	220.00	796.04	224.59	979.37	220.00	900.00	989.00	1011.00	1120.00
46.000	167.45	.00	167.50	415.65	1482.97	177.51	339.52	.00	.00	989.00	1011.00	.00
46.000	167.56	.11	167.61	416.89	1471.84	172.66	355.50	.00	.00	989.00	1011.00	.00
46.000	167.67	.22	167.79	188.42	1639.27	257.31	103.42	.39	836.71	989.00	1011.00	1025.13
46.000	167.67	.23	167.79	190.00	1643.29	254.99	101.72	190.00	835.00	989.00	1011.00	1025.00
46.750	167.45	.00	167.58	315.64	248.32	332.60	1419.08	.00	.00	989.00	1011.00	.00
46.750	167.55	.11	167.67	316.88	246.67	319.34	1433.99	.00	.00	989.00	1011.00	.00
46.750	167.56	.11	167.94	125.67	.00	481.22	1518.78	.45	989.00	989.00	1011.00	1114.67
46.750	167.54	.10	167.94	125.00	.00	461.01	1538.99	125.00	990.00	989.00	1011.00	1115.00
48.800	167.89	.00	168.04	315.25	224.69	363.84	1411.47	.00	.00	970.00	990.00	.00
48.800	167.95	.05	168.09	320.31	226.81	356.71	1416.49	.00	.00	970.00	990.00	.00
48.800	168.43	.54	168.81	99.14	.00	456.93	1543.07	.45	970.00	970.00	990.00	1069.14
48.800	168.44	.55	168.81	100.00	.00	453.41	1546.59	100.00	970.00	970.00	990.00	1070.00

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	SECNO	CWSEL	DIFKWS	EG	TOPWID	QLOB	QCH	QROB	PERENC	STENCL	STCHL	STCHR	STENCR
	51.100	168.55	.00	168.86	212.91	461.19	397.28	1141.53	.00	.00	989.00	1011.00	.00
	51.100	168.56	.01	168.87	213.21	461.79	395.99	1142.22	.00	.00	989.00	1011.00	.00
	51.100	169.31	.76	169.91	87.64	85.89	565.37	1348.73	.46	983.74	989.00	1011.00	1071.38
	51.100	169.32	.77	169.94	85.00	63.26	590.93	1345.80	85.00	985.00	989.00	1011.00	1070.00
	52.500	169.17	.00	169.35	245.62	248.01	317.38	1434.61	.00	.00	989.00	1011.00	.00
	52.500	169.17	.00	169.35	220.38	248.03	317.26	1434.71	.00	934.97	989.00	1011.00	1155.35
	52.500	170.16	.99	170.45	105.36	.00	394.04	1605.96	.41	989.00	989.00	1011.00	1094.36
	52.500	170.20	1.03	170.49	105.00	.00	371.04	1628.96	105.00	990.00	989.00	1011.00	1095.00
	54.750	169.64	.00	170.11	121.47	592.63	595.08	812.29	.00	.00	989.00	1011.00	.00
	54.750	169.65	.00	170.11	121.43	592.30	595.60	812.10	.00	.00	989.00	1011.00	.00
	54.750	170.57	.92	171.26	60.26	453.02	797.65	749.33	.37	972.97	989.00	1011.00	1033.23
	54.750	170.60	.96	171.28	60.00	396.81	797.91	805.28	60.00	975.00	989.00	1011.00	1035.00
	57.100	170.50	.00	170.62	232.09	.00	118.17	1881.83	.00	.00	970.00	1000.00	.00
	57.100	170.51	.01	170.63	230.00	.00	115.88	1884.12	.00	970.00	970.00	1000.00	1200.00
	57.100	171.59	1.09	171.76	135.42	.00	181.64	1818.36	.35	970.00	970.00	1000.00	1105.42
	57.100	171.61	1.11	171.78	135.00	.00	182.34	1817.66	135.00	970.00	970.00	1000.00	1105.00
*	58.350	170.54	.00	171.55	126.20	1.47	1434.88	563.66	.00	.00	965.00	1035.00	.00
*	58.350	170.54	.00	171.55	126.20	1.46	1434.90	563.63	.00	.00	965.00	1035.00	.00
*	58.350	171.07	.53	172.55	70.00	.00	2000.00	.00	.33	965.00	965.00	1035.00	1035.00
*	58.350	171.07	.53	172.55	70.00	.00	2000.00	.00	70.00	965.00	965.00	1035.00	1035.00
	60.000	172.17	.00	172.54	129.15	13.38	1260.21	726.41	.00	.00	975.00	1050.00	.00
	60.000	172.17	.00	172.54	129.12	13.36	1260.21	726.43	.00	.00	975.00	1050.00	.00
	60.000	173.11	.94	173.64	80.52	.00	1926.19	73.81	.35	975.00	975.00	1050.00	1055.52
	60.000	173.11	.94	173.64	80.00	.00	1935.86	64.14	80.00	975.00	975.00	1050.00	1055.00

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EAST BRANCH GYPSUM CR

SUMMARY PRINTOUT TABLE 150

SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10K*S	VCH	AREA	.01K
37.550	.00	.00	.00	158.10	2000.00	167.20	.00	167.22	.50	1.27	1798.08	2821.37
37.550	.00	.00	.00	158.10	2000.00	167.20	.00	167.22	.50	1.27	1798.08	2821.37
37.550	.00	.00	.00	158.10	2000.00	167.20	.00	167.23	.70	1.44	1392.01	2390.03
37.550	.00	.00	.00	158.10	2000.00	167.20	.00	167.23	.70	1.44	1391.99	2390.01
39.600	200.00	.00	.00	158.10	2000.00	167.22	.00	167.23	.75	1.17	1951.08	2304.96
39.600	200.00	.00	.00	158.10	2000.00	167.22	.00	167.23	.75	1.17	1942.12	2303.46
39.600	200.00	.00	.00	158.10	2000.00	167.22	.00	167.25	.98	1.32	1514.29	2016.74
39.600	200.00	.00	.00	158.10	2000.00	167.22	.00	167.25	.98	1.32	1513.71	2015.49
40.800	210.00	.00	.00	162.00	2000.00	167.21	.00	167.27	7.06	1.56	1005.55	752.76
40.800	210.00	.00	.00	162.00	2000.00	167.21	.00	167.27	7.06	1.56	1005.55	752.75
40.800	210.00	.00	.00	162.00	2000.00	167.14	.00	167.30	18.21	2.29	630.98	468.66
40.800	210.00	.00	.00	162.00	2000.00	167.13	.00	167.30	18.91	2.29	620.57	459.87
43.500	170.00	.00	.00	162.00	2000.00	167.32	.00	167.37	4.83	1.31	1197.07	910.01
43.500	170.00	.00	.00	162.00	2000.00	167.31	.00	167.42	11.20	1.99	770.48	597.74
43.500	170.00	.00	.00	162.00	2000.00	167.43	.00	167.53	10.11	1.92	793.39	628.93
43.500	170.00	.00	.00	162.00	2000.00	167.43	.00	167.53	10.02	1.91	796.43	631.70
46.000	250.00	.00	.00	162.00	2000.00	167.45	.00	167.50	6.19	1.51	1102.74	803.88
46.000	250.00	.00	.00	162.00	2000.00	167.56	.00	167.61	5.48	1.44	1147.73	854.46
46.000	250.00	.00	.00	162.00	2000.00	167.67	.00	167.79	11.34	2.10	725.56	593.78
46.000	250.00	.00	.00	162.00	2000.00	167.67	.00	167.79	11.13	2.08	731.75	599.43
46.750	70.00	.00	.00	162.00	2000.00	167.45	.00	167.58	21.74	2.82	691.71	428.94
46.750	70.00	.00	.00	162.00	2000.00	167.55	.00	167.67	18.76	2.66	725.69	461.79
46.750	70.00	.00	.00	162.00	2000.00	167.56	.00	167.94	50.95	4.00	409.42	280.19
46.750	70.00	.00	.00	162.00	2000.00	167.54	.00	167.94	52.96	3.99	403.86	274.83
48.800	205.00	.00	.00	162.00	2000.00	167.89	.00	168.04	24.59	3.14	638.33	403.36
48.800	205.00	.00	.00	162.00	2000.00	167.95	.00	168.09	22.88	3.05	656.18	418.10
48.800	205.00	.00	.00	162.00	2000.00	168.43	.00	168.81	36.71	3.61	419.92	330.11
48.800	205.00	.00	.00	162.00	2000.00	168.44	.00	168.81	35.95	3.58	423.62	333.57
51.100	230.00	.00	.00	164.00	2000.00	168.55	.00	168.86	57.10	4.05	449.40	264.68
51.100	230.00	.00	.00	164.00	2000.00	168.56	.00	168.87	56.34	4.03	451.37	266.46
51.100	230.00	.00	.00	164.00	2000.00	169.31	.00	169.91	68.23	4.92	332.57	242.13
51.100	230.00	.00	.00	164.00	2000.00	169.32	.00	169.94	74.46	5.14	323.99	231.77
52.500	140.00	.00	.00	164.00	2000.00	169.17	.00	169.35	23.61	2.84	602.06	411.56
52.500	140.00	.00	.00	164.00	2000.00	169.17	.00	169.35	23.57	2.84	595.72	411.96
52.500	140.00	.00	.00	164.00	2000.00	170.16	.00	170.45	24.83	2.95	480.02	401.33
52.500	140.00	.00	.00	164.00	2000.00	170.20	.00	170.49	24.30	2.87	482.14	405.72

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	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10K*S	VCH	AREA	.01K
	54.750	210.00	.00	.00	164.00	2000.00	169.64	.00	170.11	61.58	4.87	369.52	254.86
	54.750	210.00	.00	.00	164.00	2000.00	169.65	.00	170.11	61.84	4.88	369.04	254.33
	54.750	210.00	.00	.00	164.00	2000.00	170.57	.00	171.26	66.35	5.60	308.44	245.53
	54.750	210.00	.00	.00	164.00	2000.00	170.60	.00	171.28	65.10	5.57	310.05	247.89
	57.100	235.00	.00	.00	166.00	2000.00	170.50	.00	170.62	11.05	1.39	756.01	601.61
	57.100	235.00	.00	.00	166.00	2000.00	170.51	.00	170.63	11.09	1.36	755.59	600.68
	57.100	235.00	.00	.00	166.00	2000.00	171.59	.00	171.76	10.51	1.54	647.03	616.94
	57.100	235.00	.00	.00	166.00	2000.00	171.61	.00	171.78	10.43	1.54	647.98	619.28
*	58.350	125.00	.00	.00	168.00	2000.00	170.54	170.54	171.55	164.71	8.53	254.16	155.83
*	58.350	125.00	.00	.00	168.00	2000.00	170.54	170.54	171.55	164.78	8.54	254.13	155.81
*	58.350	125.00	.00	.00	168.00	2000.00	171.07	171.07	172.55	178.26	9.75	205.03	149.80
*	58.350	125.00	.00	.00	168.00	2000.00	171.07	171.07	172.55	178.39	9.76	204.98	149.74
	60.000	155.00	.00	.00	168.00	2000.00	172.17	.00	172.54	33.60	4.89	412.52	345.03
	60.000	155.00	.00	.00	168.00	2000.00	172.17	.00	172.54	33.64	4.89	412.35	344.80
	60.000	155.00	.00	.00	168.00	2000.00	173.11	.00	173.64	37.17	5.88	347.81	328.04
	60.000	155.00	.00	.00	168.00	2000.00	173.11	.00	173.64	37.31	5.90	346.29	327.41

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EAST BRANCH GYPSUM CR

SUMMARY PRINTOUT TABLE 150

SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
37.550	2000.00	167.20	.00	.00	.00	323.33	.00
37.550	2000.00	167.20	.00	.00	.00	323.33	.00
37.550	2000.00	167.20	.00	.00	.00	160.00	.00
37.550	2000.00	167.20	.00	.00	.00	160.00	.00
39.600	2000.00	167.22	.00	.02	.00	497.92	200.00
39.600	2000.00	167.22	.00	.02	.00	482.58	200.00
39.600	2000.00	167.22	.01	.02	.01	265.00	200.00
39.600	2000.00	167.22	.00	.02	.01	265.00	200.00
40.800	2000.00	167.21	.00	-.01	.00	334.86	210.00
40.800	2000.00	167.21	.00	-.01	.00	334.86	210.00
40.800	2000.00	167.14	-.07	-.08	-.07	187.67	210.00
40.800	2000.00	167.13	-.01	-.09	-.07	185.00	210.00
43.500	2000.00	167.32	.00	.12	.00	404.22	170.00
43.500	2000.00	167.31	-.01	.10	-.01	220.00	170.00
43.500	2000.00	167.43	.11	.29	.10	219.35	170.00
43.500	2000.00	167.43	.00	.30	.11	220.00	170.00
46.000	2000.00	167.45	.00	.12	.00	415.65	250.00
46.000	2000.00	167.56	.11	.25	.11	416.89	250.00
46.000	2000.00	167.67	.12	.25	.22	188.42	250.00
46.000	2000.00	167.67	.00	.24	.23	190.00	250.00
46.750	2000.00	167.45	.00	.00	.00	315.64	70.00
46.750	2000.00	167.55	.11	.00	.11	316.88	70.00
46.750	2000.00	167.56	.00	-.12	.11	125.67	70.00
46.750	2000.00	167.54	-.01	-.13	.10	125.00	70.00
48.800	2000.00	167.89	.00	.44	.00	315.25	205.00
48.800	2000.00	167.95	.05	.39	.05	320.31	205.00
48.800	2000.00	168.43	.48	.87	.54	99.14	205.00
48.800	2000.00	168.44	.01	.90	.55	100.00	205.00
51.100	2000.00	168.55	.00	.66	.00	212.91	230.00
51.100	2000.00	168.56	.01	.61	.01	213.21	230.00
51.100	2000.00	169.31	.75	.89	.76	87.64	230.00
51.100	2000.00	169.32	.00	.88	.77	85.00	230.00
52.500	2000.00	169.17	.00	.62	.00	245.62	140.00
52.500	2000.00	169.17	.00	.61	.00	220.38	140.00
52.500	2000.00	170.16	.99	.84	.99	105.36	140.00
52.500	2000.00	170.20	.04	.88	1.03	105.00	140.00

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	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
	54.750	2000.00	169.64	.00	.47	.00	121.47	210.00
	54.750	2000.00	169.65	.00	.47	.00	121.43	210.00
	54.750	2000.00	170.57	.92	.41	.92	60.26	210.00
	54.750	2000.00	170.60	.03	.40	.96	60.00	210.00
	57.100	2000.00	170.50	.00	.86	.00	232.09	235.00
	57.100	2000.00	170.51	.01	.86	.01	230.00	235.00
	57.100	2000.00	171.59	1.08	1.02	1.09	135.42	235.00
	57.100	2000.00	171.61	.02	1.01	1.11	135.00	235.00
*	58.350	2000.00	170.54	.00	.04	.00	126.20	125.00
*	58.350	2000.00	170.54	.00	.04	.00	126.20	125.00
*	58.350	2000.00	171.07	.53	-.52	.53	70.00	125.00
*	58.350	2000.00	171.07	.00	-.54	.53	70.00	125.00
	60.000	2000.00	172.17	.00	1.62	.00	129.15	155.00
	60.000	2000.00	172.17	.00	1.62	.00	129.12	155.00
	60.000	2000.00	173.11	.94	2.04	.94	80.52	155.00
	60.000	2000.00	173.11	.00	2.04	.94	80.00	155.00

SUMMARY OF ERRORS AND SPECIAL NOTES

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CAUTION  SECNO=    58.350  PROFILE= 1  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=    58.350  PROFILE= 1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=    58.350  PROFILE= 1  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION  SECNO=    58.350  PROFILE= 2  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=    58.350  PROFILE= 2  MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=    58.350  PROFILE= 3  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=    58.350  PROFILE= 3  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=    58.350  PROFILE= 3  20 TRIALS ATTEMPTED TO BALANCE WSEL
CAUTION  SECNO=    58.350  PROFILE= 4  CRITICAL DEPTH ASSUMED
CAUTION  SECNO=    58.350  PROFILE= 4  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION  SECNO=    58.350  PROFILE= 4  20 TRIALS ATTEMPTED TO BALANCE WSEL
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FLOODWAY DATA, EAST BRANCH GYPSUM CR
PROFILE NO. 2

STATION	FLOODWAY WIDTH	FLOODWAY SECTION AREA	FLOODWAY MEAN VELOCITY	WATER SURFACE ELEVATION WITH FLOODWAY	WITHOUT FLOODWAY	DIFFERENCE
37.550	323.	1798.	1.1	167.2	167.2	.0
39.600	483.	1942.	1.0	167.2	167.2	.0
40.800	335.	1006.	2.0	167.2	167.2	.0
43.500	220.	770.	2.6	167.3	167.3	.0
46.000	417.	1148.	1.7	167.5	167.4	.1
46.750	317.	726.	2.8	167.5	167.4	.1
48.800	320.	656.	3.0	168.0	167.9	.1
51.100	213.	451.	4.4	168.6	168.6	.0
52.500	220.	596.	3.4	169.2	169.2	.0
54.750	121.	369.	5.4	169.6	169.6	.0
57.100	230.	756.	2.6	170.5	170.5	.0
58.350	126.	254.	7.9	170.5	170.5	.0
60.000	129.	412.	4.9	172.2	172.2	.0

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FLOODWAY DATA, EAST BRANCH GYPSUM CR
PROFILE NO. 3

STATION	FLOODWAY WIDTH	FLOODWAY SECTION AREA	FLOODWAY MEAN VELOCITY	WATER SURFACE ELEVATION WITH FLOODWAY	WITHOUT FLOODWAY	DIFFERENCE
37.550	160.	1392.	1.4	167.2	167.2	.0
39.600	265.	1514.	1.3	167.2	167.2	.0
40.800	188.	631.	3.2	167.2	167.2	.0
43.500	219.	793.	2.5	167.4	167.3	.1
46.000	188.	726.	2.8	167.6	167.4	.2
46.750	126.	409.	4.9	167.5	167.4	.1
48.800	99.	420.	4.8	168.4	167.9	.5
51.100	88.	333.	6.0	169.4	168.6	.8
52.500	105.	480.	4.2	170.2	169.2	1.0
54.750	60.	308.	6.5	170.5	169.6	.9
57.100	135.	647.	3.1	171.6	170.5	1.1
58.350	70.	205.	9.8	171.0	170.5	.5
60.000	81.	348.	5.8	173.1	172.2	.9

FLOODWAY DATA, EAST BRANCH GYPSUM CR
PROFILE NO. 4

STATION	FLOODWAY WIDTH	FLOODWAY SECTION AREA	FLOODWAY MEAN VELOCITY	WATER SURFACE ELEVATION WITH FLOODWAY	WITHOUT FLOODWAY	DIFFERENCE
37.550	160.	1392.	1.4	167.2	167.2	.0
39.600	265.	1514.	1.3	167.2	167.2	.0
40.800	185.	621.	3.2	167.2	167.2	.0
43.500	220.	796.	2.5	167.4	167.3	.1
46.000	190.	732.	2.7	167.6	167.4	.2
46.750	125.	404.	5.0	167.5	167.4	.1
48.800	100.	424.	4.7	168.4	167.9	.5
51.100	85.	324.	6.2	169.4	168.6	.8
52.500	105.	482.	4.1	170.2	169.2	1.0
54.750	60.	310.	6.5	170.6	169.6	1.0
57.100	135.	648.	3.1	171.6	170.5	1.1
58.350	70.	205.	9.8	171.0	170.5	.5
60.000	80.	346.	5.8	173.1	172.2	.9


(Joins sheet 28)
(Joins sheet 35)
(Joins sheet 44)
N
1 Mile
5000 Feet
Scale 1:20000
1 380 000 FEET
2 370 000 FEET
SAINT LOUIS SAN FRANCISCO
ST LOUIS SAN FRANCISCO
water
CROSS CREEK ADD
LAKEVIEW GARDENS CEMETERY
Rawdon Landing Strip
Gb
Rd
Ta
Ce
Ma
Ec
Ia
Ic
Ib
Id
Ie
Va
5
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EXHIBIT NO. 1

SOIL LEGEND

SYMBOL	HYDROLOGIC GROUP	NAME
Aa	B	Albion-Shellabarger sandy loams, 1 to 4 percent slopes
Ab	B	Albion and Shellabarger sandy loans, 7 to 15 percent slopes
Ba	C	Blanket silt loam, 0 to 1 percent slopes
Bb	C	Blanket silt loan, 1 to 3 percent slopes
Ca	B	Canadian fine sandy loan
Cb	B	Canadian-Waldeck fine sandy loams
Cc	D	Carwile fine sandy loam
Cd	B	Clark-Ost clay loams, 1 to 4 percent slopes
Ce	C	Clime silty clay, 3 to 6 percent slopes
Ea	B	Elandco silt loam
Eb	B	Elandco silt loam, occasionally flooded
Ec	B	Elandco silt loam, frequently flooded
Fa	B	Farnum loam, 0 to 1 percent slopes
Fb	B	Farnum loam, 1 to 3 percent slopes
Fc	B	Farnum loam, sandy substratum, 0 to 1 percent slopes
Ga	D	Goessel silty clay, 0 to 1 percent slopes
Gb	D	Goessel silty clay, 1 to 2 percent slopes
Ia	D	Irwin silty clay loam, 1 to 3 percent slopes
Ib	D	Irwin silty clay loam, 3 to 6 percent slopes
Ic	D	Irwin silty clay loam, 2 to 6 percent slopes, eroded
La	C	Lesho loam
Lb	A	Lincoln soils
Ma	B	Milan loam, 1 to 3 percent slopes
Mb	B	Milan form, 3 to 6 percent slopes
Mc	B	Milan clay loam, 2 to 6 percent slopes, eroded
Na	B	Naron fine sandy loam
Oc	D	Owens clay loam, 1 to 3 percent slopes
Od	D	Owens-Rock outcrop complex, 3 to 10 percent slopes
Pa		Pits
Pb	D	Plevna fine sandy loam
Pc	A	Pratt loamy fine sand, undulating
Pd	A	Pratt-Tivoli complex, rolling
Ra	D	Renfrow silty clay loam, 1 to 3 percent slopes
Rb	D	Renfrow silty clay loam, 3 to 6 percent slopes
Rc	D	Renfrow-Owens clay loams, 1 to 4 percent slopes
Rd	D	Rosehill silty clay, 1 to 3 percent slopes
Sa	B	Shellabarger sandy loam, 1 to 3 percent slopes
Sb	B	Shellabarger sandy loam, 3 to 6 percent slopes
Sc	B	Shellabarger sandy loam, 3 to 6 percent slopes, eroded
Ta	D	Tabler silty clay loam
Tb	D	Tabler-Drummond complex
Ua	B	Urban land-Canadian complex
Ub	B	Urban land-Elandco complex
Uc	B	Urban land-Farnum complex, 0 to 3 percent slopes
Ud	D	Urban land-Irwin complex, 1 to 3 percent slopes
Ue	D	Urban land-Tabler complex
Va	B	Vanoss silt loam, 0 to 1 percent slopes
Vb	B	Vanoss silt loam, 1 to 3 percent slopes
Vc	B	Vanoss silt loam, 3 to 6 percent slopes
Vd	B	Vanoss silt loam, 3 to 6 percent slopes, eroded
Ve	D	Vernon sandy loam, 1 to 3 percent slopes
Vf	D	Vernon sandy loam, 3 to 6 percent lopes
Wa	C	Waldeck sandy loam
Wb	D	Waurika silt loam

(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
5. Schools:	40	0.49	0.51	0.56	0.66
6. 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	0.16	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 basins 320 acres or larger.

April 15, 1986

ATTACHMENT A
DRAINAGE CRITERIA MANUAL

CITY OF WICHITA, KANSAS

RAINFALL INTENSITY TABLE FOR SEDGWICK COUNTY, KANSAS

The following tabulation contains rainfall intensity in inches per hour as derived from ESSA Weather Bureau Technical Paper 40 Modified to NWS Hydro-35, 1977 During First Hour

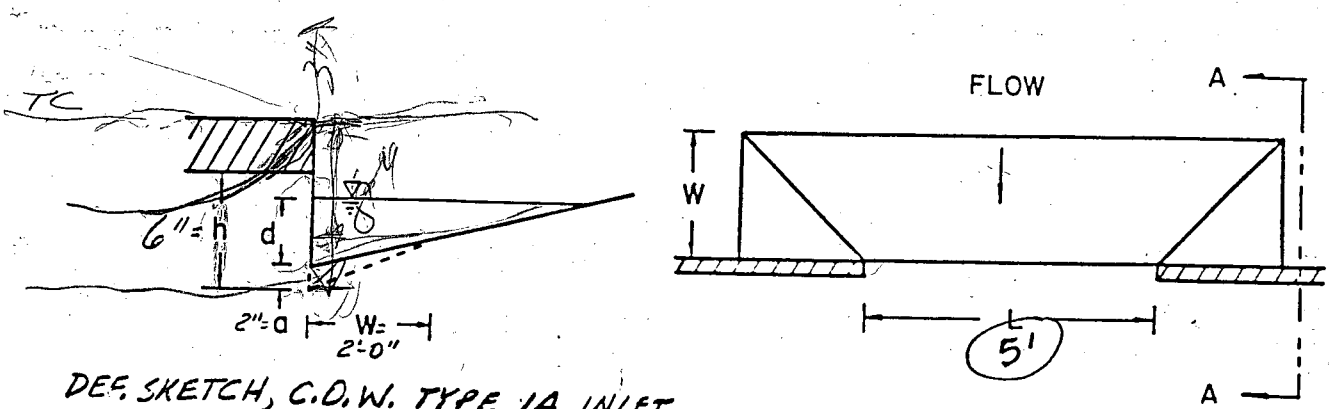
DURATION IN MINUTES	RETURN PERIODS OF 1-YR	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
5	4.18	5.57	6.53	7.41	8.52	9.48	10.32
6	3.99	5.32	6.25	7.09	8.16	9.09	9.89
7	3.81	5.09	5.99	6.81	7.84	8.74	9.50
8	3.66	4.89	5.75	6.55	7.55	8.42	9.15
9	3.52	4.70	5.54	6.31	7.28	8.13	8.83
10	3.39	4.52	5.34	6.09	7.04	7.86	8.54
11	3.27	4.36	5.16	5.89	6.81	7.61	8.27
12	3.18	4.21	4.99	5.71	6.60	7.38	8.02
13	3.05	4.08	4.84	5.53	6.41	7.17	7.79
14	2.96	3.95	4.69	5.37	6.23	6.97	7.57
15	2.87	3.83	4.56	5.22	6.06	6.78	7.37
16	2.78	3.72	4.43	5.08	5.90	6.60	7.18
17	2.71	3.61	4.31	4.95	5.75	6.44	7.00
18	2.63	3.51	4.20	4.83	5.61	6.29	6.84
19	2.56	3.42	4.10	4.71	5.47	6.14	6.68
20	2.50	3.33	4.00	4.60	5.35	6.00	6.53
21	2.44	3.25	3.90	4.50	5.23	5.87	6.39
22	2.38	3.17	3.81	4.40	5.12	5.75	6.26
23	2.32	3.10	3.73	4.31	5.01	5.63	6.13
24	2.27	3.03	3.65	4.22	4.91	5.52	6.01
25	2.22	2.96	3.57	4.13	4.81	5.41	5.90
26	2.20	2.90	3.50	4.05	4.72	5.31	5.79
27	2.16	2.84	3.43	3.98	4.63	5.21	5.69
28	2.14	2.78	3.37	3.90	4.55	5.12	5.59
29	2.11	2.72	3.30	3.83	4.47	5.03	5.49
30	2.08	2.67	3.24	3.76	4.39	4.94	5.40
31	2.05	2.62	3.19	3.70	4.32	4.86	5.32
32	2.02	2.57	3.10	3.63	4.25	4.79	5.22
33	1.99	2.52	3.05	3.57	4.18	4.71	5.14
34	1.96	2.48	3.01	3.51	4.11	4.63	5.07
35	1.93	2.44	2.98	3.46	4.05	4.56	5.00
36	1.91	2.39	2.93	3.41	3.99	4.50	4.93
37	1.89	2.35	2.88	3.36	3.93	4.43	4.86
38	1.87	2.32	2.84	3.31	3.87	4.37	4.79
39	1.85	2.28	2.80	3.26	3.82	4.31	4.73
40	1.83	2.24	2.76	3.22	3.76	4.25	4.66
41	1.81	2.21	2.72	3.17	3.71	4.19	4.60
42	1.79	2.18	2.68	3.13	3.66	4.13	4.54
43	1.77	2.14	2.64	3.09	3.61	4.08	4.49
44	1.75	2.11	2.61	3.05	3.57	4.03	4.43
45	1.73	2.08	2.57	3.01	3.52	3.98	4.38

ATTACHMENT A CONTINUED
Page 2

DURATION IN MINUTES	RETURN PERIODS OF 1-YR	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
46	1.70	2.05	2.54	2.97	3.48	3.93	4.33
47	1.67	2.02	2.50	2.93	3.44	3.88	4.28
48	1.66	2.00	2.47	2.90	3.39	3.84	4.23
49	1.64	1.97	2.44	2.86	3.35	3.79	4.18
50	1.61	1.95	2.41	2.83	3.32	3.75	4.13
51	1.59	1.92	2.38	2.79	3.28	3.71	4.09
52	1.56	1.89	2.35	2.76	3.24	3.67	4.05
53	1.54	1.86	2.33	2.73	3.20	3.63	4.00
54	1.52	1.84	2.30	2.70	3.17	3.59	3.96
55	1.50	1.81	2.27	2.67	3.14	3.55	3.92
56	1.47	1.79	2.25	2.64	3.10	3.51	3.88
57	1.45	1.76	2.22	2.61	3.07	3.48	3.84
58	1.43	1.74	2.20	2.59	3.04	3.44	3.81
59	1.42	1.72	2.18	2.56	3.01	3.41	3.77
60	1.40	1.69	2.15	2.53	2.98	3.37	3.73
61	1.38	1.67	2.13	2.51	2.95	3.34	3.70
62	1.36	1.65	2.11	2.48	2.92	3.31	3.67
63	1.34	1.63	2.09	2.46	2.89	3.28	3.63
64	1.33	1.61	2.07	2.44	2.86	3.25	3.60
65	1.31	1.59	2.05	2.41	2.84	3.22	3.57
66	1.30	1.57	2.03	2.39	2.81	3.19	3.54
67	1.28	1.56	2.01	2.37	2.79	3.16	3.51
68	1.26	1.54	1.99	2.35	2.76	3.13	3.48
69	1.25	1.52	1.97	2.33	2.74	3.10	3.45
70	1.24	1.50	1.95	2.31	2.71	3.08	3.42
71	1.22	1.49	1.93	2.28	2.69	3.05	3.39
72	1.21	1.47	1.92	2.26	2.67	3.02	3.36
73	1.20	1.46	1.90	2.25	2.64	3.00	3.34
74	1.18	1.44	1.88	2.23	2.63	2.98	3.31
75	1.17	1.43	1.86	2.21	2.61	2.95	3.29
76	1.16	1.41	1.85	2.19	2.58	2.93	3.26
77	1.15	1.40	1.83	2.17	2.55	2.90	3.24
78	1.13	1.38	1.82	2.15	2.53	2.88	3.22
79	1.12	1.37	1.80	2.14	2.50	2.86	3.19
80	1.11	1.36	1.79	2.12	2.48	2.84	3.16
81	1.10	1.34	1.77	2.10	2.46	2.82	3.13
82	1.09	1.33	1.76	2.08	2.43	2.79	3.10
83	1.08	1.32	1.74	2.06	2.41	2.76	3.07
84	1.07	1.31	1.73	2.04	2.39	2.74	3.04
85	1.06	1.30	1.72	2.02	2.37	2.71	3.01
86	1.05	1.28	1.70	2.00	2.34	2.69	2.99
87	1.04	1.27	1.69	1.99	2.32	2.66	2.96
88	1.03	1.26	1.68	1.97	2.30	2.64	2.93
89	1.02	1.25	1.68	1.95	2.28	2.62	2.91
90	1.01	1.24	1.66	1.93	2.26	2.59	2.88

DURATION IN MINUTES	RETURN PERIODS OF 1-YR	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
91	1.00	1.23	1.65	1.92	2.24	2.57	2.86
92	1.00	1.22	1.63	1.90	2.22	2.55	2.83
93	0.99	1.21	1.62	1.89	2.20	2.53	2.81
94	0.98	1.20	1.61	1.87	2.19	2.51	2.79
95	0.97	1.19	1.59	1.85	2.17	2.49	2.76
96	0.96	1.18	1.58	1.84	2.15	2.46	2.74
97	0.96	1.17	1.57	1.82	2.13	2.44	2.72
98	0.95	1.16	1.56	1.81	2.12	2.42	2.70
99	0.94	1.15	1.54	1.80	2.10	2.41	2.67
100	0.93	1.14	1.53	1.78	2.08	2.39	2.65
101	0.93	1.13	1.52	1.77	2.07	2.39	2.65
102	0.92	1.13	1.51	1.75	2.05	2.35	2.61
103	0.91	1.12	1.50	1.74	2.04	2.33	2.59
104	0.90	1.11	1.49	1.73	2.02	2.31	2.57
105	0.90	1.10	1.47	1.72	2.01	2.30	2.55
106	0.89	1.09	1.46	1.70	1.99	2.28	2.54
107	0.88	1.09	1.45	1.69	1.98	2.26	2.52
108	0.88	1.08	1.44	1.68	1.96	2.25	2.50
109	0.87	1.07	1.43	1.67	1.95	2.23	2.48
110	0.87	1.06	1.42	1.65	1.93	2.21	2.46
111	0.86	1.06	1.41	1.64	1.92	2.20	2.45
112	0.85	1.05	1.40	1.63	1.91	2.18	2.43
113	0.85	1.04	1.39	1.62	1.89	2.17	2.41
114	0.84	1.03	1.38	1.61	1.88	2.15	2.40
115	0.84	1.03	1.37	1.60	1.87	2.14	2.38
116	0.83	1.02	1.36	1.59	1.86	2.12	2.36
117	0.82	1.01	1.36	1.58	1.84	2.11	2.35
118	0.82	1.01	1.35	1.57	1.83	2.09	2.33
119	0.81	1.00	1.34	1.56	1.82	2.08	2.32
120	0.81	0.99	1.33	1.55	1.81	2.07	2.30

DURATION IN HOURS	RETURN PERIODS OF 1-YR	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
2	0.81	0.99	1.33	1.55	1.81	2.07	2.30
3	0.59	0.72	0.97	1.13	1.32	1.51	1.68
4	0.47	0.58	0.78	0.91	1.06	1.21	1.35
5	0.40	0.49	0.66	0.77	0.89	1.02	1.14
6	0.35	0.42	0.57	0.67	0.78	0.89	0.99
8	0.28	0.34	0.46	0.53	0.62	0.71	0.79
10	0.23	0.29	0.39	0.45	0.52	0.60	0.67
12	0.20	0.25	0.33	0.39	0.45	0.52	0.58
18	0.15	0.18	0.24	0.28	0.33	0.38	0.42
24	0.12	0.15	0.20	0.23	0.27	0.31	0.34



DEF. SKETCH, C.O.W. TYPE 1A INLET

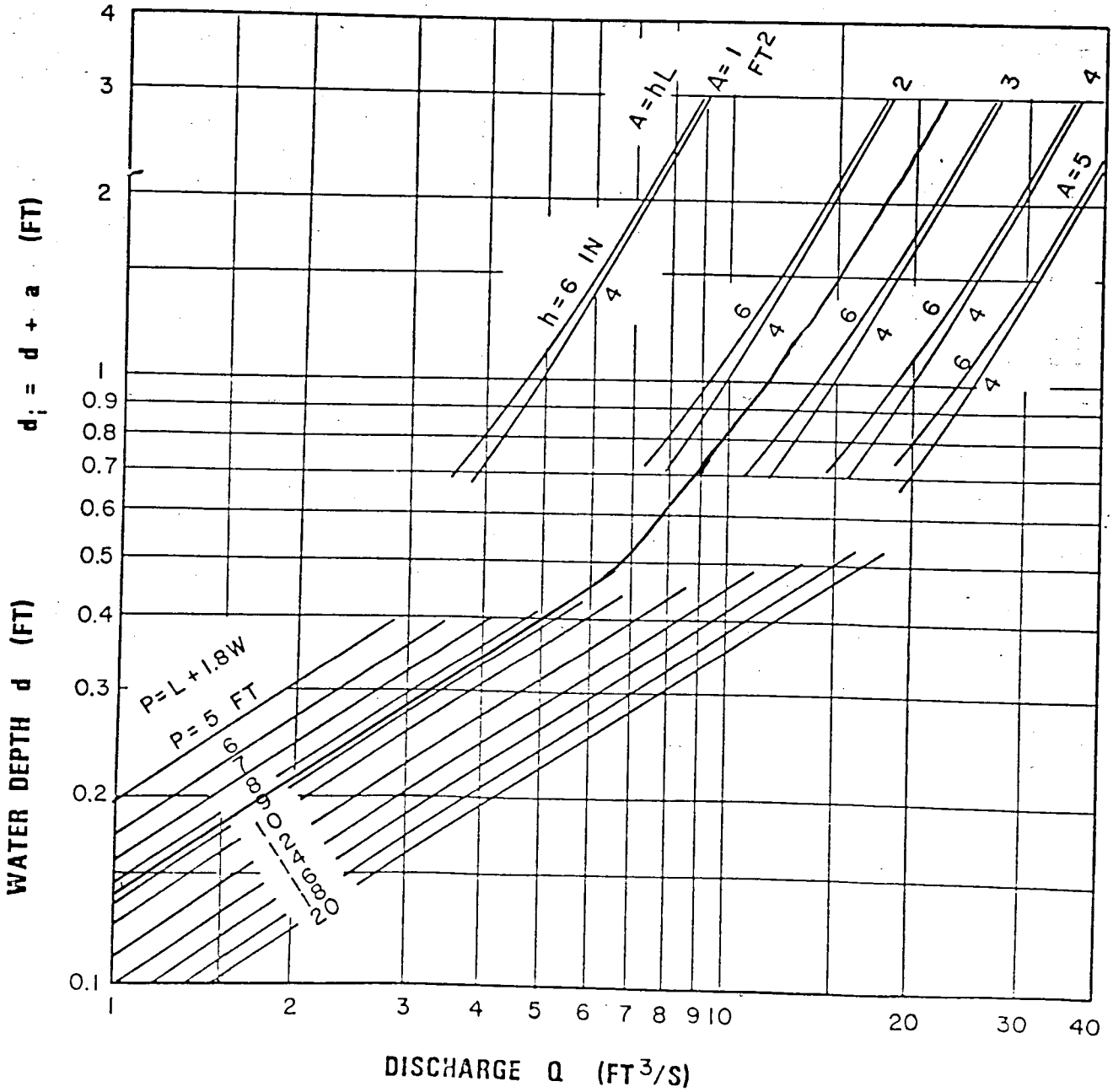
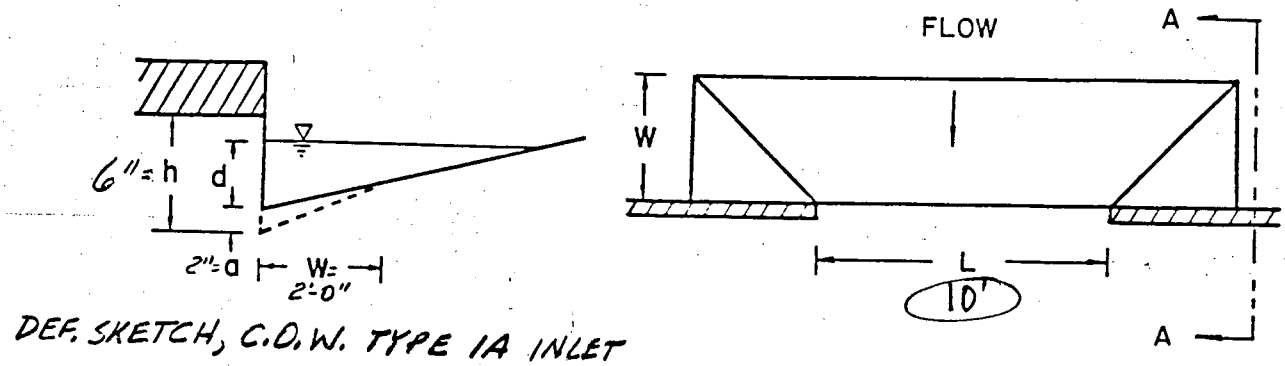


CHART 12. Depressed curb-opening inlet capacity in sump locations.

FROM: HEC-12, DRAINAGE OF HIGHWAY PAVEMENTS, F.H.W.A., MAR., 1984



DEF. SKETCH, C.O.W. TYPE 1A INLET

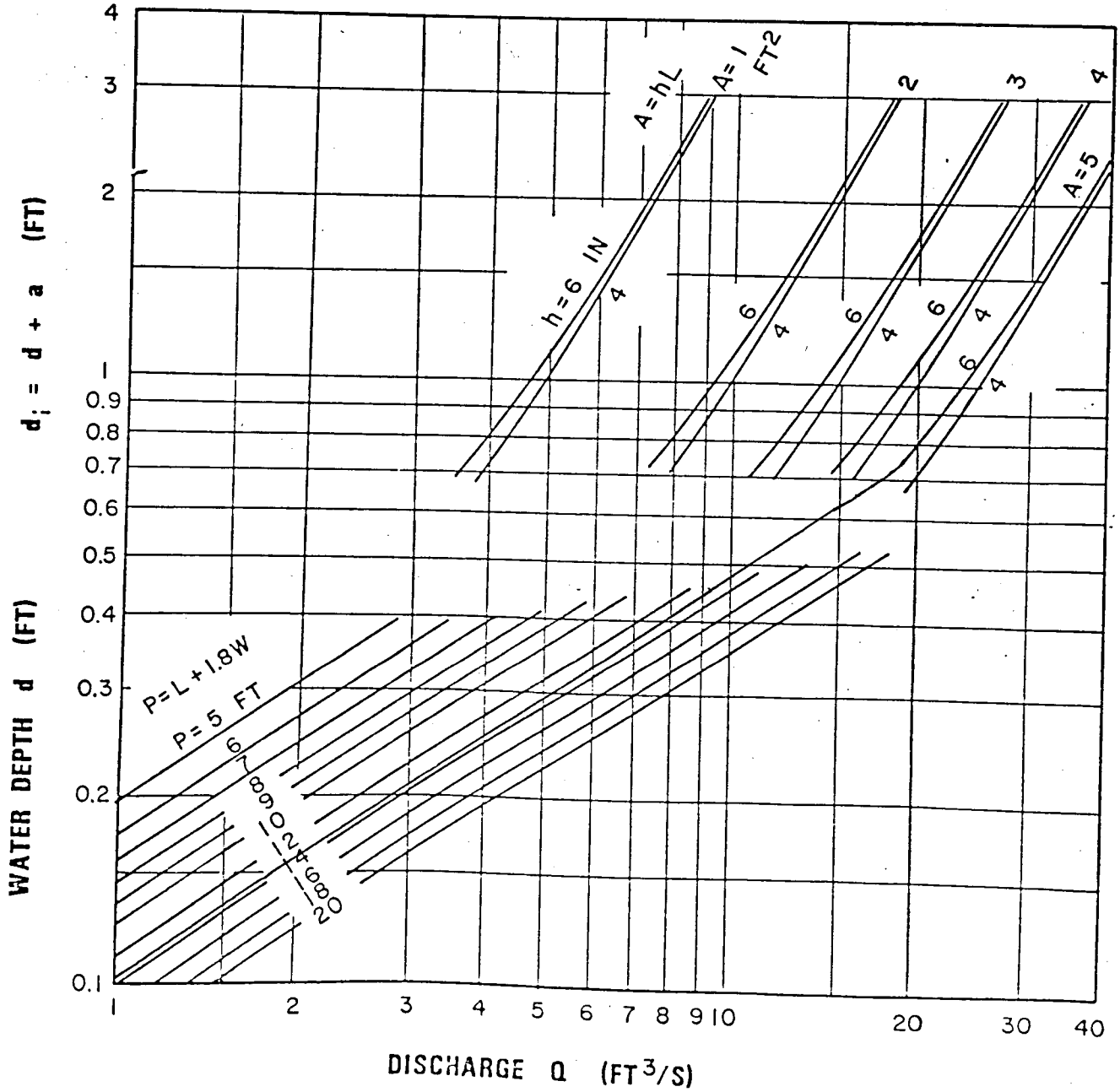
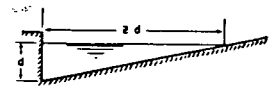


CHART 12. Depressed curb-opening inlet capacity in sump locations.

FROM: HEC-12, DRAINAGE OF HIGHWAY PAVEMENTS, F.H.W.A., MAR., 1984

Chart 1



EQUATION: $Q = 0.56\left(\frac{z}{n}\right) S^{\frac{1}{2}} d^{\frac{8}{3}}$

n IS ROUGHNESS COEFFICIENT IN MANNING FORMULA APPROPRIATE TO MATERIAL IN BOTTOM OF CHANNEL

z IS RECIPROCAL OF CROSS SLOPE

REFERENCE: H. R. B. PROCEEDINGS 1946, PAGE 150, EQUATION (14)

EXAMPLE (SEE INSTRUCTION 1)

GIVEN: S = 0.03
z = 24
n = .02
z/n = 1200
Q = 20 CFS

FIND: d = 0.22 BY FOLLOWING DASHED LINES

RATIO z/n: 10000, 9000, 8000, 7000, 6000, 5000, 4000, 3000, 2000, 1000, 900, 800, 700, 600, 500, 400, 300, 200, 100, 90, 80, 70, 60, 50, 40, 30, 20, 10

TURNING LINE

DISCHARGE (Q) IN CFS: 100, 70, 50, 30, 20, 10, 7, 5, 3, 2, 1, .7, .5, .3, .2, .1, .07, .05, .03, .02, .01

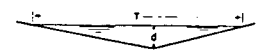
SLOPE OF CHANNEL (S) IN FT./FT.: .10, .08, .07, .06, .05, .04, .03, .02, .01, .008, .007, .006, .005, .004, .003, .002, .001

DEPTH AT CURB OR DEEPEST POINT (d) IN FT.: 2.0, 1.0, .80, .70, .60, .50, .40, .30, .20, .10, .08, .07, .06, .05, .04, .03, .02, .01

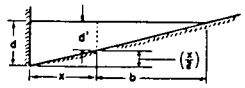
INSTRUCTIONS

1. CONNECT z/n RATIO WITH SLOPE (S) AND CONNECT DISCHARGE (Q) WITH POINT WHERE LINE CROSSES TURNING LINE READ DEPTH AT CURB (d) Q CAN BE FOUND FROM d BY CONNECTING d WITH CROSSING OF TURNING LINE.

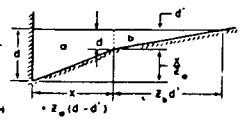
2. FOR SHALLOW V-SHAPED CHANNEL AS SHOWN USE NOMOGRAPH AS EXPLAINED IN INSTRUCTION 1 BUT WITH $z = \frac{T}{d}$.



3. TO DETERMINE DISCHARGE Q_x IN PORTION OF CHANNEL HAVING WIDTH X: DETERMINE DEPTH d FOR TOTAL DISCHARGE IN ENTIRE SECTION AS EXPLAINED IN 1. THEN USE NOMOGRAPH TO DETERMINE Q_b IN SECTION OF WIDTH b FOR DEPTH $d' = d - \left(\frac{x}{z}\right)$. THEN $Q_x = Q - Q_b$.



4. TO DETERMINE DISCHARGE (Q_T) IN COMPOSITE SECTION:— FOLLOW INSTRUCTION 3. TO OBTAIN DISCHARGE (Q_a) IN SECTION a AT ASSUMED DEPTH d BASED ON AN EXTENSION OF SLOPE RATIO z_a TO INTERSECT WATER SURFACE; OBTAIN Q_b FOR SLOPE RATIO z_b AND DEPTH d'; $d' = d - \frac{x}{z_a}$ THEN $Q_T = Q_a + Q_b$.



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NOMOGRAPH FOR FLOW IN TRIANGULAR CHANNELS

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Project Cross Creek

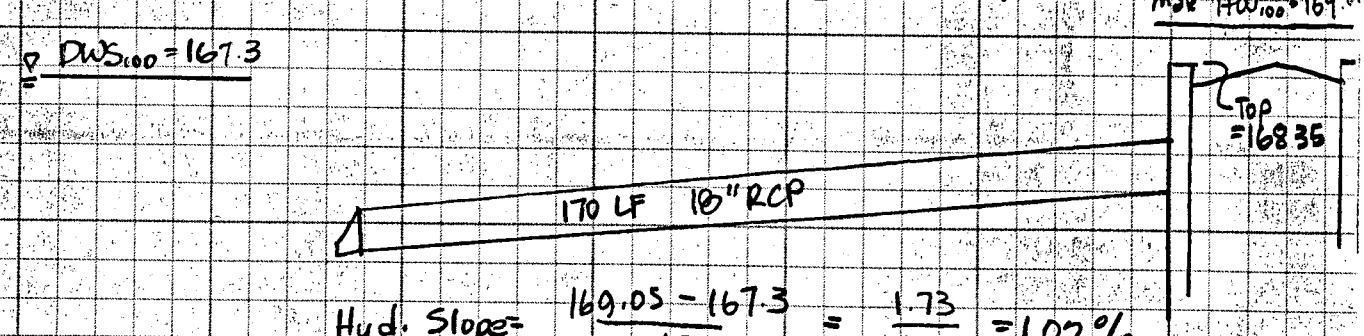
Item Drainage

PROBLEM: Investigate possibility of reducing drainage easement width from 20' to 10' in Lot , Block Cross Creek in order to increase buildable area.

PROCEDURE: In order to reduce easement size, overland flow must be decreased and/or section of overflow swale altered.

To decrease flow in overflow channel, the flow in pipe must be increased.

Flow in pipe can be increased with increased head @ inlets:



Hyd. Slope = $\frac{169.05 - 167.3}{170} = \frac{1.73}{170} = 1.02\%$

Capacity of 18" @ 1.02% = 12 cfs

Determine Q_{100} approaching sump.

Q_{100} total = 12.8 + 36.2 + 37.3 + 8.9 + 14.5 = 109.7

Q entering SWS Line #1 = 29 cfs (from p. 2)

Q_{100} approaching sump = 109.7 - 29 = 80.7 cfs

Q overflow channel = 80.7 - 12 cfs (pipe) = 67.3 cfs.

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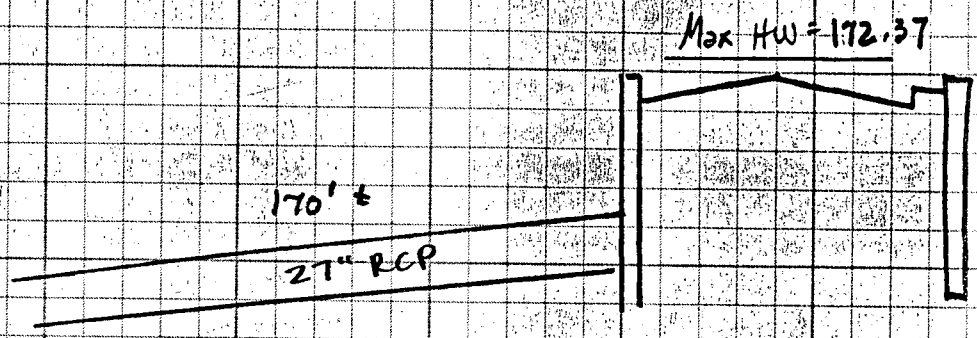
Project CROSS CREEK

Item DRAINAGE

Line #1 Analysis



Hyd. Slope = $\frac{172.37 - 169.3}{170} = \frac{3.07}{170} = 1.81\%$

Capacity of 27" SWS = 41 cfs

Check capacity of 3 inlets (1-10' & 2-5')

10' Top = 172.87
HW_{max} = 172.37
d = 11" - 0.5' = 0.42' ∴ cap. = 9 cfs

5' Top = 172.50
HW_{max} = 172.37
d = 11" - 0.13' = 0.79' ∴ cap. = 10 cfs

Total inlet capacity Line #1 = 9 + 10 + 10 = 29 cfs

Total intercept = smaller of Inlet cap or pipe

" " = 29 cfs.

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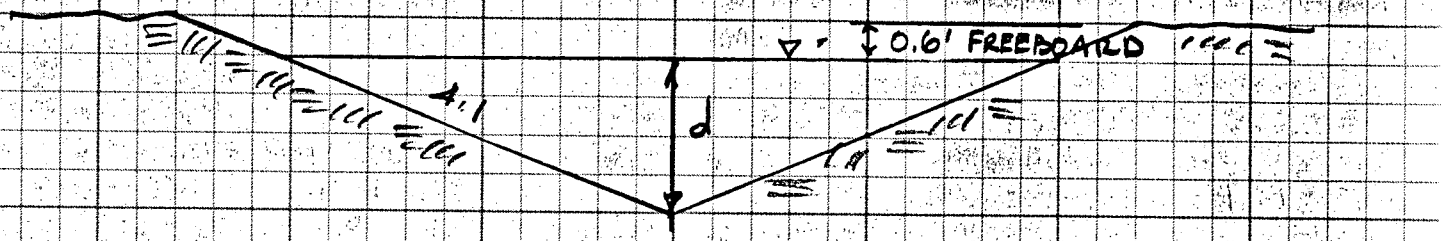
Project CROSS CREEK

Item DRAINAGE

Design Section for 67.3 cfs

Channel slope = 1%



Manning's Eq'n - $Q = \frac{1.486}{n} AR^{2/3} S^{1/2}$

$67.3 = \frac{1.486}{0.03} AR^{2/3} (0.01)^{1/2}$

$AR^{2/3} = 13.59$

d	A	P	R	$R^{2/3}$	$AR^{2/3}$
2.0	16.00	16.49	0.97	0.98	15.68
1.9	14.44	15.67	0.92	0.95	13.68 ←

USE d = 1.9

$V = Q/A = 67.3/14.4 = 4.67$

$W = (1.9 + 0.6) \times 4 \times 2 = 20.0$

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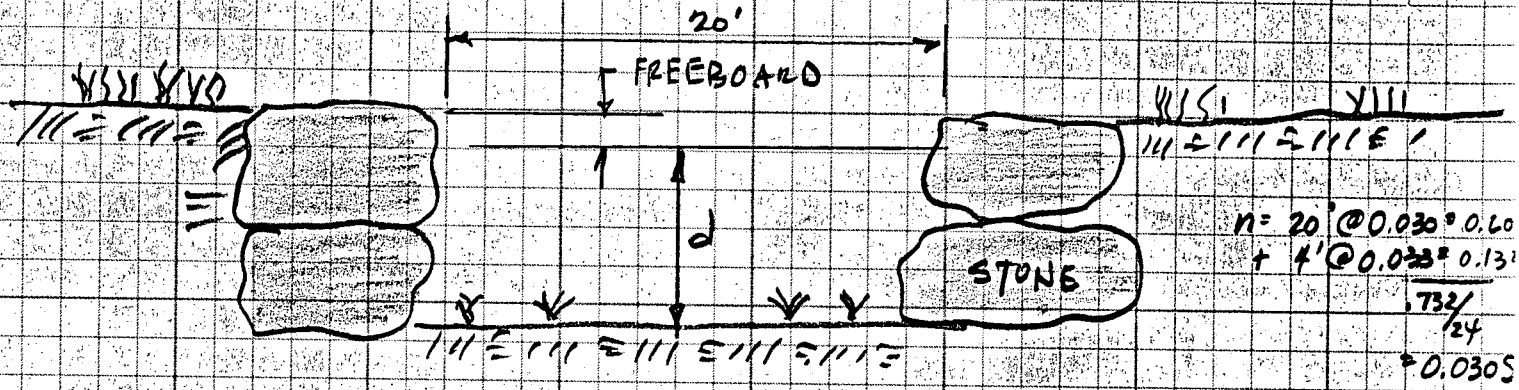
Project CROSS CREEK

Item DRAINAGE

ALTERNATE SECTION



n = 20' @ 0.030 = 0.60
+ 4' @ 0.033 = 0.13
0.732/24
= 0.0305

Mannings Eq'n $Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$

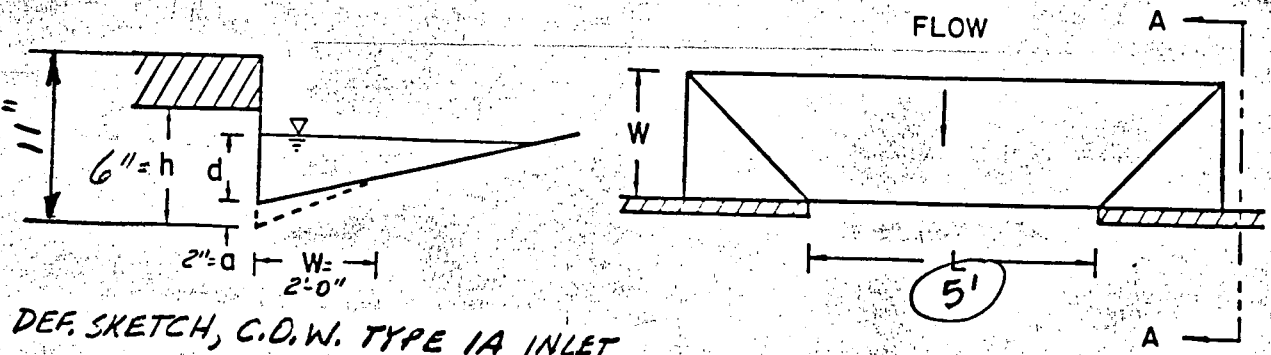
$67.3 = \frac{1.486}{0.0305} A R^{2/3} (0.01)^{1/2}$

$67.3 = 48.72 \times A R^{2/3} \times 0.10$

$A R^{2/3} = 13.81$

d	A	P	R	$R^{2/3}$	$AR^{2/3}$
1.0	20.0	22.0	0.909	0.938	18.76
0.9	18.0	21.8	0.826	0.880	15.8
0.8	16.0	21.6	0.741	0.819	13.10

USE $d = 0.8'$ $V = Q/A = 67.3/16 = 4.2$



DEF. SKETCH, C.O.W. TYPE 1A INLET

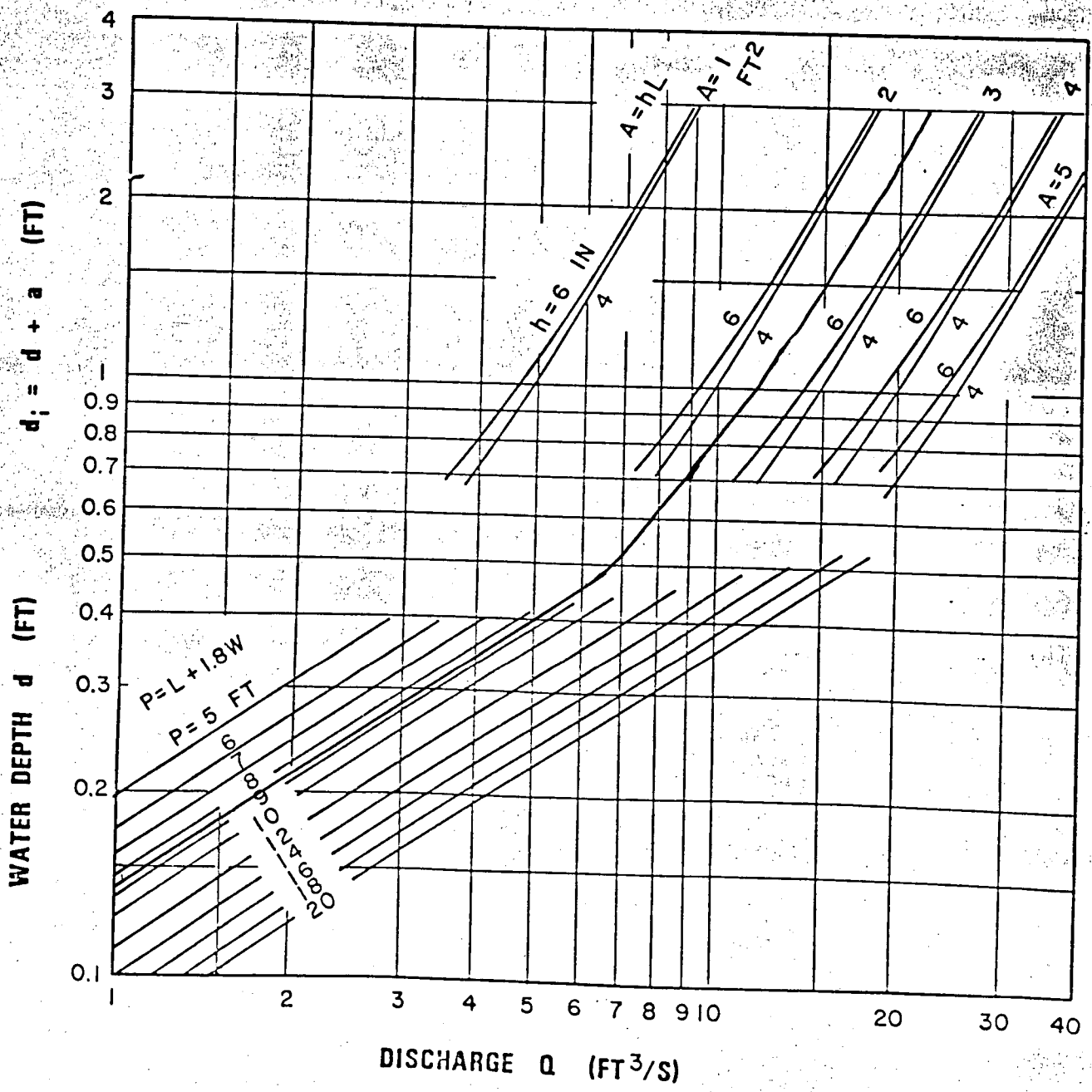


CHART 12. Depressed curb-opening inlet capacity in sump locations.

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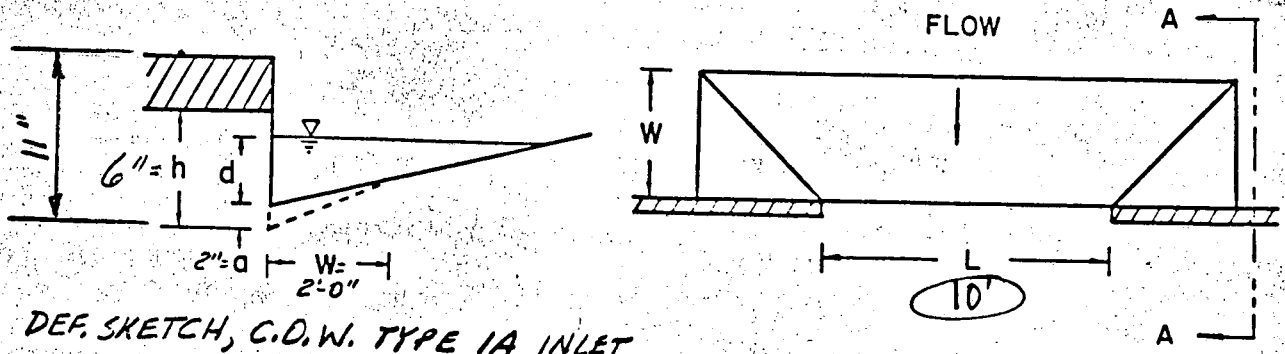
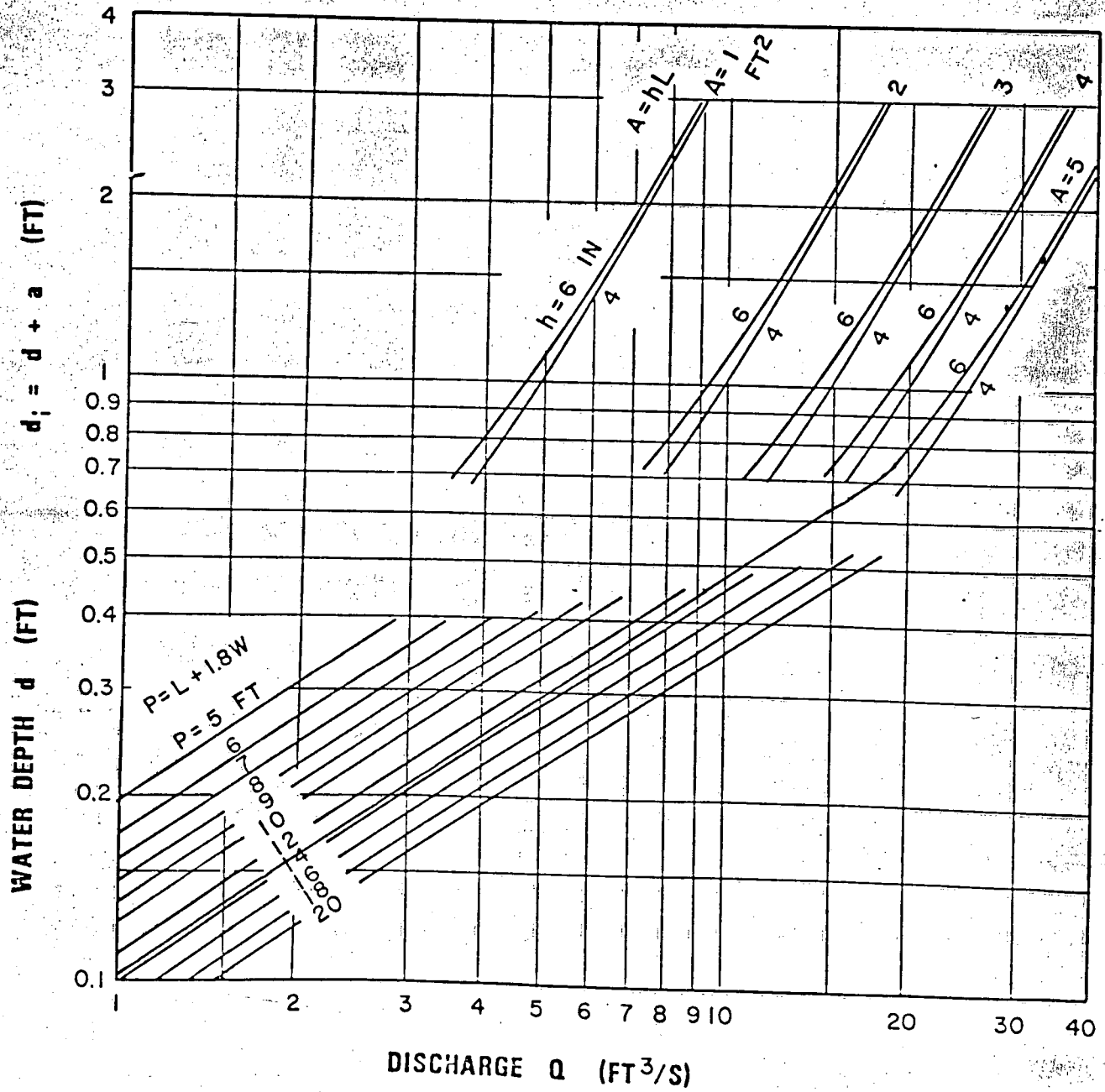


DEF. SKETCH, C.O.W. TYPE 1A INLET



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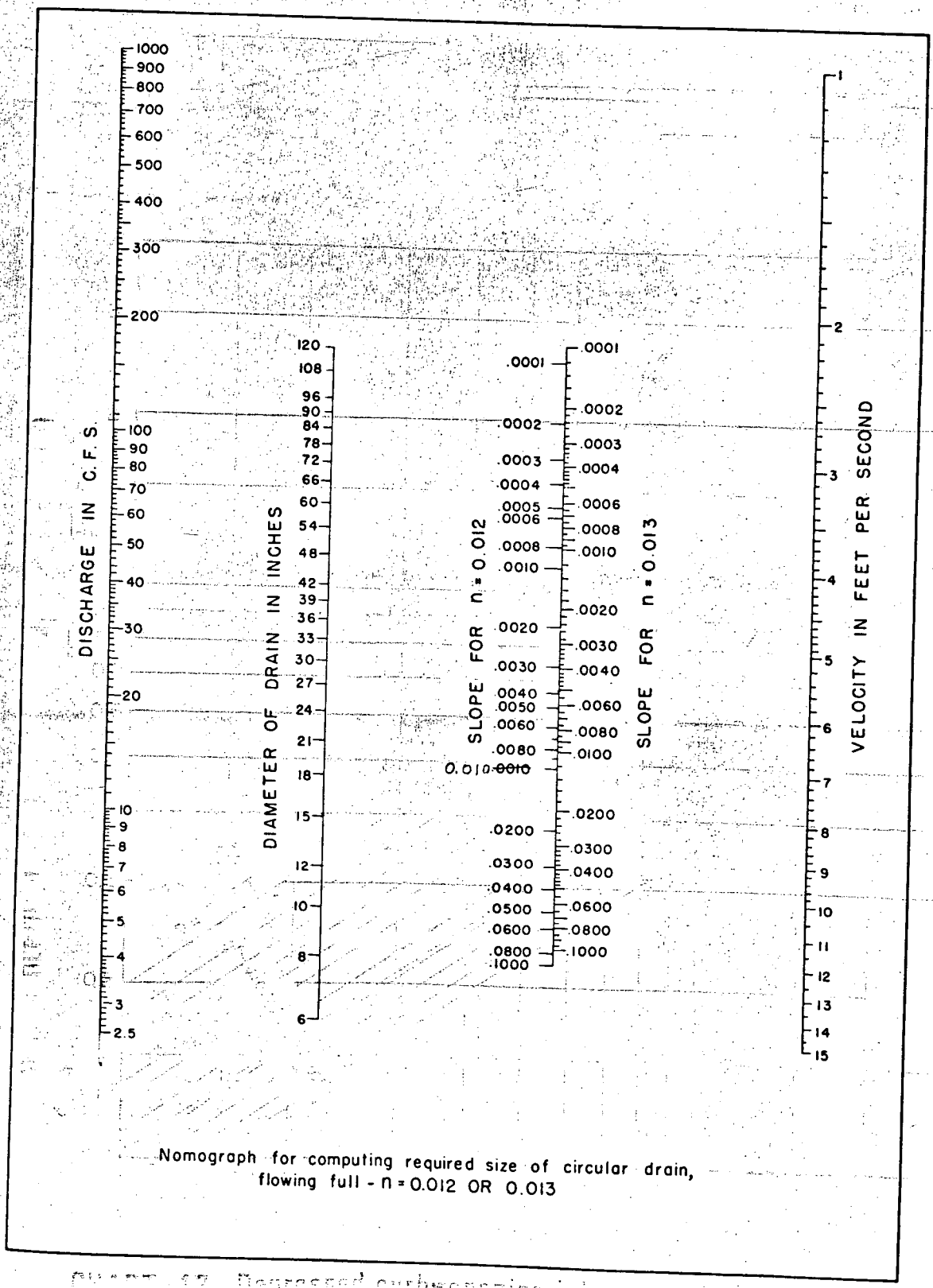

Nomograph for computing required size of circular drain, flowing full - n = 0.012 OR 0.013

Figure 12 Depressed curb opening [illegible]