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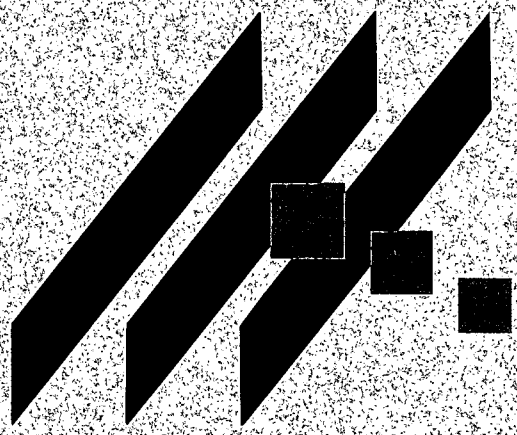


DRAINAGE REPORT

FOR

IRONHORSE AT OXFORD ADDITION

October 2002

411 N. WEBB ROAD • WICHITA, KS 67206 • 316 684-9600 • FAX 316 684-5100

Drainage Report for Ironhorse at Oxford Addition
Wichita, Sedgwick County, Kansas

Location

The subject property is located in Wichita, Sedgwick County, Kansas. It lies in the Northeast corner of the Sec. 1, Township 27 South, Range 1 East. The property abuts Woodlawn Avenue on the east and lies between 29th and 21st Streets to the north and south. The total site area is approximately 20.3 acres. The site is shown in the Wichita East, Kansas, Quadrangle located in Appendix A.

Soils

According to the NRCS (SCS) Sedgwick County Soil Survey (Appendix B), most of the site is Farnum Loam (Fb: 1 to 3 percent slopes) and Rosehill Silty Clay (Rd: 1 to 3 percent slopes). The southwest corner of the site is Elandco silt loam (Ec: frequently flooded. The Hydrological Soil Group (HSG) for the site is "D".

Pre-developed Conditions

Current Development
The site is undeveloped agricultural land. The property north of the site is developing as Northeast Elementary School. South of the site is the office of T-Mobile. Developed residential housing is west of the site.

Current Landform and Slope
The slopes in the area range between 1-3%. Elevations vary from 188 ft in the north to 170 ft in the southwest corner. A channel known as Crooked Creek crosses the southwest corner of the site from southeast to northwest. An existing ditch flows from north to south at the west property line of the addition.

Current Drainage Conditions
No portion of the site is included in a regulatory floodplain. The site is located in Zone C. A copy of the effective FEMA map (FIRM Panel 15, Wichita, Kansas May 15, 1986) is found in Appendix C.

Upstream of Site
Approximately 360 acres have drained into Crooked Creek when it converges with a tributary downstream of the site. Crooked Creek flows northwest into the Beacon Hill Addition where it passes under a bridge and into a pond before it exits to the north under 29th Street. An existing TR-20 run on Crooked Creek was completed during the

planning of the Beacon Hill Addition. Flows through Crooked Creek are shown in Table 1.

Table 1. Pre-developed flow in Crooked Creek.

Location	2-Year (cfs)	5-Year (cfs)	10-Year (cfs)	100-Year (cfs)
29th Street	525	807	1204	1922
Bridge in Beacon Hill	556	742	1057	1777
Ironhorse at Oxford Addition	418	625	762	1236

Flow from the north crosses the site though the existing drainage ditch along the west property line. The Northeast Elementary School Addition is planning to construct a detention pond that will reduce flows through the ditch onto the subject property. Table 2 shows the existing flows at the north property line, and at the confluence with Crooked Creek before the development of Northeast Elementary School and Ironhorse at Oxford Additions, and with the development of Northeast Elementary School Addition and the planned detention facility.

Table 2. Pre-developed flow in West Ditch

Location	2-Year (cfs)	5-Year (cfs)	10-Year (cfs)	100-Year (cfs)
Existing				
North Prop. Line	8.5	12.7	19.8	47.9
Confluence w/ Crooked Cr.	12.4	17.9	27.5	64.2
W/ NE Elementary				
North Prop. Line	16.7	18.4	20.2	24.9
Confluence w/ Crooked Cr.	19.9	23.2	27.6	42.1

Current Runoff Characteristics

The site currently sheet flows west and south into the existing drainage ditch along the west property line and into Crooked Creek. The site was divided into drainage areas based upon proposed features. Boundaries are shown in the drainage and utility plan in Appendix D. The rational method was used to calculate peak flows in the 2, 5, 10, and 100-year events. The FAA method was used to determine time of concentration values which range from 15 to 50 minutes. The spreadsheet in Appendix E displays the area, runoff coefficient (c), time of concentration (t_c), and the flow rate (Q) for each area in the design events. Pre-developed runoff values are found in Table 3.

Table 3. Pre-developed runoff.

Sub-Watershed	2-Year (cfs)	5-Year (cfs)	10-Year (cfs)	100-Year (cfs)
A	4.8	6.3	9.5	20.1
B	1.0	1.5	2.4	5.7
C	2.3	3.4	5.6	14.0
D	2.0	3.1	4.9	12.1
E	2.0	3.0	4.8	11.9
F	0.7	1.0	1.6	4.0
G	1.6	2.3	3.7	8.9
H	2.4	3.4	5.0	10.2
Entire Site	15.9	23.1	36.0	85.1

Developed Condition

Proposed Development

The site will develop as two-family residential lots with an average size of approximately ¼ acre. The development will have 35 lots and one reserve.

Proposed Landform and Slope

Final slopes in the residential development have not been determined, but the minimum will be 0.5% within street right-of-way, and 1-2% in backyards.

Proposed Runoff Characteristics

A storm water sewer system will carry runoff from the streets into Crooked Creek. The rational method was again used to determine runoff for the same drainage areas under developed conditions. Time of concentration values ranging from 15 to 44 minutes were calculated using the FAA method. The spreadsheet in Appendix E displays the area, runoff coefficient (c), time of concentration (t_c), and the flow rate (Q) for the site, for the 2, 5, 10, and 100-year events. Table 4 shows the developed peak flow values for the drainage areas. These flows were used to size the storm water system for a 2-year design event.

Table 4. Developed runoff.

Sub-Watershed	2-Year (cfs)	5-Year (cfs)	10-Year (cfs)	100-Year (cfs)
A	6.6	8.9	12.8	26.9
B	1.9	2.6	3.7	6.8
C	4.5	6.3	9.0	18.7
D	4.1	5.5	8.0	15.9
E	3.9	5.3	7.6	15.5
F	1.4	1.8	2.6	4.6
G	3.1	4.1	5.9	11.3
H	2.4	3.4	4.5	10.2
Entire Site	28.4	38.8	55.3	115.1

A proposed drainage ditch on the west side along the north property line will carry runoff from the lots along the north and Northeast Elementary School into the existing drainage ditch and then to Crooked Creek. Runoff through the ditch after the development of this site is shown in Table 5. Peak flow in the 100-year event is less than under undeveloped conditions due to the construction of the detention pond by Northeast Elementary School.

Table 5. Developed flow in West Ditch

Location	2-Year (cfs)	5-Year (cfs)	10-Year (cfs)	100-Year (cfs)
Fully Developed				
North Prop. Line	16.7	18.4	20.2	24.9
Confluence w/ Crooked Cr.	22.1	25.7	30.9	51.2

The TR-20 model was modified to reflect the proposed development. The curve number for the watershed was increased to model the proposed development. Proposed flows from the TR-20 model are shown in Table 6. Peak flows in Crooked Creek increased by approximately 4 cfs in the 100-year event. The TR-20 models are found in Appendix F.

Minimum pads were calculated for lots adjacent to the existing drainage ditch along the west property line and lots adjacent to the proposed drainage ditch along the north line of the property. Minimum pad elevations were established based on the water surface elevations calculated using HEC-RAS version 3.0. The HEC-RAS model includes analysis of both drainage ditches and is in Appendix G. Minimum pads are shown on the drainage and utility plan in Appendix D.

Table 6. Developed flow in Crooked Creek.

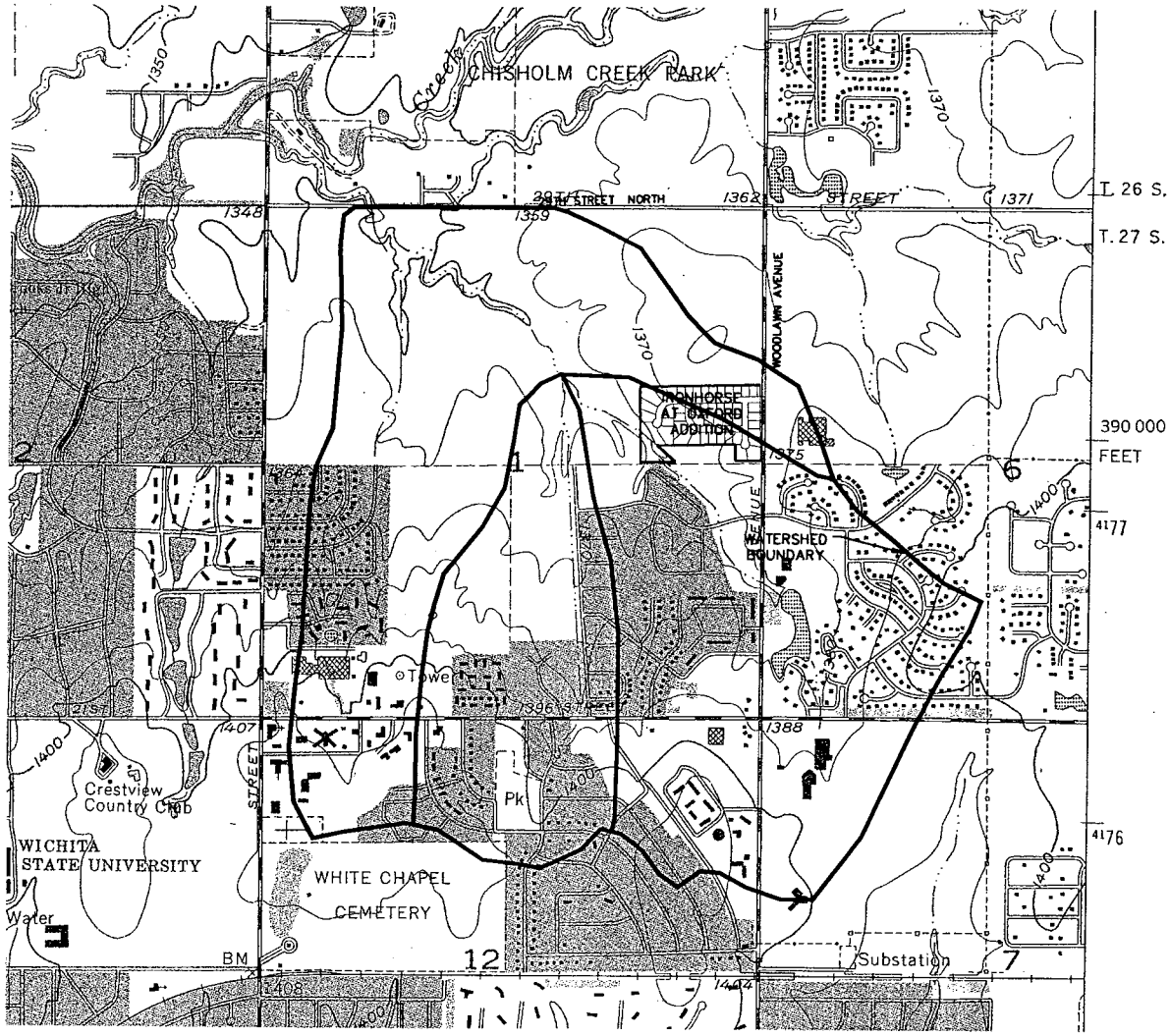
Location	2-Year (cfs)	5-Year (cfs)	10-Year (cfs)	100-Year (cfs)
29th Street	530	812	1210	1925
Bridge in Beacon Hill	561	747	1063	1781
Ironhorse at Oxford Addition	423	631	768	1240

Summary

The site is adjacent to Woodlawn Avenue between 21st and 29th Streets. The 20.3 acre site will develop as 35 multi-family residential lots. All runoff from the site will drain into Crooked Creek at the southwest corner of the site. Runoff from the streets will reach Crooked Creek though a storm water sewer system. Runoff from individual lots will flow overland to Crooked Creek. Runoff from the site will increase from 85.1 cfs to 115.1 cfs in the 100-year event. The peak flow through Crooked Creek is 1240 cfs when it passes Ironhorse at Oxford Addition. This increase of in runoff from this site accounts for less than 1% of the flow through Crooked Creek. The development of this site will have a negligible effect on the watershed and areas downstream.

Appendix A

Quadrangle



SOUTH WICHITA INTERCHANGE 1.7 MI. ... CONNEL. DERBY

SCALE 1:24 000

1 0 1/2 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

CONTOUR INTERVAL 10 FEET
DOTTED LINES REPRESENT 5-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

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MKEC ENGINEERING CONSULTANTS
411 N. WEBB ROAD
WICHITA, KS. 67206
316 - 684 - 9600

IRONHORSE AT OXFORD ADDITION
PROJECT NAME

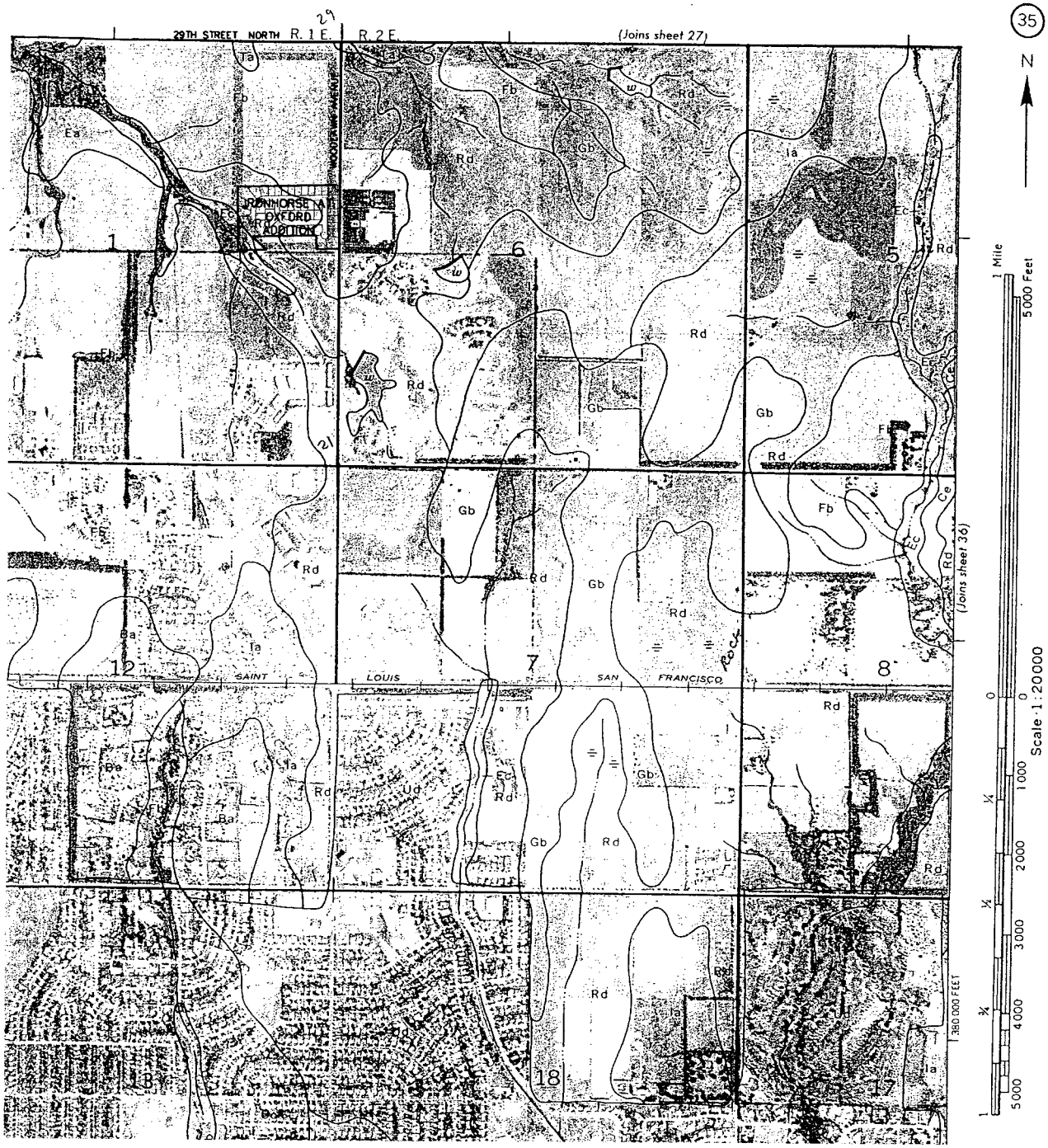
WICHITA EAST QUADRANGLE
SEDGWICK COUNTY, KANSAS
SHEET TITLE

KLA	KLA	GJA
DESIGN BY:	DRAWN BY:	CHECKED BY:
OCTOBER 2002	02173	1 / 1
DATE	JOB NO.	SHEET/OF

Appendix B

Soil Survey

— SHEET NUMBER 35



United States Department of Agriculture
Soil Conservation Service
in cooperation with
Kansas Agricultural Experiment Station

MKEC ENGINEERING CONSULTANTS
411 N. WEBB ROAD
WICHITA, KS. 67206
316 - 684 - 9600

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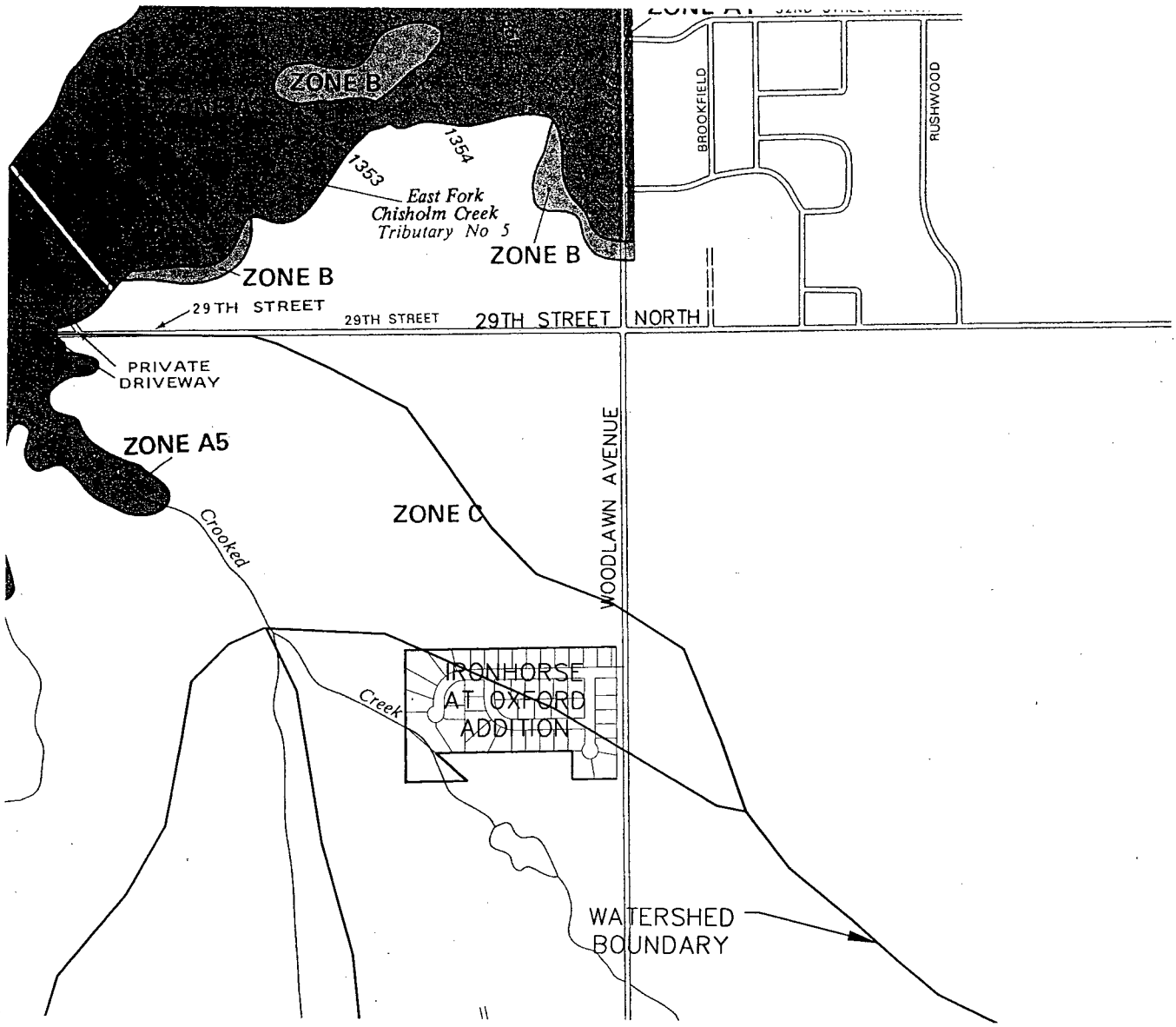
IRONHORSE AT OXFORD ADDITION
PROJECT NAME

SOIL SURVEY OF SEDGWICK COUNTY, KANSAS
SHEET TITLE

KLA	KLA	GJA
DESIGN BY:	DRAWN BY:	CHECKED BY:
OCTOBER 2002	02173	1 / 1
DATE	JOB NO.	SHEET/OF

Appendix C

Flood Insurance Rate Map



NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

CITY OF
WICHITA,
KANSAS
SEDGWICK COUNTY

PANEL 15 OF 40
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
200328 0015 B

EFFECTIVE DATE:
MAY 15, 1986

Federal Emergency Management Agency

N

APPROXIMATE SCALE

1000 0 1000 FEET

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MKEC ENGINEERING CONSULTANTS
411 N. WEBB ROAD
WICHITA, KS. 67206
316 - 684 - 9600

IRONHORSE AT OXFORD ADDITION
PROJECT NAME

FIRM PANEL 15 OF 40
WICHITA, SEDGWICK COUNTY, KANSAS
SHEET TITLE

KLA	KLA	GJA
DESIGN BY:	DRAWN BY:	CHECKED BY:
OCTOBER 2002	02173	1 / 1
DATE	JOB NO.	SHEET/OF

Appendix D

Drainage & Utility Plan

Appendix E

Drainage Calculations

10/28/02

DRAINAGE ANALYSIS SUMMARY
Ironhorse at Oxford Addition

Soil Group D

Area ID	Area	Accum. Area	C2	C5	C10	C100	Elev	Elev	Flow	Tc2	Avg V2	Tc5	Avg V5	Tc10	Avg V10	Tc100	vg V100	Tc2	Tc5	Tc10	Tc100	I2	I5	I10	I100	Q2	Q5	Q10	Q100	Q2		
	ac	ac					Max	Min	Length	Calc		Calc		Calc		Calc		min	min	min	min	in/hr	in/hr	in/hr	in/hr	cfs	cfs	cfs	cfs	Pipe Size in	Min Slope %	Comments
Pre-Developed																																
A	7.3		0.33	0.35	0.42	0.55	193.0	177.0	1400.0	49.60	0.47	48.31	0.48	43.80	0.53	35.43	0.66	50	48	44	35	1.97	2.47	3.09	5.00	4.75	6.31	9.47	20.08			
B	1.2		0.30	0.35	0.45	0.65	177.0	172.0	450.0	29.49	0.25	27.65	0.27	23.96	0.31	16.59	0.45	29	28	24	17	2.72	3.43	4.31	7.18	0.99	1.45	2.35	5.65			
C	3.6		0.30	0.35	0.45	0.65	188.0	174.0	1100.0	44.07	0.42	41.32	0.44	35.81	0.51	24.79	0.74	44	41	36	25	2.11	2.72	3.46	6.01	2.27	3.42	5.59	14.02			
D	2.9		0.30	0.35	0.45	0.65	187.0	180.0	700.0	38.10	0.31	35.72	0.33	30.98	0.38	21.43	0.54	38	36	31	21	2.32	2.98	3.76	6.39	2.03	3.05	4.94	12.13			
E	2.9		0.30	0.35	0.45	0.65	187.0	180.0	750.0	40.35	0.31	37.83	0.33	32.79	0.38	22.70	0.55	40	38	33	23	2.24	2.88	3.63	6.26	1.96	2.94	4.77	11.88			
F	0.8		0.30	0.35	0.45	0.65	185.0	177.0	500.0	27.53	0.30	25.81	0.32	22.37	0.37	15.49	0.54	28	26	22	15	2.84	3.57	4.40	7.37	0.71	1.04	1.64	3.98			
G	2.0		0.30	0.35	0.45	0.65	180.0	174.0	550.0	32.81	0.28	30.76	0.30	26.65	0.34	18.45	0.50	33	31	27	18	2.57	3.24	4.05	6.84	1.55	2.28	3.66	8.94			
H	2.1		0.30	0.35	0.45	0.65	184.0	180.0	150.0	12.72	0.20	11.92	0.21	10.33	0.24	7.15	0.35	15	15	15	15	3.83	4.56	5.22	7.37	2.44	3.38	4.98	10.16			
Entire Site	22.9		0.31	0.35	0.44	0.62	193.0	172.0	1170.0	40.05	0.49	38.00	0.51	33.42	0.58	24.41	0.80	40	38	33	24	2.24	2.88	3.57	6.01	15.88	23.08	36.01	85.07			
Developed																																
A	7.3		0.42	0.45	0.52	0.66	193.0	177.0	1400.0	43.80	0.53	41.87	0.56	37.36	0.62	28.34	0.82	44	42	37	28	2.14	2.72	3.36	5.59	6.56	8.94	12.75	26.93			
B	1.2		0.50	0.54	0.62	0.76	177.0	172.0	450.0	22.12	0.34	20.65	0.36	17.70	0.42	12.53	0.60	22	21	18	15	3.17	4.00	4.95	7.37	1.92	2.61	3.71	6.78			
C	3.6		0.50	0.54	0.62	0.76	188.0	174.0	1100.0	33.05	0.55	30.85	0.59	26.44	0.69	18.73	0.98	33	31	26	19	2.52	3.24	4.05	6.84	4.52	6.28	9.01	18.66	18	0.32%	Sized for two-year design event
D	2.9		0.50	0.54	0.62	0.76	187.0	180.0	700.0	28.57	0.41	26.67	0.44	22.86	0.51	16.19	0.72	29	27	23	16	2.78	3.50	4.40	7.18	4.06	5.52	7.97	15.93	15	0.40%	Sized for two-year design event
E	2.9		0.50	0.54	0.62	0.76	187.0	180.0	750.0	30.27	0.41	28.25	0.44	24.21	0.52	17.15	0.73	30	28	24	17	2.67	3.37	4.22	7.00	3.90	5.31	7.64	15.53			
D+E	5.8		0.50	0.54	0.62	0.76	187.0	180.0	750.0	30.27	0.41	28.25	0.44	24.21	0.52	17.15	0.73	30	28	24	17	2.67	3.37	4.22	7.00	7.80	10.63	15.28	31.07	24	0.21%	Sized for two-year design event
F	0.8		0.50	0.54	0.62	0.76	185.0	177.0	500.0	20.65	0.40	19.27	0.43	16.52	0.50	11.70	0.71	21	19	17	15	3.33	4.10	5.08	7.37	1.38	1.84	2.61	4.65			
D+E+F	6.7		0.50	0.54	0.62	0.76	187.0	177.0	850.0	29.83	0.47	27.84	0.51	23.86	0.59	16.90	0.84	30	28	24	17	2.72	3.43	4.31	7.18	9.07	12.35	17.82	36.40	24	0.21%	Sized for two-year design event
G	2.0		0.50	0.54	0.62	0.76	180.0	174.0	550.0	24.60	0.37	22.96	0.40	19.68	0.47	13.94	0.66	25	23	20	15	3.03	3.81	4.71	7.37	3.05	4.14	5.87	11.26			
H	2.1		0.30	0.35	0.45	0.65	184.0	180.0	150.0	12.72	0.20	11.92	0.21	10.33	0.24	7.15	0.35	15	15	15	15	3.83	4.56	5.22	7.37	2.44	3.38	4.98	10.16			
Entire Site	22.9		0.46	0.49	0.57	0.72	193.0	172.0	1030.0	29.34	0.59	27.62	0.62	24.04	0.71	17.41	0.99	29	28	24	17	2.72	3.43	4.22	7.00	28.40	38.78	55.31	115.09			

10/28/02

DRAINAGE ANALYSIS SUMMARY
Ironhorse at Oxford Addition

Soil Group D

Area ID	Area ac	Accum. Area ac	C2	C5	C10	C100	Elev Max	Elev Min	Flow Length	Tc2 Calc	Avg V2	Tc5 Calc	Avg V5	Tc10 Calc	Avg V10	Tc100 Calc	vg V100	Tc2 min	Tc5 min	Tc10 min	Tc100 min	I2 in/hr	I5 in/hr	I10 in/hr	I100 in/hr	Q2 cfs	Q5 cfs	Q10 cfs	Q100 cfs	Q2 Pipe Size in	Q2 Min Slope %	Comments
Pre-Developed																																
A	7.3		0.33	0.35	0.42	0.55	193.0	177.0	1400.0	49.60	0.47	48.31	0.48	43.80	0.53	35.43	0.66	50	48	44	35	1.97	2.47	3.09	5.00	4.75	6.31	9.47	20.08			
B	1.2		0.30	0.35	0.45	0.65	177.0	172.0	450.0	29.49	0.25	27.65	0.27	23.96	0.31	16.59	0.45	29	28	24	17	2.72	3.43	4.31	7.18	0.99	1.45	2.35	5.65			
C	3.6		0.30	0.35	0.45	0.65	188.0	174.0	1100.0	44.07	0.42	41.32	0.44	35.81	0.51	24.79	0.74	44	41	36	25	2.11	2.72	3.46	6.01	2.27	3.42	5.59	14.02			
D	2.9		0.30	0.35	0.45	0.65	187.0	180.0	700.0	38.10	0.31	35.72	0.33	30.96	0.38	21.43	0.54	38	36	31	21	2.32	2.98	3.76	6.39	2.03	3.05	4.94	12.13			
E	2.9		0.30	0.35	0.45	0.65	187.0	180.0	750.0	40.35	0.31	37.83	0.33	32.79	0.38	22.70	0.55	40	38	33	23	2.24	2.88	3.63	6.26	1.96	2.94	4.77	11.88			
F	0.8		0.30	0.35	0.45	0.65	185.0	177.0	500.0	27.53	0.30	25.81	0.32	22.37	0.37	15.49	0.54	28	26	22	15	2.84	3.57	4.40	7.37	0.71	1.04	1.64	3.98			
G	2.0		0.30	0.35	0.45	0.65	180.0	174.0	550.0	32.81	0.28	30.76	0.30	26.65	0.34	18.45	0.50	33	31	27	18	2.57	3.24	4.05	6.84	1.55	2.28	3.66	8.94			
H	2.1		0.30	0.35	0.45	0.65	184.0	180.0	150.0	12.72	0.20	11.92	0.21	10.33	0.24	7.15	0.35	15	15	15	15	3.83	4.56	5.22	7.37	2.44	3.38	4.98	10.16			
Entire Site	22.9		0.31	0.35	0.44	0.62	193.0	172.0	1170.0	40.05	0.49	38.00	0.51	33.42	0.58	24.41	0.80	40	38	33	24	2.24	2.88	3.57	6.01	15.88	23.08	36.01	85.07			
Developed																																
A	7.3		0.42	0.45	0.52	0.66	193.0	177.0	1400.0	43.80	0.53	41.87	0.56	37.36	0.62	28.34	0.82	44	42	37	28	2.14	2.72	3.36	5.59	6.56	8.94	12.75	26.93			
B	1.2		0.50	0.54	0.62	0.76	177.0	172.0	450.0	22.12	0.34	20.65	0.36	17.70	0.42	12.53	0.60	22	21	18	15	3.17	4.00	4.95	7.37	1.92	2.61	3.71	6.78			
C	3.6		0.50	0.54	0.62	0.76	188.0	174.0	1100.0	33.05	0.55	30.85	0.59	26.44	0.69	18.73	0.98	33	31	26	19	2.52	3.24	4.05	6.84	4.52	6.28	9.01	18.66	18	0.32%	Sized for two-year design event
D	2.9		0.50	0.54	0.62	0.76	187.0	180.0	700.0	28.57	0.41	26.67	0.44	22.86	0.51	16.19	0.72	29	27	23	16	2.78	3.50	4.40	7.18	4.06	5.52	7.97	15.93	15	0.40%	Sized for two-year design event
E	2.9		0.50	0.54	0.62	0.76	187.0	180.0	750.0	30.27	0.41	28.25	0.44	24.21	0.52	17.15	0.73	30	28	24	17	2.67	3.37	4.22	7.00	3.90	5.31	7.64	15.53			
D+E	5.8		0.50	0.54	0.62	0.76	187.0	180.0	750.0	30.27	0.41	28.25	0.44	24.21	0.52	17.15	0.73	30	28	24	17	2.67	3.37	4.22	7.00	7.80	10.63	15.28	31.07	24	0.21%	Sized for two-year design event
F	0.8		0.50	0.54	0.62	0.76	185.0	177.0	500.0	20.65	0.40	19.27	0.43	16.52	0.50	11.70	0.71	21	19	17	15	3.33	4.10	5.08	7.37	1.38	1.84	2.61	4.65			
D+E+F	6.7		0.50	0.54	0.62	0.76	187.0	177.0	850.0	29.83	0.47	27.84	0.51	23.86	0.59	16.90	0.84	30	28	24	17	2.72	3.43	4.31	7.18	9.07	12.35	17.82	36.40	24	0.21%	Sized for two-year design event
G	2.0		0.50	0.54	0.62	0.76	180.0	174.0	550.0	24.60	0.37	22.96	0.40	19.68	0.47	13.94	0.66	25	23	20	15	3.03	3.81	4.71	7.37	3.05	4.14	5.87	11.26			
H	2.1		0.30	0.35	0.45	0.65	184.0	180.0	150.0	12.72	0.20	11.92	0.21	10.33	0.24	7.15	0.35	15	15	15	15	3.83	4.56	5.22	7.37	2.44	3.38	4.98	10.16			
Entire Site	22.9		0.46	0.49	0.57	0.72	193.0	172.0	1030.0	29.34	0.59	27.62	0.62	24.04	0.71	17.41	0.99	29	28	24	17	2.72	3.43	4.22	7.00	28.40	38.78	55.31	115.09			

Appendix F

TR-20 Output

1

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

```
JOB TR-20                        FULLPRINT          SUMMARY   NOPLOTS                10
TITLE 006  BEACON HILL:  DRAINAGE AREA TO 5 - 9' x 5' RCB'S, USING                     20
TITLE      100YR, 24HR RNFL FROM SCS TR20 PROGRAM                                      30
 2 XSECTN   001              1.00       177.10                                        40
 8                         169.10         0.00         0.0                           170
 8                         169.60        18.56        11.00                          180
 8                         170.10        61.32        24.00                          190
 8                         170.60       125.77        39.00                          200
 8                         171.10       212.20        56.00                          210
 8                         171.60       321.51        75.00                          220
 8                         172.10       454.87        96.00                          230
 8                         172.60       613.51       119.00                          240
 8                         173.10       798.72       144.00                          250
 8                         173.60      1011.78       171.00                          260
 8                         174.10      1254.00       200.00                          270
 8                         174.60      1526.61       231.00                          280
 8                         175.10      1830.92       264.00                          290
 8                         175.60      2168.15       299.00                          300
 8                         176.10      2539.54       336.00                          310
 8                         176.60      2946.29       375.00                          320
 8                         177.10      3389.60       416.00                          330
 9 ENDTBL                                                                           340
 2 XSECTN   002              1.00       178.00                                        230
 8                         170.00         0.00         0.0                           360
 8                         170.50        12.47         6.00                          370
 8                         171.00        43.14        14.00                          380
 8                         171.50        92.48        24.00                          390
 8                         172.00       162.39        36.00                          400
 8                         172.50       254.96        50.00                          410
 8                         173.00       372.26        66.00                          420
 8                         173.50       516.34        84.00                          430
 8                         174.00       689.17       104.00                          440
 8                         174.50       892.69       126.00                          450
 8                         175.00      1128.79       150.00                          460
 8                         175.50      1399.27       176.00                          470
 8                         176.00      1705.94       204.00                          480
 8                         176.50      2050.54       234.00                          490
 8                         177.00      2434.77       266.00                          500
 8                         177.50      2860.31       300.00                          510
 8                         178.00      3328.79       336.00                          520
 9 ENDTBL                                                                           530
 3 STRUCT     01                                                                    420
 8                         163.00         0.00         0.00                          550
 8                         163.50        27.50         1.15                          560
 8                         164.00        89.53         2.34                          570
 8                         164.50       180.79         3.57                          580
```

1

**********80-80 LIST OF INPUT DATA (CONTINUED)**********

```
 8                         165.00       300.37         5.10                          590
 8                         165.50       448.44         6.45                          600
 8                         166.00       625.62         7.84                          610
 8                         166.50       832.79         9.26                          620
 8                         167.00      1070.93        10.41                          630
 8                         167.50      1341.11        11.87                          640
 8                         168.00      1644.41        13.40                          650
 8                         168.50      1981.96        14.98                          660
 8                         169.00      2354.89        16.61                          670
 8                         169.50      2764.31        18.28                          680
```

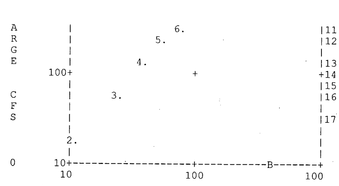
```
8                              170.00      3211.37       20.00                                690
9 ENDTBL                                                                                       700
3 STRUCT      02                                                                               590
8                              154.00         0.00        0.00                                720
8                              154.50        94.70        0.02                                730
8                              155.00       284.20        0.09                                740
8                              155.50       544.70        0.21                                750
8                              156.00       828.80        0.39                                760
8                              156.50      1184.00        0.64                                770
8                              157.00      1539.20        0.96                                780
8                              159.50      1665.00        4.01                                790
8                              160.00      1800.00        4.96                                800
8                              160.50      1980.00        6.04                                810
8                              161.00      2160.00        7.25                                820
8                              161.50      2295.00        8.61                                830
8                              162.00      2430.00       10.12                                840
9 ENDTBL                                                                                       850
6 RUNOFF 1 001        5        0.564        85.92        0.84   1         1                   740
6 REACH  3 001   5    4   6810.0                                 1         1                   750
6 RUNOFF 1 002        5        0.302        75.0         0.85   1         1                   760
6 REACH  3 002   5    6   5650.0                                 1         1                   770
6 ADDHYD 4    01 4 6 7                                          1         1                   780
6 RESVOR 2    01 7   5      163.00                              1         1                   790
6 RUNOFF 1    02     6        0.200        79.85        0.75   1         1                   800
6 ADDHYD 4    02 5 6 7                                          1         1                   810
6 RESVOR 2    02 7   5      154.00                              1         1                   820
  ENDATA                                                                                       830
7 INCREM 6                     0.50                                                          840
7 COMPUT 7 001        02                    3.48         1.0    2 2  01  01                 850
  ENDCMP 1                                                                                     860
7 COMPUT 7 001        02                    4.55         1.0    2 2  02  02                 870
  ENDCMP 1                                                                                     880
7 COMPUT 7 001        02                    5.25         1.0    2 2  03  03                 890
  ENDCMP 1                                                                                     900
7 COMPUT 7 001        02                    7.8          1.0    2 2  04  04                 910
  ENDCMP 1                                                                                     920
1


**********80-80 LIST OF INPUT DATA (CONTINUED)**********

  ENDJOB 2                                                                                     930

**********END OF 80-80 LIST**********
1
TR20 ------------------------------------------------------------------------------
          BEACON HILL:  DRAINAGE AREA TO 5 - 9' x 5' RCB'S, USING        VERSION
10/25/**            100YR, 24HR RNFL FROM SCS TR20 PROGRAM               10/01/90
11:33:46                        PASS   1                                 PAGE   1

            XSECTION  1  END AREA VS DISCHARGE
            ----------------------------------
                                                 PLOT   DIS-     END   COMPUTED
                                                 NO.  CHARGE    AREA       M
                                                        (CFS)  (SQ FT)
      10000+-----------------+-----------------+ 1      .0      .0    1.53
           |                                    | 2     18.6    11.0   1.53
           |                                    | 3     61.3    24.0   1.53
L          |                                    | 4    125.8    39.0   1.51
O        B                            1X.       |
G          |                          1X.       | 5    212.2    56.0   1.48
           |                       13.          | 6    321.5    75.0   1.46
D          |                    1X.             | 7    454.9    96.0   1.44
I     1000+                  + 10.               + 8    613.5   119.0   1.43
S          |                9.                  |
C          |               8.                   | 9    798.7   144.0   1.42
H          |             7.                     |10   1011.8   171.0   1.41
```



11	1254.0	200.0	1.40
12	1526.6	231.0	1.40
13	1830.9	264.0	1.39
14	2168.1	299.0	1.39
15	2539.5	336.0	1.38
16	2946.3	375.0	1.38
17	3389.6	416.0	1.37

LOG END AREA SQ FT

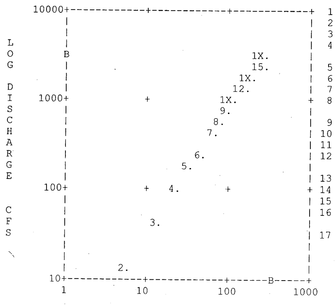
NOTE: '*' INDICATES THE COMPUTED M VALUE IS OUTSIDE THE RANGE (1.00 - 2.00). THE CLOSEST LIMITING M VALUE WILL BE USED IN ROUTING.

LEGEND
+ = GRID REFERENCE
. = LOCATION OF PLOTTED VALUE
3 = PLOT NO. (ANY INTEGER)
X = MULTIPLE PLOT NUMBERS
B = BANKFULL (SHOWN ON AXIS)
AREA= 416.0 SQ FT
DISCHARGE= 3389.6 CFS

1
TR20 ----------

BEACON HILL: DRAINAGE AREA TO 5 - 9' x 5' RCB'S, USING VERSION
10/25/** 100YR, 24HR RNFL FROM SCS TR20 PROGRAM 10/01/90
11:33:46 PASS 1 PAGE 2

XSECTION 2 END AREA VS DISCHARGE



PLOT NO.	DISCHARGE (CFS)	END AREA (SQ FT)	COMPUTED M
1	.0	.0	1.46
2	12.5	6.0	1.46
3	43.1	14.0	1.46
4	92.5	24.0	1.44
5	162.4	36.0	1.42
6	255.0	50.0	1.40
7	372.3	66.0	1.39
8	516.3	84.0	1.38
9	689.2	104.0	1.37
10	892.7	126.0	1.37
11	1128.8	150.0	1.36
12	1399.3	176.0	1.36
13	1705.9	204.0	1.36
14	2050.5	234.0	1.35
15	2434.8	266.0	1.35
16	2860.3	300.0	1.35
17	3328.8	336.0	1.35

LOG END AREA SQ FT

NOTE: '*' INDICATES THE COMPUTED M VALUE IS OUTSIDE

THE RANGE (1.00 - 2.00).
THE CLOSEST LIMITING M VALUE
WILL BE USED IN ROUTING.

LEGEND
+ = GRID REFERENCE
. = LOCATION OF PLOTTED VALUE
3 = PLOT NO. (ANY INTEGER)
X = MULTIPLE PLOT NUMBERS
B = BANKFULL (SHOWN ON AXIS)
AREA= 336.0 SQ FT
DISCHARGE= 3328.8 CFS

1
TR20 ----------

EXECUTIVE CONTROL INCREM MAIN TIME INCREMENT = .50 HOURS 840

EXECUTIVE CONTROL COMPUT FROM XSECTION 1 TO STRUCTURE 2 850
STARTING TIME = .00 RAIN DEPTH = 3.48 RAIN DURATION= 1.00
ANT. MOIST. COND. = 2 MAIN TIME INCREMENT = .50 HOURS
ALTERNATE NO.= 1 STORM NO.= 1 RAIN TABLE NO.= 2

OPERATION RUNOFF XSECTION 1
OUTPUT HYDROGRAPH= 5 AREA= .56 SQ MI
INPUT RUNOFF CURVE= 86. TIME OF CONCENTRATION= .84 HOURS
COMPUTED INTERNAL TIME INCREMENT = .0916 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET) (RUNOFF)
12.50	431.9	

RUNOFF ABOVE BASEFLOW OF .00 CFS
2.12 WATERSHED INCHES; 773 CFS-HRS; 63.8 ACRE-FEET.

OPERATION REACH XSECTION 1
INPUT HYDROGRAPH 5 OUTPUT HYDROGRAPH 4
CHANNEL LENGTH = 6810.00 FT
INPUT = RATING CURVE REPRESENTATIVE OF REACH

COEFFICIENTS USED IN ROUTING RELATED TO CROSS SECTION AREA, X= .62 M= 1.45
MODIFIED ATT-KIN ROUTING COEFFICIENT = .94 PEAK TRAVEL TIME = .50 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.01	417.9	171.96

RUNOFF ABOVE BASEFLOW OF .00 CFS
2.06 WATERSHED INCHES; 751 CFS-HRS; 62.1 ACRE-FEET.

OPERATION RUNOFF XSECTION 2
OUTPUT HYDROGRAPH= 5 AREA= .30 SQ MI
INPUT RUNOFF CURVE= 75. TIME OF CONCENTRATION= .85 HOURS
COMPUTED INTERNAL TIME INCREMENT = .0927 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET) (RUNOFF)
12.53	139.0	

RUNOFF ABOVE BASEFLOW OF .00 CFS
1.32 WATERSHED INCHES; 258 CFS-HRS; 21.3 ACRE-FEET.

OPERATION REACH XSECTION 2

INPUT HYDROGRAPH 5 OUTPUT HYDROGRAPH 6
CHANNEL LENGTH = 5650.00 FT
INPUT = RATING CURVE REPRESENTATIVE OF REACH

COEFFICIENTS USED IN ROUTING RELATED TO CROSS SECTION AREA, X= 1.00 M= 1.42
MODIFIED ATT-KIN ROUTING COEFFICIENT = .99 PEAK TRAVEL TIME = .50 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.03	138.1	171.83

RUNOFF ABOVE BASEFLOW OF .00 CFS
1.24 WATERSHED INCHES; 242 CFS-HRS; 20.0 ACRE-FEET.

OPERATION ADDHYD STRUCTURE 1
INPUT HYDROGRAPHS 4,6 OUTPUT HYDROGRAPH 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.02	555.9	165.80

RUNOFF ABOVE BASEFLOW OF .00 CFS
1.79 WATERSHED INCHES; 1001 CFS-HRS; 82.7 ACRE-FEET.

OPERATION RESVOR STRUCTURE 1
INPUT HYDROGRAPH 7 OUTPUT HYDROGRAPH 5
SURFACE ELEVATION= 163.00

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.15	489.3	165.62

RUNOFF ABOVE BASEFLOW OF .00 CFS
1.79 WATERSHED INCHES; 1001 CFS-HRS; 82.7 ACRE-FEET.

OPERATION RUNOFF STRUCTURE 2
OUTPUT HYDROGRAPH= 6 AREA= .20 SQ MI
INPUT RUNOFF CURVE= 80. TIME OF CONCENTRATION= .75 HOURS
COMPUTED INTERNAL TIME INCREMENT = .1000 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.48	119.0	(RUNOFF)

RUNOFF ABOVE BASEFLOW OF .00 CFS
1.60 WATERSHED INCHES; 206 CFS-HRS; 17.0 ACRE-FEET.

OPERATION ADDHYD STRUCTURE 2

INPUT HYDROGRAPHS 5,6 OUTPUT HYDROGRAPH 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.11	527.1	155.47

RUNOFF ABOVE BASEFLOW OF .00 CFS
1.75 WATERSHED INCHES; 1207 CFS-HRS; 99.7 ACRE-FEET.

```
 OPERATION RESVOR   STRUCTURE  2
         INPUT HYDROGRAPH 7         OUTPUT HYDROGRAPH 5
         SURFACE ELEVATION=   154.00

      PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
         13.11                          525.2                        155.46
         23.32                           23.7                        154.12

      RUNOFF ABOVE BASEFLOW OF     .00 CFS
                    1.75 WATERSHED INCHES;     1207 CFS-HRS;       99.7 ACRE-FEET.

 EXECUTIVE CONTROL ENDCMP    COMPUTATIONS COMPLETED FOR PASS   1             860
1
 TR20 ---------------------------------------------------------------------------
              BEACON HILL:  DRAINAGE AREA TO 5 - 9' x 5' RCB'S, USING       VERSION
 10/25/**              100YR, 24HR RNFL FROM SCS TR20 PROGRAM               10/01/90
 11:33:46                            PASS   2                              PAGE   6


 EXECUTIVE CONTROL COMPUT    FROM XSECTION   1  TO STRUCTURE  2               870
    STARTING TIME =    .00          RAIN DEPTH =   4.55       RAIN DURATION=  1.00
    ANT. MOIST. COND. = 2           MAIN TIME INCREMENT =    .50 HOURS
    ALTERNATE NO.= 2                STORM NO.= 2              RAIN TABLE NO.= 2


 OPERATION RUNOFF   XSECTION   1
         OUTPUT HYDROGRAPH=  5       AREA=     .56 SQ MI
         INPUT RUNOFF CURVE= 86.     TIME OF CONCENTRATION=    .84 HOURS
         COMPUTED INTERNAL TIME INCREMENT =  .0916 HOURS

      PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
         12.49                          628.6                        (RUNOFF)

      RUNOFF ABOVE BASEFLOW OF     .00 CFS
                    3.11 WATERSHED INCHES;     1131 CFS-HRS;       93.5 ACRE-FEET.


 OPERATION REACH    XSECTION   1
         INPUT HYDROGRAPH 5         OUTPUT HYDROGRAPH 4
         CHANNEL LENGTH =  6810.00 FT
         INPUT = RATING CURVE REPRESENTATIVE OF REACH

 COEFFICIENTS USED IN ROUTING RELATED TO CROSS SECTION AREA,  X=    .66 M= 1.43
 MODIFIED ATT-KIN ROUTING COEFFICIENT =  .99      PEAK TRAVEL TIME =     .50 HOURS

      PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
         12.99                          625.4                        172.63

      RUNOFF ABOVE BASEFLOW OF     .00 CFS
                    3.02 WATERSHED INCHES;     1100 CFS-HRS;       90.9 ACRE-FEET.


 OPERATION RUNOFF   XSECTION   2
         OUTPUT HYDROGRAPH=  5       AREA=     .30 SQ MI
         INPUT RUNOFF CURVE= 75.     TIME OF CONCENTRATION=    .85 HOURS
         COMPUTED INTERNAL TIME INCREMENT =  .0927 HOURS

      PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
         12.52                          231.2                        (RUNOFF)

      RUNOFF ABOVE BASEFLOW OF     .00 CFS
                    2.14 WATERSHED INCHES;      418 CFS-HRS;       34.5 ACRE-FEET.


 OPERATION REACH    XSECTION   2
```

INPUT HYDROGRAPH 5 OUTPUT HYDROGRAPH 6
CHANNEL LENGTH = 5650.00 FT
INPUT = RATING CURVE REPRESENTATIVE OF REACH

1
TR20 ----------

COEFFICIENTS USED IN ROUTING RELATED TO CROSS SECTION AREA, X= 1.05 M= 1.40
MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING - ROUTING COEFFICIENT (C) EQUALS 1.0,
CONSIDER SMALLER MAIN TIME INCREMENT FOR XSECTION 2. ***

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.52	231.2	172.37

RUNOFF ABOVE BASEFLOW OF .00 CFS
2.14 WATERSHED INCHES; 418 CFS-HRS; 34.5 ACRE-FEET.

OPERATION ADDHYD STRUCTURE 1
INPUT HYDROGRAPHS 4,6 OUTPUT HYDROGRAPH 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.92	741.6	166.28

RUNOFF ABOVE BASEFLOW OF .00 CFS
2.69 WATERSHED INCHES; 1506 CFS-HRS; 124.4 ACRE-FEET.

OPERATION RESVOR STRUCTURE 1
INPUT HYDROGRAPH 7 OUTPUT HYDROGRAPH 5
SURFACE ELEVATION= 163.00

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.02	733.1	166.26

RUNOFF ABOVE BASEFLOW OF .00 CFS
2.69 WATERSHED INCHES; 1506 CFS-HRS; 124.4 ACRE-FEET.

OPERATION RUNOFF STRUCTURE 2
OUTPUT HYDROGRAPH= 6 AREA= .20 SQ MI
INPUT RUNOFF CURVE= 80. TIME OF CONCENTRATION= .75 HOURS
COMPUTED INTERNAL TIME INCREMENT = .1000 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET) (RUNOFF)
12.47	184.5	

RUNOFF ABOVE BASEFLOW OF .00 CFS
2.47 WATERSHED INCHES; 319 CFS-HRS; 26.3 ACRE-FEET.

OPERATION ADDHYD STRUCTURE 2
1
TR20 ----------

INPUT HYDROGRAPHS 5,6 OUTPUT HYDROGRAPH 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.95	808.3	155.96

RUNOFF ABOVE BASEFLOW OF .00 CFS
2.65 WATERSHED INCHES; 1825 CFS-HRS; 150.8 ACRE-FEET.

OPERATION RESVOR STRUCTURE 2
INPUT HYDROGRAPH 7 OUTPUT HYDROGRAPH 5
SURFACE ELEVATION= 154.00

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.96	806.9	155.96
17.33	64.2	154.34
18.39	56.4	154.30
19.39	49.7	154.26
20.39	43.1	154.23
21.45	38.4	154.20
22.48	36.6	154.19
23.48	35.4	154.19
24.31	31.7	154.17
26.38	5.0	154.03

RUNOFF ABOVE BASEFLOW OF .00 CFS
2.65 WATERSHED INCHES; 1825 CFS-HRS; 150.8 ACRE-FEET.

EXECUTIVE CONTROL ENDCMP COMPUTATIONS COMPLETED FOR PASS 2 880

1
TR20 ----------

BEACON HILL: DRAINAGE AREA TO 5 - 9' x 5' RCB'S, USING VERSION
10/25/** 100YR, 24HR RNFL FROM SCS TR20 PROGRAM 10/01/90
11:33:46 PASS 3 PAGE 9

EXECUTIVE CONTROL COMPUT FROM XSECTION 1 TO STRUCTURE 2 890
STARTING TIME = .00 RAIN DEPTH = 5.25 RAIN DURATION= 1.00
ANT. MOIST. COND. = 2 MAIN TIME INCREMENT = .50 HOURS
ALTERNATE NO.= 3 STORM NO.= 3 RAIN TABLE NO.= 2

OPERATION RUNOFF XSECTION 1
OUTPUT HYDROGRAPH= 5 AREA= .56 SQ MI
INPUT RUNOFF CURVE= 86. TIME OF CONCENTRATION= .84 HOURS
COMPUTED INTERNAL TIME INCREMENT = .0916 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET) (RUNOFF)
12.49	762.4	

RUNOFF ABOVE BASEFLOW OF .00 CFS
3.78 WATERSHED INCHES; 1376 CFS-HRS; 113.7 ACRE-FEET.

OPERATION REACH XSECTION 1
INPUT HYDROGRAPH 5 OUTPUT HYDROGRAPH 4
CHANNEL LENGTH = 6810.00 FT
INPUT = RATING CURVE REPRESENTATIVE OF REACH

COEFFICIENTS USED IN ROUTING RELATED TO CROSS SECTION AREA, X= .68 M= 1.42
MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING - ROUTING COEFFICIENT (C) EQUALS 1.0,
CONSIDER SMALLER MAIN TIME INCREMENT FOR XSECTION 1. ***

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.49	762.4	173.00

RUNOFF ABOVE BASEFLOW OF .00 CFS
3.78 WATERSHED INCHES; 1376 CFS-HRS; 113.7 ACRE-FEET.

```
 OPERATION RUNOFF   XSECTION   2
        OUTPUT HYDROGRAPH=  5       AREA=     .30 SQ MI
        INPUT RUNOFF CURVE= 75.     TIME OF CONCENTRATION=    .85 HOURS
        COMPUTED INTERNAL TIME INCREMENT =  .0927 HOURS

    PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
       12.51                          294.7                        (RUNOFF)

    RUNOFF ABOVE BASEFLOW OF     .00 CFS
                  2.72 WATERSHED INCHES;      530 CFS-HRS;       43.8 ACRE-FEET.


 OPERATION REACH    XSECTION   2
1
 TR20 ---------------------------------------------------------------------------
          BEACON HILL:  DRAINAGE AREA TO 5 - 9' x 5' RCB'S, USING       VERSION
 10/25/**            100YR, 24HR RNFL FROM SCS TR20 PROGRAM             10/01/90
 11:33:46                        PASS   3                              PAGE  10

        INPUT HYDROGRAPH 5        OUTPUT HYDROGRAPH 6
        CHANNEL LENGTH =  5650.00 FT
        INPUT = RATING CURVE REPRESENTATIVE OF REACH

 COEFFICIENTS USED IN ROUTING RELATED TO CROSS SECTION AREA,  X=  1.08 M= 1.40
 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00      PEAK TRAVEL TIME =     .00 HOURS

 *** WARNING - ROUTING COEFFICIENT (C) EQUALS 1.0,
               CONSIDER SMALLER MAIN TIME INCREMENT FOR XSECTION   2.       ***

    PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
       12.51                          294.7                        172.67

    RUNOFF ABOVE BASEFLOW OF     .00 CFS
                  2.72 WATERSHED INCHES;      530 CFS-HRS;       43.8 ACRE-FEET.


 OPERATION ADDHYD   STRUCTURE  1
        INPUT HYDROGRAPHS 4,6     OUTPUT HYDROGRAPH 7

    PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
       12.50                         1056.9                        166.97

    RUNOFF ABOVE BASEFLOW OF     .00 CFS
                  3.41 WATERSHED INCHES;     1905 CFS-HRS;      157.4 ACRE-FEET.


 OPERATION RESVOR   STRUCTURE  1
        INPUT HYDROGRAPH 7        OUTPUT HYDROGRAPH 5
        SURFACE ELEVATION=   163.00

    PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
       12.58                          993.0                        166.84

    RUNOFF ABOVE BASEFLOW OF     .00 CFS
                  3.32 WATERSHED INCHES;     1853 CFS-HRS;      153.1 ACRE-FEET.


 OPERATION RUNOFF   STRUCTURE  2
        OUTPUT HYDROGRAPH=  6       AREA=     .20 SQ MI
        INPUT RUNOFF CURVE= 80.     TIME OF CONCENTRATION=    .75 HOURS
        COMPUTED INTERNAL TIME INCREMENT =  .1000 HOURS

    PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
       12.47                          228.9                        (RUNOFF)

    RUNOFF ABOVE BASEFLOW OF     .00 CFS
                  3.07 WATERSHED INCHES;      396 CFS-HRS;       32.8 ACRE-FEET.
```

```
1
 TR20 ---------------------------------------------------------------------------
            BEACON HILL:  DRAINAGE AREA TO 5 - 9' x 5' RCB'S, USING      VERSION
 10/25/**             100YR, 24HR RNFL FROM SCS TR20 PROGRAM             10/01/90
 11:33:46                          PASS   3                             PAGE  11


   OPERATION ADDHYD   STRUCTURE  2
          INPUT HYDROGRAPHS 5,6     OUTPUT HYDROGRAPH 7

     PEAK TIME(HRS)              PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
        12.55                         1217.2                       156.55

     RUNOFF ABOVE BASEFLOW OF    .00 CFS
                   3.27 WATERSHED INCHES;    2250 CFS-HRS;     185.9 ACRE-FEET.


   OPERATION RESVOR   STRUCTURE  2
          INPUT HYDROGRAPH 7        OUTPUT HYDROGRAPH 5
          SURFACE ELEVATION=   154.00

     PEAK TIME(HRS)              PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
        12.57                         1203.5                       156.53
        14.84                          134.7                       154.61
        15.92                          107.4                       154.53
        16.95                           88.2                       154.47
        17.97                           78.3                       154.41
        18.97                           70.0                       154.37
        19.97                           61.6                       154.33
        20.98                           54.8                       154.29
        21.99                           52.1                       154.28
        22.99                           50.1                       154.26

     RUNOFF ABOVE BASEFLOW OF    .00 CFS
                   3.27 WATERSHED INCHES;    2250 CFS-HRS;     185.9 ACRE-FEET.


   EXECUTIVE CONTROL ENDCMP    COMPUTATIONS COMPLETED FOR PASS   3            900
1
 TR20 ---------------------------------------------------------------------------
            BEACON HILL:  DRAINAGE AREA TO 5 - 9' x 5' RCB'S, USING      VERSION
 10/25/**             100YR, 24HR RNFL FROM SCS TR20 PROGRAM             10/01/90
 11:33:46                          PASS   4                             PAGE  12


   EXECUTIVE CONTROL COMPUT    FROM XSECTION   1  TO STRUCTURE  2            910
      STARTING TIME =    .00        RAIN DEPTH =  7.80       RAIN DURATION=  1.00
      ANT. MOIST. COND. = 2         MAIN TIME INCREMENT =    .50 HOURS
      ALTERNATE NO.= 4              STORM NO.= 4             RAIN TABLE NO.= 2


   OPERATION RUNOFF   XSECTION   1
          OUTPUT HYDROGRAPH=  5       AREA=     .56 SQ MI
          INPUT RUNOFF CURVE= 86.     TIME OF CONCENTRATION=    .84 HOURS
          COMPUTED INTERNAL TIME INCREMENT =   .0916 HOURS

     PEAK TIME(HRS)              PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
        12.48                         1235.8                       (RUNOFF)

     RUNOFF ABOVE BASEFLOW OF    .00 CFS
                   6.26 WATERSHED INCHES;    2278 CFS-HRS;     188.2 ACRE-FEET.


   OPERATION REACH    XSECTION   1
          INPUT HYDROGRAPH 5        OUTPUT HYDROGRAPH 4
          CHANNEL LENGTH =  6810.00 FT
```

```
          INPUT = RATING CURVE REPRESENTATIVE OF REACH

 COEFFICIENTS USED IN ROUTING RELATED TO CROSS SECTION AREA,  X=   .74 M= 1.40
 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00      PEAK TRAVEL TIME =    .00 HOURS

 *** WARNING - ROUTING COEFFICIENT (C) EQUALS 1.0,
               CONSIDER SMALLER MAIN TIME INCREMENT FOR XSECTION   1.       ***

    PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
       12.48                         1235.8                        174.06

    RUNOFF ABOVE BASEFLOW OF    .00 CFS
                   6.26 WATERSHED INCHES;    2278 CFS-HRS;     188.2 ACRE-FEET.


 OPERATION RUNOFF   XSECTION   2
         OUTPUT HYDROGRAPH=  5       AREA=    .30 SQ MI
         INPUT RUNOFF CURVE= 75.     TIME OF CONCENTRATION=    .85 HOURS
         COMPUTED INTERNAL TIME INCREMENT =  .0927 HOURS

    PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
       12.50                         541.7                        (RUNOFF)

    RUNOFF ABOVE BASEFLOW OF    .00 CFS
                   4.98 WATERSHED INCHES;     971 CFS-HRS;      80.3 ACRE-FEET.


 OPERATION REACH    XSECTION   2
1
 TR20 ---------------------------------------------------------------------------
             BEACON HILL:  DRAINAGE AREA TO 5 - 9' x 5' RCB'S, USING      VERSION
 10/25/**                100YR, 24HR RNFL FROM SCS TR20 PROGRAM            10/01/90
 11:33:46                          PASS   4                                PAGE  13

         INPUT HYDROGRAPH 5         OUTPUT HYDROGRAPH 6
         CHANNEL LENGTH =  5650.00 FT
         INPUT = RATING CURVE REPRESENTATIVE OF REACH

 COEFFICIENTS USED IN ROUTING RELATED TO CROSS SECTION AREA,  X=  1.15 M= 1.38
 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00      PEAK TRAVEL TIME =    .00 HOURS

 *** WARNING - ROUTING COEFFICIENT (C) EQUALS 1.0,
               CONSIDER SMALLER MAIN TIME INCREMENT FOR XSECTION   2.       ***

    PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
       12.50                         541.7                        173.57

    RUNOFF ABOVE BASEFLOW OF    .00 CFS
                   4.98 WATERSHED INCHES;     971 CFS-HRS;      80.3 ACRE-FEET.


 OPERATION ADDHYD   STRUCTURE  1
         INPUT HYDROGRAPHS 4,6      OUTPUT HYDROGRAPH 7

    PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
       12.49                        1777.2                        168.20

    RUNOFF ABOVE BASEFLOW OF    .00 CFS
                   5.81 WATERSHED INCHES;    3249 CFS-HRS;     268.5 ACRE-FEET.


 OPERATION RESVOR   STRUCTURE  1
         INPUT HYDROGRAPH 7         OUTPUT HYDROGRAPH 5
         SURFACE ELEVATION=   163.00

    PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
       12.55                        1716.7                        168.11
```

RUNOFF ABOVE BASEFLOW OF .00 CFS
5.66 WATERSHED INCHES; 3166 CFS-HRS; 261.6 ACRE-FEET.

OPERATION RUNOFF STRUCTURE 2
OUTPUT HYDROGRAPH= 6 AREA= .20 SQ MI
INPUT RUNOFF CURVE= 80. TIME OF CONCENTRATION= .75 HOURS
COMPUTED INTERNAL TIME INCREMENT = .1000 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET) (RUNOFF)
12.46	394.4	

RUNOFF ABOVE BASEFLOW OF .00 CFS
5.38 WATERSHED INCHES; 694 CFS-HRS; 57.4 ACRE-FEET.

1
TR20 ----------

OPERATION ADDHYD STRUCTURE 2
INPUT HYDROGRAPHS 5,6 OUTPUT HYDROGRAPH 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.53	2105.1	160.85

RUNOFF ABOVE BASEFLOW OF .00 CFS
5.61 WATERSHED INCHES; 3860 CFS-HRS; 319.0 ACRE-FEET.

OPERATION RESVOR STRUCTURE 2
INPUT HYDROGRAPH 7 OUTPUT HYDROGRAPH 5
SURFACE ELEVATION= 154.00

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.63	1921.8	160.34
13.97	658.4	155.70
14.99	478.7	155.37
16.00	418.7	155.26
17.00	374.0	155.17
18.00	345.8	155.12
19.00	319.5	155.07
20.00	294.5	155.02
21.00	273.1	154.97
22.00	258.7	154.93

RUNOFF ABOVE BASEFLOW OF .00 CFS
5.61 WATERSHED INCHES; 3860 CFS-HRS; 319.0 ACRE-FEET.

EXECUTIVE CONTROL ENDCMP COMPUTATIONS COMPLETED FOR PASS 4 920
1
TR20 ----------

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

XSECTION/ STRUCTURE	STANDARD CONTROL	DRAINAGE	RUNOFF	PEAK DISCHARGE

ID	OPERATION	AREA (SQ MI)	AMOUNT (IN)	ELEVATION (FT)	TIME (HR)	RATE (CFS)	RATE (CSM)

RAINFALL OF 3.48 inches AND 24.00 hr DURATION, BEGINS AT .0 hrs.
RAINTABLE NUMBER 2, AMC 2
MAIN TIME INCREMENT .50 HOURS

ALTERNATE 1 STORM 1

XSECTION	1	RUNOFF	.56	2.12	---	12.50	432	771.4
XSECTION	1	REACH	.56	2.06	171.96	13.01	418	746.4
XSECTION	2	RUNOFF	.30	1.32	---	12.53	139	463.3
XSECTION	2	REACH	.30	1.24	171.83	13.03	138	460.0
STRUCTURE	1	ADDHYD	.87	1.79	165.80	13.02	556	639.1
STRUCTURE	1	RESVOR	.87	1.79	165.62	13.15	489	562.1
STRUCTURE	2	RUNOFF	.20	1.60	---	12.48	119	595.0
STRUCTURE	2	ADDHYD	1.07	1.75	155.47	13.11	527	492.5
STRUCTURE	2	RESVOR	1.07	1.75	155.46	13.11	525	490.7

RAINFALL OF 4.55 inches AND 24.00 hr DURATION, BEGINS AT .0 hrs.

ALTERNATE 2 STORM 2

XSECTION	1	RUNOFF	.56	3.11	---	12.49	629	1123.2
XSECTION	1	REACH	.56	3.02	172.63	12.99	625	1116.1
XSECTION	2	RUNOFF	.30	2.14	---	12.52	231	770.0
XSECTION	2	REACH	.30	2.14	172.37	12.52	231	770.0
STRUCTURE	1	ADDHYD	.87	2.69	166.28	12.92	742	852.9
STRUCTURE	1	RESVOR	.87	2.69	166.26	13.02	733	842.5
STRUCTURE	2	RUNOFF	.20	2.47	---	12.47	185	925.0
STRUCTURE	2	ADDHYD	1.07	2.65	155.96	12.95	808	755.1
STRUCTURE	2	RESVOR	1.07	2.65	155.96	12.96	807	754.2

RAINFALL OF 5.25 inches AND 24.00 hr DURATION, BEGINS AT .0 hrs.

ALTERNATE 3 STORM 3

XSECTION	1	RUNOFF	.56	3.78	---	12.49	762	1360.7

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

XSECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RUNOFF AMOUNT (IN)	PEAK DISCHARGE ELEVATION (FT)	TIME (HR)	RATE (CFS)	RATE (CSM)

ALTERNATE 3 STORM 3

XSECTION	1	REACH	.56	3.78	173.00	12.49	762	1360.7
XSECTION	2	RUNOFF	.30	2.72	---	12.51	295	983.3
XSECTION	2	REACH	.30	2.72	172.67	12.51	295	983.3
STRUCTURE	1	ADDHYD	.87	3.41	166.97	12.50	1057	1214.9
STRUCTURE	1	RESVOR	.87	3.32	166.84	12.58	993	1141.4

STRUCTURE	2	RUNOFF	.20	3.07	---	12.47	229	1145.0
STRUCTURE	2	ADDHYD	1.07	3.27	156.55	12.55	1217	1137.4
STRUCTURE	2	RESVOR	1.07	3.27	156.53	12.57	1204	1125.2

RAINFALL OF 7.80 inches AND 24.00 hr DURATION, BEGINS AT .0 hrs.

ALTERNATE 4 STORM 4

XSECTION	1	RUNOFF	.56	6.26	---	12.48	1236	2207.1
XSECTION	1	REACH	.56	6.26	174.06	12.48	1236	2207.1
XSECTION	2	RUNOFF	.30	4.98	---	12.50	542	1806.7
XSECTION	2	REACH	.30	4.98	173.57	12.50	542	1806.7
STRUCTURE	1	ADDHYD	.87	5.81	168.20	12.49	1777	2042.5
STRUCTURE	1	RESVOR	.87	5.66	168.11	12.55	1717	1973.6
STRUCTURE	2	RUNOFF	.20	5.38	---	12.46	394	1970.0
STRUCTURE	2	ADDHYD	1.07	5.61	160.85	12.53	2105	1967.3
STRUCTURE	2	RESVOR	1.07	5.61	160.34	12.63	1922	1796.3

1

SUMMARY TABLE 2

MODIFIED ATT-KIN REACH ROUTING IN ORDER PERFORMED.
QUESTION MARK (?) AFTER: OUTFLOW PEAK - MAX. NUMBER ROUTING ITERATIONS USED;
ATT-KIN COEFF - VALUE OUTSIDE ACCEPTABLE LIMITS.

			HYDROGRAPH INFORMATION				ROUTING PARAMETERS				
			INFLOW		OUTFLOW		Q-A EQ.			PEAK	ATT-
XSEC ID	REACH LENGTH (FT)	FLOOD PLAIN LENGTH (FT)	PEAK (CFS)	TIME (HR)	PEAK (CFS)	TIME (HR)	COEFF (X)	POWER (M)	LENGTH FACTOR (K*)	RATIO Q/I (Q*)	KIN COEFF (C)
BASEFLOW IS .0 CFS											
ALTERNATE 1 STORM 1											
1	6810		432	12.5	418	13.0	.62	1.45	.117	.968	.94?
2	5650		139	12.5	138	13.0	1.00	1.42	.098	.993	.99?
ALTERNATE 2 STORM 2											
1	6810		629	12.5	625	13.0	.66	1.43	.102	.995	.99?
2	5650		231	12.5	231	12.5	1.05	1.40	.086	1.000	1.00?
ALTERNATE 3 STORM 3											
1	6810		762	12.5	762	12.5	.68	1.42	.095	1.000	1.00?
2	5650		295	12.5	295	12.5	1.08	1.40	.081	1.000	1.00?
ALTERNATE 4 STORM 4											
1	6810		1235	12.5	1235	12.5	.74	1.40	.079	1.000	1.00?
2	5650		542	12.5	542	12.5	1.15	1.38	.067	1.000	1.00?

1

SUMMARY TABLE 3

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES

XSECTION/ STRUCTURE ID		DRAINAGE AREA (SQ MI)	STORM NUMBERS..... 1	2	3	4
STRUCTURE 2		1.07				
	ALTERNATE 1		525	*********	*********	*********
	ALTERNATE 2		*********	807	*********	*********
	ALTERNATE 3		*********	*********	1204	*********
	ALTERNATE 4		*********	*********	*********	1922
STRUCTURE 1		.87				
	ALTERNATE 1		489	*********	*********	*********
	ALTERNATE 2		*********	733	*********	*********
	ALTERNATE 3		*********	*********	993	*********
	ALTERNATE 4		*********	*********	*********	1717
XSECTION 1		.56				
	ALTERNATE 1		418	*********	*********	*********
	ALTERNATE 2		*********	625	*********	*********
	ALTERNATE 3		*********	*********	762	*********
	ALTERNATE 4		*********	*********	*********	1236
XSECTION 2		.30				
	ALTERNATE 1		138	*********	*********	*********
	ALTERNATE 2		*********	231	*********	*********
	ALTERNATE 3		*********	*********	295	*********
	ALTERNATE 4		*********	*********	*********	542

END OF 1 JOBS IN THIS RUN

1

SCS TR-20, VERSION 10/01/90

FILES

INPUT = d:\tr-20\crookedp.t20

OUTPUT = d:\tr-20\crookedp.out , DATED 10/25/**,11:33:46

FILES GENERATED - DATED 10/25/**,11:33:46

NONE!

*** TR-20 RUN COMPLETED ***

1

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

```
JOB TR-20                    FULLPRINT          SUMMARY   NOPLOTS                10
TITLE 006  CROOKED CREEK:  DRAINAGE AREA TO 5 - 9' x 5' RCB'S, USING            20
TITLE      100YR, 24HR RNFL FROM SCS TR20 PROGRAM                                30
 2 XSECTN   001                1.00       177.10                                40
 8                           169.10         0.00         0.0                    170
 8                           169.60        18.56        11.00                   180
 8                           170.10        61.32        24.00                   190
 8                           170.60       125.77        39.00                   200
 8                           171.10       212.20        56.00                   210
 8                           171.60       321.51        75.00                   220
 8                           172.10       454.87        96.00                   230
 8                           172.60       613.51       119.00                   240
 8                           173.10       798.72       144.00                   250
 8                           173.60      1011.78       171.00                   260
 8                           174.10      1254.00       200.00                   270
 8                           174.60      1526.61       231.00                   280
 8                           175.10      1830.92       264.00                   290
 8                           175.60      2168.15       299.00                   300
 8                           176.10      2539.54       336.00                   310
 8                           176.60      2946.29       375.00                   320
 8                           177.10      3389.60       416.00                   330
 9 ENDTBL                                                                       340
 2 XSECTN   002                1.00       178.00                                230
 8                           170.00         0.00         0.0                    360
 8                           170.50        12.47         6.00                   370
 8                           171.00        43.14        14.00                   380
 8                           171.50        92.48        24.00                   390
 8                           172.00       162.39        36.00                   400
 8                           172.50       254.96        50.00                   410
 8                           173.00       372.26        66.00                   420
 8                           173.50       516.34        84.00                   430
 8                           174.00       689.17       104.00                   440
 8                           174.50       892.69       126.00                   450
 8                           175.00      1128.79       150.00                   460
 8                           175.50      1399.27       176.00                   470
 8                           176.00      1705.94       204.00                   480
 8                           176.50      2050.54       234.00                   490
 8                           177.00      2434.77       266.00                   500
 8                           177.50      2860.31       300.00                   510
 8                           178.00      3328.79       336.00                   520
 9 ENDTBL                                                                       530
 3 STRUCT      01                                                               420
 8                           163.00         0.00         0.00                   550
 8                           163.50        27.50         1.15                   560
 8                           164.00        89.53         2.34                   570
 8                           164.50       180.79         3.57                   580
```

1

**********80-80 LIST OF INPUT DATA (CONTINUED)**********

```
 8                           165.00       300.37         5.10                   590
 8                           165.50       448.44         6.45                   600
 8                           166.00       625.62         7.84                   610
 8                           166.50       832.79         9.26                   620
 8                           167.00      1070.93        10.41                   630
 8                           167.50      1341.11        11.87                   640
 8                           168.00      1644.41        13.40                   650
 8                           168.50      1981.96        14.98                   660
 8                           169.00      2354.89        16.61                   670
 8                           169.50      2764.31        18.28                   680
```

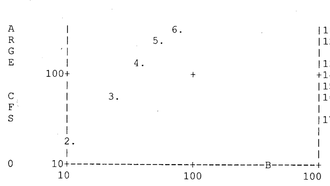
```
8                                170.00     3211.37       20.00                    690
9 ENDTBL                                                                            700
3 STRUCT      02                                                                    590
8                                154.00        0.00        0.00                    720
8                                154.50       94.70        0.02                    730
8                                155.00      284.20        0.09                    740
8                                155.50      544.70        0.21                    750
8                                156.00      828.80        0.39                    760
8                                156.50     1184.00        0.64                    770
8                                157.00     1539.20        0.96                    780
8                                159.50     1665.00        4.01                    790
8                                160.00     1800.00        4.96                    800
8                                160.50     1980.00        6.04                    810
8                                161.00     2160.00        7.25                    820
8                                161.50     2295.00        8.61                    830
8                                162.00     2430.00       10.12                    840
9 ENDTBL                                                                            850
6 RUNOFF 1 001       5     0.564      86.22        0.84   1         1               740
6 REACH  3 001   5   4  6810.0                             1         1               750
6 RUNOFF 1 002       5     0.302      75.0         0.85   1         1               760
6 REACH  3 002   5   6  5650.0                             1         1               770
6 ADDHYD 4     01 4 6 7                                    1         1               780
6 RESVOR 2     01 7   5   163.00                           1         1               790
6 RUNOFF 1     02     6     0.200      79.85        0.75   1         1               800
6 ADDHYD 4     02 5 6 7                                    1         1               810
6 RESVOR 2     02 7   5   154.00                           1         1               820
  ENDATA                                                                            830
7 INCREM 6                     0.50                                                 840
7 COMPUT 7 001       02                  3.48        1.0    2 2  01  01            850
  ENDCMP 1                                                                          980
7 COMPUT 7 001       02                  4.55        1.0    2 2  02  02            850
  ENDCMP 1                                                                          980
7 COMPUT 7 001       02                  5.25        1.0    2 2  03  03            850
  ENDCMP 1                                                                          980
7 COMPUT 7 001       02                  7.8         1.0    2 2  04  04            850
  ENDCMP 1                                                                          980
1

**********80-80 LIST OF INPUT DATA (CONTINUED)**********

  ENDJOB 2                                                                          990

**********END OF 80-80 LIST**********
1
TR20 ------------------------------------------------------------------------------
        CROOKED CREEK:  DRAINAGE AREA TO 5 - 9' x 5' RCB'S, USING      VERSION
10/25/**              100YR, 24HR RNFL FROM SCS TR20 PROGRAM            10/01/90
11:23:32                          PASS   1                            PAGE   1

            XSECTION  1  END AREA VS DISCHARGE
            ----------------------------------
                                                  PLOT   DIS-    END   COMPUTED
                                                   NO. CHARGE   AREA        M
                                                       (CFS)  (SQ FT)
    10000+--------------------+--------------------+ 1      .0     .0   1.53
         |                                         | 2    18.6    11.0   1.53
         |                                         | 3    61.3    24.0   1.53
L        |                                         | 4   125.8    39.0   1.51
O        B                                1X.     |
G        |                                1X.     | 5   212.2    56.0   1.48
         |                             13.        | 6   321.5    75.0   1.46
D        |                          1X.           | 7   454.9    96.0   1.44
I    1000+                      +  10.            + 8   613.5   119.0   1.43
S        |                    9.                  |
C        |                   8.                   | 9   798.7   144.0   1.42
H        |                 7.                     |10  1011.8   171.0   1.41
```



11	1254.0	200.0	1.40
12	1526.6	231.0	1.40
13	1830.9	264.0	1.39
14	2168.1	299.0	1.39
15	2539.5	336.0	1.38
16	2946.3	375.0	1.38
17	3389.6	416.0	1.37

LOG END AREA SQ FT

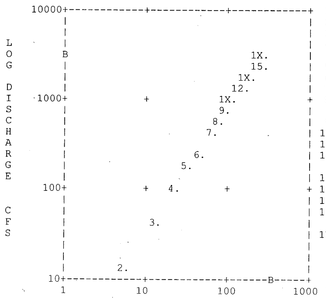
NOTE: '*' INDICATES THE COMPUTED M VALUE IS OUTSIDE THE RANGE (1.00 - 2.00). THE CLOSEST LIMITING M VALUE WILL BE USED IN ROUTING.

LEGEND
+ = GRID REFERENCE
. = LOCATION OF PLOTTED VALUE
3 = PLOT NO. (ANY INTEGER)
X = MULTIPLE PLOT NUMBERS
B = BANKFULL (SHOWN ON AXIS)
AREA= 416.0 SQ FT
DISCHARGE= 3389.6 CFS

1
TR20 ----------

CROOKED CREEK: DRAINAGE AREA TO 5 - 9' x 5' RCB'S, USING VERSION
10/25/** 100YR, 24HR RNFL FROM SCS TR20 PROGRAM 10/01/90
11:23:32 PASS 1 PAGE 2

XSECTION 2 END AREA VS DISCHARGE



PLOT NO.	DISCHARGE (CFS)	END AREA (SQ FT)	COMPUTED M
1	.0	.0	1.46
2	12.5	6.0	1.46
3	43.1	14.0	1.46
4	92.5	24.0	1.44
5	162.4	36.0	1.42
6	255.0	50.0	1.40
7	372.3	66.0	1.39
8	516.3	84.0	1.38
9	689.2	104.0	1.37
10	892.7	126.0	1.37
11	1128.8	150.0	1.36
12	1399.3	176.0	1.36
13	1705.9	204.0	1.36
14	2050.5	234.0	1.35
15	2434.8	266.0	1.35
16	2860.3	300.0	1.35
17	3328.8	336.0	1.35

NOTE: '*' INDICATES THE COMPUTED M VALUE IS OUTSIDE

THE RANGE (1.00 - 2.00).
THE CLOSEST LIMITING M VALUE
WILL BE USED IN ROUTING.

LEGEND
+ = GRID REFERENCE
. = LOCATION OF PLOTTED VALUE
3 = PLOT NO. (ANY INTEGER)
X = MULTIPLE PLOT NUMBERS
B = BANKFULL (SHOWN ON AXIS)
AREA= 336.0 SQ FT
DISCHARGE= 3328.8 CFS

1
TR20 ----------

CROOKED CREEK: DRAINAGE AREA TO 5 - 9' x 5' RCB'S, USING VERSION
10/25/** 100YR, 24HR RNFL FROM SCS TR20 PROGRAM 10/01/90
11:23:32 PASS 1 PAGE 3

EXECUTIVE CONTROL INCREM MAIN TIME INCREMENT = .50 HOURS 840

EXECUTIVE CONTROL COMPUT FROM XSECTION 1 TO STRUCTURE 2 850
STARTING TIME = .00 RAIN DEPTH = 3.48 RAIN DURATION= 1.00
ANT. MOIST. COND. = 2 MAIN TIME INCREMENT = .50 HOURS
ALTERNATE NO.= 1 STORM NO.= 1 RAIN TABLE NO.= 2

OPERATION RUNOFF XSECTION 1
OUTPUT HYDROGRAPH= 5 AREA= .56 SQ MI
INPUT RUNOFF CURVE= 86. TIME OF CONCENTRATION= .84 HOURS
COMPUTED INTERNAL TIME INCREMENT = .0916 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET) (RUNOFF)
12.50	436.6	

RUNOFF ABOVE BASEFLOW OF .00 CFS
2.15 WATERSHED INCHES; 781 CFS-HRS; 64.6 ACRE-FEET.

OPERATION REACH XSECTION 1
INPUT HYDROGRAPH 5 OUTPUT HYDROGRAPH 4
CHANNEL LENGTH = 6810.00 FT
INPUT = RATING CURVE REPRESENTATIVE OF REACH

COEFFICIENTS USED IN ROUTING RELATED TO CROSS SECTION AREA, X= .62 M= 1.45
MODIFIED ATT-KIN ROUTING COEFFICIENT = .94 PEAK TRAVEL TIME = .50 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
13.01	422.9	171.98

RUNOFF ABOVE BASEFLOW OF .00 CFS
2.03 WATERSHED INCHES; 740 CFS-HRS; 61.1 ACRE-FEET.

OPERATION RUNOFF XSECTION 2
OUTPUT HYDROGRAPH= 5 AREA= .30 SQ MI
INPUT RUNOFF CURVE= 75. TIME OF CONCENTRATION= .85 HOURS
COMPUTED INTERNAL TIME INCREMENT = .0927 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET) (RUNOFF)
12.53	139.0	

RUNOFF ABOVE BASEFLOW OF .00 CFS
1.32 WATERSHED INCHES; 258 CFS-HRS; 21.3 ACRE-FEET.

OPERATION REACH XSECTION 2

```
1
 TR20 ---------------------------------------------------------------------------
          CROOKED CREEK:  DRAINAGE AREA TO 5 - 9' x 5' RCB'S, USING      VERSION
 10/25/**              100YR, 24HR RNFL FROM SCS TR20 PROGRAM              10/01/90
 11:23:32                            PASS   1                             PAGE   4

         INPUT HYDROGRAPH 5        OUTPUT HYDROGRAPH 6
         CHANNEL LENGTH =  5650.00 FT
         INPUT = RATING CURVE REPRESENTATIVE OF REACH

 COEFFICIENTS USED IN ROUTING RELATED TO CROSS SECTION AREA,  X=  1.00 M= 1.42
 MODIFIED ATT-KIN ROUTING COEFFICIENT =  .99      PEAK TRAVEL TIME =    .50 HOURS

    PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
       13.03                          138.1                         171.83

    RUNOFF ABOVE BASEFLOW OF    .00 CFS
                   1.24 WATERSHED INCHES;      242 CFS-HRS;       20.0 ACRE-FEET.


 OPERATION ADDHYD    STRUCTURE  1
         INPUT HYDROGRAPHS 4,6     OUTPUT HYDROGRAPH 7

    PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
       13.02                          560.8                         165.82

    RUNOFF ABOVE BASEFLOW OF    .00 CFS
                   1.76 WATERSHED INCHES;      982 CFS-HRS;       81.1 ACRE-FEET.


 OPERATION RESVOR    STRUCTURE  1
         INPUT HYDROGRAPH 7        OUTPUT HYDROGRAPH 5
         SURFACE ELEVATION=   163.00

    PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
       13.15                          493.8                         165.63

    RUNOFF ABOVE BASEFLOW OF    .00 CFS
                   1.81 WATERSHED INCHES;     1009 CFS-HRS;       83.4 ACRE-FEET.


 OPERATION RUNOFF    STRUCTURE  2
         OUTPUT HYDROGRAPH=  6       AREA=    .20 SQ MI
         INPUT RUNOFF CURVE= 80.     TIME OF CONCENTRATION=   .75 HOURS
         COMPUTED INTERNAL TIME INCREMENT =  .1000 HOURS

    PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
       12.48                          119.0                         (RUNOFF)

    RUNOFF ABOVE BASEFLOW OF    .00 CFS
                   1.60 WATERSHED INCHES;      206 CFS-HRS;       17.0 ACRE-FEET.


 OPERATION ADDHYD    STRUCTURE  2
1
 TR20 ---------------------------------------------------------------------------
          CROOKED CREEK:  DRAINAGE AREA TO 5 - 9' x 5' RCB'S, USING      VERSION
 10/25/**              100YR, 24HR RNFL FROM SCS TR20 PROGRAM              10/01/90
 11:23:32                            PASS   1                             PAGE   5

         INPUT HYDROGRAPHS 5,6     OUTPUT HYDROGRAPH 7

    PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
       13.11                          531.8                         155.48

    RUNOFF ABOVE BASEFLOW OF    .00 CFS
                   1.77 WATERSHED INCHES;     1215 CFS-HRS;      100.4 ACRE-FEET.
```

```
 OPERATION RESVOR   STRUCTURE  2
         INPUT HYDROGRAPH 7        OUTPUT HYDROGRAPH 5
         SURFACE ELEVATION=   154.00

      PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
         13.11                          529.8                        155.47
         23.32                           23.7                        154.13

      RUNOFF ABOVE BASEFLOW OF     .00 CFS
                     1.77 WATERSHED INCHES;    1215 CFS-HRS;     100.4 ACRE-FEET.


 EXECUTIVE CONTROL ENDCMP    COMPUTATIONS COMPLETED FOR PASS   1             980
1
 TR20 ---------------------------------------------------------------------------
           CROOKED CREEK:  DRAINAGE AREA TO 5 - 9' x 5' RCB'S, USING     VERSION
 10/25/**              100YR, 24HR RNFL FROM SCS TR20 PROGRAM             10/01/90
 11:23:32                          PASS   2                               PAGE   6


 EXECUTIVE CONTROL COMPUT    FROM XSECTION   1  TO STRUCTURE  2              850
    STARTING TIME =   .00          RAIN DEPTH =  4.55       RAIN DURATION=  1.00
    ANT. MOIST. COND. = 2          MAIN TIME INCREMENT =   .50 HOURS
    ALTERNATE NO.= 2               STORM NO.= 2             RAIN TABLE NO.= 2


 OPERATION RUNOFF   XSECTION   1
         OUTPUT HYDROGRAPH=  5        AREA=    .56 SQ MI
         INPUT RUNOFF CURVE= 86.      TIME OF CONCENTRATION=   .84 HOURS
         COMPUTED INTERNAL TIME INCREMENT =  .0916 HOURS

      PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
         12.49                          633.8                        (RUNOFF)

      RUNOFF ABOVE BASEFLOW OF     .00 CFS
                     3.13 WATERSHED INCHES;    1141 CFS-HRS;      94.3 ACRE-FEET.


 OPERATION REACH    XSECTION   1
         INPUT HYDROGRAPH 5        OUTPUT HYDROGRAPH 4
         CHANNEL LENGTH =  6810.00 FT
         INPUT = RATING CURVE REPRESENTATIVE OF REACH

 COEFFICIENTS USED IN ROUTING RELATED TO CROSS SECTION AREA,  X=   .66 M= 1.43
 MODIFIED ATT-KIN ROUTING COEFFICIENT =  .99     PEAK TRAVEL TIME =    .50 HOURS

      PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
         12.99                          630.9                        172.65

      RUNOFF ABOVE BASEFLOW OF     .00 CFS
                     3.05 WATERSHED INCHES;    1110 CFS-HRS;      91.7 ACRE-FEET.


 OPERATION RUNOFF   XSECTION   2
         OUTPUT HYDROGRAPH=  5        AREA=    .30 SQ MI
         INPUT RUNOFF CURVE= 75.      TIME OF CONCENTRATION=   .85 HOURS
         COMPUTED INTERNAL TIME INCREMENT =  .0927 HOURS

      PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
         12.52                          231.2                        (RUNOFF)

      RUNOFF ABOVE BASEFLOW OF     .00 CFS
                     2.14 WATERSHED INCHES;     418 CFS-HRS;      34.5 ACRE-FEET.


 OPERATION REACH    XSECTION   2
```

```
        INPUT HYDROGRAPH 5        OUTPUT HYDROGRAPH 6
        CHANNEL LENGTH =  5650.00 FT
        INPUT = RATING CURVE REPRESENTATIVE OF REACH
1
 TR20 ---------------------------------------------------------------------------
          CROOKED CREEK:  DRAINAGE AREA TO 5 - 9' x 5' RCB'S, USING     VERSION
 10/25/**              100YR, 24HR RNFL FROM SCS TR20 PROGRAM            10/01/90
 11:23:32                        PASS   2                               PAGE   7

 COEFFICIENTS USED IN ROUTING RELATED TO CROSS SECTION AREA,  X=  1.05 M= 1.40
 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00     PEAK TRAVEL TIME =    .00 HOURS

 *** WARNING - ROUTING COEFFICIENT (C) EQUALS 1.0,
               CONSIDER SMALLER MAIN TIME INCREMENT FOR XSECTION   2.       ***

    PEAK TIME(HRS)             PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
       12.52                         231.2                        172.37

    RUNOFF ABOVE BASEFLOW OF    .00 CFS
                   2.14 WATERSHED INCHES;     418 CFS-HRS;      34.5 ACRE-FEET.


 OPERATION ADDHYD   STRUCTURE  1
        INPUT HYDROGRAPHS 4,6     OUTPUT HYDROGRAPH 7

    PEAK TIME(HRS)             PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
       12.92                         747.1                        166.29

    RUNOFF ABOVE BASEFLOW OF    .00 CFS
                   2.71 WATERSHED INCHES;    1516 CFS-HRS;     125.2 ACRE-FEET.


 OPERATION RESVOR   STRUCTURE  1
        INPUT HYDROGRAPH 7        OUTPUT HYDROGRAPH 5
        SURFACE ELEVATION=   163.00

    PEAK TIME(HRS)             PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
       13.02                         738.3                        166.27

    RUNOFF ABOVE BASEFLOW OF    .00 CFS
                   2.71 WATERSHED INCHES;    1515 CFS-HRS;     125.2 ACRE-FEET.


 OPERATION RUNOFF   STRUCTURE  2
        OUTPUT HYDROGRAPH=  6       AREA=    .20 SQ MI
        INPUT RUNOFF CURVE= 80.     TIME OF CONCENTRATION=    .75 HOURS
        COMPUTED INTERNAL TIME INCREMENT =  .1000 HOURS

    PEAK TIME(HRS)             PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
       12.47                         184.5                        (RUNOFF)

    RUNOFF ABOVE BASEFLOW OF    .00 CFS
                   2.47 WATERSHED INCHES;     319 CFS-HRS;      26.3 ACRE-FEET.


 OPERATION ADDHYD   STRUCTURE  2
1
 TR20 ---------------------------------------------------------------------------
          CROOKED CREEK:  DRAINAGE AREA TO 5 - 9' x 5' RCB'S, USING     VERSION
 10/25/**              100YR, 24HR RNFL FROM SCS TR20 PROGRAM            10/01/90
 11:23:32                        PASS   2                               PAGE   8

        INPUT HYDROGRAPHS 5,6     OUTPUT HYDROGRAPH 7

    PEAK TIME(HRS)             PEAK DISCHARGE(CFS)          PEAK ELEVATION(FEET)
       12.95                         813.4                        155.97
```

```
    RUNOFF ABOVE BASEFLOW OF    .00 CFS
                  2.67 WATERSHED INCHES;    1834 CFS-HRS;     151.6 ACRE-FEET.


  OPERATION RESVOR   STRUCTURE  2
          INPUT HYDROGRAPH 7         OUTPUT HYDROGRAPH 5
          SURFACE ELEVATION=   154.00

     PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
        12.96                          812.1                        155.97
        17.34                           64.4                        154.34
        18.39                           56.5                        154.30
        19.39                           49.9                        154.26
        20.40                           43.2                        154.23
        21.45                           38.5                        154.20
        22.48                           36.7                        154.19
        23.48                           35.5                        154.19
        24.32                           31.8                        154.17
        26.38                            5.0                        154.03

     RUNOFF ABOVE BASEFLOW OF    .00 CFS
                  2.67 WATERSHED INCHES;    1834 CFS-HRS;     151.6 ACRE-FEET.


  EXECUTIVE CONTROL ENDCMP    COMPUTATIONS COMPLETED FOR PASS   2             980
  1
  TR20 ---------------------------------------------------------------------------
            CROOKED CREEK:  DRAINAGE AREA TO 5 - 9' x 5' RCB'S, USING      VERSION
  10/25/**            100YR, 24HR RNFL FROM SCS TR20 PROGRAM              10/01/90
  11:23:32                          PASS   3                              PAGE   9


  EXECUTIVE CONTROL COMPUT    FROM XSECTION   1  TO STRUCTURE  2             850
     STARTING TIME =   .00          RAIN DEPTH =  5.25       RAIN DURATION=  1.00
     ANT. MOIST. COND. = 2          MAIN TIME INCREMENT =    .50 HOURS
     ALTERNATE NO.= 3               STORM NO.= 3             RAIN TABLE NO.= 2

  OPERATION RUNOFF   XSECTION   1
          OUTPUT HYDROGRAPH=  5        AREA=     .56 SQ MI
          INPUT RUNOFF CURVE= 86.      TIME OF CONCENTRATION=    .84 HOURS
          COMPUTED INTERNAL TIME INCREMENT =  .0916 HOURS

     PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
        12.49                          768.2                        (RUNOFF)

     RUNOFF ABOVE BASEFLOW OF    .00 CFS
                  3.81 WATERSHED INCHES;    1387 CFS-HRS;     114.6 ACRE-FEET.


  OPERATION REACH    XSECTION   1
          INPUT HYDROGRAPH 5         OUTPUT HYDROGRAPH 4
          CHANNEL LENGTH =  6810.00 FT
          INPUT = RATING CURVE REPRESENTATIVE OF REACH

  COEFFICIENTS USED IN ROUTING RELATED TO CROSS SECTION AREA,  X=    .68 M= 1.42
  MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00      PEAK TRAVEL TIME =     .00 HOURS

  *** WARNING - ROUTING COEFFICIENT (C) EQUALS 1.0,
                CONSIDER SMALLER MAIN TIME INCREMENT FOR XSECTION   1.        ***

     PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
        12.49                          768.2                        173.02

     RUNOFF ABOVE BASEFLOW OF    .00 CFS
                  3.81 WATERSHED INCHES;    1387 CFS-HRS;     114.6 ACRE-FEET.
```

OPERATION RUNOFF XSECTION 2
OUTPUT HYDROGRAPH= 5 AREA= .30 SQ MI
INPUT RUNOFF CURVE= 75. TIME OF CONCENTRATION= .85 HOURS
COMPUTED INTERNAL TIME INCREMENT = .0927 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.51	294.7	(RUNOFF)

RUNOFF ABOVE BASEFLOW OF .00 CFS
2.72 WATERSHED INCHES; 530 CFS-HRS; 43.8 ACRE-FEET.

OPERATION REACH XSECTION 2
1
TR20 ----------

CROOKED CREEK: DRAINAGE AREA TO 5 - 9' x 5' RCB'S, USING		VERSION
10/25/**	100YR, 24HR RNFL FROM SCS TR20 PROGRAM	10/01/90
11:23:32	PASS 3	PAGE 10

INPUT HYDROGRAPH 5 OUTPUT HYDROGRAPH 6
CHANNEL LENGTH = 5650.00 FT
INPUT = RATING CURVE REPRESENTATIVE OF REACH

COEFFICIENTS USED IN ROUTING RELATED TO CROSS SECTION AREA, X= 1.08 M= 1.40
MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00 PEAK TRAVEL TIME = .00 HOURS

*** WARNING - ROUTING COEFFICIENT (C) EQUALS 1.0,
CONSIDER SMALLER MAIN TIME INCREMENT FOR XSECTION 2. ***

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.51	294.7	172.67

RUNOFF ABOVE BASEFLOW OF .00 CFS
2.72 WATERSHED INCHES; 530 CFS-HRS; 43.8 ACRE-FEET.

OPERATION ADDHYD STRUCTURE 1
INPUT HYDROGRAPHS 4,6 OUTPUT HYDROGRAPH 7

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.50	1062.6	166.98

RUNOFF ABOVE BASEFLOW OF .00 CFS
3.43 WATERSHED INCHES; 1917 CFS-HRS; 158.4 ACRE-FEET.

OPERATION RESVOR STRUCTURE 1
INPUT HYDROGRAPH 7 OUTPUT HYDROGRAPH 5
SURFACE ELEVATION= 163.00

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.57	999.4	166.85

RUNOFF ABOVE BASEFLOW OF .00 CFS
3.34 WATERSHED INCHES; 1865 CFS-HRS; 154.1 ACRE-FEET.

OPERATION RUNOFF STRUCTURE 2
OUTPUT HYDROGRAPH= 6 AREA= .20 SQ MI
INPUT RUNOFF CURVE= 80. TIME OF CONCENTRATION= .75 HOURS
COMPUTED INTERNAL TIME INCREMENT = .1000 HOURS

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
12.47	228.9	(RUNOFF)

RUNOFF ABOVE BASEFLOW OF .00 CFS
3.07 WATERSHED INCHES; 396 CFS-HRS; 32.8 ACRE-FEET.

```
1
 TR20 ---------------------------------------------------------------------------
          CROOKED CREEK:  DRAINAGE AREA TO 5 - 9' x 5' RCB'S, USING      VERSION
 10/25/**            100YR, 24HR RNFL FROM SCS TR20 PROGRAM              10/01/90
 11:23:32                          PASS   3                              PAGE  11


 OPERATION ADDHYD   STRUCTURE  2
         INPUT HYDROGRAPHS 5,6     OUTPUT HYDROGRAPH 7

    PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
       12.55                         1223.7                        156.56

    RUNOFF ABOVE BASEFLOW OF    .00 CFS
                   3.29 WATERSHED INCHES;    2261 CFS-HRS;     186.9 ACRE-FEET.


 OPERATION RESVOR   STRUCTURE  2
         INPUT HYDROGRAPH 7          OUTPUT HYDROGRAPH 5
         SURFACE ELEVATION=   154.00

    PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
       12.56                         1209.8                        156.54
       14.84                          135.1                        154.61
       15.92                          107.8                        154.53
       16.95                           88.6                        154.47
       17.97                           78.6                        154.42
       18.97                           70.3                        154.37
       19.97                           61.9                        154.33
       20.98                           55.1                        154.29
       21.99                           52.4                        154.28
       22.99                           50.3                        154.27

    RUNOFF ABOVE BASEFLOW OF    .00 CFS
                   3.29 WATERSHED INCHES;    2261 CFS-HRS;     186.9 ACRE-FEET.


 EXECUTIVE CONTROL ENDCMP    COMPUTATIONS COMPLETED FOR PASS   3            980
1
 TR20 ---------------------------------------------------------------------------
          CROOKED CREEK:  DRAINAGE AREA TO 5 - 9' x 5' RCB'S, USING      VERSION
 10/25/**            100YR, 24HR RNFL FROM SCS TR20 PROGRAM              10/01/90
 11:23:32                          PASS   4                              PAGE  12


 EXECUTIVE CONTROL COMPUT    FROM XSECTION   1  TO STRUCTURE  2             850
    STARTING TIME =   .00         RAIN DEPTH =  7.80       RAIN DURATION=  1.00
    ANT. MOIST. COND. = 2         MAIN TIME INCREMENT =    .50 HOURS
    ALTERNATE NO.= 4              STORM NO.= 4             RAIN TABLE NO.= 2


 OPERATION RUNOFF   XSECTION   1
         OUTPUT HYDROGRAPH=  5       AREA=    .56 SQ MI
         INPUT RUNOFF CURVE= 86.     TIME OF CONCENTRATION=    .84 HOURS
         COMPUTED INTERNAL TIME INCREMENT =  .0916 HOURS

    PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
       12.48                         1239.8                        (RUNOFF)

    RUNOFF ABOVE BASEFLOW OF    .00 CFS
                   6.29 WATERSHED INCHES;    2289 CFS-HRS;     189.2 ACRE-FEET.


 OPERATION REACH    XSECTION   1
         INPUT HYDROGRAPH 5        OUTPUT HYDROGRAPH 4
         CHANNEL LENGTH =  6810.00 FT
```

```
        INPUT = RATING CURVE REPRESENTATIVE OF REACH

 COEFFICIENTS USED IN ROUTING RELATED TO CROSS SECTION AREA,  X=   .74 M= 1.40
 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00      PEAK TRAVEL TIME =    .00 HOURS

 *** WARNING - ROUTING COEFFICIENT (C) EQUALS 1.0,
               CONSIDER SMALLER MAIN TIME INCREMENT FOR XSECTION   1.      ***

    PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
       12.48                         1239.8                        174.07

    RUNOFF ABOVE BASEFLOW OF    .00 CFS
                   6.29 WATERSHED INCHES;     2289 CFS-HRS;     189.2 ACRE-FEET.


 OPERATION RUNOFF   XSECTION   2
         OUTPUT HYDROGRAPH=  5       AREA=    .30 SQ MI
         INPUT RUNOFF CURVE= 75.     TIME OF CONCENTRATION=   .85 HOURS
         COMPUTED INTERNAL TIME INCREMENT =  .0927 HOURS

    PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
       12.50                         541.7                         (RUNOFF)

    RUNOFF ABOVE BASEFLOW OF    .00 CFS
                   4.98 WATERSHED INCHES;     971 CFS-HRS;      80.3 ACRE-FEET.


 OPERATION REACH    XSECTION   2
1
 TR20 ---------------------------------------------------------------------------
         CROOKED CREEK:  DRAINAGE AREA TO 5 - 9' x 5' RCB'S, USING     VERSION
 10/25/**              100YR, 24HR RNFL FROM SCS TR20 PROGRAM          10/01/90
 11:23:32                          PASS   4                          PAGE  13

         INPUT HYDROGRAPH 5        OUTPUT HYDROGRAPH 6
         CHANNEL LENGTH =  5650.00 FT
         INPUT = RATING CURVE REPRESENTATIVE OF REACH

 COEFFICIENTS USED IN ROUTING RELATED TO CROSS SECTION AREA,  X=  1.15 M= 1.38
 MODIFIED ATT-KIN ROUTING COEFFICIENT = 1.00      PEAK TRAVEL TIME =    .00 HOURS

 *** WARNING - ROUTING COEFFICIENT (C) EQUALS 1.0,
               CONSIDER SMALLER MAIN TIME INCREMENT FOR XSECTION   2.      ***

    PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
       12.50                         541.7                         173.57

    RUNOFF ABOVE BASEFLOW OF    .00 CFS
                   4.98 WATERSHED INCHES;     971 CFS-HRS;      80.3 ACRE-FEET.


 OPERATION ADDHYD   STRUCTURE  1
         INPUT HYDROGRAPHS 4,6     OUTPUT HYDROGRAPH 7

    PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
       12.49                        1781.2                         168.20

    RUNOFF ABOVE BASEFLOW OF    .00 CFS
                   5.83 WATERSHED INCHES;    3260 CFS-HRS;     269.4 ACRE-FEET.


 OPERATION RESVOR   STRUCTURE  1
         INPUT HYDROGRAPH 7        OUTPUT HYDROGRAPH 5
         SURFACE ELEVATION=   163.00

    PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
       12.55                        1720.5                         168.11
```

```
    RUNOFF ABOVE BASEFLOW OF    .00 CFS
                  5.68 WATERSHED INCHES;     3177 CFS-HRS;      262.6 ACRE-FEET.

 OPERATION RUNOFF   STRUCTURE  2
         OUTPUT HYDROGRAPH=  6       AREA=     .20 SQ MI
         INPUT RUNOFF CURVE= 80.     TIME OF CONCENTRATION=    .75 HOURS
         COMPUTED INTERNAL TIME INCREMENT =  .1000 HOURS

    PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
       12.46                          394.4                        (RUNOFF)

    RUNOFF ABOVE BASEFLOW OF    .00 CFS
                  5.38 WATERSHED INCHES;      694 CFS-HRS;       57.4 ACRE-FEET.
1
 TR20 ---------------------------------------------------------------------------
          CROOKED CREEK:  DRAINAGE AREA TO 5 - 9' x 5' RCB'S, USING     VERSION
 10/25/**            100YR, 24HR RNFL FROM SCS TR20 PROGRAM              10/01/90
 11:23:32                        PASS   4                               PAGE  14


 OPERATION ADDHYD   STRUCTURE  2
         INPUT HYDROGRAPHS 5,6     OUTPUT HYDROGRAPH 7

    PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
       12.53                         2109.0                       160.86

    RUNOFF ABOVE BASEFLOW OF    .00 CFS
                  5.63 WATERSHED INCHES;     3871 CFS-HRS;      319.9 ACRE-FEET.


 OPERATION RESVOR   STRUCTURE  2
         INPUT HYDROGRAPH 7        OUTPUT HYDROGRAPH 5
         SURFACE ELEVATION=   154.00

    PEAK TIME(HRS)              PEAK DISCHARGE(CFS)           PEAK ELEVATION(FEET)
       12.63                         1924.7                       160.35
       13.97                          657.3                       155.70
       14.99                          477.4                       155.37
       16.00                          417.5                       155.26
       17.00                          372.8                       155.17
       18.00                          344.6                       155.12
       19.00                          318.5                       155.07
       20.00                          293.5                       155.02
       21.00                          272.1                       154.97
       22.00                          257.8                       154.93

    RUNOFF ABOVE BASEFLOW OF    .00 CFS
                  5.63 WATERSHED INCHES;     3871 CFS-HRS;      319.9 ACRE-FEET.


 EXECUTIVE CONTROL ENDCMP    COMPUTATIONS COMPLETED FOR PASS   4            980
1
 TR20 ---------------------------------------------------------------------------
          CROOKED CREEK:  DRAINAGE AREA TO 5 - 9' x 5' RCB'S, USING     VERSION
 10/25/**            100YR, 24HR RNFL FROM SCS TR20 PROGRAM              10/01/90
 11:23:32                                                                PAGE  15


                              SUMMARY TABLE 1
                              ---------------

    SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
    A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
 F-FLAT TOP HYDROGRAPH    T-TRUNCATED HYDROGRAPH    R-RISING TRUNCATED HYDROGRAPH

 XSECTION/  STANDARD                                      PEAK DISCHARGE
 STRUCTURE   CONTROL    DRAINAGE   RUNOFF   ---------------------------------------
```

ID	OPERATION	AREA (SQ MI)	AMOUNT (IN)	ELEVATION (FT)	TIME (HR)	RATE (CFS)	RATE (CSM)

RAINFALL OF 3.48 inches AND 24.00 hr DURATION, BEGINS AT .0 hrs.
RAINTABLE NUMBER 2, AMC 2
MAIN TIME INCREMENT .50 HOURS

ALTERNATE 1 STORM 1

XSECTION	1	RUNOFF	.56	2.15	---	12.50	437	780.4
XSECTION	1	REACH	.56	2.03	171.98	13.01	423	755.4
XSECTION	2	RUNOFF	.30	1.32	---	12.53	139	463.3
XSECTION	2	REACH	.30	1.24	171.83	13.03	138	460.0
STRUCTURE	1	ADDHYD	.87	1.76	165.82	13.02	561	644.8
STRUCTURE	1	RESVOR	.87	1.81	165.63	13.15	494	567.8
STRUCTURE	2	RUNOFF	.20	1.60	---	12.48	119	595.0
STRUCTURE	2	ADDHYD	1.07	1.77	155.48	13.11	532	497.2
STRUCTURE	2	RESVOR	1.07	1.77	155.47	13.11	530	495.3

RAINFALL OF 4.55 inches AND 24.00 hr DURATION, BEGINS AT .0 hrs.

ALTERNATE 2 STORM 2

XSECTION	1	RUNOFF	.56	3.13	---	12.49	634	1132.1
XSECTION	1	REACH	.56	3.05	172.65	12.99	631	1126.8
XSECTION	2	RUNOFF	.30	2.14	---	12.52	231	770.0
XSECTION	2	REACH	.30	2.14	172.37	12.52	231	770.0
STRUCTURE	1	ADDHYD	.87	2.71	166.29	12.92	747	858.6
STRUCTURE	1	RESVOR	.87	2.71	166.27	13.02	738	848.3
STRUCTURE	2	RUNOFF	.20	2.47	---	12.47	185	925.0
STRUCTURE	2	ADDHYD	1.07	2.67	155.97	12.95	813	759.8
STRUCTURE	2	RESVOR	1.07	2.67	155.97	12.96	812	758.9

RAINFALL OF 5.25 inches AND 24.00 hr DURATION, BEGINS AT .0 hrs.

ALTERNATE 3 STORM 3

XSECTION	1	RUNOFF	.56	3.81	---	12.49	768	1371.4

1

SUMMARY TABLE 1

SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL IN ORDER PERFORMED.
A CHARACTER FOLLOWING THE PEAK DISCHARGE TIME AND RATE (CFS) INDICATES:
F-FLAT TOP HYDROGRAPH T-TRUNCATED HYDROGRAPH R-RISING TRUNCATED HYDROGRAPH

XSECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RUNOFF AMOUNT (IN)	PEAK DISCHARGE ELEVATION (FT)	TIME (HR)	RATE (CFS)	RATE (CSM)

ALTERNATE 3 STORM 3

XSECTION	1	REACH	.56	3.81	173.02	12.49	768	1371.4
XSECTION	2	RUNOFF	.30	2.72	---	12.51	295	983.3
XSECTION	2	REACH	.30	2.72	172.67	12.51	295	983.3
STRUCTURE	1	ADDHYD	.87	3.43	166.98	12.50	1063	1221.8
STRUCTURE	1	RESVOR	.87	3.34	166.85	12.57	999	1148.3

```
STRUCTURE  2  RUNOFF      .20     3.07        ---     12.47      229   1145.0
STRUCTURE  2  ADDHYD     1.07     3.29     156.56     12.55     1224   1143.9
STRUCTURE  2  RESVOR     1.07     3.29     156.54     12.56     1210   1130.8

RAINFALL OF   7.80 inches AND  24.00 hr DURATION, BEGINS AT    .0 hrs.

   ALTERNATE    4   STORM    4
   ----------------------------
XSECTION   1  RUNOFF      .56     6.29        ---     12.48     1240   2214.3
XSECTION   1  REACH       .56     6.29     174.07     12.48     1240   2214.3
XSECTION   2  RUNOFF      .30     4.98        ---     12.50      542   1806.7
XSECTION   2  REACH       .30     4.98     173.57     12.50      542   1806.7
STRUCTURE  1  ADDHYD      .87     5.83     168.20     12.49     1781   2047.1

STRUCTURE  1  RESVOR      .87     5.68     168.11     12.55     1721   1978.2
STRUCTURE  2  RUNOFF      .20     5.38        ---     12.46      394   1970.0
STRUCTURE  2  ADDHYD     1.07     5.63     160.86     12.53     2109   1971.0
STRUCTURE  2  RESVOR     1.07     5.63     160.35     12.63     1925   1799.1
1
TR20 ---------------------------------------------------------------------------
          CROOKED CREEK:  DRAINAGE AREA TO 5 - 9' x 5' RCB'S, USING      VERSION
10/25/**                  100YR, 24HR RNFL FROM SCS TR20 PROGRAM          10/01/90
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                              SUMMARY TABLE 2
                              ---------------
                 MODIFIED ATT-KIN REACH ROUTING IN ORDER PERFORMED.
   QUESTION MARK (?) AFTER: OUTFLOW PEAK - MAX. NUMBER ROUTING ITERATIONS USED;
                            ATT-KIN COEFF - VALUE OUTSIDE ACCEPTABLE LIMITS.

                      HYDROGRAPH INFORMATION          ROUTING PARAMETERS
                      ----------------------   ------------------------------
                FLOOD    INFLOW       OUTFLOW     Q-A EQ.                PEAK  ATT-
XSEC REACH      PLAIN  ----------   ----------  ----------  LENGTH  RATIO  KIN
 ID  LENGTH    LENGTH  PEAK  TIME   PEAK  TIME  COEFF POWER FACTOR  Q/I   COEFF
      (FT)      (FT)  (CFS) (HR)   (CFS) (HR)   (X)    (M)   (K*)  (Q*)   (C)


BASEFLOW IS    .0 CFS

   ALTERNATE    1   STORM    1
   ----------------------------
  1   6810          437  12.5    423  13.0   .62   1.45   .116   .968   .94?
  2   5650          139  12.5    138  13.0  1.00   1.42   .098   .993   .99?

   ALTERNATE    2   STORM    2
   ----------------------------
  1   6810          634  12.5    631  13.0   .66   1.43   .102   .995   .99?
  2   5650          231  12.5    231  12.5  1.05   1.40   .086  1.000  1.00?

   ALTERNATE    3   STORM    3
   ----------------------------
  1   6810          768  12.5    768  12.5   .68   1.42   .095  1.000  1.00?
  2   5650          295  12.5    295  12.5  1.08   1.40   .081  1.000  1.00?

   ALTERNATE    4   STORM    4
   ----------------------------
  1   6810         1239  12.5   1239  12.5   .74   1.40   .079  1.000  1.00?
  2   5650          542  12.5    542  12.5  1.15   1.38   .067  1.000  1.00?
1
TR20 ---------------------------------------------------------------------------
          CROOKED CREEK:  DRAINAGE AREA TO 5 - 9' x 5' RCB'S, USING      VERSION
10/25/**                  100YR, 24HR RNFL FROM SCS TR20 PROGRAM          10/01/90
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                              SUMMARY TABLE 3
```

STORM DISCHARGES (CFS) AT XSECTIONS AND STRUCTURES FOR ALL ALTERNATES

XSECTION/ STRUCTURE ID		DRAINAGE AREA (SQ MI)	STORM NUMBERS..... 1	2	3	4
STRUCTURE	2	1.07				
ALTERNATE	1		530	*********	*********	*********
ALTERNATE	2		*********	812	*********	*********
ALTERNATE	3		*********	*********	1210	*********
ALTERNATE	4		*********	*********	*********	1925
STRUCTURE	1	.87				
ALTERNATE	1		494	*********	*********	*********
ALTERNATE	2		*********	738	*********	*********
ALTERNATE	3		*********	*********	999	*********
ALTERNATE	4		*********	*********	*********	1721
XSECTION	1	.56				
ALTERNATE	1		423	*********	*********	*********
ALTERNATE	2		*********	631	*********	*********
ALTERNATE	3		*********	*********	768	*********
ALTERNATE	4		*********	*********	*********	1240
XSECTION	2	.30				
ALTERNATE	1		138	*********	*********	*********
ALTERNATE	2		*********	231	*********	*********
ALTERNATE	3		*********	*********	295	*********
ALTERNATE	4		*********	*********	*********	542

END OF 1 JOBS IN THIS RUN

1

SCS TR-20, VERSION 10/01/90

FILES

INPUT = d:\tr-20\crooked.t20

OUTPUT = d:\tr-20\crooked.out , DATED 10/25/**,11:23:32

FILES GENERATED - DATED 10/25/**,11:23:32

NONE!

*** TR-20 RUN COMPLETED ***

Appendix G

HEC - RAS Output

HEC-RAS Plan: Imported Pla Profile: 100-Year

River	Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Courts/Beacon Hi	Reach-1	29	1240.00	165.00	170.45		171.46	0.005693	9.27	185.77	62.96	0.73
Courts/Beacon Hi	Reach-1	28	1240.00	164.00	169.45		170.09	0.003199	6.91	222.85	70.23	0.54
Courts/Beacon Hi	Reach-1	27	1240.00	163.00	168.11		169.04	0.005435	8.65	186.21	59.90	0.71
Courts/Beacon Hi	Reach-1	26	1781.00	160.00	166.68		167.54	0.003599	8.07	273.14	70.78	0.60
Courts/Beacon Hi	Reach-1	25	1781.00	159.00	165.90		166.57	0.002599	7.45	317.95	76.16	0.52
Courts/Beacon Hi	Reach-1	24	1781.00	158.00	165.37		165.89	0.001784	6.34	386.10	123.30	0.43
Courts/Beacon Hi	Reach-1	23	1781.00	157.00	164.90		165.37	0.001568	6.37	426.89	129.57	0.41
Courts/Beacon Hi	Reach-1	22	1781.00	156.00	164.64		164.94	0.001026	5.72	600.62	202.65	0.34
Courts/Beacon Hi	Reach-1	21	1781.00	155.00	164.37		164.64	0.000941	5.54	527.60	115.00	0.33
Courts/Beacon Hi	Reach-1	20	1781.00	154.50	164.20		164.42	0.000514	4.26	551.52	84.00	0.24
Courts/Beacon Hi	Reach-1	19	1781.00	154.00	164.24		164.31	0.000154	2.49	994.24	129.00	0.14
Courts/Beacon Hi	Reach-1	18	1781.00	154.07	164.11		164.26	0.000527	3.26	658.40	148.00	0.18
Courts/Beacon Hi	Reach-1	17	1781.00	154.07	164.08	157.71	164.25	0.000306	3.51	632.90	148.00	0.20
Courts/Beacon Hi	Reach-1	16.5	Bridge									
Courts/Beacon Hi	Reach-1	16	1781.00	153.75	163.63		163.83	0.000341	3.66	582.24	148.00	0.21
Courts/Beacon Hi	Reach-1	15	1781.00	153.75	163.63		163.82	0.000165	3.58	602.52	148.00	0.20
Courts/Beacon Hi	Reach-1	14	1781.00	152.00	163.67		163.77	0.000056	2.68	1052.14	226.00	0.14
Courts/Beacon Hi	Reach-1	13	2109.00	152.00	163.69		163.74	0.000029	1.93	1552.60	205.00	0.10
Courts/Beacon Hi	Reach-1	12	2109.00	152.00	163.71		163.73	0.000010	1.15	2116.02	233.39	0.06
Courts/Beacon Hi	Reach-1	11	2109.00	152.00	163.71		163.73	0.000010	1.12	2161.32	238.00	0.06
Courts/Beacon Hi	Reach-1	10	2109.00	152.00	163.67		163.72	0.000029	1.92	1424.64	173.00	0.10
Courts/Beacon Hi	Reach-1	9	2109.00	152.00	163.65		163.72	0.000037	2.18	1297.85	158.00	0.12
Courts/Beacon Hi	Reach-1	8	2109.00	152.00	163.67		163.69	0.000015	1.38	1855.00	213.00	0.07
Courts/Beacon Hi	Reach-1	7	2109.00	152.00	163.66		163.69	0.000017	1.47	1825.74	212.00	0.08
Courts/Beacon Hi	Reach-1	6	2109.00	154.61	163.57		163.67	0.000306	3.03	1106.55	232.00	0.18
Courts/Beacon Hi	Reach-1	5	2109.00	151.76	163.59		163.63	0.000111	2.07	1582.48	290.00	0.11
Courts/Beacon Hi	Reach-1	4	2109.00	149.96	160.42		162.89	0.014653	12.63	166.96	17.00	0.71
Courts/Beacon Hi	Reach-1	3	2109.00	149.96	160.39	158.41	162.88	0.005762	12.66	166.54	17.00	0.71
Courts/Beacon Hi	Reach-1	2.5	Bridge									
Courts/Beacon Hi	Reach-1	2	2109.00	149.96	158.41	158.41	162.32	0.010458	15.88	132.80	17.00	1.00
Courts/Beacon Hi	Reach-1	1	2109.00	149.96	158.41	158.41	162.32	0.010458	15.88	132.80	17.00	1.00
Dmg Ditch	Reach-1	70	26.90	186.00	186.83		186.94	0.008233	2.63	10.24	14.58	0.55
Dmg Ditch	Reach-1	68	26.90	184.00	184.73	184.57	184.87	0.013230	3.08	8.73	14.00	0.69
Dmg Ditch	Reach-1	66	26.90	182.00	182.87		182.97	0.007096	2.50	10.76	14.78	0.52
Dmg Ditch	Reach-1	64	26.90	180.00	180.67	180.57	180.85	0.017258	3.37	7.99	13.71	0.78
Dmg Ditch	Reach-1	62	26.90	178.00	178.93	178.57	179.01	0.005544	2.30	11.70	15.12	0.46
Dmg Ditch	Reach-1	60	26.90	176.00	176.58	176.58	176.83	0.029775	4.03	6.67	13.17	1.00
Dmg Ditch	Reach-1	54	53.70	173.00	174.87	174.09	174.92	0.002221	1.77	30.29	29.45	0.31
Dmg Ditch	Reach-1	52	53.70	172.70	173.66	173.56	173.82	0.018457	3.30	16.27	30.70	0.80
Dmg Ditch	Reach-1	50	53.70	170.00	172.14	171.48	172.22	0.003783	2.35	22.80	21.36	0.40
RIVER-1	Reach-1	45	1085.00	169.00	174.29		174.43	0.001106	3.06	361.56	162.94	0.30
RIVER-1	Reach-1	40	1085.00	168.00	173.36		173.58	0.001339	3.81	297.29	93.79	0.34