

**REVISED
DRAINAGE PLAN REPORT**

**TOWNE PARC 3RD ADDITION
AND
FUTURE ADDITIONS**

WICHITA, SEDGWICK COUNTY, KANSAS



BAUGHMAN COMPANY, P.A.

SURVEYING & ENGINEERING

316/262-7271 • 315 ELLIS • WICHITA, KANSAS 67211

REVISED AUGUST 21, 1990

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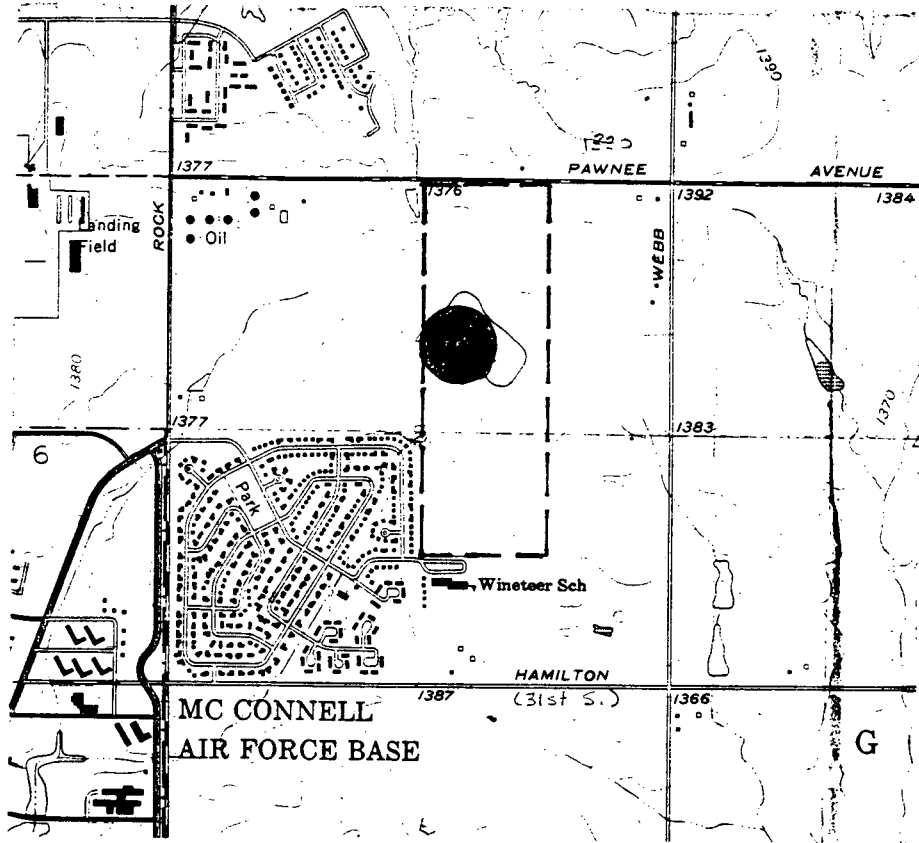
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N



1"=2000'



VICINITY MAP

SECTION I GENERAL

SCOPE AND PURPOSE

This report describes drainage improvements necessary for the immediate development of Towne Parc 3rd Addition and future development of the remainder of the Towne Parc area as shown on the Drainage Plans. Provisions for the effects of this development on the McConnell Air Force Base housing addition to the southwest are also included in this plan.

The report is presented in three Sections: General, Alternate "A", and Alternate "B". The alternates differ mainly in the limits of future development to the east of MAFB property. They also differ somewhat in the ownership and location of the proposed detention pond site, and storm sewers. These alternates are explained more fully within Sections II and III. Copies of Drainage Plans for both alternates are attached to this report.

The critical element of both alternates is the detention pond with its outlet connection to the storm sewer system on MAFB. The pond will reduce peak discharge rates substantially from existing conditions.

It is the intention of this plan that only those portions of the storm sewer system necessary for development of Towne Parc 3rd Addition, including the Detention Pond, be constructed at this time. Detailed requirements for remaining drainage improvements will be addressed in updated Drainage Plans for subsequent plats (Towne Parc 4th Addition, etc.).

AREA DESCRIPTION

The development area as shown on the Drainage Plans generally include the west half of the NE 1/4 of Section 5, and the NW 1/4 of the SE 1/4 of Section 5, Township 28 South, Range 1 East. It is bounded by Pawnee on the north, single-family residential and MAFB housing on the west, Wineteer School on the south, and unplatted agricultural land on the east.

Parts of Towne Parc Addition and Towne Parc 2nd Addition, as indicated on the Drainage Plans, have already been developed. These previously-developed areas drain toward the northwest. The other quadrants of the development area drain toward the northeast, southeast, and southwest, respectively. The area draining toward the southwest drains onto MAFB property.

Most of Towne Parc 3rd Addition will drain into the Detention Pond. Three smaller areas (1.5 acres or less, each) are outside this basin and will drain to existing streets or temporary ditches as indicated on the Drainage Plans. The drainage basins have been redefined since the original plan, dated August 1990, to more accurately represent the area draining to the outlet location for the proposed detention pond.

From earlier discussion with MAFB engineers it was learned that some flooding of base housing occurs during heavy rains under existing conditions. Therefore, special considerations have been made in order to reduce the peak discharge to a rate lower than the existing. This reduction greatly exceeds the normal drainage requirements of the City of Wichita for subdivision development.

METHODS OF ANALYSIS (ALTERNATES "A" AND "B")

Existing drainage patterns were determined from the contour map included in the Drainage Plans. Contours shown are prior to development and are to City of Wichita datum (add 1187.40 to convert to MSL datum). Drainage basins for existing and developed conditions are outlined on the two Drainage Plans.

Runoff volume and peak discharge from the main basin were determined using the U.S. Army Corps of Engineers HEC-1 computer programs (Kinematic Wave Option). The design storm was the 100-year, 24-hour duration rainfall, 7.8" total. The Kinematic Wave Method utilizes the SCS unit hydrograph and runoff curve numbers. Curve numbers used were selected from USDA Technical Release 55, Table 2-2 (Page 5), based on hydrologic soil group "D", as determined from SCS "Soil Survey of Sedgwick County, Kansas". HEC-1 runs were made for existing conditions and developed conditions, including routing through the Detention Pond. Copies of HEC-1 output are included with each Section.

Peak discharges from sub-areas for storm sewer design were determined by the Rational Method ($Q=CIA$). Design storms used were 2-year (initial storm) and 100-year (major storm) with durations equal to times of concentration. C values were selected from Attachment D of the City of Wichita Drainage Criteria Manual (Page 6). Rainfall intensities were derived from the U.S. Weather Service Technical Paper 40 (Page 7).

STORM SEWER DESIGN (Towne Parc 3rd Addition)

Pipes and inlets are sized for the initial storm (Q2), except in cases where no overflow outlet is available. In such cases, pipes and inlets are sized for Q100. The initial storm sizing provides for no curb overtopping and a hydraulic grade profile in the storm sewer pipes at least 0.5' below gutter flow line. The major storm sizing contains the Q100 within public R/W or easements. Pipe sizes (for R.C.P.) and inlet requirements, based on City of Wichita standard 5' inlet, are indicated on the Drainage Plans. Detailed design information will be provided with the storm sewer plans, to be reviewed by the City of Wichita.

STORM SEWER DESIGN (Future Development)

Pipe sizes indicated on the Drainage Plan are estimated. Detailed information will be provided on future drainage plan updates and storm sewer plans.

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

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

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

^{2/} Good cover is protected from grazing and litter and brush cover soil.

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

^{2/} The remaining pervious areas (lawn) are considered to be in good pasture condition for these curve numbers.

^{3/} In some warmer climates of the country a curve number of 95 may be used.

ATTACHMENT D

DRAINAGE CRITERIA

CITY OF WICHITA, KANSAS

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

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

ATTACHMENT A
DRAINAGE CRITERIA MANUAL

CITY OF WICHITA, KANSAS

RAINFALL INTENSITY TABLE FOR SEDGWICK COUNTY, KANSAS

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

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

EXISTING CONDITIONS
HEC-1 OUTPUT

(ALT. A & B)

1

FLOOD HYDROGRAPH PACKAGE HEC-1 (IBM XT 512K VERSION) -FEB 1,1985
U.S. ARMY CORPS OF ENGINEERS, THE HYDROLOGIC ENGINEERING CENTER, 609 SECOND STREET, DAVIS, CA. 95616

THIS HEC-1 VERSION CONTAINS ALL OPTIONS EXCEPT ECONOMICS, AND THE NUMBER OF PLANS ARE REDUCED TO 3

1

HEC-1 INPUT

PAGE 1

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

*** FREE ***

1	ID	EXISTING CONDITION - TOWNE PARC 3rd AND FUTURE ADDITION									
2	ID	100 YR - 24 HR. STORM									
3	ID	A:TP4EX.IN/OUT									
4	ID										
5	IT	10	0	0	145						
6	KK	TRIB-1									
7	KM	COMPUTING RUNOFF HYDROGRAPH FOR THE AREA CONTRIBUTING TO									
8	KM	INLET AT THE NORTHEAST CORNER OF MAFB HOUSING ADDITION									
9	PB	0									
10	IN	60									
11	PC	0.00	0.0585	0.1287	0.126	0.312	0.419	0.566	0.712	0.858	1.053
12	PC	1.297	1.641	3.705	5.811	6.201	6.503	6.747	6.937	7.108	7.250
13	PC	7.371	7.487	7.600	7.703	7.800					
14	BA	0.0431									
15	LS	0	84	0							
16	UD	0.45									
17	ZZ										

1

FLOOD HYDROGRAPH PACKAGE HEC-1 (IBM XT 512K VERSION) -FEB 1,1985
U.S. ARMY CORPS OF ENGINEERS, THE HYDROLOGIC ENGINEERING CENTER, 609 SECOND STREET, DAVIS, CA. 95616

IT HYDROGRAPH TIME DATA
 NMIN 10 MINUTES IN COMPUTATION INTERVAL
 IDATE 1 0 STARTING DATE
 ITIME 0000 STARTING TIME
 NQ 145 NUMBER OF HYDROGRAPH ORDINATES
 NDDATE 2 0 ENDING DATE
 NDTIME 0000 ENDING TIME

COMPUTATION INTERVAL .17 HOURS
 TOTAL TIME BASE 24.00 HOURS

ENGLISH UNITS

6 KK

 | |
 | TRIB-1 |
 | |

COMPUTING RUNOFF HYDROGRAPH FOR THE AREA CONTRIBUTING TO
 INLET AT THE NORTHEAST CORNER OF MAFB HOUSING ADDITION

10 IN TIME DATA FOR INPUT TIME SERIES
 JXMIN 60 TIME INTERVAL IN MINUTES
 JXDATE 1 0 STARTING DATE
 JXTIME 0 STARTING TIME

SUBBASIN RUNOFF DATA

14 BA SUBBASIN CHARACTERISTICS
 TAREA .04 SUBBASIN AREA

PRECIPITATION DATA

9 PB STORM 7.80 BASIN TOTAL PRECIPITATION

11 PI INCREMENTAL PRECIPITATION PATTERN

.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.00	.00	.00	.00	.00	.00	.00	.03	.03
.03	.03	.03	.03	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.03	.03
.03	.03	.03	.03	.04	.04	.04	.04	.04	.04	.04
.06	.06	.06	.06	.06	.06	.06	.34	.34	.34	.34
.34	.34	.35	.35	.35	.35	.35	.35	.35	.07	.07
.07	.07	.07	.07	.05	.05	.05	.05	.05	.05	.05
.04	.04	.04	.04	.04	.04	.03	.03	.03	.03	.03
.03	.03	.03	.03	.03	.03	.03	.03	.03	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02

15 LS SCS LOSS RATE
 STRL .38 INITIAL ABSTRACTION
 CRVNR 84.00 CURVE NUMBER
 RTIMP .00 PERCENT IMPERVIOUS AREA

WARNING *** TIME INTERVAL IS GREATER THAN .29*LAG

UNIT HYDROGRAPH
15 END-OF-PERIOD ORDINATES

8. 27. 39. 35. 24. 13. 8. 5. 3. 2.
1. 1. 0. 0. 0.

HYDROGRAPH AT STATION TRIB-1

DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q		DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
1	0000	1	.00	.00	.00	0.		1	1210	74	.35	.04	.31	44.		
1	0010	2	.01	.01	.00	0.		1	1220	75	.35	.04	.31	46.		
1	0020	3	.01	.01	.00	0.		1	1230	76	.35	.03	.32	48.		
1	0030	4	.01	.01	.00	0.		1	1240	77	.35	.03	.32	50.		
1	0040	5	.01	.01	.00	0.		1	1250	78	.35	.03	.32	51.		
1	0050	6	.01	.01	.00	0.		1	1300	79	.35	.02	.33	52.		
1	0100	7	.01	.01	.00	0.		1	1310	80	.07	.00	.06	51.		
1	0110	8	.01	.01	.00	0.		1	1320	81	.07	.00	.06	44.		
1	0120	9	.01	.01	.00	0.		1	1330	82	.07	.00	.06	34.		
1	0130	10	.01	.01	.00	0.		1	1340	83	.07	.00	.06	25.		
1	0140	11	.01	.01	.00	0.		1	1350	84	.07	.00	.06	19.		
1	0150	12	.01	.01	.00	0.		1	1400	85	.07	.00	.06	15.		
1	0200	13	.01	.01	.00	0.		1	1410	86	.05	.00	.05	13.		
1	0210	14	.00	.00	.00	0.		1	1420	87	.05	.00	.05	12.		
1	0220	15	.00	.00	.00	0.		1	1430	88	.05	.00	.05	10.		
1	0230	16	.00	.00	.00	0.		1	1440	89	.05	.00	.05	9.		
1	0240	17	.00	.00	.00	0.		1	1450	90	.05	.00	.05	9.		
1	0250	18	.00	.00	.00	0.		1	1500	91	.05	.00	.05	8.		
1	0300	19	.00	.00	.00	0.		1	1510	92	.04	.00	.04	8.		
1	0310	20	.03	.03	.00	0.		1	1520	93	.04	.00	.04	8.		
1	0320	21	.03	.03	.00	0.		1	1530	94	.04	.00	.04	7.		
1	0330	22	.03	.03	.00	0.		1	1540	95	.04	.00	.04	7.		
1	0340	23	.03	.03	.00	0.		1	1550	96	.04	.00	.04	7.		
1	0350	24	.03	.03	.00	0.		1	1600	97	.04	.00	.04	7.		
1	0400	25	.03	.03	.00	0.		1	1610	98	.03	.00	.03	6.		
1	0410	26	.02	.02	.00	0.		1	1620	99	.03	.00	.03	6.		
1	0420	27	.02	.02	.00	0.		1	1630	100	.03	.00	.03	6.		
1	0430	28	.02	.02	.00	0.		1	1640	101	.03	.00	.03	6.		
1	0440	29	.02	.02	.00	0.		1	1650	102	.03	.00	.03	5.		
1	0450	30	.02	.02	.00	0.		1	1700	103	.03	.00	.03	5.		
1	0500	31	.02	.02	.00	0.		1	1710	104	.03	.00	.03	5.		
1	0510	32	.02	.02	.00	0.		1	1720	105	.03	.00	.03	5.		
1	0520	33	.02	.02	.00	0.		1	1730	106	.03	.00	.03	5.		
1	0530	34	.02	.02	.00	0.		1	1740	107	.03	.00	.03	5.		
1	0540	35	.02	.02	.00	0.		1	1750	108	.03	.00	.03	5.		
1	0550	36	.02	.02	.00	0.		1	1800	109	.03	.00	.03	5.		
1	0600	37	.02	.02	.00	0.		1	1810	110	.02	.00	.02	5.		
1	0610	38	.02	.02	.00	0.		1	1820	111	.02	.00	.02	4.		
1	0620	39	.02	.02	.00	1.		1	1830	112	.02	.00	.02	4.		
1	0630	40	.02	.02	.01	1.		1	1840	113	.02	.00	.02	4.		
1	0640	41	.02	.02	.01	1.		1	1850	114	.02	.00	.02	4.		
1	0650	42	.02	.02	.01	1.		1	1900	115	.02	.00	.02	4.		
1	0700	43	.02	.02	.01	1.		1	1910	116	.02	.00	.02	4.		
1	0710	44	.02	.02	.01	1.		1	1920	117	.02	.00	.02	4.		
1	0720	45	.02	.02	.01	1.		1	1930	118	.02	.00	.02	4.		

1	0740	47	.02	.02	.01	1.	†	1	1950	120	.02	.00	.02	3.
1	0750	48	.02	.02	.01	1.	†	1	2000	121	.02	.00	.02	3.
1	0800	49	.02	.02	.01	1.	†	1	2010	122	.02	.00	.02	3.
1	0810	50	.03	.02	.01	1.	†	1	2020	123	.02	.00	.02	3.
1	0820	51	.03	.02	.01	1.	†	1	2030	124	.02	.00	.02	3.
1	0830	52	.03	.02	.01	2.	†	1	2040	125	.02	.00	.02	3.
1	0840	53	.03	.02	.01	2.	†	1	2050	126	.02	.00	.02	3.
1	0850	54	.03	.02	.01	2.	†	1	2100	127	.02	.00	.02	3.
1	0900	55	.03	.02	.01	2.	†	1	2110	128	.02	.00	.02	3.
1	0910	56	.04	.02	.02	2.	†	1	2120	129	.02	.00	.02	3.
1	0920	57	.04	.02	.02	2.	†	1	2130	130	.02	.00	.02	3.
1	0930	58	.04	.02	.02	3.	†	1	2140	131	.02	.00	.02	3.
1	0940	59	.04	.02	.02	3.	†	1	2150	132	.02	.00	.02	3.
1	0950	60	.04	.02	.02	3.	†	1	2200	133	.02	.00	.02	3.
1	1000	61	.04	.02	.02	3.	†	1	2210	134	.02	.00	.02	3.
1	1010	62	.06	.03	.03	3.	†	1	2220	135	.02	.00	.02	3.
1	1020	63	.06	.02	.03	4.	†	1	2230	136	.02	.00	.02	3.
1	1030	64	.06	.02	.03	4.	†	1	2240	137	.02	.00	.02	3.
1	1040	65	.06	.02	.03	5.	†	1	2250	138	.02	.00	.02	3.
1	1050	66	.06	.02	.04	5.	†	1	2300	139	.02	.00	.02	3.
1	1100	67	.06	.02	.04	5.	†	1	2310	140	.02	.00	.02	3.
1	1110	68	.34	.11	.23	7.	†	1	2320	141	.02	.00	.02	3.
1	1120	69	.34	.09	.25	13.	†	1	2330	142	.02	.00	.02	3.
1	1130	70	.34	.08	.27	21.	†	1	2340	143	.02	.00	.02	3.
1	1140	71	.34	.07	.28	29.	†	1	2350	144	.02	.00	.02	3.
1	1150	72	.34	.06	.29	36.	†	2	0000	145	.02	.00	.02	3.
1	1200	73	.34	.05	.30	40.	†							

TOTAL RAINFALL = 7.80, TOTAL LOSS = 1.89, TOTAL EXCESS = 5.91

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.00-HR
52.	13.00	21.	7.	7.	7.
		(INCHES) 4.592	5.849	5.849	5.849
		(AC-FT) 11.	13.	13.	13.

CUMULATIVE AREA = .04 SQ MI

RUNOFF SUMMARY

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

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
				6-HOUR	24-HOUR	72-HOUR			
HYDROGRAPH AT	TRIB-1	52.	13.00	21.	7.	7.	.04		

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

SECTION 11

ALTERNATE "A" DETENTION POND DESIGN

The Detention Pond is to be located within a proposed park on a 4.3-acre site as shown on the Drainage Plan. The west 240 feet (2.45 acres) of the Detention Pond site is within property acquired by MAFB for the purpose of drainage improvements. Implementation of this alternate presumes that an agreement for acquisition of this property by the developer can be reached with MAFB. The developer is currently negotiating with the Wichita Board of Park Commissioners for development of the site as a public park.

This plan will provide relief for the MAFB housing area from existing flooding problems, by diverting much of the sheet runoff from the area east of the housing addition into the Detention Pond. This will both reduce the peak discharge rate and delay the peak by several minutes.

The pond will be maintained with a permanent pool at elevation 198.2 and a water surface area of 0.67 acres. This elevation was used as the base elevation for flood routing through the detention pond, assuming a full pond at the time of design storm occurrence.

Runoff will enter the pond at three locations from the north, east, and south. The reduced discharge from the pond will flow to the west and connect to an existing storm sewer inlet on MAFB property. Comparison of the HEC-1 output indicates a reduction of the peak discharge (Q100) at the pond outlet from 52 cfs under existing conditions to 25 cfs under developed conditions. This reduction should significantly improve the flood situation in the MAFB housing area.

Input/output data for the HEC-1 program is summarized as follows:

	Existing Conditions	Developed Conditions
Drainage Area	27.6 Acres (0.0431 s.m.)	32.6 Acres (0.0509 s.m.)
SCS Curve no.	84	92
Peak Discharge	52 cfs	25 cfs
Maximum Storage	-	9 Ac.-ft.
Maximum Stage	-	Elev. 204.7

(More detailed data may be read from the attached HEC-1 output).

POND DISCHARGE PIPE

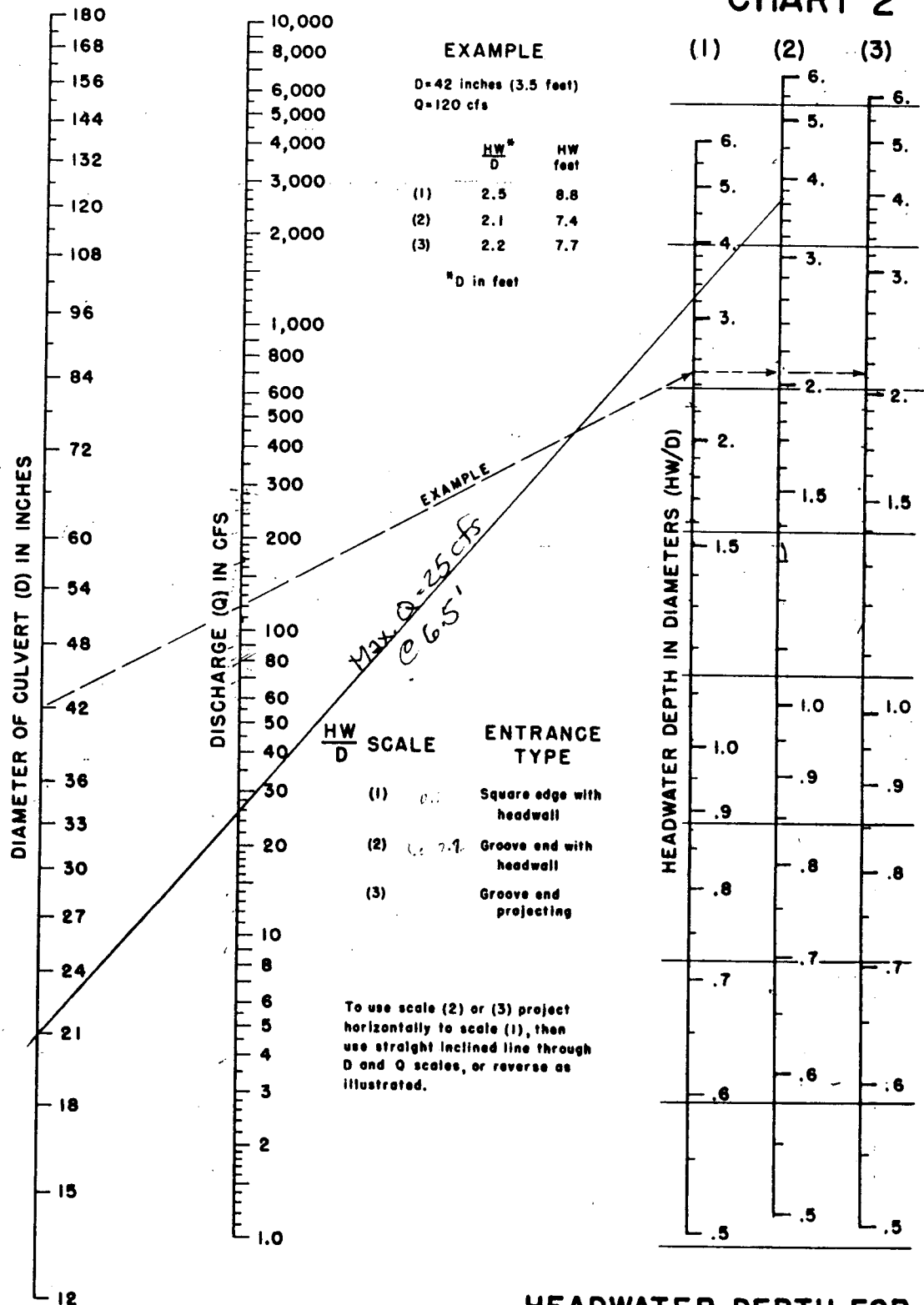
Using 21" R.C.P., discharge values were determined by the U.S. Dept. of Transportation "Hydraulic Charts for the Selection of Highway Culverts" (See Page 11); inlet control assumed.

Depth (feet)	Elevation	HW/D	Q (cfs)
0	198.2	-	0
1	199.2	0.57	3.5
2	200.2	1.14	10.0
3	201.2	1.71	15.5
4	202.2	2.29	19.4
5	203.2	2.86	21.8
6	204.2	3.43	24.6
7	205.2	4.00	26.0

Maximum design discharge = 25 cfs elevation 204.7.

The top of dike along the west side of the pond will be at elevation 205.7 (minimum), providing a freeboard of ≥ 1.0 foot. The shape of the pond may vary from the Plan, but the final design will provide equivalent flood storage at the elevation and discharge indicated.

CHART 2



HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

HEADWATER SCALES 283
 REVISED MAY 1964

BUREAU OF PUBLIC ROADS JAN. 1963

ALTERNATE "A"
HEC-1 OUTPUT

ALT. A

1

FLOOD HYDROGRAPH PACKAGE HEC-1 (IBM XT 512K VERSION) -FEB 1,1985
U.S. ARMY CORPS OF ENGINEERS, THE HYDROLOGIC ENGINEERING CENTER, 609 SECOND STREET, DAVIS, CA. 95616

THIS HEC-1 VERSION CONTAINS ALL OPTIONS EXCEPT ECONOMICS, AND THE NUMBER OF PLANS ARE REDUCED TO 3

HEC-1 INPUT

PAGE 1

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

*** FREE ***

1	ID	IMPROVED CONDITION - TOWNE PARC 3RD AND FUTURE ADDITIONS									
2	ID	100 YR - 24 HR. STORM									
3	ID	A: TPZB.INPUT									
4	IT	10	0	0	145						
5	KK	TRIB-1									
6	KM	COMPUTING RUNOFF HYDROGRAPH FOR THE AREA CONTRIBUTING TO									
7	KM	DETENTION POND IN PARK AREA									
8	PB	0									
9	IN	60									
10	PC	0.00	0.0585	0.1287	0.126	0.312	0.419	0.566	0.712	0.858	1.053
11	PC	1.297	1.641	3.705	5.811	6.201	6.503	6.747	6.937	7.108	7.250
12	PC	7.371	7.487	7.600	7.703	7.800					
13	BA	0.0509									
14	LS	0	92	0							
15	UK	150	0.02	0.25	100						
16	RK	1550	0.01	0.013	0.0509	TRAP	10	1	NO		
17	KK	POND									
18	RS	1	ELEV	198.2	0						
19	SA	.67	.80	.99	1.19	1.40	1.63	1.87	2.13		
20	SE	198.2	199	200	201	202	203	204	205		
21	SO	0	3.5	10	14.5	19	20	24	26		
22	SE	198.2	199.2	200.2	201.2	202.2	203.2	204.2	205.2		
23	ZZ										

1

FLOOD HYDROGRAPH PACKAGE HEC-1 (IBM XT 512K VERSION) -FEB 1,1985
U.S. ARMY CORPS OF ENGINEERS, THE HYDROLOGIC ENGINEERING CENTER, 609 SECOND STREET, DAVIS, CA. 95616

IMPROVED CONDITION - TOWNE PARC 3RD AND FUTURE ADDITIONS
100 YR - 24 HR. STORM

IDATE 1 0 STARTING DATE
 ITIME 0000 STARTING TIME
 NG 145 NUMBER OF HYDROGRAPH ORDINATES
 NDDATE 2 0 ENDING DATE
 NDTIME 0000 ENDING TIME

COMPUTATION INTERVAL .17 HOURS
 TOTAL TIME BASE 24.00 HOURS

ENGLISH UNITS

*** **

5 KK

 | |
 | TRIB-1 |
 | |

COMPUTING RUNOFF HYDROGRAPH FOR THE AREA CONTRIBUTING TO
 DETENTION POND IN PARK AREA

9 IN TIME DATA FOR INPUT TIME SERIES
 JXMIN 60 TIME INTERVAL IN MINUTES
 JXDATE 1 0 STARTING DATE
 JXTIME 0 STARTING TIME

SUBBASIN RUNOFF DATA

13 BA SUBBASIN CHARACTERISTICS
 TAREA .05 SUBBASIN AREA

PRECIPITATION DATA

8 PB STORM 7.80 BASIN TOTAL PRECIPITATION

10 PI INCREMENTAL PRECIPITATION PATTERN

.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.00	.00	.00	.00	.00	.00	.00	.03	.03
.03	.03	.03	.03	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.03	.03
.03	.03	.03	.03	.04	.04	.04	.04	.04	.04	.04
.06	.06	.06	.06	.06	.06	.34	.34	.34	.34	.34
.34	.34	.35	.35	.35	.35	.35	.35	.35	.07	.07
.07	.07	.07	.07	.05	.05	.05	.05	.05	.05	.05
.04	.04	.04	.04	.04	.04	.03	.03	.03	.03	.03
.03	.03	.03	.03	.03	.03	.03	.03	.03	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02

14 LS SCS LOSS RATE
 STRTL .17 INITIAL ABSTRACTION
 CRVNBR 92.00 CURVE NUMBER
 RTIMP .00 PERCENT IMPERVIOUS AREA

15 UK KINEMATIC WAVE
 OVERLAND-FLOW ELEMENT NO. 1
 L 150. OVERLAND FLOW LENGTH
 S .0200 SLOPE
 N .250 ROUGHNESS COEFFICIENT
 PA 100.0 PERCENT OF SUBBASIN

RAIN CHANNEL

L 1550. CHANNEL LENGTH
 S .0100 SLOPE
 N .013 CHANNEL ROUGHNESS COEFFICIENT
 CA .05 CONTRIBUTING AREA
 SHAPE TRAP CHANNEL SHAPE
 WD 10.00 BOTTOM WIDTH OR DIAMETER
 Z 1.00 SIDE SLOPE
 RUPSTQ NO ROUTE UPSTREAM HYDROGRAPH

COMPUTED KINEMATIC PARAMETERS

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)
1	.8429	1.667	10.00	75.00
3	3.0869	1.479	10.00	775.00

HYDROGRAPH AT STATION TRIB-1

DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	↓	DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
1	0000	1	.00	.00	.00	0.	↓	1	1210	74	.35	.01	.34	65.		
1	0010	2	.01	.01	.00	0.	↓	1	1220	75	.35	.01	.34	66.		
1	0020	3	.01	.01	.00	0.	↓	1	1230	76	.35	.01	.34	67.		
1	0030	4	.01	.01	.00	0.	↓	1	1240	77	.35	.01	.34	67.		
1	0040	5	.01	.01	.00	0.	↓	1	1250	78	.35	.01	.34	67.		
1	0050	6	.01	.01	.00	0.	↓	1	1300	79	.35	.01	.34	68.		
1	0100	7	.01	.01	.00	0.	↓	1	1310	80	.07	.00	.06	68.		
1	0110	8	.01	.01	.00	0.	↓	1	1320	81	.07	.00	.06	43.		
1	0120	9	.01	.01	.00	0.	↓	1	1330	82	.07	.00	.06	13.		
1	0130	10	.01	.01	.00	0.	↓	1	1340	83	.07	.00	.06	12.		
1	0140	11	.01	.01	.00	0.	↓	1	1350	84	.07	.00	.06	12.		
1	0150	12	.01	.01	.00	0.	↓	1	1400	85	.07	.00	.06	12.		
1	0200	13	.01	.01	.00	0.	↓	1	1410	86	.05	.00	.05	12.		
1	0210	14	.00	.00	.00	0.	↓	1	1420	87	.05	.00	.05	11.		
1	0220	15	.00	.00	.00	0.	↓	1	1430	88	.05	.00	.05	10.		
1	0230	16	.00	.00	.00	0.	↓	1	1440	89	.05	.00	.05	10.		
1	0240	17	.00	.00	.00	0.	↓	1	1450	90	.05	.00	.05	10.		
1	0250	18	.00	.00	.00	0.	↓	1	1500	91	.05	.00	.05	10.		
1	0300	19	.00	.00	.00	0.	↓	1	1510	92	.04	.00	.04	10.		
1	0310	20	.03	.03	.00	0.	↓	1	1520	93	.04	.00	.04	9.		
1	0320	21	.03	.03	.00	0.	↓	1	1530	94	.04	.00	.04	8.		
1	0330	22	.03	.03	.00	0.	↓	1	1540	95	.04	.00	.04	8.		
1	0340	23	.03	.03	.00	0.	↓	1	1550	96	.04	.00	.04	8.		
1	0350	24	.03	.03	.01	0.	↓	1	1600	97	.04	.00	.04	8.		
1	0400	25	.03	.02	.01	0.	↓	1	1610	98	.03	.00	.03	8.		
1	0410	26	.02	.01	.00	0.	↓	1	1620	99	.03	.00	.03	7.		
1	0420	27	.02	.01	.01	0.	↓	1	1630	100	.03	.00	.03	7.		
1	0430	28	.02	.01	.01	0.	↓	1	1640	101	.03	.00	.03	6.		
1	0440	29	.02	.01	.01	0.	↓	1	1650	102	.03	.00	.03	6.		
1	0450	30	.02	.01	.01	1.	↓	1	1700	103	.03	.00	.03	6.		
1	0500	31	.02	.01	.01	1.	↓	1	1710	104	.03	.00	.03	6.		
1	0510	32	.02	.01	.01	1.	↓	1	1720	105	.03	.00	.03	6.		
1	0520	33	.02	.01	.01	1.	↓	1	1730	106	.03	.00	.03	6.		
1	0530	34	.02	.01	.01	1.	↓	1	1740	107	.03	.00	.03	6.		
1	0540	35	.02	.01	.01	1.	↓	1	1750	108	.03	.00	.03	6.		
1	0550	36	.02	.01	.01	2.	↓	1	1800	109	.03	.00	.03	5.		
1	0600	37	.02	.01	.01	2.	↓	1	1810	110	.02	.00	.02	5.		
1	0610	38	.02	.01	.01	2.	↓	1	1820	111	.02	.00	.02	5.		
1	0620	39	.02	.01	.01	2.	↓	1	1830	112	.02	.00	.02	5.		
1	0630	40	.02	.01	.01	2.	↓	1	1840	113	.02	.00	.02	5.		
1	0640	41	.02	.01	.01	2.	↓	1	1850	114	.02	.00	.02	5.		

1	0650	42	.02	.01	.01	2.	†	1	1700	115	.02	.00	.02	3.
1	0700	43	.02	.01	.01	3.	†	1	1910	116	.02	.00	.02	5.
1	0710	44	.02	.01	.02	3.	†	1	1920	117	.02	.00	.02	4.
1	0720	45	.02	.01	.02	3.	†	1	1930	118	.02	.00	.02	4.
1	0730	46	.02	.01	.02	3.	†	1	1940	119	.02	.00	.02	4.
1	0740	47	.02	.01	.02	3.	†	1	1950	120	.02	.00	.02	4.
1	0750	48	.02	.01	.02	3.	†	1	2000	121	.02	.00	.02	4.
1	0800	49	.02	.01	.02	3.	†	1	2010	122	.02	.00	.02	4.
1	0810	50	.03	.01	.02	3.	†	1	2020	123	.02	.00	.02	4.
1	0820	51	.03	.01	.02	3.	†	1	2030	124	.02	.00	.02	4.
1	0830	52	.03	.01	.02	4.	†	1	2040	125	.02	.00	.02	4.
1	0840	53	.03	.01	.02	4.	†	1	2050	126	.02	.00	.02	4.
1	0850	54	.03	.01	.02	4.	†	1	2100	127	.02	.00	.02	4.
1	0900	55	.03	.01	.02	4.	†	1	2110	128	.02	.00	.02	4.
1	0910	56	.04	.01	.03	4.	†	1	2120	129	.02	.00	.02	4.
1	0920	57	.04	.01	.03	5.	†	1	2130	130	.02	.00	.02	4.
1	0930	58	.04	.01	.03	5.	†	1	2140	131	.02	.00	.02	4.
1	0940	59	.04	.01	.03	6.	†	1	2150	132	.02	.00	.02	4.
1	0950	60	.04	.01	.03	6.	†	1	2200	133	.02	.00	.02	4.
1	1000	61	.04	.01	.03	6.	†	1	2210	134	.02	.00	.02	4.
1	1010	62	.06	.01	.05	6.	†	1	2220	135	.02	.00	.02	4.
1	1020	63	.06	.01	.05	7.	†	1	2230	136	.02	.00	.02	3.
1	1030	64	.06	.01	.05	8.	†	1	2240	137	.02	.00	.02	3.
1	1040	65	.06	.01	.05	9.	†	1	2250	138	.02	.00	.02	3.
1	1050	66	.06	.01	.05	9.	†	1	2300	139	.02	.00	.02	3.
1	1100	67	.06	.01	.05	9.	†	1	2310	140	.02	.00	.02	3.
1	1110	68	.34	.04	.30	9.	†	1	2320	141	.02	.00	.02	3.
1	1120	69	.34	.03	.31	30.	†	1	2330	142	.02	.00	.02	3.
1	1130	70	.34	.03	.32	59.	†	1	2340	143	.02	.00	.02	3.
1	1140	71	.34	.02	.32	62.	†	1	2350	144	.02	.00	.02	3.
1	1150	72	.34	.02	.33	63.	†	2	0000	145	.02	.00	.02	3.
1	1200	73	.34	.01	.33	64.	†							

.....

TOTAL RAINFALL = 7.80, TOTAL LOSS = .95, TOTAL EXCESS = 6.85

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.00-HR
68.	13.17	28.	9.	9.	9.
		(INCHES) 5.119	6.666	6.666	6.666
		(AC-FT) 14.	18.	18.	18.

CUMULATIVE AREA = .05 SQ MI

.....

17 KK *****
 POND *****

HYDROGRAPH ROUTING DATA

18 RS STORAGE ROUTING
 NSTPS 1 NUMBER OF SUBREACHES
 ITYP ELEV TYPE OF INITIAL CONDITION
 RSVRIC 198.20 INITIAL CONDITION
 Y .00 WORKING R AND D COEFFICIENT

19 SA	AREA	.7	.8	1.0	1.2	1.4	1.6	1.9	2.1
20 SE	ELEVATION	198.20	199.00	200.00	201.00	202.00	203.00	204.00	205.00
21 SQ	DISCHARGE	0.	4.	10.	15.	19.	20.	24.	26.
22 SE	ELEVATION	198.20	199.20	200.20	201.20	202.20	203.20	204.20	205.20

COMPUTED STORAGE-ELEVATION DATA

STORAGE	.00	.59	1.48	2.57	3.86	5.38	7.12	9.12
ELEVATION	198.20	199.00	200.00	201.00	202.00	203.00	204.00	205.00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	.00	.59	.75	1.48	1.68	2.57	2.81	3.86	4.15	5.38
OUTFLOW	.00	2.80	3.50	8.70	10.00	13.60	14.50	18.10	19.00	19.80
ELEVATION	198.20	199.00	199.20	200.00	200.20	201.00	201.20	202.00	202.20	203.00
STORAGE	5.71	7.12	7.50	9.12	9.55					
OUTFLOW	20.00	23.20	24.00	25.60	26.00					
ELEVATION	203.20	204.00	204.20	205.00	205.20					

HYDROGRAPH AT STATION POND

DA	MON	HRMN	DRD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	DRD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	DRD	OUTFLOW	STORAGE	STAGE
1	0000	1	0.	.0	198.2	1	0810	50	2.	.4	198.7	1	1620	99	20.	5.5	203.1			
1	0010	2	0.	.0	198.2	1	0820	51	2.	.4	198.7	1	1630	100	20.	5.3	203.0			
1	0020	3	0.	.0	198.2	1	0830	52	2.	.4	198.7	1	1640	101	20.	5.2	202.9			
1	0030	4	0.	.0	198.2	1	0840	53	2.	.4	198.8	1	1650	102	20.	5.0	202.7			
1	0040	5	0.	.0	198.2	1	0850	54	2.	.5	198.8	1	1700	103	19.	4.8	202.6			
1	0050	6	0.	.0	198.2	1	0900	55	2.	.5	198.9	1	1710	104	19.	4.6	202.5			
1	0100	7	0.	.0	198.2	1	0910	56	2.	.5	198.9	1	1720	105	19.	4.4	202.4			
1	0110	8	0.	.0	198.2	1	0920	57	3.	.5	198.9	1	1730	106	19.	4.2	202.3			
1	0120	9	0.	.0	198.2	1	0930	58	3.	.6	199.0	1	1740	107	19.	4.1	202.1			
1	0130	10	0.	.0	198.2	1	0940	59	3.	.6	199.0	1	1750	108	18.	3.9	202.0			
1	0140	11	0.	.0	198.2	1	0950	60	3.	.6	199.1	1	1800	109	18.	3.7	201.9			
1	0150	12	0.	.0	198.2	1	1000	61	3.	.7	199.1	1	1810	110	17.	3.6	201.8			
1	0200	13	0.	.0	198.2	1	1010	62	3.	.7	199.2	1	1820	111	16.	3.4	201.6			
1	0210	14	0.	.0	198.2	1	1020	63	4.	.8	199.2	1	1830	112	16.	3.2	201.5			
1	0220	15	0.	.0	198.2	1	1030	64	4.	.8	199.3	1	1840	113	15.	3.1	201.4			
1	0230	16	0.	.0	198.2	1	1040	65	4.	.9	199.3	1	1850	114	15.	2.9	201.3			
1	0240	17	0.	.0	198.2	1	1050	66	5.	.9	199.4	1	1900	115	14.	2.8	201.2			
1	0250	18	0.	.0	198.2	1	1100	67	5.	1.0	199.5	1	1910	116	14.	2.7	201.1			
1	0300	19	0.	.0	198.2	1	1110	68	6.	1.0	199.5	1	1920	117	14.	2.5	201.0			
1	0310	20	0.	.0	198.2	1	1120	69	7.	1.2	199.7	1	1930	118	13.	2.4	200.9			
1	0320	21	0.	.0	198.2	1	1130	70	10.	1.7	200.2	1	1940	119	13.	2.3	200.8			
1	0330	22	0.	.0	198.2	1	1140	71	13.	2.4	200.8	1	1950	120	12.	2.2	200.7			
1	0340	23	0.	.0	198.2	1	1150	72	15.	3.1	201.4	1	2000	121	12.	2.1	200.6			
1	0350	24	0.	.0	198.2	1	1200	73	18.	3.7	201.9	1	2010	122	11.	2.0	200.5			
1	0400	25	0.	.0	198.2	1	1210	74	19.	4.3	202.3	1	2020	123	11.	1.9	200.4			
1	0410	26	0.	.0	198.2	1	1220	75	20.	5.0	202.7	1	2030	124	10.	1.8	200.3			
1	0420	27	0.	.0	198.2	1	1230	76	20.	5.6	203.1	1	2040	125	10.	1.7	200.2			
1	0430	28	0.	.0	198.2	1	1240	77	21.	6.3	203.5	1	2050	126	10.	1.6	200.1			
1	0440	29	0.	.0	198.2	1	1250	78	23.	6.9	203.9	1	2100	127	9.	1.5	200.1			
1	0450	30	0.	.0	198.2	1	1300	79	24.	7.5	204.2	1	2110	128	9.	1.5	200.0			
1	0500	31	0.	.0	198.2	1	1310	80	25.	8.1	204.5	1	2120	129	8.	1.4	199.9			
1	0510	32	0.	.0	198.2	1	1320	81	25.	8.5	204.7	1	2130	130	8.	1.3	199.8			

1	0520	33	0.	.0	198.3	1	1330	82	25.	8.5	204.7	1	2140	131	7.	1.3	197.8
1	0530	34	0.	.1	198.3	1	1340	83	25.	8.4	204.6	1	2150	132	7.	1.2	199.7
1	0540	35	0.	.1	198.3	1	1350	84	25.	8.2	204.5	1	2200	133	7.	1.2	199.7
1	0550	36	0.	.1	198.3	1	1400	85	25.	8.0	204.5	1	2210	134	6.	1.2	199.6
1	0600	37	0.	.1	198.3	1	1410	86	24.	7.9	204.4	1	2220	135	6.	1.1	199.6
1	0610	38	1.	.1	198.4	1	1420	87	24.	7.7	204.3	1	2230	136	6.	1.1	199.6
1	0620	39	1.	.1	198.4	1	1430	88	24.	7.5	204.2	1	2240	137	6.	1.1	199.5
1	0630	40	1.	.2	198.4	1	1440	89	24.	7.3	204.1	1	2250	138	5.	1.0	199.5
1	0640	41	1.	.2	198.4	1	1450	90	23.	7.1	204.0	1	2300	139	5.	1.0	199.5
1	0650	42	1.	.2	198.5	1	1500	91	23.	6.9	203.9	1	2310	140	5.	1.0	199.4
1	0700	43	1.	.2	198.5	1	1510	92	22.	6.8	203.8	1	2320	141	5.	.9	199.4
1	0710	44	1.	.2	198.5	1	1520	93	22.	6.6	203.7	1	2330	142	5.	.9	199.4
1	0720	45	1.	.3	198.6	1	1530	94	22.	6.4	203.6	1	2340	143	5.	.9	199.4
1	0730	46	1.	.3	198.6	1	1540	95	21.	6.2	203.5	1	2350	144	4.	.9	199.3
1	0740	47	1.	.3	198.6	1	1550	96	21.	6.0	203.4	2	0000	145	4.	.9	199.3
1	0750	48	2.	.3	198.6	1	1600	97	20.	5.9	203.3						
1	0800	49	2.	.3	198.7	1	1610	98	20.	5.7	203.2						

PEAK FLOW + (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW				
		6-HR	24-HR	72-HR	24.00-HR	
25.	13.50	22.	9.	9.	9.	
		(INCHES)	3.936	6.347	6.347	6.347
		(AC-FT)	11.	17.	17.	17.

PEAK STORAGE + (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.00-HR
9.	13.50	6.	2.	2.	2.

PEAK STAGE + (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.00-HR
204.71	13.50	203.45	200.24	200.24	200.24

CUMULATIVE AREA = .05 SQ MI

1
 RUNOFF SUMMARY
 FLOW IN CUBIC FEET PER SECOND
 TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
				6-HOUR	24-HOUR	72-HOUR			
HYDROGRAPH AT	TRIB-1	68.	13.17	28.	9.	9.	.05		
ROUTED TO	POND	25.	13.50	22.	9.	9.	.05		
								204.71	
								13.50	

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

SECTION III

ALTERNATE "B"
DETENTION POND DESIGN

The Detention Pond is to^{be} located within a 2.45 acre site as shown on the Drainage Plan. The property is owned by MAFB.

The pond will be maintained with a permanent pool at elevation 198.2 and a water surface area of 0.67 acre. This elevation was used as the base elevation for flood routing through the detention pond, assuming a full pond at the time of design storm occurrence.

Runoff will enter the pond at three locations from the north, east, and south. The reduced discharge from the pond will flow to the west and connect to an existing storm sewer inlet on MAFB property. Comparison of the attached HEC_1 output indicates a reduction of the peak discharge (Q100) from 52 cfs under existing conditions to 26 cfs under developed conditions. This reduction should significantly improve the flood situation in the MAFB housing area.

Input\output data for the HEC-1 program is summarized as follows:

	Existing Conditions	Developed Conditions
Drainage Area	27.6 Acres (0,0431 s.m.)	29.2 Acres (0.0456 s.m.)
SCS Curve number	84	92
Peak Discharge	52 cfs	26 cfs
Maximum Storage	-	9 Ac.-ft.
Maximum Stage	-	Elev. 205.4

(More detailed data may be read from the attached HEC-1 output).

POND DISCHARGE PIPE

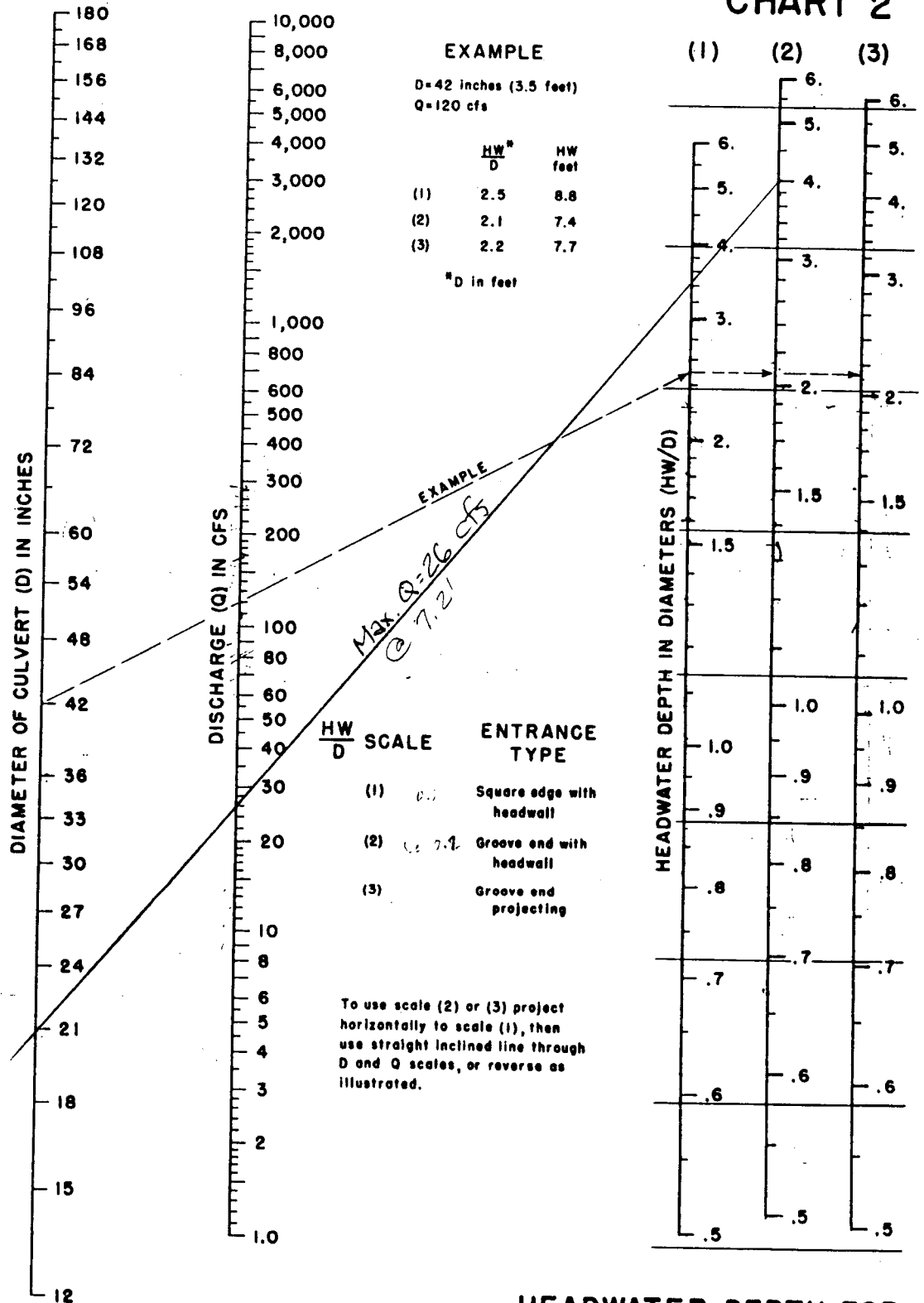
Using 21" R.C.P., discharge values were determined by the U.S. Dept. of Transportation "Hydraulic Charts for the Selection of Highway Culverts" (See Page 15); inlet control assumed.

Depth (feet)	Elevation	HW/D	Q (cfs)
0	198.2	-	0
1	199.2	0.57	3.5
2	200.2	1.14	10.0
3	201.2	1.71	15.5
4	202.2	2.29	19.4
5	203.2	2.86	21.8
6	204.2	3.43	24.6
7	205.2	4.00	26.0
8	206.2	4.57	28.0

Maximum design discharge = 26 cfs elevation 205.4

The top dike along the west side of the pond will be at elevation 205.0 (minimum), providing a freeboard of ≥ 1.0 foot. The shape of the pond may vary from the Plan, but the final design will provide equivalent flood storage at the elevation and discharge indicated.

CHART 2



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

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

*D in feet

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

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

HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

HEADWATER SCALES 2&3
 REVISED MAY 1964

BUREAU OF PUBLIC ROADS JAN. 1963

ALTERNATE "B"
HEC-1 OUTPUT

ALT. B

PT. 419 N 23568.095 E 24988.052

1

FLOOD HYDROGRAPH PACKAGE HEC-1 (IBM XT 512K VERSION) -FEB 1,1985
U.S. ARMY CORPS OF ENGINEERS, THE HYDROLOGIC ENGINEERING CENTER, 609 SECOND STREET, DAVIS, CA. 95616

THIS HEC-1 VERSION CONTAINS ALL OPTIONS EXCEPT ECONOMICS, AND THE NUMBER OF PLANS ARE REDUCED TO 3

1

HEC-1 INPUT

PAGE 1

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

*** FREE ***

1	ID	IMPROVED CONDITION - TOWNE PARC 3RD AND FUTURE ADDITIONS									
2	ID	100 YR - 24 HR. STORM									
3	ID	A:TP2A.IN/OUT									
4	ID										
5	IT	10	0	0	145						
6	KK	TRIB-1									
7	KM	COMPUTING RUNOFF HYDROGRAPH FOR THE AREA CONTRIBUTING TO									
8	KM	DETENTION POND IN PARK AREA									
9	PB	0									
10	IN	60									
11	PC	0.00	0.0585	0.1287	0.126	0.312	0.419	0.566	0.712	0.858	1.053
12	PC	1.297	1.641	3.705	5.811	6.201	6.503	6.747	6.937	7.108	7.250
13	PC	7.371	7.487	7.600	7.703	7.800					
14	BA	0.0456									
15	LS	0	92	0							
16	UK	150	0.02	0.25	100						
17	RK	1550	0.01	0.013	0.0509	TRAP	10	1	NO		
18	KK	POND									
19	RS	1	ELEV	198.2	0						
20	SA	.67	.74	.82	.91	1.01	1.11	1.21	1.31		
21	SE	198.2	199	200	201	202	203	204	205		
22	SQ	0	3.5	10	14.5	19	20	24	26		
23	SE	198.2	199.2	200.2	201.2	202.2	203.2	204.2	205.2		
24	ZZ										

1

FLOOD HYDROGRAPH PACKAGE HEC-1 (IBM XT 512K VERSION) -FEB 1,1985
U.S. ARMY CORPS OF ENGINEERS, THE HYDROLOGIC ENGINEERING CENTER, 609 SECOND STREET, DAVIS, CA. 95616

IMPROVED CONDITION - TOWNE PARC 3RD AND FUTURE ADDITIONS
100 YR - 24 HR. STORM
A:TP2A.IN/OUT

1603

HYDROGRAPH TIME DATA

NMIN 10 MINUTES IN COMPUTATION INTERVAL
 IDATE 1 0 STARTING DATE
 ITIME 0000 STARTING TIME
 NQ 145 NUMBER OF HYDROGRAPH ORDINATES
 NDDATE 2 0 ENDING DATE
 NDTIME 0000 ENDING TIME

COMPUTATION INTERVAL .17 HOURS
 TOTAL TIME BASE 24.00 HOURS

ENGLISH UNITS

*** ** ** ** **

6 KK

 | |
 | TRIB-1 |
 | |

COMPUTING RUNOFF HYDROGRAPH FOR THE AREA CONTRIBUTING TO
 DETENTION POND IN PARK AREA

10 IN TIME DATA FOR INPUT TIME SERIES
 JXMIN 60 TIME INTERVAL IN MINUTES
 JXDATE 1 0 STARTING DATE
 JXTIME 0 STARTING TIME

SUBBASIN RUNOFF DATA

14 BA SUBBASIN CHARACTERISTICS
 TAREA .05 SUBBASIN AREA

PRECIPITATION DATA

9 PB STORM 7.80 BASIN TOTAL PRECIPITATION

11 PI INCREMENTAL PRECIPITATION PATTERN

.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.01	.01	.00	.00	.00	.00	.00	.00	.03	.03
.03	.03	.03	.03	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.03	.03
.03	.03	.03	.03	.04	.04	.04	.04	.04	.04
.06	.06	.06	.06	.06	.06	.34	.34	.34	.34
.34	.34	.35	.35	.35	.35	.35	.35	.07	.07
.07	.07	.07	.07	.05	.05	.05	.05	.05	.05
.04	.04	.04	.04	.04	.04	.03	.03	.03	.03
.03	.03	.03	.03	.03	.03	.03	.03	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
.02	.02	.02	.02	.02	.02	.02	.02	.02	.02

15 LS SCS LOSS RATE
 STRTL .17 INITIAL ABSTRACTION
 CRVNB 92.00 CURVE NUMBER
 RTIMP .00 PERCENT IMPERVIOUS AREA

16 UK KINEMATIC WAVE
 OVERLAND-FLOW ELEMENT NO. 1
 L 150. OVERLAND FLOW LENGTH
 S .0200 SLOPE

17 RK

N .250 ROUGHNESS COEFFICIENT
 PA 100.0 PERCENT OF SUBBASIN
 MAIN CHANNEL
 L 1550. CHANNEL LENGTH
 S .0100 SLOPE
 N .013 CHANNEL ROUGHNESS COEFFICIENT
 CA .05 CONTRIBUTING AREA
 SHAPE TRAP CHANNEL SHAPE
 WD 10.00 BOTTOM WIDTH OR DIAMETER
 Z 1.00 SIDE SLOPE
 RUPSTQ NO ROUTE UPSTREAM HYDROGRAPH

COMPUTED KINEMATIC PARAMETERS

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)
1	.8429	1.667	10.00	75.00
3	3.0869	1.479	10.00	775.00

HYDROGRAPH AT STATION TRIB-1

DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q		DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
1	0000	1	.00	.00	.00	0.		1	1210	74	.35	.01	.34		58.	
1	0010	2	.01	.01	.00	0.		1	1220	75	.35	.01	.34		59.	
1	0020	3	.01	.01	.00	0.		1	1230	76	.35	.01	.34		60.	
1	0030	4	.01	.01	.00	0.		1	1240	77	.35	.01	.34		60.	
1	0040	5	.01	.01	.00	0.		1	1250	78	.35	.01	.34		60.	
1	0050	6	.01	.01	.00	0.		1	1300	79	.35	.01	.34		61.	
1	0100	7	.01	.01	.00	0.		1	1310	80	.07	.00	.06		61.	
1	0110	8	.01	.01	.00	0.		1	1320	81	.07	.00	.06		38.	
1	0120	9	.01	.01	.00	0.		1	1330	82	.07	.00	.06		12.	
1	0130	10	.01	.01	.00	0.		1	1340	83	.07	.00	.06		10.	
1	0140	11	.01	.01	.00	0.		1	1350	84	.07	.00	.06		11.	
1	0150	12	.01	.01	.00	0.		1	1400	85	.07	.00	.06		11.	
1	0200	13	.01	.01	.00	0.		1	1410	86	.05	.00	.05		11.	
1	0210	14	.00	.00	.00	0.		1	1420	87	.05	.00	.05		10.	
1	0220	15	.00	.00	.00	0.		1	1430	88	.05	.00	.05		9.	
1	0230	16	.00	.00	.00	0.		1	1440	89	.05	.00	.05		9.	
1	0240	17	.00	.00	.00	0.		1	1450	90	.05	.00	.05		9.	
1	0250	18	.00	.00	.00	0.		1	1500	91	.05	.00	.05		9.	
1	0300	19	.00	.00	.00	0.		1	1510	92	.04	.00	.04		9.	
1	0310	20	.03	.03	.00	0.		1	1520	93	.04	.00	.04		8.	
1	0320	21	.03	.03	.00	0.		1	1530	94	.04	.00	.04		7.	
1	0330	22	.03	.03	.00	0.		1	1540	95	.04	.00	.04		7.	
1	0340	23	.03	.03	.00	0.		1	1550	96	.04	.00	.04		7.	
1	0350	24	.03	.03	.01	0.		1	1600	97	.04	.00	.04		7.	
1	0400	25	.03	.02	.01	0.		1	1610	98	.03	.00	.03		7.	
1	0410	26	.02	.01	.00	0.		1	1620	99	.03	.00	.03		6.	
1	0420	27	.02	.01	.01	0.		1	1630	100	.03	.00	.03		6.	
1	0430	28	.02	.01	.01	0.		1	1640	101	.03	.00	.03		6.	
1	0440	29	.02	.01	.01	0.		1	1650	102	.03	.00	.03		6.	
1	0450	30	.02	.01	.01	0.		1	1700	103	.03	.00	.03		5.	
1	0500	31	.02	.01	.01	1.		1	1710	104	.03	.00	.03		5.	
1	0510	32	.02	.01	.01	1.		1	1720	105	.03	.00	.03		5.	
1	0520	33	.02	.01	.01	1.		1	1730	106	.03	.00	.03		5.	
1	0530	34	.02	.01	.01	1.		1	1740	107	.03	.00	.03		5.	
1	0540	35	.02	.01	.01	1.		1	1750	108	.03	.00	.03		5.	
1	0550	36	.02	.01	.01	1.		1	1800	109	.03	.00	.03		5.	
1	0600	37	.02	.01	.01	2.		1	1810	110	.02	.00	.02		5.	
1	0610	38	.02	.01	.01	2.		1	1820	111	.02	.00	.02		5.	

1	0630	40	.02	.01	.01	2.	1	1840	115	.02	.00	.02	4.
1	0640	41	.02	.01	.01	2.	1	1850	114	.02	.00	.02	4.
1	0650	42	.02	.01	.01	2.	1	1900	115	.02	.00	.02	4.
1	0700	43	.02	.01	.01	2.	1	1910	116	.02	.00	.02	4.
1	0710	44	.02	.01	.02	2.	1	1920	117	.02	.00	.02	4.
1	0720	45	.02	.01	.02	2.	1	1930	118	.02	.00	.02	4.
1	0730	46	.02	.01	.02	3.	1	1940	119	.02	.00	.02	4.
1	0740	47	.02	.01	.02	3.	1	1950	120	.02	.00	.02	4.
1	0750	48	.02	.01	.02	3.	1	2000	121	.02	.00	.02	4.
1	0800	49	.02	.01	.02	3.	1	2010	122	.02	.00	.02	3.
1	0810	50	.03	.01	.02	3.	1	2020	123	.02	.00	.02	3.
1	0820	51	.03	.01	.02	3.	1	2030	124	.02	.00	.02	3.
1	0830	52	.03	.01	.02	3.	1	2040	125	.02	.00	.02	3.
1	0840	53	.03	.01	.02	4.	1	2050	126	.02	.00	.02	3.
1	0850	54	.03	.01	.02	4.	1	2100	127	.02	.00	.02	3.
1	0900	55	.03	.01	.02	4.	1	2110	128	.02	.00	.02	3.
1	0910	56	.04	.01	.03	4.	1	2120	129	.02	.00	.02	3.
1	0920	57	.04	.01	.03	4.	1	2130	130	.02	.00	.02	3.
1	0930	58	.04	.01	.03	5.	1	2140	131	.02	.00	.02	3.
1	0940	59	.04	.01	.03	5.	1	2150	132	.02	.00	.02	3.
1	0950	60	.04	.01	.03	5.	1	2200	133	.02	.00	.02	3.
1	1000	61	.04	.01	.03	5.	1	2210	134	.02	.00	.02	3.
1	1010	62	.06	.01	.05	5.	1	2220	135	.02	.00	.02	3.
1	1020	63	.06	.01	.05	6.	1	2230	136	.02	.00	.02	3.
1	1030	64	.06	.01	.05	7.	1	2240	137	.02	.00	.02	3.
1	1040	65	.06	.01	.05	8.	1	2250	138	.02	.00	.02	3.
1	1050	66	.06	.01	.05	8.	1	2300	139	.02	.00	.02	3.
1	1100	67	.06	.01	.05	8.	1	2310	140	.02	.00	.02	3.
1	1110	68	.34	.04	.30	8.	1	2320	141	.02	.00	.02	3.
1	1120	69	.34	.03	.31	26.	1	2330	142	.02	.00	.02	3.
1	1130	70	.34	.03	.32	52.	1	2340	143	.02	.00	.02	3.
1	1140	71	.34	.02	.32	56.	1	2350	144	.02	.00	.02	3.
1	1150	72	.34	.02	.33	57.	2	0000	145	.02	.00	.02	3.
1	1200	73	.34	.01	.33	57.							

TOTAL RAINFALL = 7.80, TOTAL LOSS = .95, TOTAL EXCESS = 6.85

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.00-HR
61.	13.17	25.	8.	8.	8.
		(INCHES) 5.119	6.666	6.666	6.666
		(AC-FT) 12.	16.	16.	16.

CUMULATIVE AREA = .05 SQ MI

18 KX

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|           |
|   POND   |
|           |
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HYDROGRAPH ROUTING DATA

19 RS

STORAGE ROUTING

NSTPS 1 NUMBER OF SUBREACHES
ITYP FLEV TYPE OF INITIAL CONDITION

RSVRIL 178.20 INITIAL CONDITION
 X .00 WORKING R AND D COEFFICIENT

20 SA	AREA	.7	.7	.8	.9	1.0	1.1	1.2	1.3
21 SE	ELEVATION	198.20	199.00	200.00	201.00	202.00	203.00	204.00	205.00
22 SB	DISCHARGE	0.	4.	10.	15.	19.	20.	24.	26.
23 SE	ELEVATION	198.20	199.20	200.20	201.20	202.20	203.20	204.20	205.20

COMPUTED STORAGE-ELEVATION DATA

STORAGE	.00	.56	1.34	2.21	3.17	4.23	5.39	6.65
ELEVATION	198.20	199.00	200.00	201.00	202.00	203.00	204.00	205.00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	.00	.56	.71	1.34	1.51	2.21	2.39	3.17	3.37	4.23
OUTFLOW	.00	2.80	3.50	8.70	10.00	13.60	14.50	18.10	19.00	19.80
ELEVATION	198.20	199.00	199.20	200.00	200.20	201.00	201.20	202.00	202.20	203.00
STORAGE	4.45	5.39	5.63	6.65	6.91					
OUTFLOW	20.00	23.20	24.00	25.60	26.00					
ELEVATION	203.20	204.00	204.20	205.00	205.20					

HYDROGRAPH AT STATION POND

DA	MON	HRMN	DRD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	DRD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	DRD	OUTFLOW	STORAGE	STAGE
1	0000	1	0.	.0	198.2	1	0810	50	2.	.3	198.6	1	1620	99	19.	3.8	202.6			
1	0010	2	0.	.0	198.2	1	0820	51	2.	.3	198.7	1	1630	100	19.	3.7	202.5			
1	0020	3	0.	.0	198.2	1	0830	52	2.	.4	198.7	1	1640	101	19.	3.5	202.3			
1	0030	4	0.	.0	198.2	1	0840	53	2.	.4	198.7	1	1650	102	19.	3.3	202.1			
1	0040	5	0.	.0	198.2	1	0850	54	2.	.4	198.8	1	1700	103	18.	3.1	201.9			
1	0050	6	0.	.0	198.2	1	0900	55	2.	.4	198.8	1	1710	104	17.	2.9	201.8			
1	0100	7	0.	.0	198.2	1	0910	56	2.	.4	198.8	1	1720	105	16.	2.8	201.6			
1	0110	8	0.	.0	198.2	1	0920	57	2.	.5	198.9	1	1730	106	16.	2.6	201.5			
1	0120	9	0.	.0	198.2	1	0930	58	2.	.5	198.9	1	1740	107	15.	2.5	201.3			
1	0130	10	0.	.0	198.2	1	0940	59	3.	.5	199.0	1	1750	108	14.	2.4	201.2			
1	0140	11	0.	.0	198.2	1	0950	60	3.	.6	199.0	1	1800	109	14.	2.2	201.0			
1	0150	12	0.	.0	198.2	1	1000	61	3.	.6	199.0	1	1810	110	13.	2.1	200.9			
1	0200	13	0.	.0	198.2	1	1010	62	3.	.6	199.1	1	1820	111	13.	2.0	200.8			
1	0210	14	0.	.0	198.2	1	1020	63	3.	.7	199.1	1	1830	112	12.	1.9	200.7			
1	0220	15	0.	.0	198.2	1	1030	64	4.	.7	199.2	1	1840	113	12.	1.8	200.5			
1	0230	16	0.	.0	198.2	1	1040	65	4.	.8	199.3	1	1850	114	11.	1.7	200.4			
1	0240	17	0.	.0	198.2	1	1050	66	4.	.8	199.3	1	1900	115	11.	1.6	200.3			
1	0250	18	0.	.0	198.2	1	1100	67	5.	.9	199.4	1	1910	116	10.	1.5	200.2			
1	0300	19	0.	.0	198.2	1	1110	68	5.	.9	199.4	1	1920	117	10.	1.4	200.1			
1	0310	20	0.	.0	198.2	1	1120	69	6.	1.1	199.7	1	1930	118	9.	1.4	200.0			
1	0320	21	0.	.0	198.2	1	1130	70	10.	1.5	200.2	1	1940	119	8.	1.3	200.0			
1	0330	22	0.	.0	198.2	1	1140	71	13.	2.1	200.9	1	1950	120	8.	1.2	199.9			
1	0340	23	0.	.0	198.2	1	1150	72	16.	2.7	201.5	1	2000	121	7.	1.2	199.8			
1	0350	24	0.	.0	198.2	1	1200	73	18.	3.2	202.0	1	2010	122	7.	1.1	199.7			
1	0400	25	0.	.0	198.2	1	1210	74	19.	3.7	202.6	1	2020	123	7.	1.1	199.7			
1	0410	26	0.	.0	198.2	1	1220	75	20.	4.3	203.1	1	2030	124	6.	1.0	199.6			
1	0420	27	0.	.0	198.2	1	1230	76	21.	4.8	203.5	1	2040	125	6.	1.0	199.6			
1	0430	28	0.	.0	198.2	1	1240	77	23.	5.3	204.0	1	2050	126	6.	1.0	199.5			
1	0440	29	0.	.0	198.2	1	1250	78	24.	5.8	204.4	1	2100	127	5.	.9	199.5			
1	0450	30	0.	.0	198.2	1	1300	79	25.	6.3	204.8	1	2110	128	5.	.8	199.5			

1	0500	31	0.	.0	198.2	1	1310	80	26.	6.6	203.1	1	2120	127	5.	.7	199.4
1	0510	32	0.	.0	198.2	1	1320	81	26.	7.1	205.4	1	2130	130	5.	.9	199.4
1	0520	33	0.	.0	198.3	1	1330	82	26.	7.1	205.4	1	2140	131	5.	.9	199.4
1	0530	34	0.	.0	198.3	1	1340	83	26.	6.9	205.2	1	2150	132	4.	.8	199.4
1	0540	35	0.	.1	198.3	1	1350	84	26.	6.7	205.0	1	2200	133	4.	.8	199.3
1	0550	36	0.	.1	198.3	1	1400	85	25.	6.5	204.9	1	2210	134	4.	.8	199.3
1	0600	37	0.	.1	198.3	1	1410	86	25.	6.3	204.7	1	2220	135	4.	.8	199.3
1	0610	38	1.	.1	198.3	1	1420	87	25.	6.1	204.6	1	2230	136	4.	.8	199.3
1	0620	39	1.	.1	198.4	1	1430	88	24.	5.9	204.4	1	2240	137	4.	.8	199.3
1	0630	40	1.	.1	198.4	1	1440	89	24.	5.7	204.3	1	2250	138	4.	.8	199.2
1	0640	41	1.	.2	198.4	1	1450	90	24.	5.5	204.1	1	2300	139	4.	.7	199.2
1	0650	42	1.	.2	198.4	1	1500	91	23.	5.3	203.9	1	2310	140	4.	.7	199.2
1	0700	43	1.	.2	198.5	1	1510	92	22.	5.1	203.8	1	2320	141	4.	.7	199.2
1	0710	44	1.	.2	198.5	1	1520	93	22.	4.9	203.6	1	2330	142	3.	.7	199.2
1	0720	45	1.	.2	198.5	1	1530	94	21.	4.7	203.4	1	2340	143	3.	.7	199.2
1	0730	46	1.	.2	198.5	1	1540	95	20.	4.5	203.3	1	2350	144	3.	.7	199.2
1	0740	47	1.	.3	198.6	1	1550	96	20.	4.4	203.1	2	0000	145	3.	.7	199.2
1	0750	48	1.	.3	198.6	1	1600	97	20.	4.2	203.0						
1	0800	49	1.	.3	198.6	1	1610	98	20.	4.0	202.8						

PEAK FLOW + (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW				
		6-HR	24-HR	72-HR	24.00-HR	
26.	13.33	21.	8.	8.	8.	
		(INCHES)	4.358	6.383	6.383	6.383
		(AC-FT)	11.	16.	16.	16.

PEAK STORAGE + (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.00-HR
7.	13.33	5.	2.	2.	2.

PEAK STAGE + (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.00-HR
205.38	13.33	203.42	200.09	200.09	200.09

CUMULATIVE AREA = .05 SQ MI

1
 RUNOFF SUMMARY
 FLOW IN CUBIC FEET PER SECOND
 TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
				6-HOUR	24-HOUR	72-HOUR			
HYDROGRAPH AT	TRIB-1	61.	13.17	25.	8.	8.	.05		
ROUTED TO	POND	26.	13.33	21.	8.	8.	.05		
								205.38 13.33	

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