

DETENTION CALCULATIONS  
**MEL HAMBELTON**  
**ADDITION**  
TO  
WICHITA, SEDGWICK COUNTY, KANSAS

Prepared By

 **BAUGHMAN COMPANY, P.A.**  
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March 26, 2001

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* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* MAY 1991 *
* VERSION 4.0.1E *
* Lahey F77L-EM/32 version 5.01 *
* Dodson & Associates, Inc. *
* RUN DATE 03/26/01 TIME 16:17:54 *
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* U.S. ARMY CORPS OF ENGINEERS *
* HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 551-1748 *
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION  
 NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,  
 DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION  
 KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

HEC-1 INPUT

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LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
1 ID OVERALL DRAINAGE BASIN
  * proposed conditions
  * this plan assumes that no overland capacity is available
  * to the east of the development
  * at this time
2 IT 5 26MAR01 0000 300 2001
3 IO 3 0
4 JR PREC 1.0000 1.3143 1.5143 1.7714 2.0000 2.2286
  *DIAGRAM
  *
5 KK SITE
6 BA .05
7 PB 3.5
8 IN 60
9 PC 0 0.011 0.022 0.035 0.048 0.063 0.080 0.098 0.120 0.147
10 PC 0.181 0.235 0.663 0.772 0.820 0.854 0.880 0.902 0.921 0.937
11 PC 0.952 0.965 0.978 0.989 1.000
12 UD .15
13 LS 0 98
  *
14 KK POND
15 RS 1 ELEV 134
16 SA 1.5 3.3
17 SE 134 140
18 SQ 4.5 4.5
19 SE 134.1 148
  *
20 ZZ

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SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT

LINE (V) ROUTING (--->) DIVERSION OR PUMP FLOW  
 NO. (.) CONNECTOR (<---) RETURN OF DIVERTED OR PUMPED FLOW

5 SITE  
 V  
 V  
 14 POND

(\*\*\*) RUNOFF ALSO COMPUTED AT THIS LOCATION

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OVERALL DRAINAGE BASIN

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

IT HYDROGRAPH TIME DATA  
 NMIN 5 MINUTES IN COMPUTATION INTERVAL  
 IDATE 26MAR 1 STARTING DATE  
 ITIME 0000 STARTING TIME  
 NQ 300 NUMBER OF HYDROGRAPH ORDINATES  
 NDDATE 27MAR 1 ENDING DATE  
 NDTIME 0055 ENDING TIME  
 ICENT 20 CENTURY MARK

COMPUTATION INTERVAL 0.08 HOURS  
 TOTAL TIME BASE 24.92 HOURS

ENGLISH UNITS  
 DRAINAGE AREA SQUARE MILES  
 PRECIPITATION DEPTH INCHES  
 LENGTH, ELEVATION FEET  
 FLOW CUBIC FEET PER SECOND  
 STORAGE VOLUME ACRE-Feet  
 SURFACE AREA ACRES  
 TEMPERATURE DEGREES FAHRENHEIT

JP MULTI-PLAN OPTION  
 NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION  
 RATIOS OF PRECIPITATION  
 1.00 1.31 1.51 1.77 2.00 2.23

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\*\*\*\*\*  
 \* SITE \*  
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 \*\*\*\*\*

8 IN TIME DATA FOR INPUT TIME SERIES



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HYDROGRAPH AT STATION        SITE  
FOR PLAN 1, RATIO = 1.00

TOTAL RAINFALL = 3.50, TOTAL LOSS = 0.23, TOTAL EXCESS = 3.27

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW				
			6-HR	24-HR	72-HR	24.92-HR	
+	48.	12.00	(CFS)				
			13.	4.	4.	4.	
		(INCHES)	2.424	3.266	3.266	3.266	
		(AC-FT)	6.	9.	9.	9.	

CUMULATIVE AREA = 0.05 SQ MI

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HYDROGRAPH AT STATION        SITE  
FOR PLAN 1, RATIO = 1.31

TOTAL RAINFALL = 4.60, TOTAL LOSS = 0.24, TOTAL EXCESS = 4.36

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW				
			6-HR	24-HR	72-HR	24.92-HR	
+	63.	12.00	(CFS)				
			17.	6.	6.	6.	
		(INCHES)	3.209	4.364	4.364	4.364	
		(AC-FT)	9.	12.	12.	12.	

CUMULATIVE AREA = 0.05 SQ MI

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HYDROGRAPH AT STATION        SITE  
FOR PLAN 1, RATIO = 1.51

TOTAL RAINFALL = 5.30, TOTAL LOSS = 0.24, TOTAL EXCESS = 5.06

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW				
			6-HR	24-HR	72-HR	24.92-HR	
+	73.	12.00	(CFS)				
			20.	7.	7.	7.	
		(INCHES)	3.708	5.063	5.063	5.063	
		(AC-FT)	10.	14.	14.	14.	

CUMULATIVE AREA = 0.05 SQ MI

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HYDROGRAPH AT STATION        SITE  
FOR PLAN 1, RATIO = 1.77

TOTAL RAINFALL = 6.20, TOTAL LOSS = 0.24, TOTAL EXCESS = 5.96

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW				
			6-HR	24-HR	72-HR	24.92-HR	
+	85.	12.00	(CFS)				
			23.	8.	8.	8.	
		(INCHES)	4.348	5.962	5.962	5.962	
		(AC-FT)	12.	16.	16.	16.	

CUMULATIVE AREA = 0.05 SQ MI

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HYDROGRAPH AT STATION     SITE  
FOR PLAN 1, RATIO = 2.00

TOTAL RAINFALL =	7.00,	TOTAL LOSS =	0.24,	TOTAL EXCESS =	6.76
PEAK FLOW	TIME			MAXIMUM AVERAGE FLOW	
(CFS)	(HR)			6-HR	24-HR
96.	12.00	(CFS)		72-HR	24.92-HR
		26.	9.	9.	9.
		(INCHES)	4.916	6.761	6.761
		(AC-FT)	13.	18.	18.
		CUMULATIVE AREA =	0.05 SQ MI		

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HYDROGRAPH AT STATION     SITE  
FOR PLAN 1, RATIO = 2.23

TOTAL RAINFALL =	7.80,	TOTAL LOSS =	0.24,	TOTAL EXCESS =	7.56
PEAK FLOW	TIME			MAXIMUM AVERAGE FLOW	
(CFS)	(HR)			6-HR	24-HR
108.	12.00	(CFS)		72-HR	24.92-HR
		29.	10.	10.	10.
		(INCHES)	5.483	7.560	7.560
		(AC-FT)	15.	20.	20.
		CUMULATIVE AREA =	0.05 SQ MI		

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14 KK            \*     POND     \*  
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HYDROGRAPH ROUTING DATA

15 RS	STORAGE ROUTING		
	NSTPS	1	NUMBER OF SUBREACHES
	ITYP	ELEV	TYPE OF INITIAL CONDITION
	RSVRIC	134.00	INITIAL CONDITION
	X	0.00	WORKING R AND D COEFFICIENT
16 SA	AREA	1.5	3.3
17 SE	ELEVATION	134.00	140.00
18 SQ	DISCHARGE	5.	5.
19 SE	ELEVATION	134.10	148.00

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COMPUTED STORAGE-ELEVATION DATA

STORAGE	0.00	14.05
ELEVATION	134.00	140.00

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	0.00	0.15	14.05	53.58
OUTFLOW	4.50	4.50	4.50	4.50
ELEVATION	134.00	134.10	140.00	148.00

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HYDROGRAPH AT STATION      POND  
FOR PLAN 1, RATIO = 1.00

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
(CFS)	(HR)		6-HR	24-HR	72-HR	24.92-HR
+	5.	0.08				
		(CFS)	5.	5.	5.	5.
		(INCHES)	0.837	3.347	3.475	3.475
		(AC-FT)	2.	9.	9.	9.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
(AC-FT)	(HR)		6-HR	24-HR	72-HR	24.92-HR
+	4.	14.17				
			4.	2.	2.	2.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
(FEET)	(HR)		6-HR	24-HR	72-HR	24.92-HR
+	135.88	14.17				
			135.79	134.85	134.82	134.82

CUMULATIVE AREA = 0.05 SQ MI

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HYDROGRAPH AT STATION      POND  
FOR PLAN 1, RATIO = 1.31

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
(CFS)	(HR)		6-HR	24-HR	72-HR	24.92-HR
+	5.	0.08				
		(CFS)	5.	5.	5.	5.
		(INCHES)	0.837	3.347	3.475	3.475
		(AC-FT)	2.	9.	9.	9.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
(AC-FT)	(HR)		6-HR	24-HR	72-HR	24.92-HR
+	6.	15.17				
			6.	3.	3.	3.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
(FEET)	(HR)		6-HR	24-HR	72-HR	24.92-HR
+	136.72	15.17				
			136.65	135.35	135.30	135.30

CUMULATIVE AREA = 0.05 SQ MI

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HYDROGRAPH AT STATION      POND  
FOR PLAN 1, RATIO = 1.51

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
(CFS)	(HR)		6-HR	24-HR	72-HR	24.92-HR
+	5.	0.08				
		(CFS)	5.	5.	5.	5.
		(INCHES)	0.837	3.347	3.475	3.475
		(AC-FT)	2.	9.	9.	9.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
8.	15.33	8.	4.	4.	4.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
137.28	15.50	137.23	135.69	135.63	135.63

CUMULATIVE AREA = 0.05 SQ MI

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HYDROGRAPH AT STATION      POND  
FOR PLAN 1, RATIO = 1.77

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
5.	0.08	5.	5.	5.	5.
(INCHES)		0.837	3.347	3.475	3.475
(AC-FT)		2.	9.	9.	9.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
9.	16.25	9.	5.	5.	5.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
138.05	16.33	138.01	136.13	136.05	136.05

CUMULATIVE AREA = 0.05 SQ MI

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HYDROGRAPH AT STATION      POND  
FOR PLAN 1, RATIO = 2.00

PEAK FLOW (CFS)	TIME (HR)	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	24.92-HR
5.	0.08	5.	5.	5.	5.
(INCHES)		0.837	3.347	3.475	3.475
(AC-FT)		2.	9.	9.	9.

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
11.	17.17	11.	6.	6.	6.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
138.77	17.25	138.73	136.54	136.44	136.44

CUMULATIVE AREA = 0.05 SQ MI

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HYDROGRAPH AT STATION      POND  
FOR PLAN 1, RATIO = 2.23

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)	(CFS)				
+ 5.	0.08		5.	5.	5.	5.
		(INCHES)	0.837	3.347	3.475	3.475
		(AC-FT)	2.	9.	9.	9.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)					
+ 13.	18.08		13.	7.	7.	7.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)					
+ 139.51	18.17		139.48	136.95	136.84	136.84

CUMULATIVE AREA = 0.05 SQ MI

1  
 PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS  
 FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES  
 TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO PRECIPITATION					
				RATIO 1	RATIO 2	RATIO 3	RATIO 4	RATIO 5	RATIO 6
				1.00	1.31	1.51	1.77	2.00	2.23
HYDROGRAPH AT									
+ SITE		0.05	1 FLOW	48.	63.	73.	85.	96.	108.
			TIME	12.00	12.00	12.00	12.00	12.00	12.00
ROUTED TO									
+ POND		0.05	1 FLOW	5.	5.	5.	5.	5.	5.
			TIME	0.08	0.08	0.08	0.08	0.08	0.08
			** PEAK STAGES IN FEET **						
			1 STAGE	135.88	136.72	137.28	138.05	138.77	139.51
			TIME	14.17	15.17	15.50	16.33	17.25	18.17

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