

Introduction

This report provides information and supporting documentation to support the "Drainage Plan" for Messiah Baptist Church Addition to Sedgwick County, Kansas. The site is located within Section 3, of TWP-27-S, R-2-E.

The "Drainage Plan" being submitted herein is intended to serve as a guide for the design of streets and storm water sewer improvements. Modifications to structures, pipes, etc, may be made as necessary during the final design in order to obtain the most economical design and construction possible.

Peak Flow Analysis

The peak flow rates for the defined basins were computed using the "Rational Method". The Rational "C" coefficients were assigned to the basins according to land use.

Basin #1

The existing land use for drainage basin #1 is open space. A rational "C" value of 0.40 was assigned to this basin. There are no proposed changes to this basin.

Area = 3.3 acres
Time of Concentration = 15 min.
I₂ = 3.83 in/hr.
I₁₀ = 5.22 in/hr.
I₁₀₀ = 7.37 in/hr.

Q = CIA
Q₂ = 5.1 cfs
Q₁₀ = 6.9 cfs
Q₁₀₀ = 9.7 cfs

Basin #2 and #3

The existing basin will be divided during development. The existing land use for these basins is undeveloped open space. A rational "C" value of 0.40 was assigned for existing conditions. Basin #3 will have minimal improvements, with a developed "C" value of 0.42. Basin #2 will have an increase of 5 impervious acres. A weighted rational "C" value based on area, of 0.56 was assigned for developed conditions. A detention facility will be installed within basin #2.

Existing Runoff

Area = 15.1 acres
Time of Concentration = 25 min.
I₂ = 2.96 in/hr.
I₁₀ = 4.13 in/hr.
I₁₀₀ = 5.90 in/hr.

Q = CIA
Q₂ = 17.9 cfs
Q₁₀ = 24.9 cfs
Q₁₀₀ = 35.6 cfs

Developed Runoff (Basin #2)

Area = 11.9 acres
Time of Concentration = 25 min.
I₂ = 2.96 in/hr.
I₁₀ = 4.13 in/hr.
I₁₀₀ = 5.90 in/hr.

Q = CIA
Q₂ = 19.7 cfs
Q₁₀ = 27.5 cfs
Q₁₀₀ = 39.4 cfs

Developed Runoff (Basin #3)

Area = 3.2 acres
Time of Concentration = 15 min.
I₂ = 3.83 in/hr.
I₁₀ = 5.22 in/hr.
I₁₀₀ = 7.37 in/hr.

Q = CIA
Q₂ = 5.1 cfs
Q₁₀ = 7.0 cfs
Q₁₀₀ = 9.9 cfs

Basin #4 and #5

The existing basin will be divided during development. The existing land use for these basins is undeveloped open space. A rational "C" value of 0.40 was assigned for existing conditions. Basin #5 will have minimal improvements, with a developed "C" value of 0.42. Basin #4 will have an increase of 5 impervious acres. A weighted rational "C" value based on area, of 0.61 was assigned for developed conditions. A detention facility will be installed within basin #4.

Existing Runoff

Area = 19.7 acres
Time of Concentration = 25 min.
I₂ = 2.96 in/hr.
I₁₀ = 4.13 in/hr.
I₁₀₀ = 5.90 in/hr.

Q = CIA
Q₂ = 23.3 cfs
Q₁₀ = 32.5 cfs
Q₁₀₀ = 46.5 cfs

Developed Runoff (Basin #4)

Area = 11.9 acres
Time of Concentration = 25 min.
I₂ = 2.96 in/hr.
I₁₀ = 4.13 in/hr.
I₁₀₀ = 5.90 in/hr.

Q = CIA
Q₂ = 29.8 cfs
Q₁₀ = 41.6 cfs
Q₁₀₀ = 59.4 cfs

Developed Runoff (Basin #5)

Area = 3.2 acres
Time of Concentration = 15 min.
I₂ = 3.83 in/hr.
I₁₀ = 5.22 in/hr.
I₁₀₀ = 7.37 in/hr.

Q = CIA
Q₂ = 5.1 cfs
Q₁₀ = 7.0 cfs
Q₁₀₀ = 9.9 cfs

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	4.98-HR
(AC-FT)	(HR)				
1.	3.00	0.	0.	0.	0.
PEAK STAGE		MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	4.98-HR
(FEET)	(HR)				
1380.57	3.00	1378.98	1378.98	1378.98	1378.98
CUMULATIVE AREA = 0.02 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	WEST	48.	2.78	8.	8.	8.	0.02		
ROUTED TO	POND1	33.	3.00	7.	7.	7.	0.02	1380.57	3.00

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

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	4.98-HR
(AC-FT)	(HR)				
1.	3.00	0.	0.	0.	0.
PEAK STAGE		MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	4.98-HR
(FEET)	(HR)				
1380.57	3.00	1378.98	1378.98	1378.98	1378.98
CUMULATIVE AREA = 0.02 SQ MI					

ROUTING DATA									
STORAGE									
ROUTING									
1	NUMBER OF SUBREACHES								
1379	ELEVATION								
1378.00	INITIAL CONDITION								
RSVRC	0.00	WORKING K AND D COEFFICIENT							
X									
12	AREA	0.0	1.3						
13	ELEVATION	1378.00	1381.00						
14	LOW-LEVEL OUTLET								
ELEV	1379.00	ELEVATION AT CENTER OF OUTLET							
CAREA	3.14	CROSS-SECTIONAL AREA							
COOL	0.67	COEFFICIENT							
EXPL	0.50	EXPONENT OF HEAD							
15	SPILLWAY								
ORGL	1380.00	SPILLWAY GREST ELEVATION							
SPWD	10.00	SPILLWAY WIDTH							
COEW	2.80	WEIR COEFFICIENT							
EXPW	1.50	EXPONENT OF HEAD							

COMPUTED STORAGE-ELEVATION DATA									
STORAGE									
ELEVATION									
0.00	1.30								
1378.00	1381.00								
COMPUTED OUTFLOW-ELEVATION DATA									
OUTFLOW									
ELEVATION									
0.00	0.00	15.47	15.83	16.00	16.16	16.31	16.51	16.69	16.87
1378.00	1379.00	1379.86	1379.88	1379.90	1379.92	1379.94	1379.96	1379.98	1380.00
COMPUTED STORAGE-OUTFLOW-ELEVATION DATA									
STORAGE									
OUTFLOW									
ELEVATION									
0.00	0.05	0.31	0.32	0.33	0.34	0.35	0.36	0.37	0.39
0.00	0.00	15.47	15.83	16.00	16.16	16.34	16.51	16.69	16.87
1378.00	1379.00	1379.86	1379.88	1379.90	1379.92	1379.94	1379.96	1379.98	1380.00
0.43	0.47	0.51	0.56	0.63	0.72	0.82	0.95	1.11	1.30
18.15	19.25	20.43	22.97	25.74	29.23	33.50	38.64	44.74	51.86
1380.08	1380.13	1380.19	1380.27	1380.36	1380.46	1380.58	1380.71	1380.85	1381.00

HYDROGRAPH AT STATION POND1									
PEAK FLOW									
TIME									
MAXIMUM AVERAGE FLOW									
6-HR 24-HR 72-HR 4.98-HR									
(CFS)									
33.	3.00	7.	7.	7.	7.				
(INCHES)		3.207	3.207	3.207	3.207				
(AC-FT)		3.	3.	3.	3.				

HEC-1 INPUT									
ID									
1	HESSIAN BAPTIST CHURCH								
2	WEST BASIN POND								
3	1 150097	0000	300						
4	10	3	0						
5	KK WEST								
6	BA .018								
7	PH 0	0	0.86	1.8425	3.73	4.6	5.04	5.94	6.96
8	10	0	0.6175	1.305	2.53	3.1	3.39	4.02	4.68
9	5	0	0.544	1.14	2.15	2.66	2.91	3.42	3.96
10	2	0	0.464	.9575	1.69	1.98	2.16	2.52	3.00
11	UG .25								
12	LS 0	79							
13	KK POND1								
14	RS 1	ELEV	1378						
15	SA 0	1.3							
16	SE 1378	1381							
17	SL 1379	3.14	.67	.5					
18	SS 1380	10	2.8	1.5					

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1G, HEC1GB, AND HEC1KW. THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIO- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSK- 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									
ID									
1	HESSIAN BAPTIST CHURCH								
2	WEST BASIN POND								
3	1 150097	0000	300						
4	10	3	0						
5	KK WEST								
6	BA .018								
7	PH 0	0	0.86	1.8425	3.73	4.6	5.04	5.94	6.96
8	10	0	0.6175	1.305	2.53	3.1	3.39	4.02	4.68
9	5	0	0.544	1.14	2.15	2.66	2.91	3.42	3.96
10	2	0	0.464	.9575	1.69	1.98	2.16	2.52	3.00
11	UG .25								
12	LS 0	79							
13	KK POND1								
14	RS 1	ELEV	1378						
15	SA 0	1.3							
16	SE 1378	1381							
17	SL 1379	3.14	.67	.5					
18	SS 1380	10	2.8	1.5					

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1G, HEC1GB, AND HEC1KW. THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIO- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSK- 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									
ID									
1	HESSIAN BAPTIST CHURCH								
2	EAST BASIN POND								
3	1 150097	0000	300						
4	10	3	0						
5	KK EAST								
6	BA .018								
7	PH 100	0	0.86	1.8425	3.73	4.6	5.04	5.94	6.96
8	10	0	0.6175	1.305	2.53	3.1			

***		***		***		***		***	
HYDROGRAPH AT STATION EAST									
TOTAL RAINFALL =		5.68, TOTAL LOSS =		2.19, TOTAL EXCESS =		3.50			
PEAK FLOW	TIME	6-HR		MAXIMUM AVERAGE FLOW		72-HR		4.98-HR	
* (CFS)	(HR)								
* 54.	2.78	(CFS)		11.	11.	11.	11.		
		(INCHES)		3.357	3.357	3.357	3.357		
		(AC-FT)		5.	5.	5.	5.		
CUMULATIVE AREA =		0.03 SQ MI							

 10 KK POND1 *****

HYDROGRAPH ROUTING DATA				
11 RS	STORAGE ROUTING	1 st NUMBER OF SUBREACHES		
	NOTES	ELEV	TYPE OF INITIAL CONDITION	
	117P	1377.00	INITIAL CONDITION	
	RSVRC	X	0.00	WORKING R AND D COEFFICIENT
12 SA	AREA	0.0	1.0	1.3
13 SE	ELEVATION	1377.00	1378.00	1381.00
14 SL	LOW-LEVEL OUTLET	ELEVATION AT CENTER OF OUTLET		
	ELEV	1379.00	CROSS-SECTIONAL AREA	
	CAREA	3.14	COEFFICIENT	
	COUL	0.67	EXPONENT OF HEAD	
	EXPL	1.50		
15 SS	SPILLWAY	SPILLWAY CREST ELEVATION		
	OREL	1380.00	SPILLWAY WIDTH	
	SHWD	10.00	WEIR COEFFICIENT	
	COM	2.00	EXPONENT OF HEAD	
	EXPW	1.50		

COMPUTED STORAGE-ELEVATION DATA									
STORAGE	0.00	0.33	3.77						
ELEVATION	1377.00	1378.00	1381.00						

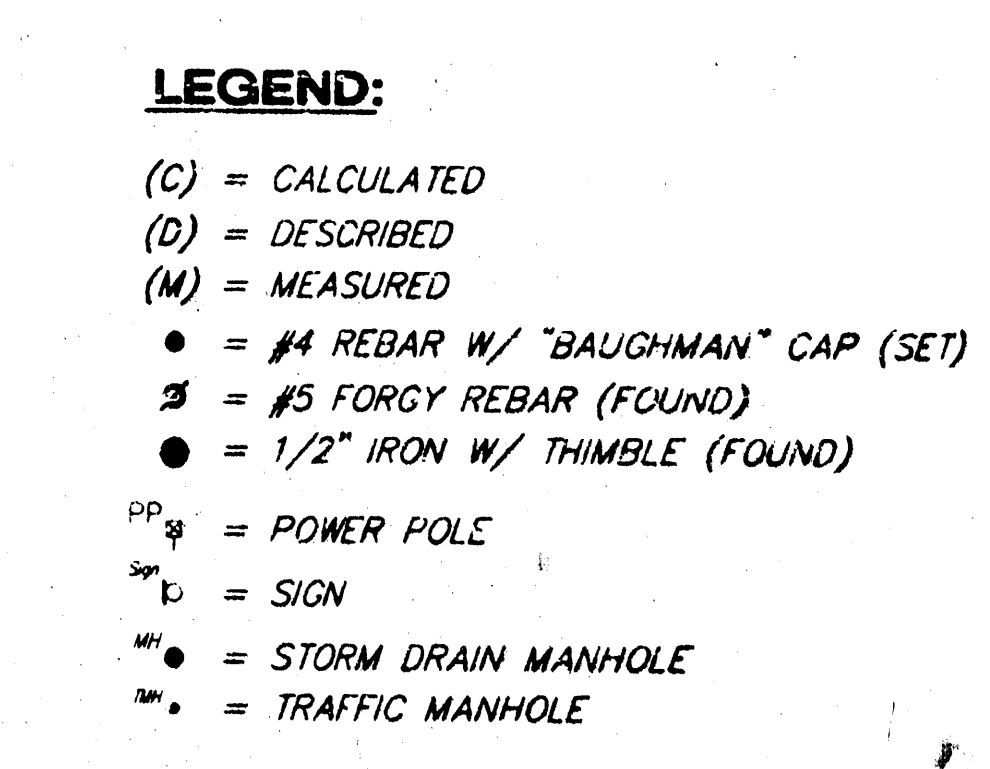
COMPUTED OUTFLOW-ELEVATION DATA									
OUTFLOW	0.00	0.00	15.67	15.83	16.00	16.16	16.34	16.51	16.67
ELEVATION	1377.00	1379.00	1379.86	1379.88	1379.90	1379.92	1379.94	1379.96	1380.00
OUTFLOW	16.14	19.25	20.83	22.97	25.74	29.22	33.50	38.64	44.74
ELEVATION	1380.08	1380.13	1380.19	1380.27	1380.36	1380.46	1380.58	1380.71	1380.85

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA									
STORAGE	0.00	0.33	1.38	2.36	2.38	2.41	2.43	2.45	2.50
OUTFLOW	0.00	0.00	0.00	15.67	15.83	16.00	16.16	16.34	16.51
ELEVATION	1377.00	1378.00	1379.00	1379.86	1379.88	1379.90	1379.92	1379.94	1379.96
STORAGE	2.53	2.62	2.68	2.76	2.85	2.96	3.09	3.23	3.40
OUTFLOW	16.67	16.15	19.25	20.83	22.97	25.74	29.22	33.50	38.64
ELEVATION	1380.00	1380.08	1380.13	1380.19	1380.27	1380.36	1380.46	1380.58	1380.71
STORAGE	3.77								
OUTFLOW	51.86								
ELEVATION	1381.00								

***	***	***	***	***
HYDROGRAPH AT STATION POND1				
PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW		
		6-HR	24-HR	72-HR
+ (CFS)	(HR)			4.96-HR
+ 20.	3.55	(CFS)	6.	6.
		(INCHES)	1.923	1.923
		(AC-FT)	3.	3.
PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE		
		6-HR	24-HR	72-HR
+ (AC-FT)	(HR)			4.98-HR
	3.	3.53	1.	1.
PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE		
		6-HR	24-HR	72-HR
+ (FEET)	(HR)			4.98-HR
1380.15	3.55	1378.36	1378.36	1378.36
CUMULATIVE AREA = 0.03 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	EAST	54.	2.78	11.	11.	11.	0.03		
ROUTED TO	POND1	20.	3.55	6.	6.	6.	0.03	1380.15	3.55

*** NORMAL END OF REC-1 ***



OWNER:
MESSIAH BAPTIST CHURCH
ATTN: PASTOR MARK HOOVER
2006 S. HILLSIDE
MCHITA, KANSAS 67211
(316) 682-9445

LEGAL DESCRIPTION:

THE WEST 40 ACRES OF THE SOUTHWEST QUARTER OF THE
SOUTHEAST QUARTER OF SECTION 3, TOWNSHIP 26 SOUTH,
RANGE 2 EAST OF THE SIXTH PRINCIPAL MERIDIAN, SEDGWICK
COUNTY, KANSAS.

BENCH MARK:
GREENWICH AND 21ST NORTH
CITY OF WICHITA BENCH MARK - DISC
41' SOUTH AND 58' WEST OF IRON CTR LINE BOTH
17.0' SW OF ASPHALT, 14.2' EAST OF FACE P.P.
17.0' WEST OF FACE P.P.
ELEVATION = 1361.38 (CITY DATUM)

NOTE:

NO RURAL WATER IN AREA.