

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

* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* MAY 1991 *
* VERSION 4.0.1E *
* Lohrey F77L-BN/32 version 5.01 *
* Dodson & Associates, Inc. *
* RUN DATE 05/19/97 TIME 11:32:23 *

X X XXXXXXX XXXX X
X X X X X X X
X X X X X X X
XXXXXXX XXXX X XXXXX X
X X X X X X X
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X X XXXXXXX XXXXX XXX

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, 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, DIS-WRITE STAGE FREQUENCY, DESIRED TIME SERIES AT DESIRED CALCULATION INTERVAL, LOSS RATE:GREEN AND AMPT INFILTRATION. KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM.

HEC-1 INPUT PAGE 1

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
1 ID MESSIAH BAPTIST CHURCH
2 ID WEST BASIN POND
3 IT 1 15MAY97
4 IO 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 8.16
+ 10 0 0.6175 1.305 2.53 3.1 3.39 4.02 4.68 5.52
+ 5 0 0.544 1.14 2.15 2.66 2.91 3.42 3.96 4.8
+ 2 0 0.464 .9575 1.69 1.98 2.16 2.52 3.00 3.6
8 US .25
9 LS 0 79
10 KK POND1
11 RS 1 ELEV 1378
12 SA 0 1.3
13 SE 1378 1381
14 SL 1379 3.14 .67 .5
15 SS 1380 10 2.8 1.5
16 ZZ

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MESSIAH BAPTIST CHURCH
WEST BASIN POND

4 TO OUTPUT CONTROL VARIABLES

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X X XXXXXXX XXXX X
X X X X X X X
X X X X X X X
XXXXXXX XXXX X XXXXX X
X X X X X X X
X X X X X X X
X X XXXXXXX XXXXX XXX

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1 ID MESSIAH BAPTIST CHURCH
2 ID EAST BASIN POND
3 IT 1 15MAY97
4 IO 3 0
5 KK EAST
6 BA .058
7 PH 100 0 0.86 1.8425 3.73 4.6 5.04 5.94 6.96 8.16
+ 10 0 0.6175 1.305 2.53 3.1 3.39 4.02 4.68 5.52
+ 5 0 0.544 1.14 2.15 2.66 2.91 3.42 3.96 4.8
+ 2 0 0.464 .9575 1.69 1.98 2.16 2.52 3.00 3.6
8 US .25
9 LS 0 80
10 KK POND1
11 RS 1 ELEV 1377
12 SA 0 1.0
13 SE 1377 1378 1381
14 SL 1379 3.14 .67 .5
15 SS 1380 10 2.8 1.5
16 ZZ

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MESSIAH BAPTIST CHURCH
EAST BASIN POND

4 TO OUTPUT CONTROL VARIABLES

IPRINT 3 PRINT CONTROL
IPLOT 0 PLOT CONTROL
OSCAL 0. HYDROGRAPH PLOT SCALE
IT HYDROGRAPH TIME DATA 1 MINUTES IN COMPUTATION INTERVAL
NMIN 15MAY97 STARTING DATE
ITIME 0000 STARTING TIME
NDATE 300 NUMBER OF HYDROGRAPH ORDINATES
NDATE 15MAY97 ENDING DATE
NDTIME 0459 ENDING TIME
ICENT 19 CENTURY MARK
COMPUTATION INTERVAL 0.02 HOURS
TOTAL TIME BASE 4.98 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

5 KK
+ WEST

SUBBASIN RUNOFF DATA

6 BA SUBBASIN CHARACTERISTICS
TAREA 0.02 SUBBASIN AREA

PRECIPITATION DATA

7 PH DEPTHS FOR 0-PERCENT HYPOTHETICAL STORM
HYDRO-35 TP-40
5-MIN 15-MIN 60-MIN 2-HR 3-HR 6-HR 12-HR 24-HR 2-DAY 4-DAY 7-DAY 10-DAY
0.86 1.84 3.73 4.60 5.04 5.94 6.96 8.16 0.00 0.00 0.00 0.00

STORM AREA = 0.02

9 LS SCS LOSS RATE 0.53 INITIAL ABSTRACTION
CRVNR 79.00 CURVE NUMBER
RTIMP 0.00 PERCENT IMPERVIOUS AREA

8 LD SCS DIMENSIONLESS UNITGRAPH
TLAG 0.25 LAG

VALUE EXCEEDS TABLE IN LOGLOG 0.01667 0.01667 24.00000

UNIT HYDROGRAPH

115 END-OF-PERIOD ORDINATES

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100.

HYDROGRAPH AT STATION WEST

TOTAL RAINFALL = 5.68, TOTAL LOSS = 2.29, TOTAL EXCESS = 3.40

PEAK FLOW TIME MAXIMUM AVERAGE FLOW

6-HR 24-HR 72-HR 4.98-HR

4 (CFS) (HR)

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X X XXXXXXX XXXX X
X X X X X X X
X X X X X X X
XXXXXXX XXXX X XXXXX X
X X X X X X X
X X X X X X X
X X XXXXXXX XXXXX XXX

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MESSIAH BAPTIST CHURCH
EAST BASIN POND

4 TO OUTPUT CONTROL VARIABLES

IPRINT 3 PRINT CONTROL

| *** | | *** | | *** | | *** | | *** | |
|----------------------------|------|--------------------|--|----------------------|--|-------|--|-------|--|
| HYDROGRAPH AT STATION EAST | | | | | | | | | |
| TOTAL RAINFALL = | | 5.68, TOTAL LOSS = | | 2.19, TOTAL EXCESS = | | 3.50 | | | |
| PEAK FLOW | TIME | 6-HR | | MAXIMUM AVERAGE FLOW | | 24-HR | | 72-HR | |
| + (CFS) | (HR) | | | | | | | | |
| 54. | 2.78 | (CFS) | | 11. | | 11. | | 11. | |
| | | (INCHES) | | 3.357 | | 3.357 | | 3.357 | |
| | | (AC-FT) | | 5. | | 5. | | 5. | |
| (continued) | | | | | | | | | |
| CUMULATIVE AREA = | | | | 0.03 SQ MI | | | | | |

 10 KK * *
 * POND1 *
 * *

| HYDROGRAPH ROUTING DATA | | | | | | |
|-------------------------|------------------|---------|-------------------------------|-----------------------------|--|--|
| 11 RS | STORAGE ROUTING | | NUMBER OF SUBREACHES | | | |
| | NTSPS | | | | | |
| | ITYP | | ELEV | TYPE OF INITIAL CONDITION | | |
| | RSVRC | | 1377.00 | INITIAL CONDITION | | |
| | 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 | | | | | |
| | ELEV | 1379.00 | ELEVATION AT CENTER OF OUTLET | | | |
| | CAREA | 3.14 | CROSS-SECTIONAL AREA | | | |
| | COOL | 0.67 | COEFFICIENT | | | |
| | EXPL | 1.50 | EXPONENT OF HEAD | | | |
| 15 SS | SPILLWAY | | SPILLWAY CREST ELEVATION | | | |
| | SHWD | 10.00 | SPILLWAY WIDTH | | | |
| | COM | 2.80 | WEIR COEFFICIENT | | | |
| | EXPW | 1.50 | EXPONENT OF HEAD | | | |

| 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 | 18.14 | 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 |

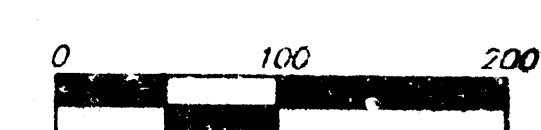
| COMPUTED STORAGE-OUTFLOW-ELEVATION DATA | | | | | | | | | |
|---|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| STORAGE | 0.00 | 0.33 | 1.38 | 2.36 | 2.38 | 2.41 | 2.43 | 2.45 | 2.50 |
| OUTFLOW | 0.00 | 0.00 | 0.00 | 15.67 | 15.83 | 16.00 | 16.16 | 16.34 | 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 | 16.87 | 18.15 | 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 | 6-HR | | MAXIMUM AVERAGE FLOW | |
| | | | | 24-HR | 72-HR |
| + (CFS) | (HR) | | | | |
| 20. | 3.55 | (CFS) | 6. | 6. | 6. |
| | | (INCHES) | 1.923 | 1.923 | 1.923 |
| | | (AC-FT) | 3. | 3. | 3. |
| PEAK STORAGE | TIME | 6-HR | | MAXIMUM AVERAGE STORAGE | |
| | | | | 24-HR | 72-HR |
| + (AC-FT) | (HR) | | | | |
| 3. | 3.53 | 1. | 1. | 1. | 1. |
| PEAK STAGE | TIME | 6-HR | | MAXIMUM AVERAGE STAGE | |
| | | | | 24-HR | 72-HR |
| + (FEET) | (HR) | | | | |
| 1380.15 | 3.55 | 1378.36 | 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 ***

NW. CORNER, SE. 1/4
SEC. 3, T14N. 27S, R. 2E



LEGEND:

(C) = CALCULATED
(D) = DESCRIBED
(M) = MEASURED

- = #4 REBAR W/ "BAUGHMAN" CAP (SET)
- = #5 FORGY REBAR (FOUND)
- = 1/2" IRON W/ THIMBLE (FOUND)

PP = POWER POLE
Sgn = SIGN

- = STORM DRAIN MANHOLE
- = TRAFFIC MANHOLE

OWNER:

MESSIAH BAPTIST CHURCH
ATTN: PASTOR MARK HOOVER
2006 S. HILLSIDE
WICHITA, 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.