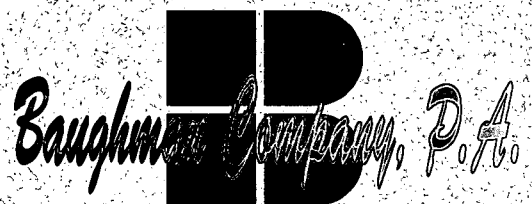


DRAINAGE PLAN FOR
**HICKORY CREEK
ADDITION**

WICHITA, SEDGWICK COUNTY, KANSAS



DRAINAGE PLAN FOR

**HICKORY CREEK
ADDITION**

WICHITA, SEDGWICK COUNTY, KANSAS

Prepared By

Baughman Company, P.A.

October 25, 1995

TABLE OF CONTENTS

Introduction
SCS Soils Map.....1
Rational Formula Flow Rates.....2
Channel Data U/S of Box Culvert.....3
Box Culvert Data.....6
Storm Water Sewer Pipe Data.....10
Weir Structure Data.....44
FEMA Floodplain & Floodway Maps.....45
Drainage Plan Sheet.....46

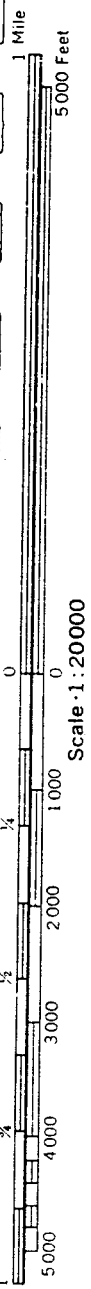
INTRODUCTION

This report provides information and supporting documentation to support the "Drainage Plan" for the property located in the Northwest Quarter of Section 13, T27-S, R2-W in Sedgwick County, Kansas.

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.



(Joins sheet 24)

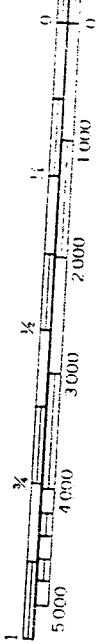


380,000 FEET

T. 27 S.

(Joins sheet 33)

2 275 000 FEET (Joins shee



HICKORY CREEK ADDITION
BAUGHMAN COMPANY, P.A. - JDS

SUB AREA	AREA (ACRES)	"C"		INTENSITY (IN/HR)		FLOW RATE (CFS)	
		2 YR.	100 YR.	2 YR.	100 YR.	2 YR.	100 YR.
1	5.14	0.26	0.53	3.83	7.37	5.1	20.1
2	6.67	0.48	0.68	3.83	7.37	12.3	33.4
3	4.13	0.48	0.68	3.83	7.37	7.6	20.7
4	1.65	0.26	0.53	3.83	7.37	1.6	6.4
5	3.12	0.48	0.68	3.83	7.37	5.7	15.6
6	4.82	0.48	0.68	3.83	7.37	8.9	24.2
7	1.31	0.26	0.53	3.83	7.37	1.3	5.1
8	5.90	0.48	0.68	3.83	7.37	10.8	29.6
9	3.98	0.48	0.68	3.83	7.37	7.3	19.9
10	0.92	0.48	0.68	3.83	7.37	1.7	4.6
11	1.38	0.48	0.68	3.83	7.37	2.5	6.9
12	0.96	0.26	0.53	3.83	7.37	1.0	3.7
13	2.22	0.48	0.68	3.83	7.37	4.1	11.1
14	3.33	0.26	0.53	3.83	7.37	3.3	13.0
15	1.48	0.26	0.53	3.83	7.37	1.5	5.8
16	2.17	0.48	0.68	3.83	7.37	4.0	10.9
17	2.13	0.48	0.68	3.83	7.37	3.9	10.7
18	25.70	0.50	0.68	3.83	7.37	49.2	128.8
19	190	0.22	0.49	1.69	3.73	70.6	347.3
20	23	0.48	0.68	2.67	5.40	29.5	84.5
21	60	0.48	0.68	2.08	4.38	59.9	178.7
22	1.29	0.48	0.68	3.83	7.37	2.4	6.5
23	1.49	0.48	0.68	3.83	7.37	2.7	7.5
24	1.49	0.48	0.68	3.83	7.37	2.7	7.5

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: CHANNEL

Comment: CHANNEL UPSTREAM OF 2-4'X8' BOX CULVERT

Solve For Depth

Given Input Data:

Bottom Width.....	17.00 ft
Left Side Slope..	3.00:1 (H:V)
Right Side Slope.	3.00:1 (H:V)
Manning's n.....	0.060
Channel Slope....	0.0078 ft/ft
Discharge.....	487.00 cfs

Computed Results:

Depth.....	3.96 ft
Velocity.....	4.26 fps
Flow Area.....	114.29 sf
Flow Top Width...	40.75 ft
Wetted Perimeter.	42.03 ft
Critical Depth...	2.52 ft
Critical Slope...	0.0436 ft/ft
Froude Number....	0.45 (flow is Subcritical)

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: PILOT

Comment: PILOT CHANNEL UPSTREAM OF 2-8'X4' BOX

Solve For Discharge

Given Input Data:

Bottom Width.....	8.00 ft
Left Side Slope..	1.00:1 (H:V)
Right Side Slope.	1.00:1 (H:V)
Manning's n.....	0.060
Channel Slope....	0.0078 ft/ft
Depth.....	1.00 ft

Computed Results:

Discharge.....	17.40 cfs
Velocity.....	1.93 fps
Flow Area.....	9.00 sf
Flow Top Width...	10.00 ft
Wetted Perimeter.	10.83 ft
Critical Depth...	0.52 ft
Critical Slope...	0.0710 ft/ft
Froude Number....	0.36 (flow is Subcritical)

 ***** CHANNEL LINING ANALYSIS *****

DESIGNER: JDS

DATE: 10-25-1995

PROJECT: HICKORY CREEK

PROJECT NO.:

STATION: 0+00

TO STATION: 4+40

DRAINAGE AREA: %250.0 Acres

DESIGN FREQUENCY: %100 Years

CHANNEL DESCRIPTION:

CHANNEL SLOPE: 0.008 ft/ft

Bottom Width: 17.00 ft

Left Side Slope: 3.0

Right Side Slope: 3.0

Lining	Permissible Shear (lb/sf)	Discharge (cfs)	Hydraulic Radius (ft)	Manning Coefficient
Veget.- B	2.10	487.0	2.78	0.063

Normal Depth (ft)	Area (sf)	Velocity (ft/sec)	Calculated Shear (lb/sf)	Remarks
4.08	%119.37	4.07	1.98	Stable

(1) Check for channel bends

CURRENT DATE: 10-24-1995
CURRENT TIME: 23:08:34

FILE DATE: 10-24-1995
FILE NAME: HICKBOX

FHWA CULVERT ANALYSIS
HY-8, VERSION 4.1

C U L V	SITE DATA			CULVERT SHAPE, MATERIAL, INLET				
	INLET ELEV. (FT)	OUTLET ELEV. (FT)	CULVERT LENGTH (FT)	BARRELS SHAPE MATERIAL	SPAN (FT)	RISE (FT)	MANNING n	INLET TYPE
1	147.10	147.00	48.00	2 RCB	8.00	4.00	.012	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (CFS)

FILE: HICKBOX

DATE: 10-24-1995

ELEV (FT)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
147.10	0	0	0	0	0	0	0	0	1
148.60	49	49	0	0	0	0	0	0	1
148.85	97	97	0	0	0	0	0	0	1
149.29	146	146	0	0	0	0	0	0	1
149.75	195	195	0	0	0	0	0	0	1
150.18	244	244	0	0	0	0	0	0	1
150.58	292	292	0	0	0	0	0	0	1
150.95	341	341	0	0	0	0	0	0	1
151.31	390	390	0	0	0	0	0	0	1
151.67	438	438	0	0	0	0	0	0	1
152.09	487	487	0	0	0	0	0	0	1
152.50	533	533	0	0	0	0	0	0	1
								0 OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS

FILE: HICKBOX

DATE: 10-24-1995

HEAD ELEV(FT)	HEAD ERROR(FT)	TOTAL FLOW(CFS)	FLOW ERROR(CFS)	% FLOW ERROR
147.10	0.00	0	0	0.00
148.60	0.00	49	0	0.00
148.85	0.00	97	0	0.00
149.29	0.00	146	0	0.00
149.75	0.00	195	0	0.00
150.18	0.00	244	0	0.00
150.58	0.00	292	0	0.00
150.95	0.00	341	0	0.00
151.31	0.00	390	0	0.00
151.67	0.00	438	0	0.00
152.09	0.00	487	0	0.00

<1> TOLERANCE (FT) = 0.010

<2> TOLERANCE (%) = 1.000

CURRENT DATE: 10-24-1995
CURRENT TIME: 23:08:34

FILE DATE: 10-24-1995
FILE NAME: HICKBOX

IMPROVED INLET FOR CULVERT # 1 - 2 (8 BY 4) RCB

DIS-CHARGE Flow (cfs)	HEAD-WATER Elev. (ft)	INLET CONTROL Depth (ft)	OUTLET CONTROL Depth (ft)	FLOW TYPE <F4>	CREST CONTROL Elev. (ft)	FACE CONTROL Elev. (ft)	THROAT CONTROL Elev. (ft)	TAILWATER Elev. (ft)
0	148.17	0.00	0.00	0-NF	148.17	147.10	0.00	147.00
49	148.60	1.50	1.05	2-M2c	148.60	148.09	0.00	147.00
97	148.85	1.75	1.67	2-M2c	148.85	148.66	0.00	147.00
146	149.29	2.05	2.19	2-M2c	149.06	149.15	0.00	147.00
195	149.75	2.52	2.65	2-M2c	149.24	149.62	0.00	147.00
244	150.18	2.95	3.08	2-M2c	149.41	150.05	0.00	147.00
292	150.58	3.36	3.48	2-M2c	149.58	150.46	0.00	147.00
341	150.95	3.76	3.85	2-M2c	149.73	150.86	0.00	147.00
390	151.31	4.17	4.21	2-M2c	149.87	151.27	0.00	147.00
438	151.67	4.57	4.55	2-M2c	150.01	151.67	0.00	147.00
487	152.09	4.99	4.89	2-M2c	150.15	152.09	0.00	147.00

CURRENT DATE: 10-24-1995
CURRENT TIME: 23:08:34

FILE DATE: 10-24-1995
FILE NAME: HICKBOX

TAILWATER

CONSTANT WATER SURFACE ELEVATION
147.00

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH (FT)	48.00
CREST LENGTH (FT)	30.00
OVERTOPPING CREST ELEVATION (FT)	152.50

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: LINE 1, A-C

Comment: LINE 1, A-C

Solve For Full Flow Slope

Given Input Data:

Diameter.....	1.00 ft
Manning's n.....	0.012
Discharge.....	2.50 cfs

Computed Results:

Full Flow Channel Slope	0.0042 ft/ft
Full Flow Depth.....	1.00 ft
Velocity.....	3.18 fps
Flow Area.....	0.79 sf
Critical Depth....	0.68 ft
Critical Slope....	0.0065 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	2.50 cfs
QMAX @.94D.....	2.69 cfs
Froude Number.....	FULL

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: LINE 1, B-C

Comment: LINE 1, B-C

Solve For Full Flow Slope

Given Input Data:

Diameter.....	1.00 ft
Manning's n.....	0.012
Discharge.....	2.50 cfs

Computed Results:

Full Flow Channel Slope	0.0042 ft/ft
Full Flow Depth.....	1.00 ft
Velocity.....	3.18 fps
Flow Area.....	0.79 sf
Critical Depth....	0.68 ft
Critical Slope....	0.0065 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	2.50 cfs
QMAX @.94D.....	2.69 cfs
Froude Number.....	FULL

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: LINE 1, C-E

Comment: LINE 1, C-E

Solve For Full Flow Slope

Given Input Data:

Diameter.....	1.50 ft
Manning's n.....	0.012
Discharge.....	7.54 cfs

Computed Results:

Full Flow Channel Slope	0.0044 ft/ft
Full Flow Depth.....	1.50 ft
Velocity.....	4.27 fps
Flow Area.....	1.77 sf
Critical Depth....	1.06 ft
Critical Slope....	0.0061 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	7.54 cfs
QMAX @.94D.....	8.11 cfs
Froude Number.....	FULL

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: LINE 1, D-E

Comment: LINE 1, D-E

Solve For Full Flow Slope

Given Input Data:

Diameter.....	1.00 ft
Manning's n.....	0.012
Discharge.....	2.51 cfs

Computed Results:

Full Flow Channel Slope	0.0042 ft/ft
Full Flow Depth.....	1.00 ft
Velocity.....	3.20 fps
Flow Area.....	0.79 sf
Critical Depth....	0.68 ft
Critical Slope....	0.0065 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	2.51 cfs
QMAX @.94D.....	2.70 cfs
Froude Number.....	FULL

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: LINE 1, E-G

Comment: LINE 1, E-G

Solve For Full Flow Slope

Given Input Data:

Diameter.....	2.00 ft
Manning's n.....	0.012
Discharge.....	12.56 cfs

Computed Results:

Full Flow Channel Slope	0.0026 ft/ft
Full Flow Depth.....	2.00 ft
Velocity.....	4.00 fps
Flow Area.....	3.14 sf
Critical Depth....	1.27 ft
Critical Slope....	0.0049 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	12.56 cfs
QMAX @.94D.....	13.51 cfs
Froude Number.....	FULL

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: LINE 1, F-G

Comment: LINE 1, F-G

Solve For Full Flow Slope

Given Input Data:

Diameter.....	1.00 ft
Manning's n.....	0.012
Discharge.....	2.51 cfs

Computed Results:

Full Flow Channel Slope	0.0042 ft/ft
Full Flow Depth.....	1.00 ft
Velocity.....	3.20 fps
Flow Area.....	0.79 sf
Critical Depth....	0.68 ft
Critical Slope....	0.0065 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	2.51 cfs
QMAX @.94D.....	2.70 cfs
Froude Number.....	FULL

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: LINE 1, G-H

Comment: LINE 1, G-H

Solve For Full Flow Slope

Given Input Data:

Diameter.....	2.00 ft
Manning's n.....	0.012
Discharge.....	17.59 cfs

Computed Results:

Full Flow Channel Slope	0.0052 ft/ft
Full Flow Depth.....	2.00 ft
Velocity.....	5.60 fps
Flow Area.....	3.14 sf
Critical Depth....	1.51 ft
Critical Slope....	0.0061 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	17.59 cfs
QMAX @.94D.....	18.92 cfs
Froude Number.....	FULL

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: LINE 1, H-I

Comment: LINE 1, H-I

Solve For Full Flow Slope

Given Input Data:

Diameter.....	2.00 ft
Manning's n.....	0.012
Discharge.....	20.10 cfs

Computed Results:

Full Flow Channel Slope	0.0067 ft/ft
Full Flow Depth.....	2.00 ft
Velocity.....	6.40 fps
Flow Area.....	3.14 sf
Critical Depth....	1.61 ft
Critical Slope....	0.0070 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	20.10 cfs
QMAX @.94D.....	21.62 cfs
Froude Number.....	FULL

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: LINE 1, I-J

Comment: LINE 1, I-J

Solve For Full Flow Slope

Given Input Data:

Diameter.....	2.50 ft
Manning's n.....	0.012
Discharge.....	37.50 cfs

Computed Results:

Full Flow Channel Slope	0.0071 ft/ft
Full Flow Depth.....	2.50 ft
Velocity.....	7.64 fps
Flow Area.....	4.91 sf
Critical Depth....	2.07 ft
Critical Slope....	0.0070 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	37.50 cfs
QMAX @.94D.....	40.34 cfs
Froude Number.....	FULL

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: LINE 1, J-K

Comment: LINE 1, J-K

Solve For Full Flow Slope

Given Input Data:

Diameter.....	2.50 ft
Manning's n.....	0.012
Discharge.....	40.10 cfs

Computed Results:

Full Flow Channel Slope	0.0081 ft/ft
Full Flow Depth.....	2.50 ft
Velocity.....	8.17 fps
Flow Area.....	4.91 sf
Critical Depth....	2.13 ft
Critical Slope....	0.0076 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	40.10 cfs
QMAX @.94D.....	43.14 cfs
Froude Number.....	FULL

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: LINE 1, K-M

Comment: LINE 1, K-M

Solve For Full Flow Slope

Given Input Data:

Diameter.....	2.50 ft
Manning's n.....	0.012
Discharge.....	40.10 cfs

Computed Results:

Full Flow Channel Slope	0.0081 ft/ft
Full Flow Depth.....	2.50 ft
Velocity.....	8.17 fps
Flow Area.....	4.91 sf
Critical Depth....	2.13 ft
Critical Slope....	0.0076 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	40.10 cfs
QMAX @.94D.....	43.14 cfs
Froude Number.....	FULL

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: LINE 1, L-M

Comment: LINE 1, L-M

Solve For Full Flow Slope

Given Input Data:

Diameter.....	1.00 ft
Manning's n.....	0.012
Discharge.....	2.50 cfs

Computed Results:

Full Flow Channel Slope	0.0042 ft/ft
Full Flow Depth.....	1.00 ft
Velocity.....	3.18 fps
Flow Area.....	0.79 sf
Critical Depth....	0.68 ft
Critical Slope....	0.0065 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	2.50 cfs
QMAX @.94D.....	2.69 cfs
Froude Number.....	FULL

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: LINE 1, M-N

Comment: LINE 1, M-N

Solve For Full Flow Slope

Given Input Data:

Diameter.....	3.00 ft
Manning's n.....	0.012
Discharge.....	41.45 cfs

Computed Results:

Full Flow Channel Slope	0.0033 ft/ft
Full Flow Depth.....	3.00 ft
Velocity.....	5.86 fps
Flow Area.....	7.07 sf
Critical Depth....	2.10 ft
Critical Slope....	0.0047 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	41.45 cfs
QMAX @.94D.....	44.59 cfs
Froude Number.....	FULL

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: LINE 1, N-R

Comment: LINE 1, N-R

Solve For Full Flow Slope

Given Input Data:

Diameter.....	3.00 ft
Manning's n.....	0.012
Discharge.....	42.80 cfs

Computed Results:

Full Flow Channel Slope	0.0035 ft/ft
Full Flow Depth.....	3.00 ft
Velocity.....	6.05 fps
Flow Area.....	7.07 sf
Critical Depth....	2.13 ft
Critical Slope....	0.0048 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	42.80 cfs
QMAX @.94D.....	46.04 cfs
Froude Number.....	FULL

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: LINE 1, O-P

Comment: LINE 1, O-P

Solve For Full Flow Slope

Given Input Data:

Diameter.....	1.00 ft
Manning's n.....	0.012
Discharge.....	3.20 cfs

Computed Results:

Full Flow Channel Slope	0.0069 ft/ft
Full Flow Depth.....	1.00 ft
Velocity.....	4.07 fps
Flow Area.....	0.79 sf
Critical Depth....	0.77 ft
Critical Slope....	0.0079 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	3.20 cfs
QMAX @.94D.....	3.44 cfs
Froude Number.....	FULL

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: LINE 1, P-Q

Comment: LINE 1, P-Q

Solve For Full Flow Slope

Given Input Data:

Diameter.....	1.50 ft
Manning's n.....	0.012
Discharge.....	6.40 cfs

Computed Results:

Full Flow Channel Slope	0.0032 ft/ft
Full Flow Depth.....	1.50 ft
Velocity.....	3.62 fps
Flow Area.....	1.77 sf
Critical Depth....	0.98 ft
Critical Slope....	0.0055 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	6.40 cfs
QMAX @.94D.....	6.88 cfs
Froude Number.....	FULL

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: LINE 1, Q-R

Comment: LINE 1, Q-R

Solve For Full Flow Slope

Given Input Data:

Diameter.....	2.50 ft
Manning's n.....	0.012
Discharge.....	27.10 cfs

Computed Results:

Full Flow Channel Slope	0.0037 ft/ft
Full Flow Depth.....	2.50 ft
Velocity.....	5.52 fps
Flow Area.....	4.91 sf
Critical Depth....	1.78 ft
Critical Slope....	0.0051 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	27.10 cfs
QMAX @.94D.....	29.15 cfs
Froude Number.....	FULL

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: LINE 1, R-S

Comment: LINE 1, R-S

Solve For Full Flow Slope

Given Input Data:

Diameter.....	3.50 ft
Manning's n.....	0.012
Discharge.....	96.20 cfs

Computed Results:

Full Flow Channel Slope	0.0078 ft/ft
Full Flow Depth.....	3.50 ft
Velocity.....	10.00 fps
Flow Area.....	9.62 sf
Critical Depth....	3.02 ft
Critical Slope....	0.0072 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	96.20 cfs
QMAX @.94D.....	103.48 cfs
Froude Number.....	FULL

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: LINE 2, A-C

Comment: LINE 2, A-C

Solve For Full Flow Slope

Given Input Data:

Diameter.....	3.50 ft
Manning's n.....	0.012
Discharge.....	84.50 cfs

Computed Results:

Full Flow Channel Slope	0.0060 ft/ft
Full Flow Depth.....	3.50 ft
Velocity.....	8.78 fps
Flow Area.....	9.62 sf
Critical Depth....	2.86 ft
Critical Slope....	0.0060 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	84.50 cfs
QMAX @.94D.....	90.90 cfs
Froude Number.....	FULL

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: LINE 2, B-C

Comment: LINE 2, B-C

Solve For Full Flow Slope

Given Input Data:

Diameter.....	1.25 ft
Manning's n.....	0.012
Discharge.....	4.15 cfs

Computed Results:

Full Flow Channel Slope	0.0035 ft/ft
Full Flow Depth.....	1.25 ft
Velocity.....	3.38 fps
Flow Area.....	1.23 sf
Critical Depth....	0.82 ft
Critical Slope....	0.0059 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	4.15 cfs
QMAX @.94D.....	4.46 cfs
Froude Number.....	FULL

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: LINE 2, C-D

Comment: LINE 2, C-D

Solve For Full Flow Slope

Given Input Data:

Diameter.....	4.00 ft
Manning's n.....	0.012
Discharge.....	89.60 cfs

Computed Results:

Full Flow Channel Slope	0.0033 ft/ft
Full Flow Depth.....	4.00 ft
Velocity.....	7.13 fps
Flow Area.....	12.57 sf
Critical Depth....	2.87 ft
Critical Slope....	0.0044 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	89.60 cfs
QMAX @.94D.....	96.38 cfs
Froude Number.....	FULL

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: LINE 2, D-E

Comment: LINE 2, D-E

Solve For Full Flow Slope

Given Input Data:

Diameter.....	4.00 ft
Manning's n.....	0.012
Discharge.....	113.80 cfs

Computed Results:

Full Flow Channel Slope	0.0053 ft/ft
Full Flow Depth.....	4.00 ft
Velocity.....	9.06 fps
Flow Area.....	12.57 sf
Critical Depth....	3.22 ft
Critical Slope....	0.0055 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	113.80 cfs
QMAX @.94D.....	122.42 cfs
Froude Number.....	FULL

Circular Channel Analysis & Design
Solved with Manning's Equation.

Open Channel - Uniform flow

Worksheet Name: LINE 2, E-F

Comment: LINE 2, E-F

Solve For Full Flow Slope

Given Input Data:

Diameter.....	4.00 ft
Manning's n.....	0.012
Discharge.....	120.30 cfs

Computed Results:

Full Flow Channel Slope	0.0060 ft/ft
Full Flow Depth.....	4.00 ft
Velocity.....	9.57 fps
Flow Area.....	12.57 sf
Critical Depth....	3.30 ft
Critical Slope....	0.0059 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	120.30 cfs
QMAX @.94D.....	129.41 cfs
Froude Number.....	FULL

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: LINE 2, F-G

Comment: LINE 2, F-G

Solve For Full Flow Slope

Given Input Data:

Diameter.....	4.00 ft
Manning's n.....	0.012
Discharge.....	120.30 cfs

Computed Results:

Full Flow Channel Slope	0.0060 ft/ft
Full Flow Depth.....	4.00 ft
Velocity.....	9.57 fps
Flow Area.....	12.57 sf
Critical Depth....	3.30 ft
Critical Slope....	0.0059 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	120.30 cfs
QMAX @.94D.....	129.41 cfs
Froude Number.....	FULL

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: LINE 3, A-B

Comment: LINE 3, A-B

Solve For Full Flow Capacity

Given Input Data:

Diameter.....	1.00 ft
Slope.....	0.0038 ft/ft
Manning's n.....	0.012
Discharge.....	2.38 cfs

Computed Results:

Full Flow Capacity.....	2.38 cfs
Full Flow Depth.....	1.00 ft
Velocity.....	3.03 fps
Flow Area.....	0.79 sf
Critical Depth....	0.66 ft
Critical Slope....	0.0063 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	2.38 cfs
QMAX @.94D.....	2.56 cfs
Froude Number.....	FULL

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: LINE 3, B-C

Comment: LINE 3, B-C

Solve For Full Flow Slope

Given Input Data:

Diameter.....	1.00 ft
Manning's n.....	0.012
Discharge.....	3.70 cfs

Computed Results:

Full Flow Channel Slope	0.0092 ft/ft
Full Flow Depth.....	1.00 ft
Velocity.....	4.71 fps
Flow Area.....	0.79 sf
Critical Depth....	0.82 ft
Critical Slope....	0.0092 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	3.70 cfs
QMAX @.94D.....	3.98 cfs
Froude Number.....	FULL

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: LINE 3, C-D

Comment: LINE 3, C-D

Solve For Full Flow Slope

Given Input Data:

Diameter.....	1.50 ft
Manning's n.....	0.012
Discharge.....	8.30 cfs

Computed Results:

Full Flow Channel Slope	0.0053 ft/ft
Full Flow Depth.....	1.50 ft
Velocity.....	4.70 fps
Flow Area.....	1.77 sf
Critical Depth....	1.12 ft
Critical Slope....	0.0065 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	8.30 cfs
QMAX @.94D.....	8.93 cfs
Froude Number.....	FULL

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: LINE 3, D-E

Comment: LINE 3, D-E

Solve For Full Flow Slope

Given Input Data:

Diameter.....	2.00 ft
Manning's n.....	0.012
Discharge.....	15.20 cfs

Computed Results:

Full Flow Channel Slope	0.0038 ft/ft
Full Flow Depth.....	2.00 ft
Velocity.....	4.84 fps
Flow Area.....	3.14 sf
Critical Depth....	1.41 ft
Critical Slope....	0.0054 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	15.20 cfs
QMAX @.94D.....	16.35 cfs
Froude Number.....	FULL

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: LINE 4

Comment: LINE 4

Solve For Full Flow Slope

Given Input Data:

Diameter.....	1.50 ft
Manning's n.....	0.012
Discharge.....	11.10 cfs

Computed Results:

Full Flow Channel Slope	0.0095 ft/ft
Full Flow Depth.....	1.50 ft
Velocity.....	6.28 fps
Flow Area.....	1.77 sf
Critical Depth....	1.28 ft
Critical Slope....	0.0090 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	11.10 cfs
QMAX @.94D.....	11.94 cfs
Froude Number.....	FULL

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: LINE 5

Comment: LINE 5

Solve For Full Flow Slope

Given Input Data:

Diameter.....	1.50 ft
Manning's n.....	0.012
Discharge.....	10.70 cfs

Computed Results:

Full Flow Channel Slope	0.0088 ft/ft
Full Flow Depth.....	1.50 ft
Velocity.....	6.05 fps
Flow Area.....	1.77 sf
Critical Depth....	1.26 ft
Critical Slope....	0.0085 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	10.70 cfs
QMAX @.94D.....	11.51 cfs
Froude Number.....	FULL

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: LINE 6

Comment: LINE 6

Solve For Full Flow Slope

Given Input Data:

Diameter.....	1.50 ft
Manning's n.....	0.012
Discharge.....	10.90 cfs

Computed Results:

Full Flow Channel Slope	0.0092 ft/ft
Full Flow Depth.....	1.50 ft
Velocity.....	6.17 fps
Flow Area.....	1.77 sf
Critical Depth....	1.27 ft
Critical Slope....	0.0087 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	10.90 cfs
QMAX @.94D.....	11.73 cfs
Froude Number.....	FULL

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: LINE 7, A-B

Comment: LINE 7, A-B

Solve For Full Flow Capacity

Given Input Data:

Diameter.....	1.25 ft
Slope.....	0.0028 ft/ft
Manning's n.....	0.012
Discharge.....	3.70 cfs

Computed Results:

Full Flow Capacity.....	3.70 cfs
Full Flow Depth.....	1.25 ft
Velocity.....	3.02 fps
Flow Area.....	1.23 sf
Critical Depth....	0.78 ft
Critical Slope....	0.0056 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	3.70 cfs
QMAX @.94D.....	3.98 cfs
Froude Number.....	FULL

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: LINE 7, B-C

Comment: LINE 7, B-C

Solve For Full Flow Slope

Given Input Data:

Diameter.....	1.25 ft
Manning's n.....	0.012
Discharge.....	5.40 cfs

Computed Results:

Full Flow Channel Slope	0.0060 ft/ft
Full Flow Depth.....	1.25 ft
Velocity.....	4.40 fps
Flow Area.....	1.23 sf
Critical Depth....	0.94 ft
Critical Slope....	0.0071 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	5.40 cfs
QMAX @.94D.....	5.81 cfs
Froude Number.....	FULL

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: LINE 8

Comment: 13TH STREET ENTRANCE

Solve For Full Flow Slope

Given Input Data:

Diameter.....	2.00 ft
Manning's n.....	0.015
Discharge.....	13.00 cfs

Computed Results:

Full Flow Channel Slope	0.0044 ft/ft
Full Flow Depth.....	2.00 ft
Velocity.....	4.14 fps
Flow Area.....	3.14 sf
Critical Depth....	1.30 ft
Critical Slope....	0.0077 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	13.00 cfs
QMAX @.94D.....	13.98 cfs
Froude Number.....	FULL

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: WEIR

Comment: WEIR STRUCTURE AT OUTFALL OF RETENTION

Solve For Depth

Given Input Data:

Bottom Width.....	10.00 ft
Left Side Slope..	12.00:1 (H:V)
Right Side Slope.	12.00:1 (H:V)
Manning's n.....	0.012
Channel Slope....	0.0020 ft/ft
Discharge.....	350.00 cfs

Computed Results:

Depth.....	1.85 ft
Velocity.....	5.87 fps
Flow Area.....	59.59 sf
Flow Top Width...	54.41 ft
Wetted Perimeter.	54.56 ft
Critical Depth...	1.84 ft
Critical Slope...	0.0020 ft/ft
Froude Number....	0.99 (flow is Subcritical)

This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or planimetric features outside special flood hazard areas.
 For adjoining map panels, see separately printed Map Index.

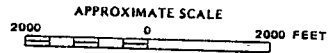
INITIAL IDENTIFICATION:
 AUGUST 2, 1974

FLOOD HAZARD BOUNDARY MAP REVISIONS:

FLOOD INSURANCE RATE MAP EFFECTIVE:
 JUNE 3, 1986

FLOOD INSURANCE RATE MAP REVISIONS:

To determine if flood insurance is available in this community, contact your insurance agent, or call the National Flood Insurance Program, at (800) 638-6620.



NATIONAL FLOOD INSURANCE PROGRAM


FIRM
FLOOD INSURANCE RATE MAP

SEDGWICK, COUNTY, KANSAS
 (UNINCORPORATED AREAS)

PANEL 125 OF 300

COMMUNITY-PANEL NUMBER
 200321 0125 A

EFFECTIVE DATE:
 JUNE 3, 1986



Federal Emergency Management Agency

