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To:

DRAINAGE PLAN AND SUPPORTING CALCULATIONS
EVERGREEN 4TH ADDITION
WICHITA, SEDGWICK COUNTY, KANSAS
PEC PROJECT NO. 36-02418-3104
PLAT NO. 356

Professional Engineering Consultants, P.A.
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Evergreen 4th Addition
Wichita, Sedgwick County, Kansas
2/24/03

Evergreen 4th Addition is a 28-acre, single family, residential development in northwest Wichita. The 74 lot development consists of streets, 1/3 acre lots, and ¼ acre lots and has been designed to connect to the original Evergreen Addition. The drainage plan and supporting calculations for Evergreen 4th Addition are presented herein.

Hydrology

The proposed plat lies in the NW ¼, NE ¼, Section 6, T27, R1W of the 6th P.M. The soil on-site is Vanoss Silt Loam and is classified in hydrologic group B. The existing landscape is vacant pasture. The site is bordered to the south by Evergreen Addition, to the west by Aberdeen 2nd Addition, and to the north by 29th Street North. The 52-acre area between the east border of the site and Maize Road consists of two houses, pasture, and wetlands.

For runoff calculations under existing conditions, the site was divided into four major basins, each with its own discharge. See enclosed 11"x17" map showing existing drainage basins. Basin A drains to the northeast corner of the site. Basin B drains to the southeast corner of the site. The runoff from both Basin A and Basin B discharges to the east, travels across the 52 acres of pasture and wetlands, and is detained naturally next to Maize Road. The 100-year floodplain elevation of approximately 161' (City of Wichita Datum) is below Maize Road, whose centerline elevation is 164.6' or above in this area. Please see enclosed 11"x17" map showing this area to Maize Road. Therefore, the only outlet for the natural detention is a 36" RCP culvert under Maize Road. The last two existing conditions basins are Basin C and D. Basin C drains south to the original Evergreen Addition. Basin D drains to the west side of the site and is picked up by Aberdeen 2nd Addition drainage structures. See enclosed calculations.

For runoff calculations under proposed conditions, the plat was again divided into 4 basins. The discharge locations for the developed basins coincide with the discharge locations under existing conditions. The minimum time of concentration was assumed for all developed basins. Basin 1 encompasses the

majority of the site. It drains towards the southeast corner of the site and discharges to the east, mainly via the street designed to tie into future development east of the site. See enclosed Drainage Plan Map. The runoff at this location increases by 64 cfs under developed conditions. A temporary drainage channel will be used to carry the runoff to the natural detention area by Maize Road; no easement is needed since the owner of Evergreen 4th also owns the land in this area.

The remainder of the site is divided into three basins. Basin 2 discharges to the northeast corner of the site and travels east. The runoff at this location decreases from 31.6 cfs to 29.2 cfs under developed conditions. Basin 3 discharges west to Aberdeen 2nd Addition. The runoff increases from 8.0 cfs under existing conditions to 8.9 cfs. However, the Aberdeen 2nd Addition Drainage Plan was designed to accommodate 9.5 cfs from the Evergreen 4th site; therefore, the slight increase is still within acceptable limits. The final basin, Basin 4, discharges 2.0 cfs south to Evergreen Addition, which is slightly less than the 2.1 cfs discharge under existing conditions.

The total runoff from the Evergreen 4th Addition site does increase under developed conditions. However, the site is only a small part of a larger basin draining to the 36" RCP culvert under Maize Road, and natural detention already exists at this location. Also, when taking into account the 100-year flood, the basin on the east side of Maize will also be filling up to the 161' BFE, making the 36" RCP a potential equalizer. Therefore, development of the Evergreen 4th site will have negligible effect on the conditions through the 36" RCP culvert.

The Rational Method was used to calculate runoff quantities. Runoff coefficients were estimated based on land use and the tables presented in the Design Aids section. A map showing the basin boundaries and the drainage calculations are included. The analysis made is based on the available site data which includes the following: 1"=100' topographic map with 1' contours of the site and adjacent areas, USGS topographic map, Sedgwick County Soil Survey Map, and references noted herein.

Storm Sewer Design

For the storm sewer hydrologic analysis, the Rational Method was again used. Runoff coefficients were estimated using the charts in the design aids section of this report. For this development, a uniform assumption of the minimum time of concentration of 15 minutes was deemed appropriate. Travel time for flow through defined channels, pipes, etc, for these basins was estimated on the basis of Manning's Equation.

In the hydraulic analysis, the storm sewers are designed for the minor storm, with major storm overflows to be routed through easements and rights-of-way to an

appropriate outlet. The minor storm has a recurrence interval of two years. The major storm evaluated has a recurrence interval of one hundred years. To simplify this analysis, the time of concentration is identical for both the major and the minor storms.

For each inlet, street flooding and inlet capacity were checked for the minor storm. Conveyance in the street is based on the Modified Manning's Equation, as expressed in the Design of Urban Highway Drainage-The State of the Art, Equation (5-1), page 5-9. It has been assumed that Tc for street flow is equal to Tc for pipe flow. This is a simplifying, but conservative, assumption, since pipe flow velocities generally exceed street flow velocities. For local streets, curb-deep flow is tolerable for the minor storm. For collector streets, a single eight-foot lane should remain unflooded for the minor storm.

Inlet capacities were determined by the methods described in Drainage of Highway Pavements, Hydraulic Engineering Circular #12, using Chart #12 as found in the Design Aids section. City of Wichita Type 1A inlets and 3/8 inch per foot cross slopes have been assumed. Minimum walk grade has been assumed to be 0.3 feet above the top of curb, unless otherwise noted. Streets have been assumed to have 6-5/8 inch standard curb, unless otherwise noted.

Hydraulic computation for the storm sewer pipe system was performed using PEC's STORM computer program. This program uses Manning's Equation to calculate friction losses for pipes flowing full. Minor losses are computed by momentum principles at each structure. All pipe area is assumed to be reinforced concrete with a Manning's "n" of 0.013. It is desirable to keep the hydraulic grade line at least one foot below the top of curb for the minor storm. The calculations and the STORM analyses for the storm sewers are included in this report.

Design Aids

This section includes material used to assist in designing the drainage system. A 1"=100' scale drainage plan map is enclosed in the pocket.

References

Design of Urban Highway Drainage – The State of the Art, by Reitz & Jens, Inc., April 1980.

Drainage of Highway Pavements, Hydraulic Engineering Circular #12, by Tye Engineering, Inc., March 1984.

Flood Insurance Rate Map, Sedgwick County, Kansas (Unincorporated Areas), Panel 125 of 300, Community-Panel Number 200321-0125 A, Effective Date: June 3, 1986, by the Federal Emergency Management Agency.

Interim Drainage and Storm Sewer Policy for Design Criteria and Documentation, City of Wichita, Kansas, 1985.

Soil Survey of Sedgwick County, Kansas, US Department of Agriculture, Soil Conservation Service, 1979.

EXISTING CONDITIONS

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Project EVERGREEN 4TH ADDITION Date ____

Item HYDROLOGY By ____

I SOIL TYPE

Vb = VANOSS SILT LOAM, 1-3% SLOPES } HYDROLOGIC GROUP "B"
Va = VANOSS SILT LOAM, 0-1% SLOPES }

II EXISTING CONDITIONS

UNDER EXISTING CONDITIONS, THE SITE CAN BE DIVIDED INTO FOUR MAJOR BASINS. THE DISCHARGE FROM BASIN A IS AN OVERLAND SWALE AT THE NORTHEAST CORNER OF THE SITE. BASIN B DISCHARGES TO AN OVERLAND SWALE AT THE SOUTHEAST CORNER OF THE SITE. [THE RUNOFF FROM BOTH BASIN A AND BASIN B DISCHARGES TO THE EAST, TRAVELS ACROSS 52 ACRES OF PASTURE AND WETLANDS, AND IS DETAINED NATURALLY NEXT TO MAIZE ROAD. THE 100-YR FLOOD PLAIN ELEVATION (BFE ≈ 161) DOES NOT TOP MAIZE ROAD (@ MAIZE ≥ 164.6) IN THIS AREA. THE ONLY OUTLET IS A 36" RCP CULVERT UNDER MAIZE ROAD.] BASIN C DISCHARGES TO THE ORIGINAL EVERGREEN ADDITION DIRECTLY SOUTH OF EVERGREEN 4TH. BASIN D DISCHARGES TO THE WEST END OF THE SITE AND IS PICKED UP BY ABERDEEN 2ND ADDITION DRAINAGE STRUCTURES.

-FIND EXISTING CONDITIONS RUNOFF USING THE RATIONAL METHOD, $Q = ciA$

A. AREA, A

BASIN A = 10.4 AC
BASIN B = 12.5 AC
BASIN C = 0.7 AC
BASIN D = 4.3 AC

B. RUNOFF COEFFICIENTS, C

URBAN LAWN AREAS, SOIL GROUP B"

SLOPE < 1% : $C_2 = 0.26$
$C_{100} = 0.37$

SLOPE 1-4% : $C_2 = 0.20$
$C_{100} = 0.41$

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BASIN A: 1.0 AC S<1%
9.4 AC S: 1-4%

$C_2 = {}^{1.0}/_{10.4}(0.26) + {}^{9.4}/_{10.4}(0.20) = 0.21$

$C_{100} = {}^{1.0}/_{10.4}(0.37) + {}^{9.4}/_{10.4}(0.41) = 0.41$

BASIN B: S: 1-4%
$C_2 = 0.20$
$C_{100} = 0.41$

BASIN C: S: 1-4%
$C_2 = 0.20$
$C_{100} = 0.41$

BASIN D: S: 1-4%
$C_2 = 0.20$
$C_{100} = 0.41$

C. INTENSITY, i

BASIN A: TIME OF CONCENTRATION, T_C = DISTANCE/VELOCITY
DISTANCE = 770'

VELOCITY (ATTACHMENT E)
SHORT GRASS PASTURE OR LAWNS, S=2.4%
VEL = 1.08 FT/S

$T_C = \frac{770' \,|\, S}{1.08F \,|\, 60S} \,|\, \frac{1\,MIN}{} = 12\,MIN \rightarrow$ USE T_C = 15 MIN (MINIMUM T_C)

@ T_C = 15 MIN: $i_2 = 3.80$ IN/HR
$i_{100} = 7.40$ IN/HR

BASIN B: DISTANCE = 1420'

VELOCITY
SHORT GRASS PASTURE OR LAWNS, S=0.6%
VELOCITY = 0.53 FT/S

$T_C = \frac{1420' \,|\, S}{0.53F \,|\, 60S} \,|\, \frac{1\,MIN}{} = 45\,MIN$

@ T_C = 45 MIN: $i_2 = 2.06$ IN/HR
$i_{100} = 4.47$ IN/HR

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BASIN C: DISTANCE = 500'

VELOCITY
SHORT GRASS PASTURE OR LAWNS, SLOPE = 1.3%
VELOCITY = 0.79 F/S

$T_c = \frac{500' \mid S \mid 1\,MIN}{0.79F \mid 60\,S} = 11\,MIN \rightarrow$ USE MIN T_c = 15 MIN

@ T_c = 15 MIN: i_2 = 3.80 IN/HR
i_{100} = 7.40 IN/HR

BASIN D: DISTANCE = 1280'

VELOCITY
SHORT GRASS PASTURE OR LAWNS, SLOPE = 0.5%
VELOCITY = 0.50 F/S

$T_c = \frac{1280' \mid S \mid 1\,MIN}{0.50F \mid 60\,S} = 43\,MIN$

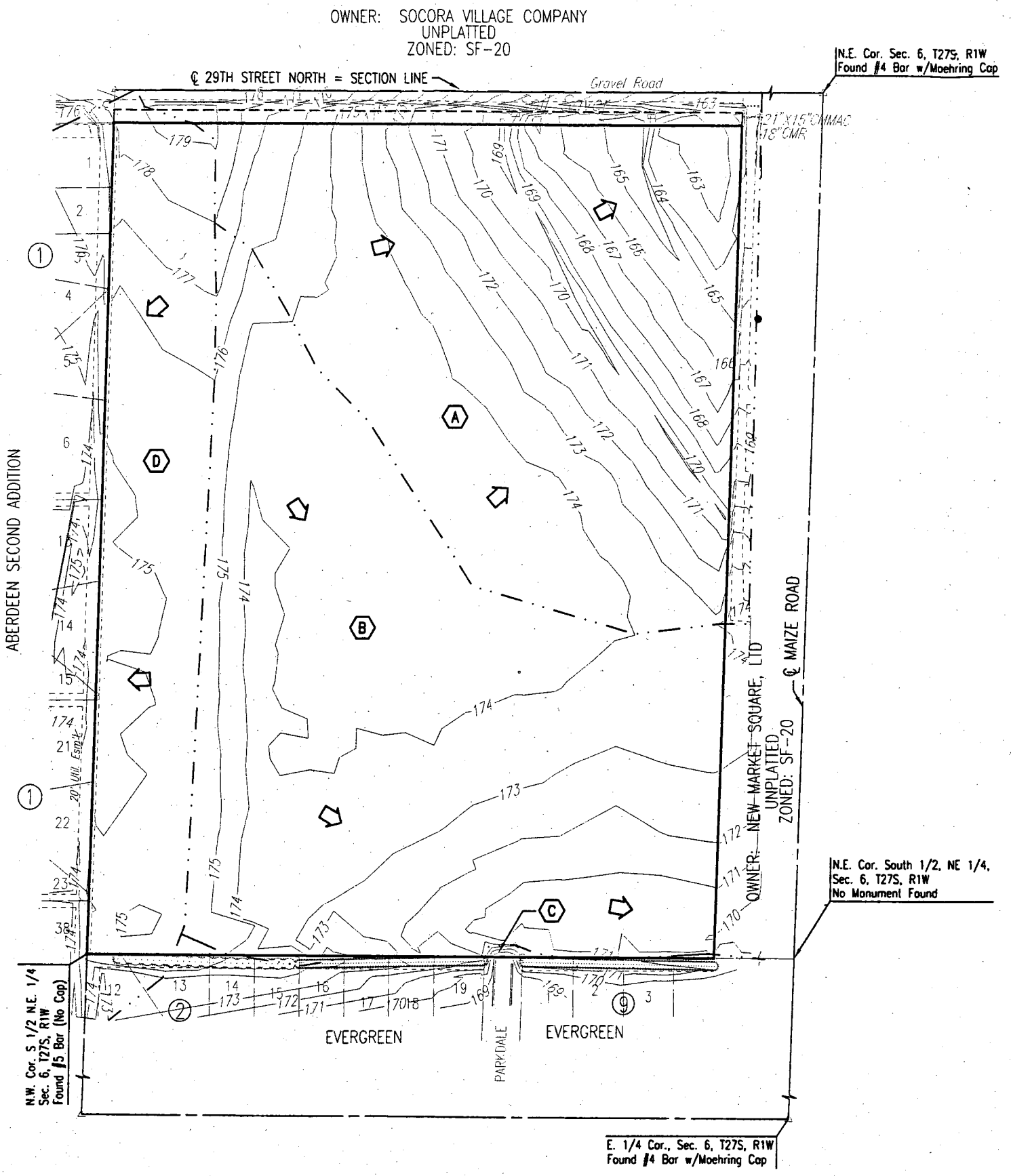
@ T_c = 43 MIN: i_2 = 2.12 IN/HR
i_{100} = 4.54 IN/HR

D. FLOW RATES, Q

BASIN	AREA (AC)	C_2	C_{100}	i_2 (IN/HR)	i_{100} (IN/HR)	Q_2 (CFS)	Q_{100} (CFS)
A	10.4	0.21	0.41	3.80	7.40	8.3	31.6
B	12.5	0.20	0.41	2.06	4.42	5.2	22.7
C	0.7	0.20	0.41	3.80	7.40	0.5	2.1
D	4.3	0.20	0.41	2.12	4.54	1.8	8.0

EVERGREEN 4TH

DRAINAGE BASINS FOR EXISTING CONDITIONS



LEGEND

- (A) BASIN IDENTIFIER
- BASIN BOUNDARY
- MAJOR STORM WATER OVERFLOW

SCALE:

200 0 200 400

DSNR: R: SPL SCALE: 1=133.00
Q:\2002\vz418\Evergreen 4th\dwg\DR_EXBAS 02-21-2003 08:23:20 am

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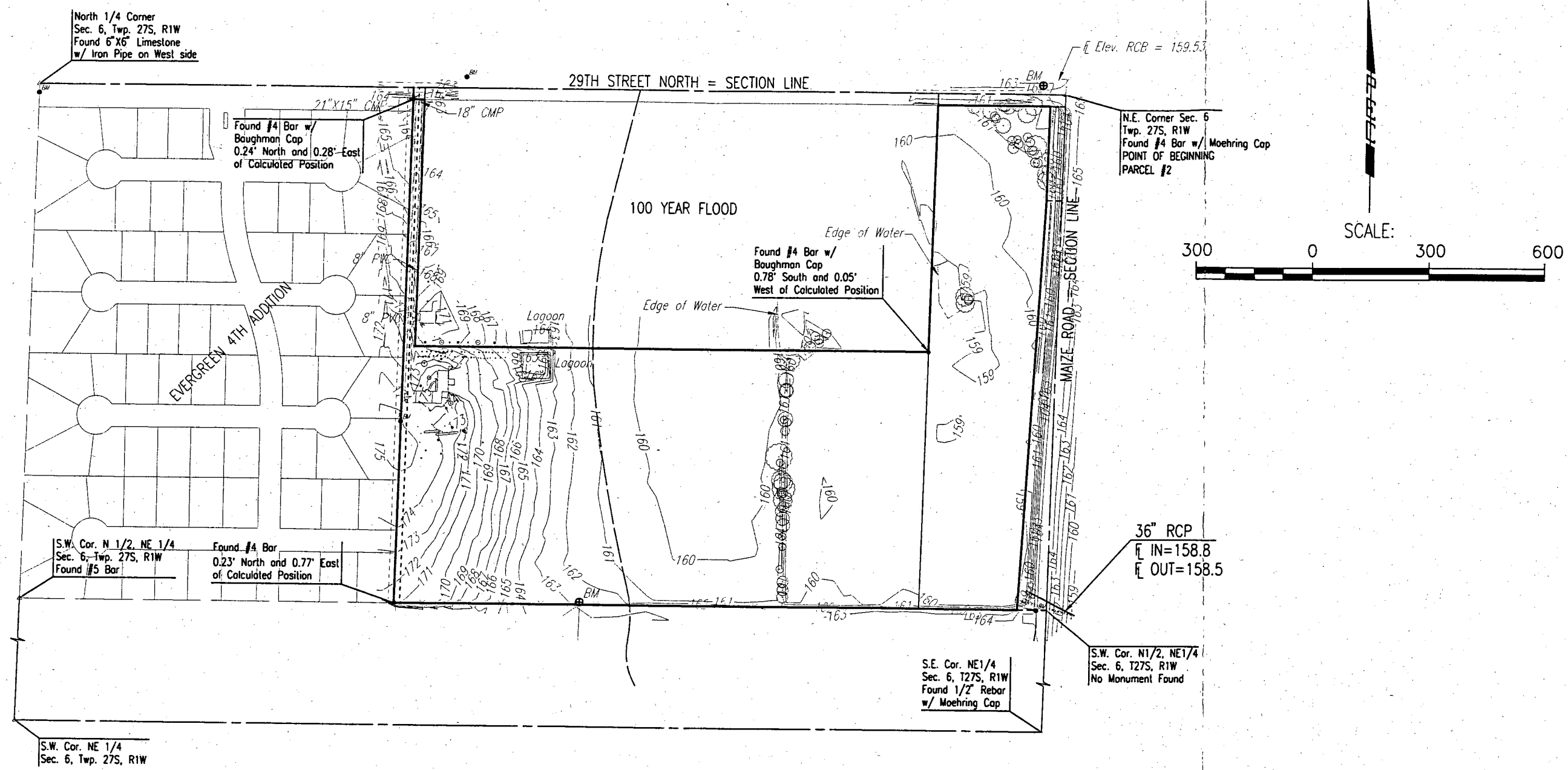

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80 ACRE BASIN TO 36" RCP UNDER MAIZE ROAD

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Surveyed by	DKH	Checked by	.
Drawn by	JTS	Date: .	Job No. 02693

Developed Conditions

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III PROPOSED DEVELOPMENT

THE PROPOSED DEVELOPMENT IS A 74 LOT, SINGLE FAMILY, RESIDENTIAL NEIGHBORHOOD CONSISTING OF 1/4 ACRE AND 1/3 ACRE LOTS.

FIND PROPOSED DEVELOPMENT CONDITIONS RUNOFF USING THE RATIONAL METHOD, $Q = CiA$

A. BASIN 1: DISCHARGES TO SOUTHEAST END OF SITE AND TRAVELS EAST (SAME LOCATION AS EXISTING BASIN B)

RUNOFF COEFFICIENTS, C

SINGLE FAMILY RESIDENTIAL, 1/4 AC LOTS, SOIL GROUP "B"

$C_2 = 0.44$

$C_{100} = 0.61$

INTENSITY

ASSUME MINIMUM TIME OF CONCENTRATION FOR ALL DEVELOPED BASINS

@ $T_c = 15$ MIN: $i_2 = 3.8$ IN/HR

$i_{100} = 7.4$ IN/HR

RUNOFF, Q

BASIN	NODE	AREA (AC)	Q_2 (CFS)	Q_{100} (CFS)
1A	—	2.06	3.4	9.3
1B	110	1.72	2.9	7.8
1C	120	1.34	2.2	6.0
1D	125	2.14	3.6	9.7
1E	130	2.56	4.3	11.6
1F	135	1.39	2.3	6.3
1G	140	1.15	1.9	5.2
1H	145	1.38	2.3	6.2
1I	150	1.73	2.9	7.8
1J	155	0.66	1.1	3.0
1K	160	3.07	5.1	13.9

TOTAL $Q_{100} = 86.8$ CFS

86.8 CFS > EXISTING BASIN B = 22.7 CFS

∴ USE NATURAL DETENTION NEXT TO MAIZE ROAD. NO EASEMENT NEEDED SINCE OWNER OF EVERGREEN 4TH OWNS LAND TO THE EAST WHERE BASIN 1 OUTFALL OCCURS

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B. BASIN 2: DISCHARGES TO NORTHEAST CORNER OF SITE AND TRAVELS EAST (SAME LOCATION AS EXISTING BASIN A)

RUNOFF COEFFICIENTS, C

SINGLE FAMILY RESIDENTIAL, 1/4 AC LOTS, SOIL GR "B"

$C_2 = 0.44$

$C_{100} = 0.61$

INTENSITY

@ $T_C = 15$ MIN: $i_2 = 3.8$ IN/HR

$i_{100} = 7.4$ IN/HR

RUNOFF, Q

BASIN	NODE	AREA (AC)	Q_2 (CFS)	Q_{100} (CFS)
2A	—	3.39	5.7	15.3
2B	210	1.31	2.2	5.9
2C	—	1.77	3.0	8.0

TOTAL $Q_{100} = 29.2$

29.2 CFS < EXISTING BASIN A = 31.6 CFS

∴ $Q_{DEV} < Q_{EXIST}$ SO OK

C. BASIN 3: DISCHARGES WEST TO ABERDEEN 2ND ADDITION (SAME LOCATION AS EXISTING BASIN D)

RUNOFF COEFFICIENTS, C

SINGLE FAM. RES., 1/3 AC LOTS, SOIL GRP B

$C_2 = 0.39$

$C_{100} = 0.57$

INTENSITY

@ $T_C = 15$ MIN: $i_2 = 3.8$ IN/HR

$i_{100} = 7.4$ IN/HR

BASIN	NODE	AREA (AC)	Q_2 (CFS)	Q_{100} (CFS)
3	—	2.10	3.1	8.9

8.9 CFS > EXIST. BASIN D = 8.0

HOWEVER, ABERDEEN 2ND ADDITION DRAINAGE STRUCTURES ARE DESIGNED TO HANDLE 9.5 CFS FROM EVERGREEN 4TH SITE, ∴ 8.9 CFS < 9.5 CFS SO OK.

* SEE DESIGN AIDS SECTION

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D. BASIN 4. DISCHARGES SOUTH TO EVERGREEN ADDITION (SAME LOCATION AS EXISTING BASIN C)

RUNOFF COEFFICIENTS, C

SINGLE FAMILY RESIDENTIAL, 1/4 AC LOTS, SOIL GR B

$C_2 = 0.44$

$C_{100} = 0.61$

INTENSITY

@ $T_C = 15$ MIN: $i_2 = 3.8$ IN/HR

$i_{100} = 7.4$ IN/HR

BASIN	NODE	AREA (AC)	Q_2 (CFS)	Q_{100} (CFS)
4	—	0.45	0.75	2.0

2.0 CFS < EXIST. BASIN C = 2.1 CFS SO OK

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Item _____ By _____

IV SWS #1

A. INLET SIZING/FLOOD ROUTING (2-YEAR) (E(Q))

BASIN	NODE	INLET CONDITION	Q_2 (CFS)	$Q_{INTERCEPT}$	Q_{BYPASS}
1K	160	CURB	5.1	0.35(5.1)=1.8	3.3 TO NODE 140
1J	155	R4826	1.1	1.1	—
1I	150	CURB	2.9	0.43(2.9)=1.2	1.7 TO NODE 125
1H	145	R4826	2.3	2.3	—
1G	140	CURB	1.9+3.3=5.2	0.35(5.2)=1.8	3.4 TO NODE 130
1F	135	R4826	2.3	2.3	—
1E	130	CURB	4.3+1.8=6.1	0.3(6.1)=1.8	4.3 TO NODE 120
1D	125	SUMP	3.6+1.7=5.3	5.3	—
1C	120	SUMP	2.2+4.3=6.5	6.5	—
1B	110	SUMP	2.9	2.9	—

* Q_{max} FOR L'=5 SUMP INLET = 11 CFS, USE L=5'
* CURB INLETS ALL L=5'
* R4826 AREA INLETS ALL 2'x2'

B. STREET FLOW

1. 2-YEAR

NODE	BASIN	Q_2	DISTRIBUTION	STREET SLOPE	d	d_{max}	∘∘
120	1C	6.5	70% N=4.6 CFS	0.5%	0.34'	0.55'	OK
125	1D	5.3	100% N	0.5%	0.36'	0.55'	OK

BY INSPECTION, ALL NODES ARE OK

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2. 100-YEAR

LOCATION	CONTRIBUTING AREA	Q_{100}	Q_{PIPE}	Q_{STREET}	$Q_{MAX\ 3'\ WALK\ GRADE}$
APPROACHING NODES 120+125 FROM NORTH	BASIN 1C TO 1K	69.7	24.1	45.6	54.2
STREET DISCHARGING OFFSITE TO EAST	BASIN 1 MINUS 20% BASIN 1A	84.9	27	57.9	54.2

∴ USE STANDARD CURB WITH 3' WALK GRADE EVERYWHERE IN THE SITE SAVE THE STREET DESIGNED TO CONNECT WITH THE AREA EAST OF EVERGREEN 4TH. USE STD CURB WITH 4' WALK GRADE (Q_{MAX} = 72.7 CFS) ON THIS STREET, EAST OF PARKDALE.

C. DISCHARGE CHANNEL

A TEMPORARY DRAINAGE CHANNEL WILL BE NEEDED TO CARRY BASIN 1 FLOW EAST. THE CHANNEL WILL BEGIN WHERE THE STREET DISCHARGING TO THE EAST ENDS AND EXTEND TO THE NATURAL DETENTION AREA NEXT TO WATER ROAD. THE CHANNEL WILL CARRY OVERLAND FLOW AS WELL AS PICKING UP THE SDS #1 FLOW WHERE THE 30" RCP DAYLIGHTS.

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I SWS #2

A. INLET SIZING / FLOOD ROUTING (2-YEAR)

BASIN	NODE	INLET CONDITION	Q_2	$Q_{INTERCEPT}$	Q_{BYPASS}
2B	210	SUMP	2.2	2.2	—

* Q_{MAX} FOR L=5' SUMP INLET = 11 CFS, USE L=5'

B. STREET FLOW

1. 2-YEAR
   $Q_2 = 2.2$ CFS
   BY INSPECTION, NODE OK

2. 100-YR
   $Q_{100} = 5.9$ CFS

   Q_{MAX} FOR 5' SUMP INLET = 11 CFS.
   SO 100-YR FLOW WILL BE HANDLED BY INLET AT NODE 210.
   d=0.38' SO 100-YR STORM WILL NOT EVEN OVERTOP CURB AT NODE 210. NO OVERFLOW CHANNEL NECESSARY.

Storm

Date: 02-19-2003
Time: 09:12:51

Input File: ev4.inp

Evergreen 4th SWS #1

Storm Frequency = 2-Year

* * * H Y D R O L O G Y * * *

Tributary Area									Hydrology Summation				Conduit Data				
Node	to Node	C	Area (Ac)	Slope (%)	Length (Ft)	TC(0) (Min)	I(0) (In/Hr)	Q(0) (CFS)	TC (Min)	I (In/Hr)	Q (CFS)	Sum Q (CFS)	Size	Velocity (Ft/Sec)	Length (Ft)	TT (Min)	TT+TC (Min)
160	140	.44	3.07	.00	.0	15.00	3.83	1.80	15.00	3.83	1.80	1.80	15"	1.47	179.50	2.04	17.04
145	140	.44	1.38	.00	.0	15.00	3.83	2.30	15.00	3.83	2.30	2.30	15"	1.87	85.50	.76	15.76
155	150	.44	.66	.00	.0	15.00	3.83	1.10	15.00	3.83	1.10	1.10	15"	.90	85.30	1.59	16.59
150	140	.44	1.73	.00	.0	15.00	3.83	1.20	16.59	3.65	1.15	2.25	15"	1.83	39.20	.36	16.94
140	130	.44	1.15	.00	.0	15.00	3.83	1.80	17.04	3.61	1.70	7.95	18"	4.50	314.00	1.16	18.20
135	130	.44	1.39	.00	.0	15.00	3.83	2.30	15.00	3.83	2.30	2.30	18"	1.30	94.80	1.21	16.21
130	120	.44	2.56	.00	.0	15.00	3.83	1.80	18.20	3.49	1.64	11.77	24"	3.75	143.00	.64	18.84
125	120	.44	2.14	.00	.0	15.00	3.83	5.30	15.00	3.83	5.30	5.30	18"	3.00	38.10	.21	15.21
120	110	.44	1.34	.00	.0	15.00	3.83	6.50	18.84	3.44	5.83	22.39	30"	4.56	38.30	.14	18.98
110	100	.44	1.72	.00	.0	15.00	3.83	2.90	18.98	3.42	2.59	24.98	30"	5.09	354.00	1.16	20.14

Date: 02-19-2003
Time: 09:12:51

Input File: ev4.inp

Evergreen 4th SWS #1

Storm Frequency = 2-Year

* * * H Y D R A U L I C S * * *

Node	Hyd-Slope (Ft/Ft)	Friction (Ft)	Bend (Ft)	Transition (Ft)	Manhole (Ft)	Deflection (Ft)	Junction (Ft)	Total (Ft)	Hyd-Gl Elevation	Desired Elevation	Diff. (Ft)
100	.00000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	163.3500	163.3500	.00
110	.00220	.7772	.0000	.0079	.0000	.9386	.1685	1.8923	165.2423	168.2300	2.99
120	.00176	.0675	.0000	.0105	.0000	.0292	.3506	.4578	165.7000	168.2300	2.53
125	.00151	.0574	.0000	.0000	.0000	.0000	.0000	.0574	165.7574	168.2300	2.47
130	.00160	.2291	.0000	.0193	.0000	.0421	.0851	.3756	166.0756	169.0200	2.94
135	.00028	.0269	.0000	.0000	.0000	.0000	.0000	.0269	166.1025	167.6200	1.52
140	.00339	1.0650	.0000	.0260	.0000	.1585	.5518	1.8013	167.8769	170.5800	2.70
145	.00075	.0641	.0000	.0000	.0000	.0000	.0000	.0641	167.9411	169.3500	1.41
150	.00071	.0280	.0000	.0040	.0000	.0017	.0814	.1150	167.9920	170.5800	2.59
155	.00017	.0146	.0000	.0000	.0000	.0000	.0000	.0146	168.0066	169.3800	1.37
160	.00046	.0825	.0000	.0000	.0000	.0000	.0000	.0825	167.9594	171.4000	3.44

Date: 02-18-2003
Time: 13:54:43

Input File: ev4-2.inp

Evergreen 4th SWS #2

Storm Frequency = 2-Year

* * * H Y D R O L O G Y * * *

Tributary Area								Hydrology Summation				Conduit Data				
Node to Node		C	Area (Ac)	Slope (%)	Length (Ft)	TC(0) (Min)	I(0) (In/Hr)	Q(0) (CFS)	TC (Min)	I (In/Hr)	Q (CFS)	Sum Q (CFS)	Size	Velocity (Ft/Sec)	Length (Ft)	TT (Min)	TT+TC (Min)
210	200	.44	1.31	.00	.0	15.00	3.83	2.20	15.00	3.83	2.20	2.20	15"	1.79	166.00	1.54	16.54

Date: 02-18-2003
Time: 13:54:43

Input File: ev4-2.inp

Evergreen 4th SWS #2

Storm Frequency = 2-Year

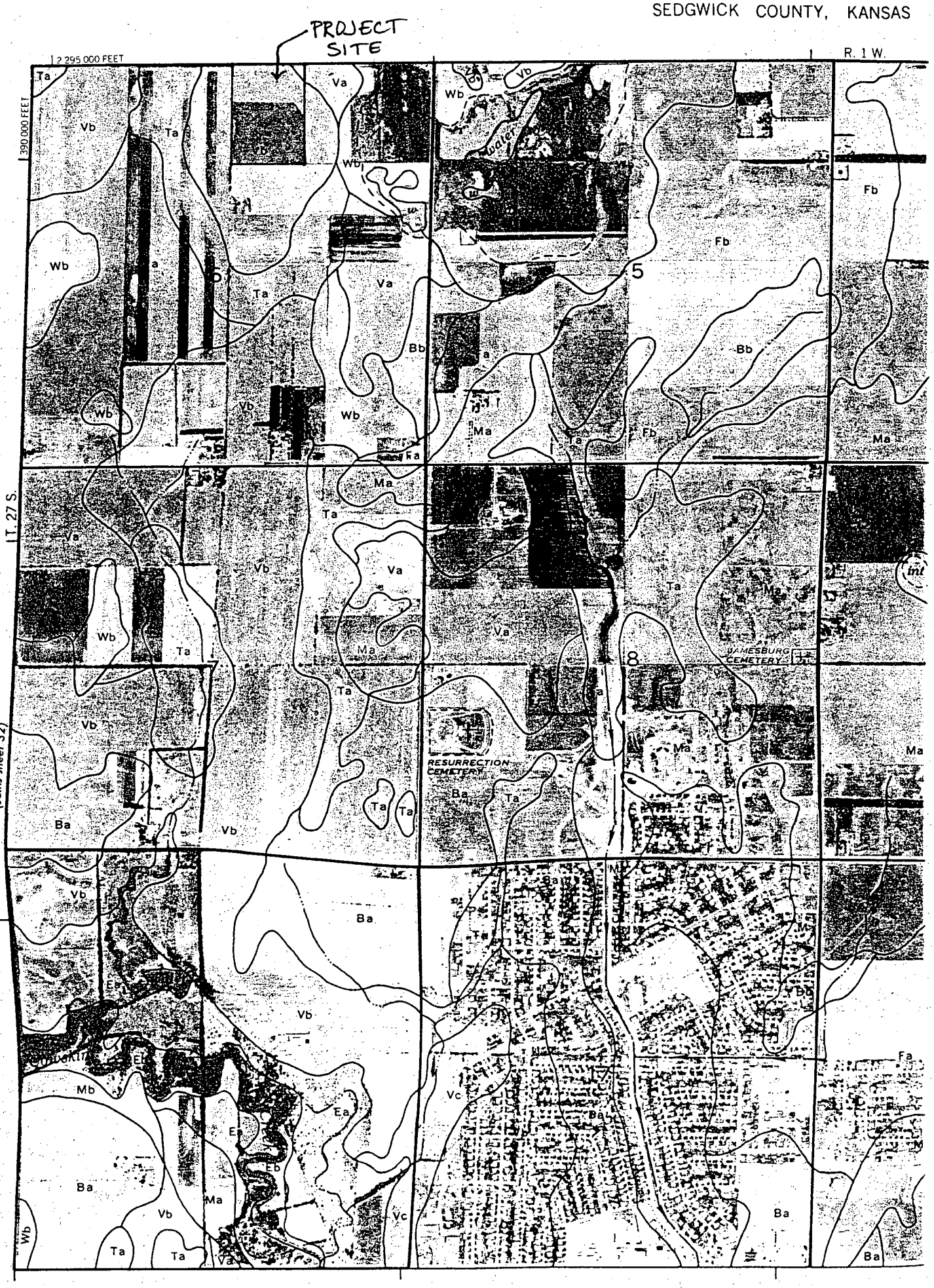
* * * H Y D R A U L I C S * * *

Node	Hyd-Slope (Ft/Ft)	Friction (Ft)	Bend (Ft)	Transition (Ft)	Manhole (Ft)	Deflection (Ft)	Junction (Ft)	Total (Ft)	Hyd-Gl Elevation	Desired Elevation	Diff. (Ft)
200	.00000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	164.0000	164.0000	.00
210	.00069	.1139	.0000	.0000	.0000	.0000	.0000	.1139	164.1139	166.6300	2.52

Design Aids

SOIL LEGEND

SYMBOL	NAME
Aa	Albion–Shellabarger sandy loams, 1 to 4 percent slopes
Ab	Albion and Shellabarger sandy loams, 7 to 15 percent slopes
Ba	Blanket silt loam, 0 to 1 percent slopes
Bb	Blanket silt loam, 1 to 3 percent slopes
Ca	Canadian fine sandy loam
Cb	Canadian–Waldeck fine sandy loams
Cc	Carwile fine sandy loam
Cd	Clark–Ost clay loams, 1 to 4 percent slopes
Ce	Clime silty clay, 3 to 6 percent slopes
Ea	Elandco silt loam
Eb	Elandco silt loam, occasionally flooded
Ec	Elandco silt loam, frequently flooded
Fa	Farnum loam, 0 to 1 percent slopes
Fb	Farnum loam, 1 to 3 percent slopes
Fc	Farnum loam, sandy substratum, 0 to 1 percent slopes
Ga	Goessel silty clay, 0 to 1 percent slopes
Gb	Goessel silty clay, 1 to 2 percent slopes
Ia	Irwin silty clay loam, 1 to 3 percent slopes
Ib	Irwin silty clay loam, 3 to 6 percent slopes
Ic	Irwin silty clay loam, 2 to 6 percent slopes, eroded
La	Lesho loam
Lb	Lincoln soils
Ma	Milan loam, 1 to 3 percent slopes
Mb	Milan loam, 3 to 6 percent slopes
Mc	Milan clay loam, 2 to 6 percent slopes, eroded
Na	Naron fine sandy loam
Oc	Owens clay loam, 1 to 3 percent slopes
Od	Owens–Rock outcrop complex, 3 to 10 percent slopes
Pa	Pits
Pb	Plevna fine sandy loam
Pc	Pratt loamy fine sand, undulating
Pd	Pratt–Tivoli complex, rolling
Ra	Renfrow silty clay loam, 1 to 3 percent slopes
Rb	Renfrow silty clay loam, 3 to 6 percent slopes
Rc	Renfrow–Owens clay loams, 1 to 4 percent slopes
Rd	Rosehill silty clay, 1 to 3 percent slopes
Sa	Shellabarger sandy loam, 1 to 3 percent slopes
Sb	Shellabarger sandy loam, 3 to 6 percent slopes
Sc	Shellabarger sandy loam, 3 to 6 percent slopes, eroded
Ta	Tabler silty clay loam
Tb	Tabler–Drummond complex
Ua	Urban land–Canadian complex
Ub	Urban land–Elandco complex
Uc	Urban land–Farnum complex, 0 to 3 percent slopes
Ud	Urban land–Irwin complex, 1 to 3 percent slopes
Ue	Urban land–Tabler complex
Va	Vanoss silt loam, 0 to 1 percent slopes
Vb	Vanoss silt loam, 1 to 3 percent slopes
Vc	Vanoss silt loam, 3 to 6 percent slopes
Vd	Vanoss silt loam, 3 to 6 percent slopes, eroded
Ve	Vernon sandy loam, 1 to 3 percent slopes
Vf	Vernon sandy loam, 3 to 6 percent slopes
Wa	Waldeck sandy loam
Wb	Waurika silt loam


PROJECT SITE
2 295 000 FEET
390 000 FEET
R. 1 W.
T. 27 S.
(Joins sheet 32)
Ta
Va
Vb
Wb
Fb
Bb
Ma
Ba
Ea
Eb
Mb
Vc
Fa
5
8
RESURRECTION CEMETERY
JAMESBURG CEMETERY

County	Expected 24-hour Storm Rainfall in Inches — Storm Frequency in Years						Normal Annual Precipitation
	100	50	25	10	5	2	Inches
Pawnee	6.6	6.0	5.2	4.5	3.7	2.8	23.3
Phillips	6.0	5.5	4.8	4.1	3.4	2.5	23.6
Pottawatomie	7.5	6.6	5.9	5.1	4.3	3.4	33.6
Pratt	7.2	6.4	5.6	4.8	4.1	3.0	24.6
Rawlins	5.5	5.0	4.3	3.6	3.1	2.3	21.0
Reno	7.4	6.6	5.8	5.0	4.2	3.2	27.7
Republic	6.8	6.0	5.4	4.6	3.9	2.9	28.6
Rice	7.3	6.4	5.6	4.8	4.1	3.0	26.6
Riley	7.4	6.5	5.8	5.1	4.3	3.3	33.5
Rooks	6.1	5.7	4.9	4.1	3.4	2.5	23.9
Rush	6.5	5.9	5.0	4.3	3.6	2.7	23.3
Russell	6.7	5.9	5.2	4.4	3.7	2.8	26.8
Saline	7.3	6.4	5.7	4.9	4.1	3.1	28.4
Scott	5.7	5.3	4.5	3.8	3.2	2.4	20.2
Sedgwick	7.8	7.0	6.1	5.3	4.5	3.5	30.6
Seward	6.0	5.7	4.8	4.2	3.5	2.6	19.8
Shawnee	7.8	6.8	6.1	5.3	4.5	3.5	34.7
Sheridan	5.7	5.3	4.5	3.8	3.2	2.4	21.3
Sherman	5.3	4.8	4.2	3.5	3.0	2.2	16.7
Smith	6.3	5.7	5.0	4.2	3.5	2.6	24.4
Stafford	7.1	6.2	5.5	4.7	4.0	2.9	25.1
Stanton	5.6	5.2	4.5	3.8	3.2	2.4	15.8
Stevens	5.9	5.5	4.7	4.1	3.4	2.5	19.7
Sumner	8.0	7.1	6.2	5.4	4.6	3.6	34.0

RAINFALL INTENSITY TABLE

SEDGWICK COUNTY KANSAS
(revised June 1997)

This table contains average rainfall intensities in inches per hour.

DURATION, HR:MIN	RETURN PERIOD 1 YR	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR
0:05	4.91	5.64	6.64	7.38	8.48	9.34	10.20
0:06	4.62	5.34	6.33	7.07	8.15	9.00	9.84
0:07	4.38	5.09	6.08	6.80	7.86	8.69	9.52
0:08	4.17	4.87	5.85	6.56	7.60	8.41	9.22
0:09	4.00	4.68	5.63	6.33	7.34	8.14	8.93
0:10	3.84	4.50	5.43	6.11	7.10	7.87	8.64
0:11	3.70	4.34	5.25	5.90	6.86	7.61	8.36
0:12	3.56	4.19	5.07	5.71	6.64	7.36	8.09
0:13	3.44	4.05	4.91	5.53	6.43	7.14	7.84
0:14	3.33	3.92	4.76	5.36	6.24	6.92	7.61
0:15	3.22	3.80	4.62	5.21	6.06	6.73	7.40
0:16	3.12	3.69	4.49	5.07	5.91	6.56	7.21
0:17	3.03	3.58	4.37	4.94	5.76	6.40	7.04
0:18	2.94	3.48	4.26	4.82	5.63	6.26	6.88
0:19	2.85	3.39	4.16	4.71	5.50	6.12	6.74
0:20	2.77	3.30	4.06	4.60	5.38	5.99	6.60
0:21	2.70	3.22	3.97	4.50	5.27	5.87	6.47
0:22	2.63	3.14	3.88	4.41	5.17	5.76	6.35
0:23	2.56	3.07	3.80	4.32	5.07	5.65	6.23
0:24	2.50	3.00	3.72	4.23	4.97	5.54	6.12
0:25	2.44	2.93	3.64	4.15	4.88	5.44	6.01
0:26	2.38	2.87	3.57	4.07	4.79	5.35	5.90
0:27	2.33	2.81	3.50	4.00	4.70	5.26	5.80
0:28	2.27	2.75	3.44	3.92	4.62	5.17	5.71
0:29	2.23	2.69	3.37	3.86	4.54	5.08	5.61
0:30	2.18	2.64	3.31	3.79	4.47	4.99	5.52
0:31	2.14	2.59	3.26	3.72	4.39	4.91	5.43
0:32	2.09	2.54	3.20	3.66	4.32	4.83	5.34
0:33	2.05	2.50	3.14	3.60	4.25	4.76	5.26
0:34	2.02	2.45	3.09	3.54	4.18	4.68	5.18
0:35	1.98	2.41	3.04	3.48	4.12	4.61	5.10
0:36	1.94	2.37	2.99	3.43	4.05	4.54	5.02
0:37	1.91	2.33	2.94	3.38	3.99	4.47	4.95
0:38	1.88	2.29	2.90	3.32	3.93	4.40	4.87
0:39	1.85	2.25	2.85	3.27	3.87	4.34	4.80
0:40	1.82	2.22	2.81	3.23	3.82	4.28	4.73
0:41	1.79	2.18	2.77	3.18	3.76	4.22	4.67
0:42	1.76	2.15	2.73	3.13	3.71	4.16	4.60
0:43	1.73	2.12	2.69	3.09	3.66	4.10	4.54
0:44	1.71	2.09	2.65	3.05	3.61	4.04	4.48
0:45	1.68	2.06	2.62	3.01	3.56	3.99	4.42
0:46	1.66	2.03	2.58	2.96	3.51	3.94	4.36
0:47	1.63	2.00	2.55	2.93	3.47	3.89	4.30
0:48	1.61	1.97	2.51	2.89	3.42	3.84	4.25
0:49	1.59	1.95	2.48	2.85	3.38	3.79	4.20
0:50	1.57	1.92	2.45	2.81	3.34	3.74	4.15

RAINFALL INTENSITY TABLE

SEDGWICK COUNTY KANSAS
(revised June 1997)

This table contains average rainfall intensities in inches per hour.

DURATION, HR:MIN	RETURN PERIOD 1 YR	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR
0:51	1.55	1.90	2.42	2.78	3.30	3.70	4.10
0:52	1.53	1.87	2.39	2.75	3.26	3.65	4.05
0:53	1.51	1.85	2.36	2.71	3.22	3.61	4.00
0:54	1.49	1.83	2.33	2.68	3.18	3.57	3.95
0:55	1.47	1.80	2.30	2.65	3.14	3.53	3.91
0:56	1.45	1.78	2.28	2.62	3.11	3.49	3.86
0:57	1.43	1.76	2.25	2.59	3.07	3.45	3.82
0:58	1.41	1.74	2.22	2.56	3.04	3.41	3.78
0:59	1.40	1.72	2.20	2.53	3.01	3.37	3.74
1:00	1.38	1.70	2.17	2.50	2.97	3.34	3.70
1:05	1.30	1.61	2.06	2.38	2.82	3.17	3.52
1:10	1.23	1.53	1.96	2.26	2.69	3.02	3.35
1:15	1.17	1.45	1.87	2.16	2.57	2.89	3.20
1:20	1.11	1.38	1.79	2.06	2.46	2.77	3.07
1:25	1.06	1.32	1.71	1.98	2.36	2.65	2.95
1:30	1.01	1.27	1.64	1.90	2.27	2.55	2.83
1:35	0.97	1.21	1.58	1.83	2.18	2.46	2.73
1:40	0.93	1.16	1.52	1.76	2.10	2.37	2.63
1:45	0.89	1.12	1.46	1.70	2.03	2.29	2.54
1:50	0.86	1.08	1.41	1.64	1.96	2.21	2.46
1:55	0.82	1.04	1.36	1.58	1.89	2.13	2.38
2:00	0.79	1.00	1.31	1.53	1.83	2.07	2.30
2:05	0.76	0.97	1.27	1.48	1.77	2.00	2.23
2:10	0.74	0.93	1.23	1.43	1.72	1.94	2.16
2:15	0.71	0.90	1.19	1.39	1.67	1.88	2.10
2:20	0.69	0.87	1.15	1.35	1.62	1.83	2.04
2:25	0.66	0.85	1.12	1.31	1.57	1.78	1.98
2:30	0.64	0.82	1.09	1.27	1.53	1.73	1.93
2:35	0.62	0.80	1.06	1.24	1.49	1.68	1.88
2:40	0.61	0.78	1.03	1.21	1.45	1.64	1.83
2:45	0.59	0.75	1.01	1.18	1.42	1.60	1.79
2:50	0.57	0.74	0.98	1.15	1.38	1.56	1.74
2:55	0.56	0.72	0.96	1.12	1.35	1.53	1.70
3:00	0.55	0.70	0.94	1.10	1.32	1.49	1.67
3:15	0.51	0.66	0.88	1.03	1.24	1.40	1.57
3:30	0.48	0.62	0.83	0.97	1.17	1.32	1.48
3:45	0.45	0.59	0.78	0.92	1.11	1.26	1.40
4:00	0.43	0.56	0.75	0.88	1.06	1.20	1.34
4:15	0.41	0.53	0.71	0.84	1.01	1.14	1.28
4:30	0.40	0.51	0.68	0.80	0.97	1.10	1.22
4:45	0.38	0.49	0.66	0.77	0.93	1.05	1.17
5:00	0.37	0.47	0.63	0.74	0.89	1.01	1.13
5:15	0.36	0.46	0.61	0.72	0.86	0.98	1.09
5:30	0.35	0.44	0.59	0.69	0.83	0.94	1.05
5:45	0.34	0.43	0.57	0.67	0.81	0.91	1.02
6:00	0.33	0.42	0.55	0.65	0.78	0.88	0.98

(3 pages)

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:					
Single Family (Soil Group D)					
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
Multi-Family (Soil Group D)					
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
Single Family (Soil Group C)					
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
Multi-Family (Soil Group C)					
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
Single-Family (Soil Group B)					
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
Multi-Family (Soil Group B)					
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

Land Use or Surface Characteristics	Percent Impervious	Frequency 2	5	10	25	100
Single Family (Soil Group A)						
1/8 Acre	50	0.47	0.50	0.54		0.60
1/4 Acre	38	0.39	0.41	0.45		0.52
1/3 Acre	30	0.33	0.35	0.39		0.47
1/2 Acre	25	0.30	0.31	0.35		0.44
3/4 Acre	22	0.28	0.29	0.33		0.42
1 Acre	20	0.26	0.28	0.32		0.40
Multi-Family (Soil Group A)						
Multi-Unit (detached)	60	0.55	0.57	0.61		0.67
Multi-Unit (attached)	65	0.58	0.60	0.64		0.70
Apartments	75	0.65	0.68	0.72		0.77
3. Industrial:						
Light Areas	70	0.68	0.69	0.73		0.80
Heavy Areas	80	0.74	0.76	0.79		0.84
4. Playgrounds:	15	0.33	0.35	0.42		0.55
5. Schools:	40	0.49	0.51	0.56		0.66
Railroad Yard Areas:	30	0.43	0.45	0.50		0.62
7. Undeveloped Urban Areas: Offsite Flow Analysis (when land use not defined)	45	0.52	0.54	0.59		0.68
8. Streets:						
Paved	99	0.87	0.88	0.90		0.93
Gravel	00	0.24	0.26	0.33		0.48
9. Drive, Parking Lots and Walks:	96	0.87	0.87	0.88		0.89
10. Roofs:	90	0.80	0.85	0.90		0.93
11. Urban Lawn Areas (See Note No. 1 below):						
Soil Group A						
Slope less than 1%	00	0.08	0.09	0.13		0.23
Slope 1% to 4%	00	0.12	0.13	0.17		0.27
Slope more than 4%	00	0.16	0.17	0.21		0.31
Soil Group B						
Slope less than 1%	00	0.16 (0.26)	0.18	0.24		0.37
Slope 1% to 4%	00	0.20	0.22	0.28		0.41
Slope more than 4%	00	0.24	0.26	0.32		0.45
Soil Group C						
Slope less than 1%	00	0.24	0.27	0.35		0.51
Slope 1% to 4%	00	0.26	0.29	0.37	040	0.53
Slope more than 4%.	00	0.28	0.31	0.39		0.55

Land Use or Surface Characteristics	Percent Impervious	Frequency 2	5	10	100
Soil Group D					
Slope less than 1%	00	0.28	0.33	0.43	0.63
Slope 1% to 4%	00	0.30	0.35	0.45	0.65
Slope more than 4%	00	0.32	0.37	0.47	0.67

Note No. 1: Coefficients shown in the above table are for pervious open space areas with thick turf which includes pervious areas in parks and cemeteries. Coefficients shown above must be increased 0.02 for use with agricultural pasture areas. Coefficients shown above must be reduced by 0.04 for use with agricultural cultivated areas. Group A soils are well-drained, coarse textured sands with high infiltration rates. Group B soils are moderately well-drained, moderately coarse textured soils with moderate infiltration rates. Group C soils are moderately poor-drained, moderately fine textured soils with slow infiltration rates. Group D soils are poor-drained, fine textured soils with very slow infiltration rates.

GENERAL NOTE: These Rational Formula Coefficients may not be valid for large basins.

ATTACHMENT E

DRAINAGE CRITERIA

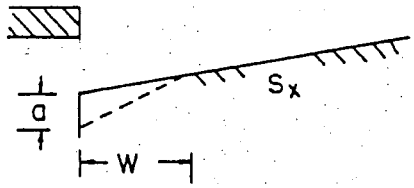
CITY OF WICHITA, KANSAS

AVERAGE OVERLAND FLOW VELOCITY FOR USE WITH URBANIZED AREAS

Surface Type	VELOCITY IN FEET/SECOND FOR SLOPES IN PERCENT SHOWN																			
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	20.0
Forrest with Heavy Ground Litter or Meadow	0.08	0.11	0.14	0.16	0.18	0.19	0.20	0.22	0.23	0.25	0.35	0.42	0.50	0.55	0.60	0.66	0.70	0.75	0.80	1.10
Fallow or Minimum Tillage Cultivation	0.15	0.21	0.26	0.29	0.33	0.35	0.39	0.41	0.44	0.46	0.65	0.80	0.92	1.10	1.20	1.30	1.40	1.50	1.60	2.10
Short Grass Pasture or Lawns	0.23	0.32	0.38	0.44	0.50	0.53	0.58	0.62	0.66	0.70	1.00	1.20	1.40	1.60	1.80	1.90	2.00	2.10	2.20	3.20
Almost Bare Ground	0.32	0.44	0.53	0.62	0.69	0.75	0.82	0.87	0.92	0.98	1.40	1.70	1.90	2.10	2.30	2.50	2.70	2.90	3.10	4.40
Grassed Waterway	0.50	0.68	0.83	0.95	1.10	1.20	1.30	1.40	1.50	1.60	2.20	2.60	3.00	3.40	3.70	4.00	4.30	4.60	4.80	7.00
Paved Areas (Sheet Flow) or Shallow Gutter Flow	0.63	0.89	1.10	1.30	1.50	1.60	1.70	1.80	1.90	2.00	2.80	3.40	4.00	4.50	4.90	5.30	5.70	6.00	6.20	9.00

n = 0.016
S = 0.5%
S_X = 3.1%

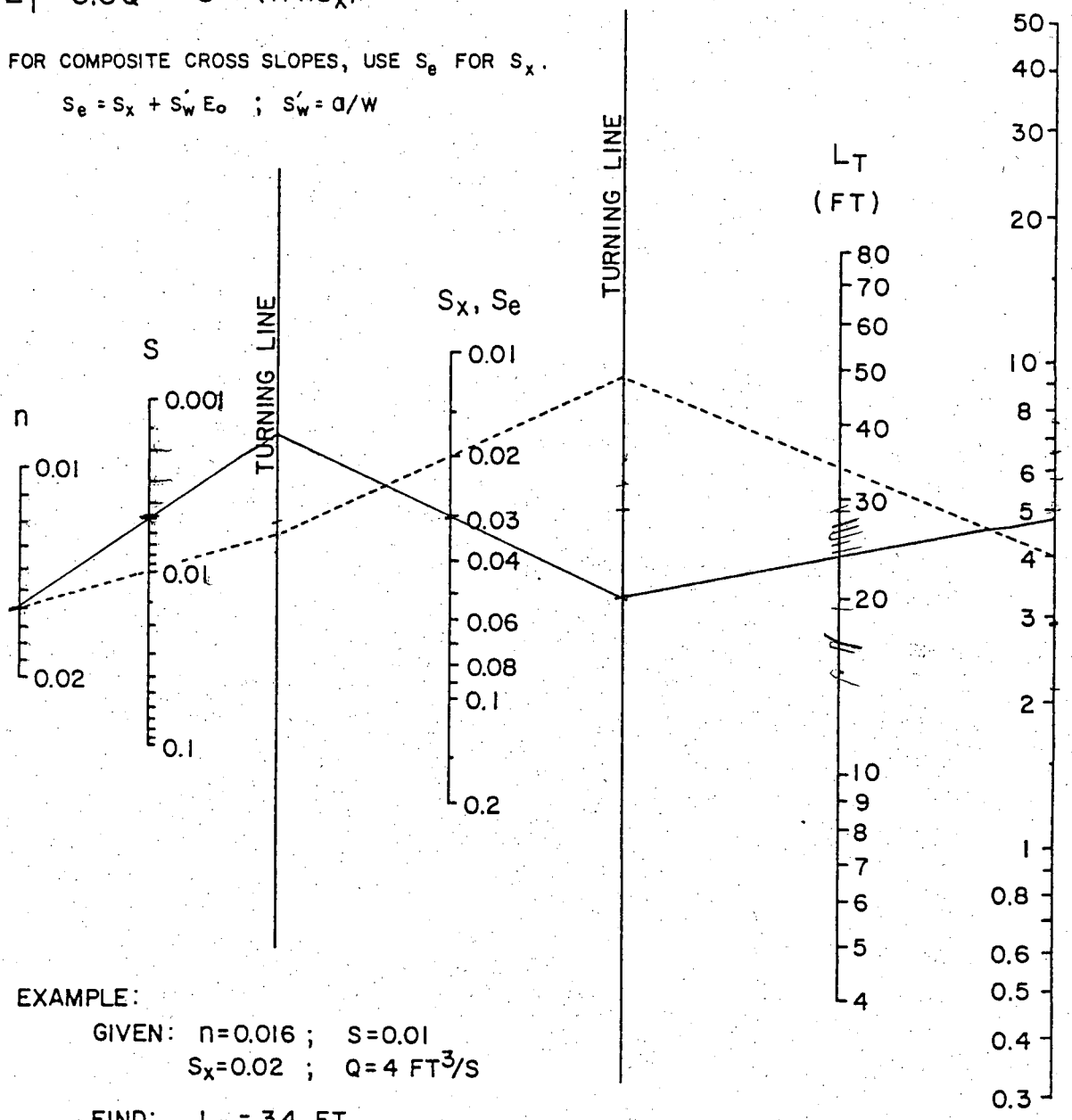
EVERGREEN 4TH
2/14/03



$$L_T = 0.6 Q^{0.42} S^{0.3} (1/nS_X)^{0.6}$$

FOR COMPOSITE CROSS SLOPES, USE S_e FOR S_x.

$S_e = S_x + S'_w E_o$; $S'_w = a/W$



EXAMPLE:

GIVEN: n=0.016 ; S=0.01
S_X=0.02 ; Q=4 FT³/S

FIND: L_T = 34 FT

CHART 9. Curb-opening and slotted drain inlet length for total interception.

EVERGREEN 4TH
2/14/03

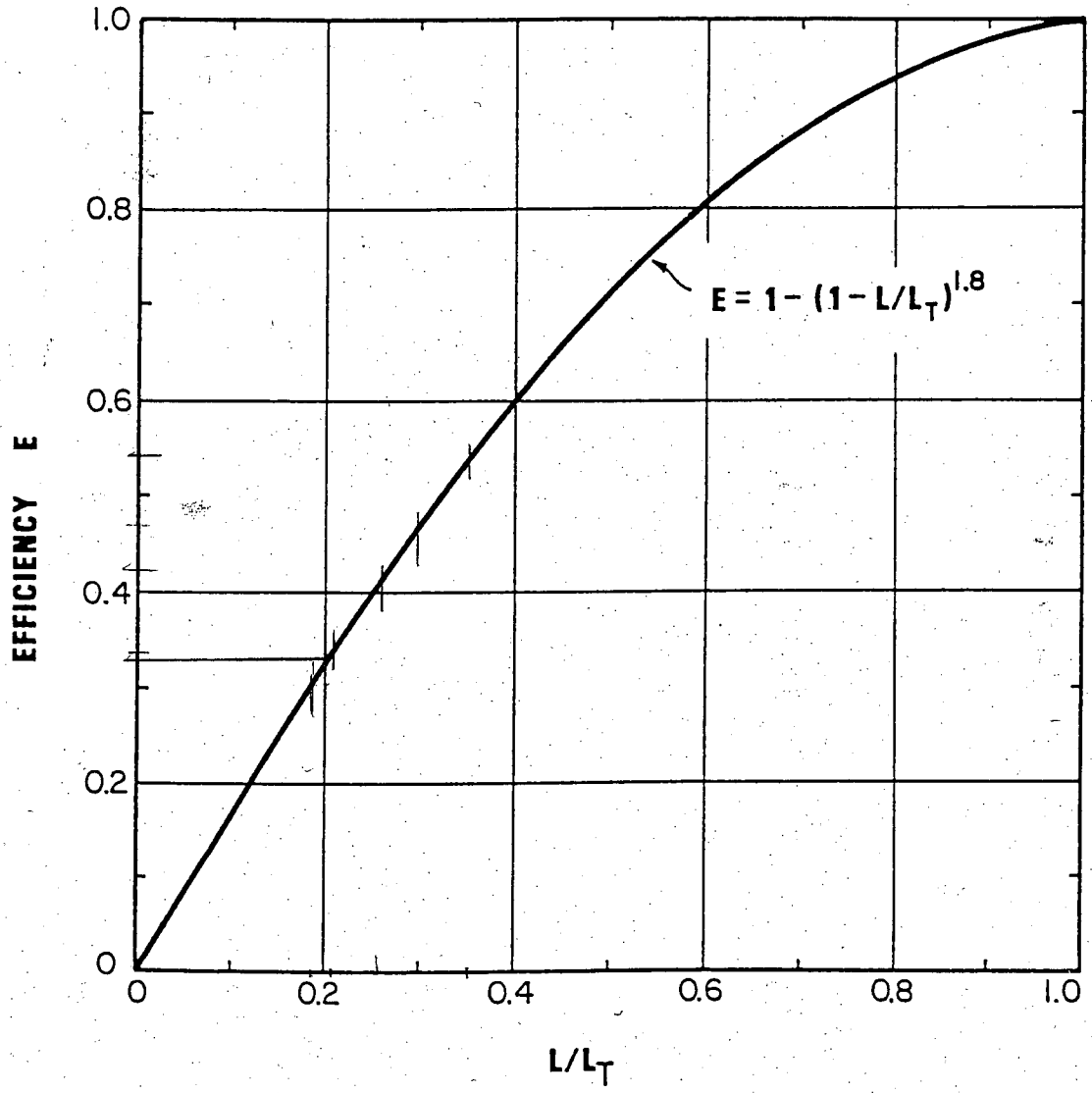
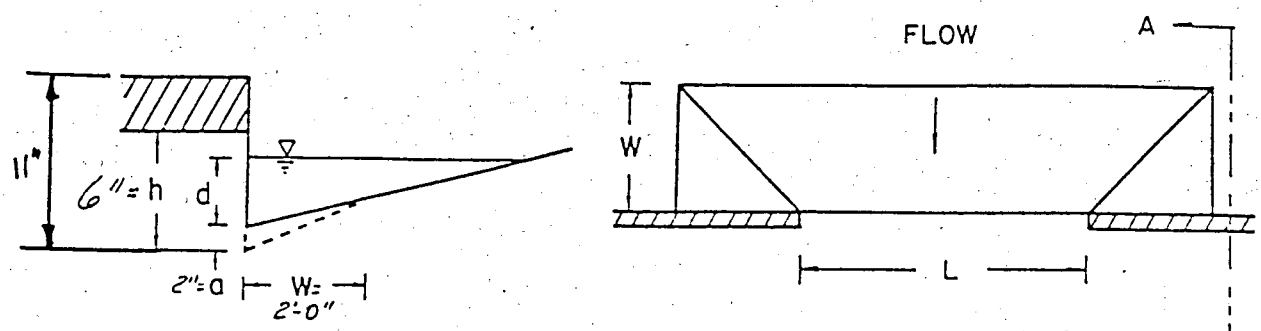


CHART 10. Curb-opening and slotted drain inlet interception efficiency.



DEF. SKETCH, C.O.W. TYPE 1A INLET

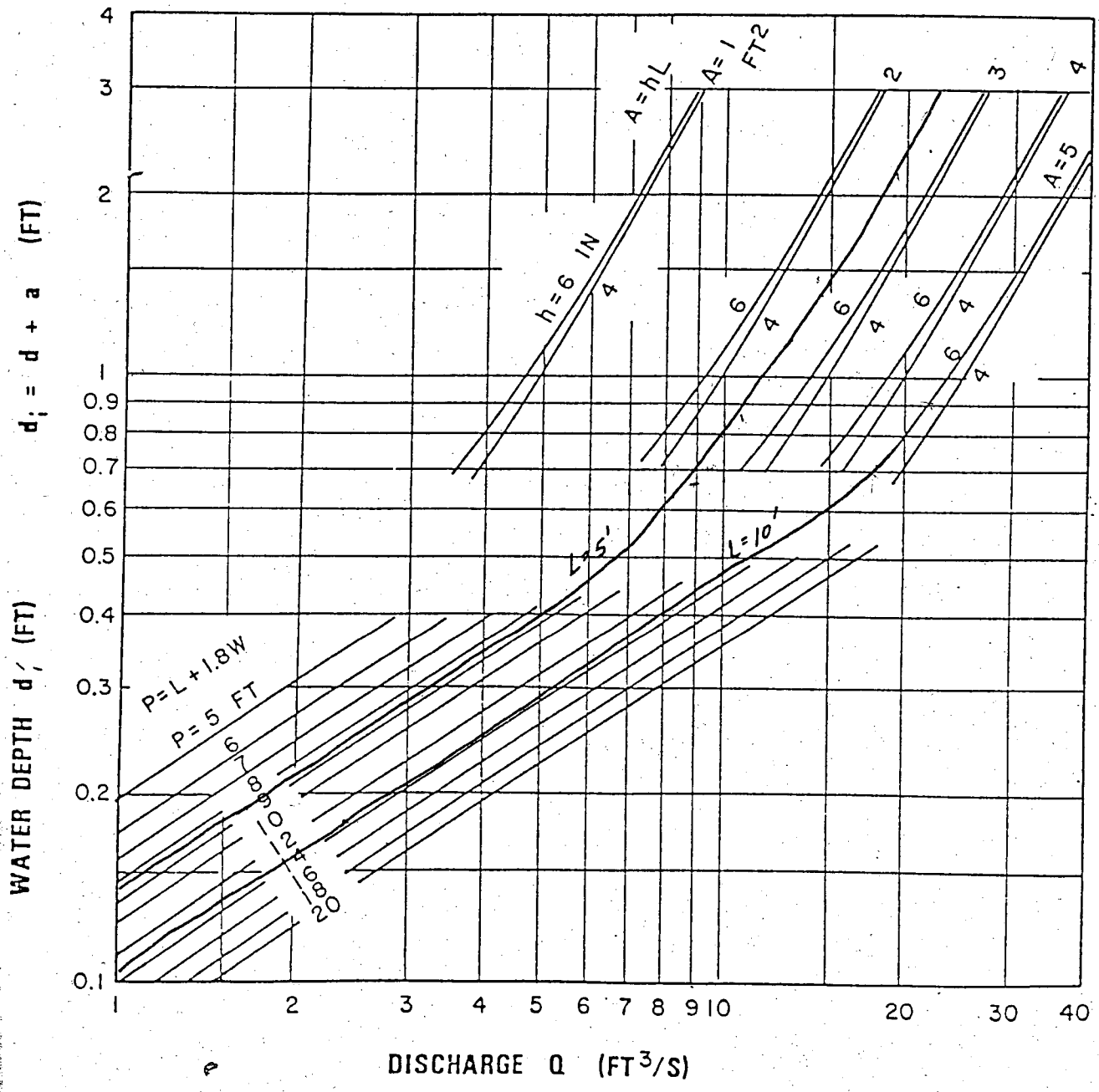


CHART 12. Depressed curb-opening inlet capacity in sump locations.

FROM: HEC-12, DRAINAGE OF HIGHWAY PAVEMENTS, F.H.W.A., MAR., 1984

EVERGREEN 4TH
2/17/03

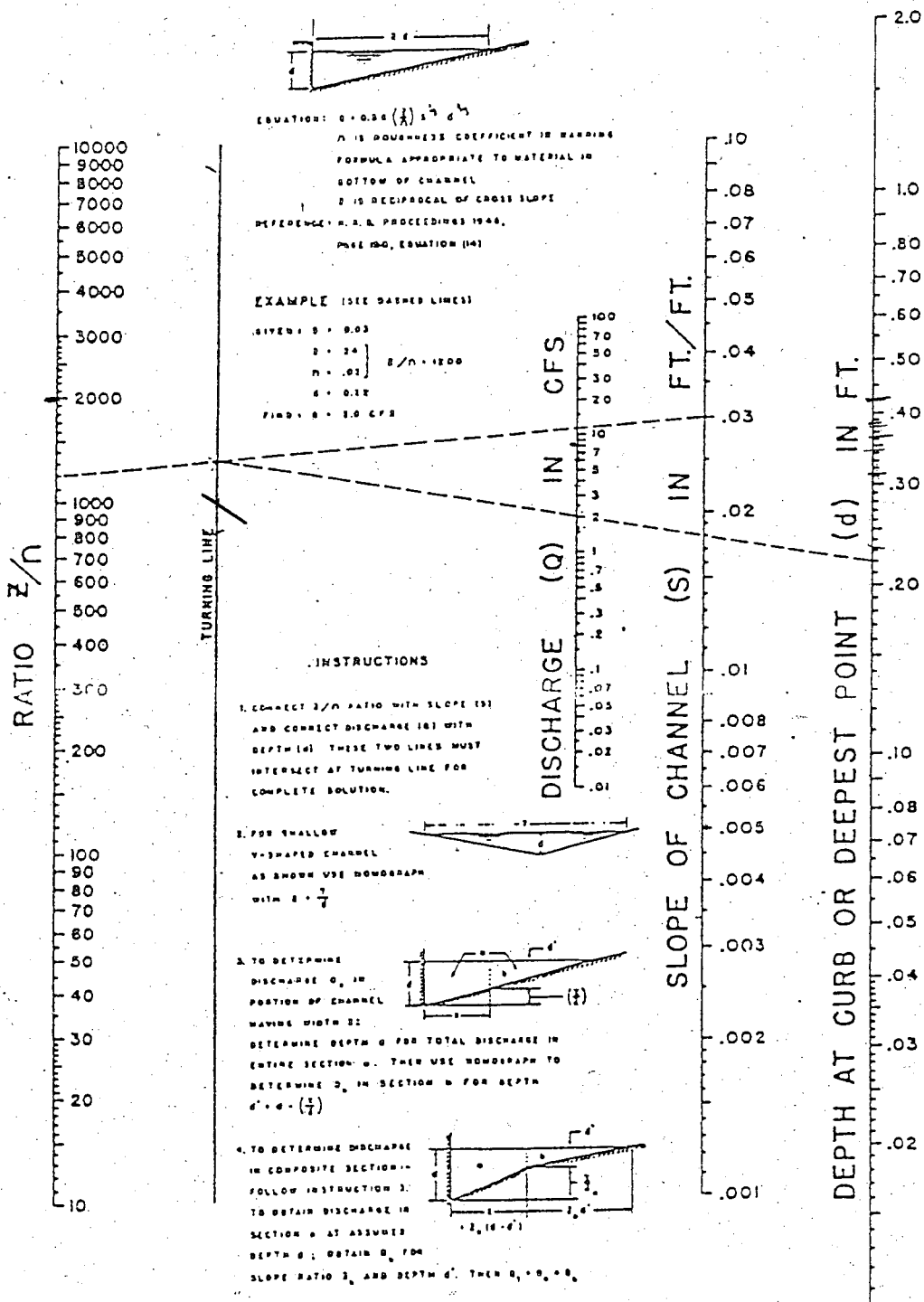
n=0.016

z = 1/.031 = 32.26

z/n = 32.26 / 0.016 = 2016

S=0.5%

NOMOGRAPH FOR FLOW IN TRIANGULAR CHANNELS



One foot is 0.3048m

One cubic foot is 0.0283m^3

Professional Engineering Consultants, P.A.

03 S. TOPEKA ▪ WICHITA, KANSAS 67202
316-262-2691 ▪ FAX 316-262-3003
www.pec1.com ▪ designers@pec1.com

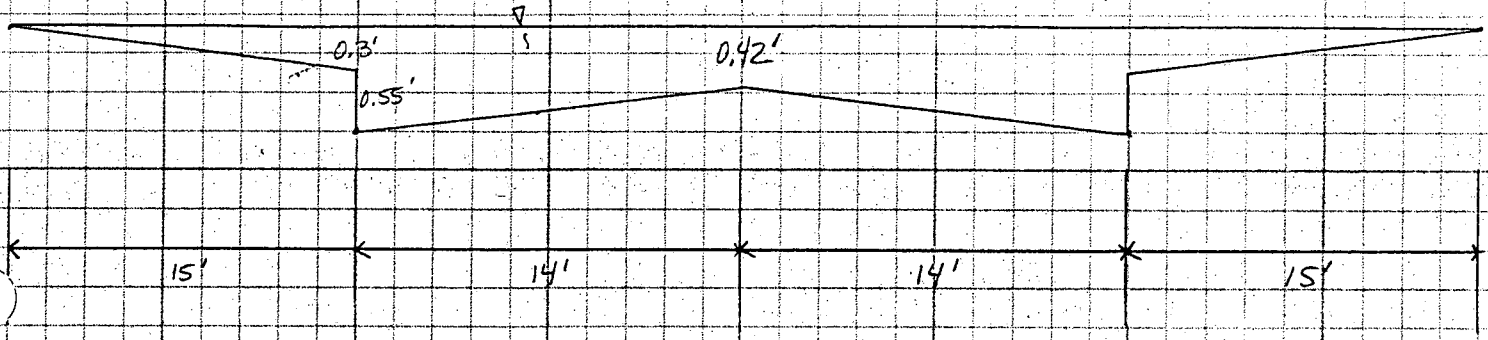
Project _____ Date _____

Item _____ By _____

DETERMINE CAPACITIES OF STANDARD CURB STREETS W/ VARIOUS WALK GRADES FOR 100-YR STORM ANALYSIS

(58' R-O-W)

0.3' WALK GRADE



$$n = \frac{(2 \times 14.5 \times 0.03) + (2 \times 3.05 \times 0.013) + (2 \times 12 \times 0.016)}{59.1} = 0.02256$$

$$A = (2 \times \tfrac{1}{2} \times 5 \times 0.3) + (28 \times 0.42) - (2 \times \tfrac{1}{2} \times 14 \times 0.43) = 22.28\ SF$$

$$P = 59.1$$

$$R = \frac{A}{P} = \frac{22.28}{59.1} = 0.377$$

$$R^{2/3} = 0.522$$

$$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$$

$$Q = \frac{1.486}{0.02256} (22.28)(0.522)(S^{1/2})$$

$$Q = 766.1 (S^{1/2})$$

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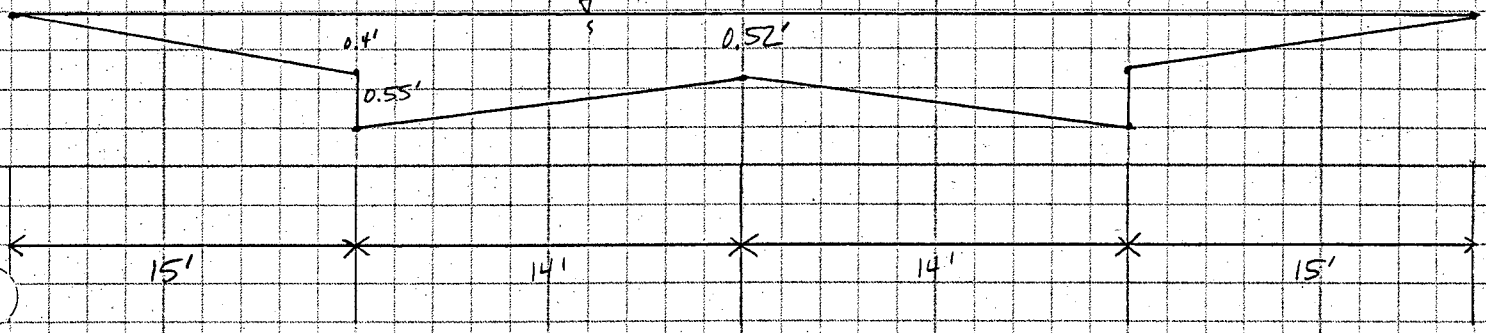
Project _____ Date _____

Item _____ By _____

DETERMINE CAPACITIES OF STANDARD CURB STREETS W/ VARIOUS WALK GRADES FOR 100-YR STORM ANALYSIS

(58' R-O-W)

0.4' WALK GRADE



$$n = \frac{(2 \times 14.5 \times 0.03) + (2 \times 3.05 \times 0.013) + (2 \times 12 \times 0.016)}{59.1} = 0.02256$$

$$A = (2 \times \tfrac{1}{2} \times 15 \times 0.4) + (28 \times 0.52) + (2 \times \tfrac{1}{2} \times 14 \times 0.43) = 26.58 \text{ SF}$$

$$P = 59.1$$

$$R = \frac{A}{P} = \frac{26.58 \text{ SF}}{59.1} = 0.450$$

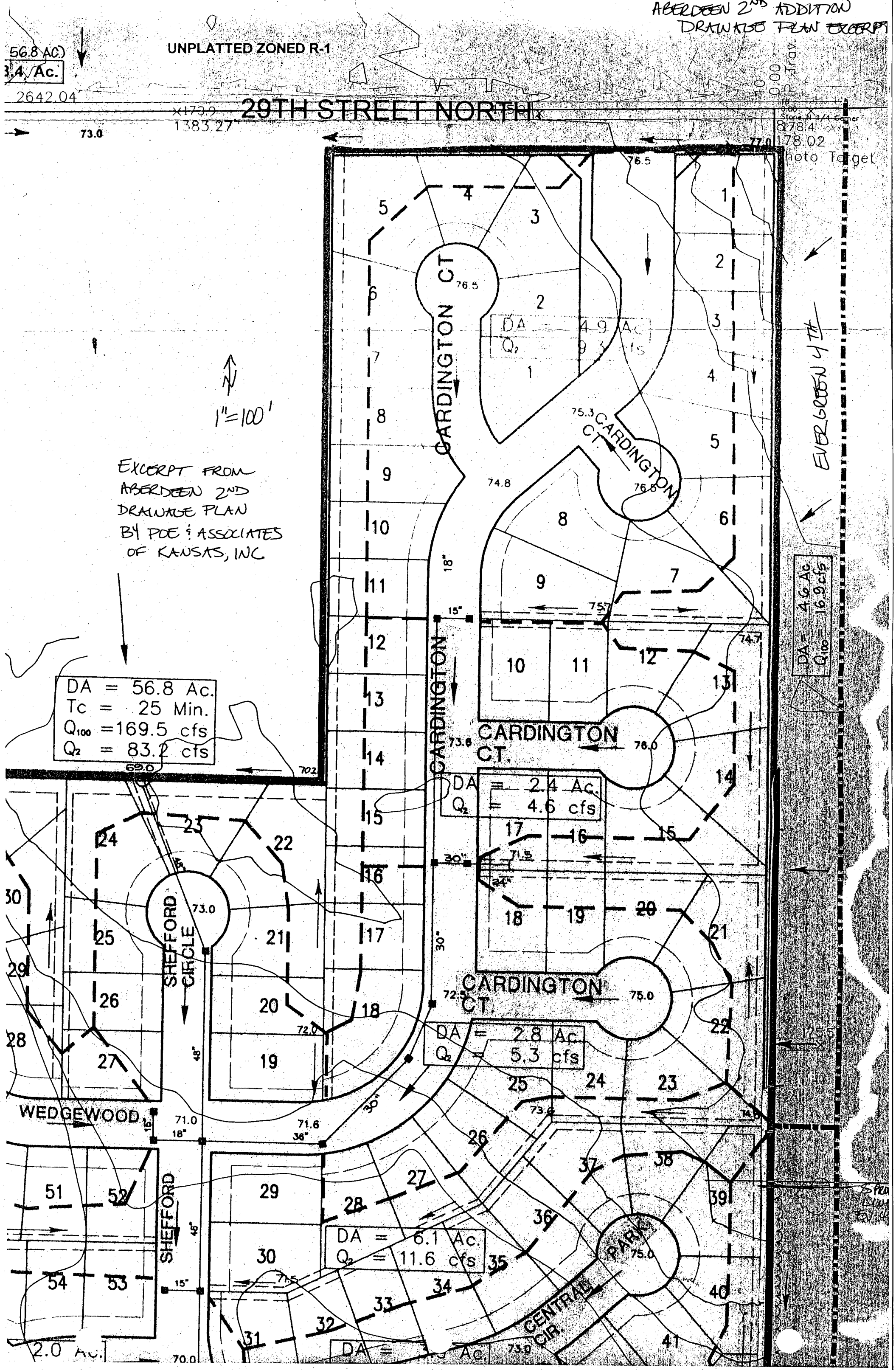
$$R^{2/3} = 0.587$$

$$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$$

$$Q = \frac{1.486}{0.02256} (26.58)(0.587)(S^{1/2})$$

$$Q = 1027.7 (S^{1/2})$$

ABERDEEN 2ND ADDITION
DRAINAGE PLAN EXCERPT



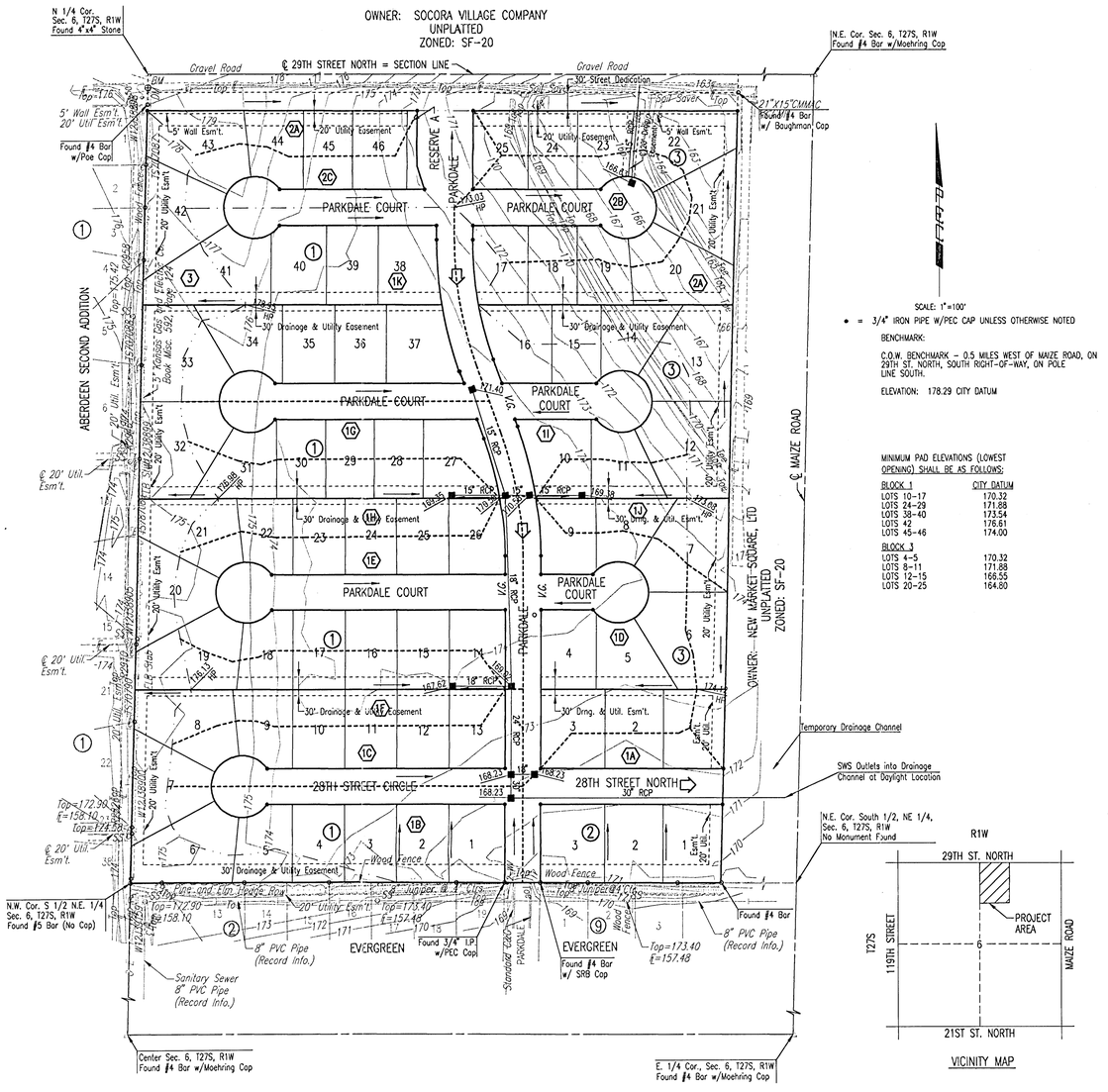
N

1"=100'

EXCERPT FROM ABERDEEN 2ND DRAINAGE PLAN BY POE & ASSOCIATES OF KANSAS, INC

PLAN MAP

DRAINAGE PLAN FOR
EVERGREEN 4TH
AN ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS



SCALE: 1"=100'

● = 3/4" IRON PIPE W/PEC CAP UNLESS OTHERWISE NOTED

BENCHMARK:

C.O.W. BENCHMARK – 0.5 MILES WEST OF MAIZE ROAD, ON 29TH ST. NORTH, SOUTH RIGHT-OF-WAY, ON POLE LINE SOUTH.

ELEVATION: 178.29 CITY DATUM

MINIMUM PAD ELEVATIONS (LOWEST OPENING) SHALL BE AS FOLLOWS:

BLOCK 1	CITY DATUM
LOTS 10-17	170.32
LOTS 24-29	171.88
LOTS 38-40	173.54
LOTS 42	176.61
LOTS 45-46	174.00
BLOCK 3	
LOTS 4-5	170.32
LOTS 8-11	171.88
LOTS 12-15	166.55
LOTS 20-25	164.80

LEGEND

- SOIL GROUP BOUNDARY
- BASIN IDENTIFIER
- MINOR BASIN BOUNDARY
- MAJOR BASIN BOUNDARY
- MAJOR STORM WATER OVERFLOW (Q100)
- MINOR STORM WATER FLOW (Q2)
- NODE IDENTIFIER
- STORM SEWER AND INLET
- PRIVATE STORM SEWER AND INLET (BY OWNER)
- STORM SEWER AND MANHOLE
- SPOT ELEVATION
- HIGH POINT ELEVATION
- MATCH EXISTING ELEVATION
- BENCH MARK
- ELECTRIC POLE
- DEADMAN
- ELECTRIC BOX
- OVERHEAD ELECTRIC
- TELEPHONE BOX
- WATER VALVE
- FIRE HYDRANT
- SANITARY SEWER MANHOLE

VICINITY MAP

O:\2002\02418\Evergreen 4th\dwg\DRAINAGE_2 02-24-2003 08:41:44 am