PROFESSIONAL ENGINEERING CONSULTANTS, PA
303 South Topeka
WICHITA, KANSAS 67202

(316) 262-2691

LETTER OF TRANSMITTAL

DATE 4-28-96 | JOB NO. 36-96162-20

ATTENTION VICKY HUANG, P.E.

RE: HORSESHOE BAY ADDITION

TO ENGINEERING DEPARTMENT
7TH Floor City HALL
Wichita, KS 67202

WE ARE SENDING YOU ☒ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☒ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
2	4-28-96		HORSESHOE BAY DRAINAGE PLAN & SUPPORTING CALCULATIONS

THESE ARE TRANSMITTED as checked below:

☐ For approval ☐ Approved as submitted ☐ Resubmit _____ copies for approval
☒ For your use ☐ Approved as noted ☐ Submit _____ copies for distribution
☐ As requested ☐ Returned for corrections ☐ Return _____ corrected prints
☐ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19_____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS _____

COPY TO File 36-96162-205
Jack Ritchie

SIGNED: Paul D Miller, P.E.

If enclosures are not as noted, kindly notify us at once.

PROFESSIONAL
ENGINEERING
CONSULTANTS
PROFESSIONAL ASSOCIATION
303 S. TOPEKA
WICHITA, KANSAS
ZIP CODE / 67202

HORSESHOE BAY ADDITION

Wichita, Sedgwick County, Kansas

4/29/96

Horseshoe Bay Addition is single family residential development in Northwest Wichita, Kansas encompassing approximately 10 acres. It is a replat of the West half of a development known as Horseshoe Lake. The computations and supporting data for the drainage plan of Horseshoe Bay Addition plat are presented herein.

Hydrology

The Rational Method has been used for hydrologic analysis of all storm sewer systems that serve the residential streets and yards. The analysis made is based on the available site data which includes the following: 1" = 100' topographic map with 2' contours of the site and adjacent areas; Sedgwick County Soil Survey Map; Wichita West Quadrangle Topographic Map; Horseshoe Lake Addition drainage plan dated July 24, 1995. Since nearly all lots abut a pond, back yard drainage systems will not be required for view out type lots, however, all lots in this plat lie within an area defined as Floodplain by FEMA's Floodway Map (See Design Aids Section) Based on a restudy of the Big Slough by Baughman Co., Les Eck's Lake has a base flood elevation of 1322.5 M.S.L. or 135.3 C.O.W. datum. Horseshoe Lake's base flood elevation is .5 ft lower but the only outlet is a 30" CMP in 21st North. Therefore, the emergency overflow for the lake is to be 21st Street North at an elevation of 1322.5 M.S.L. or 135.3 C.O.W. datum. In consideration of this, minimum opening will be 1324.7 M.S.L or 137.5 C.O.W. datum and low floor will be the 1323.5 M.S.L. or 136.3 C.O.W. datum. Additionally, the three proposed ponds will provide a 36" equilizer pipe to maintain equal elevations with the larger existing lakes.

Inlet Design

For local street conveyance, curb-deep flow is tolerable for the minor, or 2 year storm. For each inlet, street flooding and inlet capacity has been checked for the minor storm. It has been assumed 3/8 in./ft. street cross-slopes, City of Wichita 3-5/8" roll curb and gutter and Type 1A street inlets will be used throughout. Minimum walk grade has been assumed to be 0.3 feet above top of curb unless

otherwise noted. A "cascade effect" has been designed to provide a drainage release point in the event of system failure.

Pipe Design

Hydraulic computations for the pipe system were performed using Manning's Equation. All pipes were assumed to be reinforced concrete with a Manning's "n" factor of 0.013. The hydraulic grade line is at least one foot below the top of curb elevations for the minor storm in all cases. The system is designed for the minor storm or 2 year storm, and has major storm overflow directed to sumps near the ponds.

To simplify analysis the following assumptions were made:

1. The time of concentration is identical for both pipe flow and street flow for both major and minor storm; a conservative estimate since pipe velocities generally exceed gutter velocities.

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.

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HORSESHOE BAY ADDITION

HYDROLOGY

4/29/96

BASIN #	AREA (ac)	C2	C100	tc	i2 (in/hr)	i100 (in/hr)	Q2 (cfs)	Q100 (cfs)
1A	1.15	0.44	0.61	15	3.83	7.37	1.95	5.21
1B	1.10	0.44	0.61	15	3.83	7.37	1.87	4.98
1C	1.50	0.44	0.61	15	3.83	7.37	2.55	6.80
1D	0.50	0.44	0.61	15	3.83	7.37	0.85	2.27
2A	2.15	0.44	0.61	15	3.83	7.37	3.65	9.74
2B	0.75	0.44	0.61	15	3.83	7.37	1.27	3.40
2C	1.30	0.44	0.61	15	3.83	7.37	2.21	5.89
2D	0.55	0.44	0.61	15	3.83	7.37	0.93	2.49

otal Area= 9.00 Acres

Total Q2= 15.29 cfs

Total Q100= 40.78 cfs

Note : Runoff coefficient based on class B soils and 1/4 acre lots.

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Comp by PDM

HORSESHOE BAY ADDITION

STREET FLOW AND INLET DESIGN

4/29/96

Design Storm = Q 2 z=(1/Sx)/n= 2000

Hydrology			Approaching Flow				Inlet		On-Grade Inlet			Sump Inlet				
Node/ Basin	Initial Flow Qo (cfs)	Total Flow Qo+Qb (cfs)	C&G Slope So (%)	X-Slope Sx (in/ft)	Depth d (ft)	Spread T (ft)	Type	Length L (ft)	Slot Length Lt (ft)	L/Lt	Efficiency E	Sump Depth di (ft)	Curb Depth d (ft)	Spread T (ft)	Intercept Qi (cfs)	Bypass Qb (cfs)
1B	1.87		0.32	0.0313	0.27	8.55										
1D	0.85		0.47	0.0313	0.18	5.92										
103		2.72					1A	5				0.25	0.09	2.73	2.72	0.00
1A	1.95		0.32	0.0313	0.27	8.69										
1C	2.55		0.47	0.0313	0.28	8.94										
102		4.50					1A	5				0.37	0.21	6.59	4.50	0.00
2B	1.27		0.50	0.0313	0.21	6.81										
2C	2.21		0.37	0.0313	0.28	8.86										
203		3.48					1A	5				0.30	0.13	4.27	3.48	0.00
2A	3.65		0.50	0.0313	0.32	10.11										
2D	0.93		0.37	0.0313	0.20	6.42										
202		4.59					1A	5				0.37	0.21	6.59	4.59	0.00

Maximum Street Flow by Manning's Equation

58 ft R.O.W. 29 ft Street
14.5 ft Parking 0.0208 Parking X-Slope
0.302 Curb Height with 3 5/8 in. C.O.W. Roll Curb

$$Q_{max} = \frac{1.486}{n} A R^{2/3} \sqrt{S_o}$$

At Top of Curb:

n (street) = 0.016 A = 2.92 ft^2
n (curb) = 0.013 P = 19.94 ft
Composite n = 0.0154 R = 0.15
Q2= 4.42 cfs

At 0.302 ft. above Top of Curb (R.O.W.)

n (parking) = 0.030 A = 15.34 ft^2
n (street) = 0.016 P = 58.60 ft
n (curb) = 0.013 R = 0.26
Composite n = 0.0226 **Q100= 23.30 cfs**

Inlet Design

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HORSESHOE BAY ADDITION

PIPE SIZING ESTIMATES

4/29/96

Starting HGL Elev = 33 @ Outlet

Begin Node	End Node	Length (ft)	Est. Dia. (in)	Bend (°)	Q2 (cfs)	T.C. Elev. (ft)	F.L. Elev. (ft)	Min Slope (%)
104	103	160.0	15	20	0.00	--	33.30	0.38
103	102	60.0	15	20	4.50	39.45	32.69	0.38
102	101	160.0	18	0	7.22	39.45	32.46	0.47
204	203	30.0	15	0	0.00	--	32.80	0.38
203	202	60.0	15	0	4.59	39.45	32.69	0.38
202	201	160.0	18	0	8.07	39.45	32.46	0.59

Date: 04-29-1996
Time: 09:10:37

Input File: hsb1

Horseshoe Bay Addition
Wichita, Sedgwick County, Kansas
PDM 4/28/96
Line 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)
103	102	.00	.00	.00	.0	15.00	3.83	2.72	15.00	3.83	2.72	2.72	15"	2.22	60.00	.45	15.45
102	101	.00	.00	.00	.0	15.00	3.83	4.50	15.45	3.78	4.44	7.16	18"	4.05	160.00	.66	16.11

Date: 04-29-1996
Time: 09:10:37

Input File: hsb1

Horseshoe Bay Addition
Wichita, Sedgwick County, Kansas
PDM 4/28/96
Line 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)
103	.00177	.1064	.0000	.0000	.0000	.0000	.0000	.1064	34.3674	39.4500	5.08
102	.00465	.7433	.0000	.0179	.0000	.0063	.4936	1.2610	34.2610	39.4500	5.19
101	.00000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	33.0000	33.0000	.00

Date: 04-29-1996
Time: 09:17:37

Input File: hsb2

Horseshoe Bay Addition
Wichita, Sedgwick County, Kansas
PDM 4/28/96
Line 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)
203	202	.00	.00	.00	.0	15.00	3.83	3.48	15.00	3.83	3.48	3.48	15"	2.84	30.00	.18	15.18
202	201	.00	.00	.00	.0	15.00	3.83	4.59	15.18	3.81	4.57	8.05	18"	4.55	160.00	.59	15.76

Date: 04-29-1996
Time: 09:17:37

Input File: hsb2

Horseshoe Bay Addition
Wichita, Sedgwick County, Kansas
PDM 4/28/96
Line 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)
203	.00290	.0871	.0000	.0000	.0000	.0000	.0000	.0871	34.6236	39.4500	4.83
202	.00587	.9387	.0000	.0197	.0000	.0000	.5781	1.5365	34.5365	39.4500	4.91
201	.00000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	33.0000	33.0000	.00

(3 pages)

ATTACHMENT D

DRAINAGE CRITERIA

CITY OF WICHITA, KANSAS

RECOMMENDED RUNOFF COEFFICIENTS FOR RATIONAL METHOD
AND PERCENT IMPERVIOUS FOR UNIT HYDROGRAPH METHOD

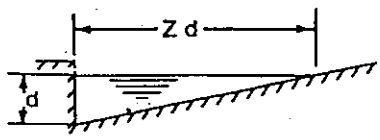
Land Use or Surface Characteristics	Percent Impervious	Frequency 2	5	10	100
1. Business:					
Downtown Areas	95	0.84	0.85	0.87	0.91
Neighborhood Areas	70	0.68	0.69	0.73	0.80
2. Residential:					
Single Family (Soil Group D)					
1/8 Acre	50	0.57	0.61	0.66	0.79
1/4 Acre	38	0.50	0.54	0.62	0.76
1/3 Acre	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 face Characteristics	Percent Impervious	Frequency 2	5	10	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
6. Railroad Yard Areas:	30	0.43	0.45	0.50	0.62
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	0.18	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	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 basins 320 acres or larger.



Equation: $Q = 0.56 \left(\frac{Z}{n}\right) s^{1/2} d^{8/3}$

n is roughness coefficient in Manning formula appropriate to material in bottom of channel

Z is reciprocal of cross slope

Reference: H. R. B. proceedings 1946, page 150, equation (14)

Example (see dashed lines)

Given: s = 0.03
z = 24 } z/n = 1200
n = .02
d = 0.22

Find: Q = 2.0 CFS

RATIO z/n: 10000, 8000, 6000, 5000, 4000, 3000, 2000, 1000, 800, 600, 500, 400, 300, 200, 100, 80, 60, 50, 40, 30, 20, 10

TURNING LINE

DISCHARGE (Q) IN CFS: 100, 50, 30, 20, 10, 5, 3, 1, .5, .3, .2, .1, .05, .03, .02, .01

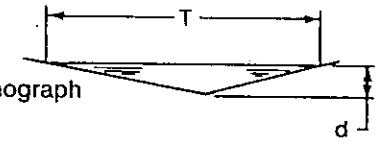
SLOPE OF CHANNEL (S) IN FT./FT.: .10, .08, .07, .06, .05, .04, .03, .02, .01, .008, .007, .006, .005, .004, .003, .002, .001

DEPTH AT CURB OR DEEPEST POINT (d) IN FT.: 2.0, 1.0, .80, .70, .60, .50, .40, .30, .20, .10, .08, .07, .06, .05, .04, .03, .02, .01

INSTRUCTIONS

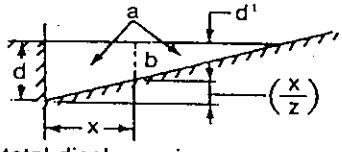
1. Connect z/n ratio with slope (s) and connect discharge (Q) with depth (d). These two lines must intersect at turning line for complete solution.

2. For shallow v-shaped channel as shown use nomograph with $z = \frac{T}{d}$

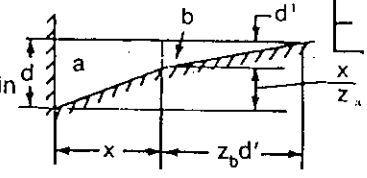


3. To determine discharge Q_x, in portion of channel having width x: determine depth d for total discharge in entire section a. Then use nomograph to determine Q_b, in section b for depth.

$d' = d - \left(\frac{x}{z}\right)$



4. To determine discharge in composite section: – follow instruction 3. To obtain discharge in section a at assumed depth d: obtain Q_b for slope ration Z_b and depth d^1, then $Q_T = Q_a \bullet Q_b$



$= Z_a (d - d')$

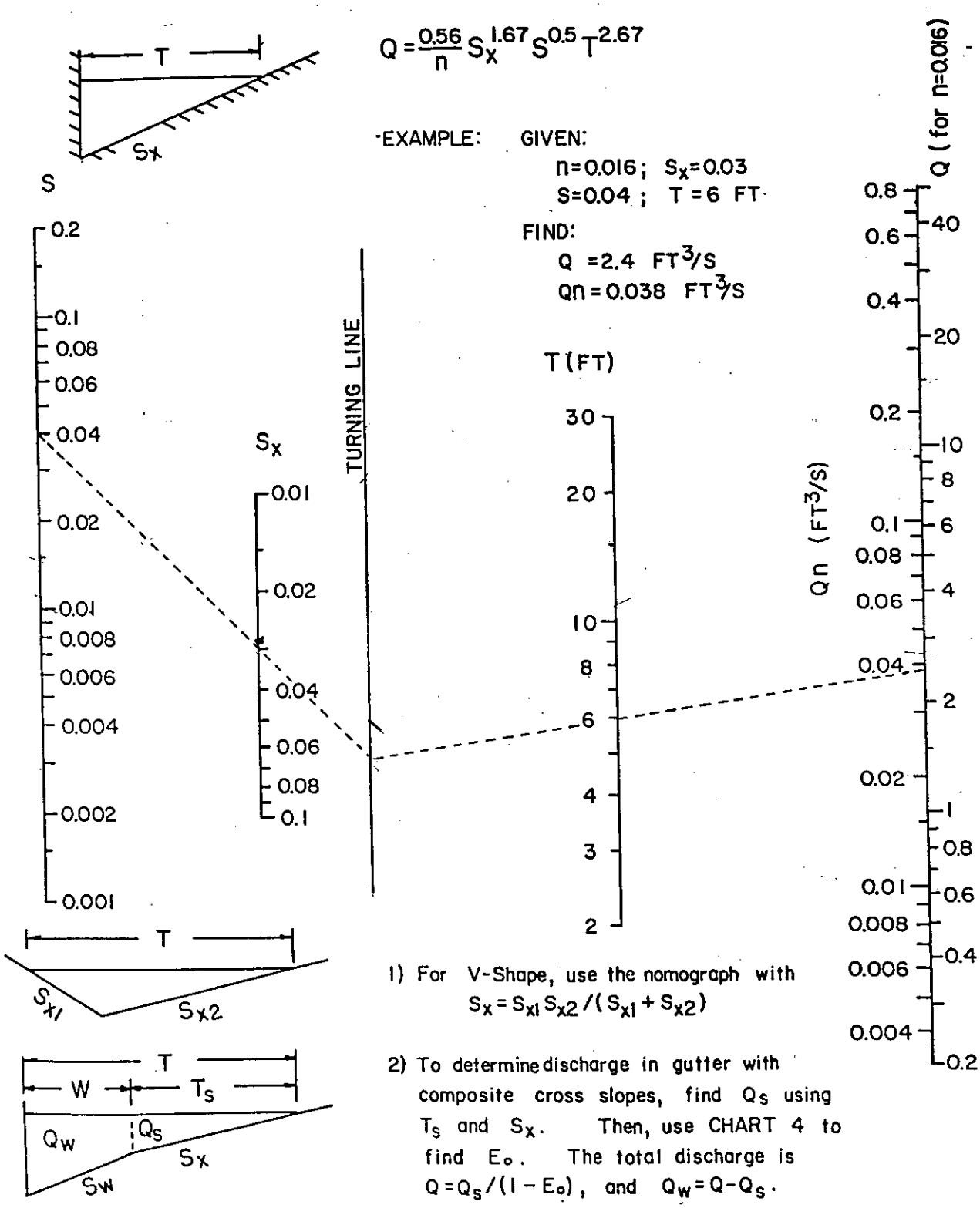
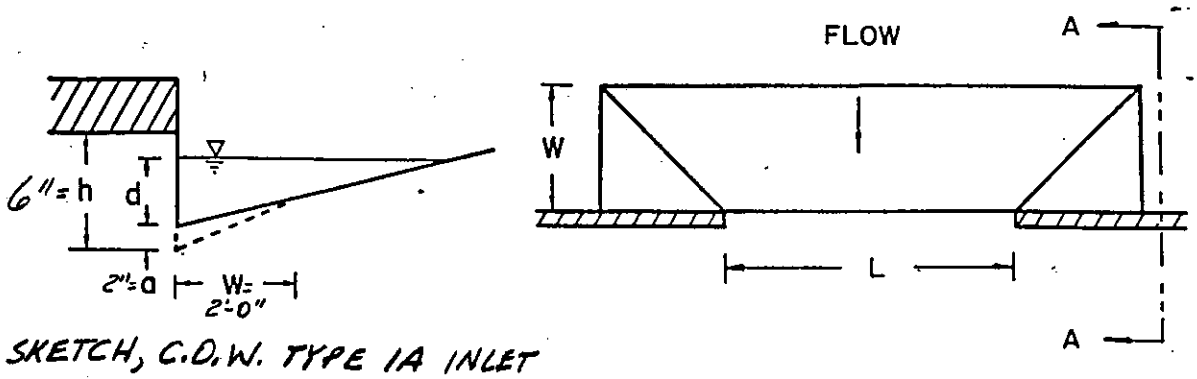


CHART 3. Flow in triangular gutter sections.

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



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

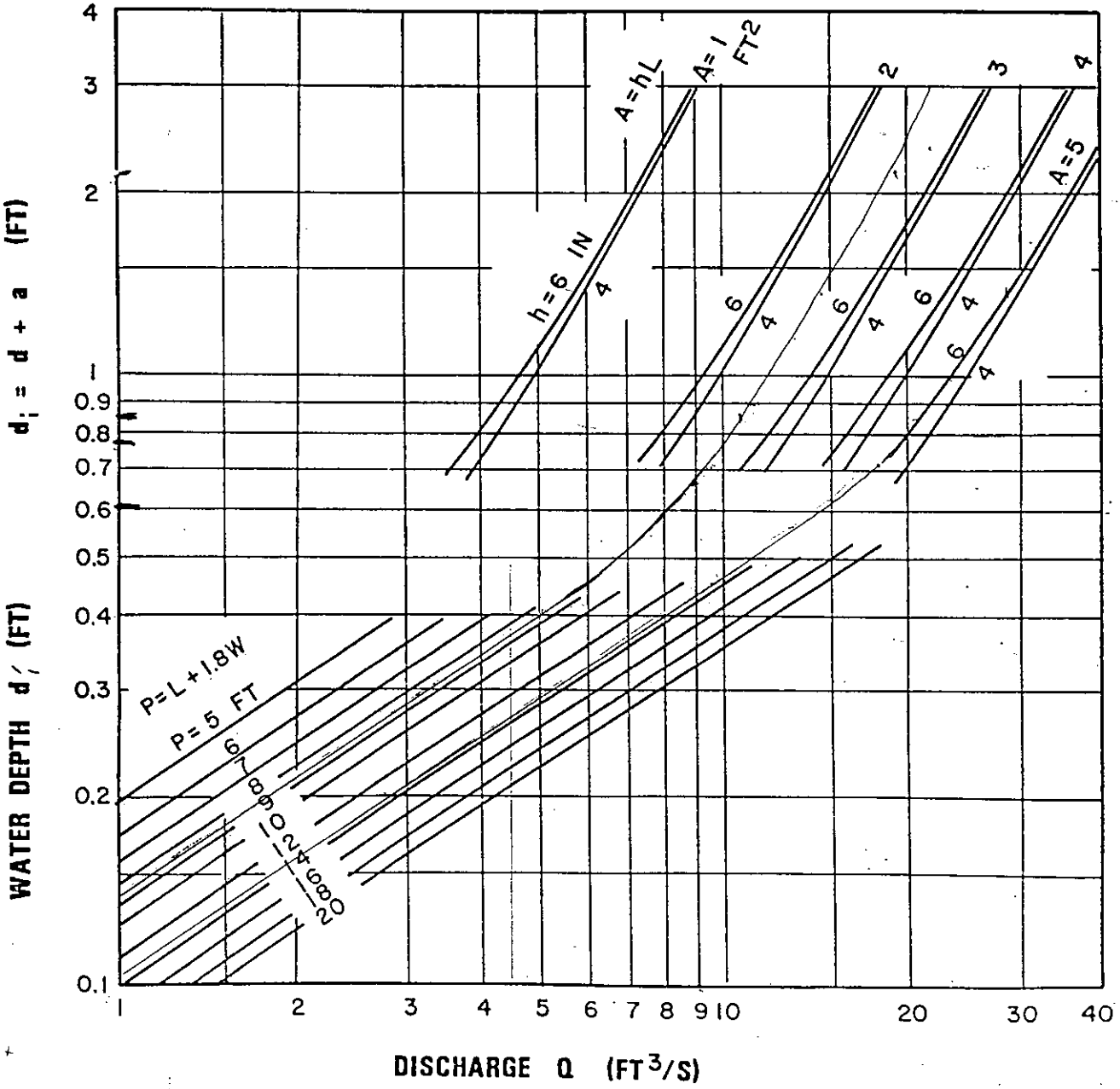


CHART 12. Depressed curb-opening inlet capacity in sump locations.

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

Pipe Design

April 15, 1986

ATTACHMENT A
DRAINAGE CRITERIA MANUAL

CITY OF WICHITA, KANSAS

RAINFALL INTENSITY TABLE FOR SEDGWICK COUNTY, KANSAS

The following tabulation contains rainfall intensity in inches per hour as derived from ESSA Weather Bureau Technical Paper 40 Modified to NWS Hydro-35, 1977 During First Hour

DURATION IN MINUTES	RETURN PERIODS OF 1-YR	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
5	4.18	5.57	6.53	7.41	8.52	9.48	10.32
6	3.99	5.32	6.25	7.09	8.16	9.09	9.89
7	3.81	5.09	5.99	6.81	7.84	8.74	9.50
8	3.66	4.89	5.75	6.55	7.55	8.42	9.15
9	3.52	4.70	5.54	6.31	7.28	8.13	8.83
10	3.39	4.52	5.34	6.09	7.04	7.86	8.54
11	3.27	4.36	5.16	5.89	6.81	7.61	8.27
12	3.18	4.21	4.99	5.71	6.60	7.38	8.02
13	3.05	4.08	4.84	5.53	6.41	7.17	7.79
14	2.96	3.95	4.69	5.37	6.23	6.97	7.57
15	2.87	3.83	4.56	5.22	6.06	6.78	7.37
16	2.78	3.72	4.43	5.08	5.90	6.60	7.18
17	2.71	3.61	4.31	4.95	5.75	6.44	7.00
18	2.63	3.51	4.20	4.83	5.61	6.29	6.84
19	2.56	3.42	4.10	4.71	5.47	6.14	6.68
20	2.50	3.33	4.00	4.60	5.35	6.00	6.53
21	2.44	3.25	3.90	4.50	5.23	5.87	6.39
22	2.38	3.17	3.81	4.40	5.12	5.75	6.26
23	2.32	3.10	3.73	4.31	5.01	5.63	6.13
24	2.27	3.03	3.65	4.22	4.91	5.52	6.01
25	2.22	2.96	3.57	4.13	4.81	5.41	5.90
26	2.20	2.90	3.50	4.05	4.72	5.31	5.79
27	2.16	2.84	3.43	3.98	4.63	5.21	5.69
28	2.14	2.78	3.37	3.90	4.55	5.12	5.59
29	2.11	2.72	3.30	3.83	4.47	5.03	5.49
30	2.08	2.67	3.24	3.76	4.39	4.94	5.40
31	2.05	2.62	3.19	3.70	4.32	4.86	5.32
32	2.02	2.57	3.10	3.63	4.25	4.79	5.22
33	1.99	2.52	3.05	3.57	4.18	4.71	5.14
34	1.96	2.48	3.01	3.51	4.11	4.63	5.07
35	1.93	2.44	2.98	3.46	4.05	4.56	5.00
36	1.91	2.39	2.93	3.41	3.99	4.50	4.93
37	1.89	2.35	2.88	3.36	3.93	4.43	4.86
38	1.87	2.32	2.84	3.31	3.87	4.37	4.79
39	1.85	2.28	2.80	3.26	3.82	4.31	4.73
40	1.83	2.24	2.76	3.22	3.76	4.25	4.66
41	1.81	2.21	2.72	3.17	3.71	4.19	4.60
42	1.79	2.18	2.68	3.13	3.66	4.13	4.54
43	1.77	2.14	2.64	3.09	3.61	4.08	4.49
44	1.75	2.11	2.61	3.05	3.57	4.03	4.43
45	1.73	2.08	2.57	3.01	3.52	3.98	4.38

DURATION IN MINUTES	RETURN PERIODS OF 1-YR	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
46	1.70	2.05	2.54	2.97	3.48	3.93	4.33
47	1.67	2.02	2.50	2.93	3.44	3.88	4.28
48	1.66	2.00	2.47	2.90	3.39	3.84	4.23
49	1.64	1.97	2.44	2.86	3.35	3.79	4.18
50	1.61	1.95	2.41	2.83	3.32	3.75	4.13
51	1.59	1.92	2.38	2.79	3.28	3.71	4.09
52	1.56	1.89	2.35	2.76	3.24	3.67	4.05
53	1.54	1.86	2.33	2.73	3.20	3.63	4.00
54	1.52	1.84	2.30	2.70	3.17	3.59	3.96
55	1.50	1.81	2.27	2.67	3.14	3.55	3.92
56	1.47	1.79	2.25	2.64	3.10	3.51	3.88
57	1.45	1.76	2.22	2.61	3.07	3.48	3.84
58	1.43	1.74	2.20	2.59	3.04	3.44	3.81
59	1.42	1.72	2.18	2.56	3.01	3.41	3.77
60	1.40	1.69	2.15	2.53	2.98	3.37	3.73
61	1.38	1.67	2.13	2.51	2.95	3.34	3.70
62	1.36	1.65	2.11	2.48	2.92	3.31	3.[illegible]
63	1.34	1.63	2.09	2.46	2.89	3.28	3

TABLE 3

FULL FLOW COEFFICIENT VALUES
CIRCULAR CONCRETE PIPE

D Pipe Diameter (inches)	A Area (Square Feet)	R Hydraulic Radius (Feet)	Value of $C_1 = \frac{1.486}{n} \times A \times R^{2/3} = K$ n=0.010	n=0.011	n=0.012	n=0.013
8	0.349	0.167	15.8	14.3	13.1	12.1
10	0.545	0.208	28.4	25.8	23.6	21.8
12	0.785	0.250	46.4	42.1	38.6	35.7
15	1.227	0.312	84.1	76.5	70.1	64.7
18	1.767	0.375	137	124	114	105
21	2.405	0.437	206	187	172	158
24	3.142	0.500	294	267	245	226
27	3.976	0.562	402	366	335	310
30	4.909	0.625	533	485	444	410
33	5.940	0.688	686	624	574	530
36	7.069	0.750	867	788	722	666
42	9.621	0.875	1308	1189	1090	1006
48	12.566	1.000	1867	1698	1556	1436
54	15.904	1.125	2557	2325	2131	1967
60	19.635	1.250	3385	3077	2821	2604
66	23.758	1.375	4364	3967	3636	3357
72	28.274	1.500	5504	5004	4587	4234
78	33.183	1.625	6815	6195	5679	5242
84	38.485	1.750	8304	7549	6920	6388
90	44.170	1.875	9985	9078	8321	7681
96	50.266	2.000	11850	10780	9878	9119
102	56.745	2.125	13940	12670	11620	10720
108	63.617	2.250	16230	14760	13530	12490
114	70.882	2.375	18750	17040	15620	14420
120	78.540	2.500	21500	19540	17920	16540
126	86.590	2.625	24480	22260	20400	18830
132	95.033	2.750	27720	25200	23100	21330
138	103.870	2.875	31210	28370	26010	24010
144	113.100	3.000	34960	31780	29130	26890

$Q = KS$

$K = \frac{Q}{\sqrt{S}}$ $\quad S = \frac{Q^2}{K^2}$

Revised 11-26-86

Date June 17, 1982 Page 2 of 2

Project

Item Minimum Storm Drain Slopes

For Reinf. Conc. Pipe w/ n = 0.013 find S_{min} for 2 fps @ 0.2d

d_o (in.)	S_{min} (%)	d_o (in.)	S_{min} (%)
12	0.51	39	0.11
15	0.38	42	0.10
18	0.30	48	0.08
21	0.24	54	0.07
24	0.20	60	0.06
27	0.17	66	0.05
30	0.15	72	0.05
33	0.13	84	0.04
36	0.12	96	0.03

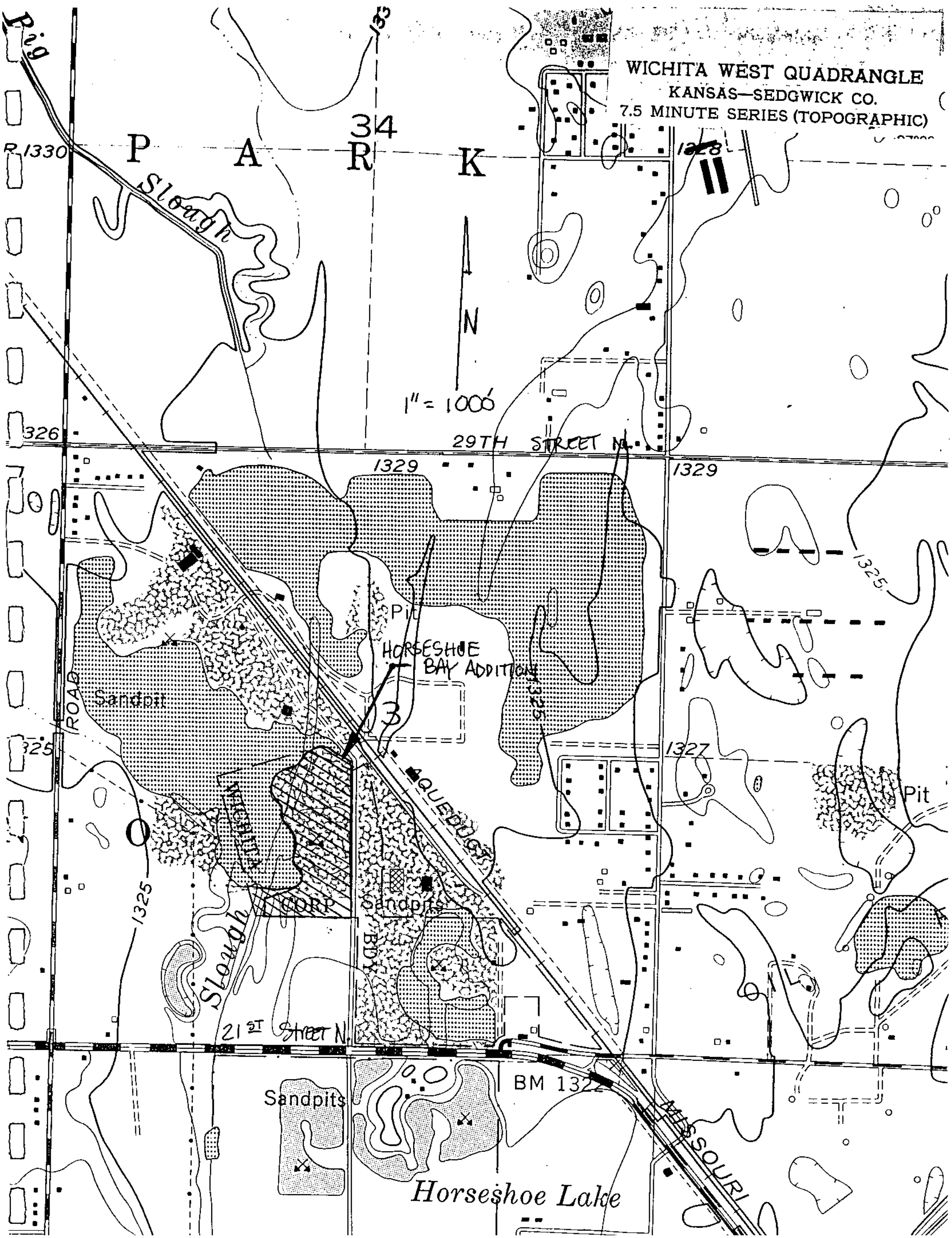
Pipe thickness $= \frac{d}{12"} + 1" = t$ (in)

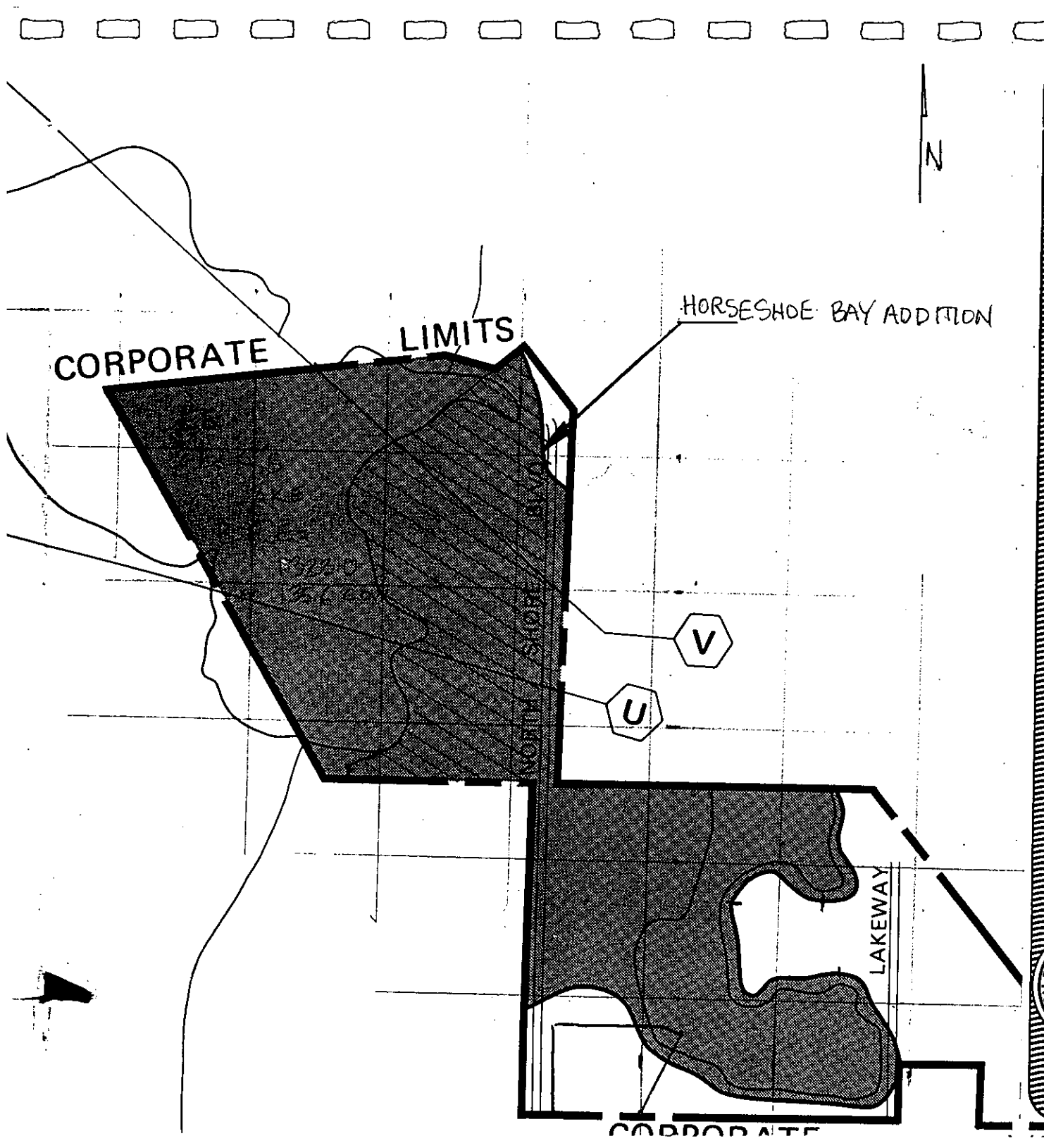
For CMP w/ n as shown find S_{min} for 3 & 2 fps @ 0.2d

	d_o (in.)	*Corrugations*	Manning's n ③	S_{min} (%) 3 f.p.s.	S_{min} (%) 2 f.p.s.
①	12	H & C	~~0.014~~ 0.024	~~1.34~~ 3.94	~~0.60~~ 1.75
	15	H & C	~~0.014~~ 0.024	~~1.00~~ 2.93	~~0.44~~ 1.30
	18	H & C	~~0.015~~ 0.024	~~0.90~~ 2.29	~~0.40~~ 1.02
	21	H & C	0.024	1.87	0.83
	24	H & C	0.024	1.56	0.70
	30	H & C	0.024	1.16	0.52
	36	H & C	0.024	0.91	0.40
	42	H & C	0.024	0.74	0.33
	48	H & C	0.024	0.62	0.28
	54	H & C	0.024	0.53	0.24
	60	C	~~0.027~~ 0.024	~~0.58~~ 0.46	~~0.26~~ 0.20
	66	C	~~0.027~~ 0.024	~~0.51~~ 0.41	~~0.23~~ 0.18
②	72	C	0.027	0.46	0.20
	78	C	0.027	0.41	0.18
	84	C	0.027	0.37	0.17
	90	C	0.027	0.34	0.15
	96	C	0.027	0.31	0.14

* C = Circumferential
H = Helical

① $2\frac{2}{3} \times \frac{1}{2}$ corrugations } from specifications
② 3 x 1 Corrugations }
③ "N" from Section III.2.2 p. 11 "Interim Drainage & Stm. Sew. Policy & Design Criteria and Documentation - C.O.W., Ks." Adopted 4-15-86; Revised 11-01-86.


WICHITA WEST QUADRANGLE
KANSAS—SEDGWICK CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
Big
Slough
P A R K
34
1330
1328
N
1" = 1000'
1326
29TH STREET N.
1329
1329
1325
Pit
HORSESHOE BAY ADDITION
Sandpit
ROAD
1325
3
1327
AQUEDUCT
Pit
O
WICHITA CORP BDY
Sandpits
1325
Slough
21ST STREET N.
BM 1322
Sandpits
MISSOURI
Horseshoe Lake



NATIONAL FLOOD INSURANCE PROGRAM

FLOODWAY

FLOOD BOUNDARY AND FLOODWAY MAP

CITY OF
WICHITA,
KANSAS
SEDGWICK COUNTY

PANEL 5 OF 40
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
200328 0005

EFFECTIVE DATE:
MAY 15, 1986

Federal Emergency Management Agency

SOIL SURVEY OF

Sedgwick County, Kansas

United States Department of Agriculture
Soil Conservation Service
In cooperation with
Kansas Agricultural Experiment Station

SUBDIVISION COMMITTEE
METROPOLITAN AREA PLANNING COMMISSION

AGENDA ITEM NO. 6

May 23, 1996

STAFF REPORT
(One Step Plat--Preliminary and Final)

CASE NUMBER: S/D 96-26 HORSESHOE BAY ADDITION

OWNER/APPLICANT: Barefoot Bay Development, Inc., 8100 E. 22nd Street - Bldg. 1000, Wichita, KS 67226

SURVEYOR/ENGINEER: P.E.C., P.A., c/o Rob Hartman, 303 S. Topeka, Wichita, KS 67202

LOCATION: North of 21st Street North and east of Ridge

SITE SIZE: 21.1 Acres

NUMBER OF LOTS

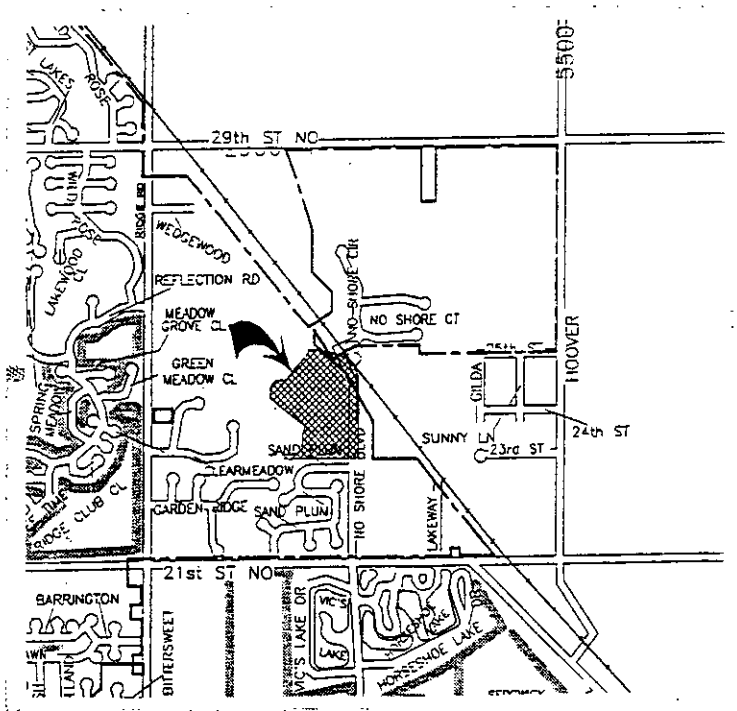
Residential:	54
Office:	
Commercial:	
Industrial:	
Total:	54

MINIMUM LOT AREA: 7,000 sq. ft.

CURRENT ZONING: "MF-18" Under CUP, DP-75

PROPOSED ZONING:

VICINITY MAP:



NOTE: This plat is being treated as a one-step, preliminary-final plat. As such, if approved by he Subdivision Committee, this plat will be placed on the MAPC's following hearing date. In essence, this plat could have possibly been accepted as a final form only plat since it is a replat of a recent plat (Horseshoe Lake Addition, 4/96) and for which the street system is basically unchanged. The primary purpose of this replat is to create additional lots. Originally, this portion of the Horseshoe Lake plat accounted for 39 lots, while this replat is now indicating 54 lots. The additional lots are being created in part by replatting some portions of Reserves into lots but also by basically a decrease in lot sizes. Another significant change proposed by this plat does, however, involve streets. The perimeter street, Northshore Boulevard, is being reduced from a 100-foot right-of-way to only 64-feet by creation of a Reserve strip along the street's eastern line. It should also be noted that the site is within CUP, DP-75.

STAFF COMMENTS:

A. **City Engineering** needs to indicate if needed guarantees should be provided for this replat or if an agreement can be provided in order to respread existing assessments.

With this plat now creating 54 lots, sidewalk will be required along at least one side of Clear Meadow/Hazelwood/Green Meadow (the previous plat did not exceed the criteria of 48 lots). **City Engineering** needs to indicate if or how this new requirement can be included in existing guarantees or if an additional guarantee will be required.

B. **City and Traffic Engineering** need to comment on the proposed change in North Shore Boulevard's right-of-way and/or design. The **applicant's agent** also needs to explain the intent of Reserve D and how it is expected to function with the property to the east.

Specifically, the property to the east is zoned "E" (LI Limited Industrial) and while it is apparently in the same ownership as the area in this plat, at some point it would be expected to be in a homeowners ownership.

For the area to the east of Reserve D, access to North Shore Boulevard would appear to be cut off by this Reserve, and no other means of access appears available to that area. Trafficwise, if access is continued from the industrial site to North Shore Boulevard, industrial-type traffic will now be occurring on a street with right-of-way and paving indicative of or allowed for residential streets.

C. Because of the mix of traffic and possible higher speeds anticipated on a street like North Shore Boulevard, when Lake Ridge 2nd to the south of this site platted, lots abutting this street were required to plat complete access control to North Shore Boulevard. Since this plat's redesign is now placing lots along this street, complete access control shall also be indicated from this plat to North Shore Boulevard for any such lot.

D. Provisions shall be made for ownership and maintenance of the proposed reserves. The applicant shall either form a lot owners' association prior to recording the plat or shall submit a covenant stating when the association will be formed, when the reserves will be deeded to the association and who is to own and maintain the reserves prior to the association taking over

those responsibilities. As a replat of a portion of an Addition, this site was involved with the use, ownership, and maintenance of Reserves both within the area now being platted, but also possibly Reserves in other areas of the original Addition. As appropriate, this new covenant shall also specify how this site is still involved with the use, ownership and maintenance of both these Reserves and the Reserves of the original Addition (Horseshoe Lake).

E. For those reserves being platted for drainage purposes, the required covenant which provides for ownership and maintenance of the reserves shall grant, to the City, the authority to maintain the drainage reserves in the event the owner(s) fail to do so. The covenant shall provide for the cost of such maintenance to be charged back to the owner(s) by a method similar to special assessments.

F. In the plattor's text, Reserve C is indicated as allowing utilities within easements. However, the face of the plat does not show any such easement. As necessary, the plattor's text or face of the plat shall be corrected so as to be consistent (show an easement in the Reserve or amend text).

G. The applicant shall submit a covenant which provides for four (4) off-street parking spaces per dwelling unit on each lot which abuts a 58-foot street. The covenant shall inventory the affected lots by lot and block number and shall state that the covenant runs with the land and is binding on future owners and assigns.

H. The applicant's agent is asked to explain the use of "Landowners" instead of "homeowners" association in regard to the plat's text that notes ownership and maintenance of the Reserves.

I. The applicant shall install or guarantee the installation of all utilities and facilities which are applicable and described in Article 8 of the MAPC Subdivision Regulations. (Water service and fire hydrants required by Article 8 for fire protection shall be as per the direction and approval of the Chief of the Fire Department.)

J. The applicant's engineer is advised that the Register of Deeds is requiring the name(s) of the notary public, who acknowledges the signatures on this plat, to be printed beneath the notary's signature.

K. To receive mail delivery without delay, and to avoid unnecessary expense, the applicant is advised of the necessity to meet with the U.S. Postal Service Growth Management Coordinator (phone 316-729-0102) prior to development of the plat so that the type of delivery, and the tentative mailbox locations can be determined.

L. Perimeter closure computations shall be submitted with the final plat tracing. Section 5-101(c).

M. Recording of the plat within 30 days after approval by the City Council.

N. The applicant is advised that various State and Federal requirements [specifically but not limited to the Army Corps of Engineers, Kanopolis Project Office, Rt. 1, Box 30, Marquette, KS 67464 (913-546-2294) or Kansas Department of Wildlife and Parks, P. O. Box 317, Valley Center, KS 67147] for the control of soil and wind erosion and the protection of wetlands may impact how

this site can be developed. It is the applicant's responsibility to contact all appropriate agencies to determine any such requirements.

O. The representatives from ***City Engineering*** *should* be prepared to comment on the status of the applicant's drainage plan.

Note this plat has been submitted as a one-step, preliminary-final plat.

AGREEMENT

BY AND BETWEEN

THE CITY OF WICHITA, KANSAS,

Party of the First Part

and

BAREFOOT BAY DEVELOPMENT, INC.

Party of the Second Part

WHEREAS, Party of the First Part has constructed certain municipal improvements in the area of Horseshoe Lake Addition, within the City Limits of the City of Wichita; and

WHEREAS, Party of the Second Part is the landowner of part of the improvement district; and

WHEREAS, a portion of the improvement district of said improvements has been replatted; and

WHEREAS, Party of the Second Part desires that a reassessment be made to reflect the changes in platting; and

WHEREAS, the Party of the First Part and Party of the Second Part are both desirous of accomplishing such a reassessment.

NOW, THEREFORE, in consideration of the mutual covenants and promises herein contained, the parties agree as follows:

1. Lots 1 through 21, Block 3; and Lots 1 through 18, Block 4, Horseshoe Lake, an Addition to Wichita, Sedgwick County, Kansas was part of the improvement district for the following City project(s):

Side Street Paving (North Shore Boulevard) - Project No. 472-82376

Submain Sewer - Project No. 468-82235

Water - Project No. 448-88843

Said property was replatted as Lots 1 thru 28, Block 1, and Lots 1 thru 26, Block 2, Horseshoe Bay, an Addition to Wichita, Sedgwick County, Kansas.

2. The Party agree to make a reassessment for said projects in the following manner: The assessment for side street paving, North Shore Blvd., Project No. 472-82376; submain sewer, Project No. 468-82235; and water, Project No. 448-88843, shall be reassessed on a fractional basis; Lots 1 through 28, Block 1, and Lots 1 through 26, Block 2, shall each pay 1/54 of the total cost.

3. The Party of the Second Part is the owner of the property described in section one above and said Party of the Second Part hereby waive their notice and hearing requirements of K.S.A. 12-6a12(b) with respect to the reassessment herein described.

4. The Party of the Second Part further waive their right to appeal the special assessments for the above mentioned projects (including this described reassessment) and agree that no suit to set aside said assessment shall be brought by them nor shall they in any other way bring an action to question the validity of the proceedings taken by the Party of the First Part in constructing this project and levying the special assessments therefor.

5. The Party of the Second Part further agrees that they will indemnify the Party of the First Part against any and all costs, expenses, claims and judgments for which the Party of the First Part is held responsible or which are entered against the Party of the First Part arising out of or as a result of the reassessment herein described.

6. Where the ownership of a single lot is or may be divided into two or more parcels, the assessment to the lot so divided shall be assessed to each ownership or parcel on a square foot basis.

IN WITNESS WHEREOF, the Parties hereto have executed this agreement the _____ of _____, 1996.

THE CITY OF WICHITA, KANSAS

Approved as to form:

BY _____
Bob Knight, Mayor
Party of the First Part

Gary Rebenstorf, Director of Law

Attest:

_____
Pat Burnett, City Clerk

BAREFOOT BAY DEVELOPMENT, INC.

BY: _____
Jack D. Ritchie, Vice President

STATE OF KANSAS)
) SS:
SEDGWICK COUNTY)

BE IT REMEMBERED, That on this 28th day of June, 1996, before me, that undersigned, a Notary Public in and for the County and State aforesaid, came Jack D. Ritchie, Vice President of Barefoot Bay Development, Inc., personally known to me to be the same person who executed the within instrument of writing and such person duly acknowledged the execution of the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal, the day and year last above written.

Karen L. Peterson
Notary Public

My Appointment Expires: 6/10/98

KAREN L. PETERSON
Notary Public - State of Kansas
My Appt. Expires 6/10/98

20-02-01-14

82608

AFFIDAVIT

STATE OF KANSAS, COUNTY OF SEDGWICK: ss.

82750

Michael E. Lindebak, P.E., City Engineer for the City of Wichita, Kansas, being first duly sworn, on oath states:

I have examined the recorded plat of Horseshoe Bay Addition to Wichita, Sedgwick County Kansas, and have found that one street name should be changed as follows:

MEADOW GROVE ST, from Hazelwood Ct northeast to North Shore Blvd; adjacent to lots 1-9 Block 1; and lots 1-9 Block 2 should be changed to **N HAZELWOOD ST**.

FURTHER AFFIANT SAITH NOT.

Michael E. Lindebak, P.E.

Dated this 16th day of June, 1997

(Seal)

ATTEST:

Taylor Levins, Office of Central Inspection
Permits Examiner

Lori Wilkerson

Lori Wilkerson, City of Wichita
Address Subcommittee Chairperson

STATE OF KANSAS, COUNTY ~~OF~~ SEDGWICK: ss.

Be it remembered that on this 16th, day of June, 1997, before me a notary public in and for said County and State, came Michael E. Lindebak, to me known to be the same person who executed the foregoing instrument duly acknowledged by me. In testimony whereof, I have hereunto set my hand and affixed my Notarial Seal the day and year above written.

JACK L. LOVE
Notary Public - State of Kansas
My Appt. Expires 1-5-98

My Appointment Expires 1/5/98

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<des>from the west line of North Shore Boulevard to the west line of North Shore Boulevard: Hazelwood Court serving Lots 9-12, Block 1 and Lots 10-21, Block 2, to and including the cul-de-sacs; and, Sidewalk along the north, easterly, and southerly side of Clear Meadow, Hazelwood and Meadow Grove from the west line of North Shore Boulevard to the west line of North Shore Boulevard; and along the west side of North Shore Boulevard from the south line of Block 1 to the south line of Meadow Grove
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<consultant>PEC
<:let>961119
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