



MEMO

TO: City of Wichita, Engineering Dept. PROJECT NO. 36-83713-1120
455 N. Main
Wichita, KS 67202
ATTN: Chris Breitenstein, P.E. DATE: April 4, 1984
FROM: Louise Olivarez
REFERENCE: Drainage Plan

PLEASE ADVISE IMMEDIATELY OF ANY DISCREPANCIES OR OMISSIONS YOU BELIEVE TO BE CONTAINED HEREIN.

Transmitted herewith are two (2) prints of the Drainage Plan for the proposed Briarwood 4th Addition, along with supporting calculations.

The plan was submitted last Friday, March 30, 1984, for hearing by the Subdivision Committee on April 12, 1984.

If you have any questions or need any additional information, please advise.

Briarwood Phase II (4th Add.)

PEC File 36-83713-1120

SYSTEM 100

- Due to minimal difference in 2 yr & 100 yr pipe sizes, use 100 yr storm.
- Street flow allowed to be 5' curb depth for 2 yr storm. See attached graph.
 $E = \text{reciprocal of cross slope} = \frac{1}{5/16} = .32$
 $n = .0016$
 $Q_{max} \text{ street} = 13 \text{ cfs}$
Curb depth allowed = 0.55'
street slope = 0.32%
- $Q_{max} \text{ street} = 13 \text{ cfs}$
Actual flows are 1.3 cfs to Node 100, 1.4 cfs to Node 101. Street flow for 2 yr storm OK.

- Street flow allowed to be .03' above curb depth for 100 year storm (depth allowed = 0.55').
Approx. $Q_{max} \text{ street} = 40 \text{ cfs}$ (see attached graph)

Actual flows are 2.9 & 8.4 cfs
Therefore, street flow for 100 yr storm OK

- Inlet size:
Sump condition at both Nodes 101 & 102
 $H = 10"$ (City inlet) = depth of water
 $h = 6"$ inlet opening
 $H/h = 10/6 = 1.67$
Resulting $Q/L = 2.0 \text{ cfs per foot of inlet}$ (See graph)
at Node 102 $Q = 2.9$ $L \text{ required} = \frac{2.9}{2.0} = 1.45'$ Use 1'-0" curb inlet
at Node 101 $Q = 8.4$ $L \text{ required} = \frac{8.4}{2.0} = 4.2'$ Use 1'-0" curb inlet

PROFESSIONAL
ENGINEERING
COUNCIL OF ONTARIO
REGISTERED ENGINEER

CHART NOT VALID FOR
RECORD & PAGES 87511
(100-00-000)

HYDROLOGY DATA SHEET

PAGE 1 OF 2

PROJECT: BRIARWOOD PHASE II (4th Add.) PROJECT NO. 36-83713-1120
ITEM: STORM SEWER DESIGN - SYSTEM 100 DATE: April 3, 1984
RETURN PERIOD: 2 COMPUTATIONS BY: CSB REVISIONS BY: _____

SCHEMATIC DIAGRAM:

TERRITORY AREA				HYDROLOGY SUMMATION				CONDUIT DATA					
SUB-BASIN	C	AREA (acres)	LENGTH (feet)	Q ₁ (cfs)	Q ₂ (cfs)	Q ₃ (cfs)	Q ₄ (cfs)	PIPE (inches)	SLOPE (ft/ft)	VELOCITY (ft/min)	LENGTH (feet)	% COMPLETION	% FILL
100	0.5	0.65	150	4.06	1.3	15	4.06	13	13	15	0.4	30	0.25
101	0.5	1.23	150	4.06	2.5	13.25	4.04	2.5	3.0	15	0.4	220	108
					</								

PROFESSIONAL
ENGINEERING
CONSULTANTS
INCORPORATED IN CALIFORNIA

1600 EAST 17th AVENUE
MILWAUKEE, WISCONSIN 53211
(414) 362-5400

HYDROLOGY DATA SHEET

PAGE 2 OF 2

PROJECT: BRIARWOOD PHASE II (4th ADD.) PROJECT NO. 36-83713-1120

DATE: APRIL 4, 1984

ITEM: STORM SEWER DESIGN - SYSTEM 100

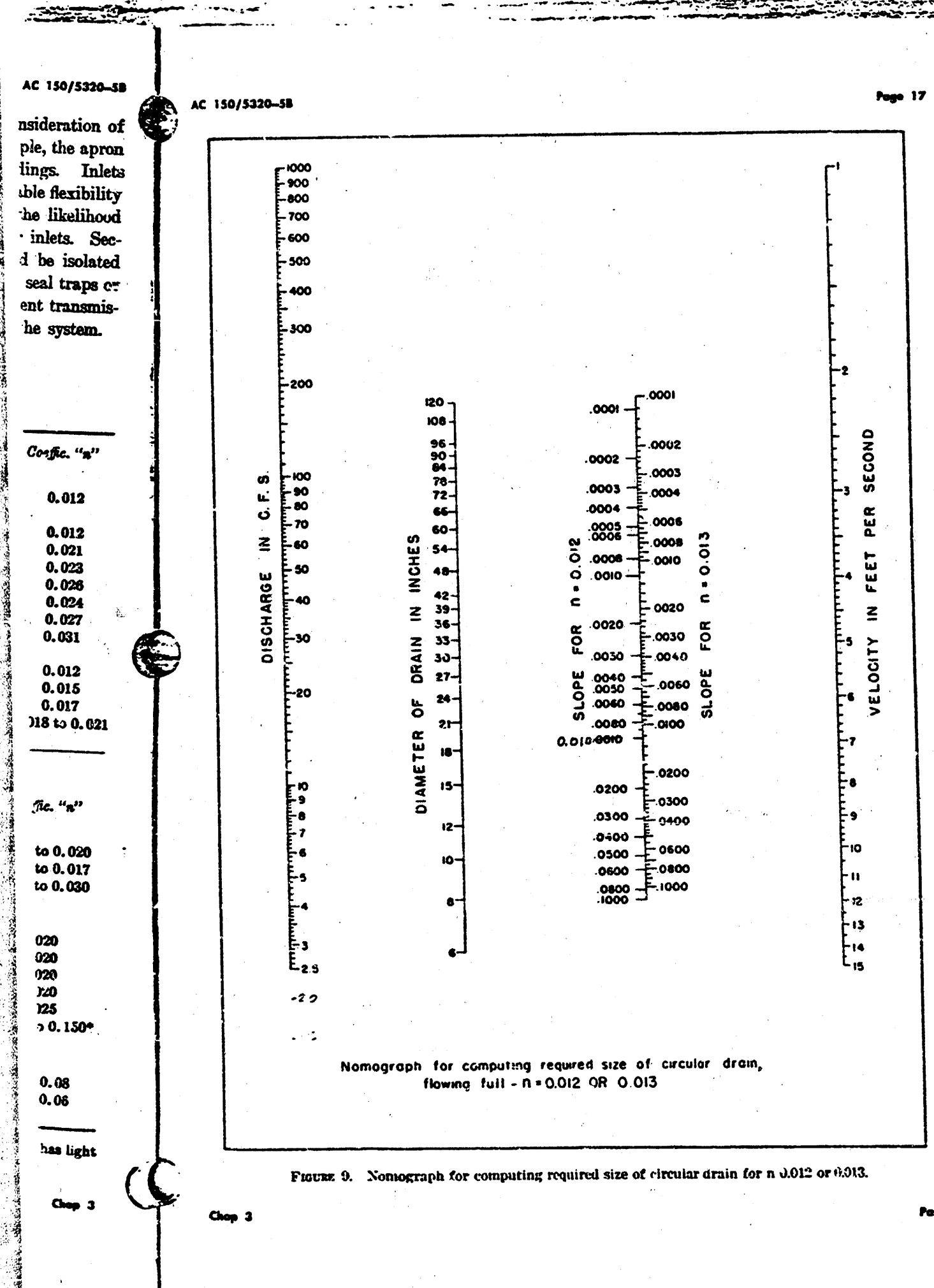
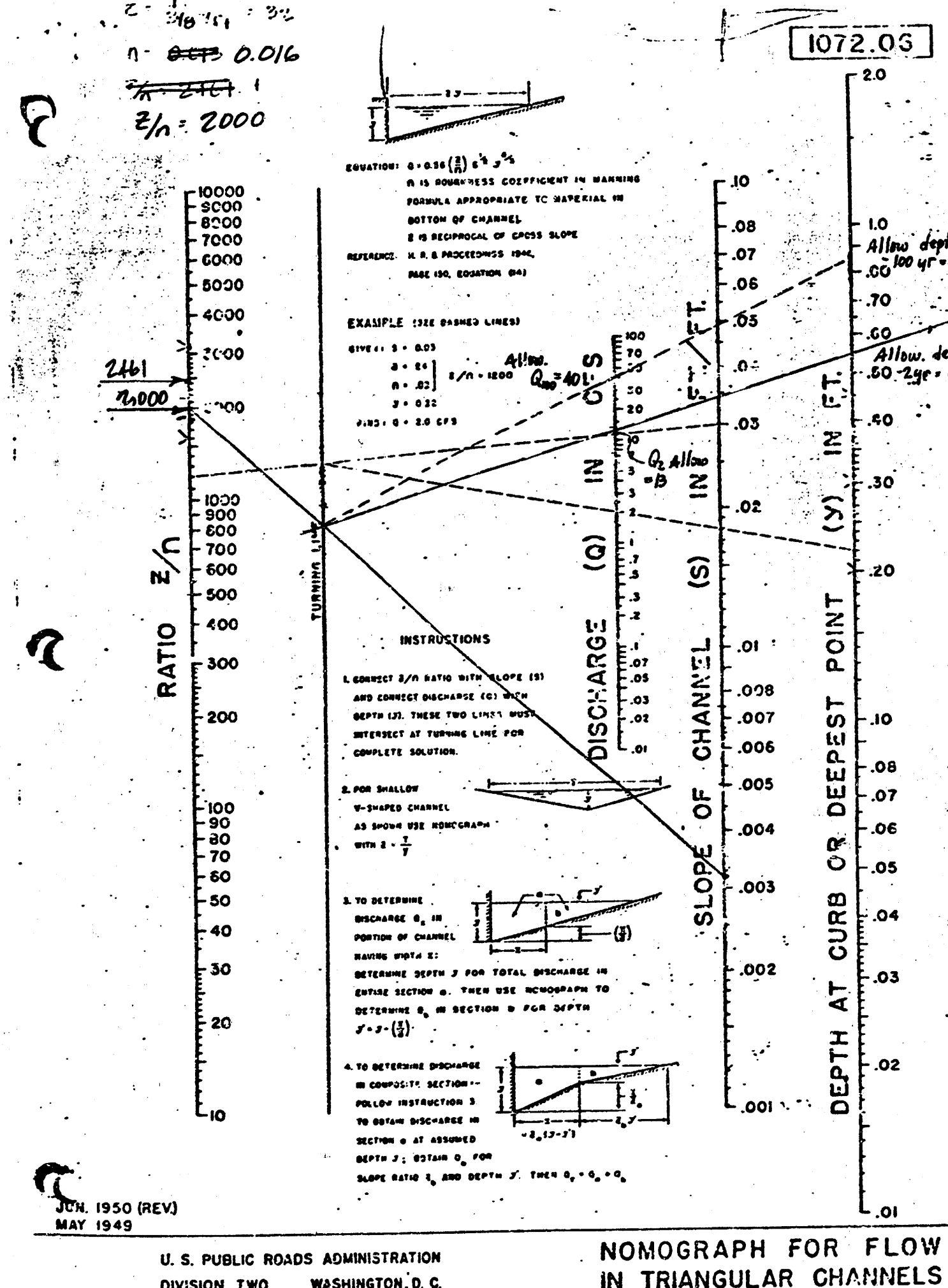
RETURN PERIOD: 100

COMPUTATIONS BY: CSB

REVISIONS BY:

SCHEMATIC DIAGRAM:

TERRITORY AREA				HYDROLOGY SUMMATION						CONDUIT DATA					
SUB-BASIN	C	AREA (acres)	SLOPE (%)	LENGTH (feet)	V_p (inches)	Q_p (cfs)	W_p (feet)	Q (cfs)	Z (feet)	R_p (feet)	R (feet)	VELOCITY (feet/sec)	LENGTH (feet)	V_p (inches)	Q_p (cfs)
100	102	0.5	0.65	15	8.98	2.9	4.5	8.98	2.9	15	.22	2.5	30	0.2	15.2
101	0.5	1.23	15	8.98	5.5	15.2	8.98	5.5	8.4	18	.60	4.6	220	0.8	16.0



RAINFALL INTENSITY TABLE		PAGE 1 OF 3	
FOR SEDGWICK COUNTY, KANSAS		The following tabulation contains rainfall intensity in inches per hour as derived from ESSA Weather Bureau Technical Paper 40.	
DURATION IN MINUTES	1-YR	2-YR	RETURN PERIODS OF 5-YR 10-YR 25-YR 50-YR 100-YR
5	4.67	6.23	8.00 9.34 10.67 12.23 13.79
6	4.35	5.80	7.45 8.70 9.94 11.39 12.84
7	4.09	5.46	7.02 8.19 9.36 10.72 12.09
8	3.88	5.18	6.66 7.77 8.89 10.18 11.48
9	3.71	4.95	6.36 7.43 8.49 9.72 10.96
10	3.56	4.75	6.11 7.13 8.15 9.33 10.52
11	3.43	4.58	5.89 6.87 7.85 8.99 10.14
12	3.32	4.43	5.69 6.64 7.59 8.69 9.80
13	3.21	4.29	5.51 6.43 7.35 8.42 9.50
14	3.12	4.17	5.36 6.25 7.14 8.18 9.23
15	3.04	4.06	5.21 6.08 6.95 7.97 9.08
16	2.96	3.96	5.09 5.93 6.78 7.77 8.89
17	2.90	3.86	4.97 5.79 6.62 7.59 8.65
18	2.83	3.78	4.86 5.67 6.48 7.42 8.57
19	2.77	3.70	4.76 5.55 6.34 7.27 8.39
20	2.72	3.63	4.66 5.44 6.22 7.12 8.30
21	2.67	3.56	4.57 5.34 6.10 6.99 8.22
22	2.62	3.49	4.49 5.24 5.99 6.86 8.14
23	2.57	3.43	4.41 5.15 5.89 6.74 8.06
24	2.53	3.38	4.34 5.07 5.79 6.63 7.98
25	2.49	3.32	4.27 4.99 5.70 6.53 7.90
26	2.45	3.28	4.21 4.91 5.61 6.43 7.82
27	2.42	3.23	4.15 4.84 5.53 6.33 7.74
28	2.38	3.19	4.09 4.77 5.45 6.25 7.66
29	2.35	3.17	4.02 4.68 5.38 6.16 7.58
30	2.32	3.15	3.92 4.56 5.31 6.08 7.50
31	2.29	3.12	3.82 4.44 5.19 6.00 7.42
32	2.26	3.09	3.73 4.33 5.07 5.92 7.34
33	2.24	3.06	3.64 4.23 4.95 5.73 7.26
34	2.21	3.02	3.55 4.13 4.83 5.60 7.18
35	2.18	3.00	3.47 4.04 4.73 5.47 7.10
36	2.15	2.97	3.40 3.96 4.62 5.35 7.02
37	2.12	2.94	3.33 3.87 4.52 5.23 6.94
38	2.10	2.91	3.26 3.79 4.43 5.13 6.86
39	2.07	2.88	3.19 3.71 4.34 5.02 6.78
40	2.05	2.85	3.13 3.64 4.26 4.92 6.70
41	2.02	2.82	3.07 3.57 4.18 4.83 6.62
42	2.00	2.80	3.01 3.51 4.10 4.74 6.54
43	1.98	2.77	2.96 3.44 4.02 4.65 6.46
44	1.95	2.74	2.91 3.38 3.95 4.56 6.38
45	1.93	2.71	2.86 3.32 3.88 4.48 6.30

RAINFALL INTENSITY TABLE		PAGE 2 OF 3	
FOR SEDGWICK COUNTY, KANSAS		The following tabulation contains rainfall intensity in inches per hour as derived from ESSA Weather Bureau Technical Paper 40.	
DURATION IN MINUTES	1-YR	2-YR	RETURN PERIODS OF 5-YR 10-YR 25-YR 50-YR 100-YR
46	1.72	2.08	2.81 3.27 3.82 4.41 4.86
47	1.69	2.04	2.76 3.21 3.75 4.33 4.78
48	1.67	2.01	2.72 3.16 3.69 4.26 4.70
49	1.64	1.98	2.67 3.11 3.63 4.19 4.63
50	1.61	1.95	2.63 3.06 3.58 4.13 4.56
51	1.59	1.92	2.59 3.01 3.52 4.06 4.49
52	1.56	1.89	2.55 2.97 3.47 4.00 4.42
53	1.54	1.86	2.51 2.92 3.42 3.94 4.35
54	1.52	1.84	2.48 2.88 3.37 3.88 4.29
55	1.50	1.81	2.44 2.84 3.32 3.83 4.23
56	1.47	1.79	2.41 2.80 3.27 3.77 4.17
57	1.45	1.76	2.37 2.76 3.23 3.72 4.11
58	1.43	1.74	2.34 2.73 3.19 3.67 4.06
59	1.42	1.72	2.31 2.69 3.14 3.62 4.01
60	1.40	1.69	2.28 2.65 3.10 3.57 3.95
61	1.38	1.67	2.25 2.62 3.06 3.53 3.90
62	1.36	1.65	2.22 2.59 3.02 3.48 3.85
63	1.34	1.63	2.20 2.55 2.99 3.44 3.81
64	1.33	1.61	2.17 2.52 2.95 3.40 3.76
65	1.31	1.59	2.14 2.49 2.92 3.35 3.71
66	1.30	1.57	2.12 2.46 2.89 3.31 3.67
67	1.28	1.55	2.09 2.44 2.86 3.27 3.63
68	1.26	1.54	2.07 2.41 2.83 3.24 3.59
69	1.25	1.52	2.05 2.38 2.78 3.20 3.54
70	1.24	1.50	2.02 2.35 2.75 3.16 3.51
71	1.22	1.49	2.00 2.33 2.72 3.13 3.47
72	1.21	1.47	1.98 2.30 2.69 3.09 3.43
73	1.20	1.46	1.96 2.28 2.66 3.05 3.39
74	1.18	1.44	1.94 2.25 2.63 3.03 3.36
75	1.17	1.43	1.92 2.23 2.61 3.00 3.32
76	1.16	1.41	1.90 2.21 2.58 2.96 3.29
77	1.15	1.40	1.88 2.18 2.55 2.93 3.25
78	1.13	1.38	1.86 2.16 2.53 2.90 3.22
79	1.12	1.37	1.84 2.14 2.50 2.88 3.19
80	1.11	1.36	1.82 2.12 2.48 2.85 3.16
81	1.10	1.34	1.81 2.10 2.46 2.82 3.13
82	1.09	1.33	1.79 2.08 2.43 2.79 3.10
83	1.08	1.32	1.77 2.06 2.41 2.76 3.07
84	1.07	1.31	1.75 2.04 2.39 2.74 3.04
85	1.06	1.30	1.74 2.02 2.37 2.71 3.01
86	1.05	1.29	1.72 2.00 2.34 2.69 2.99
87	1.04	1.27	1.71 1.99 2.32 2.66 2.96
88	1.03	1.26	1.69 1.97 2.30 2.64 2.93
89	1.02	1.25	1.68 1.95 2.28 2.62 2.91
90	1.01	1.24	1.66 1.93 2.26 2.59 2.88

Briarwood Phase II (4th Addition)

SYSTEM 200

- Design this system for 2-year storm in pipe. Difference ($Q_{100} - Q_2$) overlaid in swales.
- Street flow for 2 yr. storm (same criteria as System 100)
 $Q_{max} \text{ street} = 13 \text{ cfs}$
Street flows at all nodes are less than 13 cfs
Therefore all street flows for 2-yr storm OK
- Street flow for 100 yr storm (same criteria as System 100)
 $Q_{max} \text{ street} = 40 \text{ cfs}$
Check each segment: Node 208 to 207: $18.0 - 8.2 = 9.8$
Node 207 to 206: $22.2 - 10.1 = 12.1$
Node 206 to 205: $4.4 - 2.0 = 2.4$
Node 205 to 204: $31.6 - 14.3 = 17.3$
Node 204 to 203: $36.0 - 14.3 = 21.7$
Node 203 to 202: $49.8 - 22.2 = 27.6$
Node 202 to 201: $52.4 - 23.3 = 29.1$
Node 201 to 200: $55.2 - 24.5 = 30.7$
All street flows for 100 yr storm = < 40 cfs

Briarwood Phase II (4th Addition)

FOR SWALE DESIGN: USE MANNING'S EQUATION

$Q = 1.486 AR^{2/3} S^{1/2}$ $n = 0.035$ $S = 0.4\%$

- NODE 204 - NODE 203 $Q_{100} = 19.7 \text{ cfs}$
 $19.7 = \frac{1.486}{0.035} AR^{2/3} S^{1/2}$
 $AR^{2/3} = \frac{19.7 \times 0.035}{1.486 \times 0.06324} = \frac{0.66975}{0.09360} = 7.13$
- NODE 203 - NODE 202 $Q_{100} = 27.6 \text{ cfs}$
 $27.6 = \frac{1.486}{0.035} AR^{2/3} S^{1/2}$
 $AR^{2/3} = \frac{27.6 \times 0.035}{1.486 \times 0.06324} = \frac{0.966}{0.09360} = 10.21$
- NODE 201 - NODE 200 $Q_{100} = 30.7 \text{ cfs}$
 $30.7 = \frac{1.486}{0.035} AR^{2/3} S^{1/2}$
 $AR^{2/3} = \frac{30.7 \times 0.035}{1.486 \times 0.06324} = \frac{1.094}{0.09360} = 11.42$

SWALE DESIGN (Continued)

TRIAL 1: 6" V Ditch

d	A	P	R	R ^{2/3}	AR ^{2/3}
1.0	6.0	12.17	0.49	0.62	3.74
1.2	8.64	14.0	0.59	0.70	6.09
1.4	11.76	17.03	0.69	0.78	9.19
1.6	15.36	19.46	0.79	0.85	13.11

Using above swale section @ slope 0.4%,
Water Depth Between Node 204 to 203 = 1.3' ±
Node 203 to 202 = 1.5' ±
Node 201 to 200 = 1.5' ±

5. Inlet capacity.
All inlets in sump condition
 $Q_{allowable} = 208 \text{ ft} \times 5' \text{ (C-D-W inlet)} = 10 \text{ cfs}$
All inlet 0's for 2-yr storm < 10 cfs

6) Check Pipe sub size out of Node 208.

7) Check Inlet size of Node 203 (Drop inlet)

Use Weir Equation $Q = CLH^{3/2}$ where $Q = 6.2 \text{ cfs}$
 $L = \text{unknown}$
 $C = 3$
 $H = 1.0'$
 $6.2 = 3.0 \times L \times 1.0^{3/2}$
 $L = \frac{6.2}{3.0 \times 1.0^{3/2}} = 2.06'$
Use C-D-W 2' x 4' Drop Inlet

Use Orifice Equation
 $Q = CA\sqrt{2gh}$ where $Q = 6.2$
 $C = 0.6$
 $A = \text{unknown}$
 $g = 32.2 \text{ ft/sec}^2$
 $h = 1.0'$
 $6.2 = 0.6 \times A \times \sqrt{2 \times 32.2 \times 1.0}$
 $6.2 = 0.6 \times A \times 8.02$
 $A = \frac{6.2}{0.6 \times 8.02} = 1.26'$
Use C-D-W 2' x 4' Drop Inlet

HYDROLOGY DATA SHEET
PROJECT: Briarwood Phase II (4th Add.) PROJECT NO. 36-83713-1120
ITEM: STORM SEWER DESIGN - SYSTEM 200 DATE: April 3, 1984
RETURN PERIOD: 2 COMPUTATIONS BY: CSB REVISIONS BY:

SCHEMATIC DIAGRAM:

TRIBUTARY AREA				HYDROLOGY SUMMATION				CONDUIT DATA			
NO.	AREA (AC)	PERCENT	PERCENT	Q ₁ (CFS)	Q ₂ (CFS)	Q ₃ (CFS)	Q ₄ (CFS)	PIPE (INCHES)	VELOCITY (FPS)	LENGTH (FEET)	PERCENT
200	0.5	1.12	15	4.06	8.2	15	4.06	8.2	15	4.06	8.2
201	0.5	0.93	15	4.06	1.9	15	4.06	1.9	15	4.06	1.9
202	0.5	0.97	15	4.06	2.0	15	4.06	2.0	15	4.06	2.0
203	0.5	1.11	15	4.06	2.3	15	4.06	2.3	15	4.06	2.3
204	0.5	1.02	15	4.06	2.1	15	4.06	2.1	15	4.06	2.1
205	0.4	3.83	15	4.06	6.2	15	4.06	6.2	15	4.06	6.2
206	0.5	0.58	15	4.06	1.2	15	4.06	1.2	15	4.06	1.2
207	0.5	0.63	15	4.06	1.3	15	4.06	1.3	15	4.06	1.3

HYDROLOGY DATA SHEET
PROJECT: Briarwood Phase II (4th Add.) PROJECT NO. 36-83713-1120
ITEM: STORM SEWER DESIGN - SYSTEM 200 DATE: April 3, 1984
RETURN PERIOD: 20 COMPUTATIONS BY: CSB REVISIONS BY:

SCHEMATIC DIAGRAM:

TRIBUTARY AREA				HYDROLOGY SUMMATION				CONDUIT DATA			
NO.	AREA (AC)	PERCENT	PERCENT	Q ₁ (CFS)	Q ₂ (CFS)	Q ₃ (CFS)	Q ₄ (CFS)	PIPE (INCHES)	VELOCITY (FPS)	LENGTH (FEET)	PERCENT
200	0.5	4.02	15	8.38	18.0	15	8.38	18.0	15	8.38	18.0
201	0.5	0.93	15	8.38	4.2	15	8.38	4.2	15	8.38	4.2
202	0.5	0.97	15	8.38	4.4	15	8.38	4.4	15	8.38	4.4
203	0.5	1.11	15	8.38	5.0	15	8.38	5.0	15	8.38	5.0
204	0.5	1.02	15	8.38	4.6	15	8.38	4.6	15	8.38	4.6
205	0.4	3.83	15	8.38	13.8	15	8.38	13.8	15	8.38	13.8
206	0.5	0.58	15	8.38	2.6	15	8.38	2.6	15	8.38	2.6
207	0.5	0.63	15	8.38	2.8	15	8.38	2.8	15	8.38	2.8

HYDROLOGY DATA SHEET
PROJECT: Briarwood Phase II (4th Add.) PROJECT NO. 36-83713-1120
ITEM: STORM SEWER DESIGN (SYSTEM 300) DATE: April 3, 1984
RETURN PERIOD: 2 COMPUTATIONS BY: CSB REVISIONS BY:

SCHEMATIC DIAGRAM:

Briarwood Estates 4th Addition

To Wichita, Sedgwick County, Kansas

DRAINAGE PLAN

4-4-84

LEGEND
Storm Water Sewer Size
Inlet
Manhole
Street Flow Direction
100 Year Storm Runoff
Node No.
Drainage Sub-Basin
Drainage Basin
Prop. Approx. Elev.

Scale: 1" = 50'
March 30, 1984

We, the Mellon Bank, N.A., Pittsburgh, Pa., holder of a mortgage on the above described property, do hereby consent to the platting of Briarwood Estates 4th Addition to Wichita, Sedgwick County, Kansas.

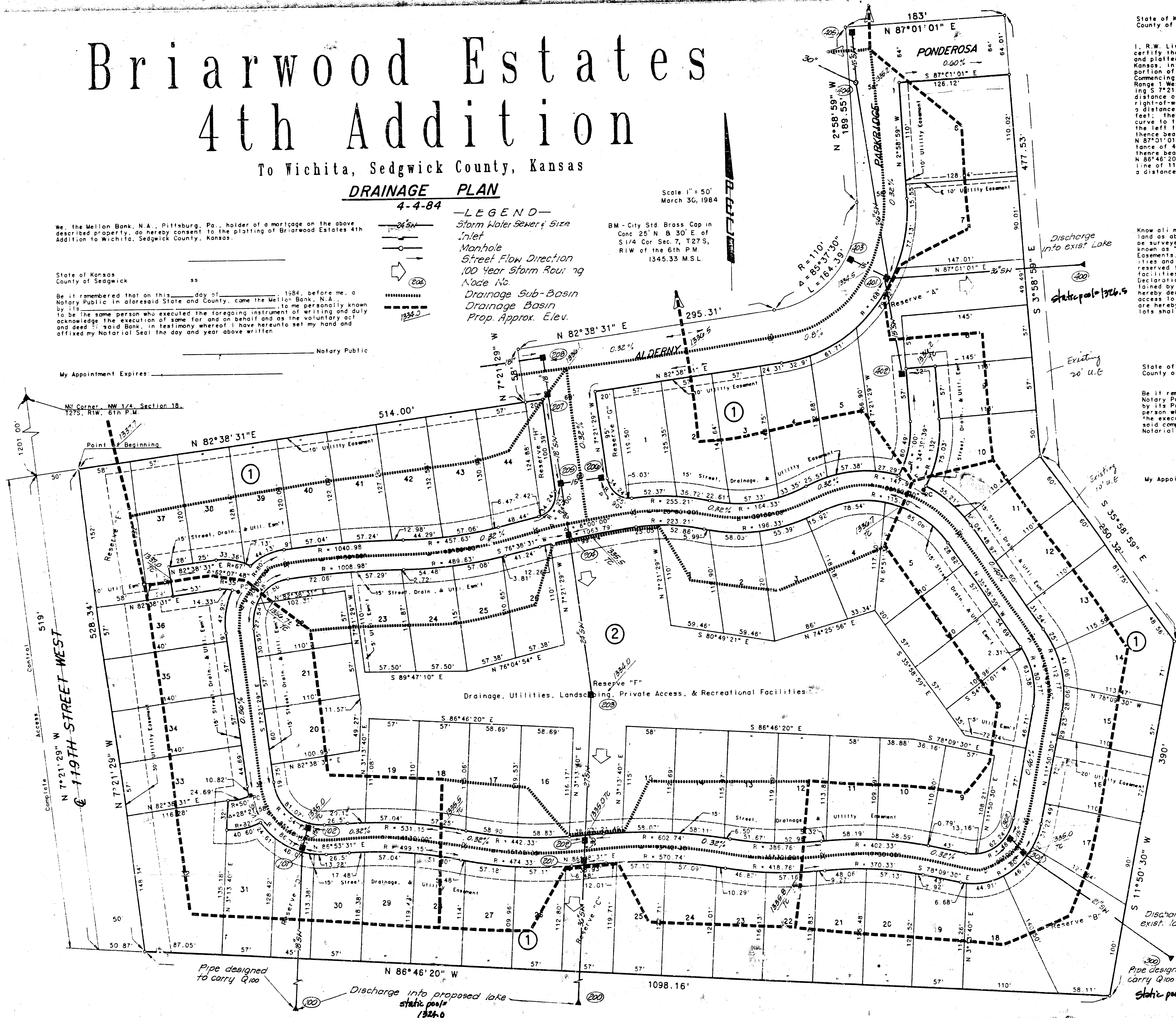
State of Kansas
County of Sedgwick

Be it remembered that on this _____ day of _____, 1984, before me, a Notary Public in aforesaid State and County, came the Mellon Bank, N.A., to be the same person who executed the foregoing instrument of writing and duly acknowledged the execution of same for and on behalf of and as the voluntary act and deed of said Bank, in testimony whereof I have hereunto set my hand and affixed my Notarial Seal the day and year above written.

Notary Public

My Appointment Expires: _____

NW Corner, NW 1/4, Section 18,
T25S, R17W, 6th P.M.



BRIARWOOD ESTATES FOURTH ADDITION
(Drainage)

State of Kansas
County of Sedgwick

I, R.W. Linn, a Professional Engineer in aforesaid State and County, do hereby certify that on this _____ day of _____, 1984, I have caused to be surveyed and plotted "BRIARWOOD ESTATES 4TH ADDITION," to Wichita, Sedgwick County, Kansas, into lots, blocks, streets and reserves, the same being a replat of a portion of Briarwood Estates, Wichita, Sedgwick County, Kansas, described as: Commencing at the NW Corner of the NW 1/4 of Section 18, Township 27 South, Range 1 West of the 6th P.M., thence along the west line of said NW 1/4 bearing S 7°21'29" E a distance of 1201.00 feet; thence bearing N 82°38'31" E a distance of 50.00 feet to the point of beginning, said point being on the east curve to the left having a radius of 295.31 feet to the P.C. of a distance of 514.00 feet; thence bearing N 7°21'29" W a distance of 58.00 feet; thence bearing N 82°38'31" E a distance of 189.55 feet; thence bearing N 87°01'01" E a distance of 183.00 feet; thence bearing S 3°58'59" E a distance of 477.53 feet; thence bearing S 35°58'59" E a distance of 250.32 feet; thence bearing S 11°50'30" W a distance of 390.00 feet; thence bearing N 86°46'20" W a distance of 1098.16 feet to a point on the east right-of-way line of 119th Street West; thence along said right-of-way bearing N 7°21'29" W a distance of 528.34 feet to the point of beginning.

R.W. Linn, P.E. No. 3684

Know all men by these presents that we, the undersigned property owners of the land as above set forth in the Engineer's Certificate have caused the land to be surveyed and plotted into lots, blocks, streets and reserves, the same to be known as "BRIARWOOD ESTATES 4TH ADDITION," to Wichita, Sedgwick County, Kansas, as indicated, for the construction and maintenance of public utilities and drainage, are hereby granted. The reserves, as indicated, shall be reserved for drainage, utilities, landscaping, private access, and recreational facilities in accordance with the restrictive covenants established by the Declaration of Landowners Association Agreement, and shall be owned and maintained by the Briarwood Estates Homeowners Association. The streets are hereby dedicated to and for the use of the public. All public rights of access to and from 119th Street West over and across the west line of Block 1 are hereby granted to the City of Wichita. Minimum Pad Elevation for all lots shall be 1335.00 M.S.L. Inland Investment Co., Inc.

Larry A. Chambers President

State of Kansas
County of Sedgwick

Be it remembered that on this _____ day of _____, 1984, before me, a Notary Public in aforesaid State and County, came Inland Investment Co., Inc., by its President Larry A. Chambers, to me personally known to be the same person who executed the foregoing instrument of writing and duly acknowledged the execution of same for and on behalf of and as the voluntary act and deed of said company, in testimony whereof I have hereunto set my hand and affixed my Notarial Seal the day and year above written.

Notary Public

My Appointment Expires: _____

This plat has been submitted to and approved by the Wichita-Sedgwick County Metropolitan Area Planning Commission, Wichita, Kansas.

Dated this _____ day of _____, 1984

Robert K. Chisholm Chairman

Robert A. Lakin Secretary

This plat approved and all dedications shown hereon are accepted by the City Commission of the City of Wichita, Kansas.

Dated this _____ day of _____, 1984.

Margalee Wright Mayor

Donald C. Givick City Clerk

This is to certify that this instrument was filed for record in the Register of Deeds Office of _____ m. on this _____ day of _____, 1984.

Bette F. McCarl Register of Deeds

Pat Kettler Deputy

This plat approved and all dedications shown hereon are accepted by the Board of County Commissioners of Sedgwick County, Kansas

Dated this _____ day of _____, 1984

Jack Spratt Chairman

Donald E. Grogg Commissioner

Tom Scott Commissioner

Dorothy K. White County Clerk

Entered on Transfer Record this _____ day of _____, 1984.

Dorothy K. White County Clerk