MEMO

TO: City of Wichita, Engineering Dept.
455 N. Main
Wichita, KS 67202

PROJECT NO. 36-83713-1120
PROJECT: Briarwood Phase II (4th Addition)
DATE: April 4, 1984

COPIES TO:
ATTN: Chris Breitenstein, P. E.
Louisa Ollvarez
File

FROM: Charles S. Brown, P.E.
REFERENCE: Drainage Plan

PLEASE ADVISE IMMEDIATELY OF ANY MISCONCEPTIONS 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 plat 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 I (4th Add.)

PEC File 36-83713-1120

SYSTEM 100

1. Due to minimal difference in 2 yr & 100 yr pipe sizes, use 100 yr. storm

2. Street flow allowed to be 8" curb depth for 2 yr. storm. See attached graph

   z = reciprocal of cross slope = 1/3.0'/ft = 32
   n = 0.016
   S/n = 2000
   curb depth allow = 0.55'
   street slope = 0.32%

   $Q_{max\ street}$ = 13 cfs
   Actual flows are 1.3cfs to Node 102 & 2.5 cfs to Node 101. Street flow for 2 yr. storm OK.

3. Street flow allowed to be .83' above curb depth for 100 year storm (depth allowed = 0.85')

   Approx. $Q_{max\ street}$ = 40 cfs (see attached graph)

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

4. Inlet size:
   Sump condition at both Nodes 101 & 102
   H = 12" (City inlet) = depth of water
   h = 6" - inlet opening
   d/n = 12/6 = 1.67
   Resulting Q/L = 2.0 cfs per foot of inlet (See graph)

   at Node 102 Q_{100} = 2.9 L required = 2.9/2 = 1.45' Use 1 C-O-W curb inlet

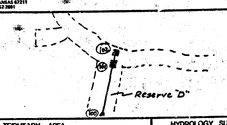
   at Node 101 Q_{100} = 5.5 L required = 5.5/2 = 2.75 "

BRIARWOOD ESTATES FOURTH ADDITION
(Drainage)

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 2, 1984
RETURN PERIOD: 2 COMPUTATIONS BY: CSB REVISIONS BY:

SCHEMATIC DIAGRAM:



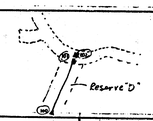
SUB-BASIN (1)	C (2)	TRIBUTARY AREA: AREA (acres) (3)	SLOPE (%) (4)	LENGTH (feet) (5)	HYDROLOGY SUMMATION: T_c (minutes) (6)	I in/hr (7)	Q (cfs) (8)	Σ Q (cfs) (9)	CONDUIT DATA: PIPE (inches) (10)	SLOPE (%) (11)	VELOCITY (ft/sec) (12)	LENGTH (feet) (13)	T_t (minutes) (14)	$T_c + T_t$ (minutes) (15)
102	0.5	0.65			15.0	4.06	1.3	1.3	15		2.0'	30	0.25	15.25
101	0.5	1.23			15.0	4.06	2.5	3.8	15	0.6	3.1	220	1.08	16.33

BRIARWOOD ESTATES FOURTH ADDITION
(Drainage)

HYDROLOGY DATA SHEET — PAGE 2 OF 2

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

SCHEMATIC DIAGRAM:



SUB-BASIN (1)	C (2)	TRIBUTARY AREA: AREA (acres) (3)	SLOPE (%) (4)	LENGTH (feet) (5)	HYDROLOGY SUMMATION: T_c (minutes) (6)	I in/hr (7)	Q (cfs) (8)	Σ Q (cfs) (9)	CONDUIT DATA: PIPE (inches) (10)	SLOPE (%) (11)	VELOCITY (ft/sec) (12)	LENGTH (feet) (13)	T_t (minutes) (14)	$T_c + T_t$ (minutes) (15)
102	0.5	0.65			15	8.98	2.9	2.9	15	0.22	2.5	30	0.2	15.2
101	0.5	1.23			15	8.98	5.5	8.4	18	0.60	4.6	220	0.8	16.0

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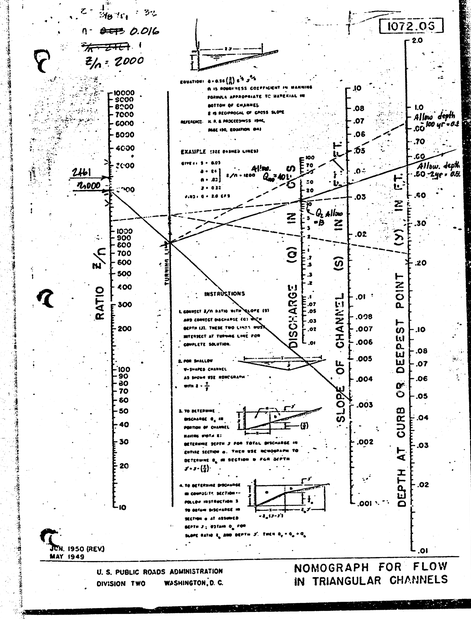
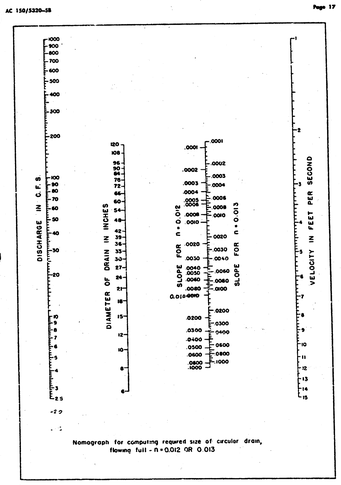
n = 0.016
z = 32
S/n = 2000



JUN. 1950 (REV)
MAY 1949

NOMOGRAPH FOR FLOW IN TRIANGULAR CHANNELS

AC 150/5320-5B — Page 17



Nomograph for computing required size of circular drain, flowing full - n = 0.012 OR 0.013

FIGURE 9. Nomograph for computing required size of circular drain for n =0.012 or 0.013.

Page 1 of 3

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.

DURATION IN MINUTES	RETURN PERIODS OF 1-YR	2-YR	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	8.98
16	2.96	3.96	5.09	5.93	6.78	7.77	8.76
17	2.90	3.86	4.97	5.79	6.62	7.59	8.55
18	2.83	3.78	4.86	5.67	6.48	7.42	8.37
19	2.77	3.70	4.76	5.55	6.34	7.27	8.19
20	2.72	3.63	4.66	5.44	6.22	7.12	8.03
21	2.67	3.56	4.57	5.34	6.10	6.99	7.88
22	2.62	3.49	4.49	5.24	5.99	6.86	7.74
23	2.57	3.43	4.41	5.15	5.89	6.74	7.60
24	2.53	3.38	4.34	5.07	5.79	6.63	7.48
25	2.49	3.32	4.27	4.99	5.70	6.53	7.36
26	2.45	3.23	4.21	4.91	5.61	6.43	7.25
27	2.42	3.13	4.15	4.84	5.53	6.33	7.14
28	2.38	3.05	4.09	4.77	5.45	6.25	7.04
29	2.35	2.97	4.02	4.68	5.38	6.16	6.95
30	2.32	2.89	3.92	4.56	5.31	6.08	6.79
31	2.29	2.82	3.82	4.44	5.19	6.00	6.62
32	2.26	2.75	3.73	4.33	5.07	5.87	6.45
33	2.24	2.68	3.64	4.23	4.95	5.73	6.30
34	2.19	2.62	3.55	4.13	4.83	5.60	6.16
35	2.14	2.57	3.47	4.04	4.73	5.47	6.02
36	2.09	2.51	3.40	3.96	4.62	5.35	5.89
37	2.05	2.46	3.33	3.7	4.52	5.23	5.76
38	2.00	2.41	3.26	3.79	4.43	5.13	5.64
39	1.96	2.36	3.19	3.71	4.34	5.02	5.53
40	1.92	2.32	3.13	3.64	4.26	4.92	5.42
41	1.89	2.27	3.07	3.57	4.18	4.83	5.32
42	1.85	2.23	3.01	3.51	4.10	4.74	5.22
43	1.82	2.19	2.96	3.44	4.02	4.65	5.13
44	1.78	2.15	2.91	3.38	3.95	4.56	5.03
45	1.75	2.11	2.86	3.32	3.88	4.48	4.95

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DURATION IN MINUTES	RETURN PERIODS OF 1-YR	2-YR	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	2.88	3.31	3.67
67	1.28	1.56	2.09	2.44	2.85	3.27	3.63
68	1.26	1.54	2.07	2.41	2.81	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	3.42
73	1.20	1.46	1.96	2.28	2.66	3.06	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	1.28	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

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DURATION IN MINUTES	RETURN PERIODS OF 1-YR	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
91	1.00	1.23	1.65	1.92	2.24	2.57	2.86
92	1.00	1.22	1.63	1.90	2.22	2.55	2.83
93	0.99	1.21	1.62	1.89	2.20	2.53	2.81
94	0.98	1.20	1.61	1.87	2.19	2.51	2.79
95	0.97	1.19	1.59	1.85	2.17	2.49	2.76
96	0.96	1.18	1.58	1.84	2.15	2.46	2.74
97	0.96	1.17	1.57	1.82	2.13	2.44	2.72
98	0.95	1.16	1.56	1.81	2.12	2.42	2.70
99	0.94	1.15	1.54	1.80	2.10	2.41	2.67
100	0.93	1.14	1.53	1.78	2.08	2.39	2.65
101	0.93	1.13	1.52	1.77	2.07	2.39	2.65
102	0.92	1.13	1.51	1.75	2.05	2.35	2.61
103	0.91	1.12	1.50	1.74	2.04	2.33	2.59
104	0.90	1.11	1.49	1.73	2.02	2.31	2.57
105	0.90	1.10	1.47	1.72	2.01	2.30	2.55
106	0.89	1.09	1.46	1.70	1.99	2.28	2.54
107	0.88	1.09	1.45	1.69	1.98	2.26	2.32
108	0.88	1.08	1.44	1.68	1.96	2.25	2.50
109	0.87	1.07	1.43	1.67	1.95	2.23	2.48
110	0.87	1.06	1.42	1.65	1.93	2.21	2.46
111	0.86	1.06	1.41	1.64	1.92	2.20	2.45
112	0.85	1.05	1.40	1.63	1.91	2.18	2.43
113	0.85	1.04	1.39	1.62	1.89	2.17	2.41
114	0.84	1.03	1.38	1.61	1.88	2.15	2.40
115	0.84	1.03	1.37	1.60	1.87	2.14	2.38
116	0.83	1.02	1.36	1.59	1.86	2.12	2.36
117	0.82	1.01	1.36	1.58	1.84	2.11	2.35
118	0.82	1.01	1.35	1.57	1.83	2.09	2.33
119	0.81	1.00	1.34	1.56	1.82	2.08	2.32
120	0.81	0.99	1.33	1.55	1.81	2.07	2.30
121	0.80	0.99	1.32	1.54	1.80	2.05	2.29
122	0.80	0.98	1.31	1.53	1.78	2.04	2.27
123	0.79	0.97	1.30	1.52	1.77	2.03	2.26
124	0.79	0.97	1.30	1.51	1.76	2.01	2.24
125	0.78	0.96	1.29	1.50	1.75	2.00	2.23
126	0.78	0.96	1.28	1.49	1.74	1.99	2.22
127	0.77	0.95	1.27	1.48	1.73	1.98	2.20
128							
129							
130							
131							
132							
133							
134							
135							

Briarwood Phase II (4th Addition)

SYSTEM 200

1. Design this system for 2-year storm in pipe. Difference ($Q_{100} - Q_2$) overland in swales.

2. Street flow for 2 yr. storm
   (Same criteria as System 100)
   $Q_{max\ street_2}$ = 13 cfs

   Street flows all nodes are less than 13 cfs
   Therefore all street flows for 2-yr. storm OK

3. Street flow for 100 yr. storm
   (Same criteria as System 100)
   $Q_{max\ street_{100}}$ = 40 cfs

   Check each segment:

Node		$Q_{100} - Q_2$
208 to 207		18.0 - 8.2 = 9.8
207 to 206		22.2 - 10.1 = 12.1
206 to 205		4.6 - 2.0 = 2.6
205 to 204		31.6 - 14.3 = 17.3
204 to 203		34.0 - 14.3 = 19.7
203 to 202		49.8 - 22.2 = 27.6
202 to 201		52.4 - 23.3 = 29.1
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 MANNINGS EQN.

$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$ n = 0.035, S = 0.4%

a) NODE 204 — NODE 203 Q_{100} = 19.7 cfs

$$19.7 = \frac{1.486}{0.035} AR^{2/3} (0.004)^{1/2}$$

$$AR^{2/3} = \frac{19.7 \times 0.035}{1.486 \times 0.06324} = \frac{0.68950}{0.09398} = 7.33$$

b) NODE 203 — NODE 202 Q_{100-2} = 27.6 cfs

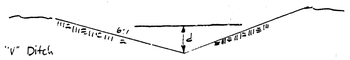
$$AR^{2/3} = \frac{27.6 \times 0.035}{1.486 \times 0.06324} = 10.27$$

c) NODE 201 — NODE 200 Q_{100-2} = 30.7 cfs

$$AR^{2/3} = \frac{30.7 \times 0.035}{1.486 \times 0.06324} = 11.42$$

SWALE DESIGN (Continued)

TRIAL 1.
6:1 "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	14.60	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 of 0.4%,

Water Depth	Between	Node 204 & 203 =	1.3' ±
" "	"	Node 203 & 202 =	1.5' ±
" "	"	Node 201 & 200 =	1.5' ±

5. Inlet capacity.

   All inlets in sump condition
   $Q_{allowable}$ = 20 cfs/ft (see System No 100) x 5' (C-O-W inlet) = 100 cfs.

   All inlet Q's for 2-yr. storm < 10 cfs

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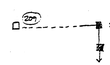
6) Check pipe stub size out of Node 208.



D.A to Future Node 209 = 3.7 Ac (from Drainage Concept)
C = 0.5
I_{2} = 4.06 (t_c = 15 min)

Q_{2} = 0.5 x 4.06 x 3.70
= 7.5 cfs

Street flow ok

Use 18" @ 0.5%

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

Use Weir Equation $Q = CLH^{3/2}$ where Q = 6.2 cfs, L = unknown, C = 3, H = 1.0'

$$6.2 = 3.0 \times L \times 1.0^{3/2}$$
$$L = \frac{6.2}{3.0} = 2.06'$$

Use C-O-W 2'x6' Drop Inlet

Use Orifice Equation

$Q = cA\sqrt{2gh}$ where Q_2 = 6.2, C = 0.6, A = unknown, g = 32.2 ft/sec², h = 1.0'

$$6.2 = 0.6 \times A \times \sqrt{2 \times 32.2 \times 1}$$
$$6.2 = 0.6 \times A \times \sqrt{64.6}$$
$$6.2 \times 0.6 \times A = 8.02$$
$$A = \frac{6.2 \times 0.6}{8.02} = .46'^2$$

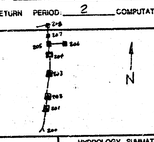
Use C-O-W 2'x6' Drop Inlet

PROFESSIONAL ENGINEERING CONSULTANTS
1440 EAST ENGLISH
WICHITA, KANSAS 67211
(316) 262 2691

HYDROLOGY DATA SHEET

PAGE 1 OF 2
PROJECT: Briarwood Phase II (4th Add.) PROJECT NO. 36-83713-1120
ITEM: STORM SEWER DESIGN - SYSTEM 200 DATE: APRIL 2, 1984
RETURN PERIOD: 2 COMPUTATIONS BY: CSB REVISIONS BY: ——

SCHEMATIC DIAGRAM:



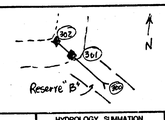
SUB-BASIN (1)	C (2)	AREA (acres) (3)	SLOPE (%) (4)	LENGTH (feet) (5)	t_o (minutes) (6)	i in/hr (7)	Q_o (cfs) (8)	t_c (minutes) (9)	i in/hr (10)	Q (cfs) (11)	ΣQ (cfs) (12)	PIPE (inches) (13)	SLOPE (%) (14)	VELOCITY (ft/sec) (15)	LENGTH (feet) (16)	T_t (minutes) (17)	$t_c + T_t$ (minutes) (18)
206	0.5	0.97			15	4.06	2.0	15	4.06	2.0	2.0	15	0.1	2.0±	50	0.4	15.4
205	0.5	1.11			15	4.06	2.3	15.45	4.01	2.2	4.3	24	0.4	4.4	60	0.23	15.7
204	0.5	1.02			15	4.06	2.1	15.7	3.99	2.0	6.3	24	0.5	5.0	170	0.6	16.3
203	0.4	3.83			15	4.06	6.2	16.3	3.93	5.9	22.2	27	0.5	5.3	160	0.5	16.8
202	0.5	0.58			15	4.06	1.2	16.8	3.88	1.1	23.3	30	0.3	4.1	30	0.1	16.9
201	0.5	0.63			15	4.06	1.3	16.9	3.87	1.2	24.5	30	0.2	3.4	220	1.1	18.0

PROFESSIONAL ENGINEERING CONSULTANTS
1440 EAST ENGLISH
WICHITA, KANSAS 67211
(316) 262 2691

HYDROLOGY DATA SHEET

PAGE 2 OF 2
PROJECT: Briarwood Phase II (4th Add.) PROJECT NO. 36-83713-1120
ITEM: STORM SEWER DESIGN (SYSTEM 300) DATE: April 2, 1984
RETURN PERIOD: 100 COMPUTATIONS BY: CSB REVISIONS BY: ——

SCHEMATIC DIAGRAM:



SUB-BASIN (1)	C (2)	AREA (acres) (3)	SLOPE (%) (4)	LENGTH (feet) (5)	t_o (minutes) (6)	i in/hr (7)	Q_o (cfs) (8)	t_c (minutes) (9)	i in/hr (10)	Q (cfs) (11)	ΣQ (cfs) (12)	PIPE (inches) (13)	SLOPE (%) (14)	VELOCITY (ft/sec) (15)	LENGTH (feet) (16)	T_t (minutes) (17)	$t_c + T_t$ (minutes) (18)
302	0.5	0.36			15	8.98	4.3	15	8.98	4.3	4.3	15	0.5	3.8	30	0.1	15.1
301	0.5	1.26			15	8.98	5.7	15.1	8.97	5.7	10.0	21	0.4	4.2	180	0.7	15.8

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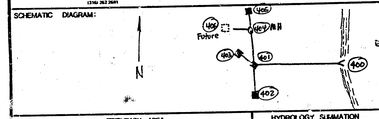
HYDROLOGY DATA SHEET

PAGE 1 OF 2
PROJECT: Briarwood Phase II (4th Add) PROJECT NO. 36-83713-1120
ITEM: STORM SEWER DESIGN (SYSTEM 400) DATE: April 3, 1984
RETURN PERIOD: 100 COMPUTATIONS BY: CSB REVISIONS BY: ——

SCHEMATIC DIAGRAM:



SUB-BASIN (1)	C (2)	AREA (acres) (3)	SLOPE (%) (4)	LENGTH (feet) (5)	t_o (minutes) (6)	i in/hr (7)	Q_o (cfs) (8)	t_c (minutes) (9)	i in/hr (10)	Q (cfs) (11)	ΣQ (cfs) (12)	PIPE (inches) (13)	SLOPE (%) (14)	VELOCITY (ft/sec) (15)	LENGTH (feet) (16)	T_t (minutes) (17)	$t_c + T_t$ (minutes) (18)
406	0.5	13.0			15	4.06	26.4	15.0	4.06	26.4	26.4	30	0.4	5.4	210	0.8	15.8
405	0.5	3.6			15	4.06	7.3	15.0	4.06	7.3	7.3	15	1.2	5.6	40	0.1	15.1
404	-	Manhole						<15.8	3.98	7.2	33.6	36	0.3	4.7	215	0.8	16.6
403	0.5	0.9			15	4.06	1.8	13.1	4.06	1.8	1.8	15	0.1	2.1	30	0.3	15.3
402	0.5	0.44			15	4.06	0.9	15.0	4.06	0.9	0.9	15	0.1	2.1	110	0.9	15.9
401	0.5	0.35			15	4.06	1.9	16.6	3.90	1.9	38.2	36	0.35	5.2	280	0.9	17.5

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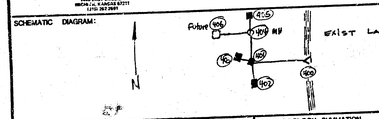
HYDROLOGY DATA SHEET

PAGE 2 OF 2
PROJECT: Briarwood Phase II (4th Add) PROJECT NO. 36-83713-1120
ITEM: STORM SEWER DESIGN (SYSTEM 400) DATE: April 3, 1984
RETURN PERIOD: 100 COMPUTATIONS BY: CSB REVISIONS BY: ——

SCHEMATIC DIAGRAM:



SUB-BASIN (1)	C (2)	AREA (acres) (3)	SLOPE (%) (4)	LENGTH (feet) (5)	t_o (minutes) (6)	i in/hr (7)	Q_o (cfs) (8)	t_c (minutes) (9)	i in/hr (10)	Q (cfs) (11)	ΣQ (cfs) (12)	PIPE (inches) (13)	SLOPE (%) (14)	VELOCITY (ft/sec) (15)	LENGTH (feet) (16)	T_t (minutes) (17)	$t_c + T_t$ (minutes) (18)
406	0.5	10.0			15	8.98	58.4	15	8.98	58.4	58.4						
405	0.5	3.6			15	8.98	16.2	15	8.98	16.2	16.2						
404	-	Manhole									74.6						
403	0.5	0.9			15	8.98	4.0	15	8.98	4.0	4.0						
402	0.5	0.44			15	8.98	2.0	15	8.98	2.0	2.0						
401	0.5	0.35			15	8.98	4.3	15	8.98	4.3	84.9						

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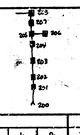
HYDROLOGY DATA SHEET

PAGE 2 OF 2
PROJECT: Briarwood Phase II (4th Add.) PROJECT NO. 36-83713-1120
ITEM: STORM SEWER DESIGN (SYSTEM 200) DATE: April 2, 1984
RETURN PERIOD: 100 COMPUTATIONS BY: CSB REVISIONS BY: ——

SCHEMATIC DIAGRAM:



SUB-BASIN (1)	C (2)	AREA (acres) (3)	SLOPE (%) (4)	LENGTH (feet) (5)	t_o (minutes) (6)	i in/hr (7)	Q_o (cfs) (8)	t_c (minutes) (9)	i in/hr (10)	Q (cfs) (11)	ΣQ (cfs) (12)	PIPE (inches) (13)	SLOPE (%) (14)	VELOCITY (ft/sec) (15)	LENGTH (feet) (16)	T_t (minutes) (17)	$t_c + T_t$ (minutes) (18)
206	0.5	0.97			15	8.98	4.4	15	"	4.4	4.4						
205	0.5	1.11			15	8.98	5.0	15	"	5.0	31.6						
204	0.5	1.02			15	8.98	4.6	15	"	4.6	36.0						
203	0.4	3.83			15	8.98	13.8	15	"	13.8	49.8						
202	0.5	0.58			15	8.98	2.6	15	"	2.6	52.4						
201	0.5	0.63			15	8.98	2.8	15	"	2.8	55.2						

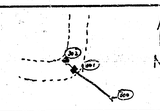
BRIARWOOD ESTATES FOURTH ADDITION
(Drainage)

PROFESSIONAL ENGINEERING CONSULTANTS
1440 EAST ENGLISH
WICHITA, KANSAS 67211
(316) 262 2691

HYDROLOGY DATA SHEET

PAGE 1 OF 2
PROJECT: Briarwood Phase II (4th Add.) PROJECT NO. 36-83713-1120
ITEM: STORM SEWER DESIGN (SYSTEM 300) DATE: April 2, 1984
RETURN PERIOD: 2 COMPUTATIONS BY: CSB REVISIONS BY: ——

SCHEMATIC DIAGRAM:



SUB-BASIN (1)	C (2)	AREA (acres) (3)	SLOPE (%) (4)	LENGTH (feet) (5)	t_o (minutes) (6)	i in/hr (7)	Q_o (cfs) (8)	t_c (minutes) (9)	i in/hr (10)	Q (cfs) (11)	ΣQ (cfs) (12)	PIPE (inches) (13)	SLOPE (%) (14)	VELOCITY (ft/sec) (15)	LENGTH (feet) (16)	T_t (minutes) (17)	$t_c + T_t$ (minutes) (18)
302	0.5	0.36			15	4.06	1.9	15	4.06	1.9	1.9	15	.1	2	30	0.3	15.3
301	0.5	1.25			15	4.06	2.6	15.3	4.03	2.5	4.4	15	0.5	3.6	180	0.8	16.1

Briarwood Phase II (4th Addition)

SYSTEM 300

1. Design this system to carry the 100-yr Q. The increase in cost for bigger pipe is offset by omitting ditch lining or other type of erosion control at swale outfall.

2. Street flow for 2-year storm
(Same criteria as System 100)
$Q_{max\text{-}street_2}$ = 13cfs

Street flows to both Nodes 302 & 301 are less than 13. Therefore street flows for 2 yr. storm OK.

3. Street flow for 100 year storm
(Same criteria as system 100)
$Q_{max\text{-}street_{100}}$ = 40 cfs

Street flows$_{100}$ to both Nodes 302 & 301 are less than 40 cfs. Therefore street flows for 100-year storm OK.

4. Inlet capacity

Both inlets in sump condition
Q_a allowable = 2 cfs/foot (see System 100) x 5' = 10 cfs. cow in

Both inlet Qs for 100 year storm < 10cfs
Therefore, use 1 C-O-W inlet at each node.

SYSTEM 400

1. Design this system with Q_2 in pipe.
Difference (Q_{100} - Q_2) in swale.

2. Street flow for 2-yr. storm
(Same criteria as System 100)
$Q_{max\text{-}st_2}$ = 13cfs

Street flows to all nodes in Briarwood 4th are less than 13. Therefore street flow for 2 year storm OK.

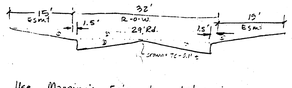
NOTE: Upon plotting of north portion of parcel, street flows will be checked for Node 406.

3. Street flow for 100 yr. storm.

Check each segment:

		$Q_{100} - Q_2$
Node	406 to 404	58.4 - 26.4 = 32.0
Node	405 to 404	16.2 - 7.3 = 8.9
Node	404 to 401	74.6 - 33.6 = 41.0
Node	403 to 401	4.0 - 1.8 = 2.2
Node	402 to 401	2.0 - 0.9 = 1.1
Node	401 to 400	84.9 - 38.2 = 46.7

3) (continued)



Use Manning's Eq'n to determine a more exact amount of flow on the above street section

a) Determine "composite" "n"

33 LF @ 0.030 = 0.99
29 LF @ 0.016 = 0.46
Σ = 1.45 / 62 = 0.023

b) Determine Cross-Sectional Area

①	½ x 16.5' x 0.3'	= 2.48
②	0.4 x 29'	= 11.60
③	½ x 14.5' x 0.45	= 3.26
④	½ x 14.5' x 0.45	= 3.26
⑤	½ x 16.5' x 0.3'	= 2.48
		23.08

c) Assume wetted perimeter = 62'

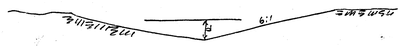
d) Hydraulic Radius = r/p = 23.08/62 = 0.37225

$S_{max} = \frac{1.49}{0.023} \times 23.08 \times (0.37225)^{2/3} \times (0.0032)^{1/2}$

$= \frac{1.49}{0.023} \times 23.08 \times 0.51748 \times 0.05656$

= 43.6 cfs.

5) (continued)



d=	A	p	R	$R^{2/3}$	$AR^{2/3}$
1.5	13.50	18.25	0.7397	0.8179	11.04
1.6	15.36	19.46	0.7891	0.8539	13.12
1.7	17.34	20.68	0.8383	0.8892	15.41

Water depth = 1.7' Velocity = $\frac{Q}{A} = \frac{46.7}{17.34} = 2.7$ fps

3) (continued)

Street Flow (100 yr.) is right at the maximum of Node 401. OK

4) Inlet capacity.

All inlets in sump condition.

Allowable Q = 2cfs/ft (see System 100) x 5' (COW inlet)
= 10 cfs

All inlets in Briarwood 4th OK

Future Nodes 406 - 407 - 408 - 409 will be checked when north portion platted.

5) Swale Design.

Use Mannings Eq'n.

$Q = \frac{1.486}{n} AR^{2/3} S^{1/2}$ where Q = 46.7cfs
n = 0.035
S = 0.5% =

$AR^{2/3} = \frac{Q \cdot n}{1.486 S^{1/2}} = \frac{46.7 \times 0.035}{1.486 \times 0.0071}$

= 15.65

Briarwood Estates 4th Addition

To Wichita, Sedgwick County, Kansas

DRAINAGE PLAN

4-4-84

Scale 1" = 50'
March 30, 1984

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

BM - City Std. Brass Cap in Conc. 25' N. & 30' E. of S1/4 Cor. Sec. 7, T27S, R1W of the 6th P.M. 1345.33 M.S.L.

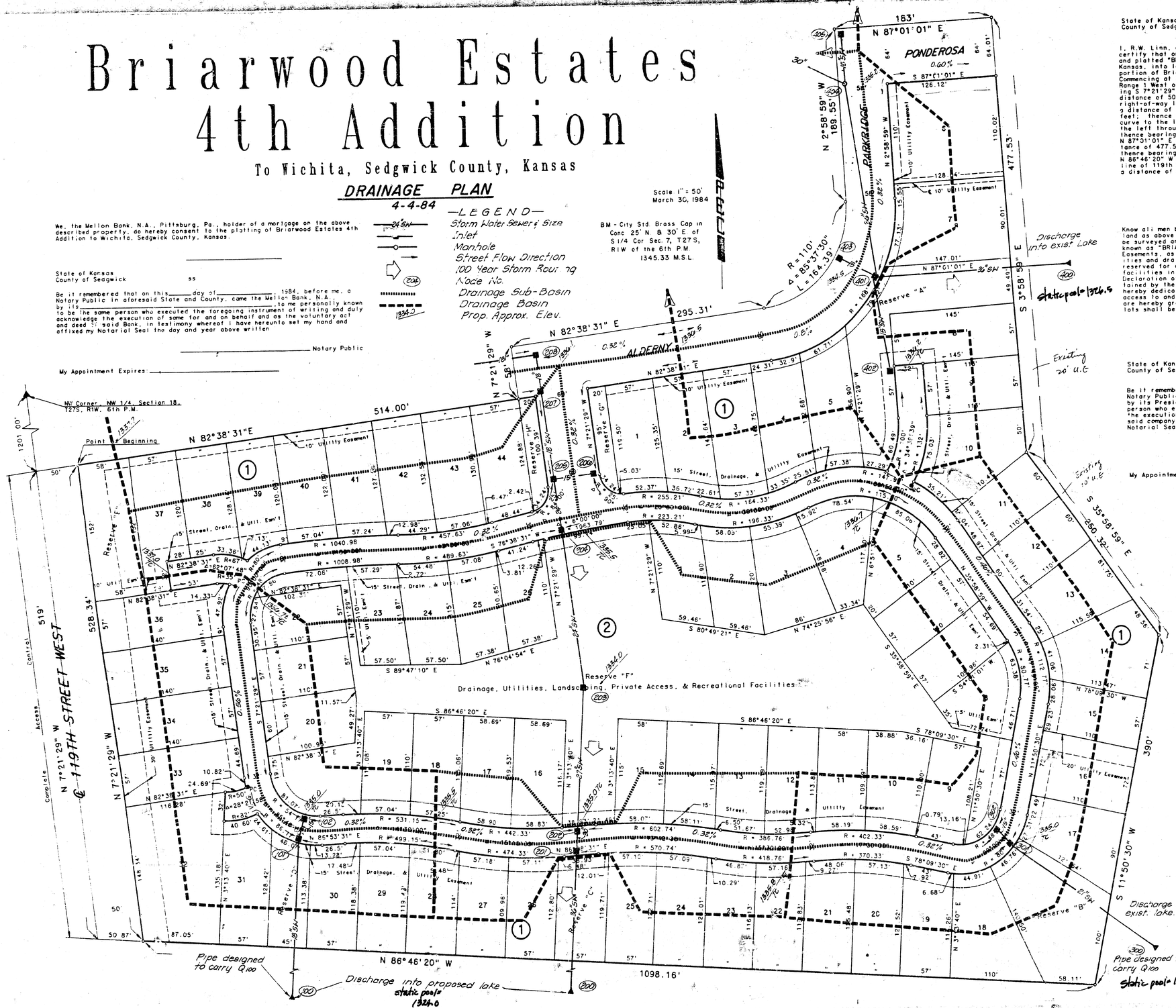
We, the Mellon Bank, N.A., Pittsburg, Pa., holder of a mortgage on the above described property, do hereby consent to the platting of Briarwood Estates 4th Addition to Wichita, Sedgwick County, Kansas.

State of Kansas
County of Sedgwick ss

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. by its_____ to me personally known to be the same person who executed the foregoing instrument of writing and duly acknowledge the execution of same for and on behalf 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: _____



BRIARWOOD ESTATES FOURTH ADDITION
(Drainage)

State of Kansas
County of Sedgwick ss

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 platted "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 right-of-way line of 119th Street West; thence continuing bearing N 82°38'31" E 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 295.31 feet to the P.C. of a curve to the left having a radius of 110.00 feet; thence along said curve to the left through a central angle of 85°37'30", an arc distance of 164.39 feet, thence bearing N 2°58'59" W 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 platted into lots, blocks, streets and reserves, the same to be known as "BRIARWOOD ESTATES 4TH ADDITION," to Wichita, Sedgwick County, Kansas. Easements, 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 abutters' 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.

_____ President
Larry A. Chambers

State of Kansas
County of Sedgwick ss

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 acknowledge the execution of same for and on behalf 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

_____ Chairman
Robert K. Chisholm

_____ Secretary
Robert A. Lakin

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.

_____ Mayor
Margaiee Wright

_____ City Clerk
Donald C. Gisick

This is to certify that this instrument was filed for record in the Register of Deeds Office at____m. on this____day of_____, 1984.

_____ Register of Deeds
Bette F. McCart

_____ Deputy
Pat Kettler

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

_____ Chairman
Jack Spratt

_____ Commissioner
Donald E. Gragg

_____ Commissioner
Tom Scott

Attest: _____ County Clerk
Dorothy K. White

Entered on Transfer Record this____day of_____, 1984.

_____ County Clerk
Dorothy K. White