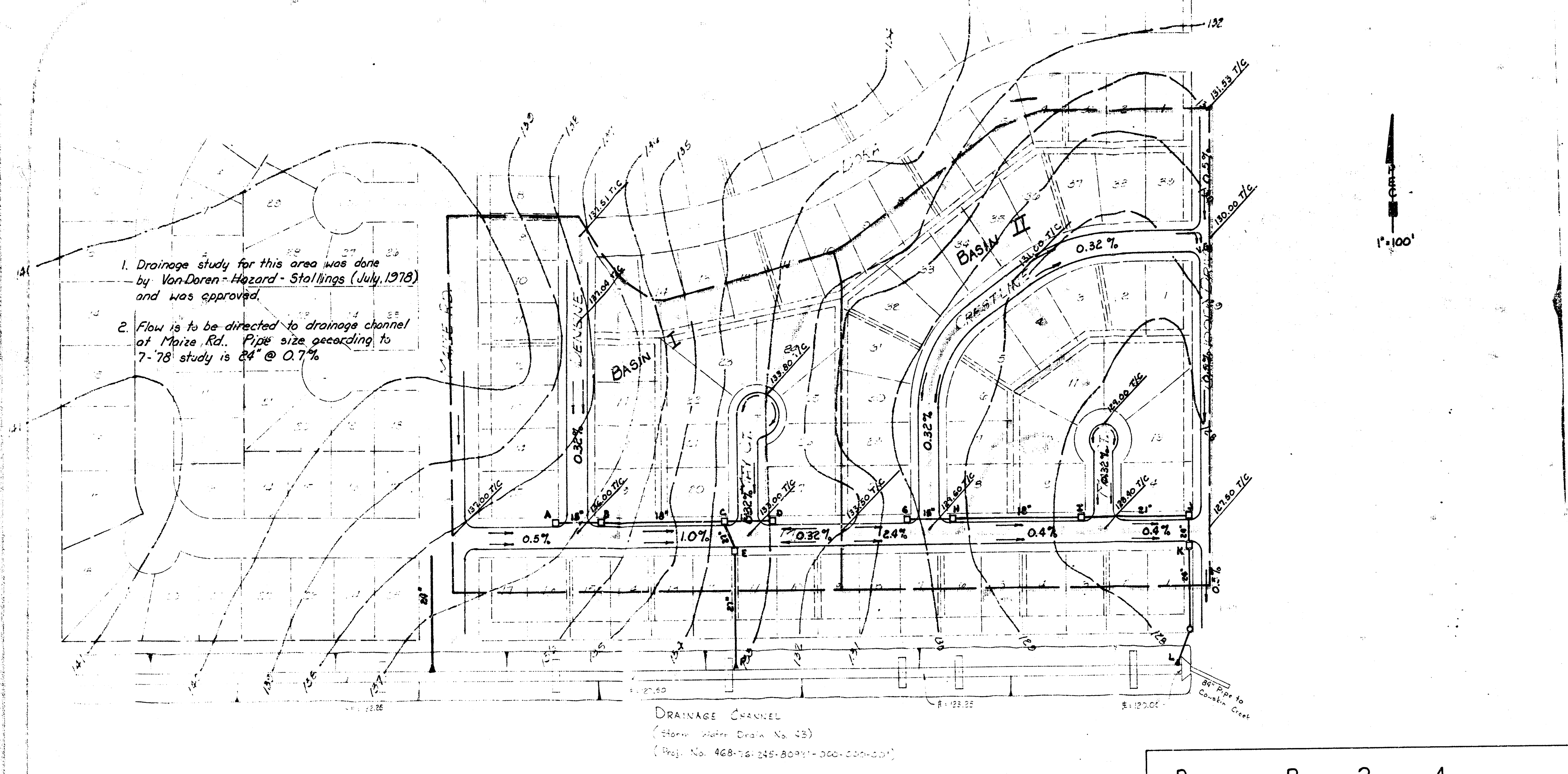


PRAIRIE PARK 2ND ADDITION
DRAINAGE STUDY
MAY 1984

PROFESSIONAL ENGINEERING CONSULTANTS

34-84261

HYDROLOGY DATA SHEET

PAGE 1 OF

PROJECT: PRAIRIE PARK 2ND ADDITION PROJECT NO. 34-84261-1767

ITEM: DRAINAGE STUDY DATE: MAY 1984

RETURN PERIOD: 2 YR COMPUTATIONS BY: KLR REVISIONS BY:

SCHEMATIC DIAGRAM:

ANALYSIS OF BASIN I

TRIBUTARY AREA								HYDROLOGY SUMMATION				CONDUIT DATA					
SUB-BASIN (1)	C (2)	AREA (acres) (3)	SLOPE (%) (4)	LENGTH (feet) (5)	T_{c_0} (minutes) (6)	I_0 in/hr (7)	Q_0 (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)
A	0.5	2.6	1.0		16	3.96	5.1	16	3.96	5.1	5.1	15	0.9	4.1	80	1	17
B	0.5	1.2	1.0		15	4.06	2.4	17	3.86	2.3	7.4	18	0.7	4.2	230	1	18
BRANCH D	0.5	1.3	0.5		20	3.63	2.3	20	3.63	2.3	2.3	15	0.2	1.8	40	0	20
C	0.5	2.0	0.5		20	3.63	3.6	20	3.63	3.6	12.9	21	0.9	5.3	40	0	20
E	0.5	1.1	1.2		15	4.06	2.2	20	3.63	2.0	14.9	21	1.3	6.0	200	1	21

HYDROLOGY DATA SHEET

PAGE 2 OF

PROJECT: PRAIRIE PARK 2ND ADDITION PROJECT NO. 34-84261-1767

ITEM: DRAINAGE STUDY DATE: MAY 1984

RETURN PERIOD: 100 YR COMPUTATIONS BY: KLR REVISIONS BY:

SCHEMATIC DIAGRAM:

ANALYSIS OF BASIN I

TRIBUTARY AREA								HYDROLOGY SUMMATION				CONDUIT DATA					
SUB-BASIN (1)	C (2)	AREA (acres) (3)	SLOPE (%) (4)	LENGTH (feet) (5)	T_{c_0} (minutes) (6)	I_0 in/hr (7)	Q_0 (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)
A	0.5	2.6	1.0		16	8.76	11.4										
B	0.5	1.2	1.0		15	8.98	5.3										
BRANCH D	0.5	1.3	0.5		20	8.03	5.2										
C	0.5	2.0	0.5		20	8.03	8.0										
E	0.5	1.1	1.2		15	8.98	4.9										
	0.5	8.2						20	8.03		32.9						

HYDROLOGY DATA SHEET

PAGE 3 OF

PROJECT: PRAIRIE PARK 2ND ADDITION PROJECT NO. 34-84261-1767

ITEM: DRAINAGE STUDY DATE: MAY 1984

RETURN PERIOD: 2 YR COMPUTATIONS BY: KLR REVISIONS BY:

SCHEMATIC DIAGRAM:

ANALYSIS OF BASIN II.

TRIBUTARY AREA								HYDROLOGY SUMMATION				CONDUIT DATA					
SUB-BASIN (1)	C (2)	AREA (acres) (3)	SLOPE (%) (4)	LENGTH (feet) (5)	T_{c_0} (minutes) (6)	I_0 in/hr (7)	Q_0 (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)
G	0.5	2.5	1.4		17	3.86	4.8	17	3.86	4.8	4.8	15	0.8	3.7	90	1	18
H	0.5	1.2	1.0		15	4.06	2.4	18	3.78	2.3	7.1	18	0.7	4.0	240	1	19
I	0.5	1.1	1.0		15	4.06	2.2	19	3.70	2.0	9.1	21	0.5	3.6	200	1	20
J	0.5	4.7	1.2		19	3.70	8.7	20	3.63	8.5	17.6	24	0.9	5.5	50	0	20
K	0.5	1.5	1.5		15	3.86	2.9	20	3.63	2.7	20.3	27	0.6	5.0	200	1	21

HYDROLOGY DATA SHEET

PAGE 4 OF

PROJECT: PRAIRIE PARK 2ND ADDITION PROJECT NO. 34-84261-1767

ITEM: DRAINAGE STUDY DATE: MAY 1984

RETURN PERIOD: 100 YR COMPUTATIONS BY: KLR REVISIONS BY:

SCHEMATIC DIAGRAM:

ANALYSIS OF BASIN II.

TRIBUTARY AREA								HYDROLOGY SUMMATION				CONDUIT DATA					
SUB-BASIN (1)	C (2)	AREA (acres) (3)	SLOPE (%) (4)	LENGTH (feet) (5)	T_{c_0} (minutes) (6)	I_0 in/hr (7)	Q_0 (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)
G	0.5	2.5	1.4		17	8.55	10.7										
H	0.5	1.2	1.0		15	8.98	5.4										
I	0.5	1.1	1.0		15	8.98	4.9										
J	0.5	4.7	1.2		19	8.19	19.3										
K	0.5	1.5	1.5		15	8.33	6.7										

PROFESSIONAL ENGINEERING CONSULTANTS

Date MAY 29, 1984 Page ___ of ___

Project PRAIRIE PARK 2ND ADDITION

Item DRAINAGE STUDY

CAPACITY OF CURB INLET

TWO YR STORM

INLET CAPACITY IN SUMP 2.0 cfs/ft OR 10 cfs

100 YR STORM

INLET CAPACITY IN SUMP 2.6 cfs/ft OR 13 cfs

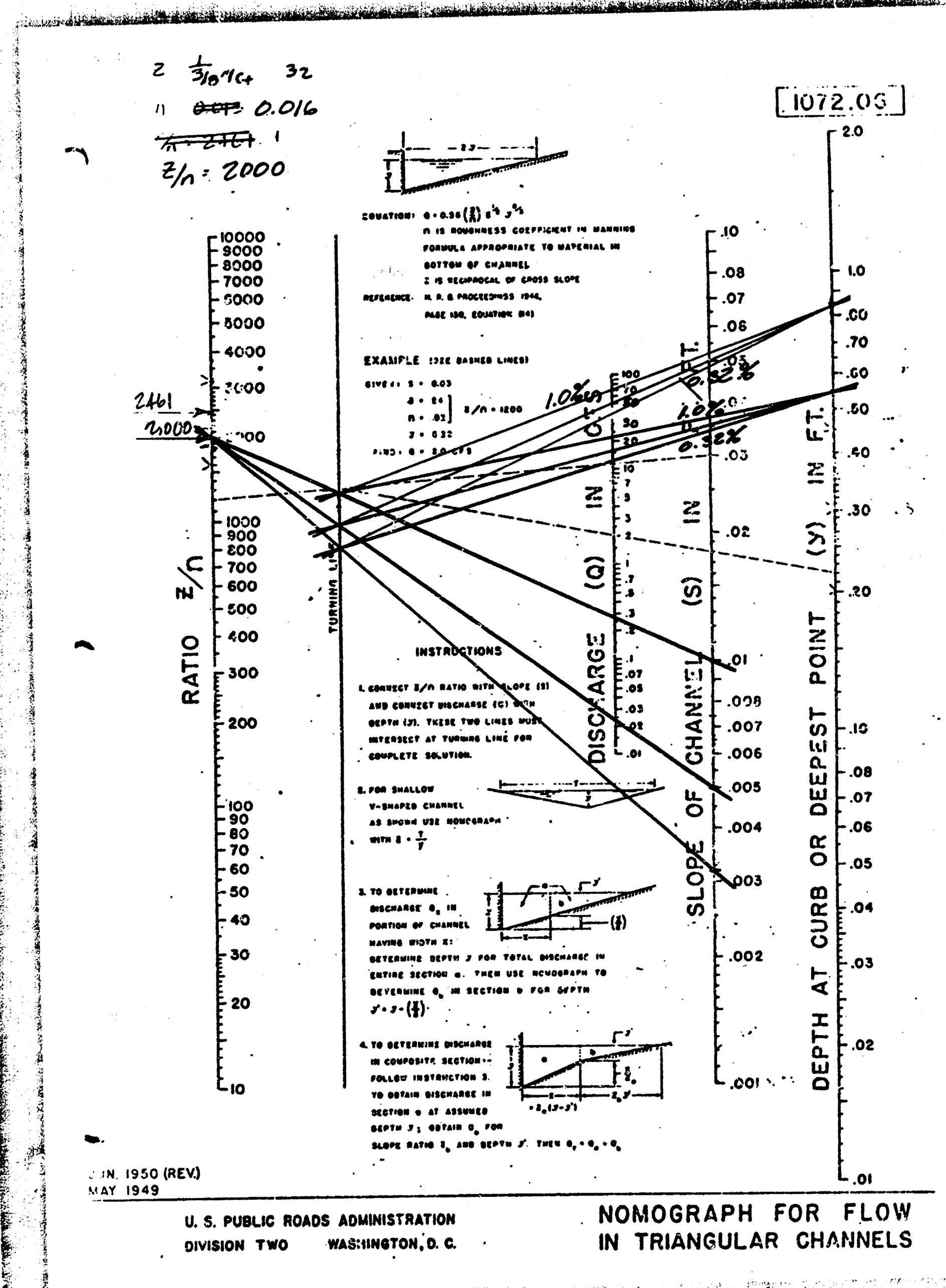
STREET FLOW PER CURB

TWO YR STORM

- 0.32% SLOPE → 12 cfs
- 0.5 % SLOPE → 15 cfs
- 1.0 % SLOPE → 22 cfs

100 YR STORM

- 0.32% SLOPE → 40 cfs
- 0.5 % SLOPE → 50 cfs
- 1.0 % SLOPE → 70 cfs



PROFESSIONAL ENGINEERING CONSULTANTS

Date MAY 29, 1984 Page 1 of ___

Project PRAIRIE PARK 2ND DRAINAGE STUDY

Item BACK WATER ANALYSIS

1) MANNING'S EQUATION $Q = \frac{1.49}{n}(A)(R)^{2/3}(S)^{1/2}$

2) $n = 0.015$ – PIPE FULL

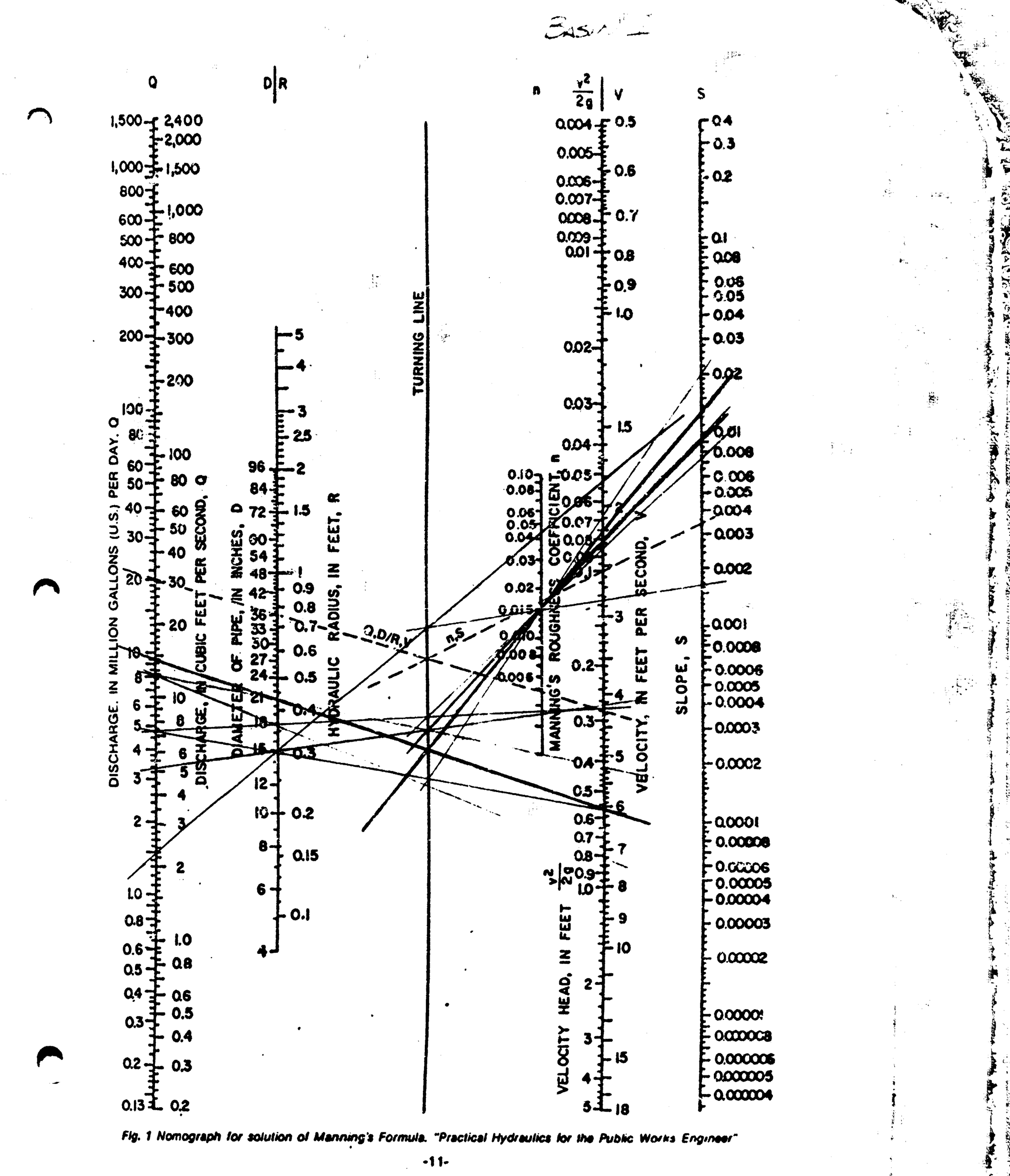
3) $(Q \cdot 0.00320 \cdot R^{-2} \cdot (\frac{R}{2})^{-2/3})^2 = S$

4) $0.0032 \cdot R^{-2} \cdot (\frac{R}{2})^{-2/3} = X$

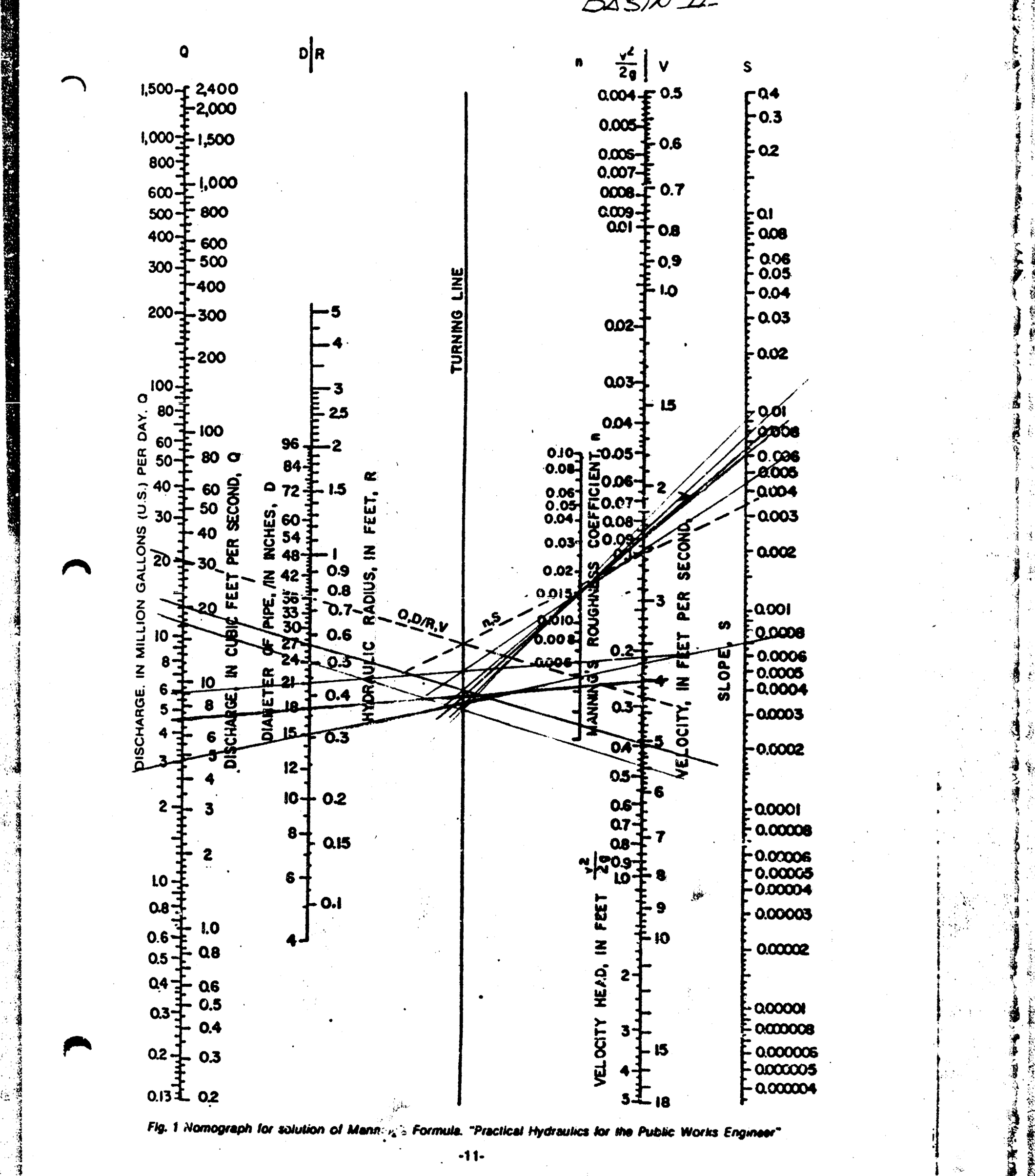
15" PIPE	R = 0.625	x = 0.01729
18" PIPE	R = 0.750	x = 0.01094
21" PIPE	R = 0.875	x = 0.00725
24" PIPE	R = 1.0	x = 0.00508
27" PIPE	R = 1.125	x = 0.00371
30" PIPE	R = 1.250	x = 0.0028
36" PIPE	R = 1.50	x = 0.00172

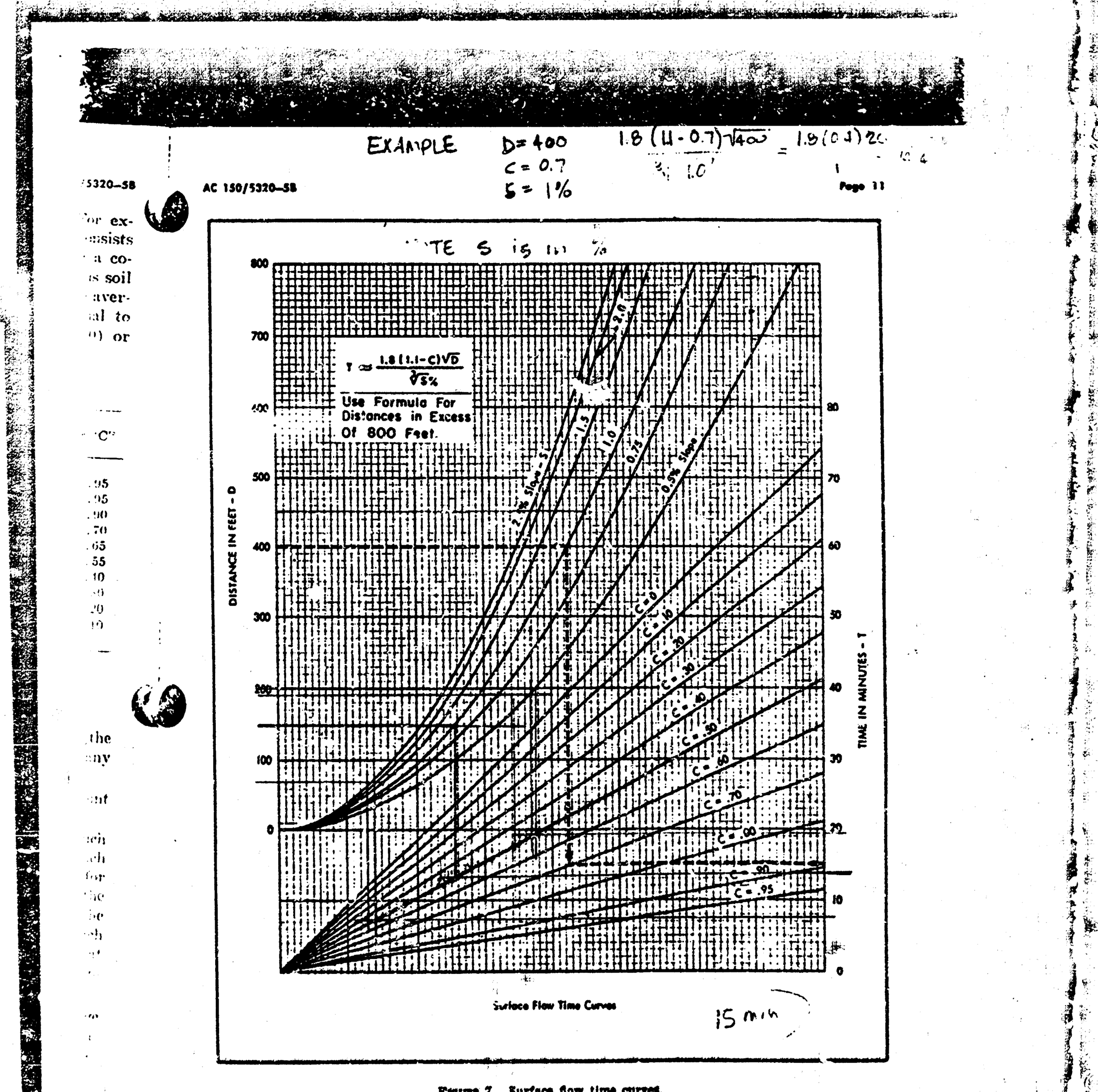
5) $(Q \cdot x)^2 = S$

BASIN I



BASIN II





Date May 29, 1984 Page 2 of
Project Prairie Park 2nd Drainage Study
Item Backwater Analysis

Basin No. I - Two Year Storm

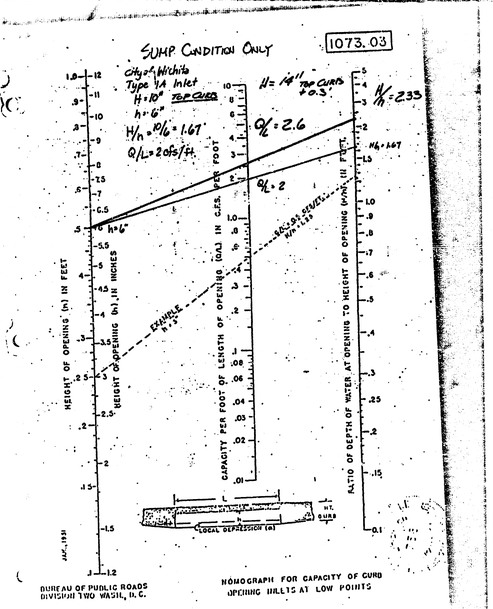
E-E → 18.5 cfs 21-inch ELEV = 130 Top of Pipe
(18.5 : 0.00725)^½ = S
S = 0.0110 L = 200 ft h = 2.20
ELEV = 132.20
0.8 Below Top of Curb

E-C → 12.5 cfs 21-inch ELEV 132.2
(12.5 : 0.00725)^½ = S
S = 0.00821 L = 95 ft h = 0.37
ELEV = 132.6
0.6 Below Top of Curb

F-E → 18.5 cfs 24-inch ELEV = 130 Top of Pipe
(18.5 : 0.00508)^½ = S
S = 0.00543 L = 200 ft h = 1.09
ELEV = 131.1
1.9 Below Top of Curb

E-C → 21-inch ELEV = 131.1
As above h = 0.37
ELEV 131.5
1.5 Below Top of Curb

C-B → 24.0 cfs 18-inch ELEV = 131.5
(24.0 : 0.0194)^½ = S
S = 0.00655 L = 250 ft h = 1.5
ELEV = 133.0
3.0 Below Top of Curb



NOMOGRAPH FOR CAPACITY OF CURB OPENING WALLS AT LOW POINTS

Date May 29, 1984 Page 3 of
Project Prairie Park 2nd Drainage Study
Item Backwater Analysis

B-A → 5.1 cfs 15-inch ELEV = 133.0
(5.1 : 0.01729)^½ = S
S = 0.00823 L = 80 ft h = 0.65
ELEV = 133.7
2.3 ft Below Top Curb

C-D → 2.5 cfs 15-inch ELEV = 134.5
(2.5 : 0.01129)^½ = S
S = 0.00167 L = 45 ft h = 0.08
ELEV = 134.6
1.8 ft Below Top Curb

Basin I - 100 yr Storm

F-E → 32.9 cfs 27-inch ELEV = 130.0 Top of Pipe
(32.9 : 0.00371)^½ S
S = 0.00890 L = 200 ft h = 3.0
ELEV = 133.0
0 Below Top of Curb

Hydraulic = Street slope of 1%
18" inch Pipe
Q = (1.49/0.012) π(0.75)^(8/3) (0.03/2)^⅝ (0.01)^½
Q = 9.1 cfs in Pipe

Date May 29, 1984 Page 4 of
Project Prairie Park 2nd Additon
Item Backwater Analysis

Intersection May Ct & May 100 yr Storm
Curb = Top + 0.3
Q Rate = 13.5 cfs
9" Low Point
6.8
11.3 in Dia. 21-inch Pipe
16.1 in Dia. 24-inch Pipe
22.0 in Dia. 27-inch Pipe
4.5
32.9 in Pipe
27-inch Pipe with inlets @ F & B
22.0 cfs in Pipe
= 9.1 cfs Pipe up stream
12.9 cfs for Inlets OK
From Q to Inlet @ Inlet @ = 12.9 cfs
Bypass to Inlet @ 6.5 cfs
Q to Inlet @ 4.8 cfs
10.9 cfs for Inlet OK

Date May 29, 1984 Page 5 of
Project Prairie Park 2nd Drainage Study
Item Backwater Analysis

Basin II - Two Year Storm

L-K → 20.3 cfs 21-inch ELEV. = 123.3
(20.3 : 0.00371)^½ = S
S = 0.00567 L = 200 ft h = 1.1
ELEV = 126.9
3.1 Below Top of Curb

K-J → 13.6 cfs 24-inch ELEV = 124.5
(13.6 : 0.00508)^½ = S
S = 0.00299 L = 50 ft h = 0.40
ELEV = 124.9
2.6 Below Top of Curb 1.6 Below Top of Curb

J-I → 9.1 cfs 21-inch ELEV = 124.9
(9.1 : 0.00725)^½ = S
S = 0.00935 L = 200 ft h = 0.87
ELEV = 125.8
2.6 Below Top of Curb 1.6 Below Top of Curb

I-H → 7.1 cfs 18-inch ELEV = 125.8
(7.1 : 0.01098)^½ = S
S = 0.00643 L = 250 h = 1.65
ELEV = 127.3
2.3 Below Top of Curb 1.3 Below Top of Curb

Date May 29, 1984 Page 6 of
Project Prairie Park 2nd Drainage Study
Item Backwater Analysis

H-G → 4.8 cfs 15-inch ELEV = 127.3
(4.8 : 0.01779)^½ = S
S = 0.00729 L = 90 h = 0.65
ELEV = 128.0
1.6 Below Top of Curb 0.6 Below Top of Curb

L-K → 20.3 cfs 27-inch ELEV = 123.3 Same as K-J
(20.3 : 0.00508)^½ = S
S = 0.00643 L = 200 h = 2.13
ELEV = 125.43
2.1 Below Top of Curb

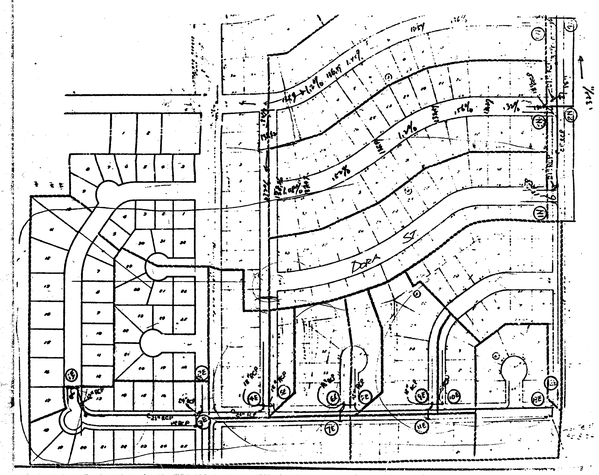
Basin II - 100 yr Storm

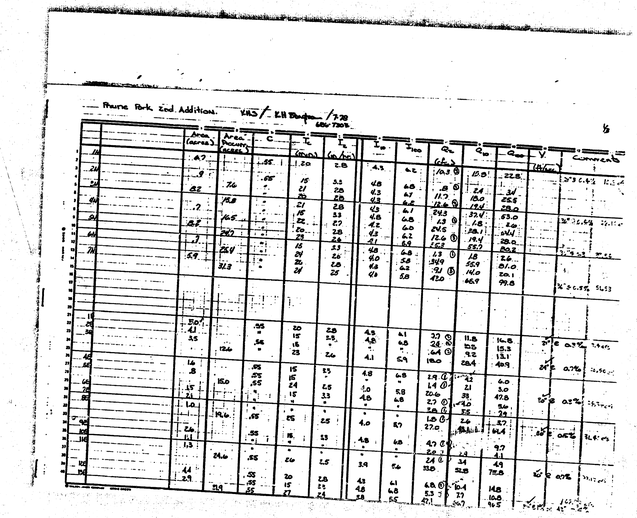
I-H Hydraulic Slope = Strt. Slope = 0.9%
18-inch Pipe
Q = 5.8 cfs
MAY
5.8 cfs in Pipe
10.3 cfs By-Pass

Date May 29, 1984 Page 7 of
Project Prairie Park 2nd Drainage Study
Item Backwater Analysis

I-I Hydraulic Slope < Strt. Slope = 0.9%
24-inch Pipe
Q = 8.72 cfs
MAY
8.72 cfs in Pipe
11.8 cfs By-Pass

V-T Hydraulic Slope = 0.3% Curb & Gutter to Top Catch Pipe
127.8 Invert 123.8 Top of Pipe h = 4.0
L = 250 ft S = 0.0160
Q = 28.9 cfs
87 in Pipe
118
CO
Q = 28.9 cfs
27-inch Pipe
S = 0.0160





MEMO

TO: City of Wichita
Department of Engineering
455 N. Main - 7th Floor
Wichita, KS 67202

PROJECT NO. 34-84261-1767
PROJECT: Prairie Park 2nd
Drainage Study

ATTN: Mr. Chris Breitenstein, P.E.
DATE: May 30, 1984

COPIES TO:

FROM: Kevin Rood, Design Engineer
REFERENCE:

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

Transmitted herewith, for your review and approval, are the Drainage Plan and Drainage Calculations for Phase II and Phase III developments of Prairie Park 2nd Addition. Basin I in the calculations corresponds to Phase II development and Basin II in the calculations corresponds to Phase III development.

If you have any questions, please call.

cn

Enc. 2

Revised Drainage Plan dated on Previous Plans
6/8
6/13/84