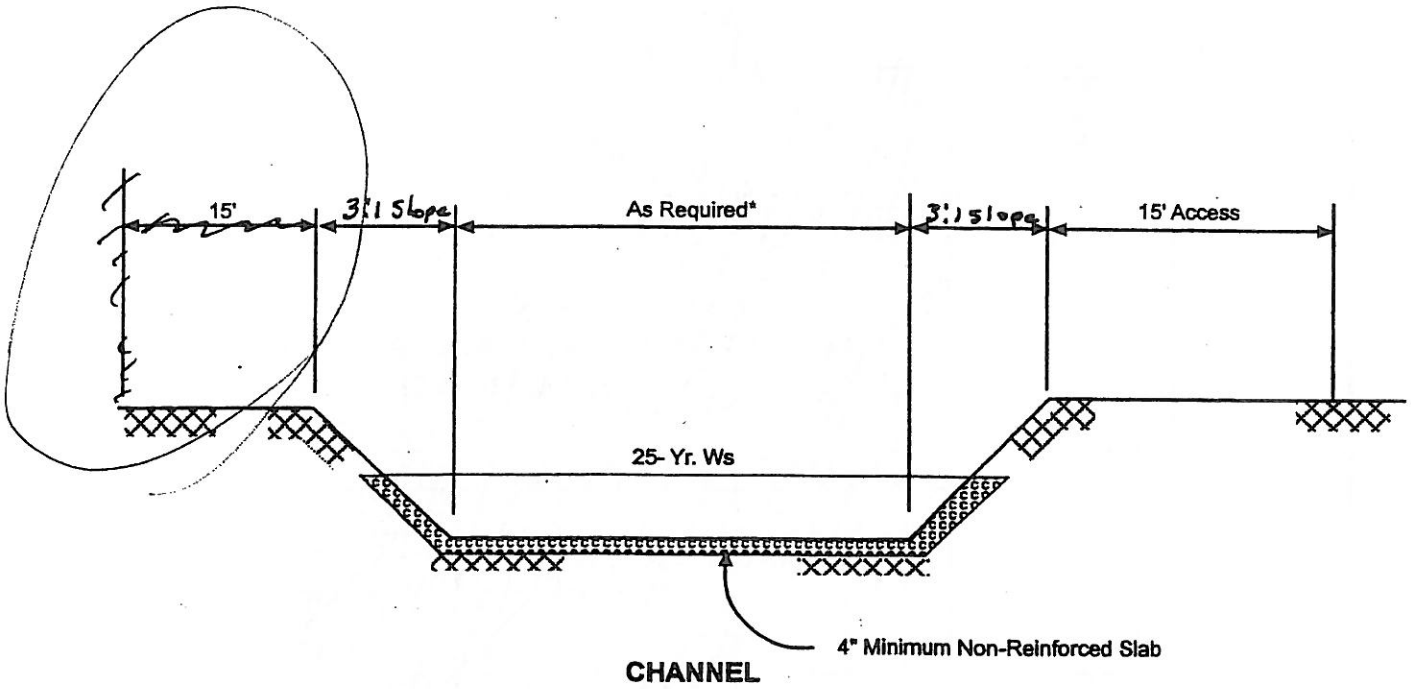
APPENDIX 3B

ADD DRAWING that shows pipe



GENERAL NOTES

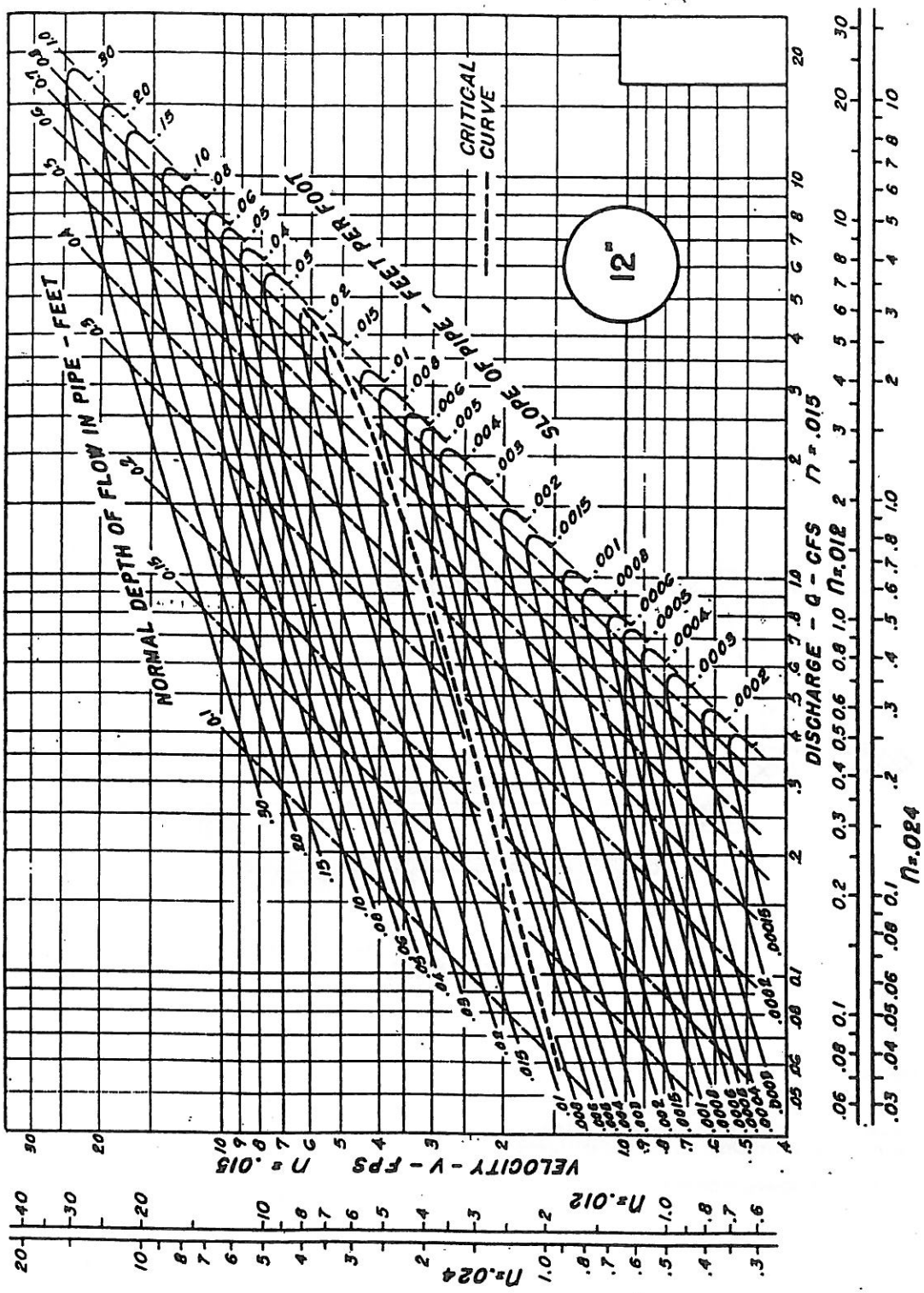
- Access easements required every 600'
- Utilities shall not be located beneath a concrete bottom except at crossings and a minimum cover of 3' will be provided
- Manholes not allowed in ditches

City of
SPRINGDALE
Arkansas

Minimum Drainage Easements Requirements

~~MINIMUM EASEMENTS FOR DRAINAGE AND UTILITIES~~

Figure 3.13

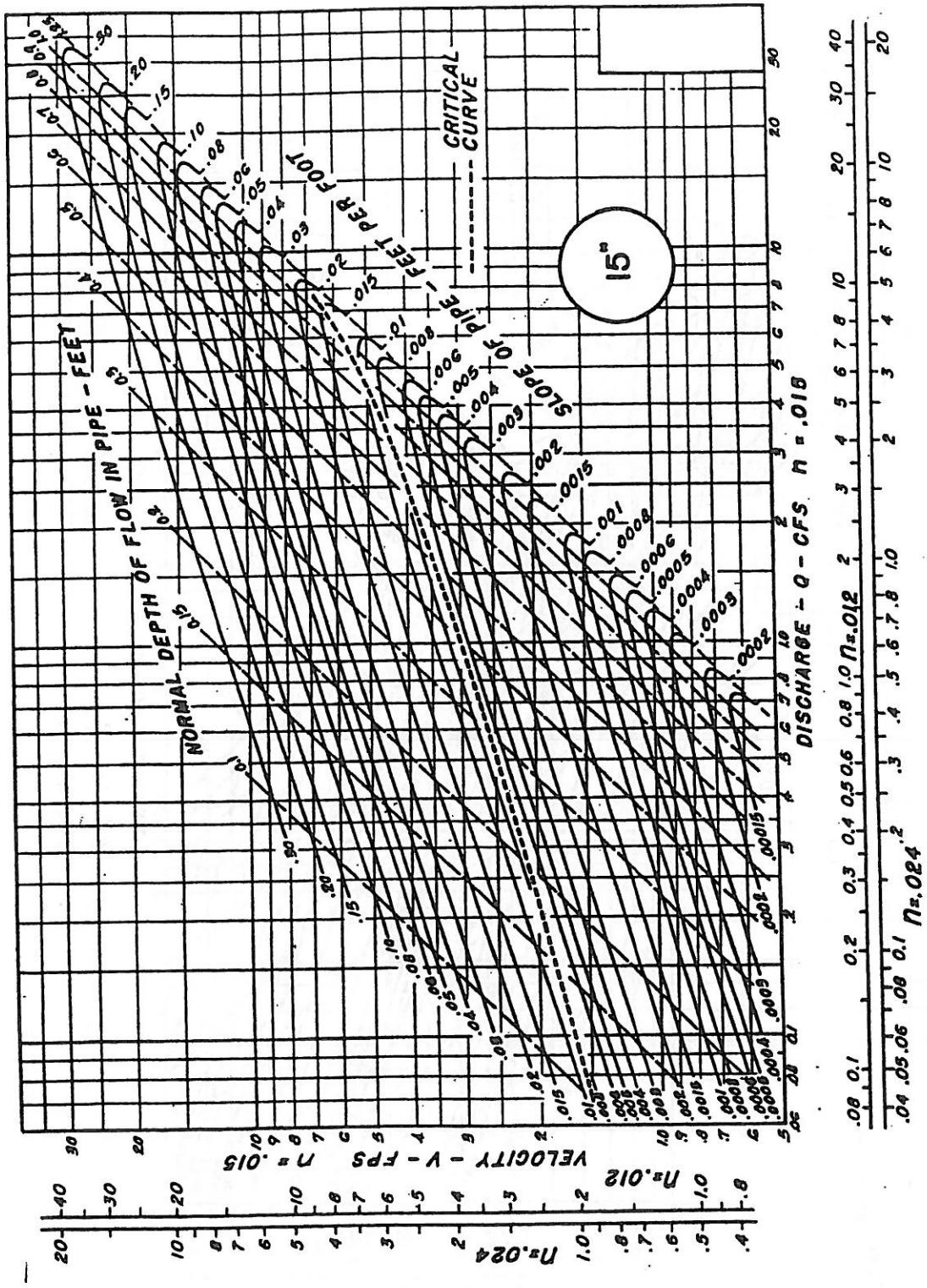


Source: Figures 3.14 to 3.26
U.S. Department of Transportation
Federal Highway Administration
Design Charts for Open Channel Flow

City of
SPRINGDALE
Arkansas

PIPE FLOW CHART
12-INCH DIAMETER

Figure 3.14



City of
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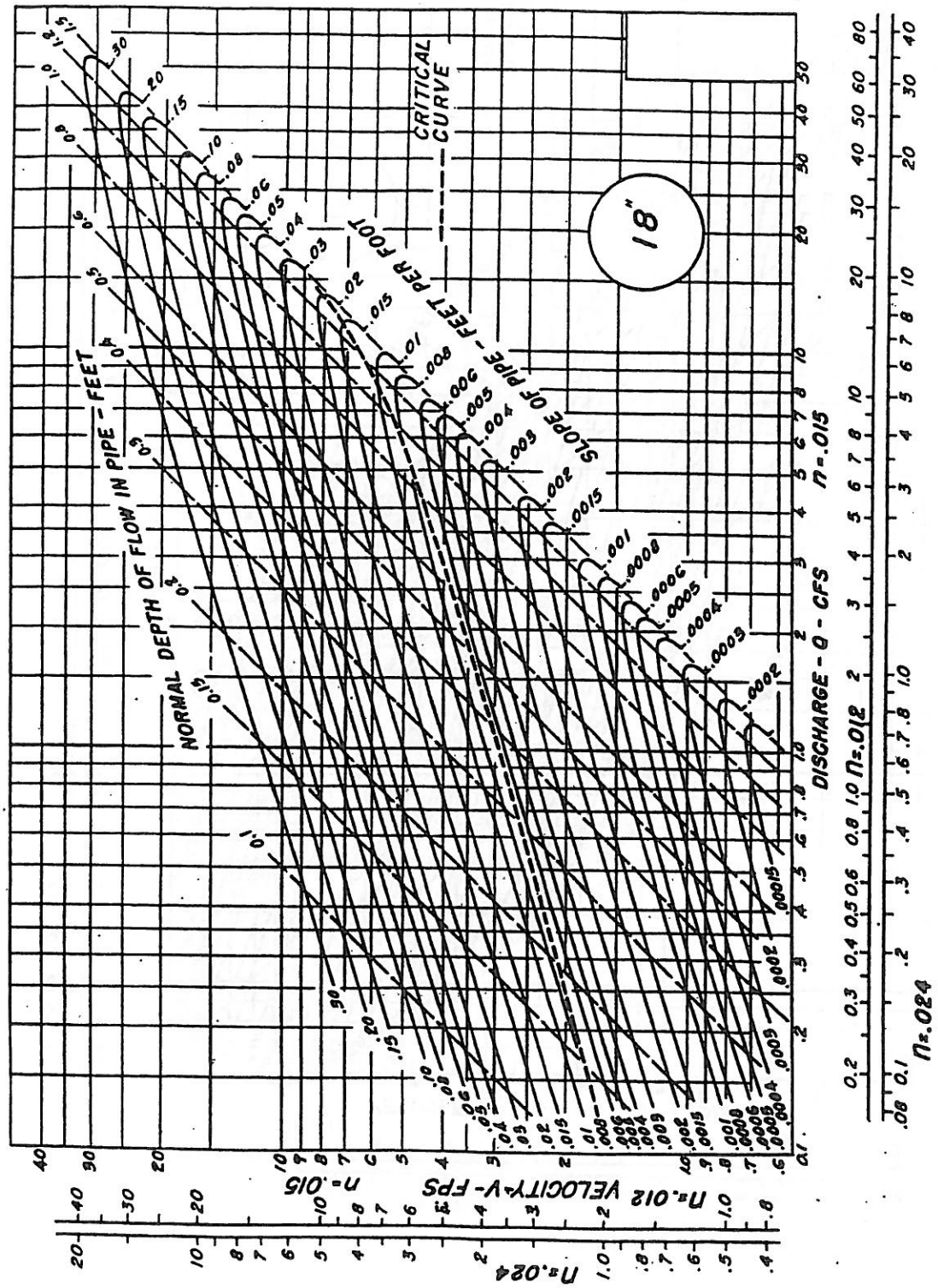
Arkansas

PIPE FLOW CHART
15 INCH DIAMETER

Figure 3.15



City of
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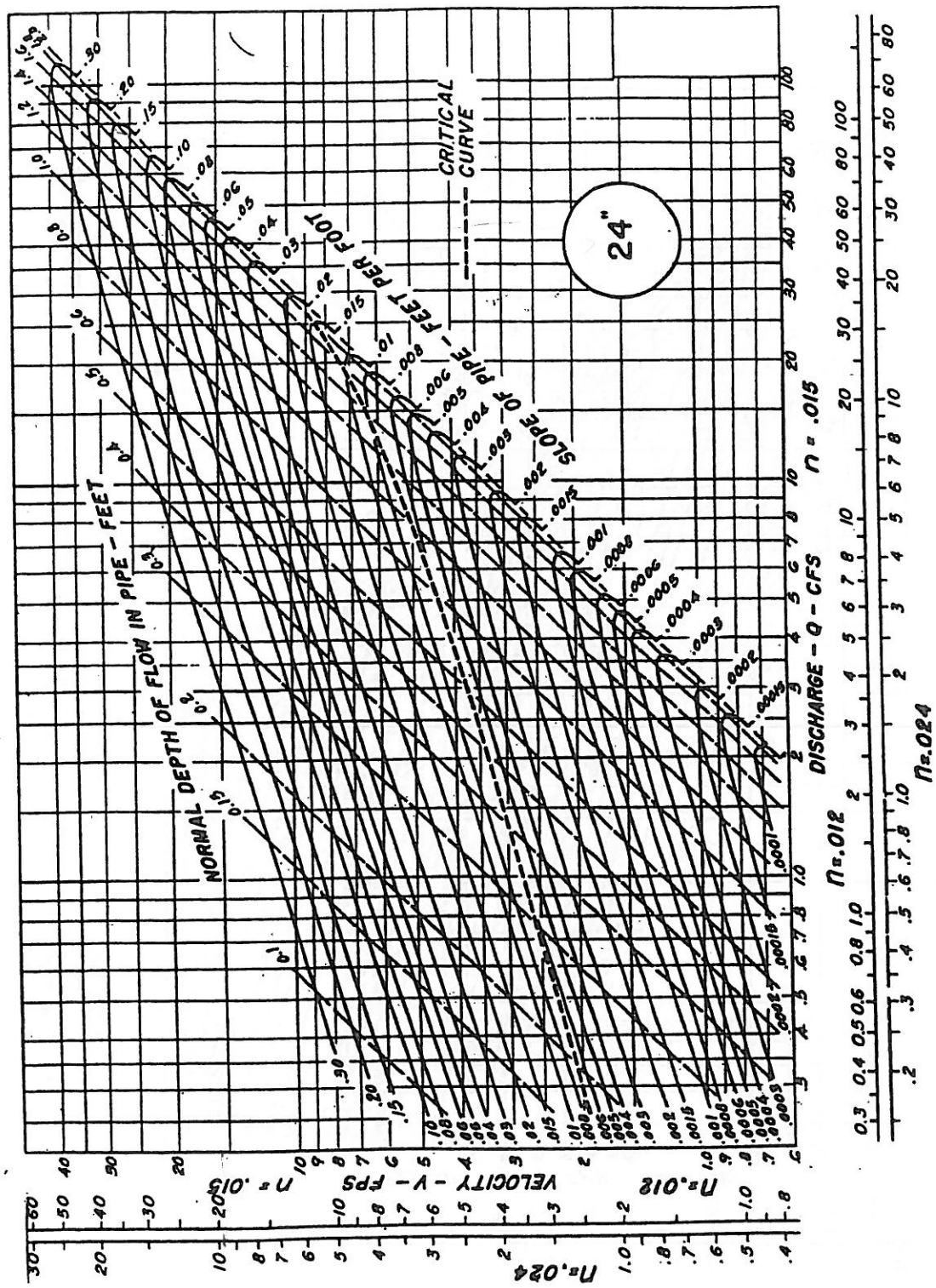
Arkansas

PIPE FLOW CHART
18 INCH DIAMETER

Figure 3.16



City of
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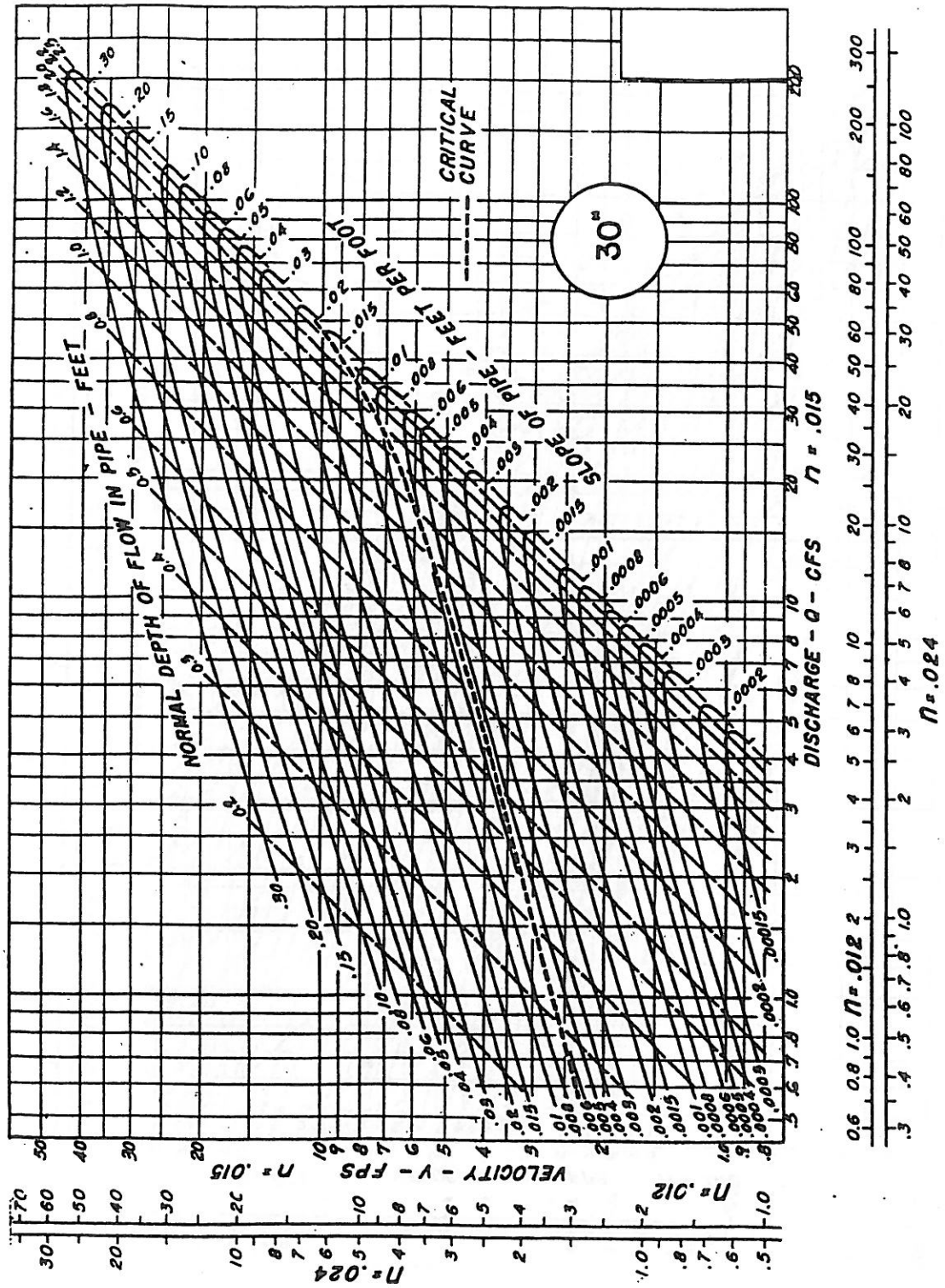
Arkansas

PIPE FLOW CHART
24 INCH DIAMETER

Figure 3.17



City of
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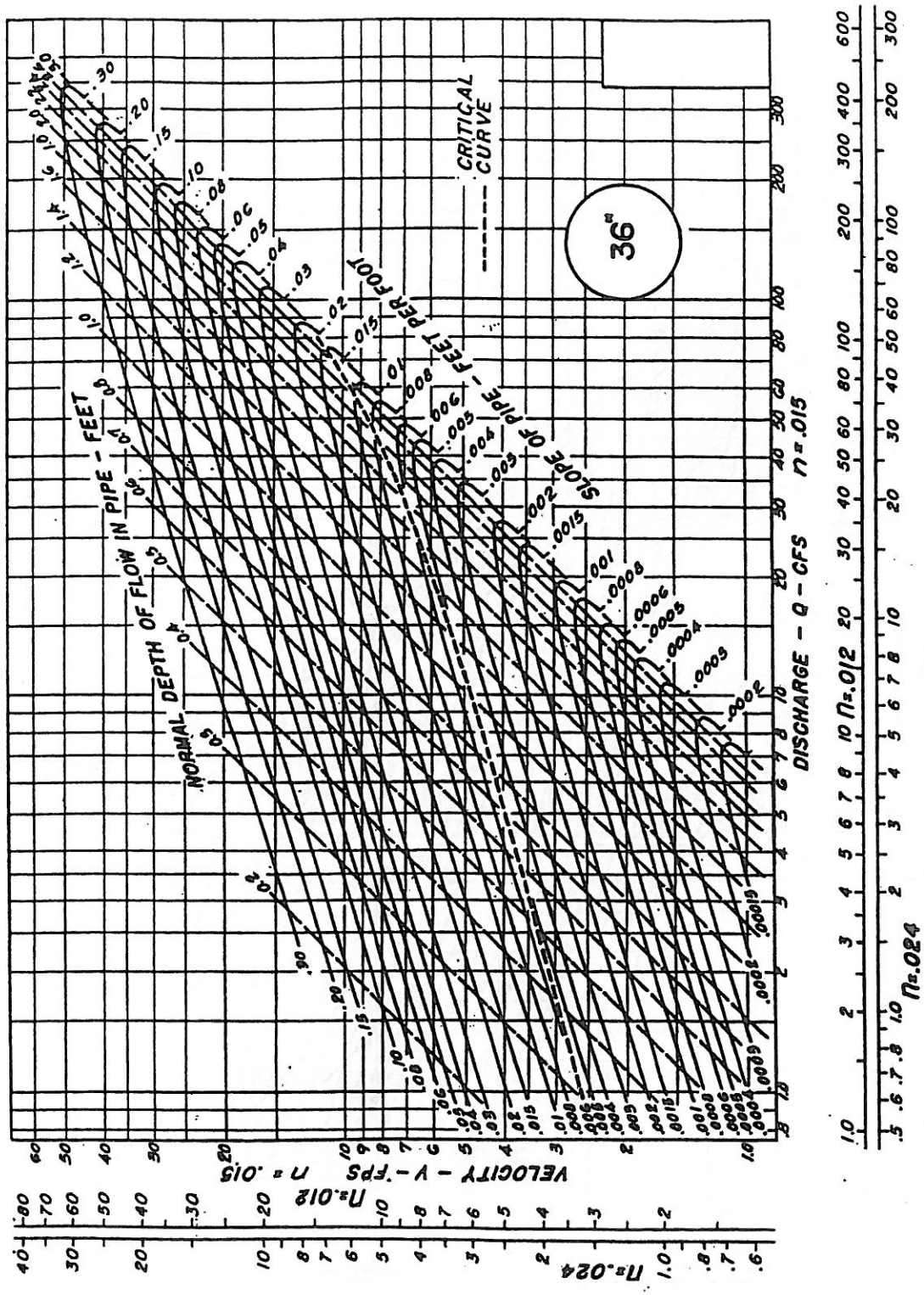
Arkansas

PIPE FLOW CHART
30 INCH DIAMETER

Figure 3.18



City of
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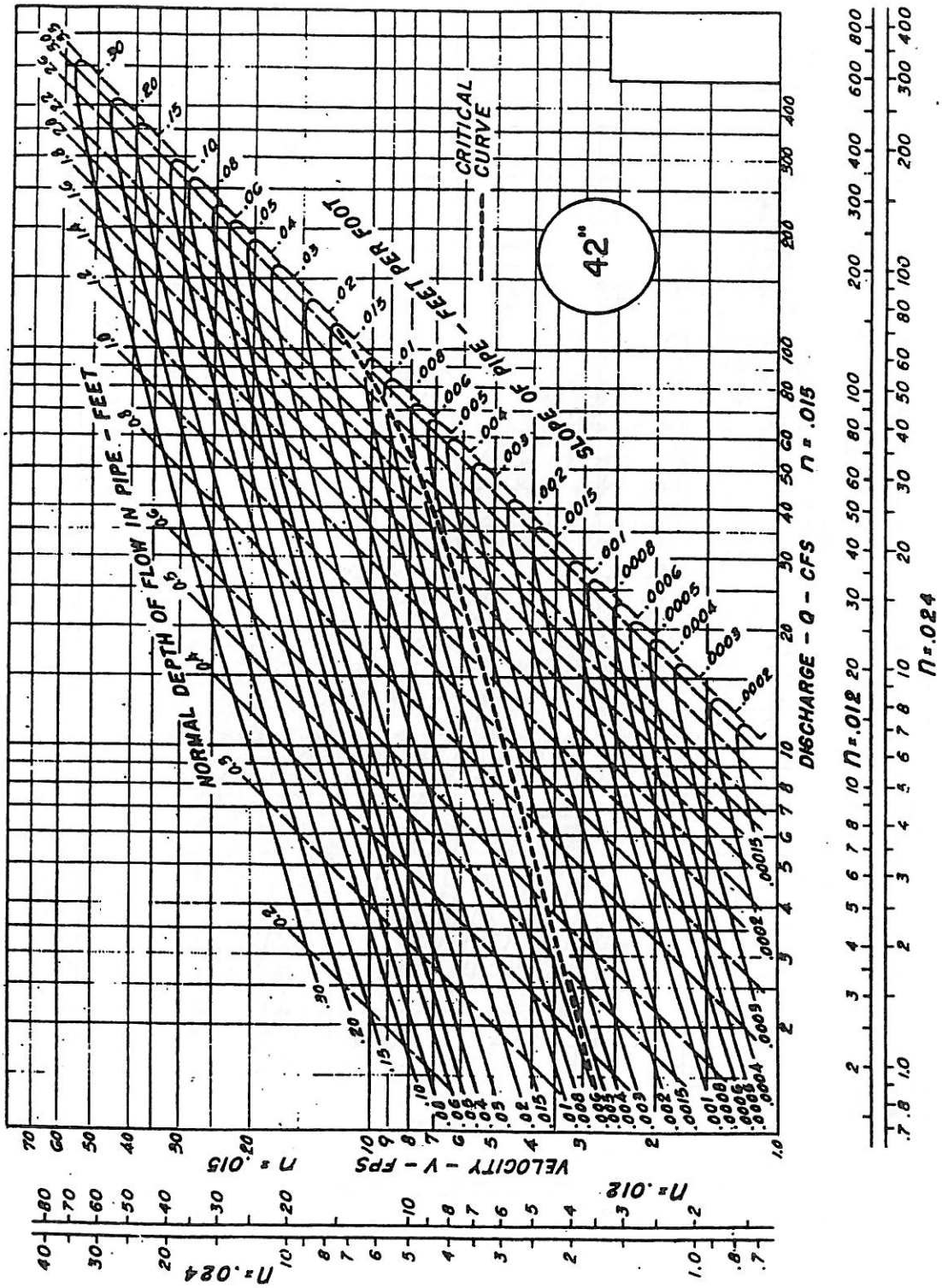
Arkansas

PIPE FLOW CHART
36 INCH DIAMETER

Figure 3.19



City of
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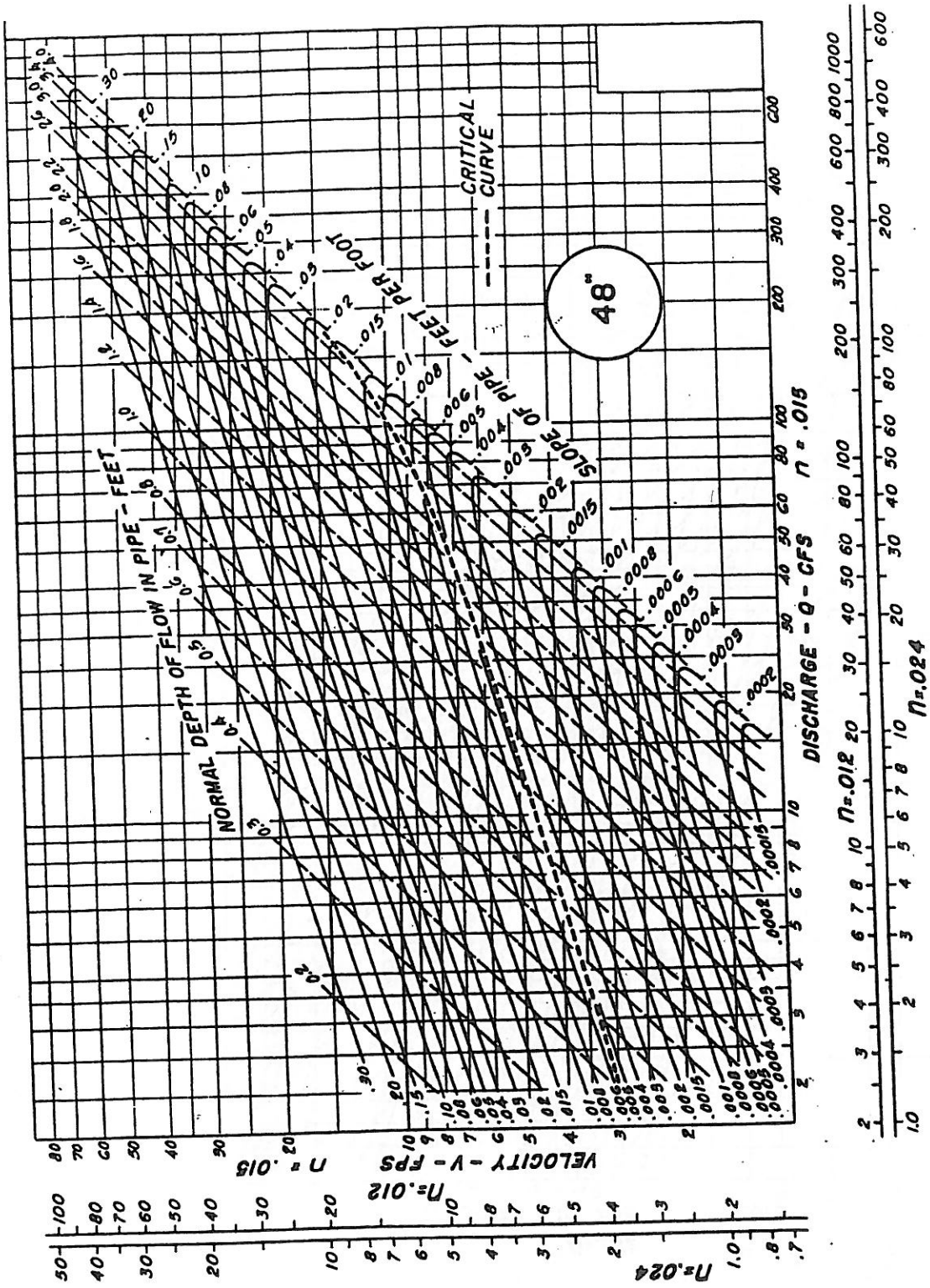
Arkansas

PIPE FLOW CHART
42 INCH DIAMETER

Figure 3.20



City of
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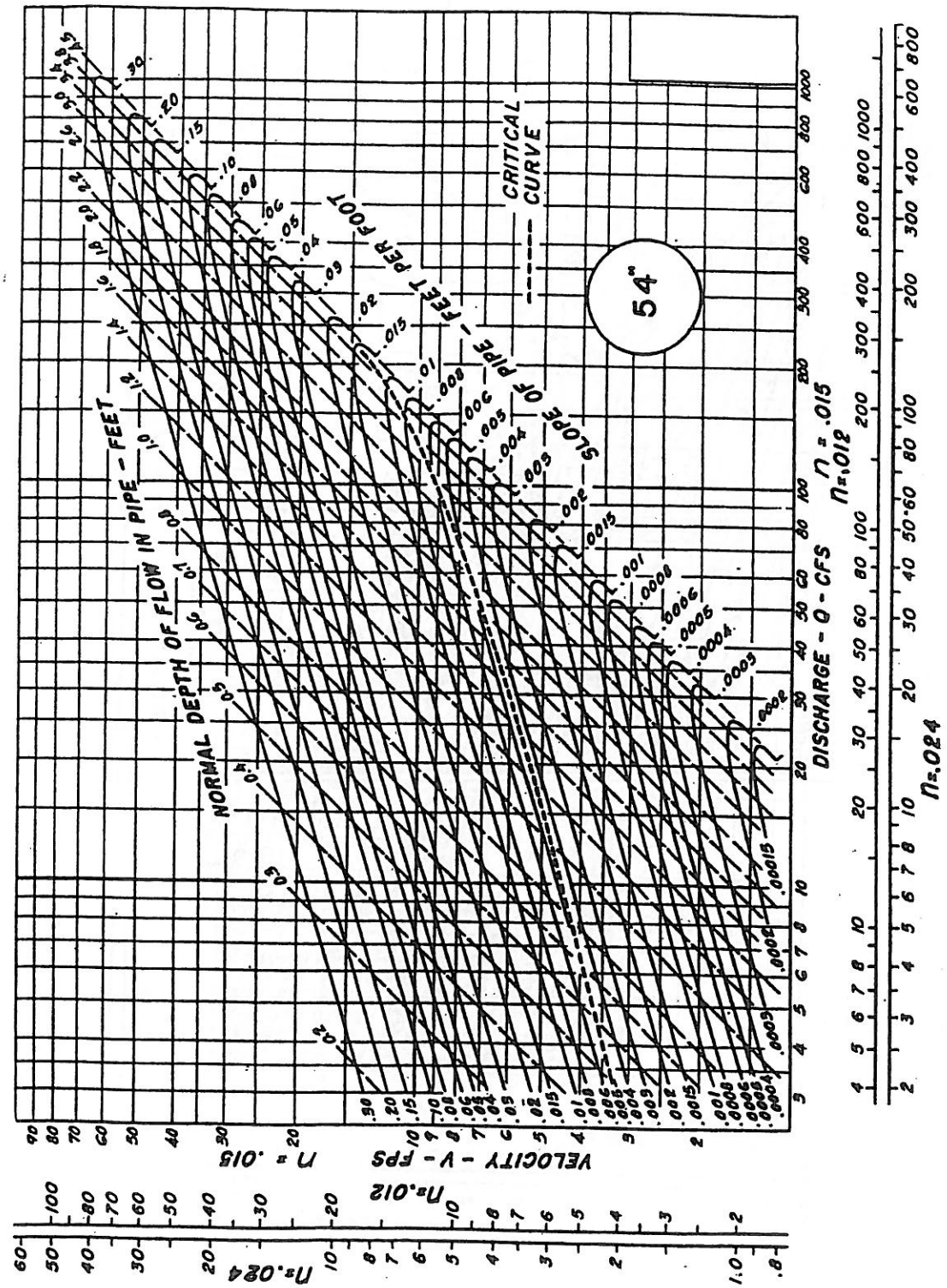
Arkansas

PIPE FLOW CHART
48 INCH DIAMETER

Figure 3.21



City of
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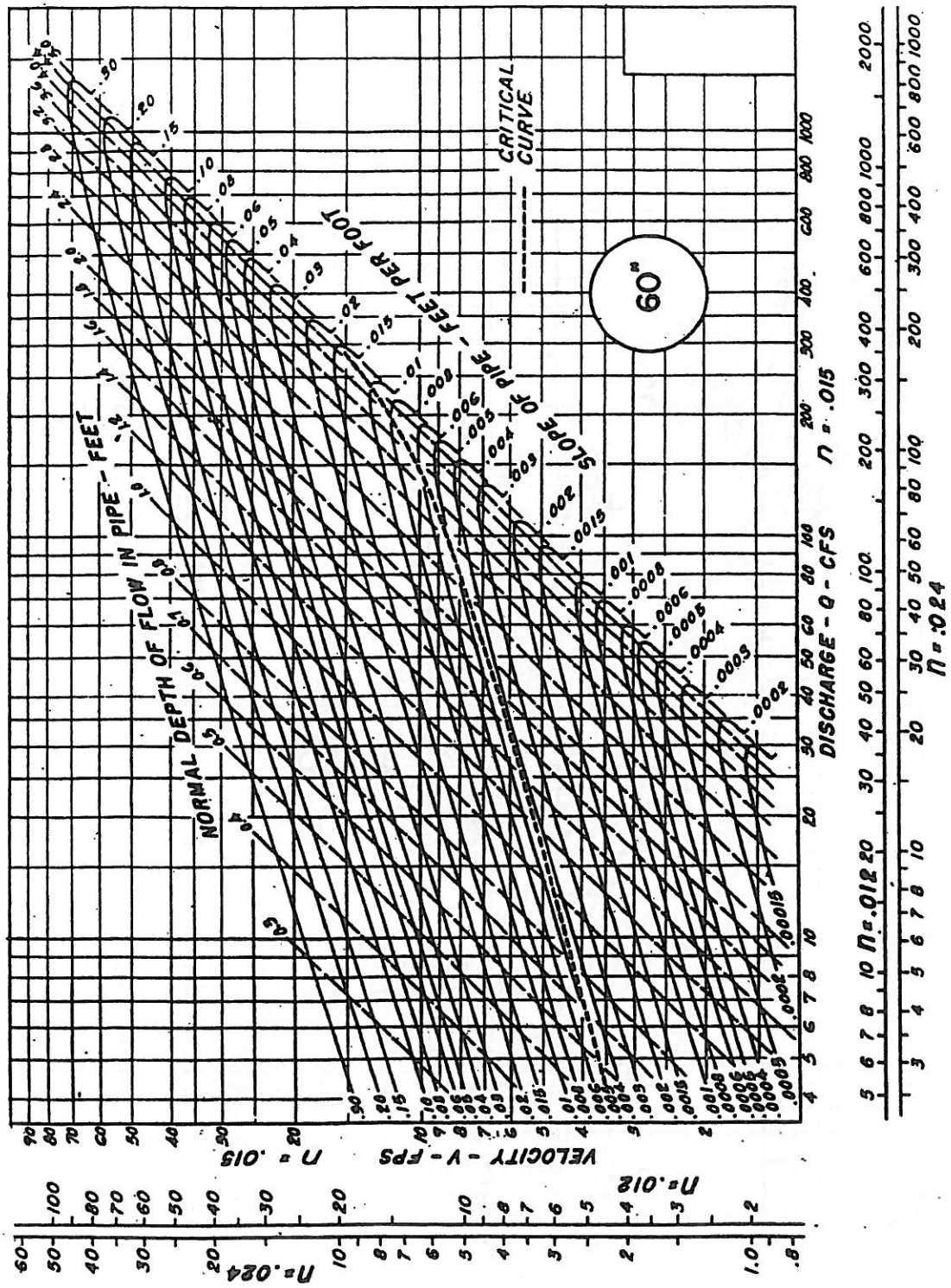
Arkansas

PIPE FLOW CHART
54 INCH DIAMETER

Figure 3.22



City of
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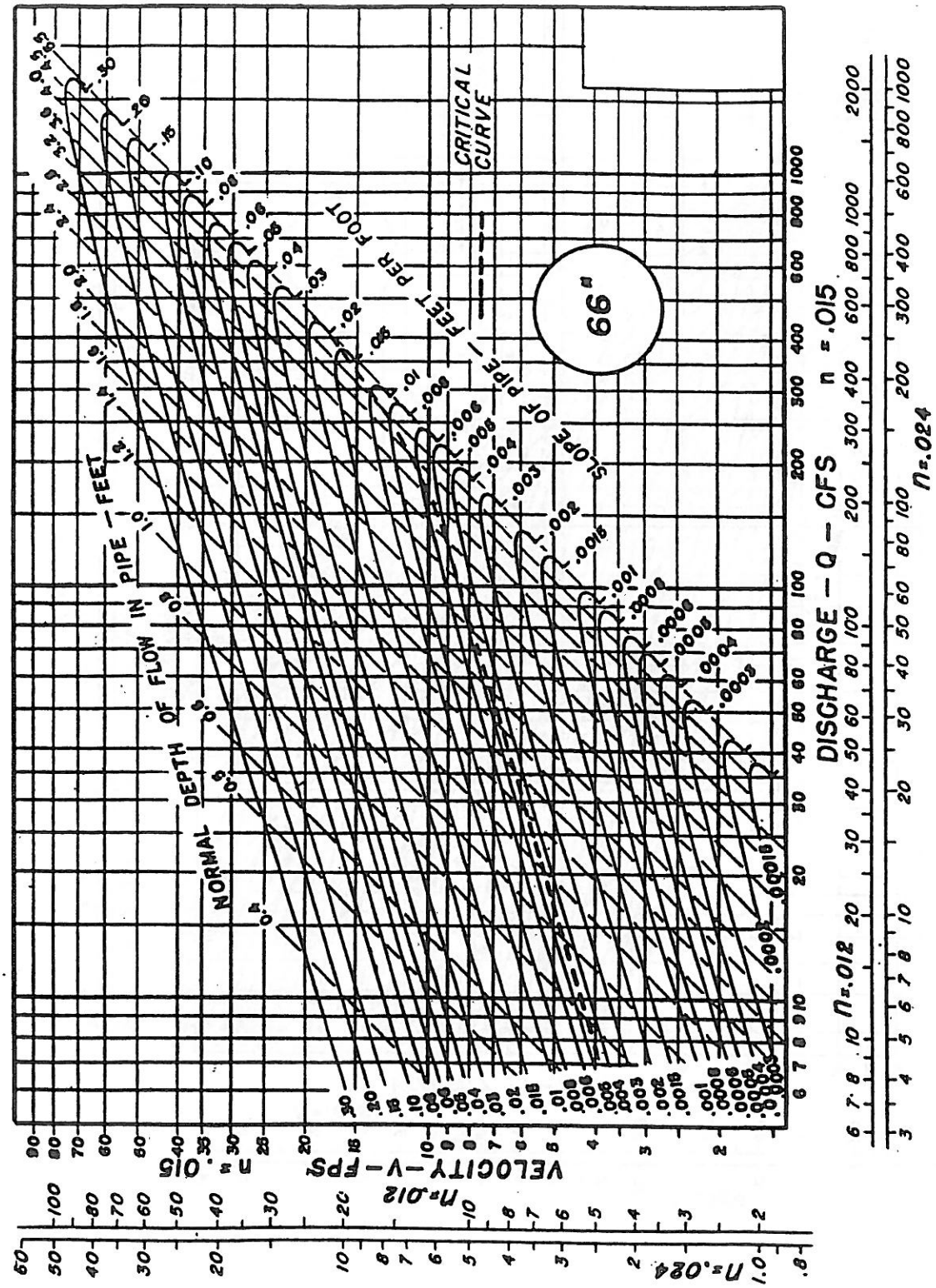
Arkansas

PIPE FLOW CHART
60 INCH DIAMETER

Figure 3.23



City of
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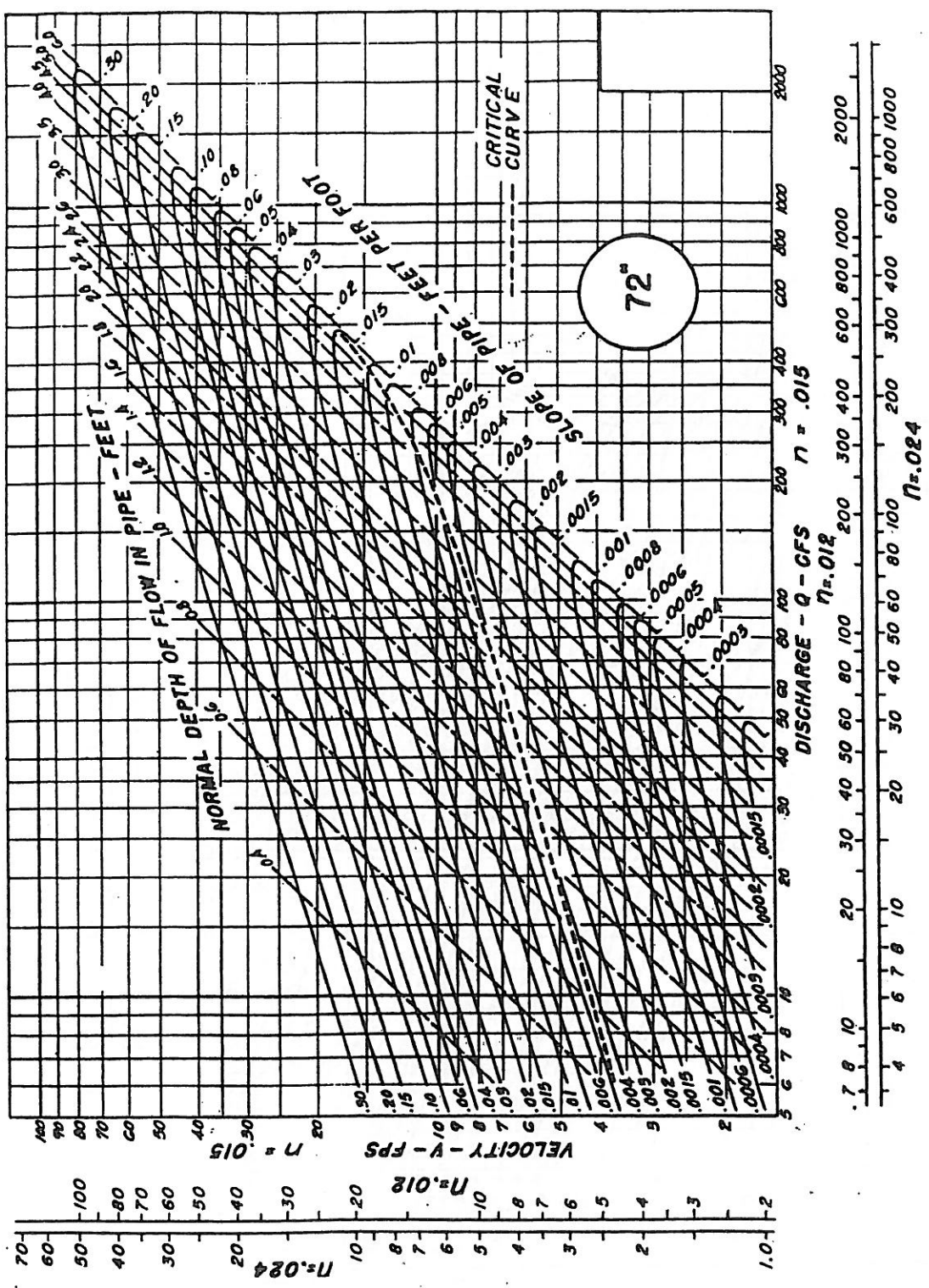
Arkansas

PIPE FLOW CHART
66 INCH DIAMETER

Figure 3.24



City of
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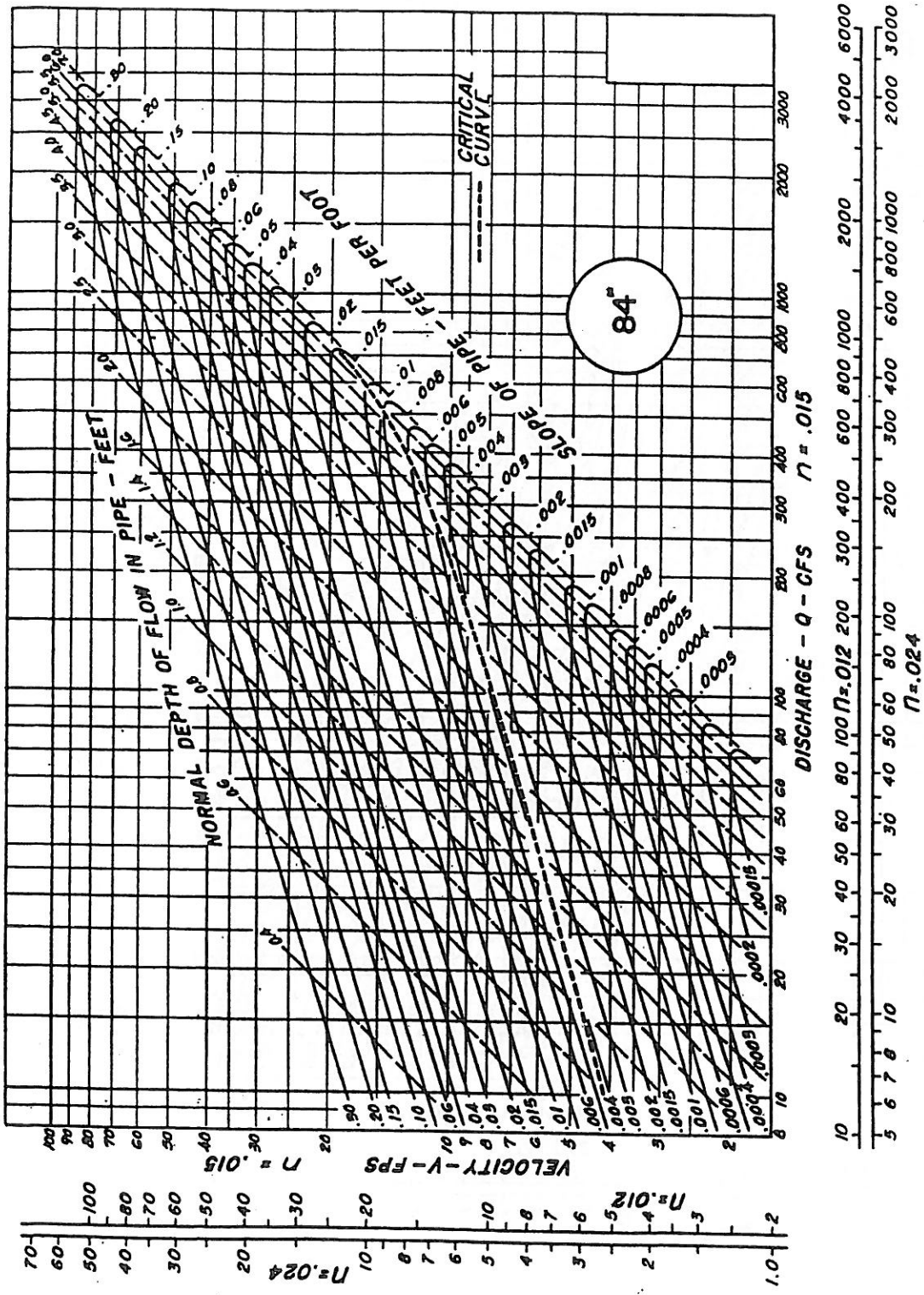
Arkansas

PIPE FLOW CHART
72 INCH DIAMETER

Figure 3.25



City of
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Arkansas

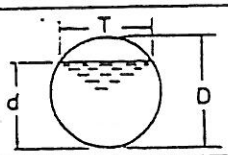
PIPE FLOW CHART
84 INCH DIAMETER

Figure 3.26

Hydraulic Properties of Circular Conduits Flowing Partly Full

d = Depth of flow
d_c = Critical depth
d_m = Mean depth

D = Diameter of pipe
A = Area of flow
R = Hydraulic radius
T = Top width of flow

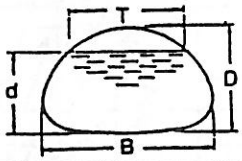


$\frac{d}{D}$ or $\frac{d_c}{D}$	$\frac{A}{D^2}$	$\frac{R}{D}$	$\frac{T}{D}$	$\frac{d_m}{D}$
1.00	0.7854	0.2500	—	—
0.95	0.7707	0.2865	0.4359	1.7681
0.90	0.7445	0.2980	0.6000	1.2408
0.85	0.7115	0.3033	0.7142	0.9962
0.80	0.6736	0.3042	0.8000	0.8420
0.75	0.6319	0.3017	0.8660	0.7297
0.70	0.5872	0.2962	0.9165	0.6407
0.65	0.5404	0.2882	0.9539	0.5665
0.60	0.4920	0.2776	0.9798	0.5021
0.55	0.4426	0.2649	0.9950	0.4448
0.50	0.3927	0.2500	1.0000	0.3927
0.45	0.3428	0.2331	0.9950	0.3445
.040	0.2934	0.2142	0.9798	0.2994
0.35	0.2450	0.1935	0.9539	0.2568
0.30	0.1982	0.1709	0.9165	0.2163
0.25	0.1535	0.1466	0.8660	0.1773
0.20	0.1118	0.1206	0.8000	0.1397
0.15	0.0739	0.0929	0.7142	0.1035

Hydraulic Properties of Pipe Arch Conduits Flowing Partly Full

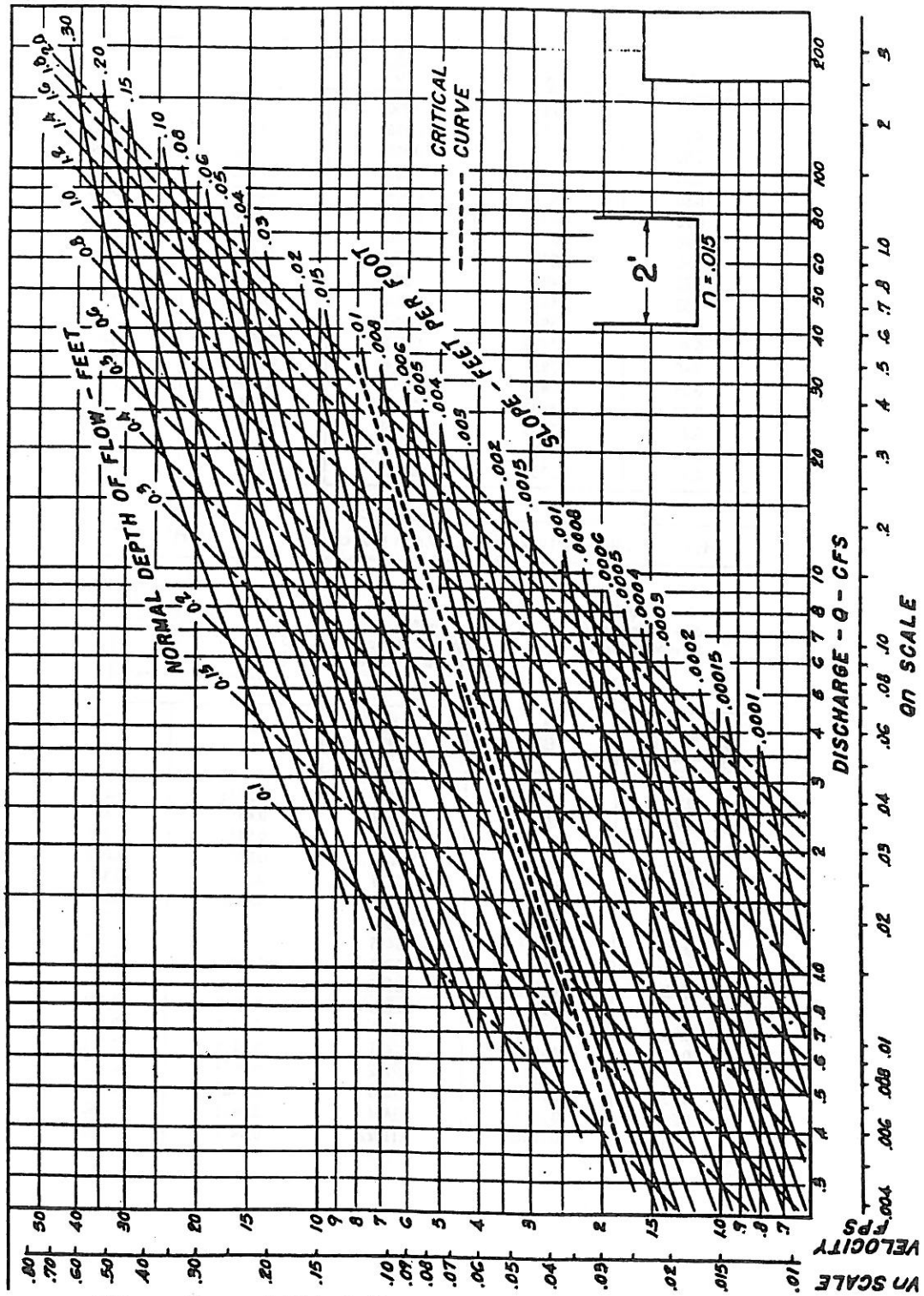
d = Depth of flow
d_c = Critical depth
d_m = Mean depth

D = Diameter of pipe
A = Area of flow
R = Hydraulic radius
T = Top width of flow



$\frac{d}{D}$ or $\frac{d_c}{D}$	$\frac{A}{BD}$	$\frac{R}{D}$	$\frac{T}{D}$	$\frac{d_m}{D}$
1.00	0.7879	0.2991	—	—
0.95	0.7762	0.3408	0.3489	2.225
0.90	0.7552	0.3549	0.4855	1.555
0.85	0.7283	0.3622	0.5848	1.245
0.80	0.6970	0.3649	0.6637	1.0503
0.75	0.6621	0.3639	0.7288	0.9085
0.70	0.6243	0.3595	0.7837	0.7966
0.65	0.5839	0.3520	0.8303	0.7033
0.60	0.5414	0.3415	0.8700	0.6223
0.55	0.4970	0.3282	0.9037	0.5500
0.50	0.4511	0.3120	0.9320	0.4840
0.45	0.4039	0.2928	0.9555	0.4227
0.40	0.3556	0.2705	0.9755	0.3616
0.35	0.3065	0.2451	0.9889	0.3100
0.30	0.2568	0.2162	0.9967	0.2577
0.25	0.2069	0.1839	0.9967	0.2076
0.20	0.1574	0.1484	0.9815	0.1603
0.15	0.10908	0.11022	0.9477	0.11505

Hydraulic Properties of Circular Conduits Flowing Partly Full
Hydraulic Properties of Pipe Arch Conduits Flowing Partly Full

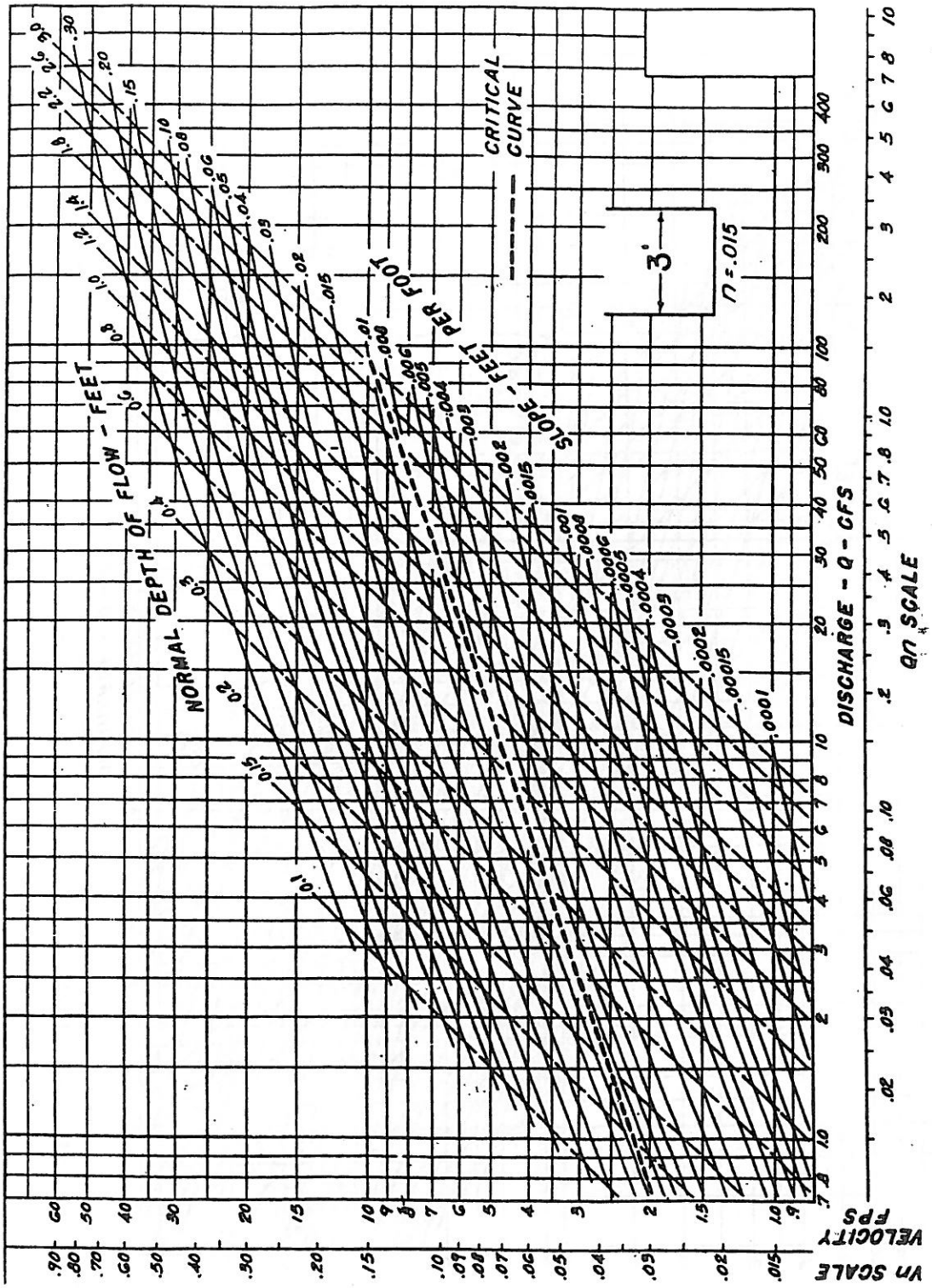


Source: Figures 3.28 to 3.41
U.S. Department of Transportation
Federal Highway Administration
Design Charts for Open Channel Flow

City of
SPRINGDALE
Arkansas

CHANNEL CHART
VERTICAL b = 2 Ft.

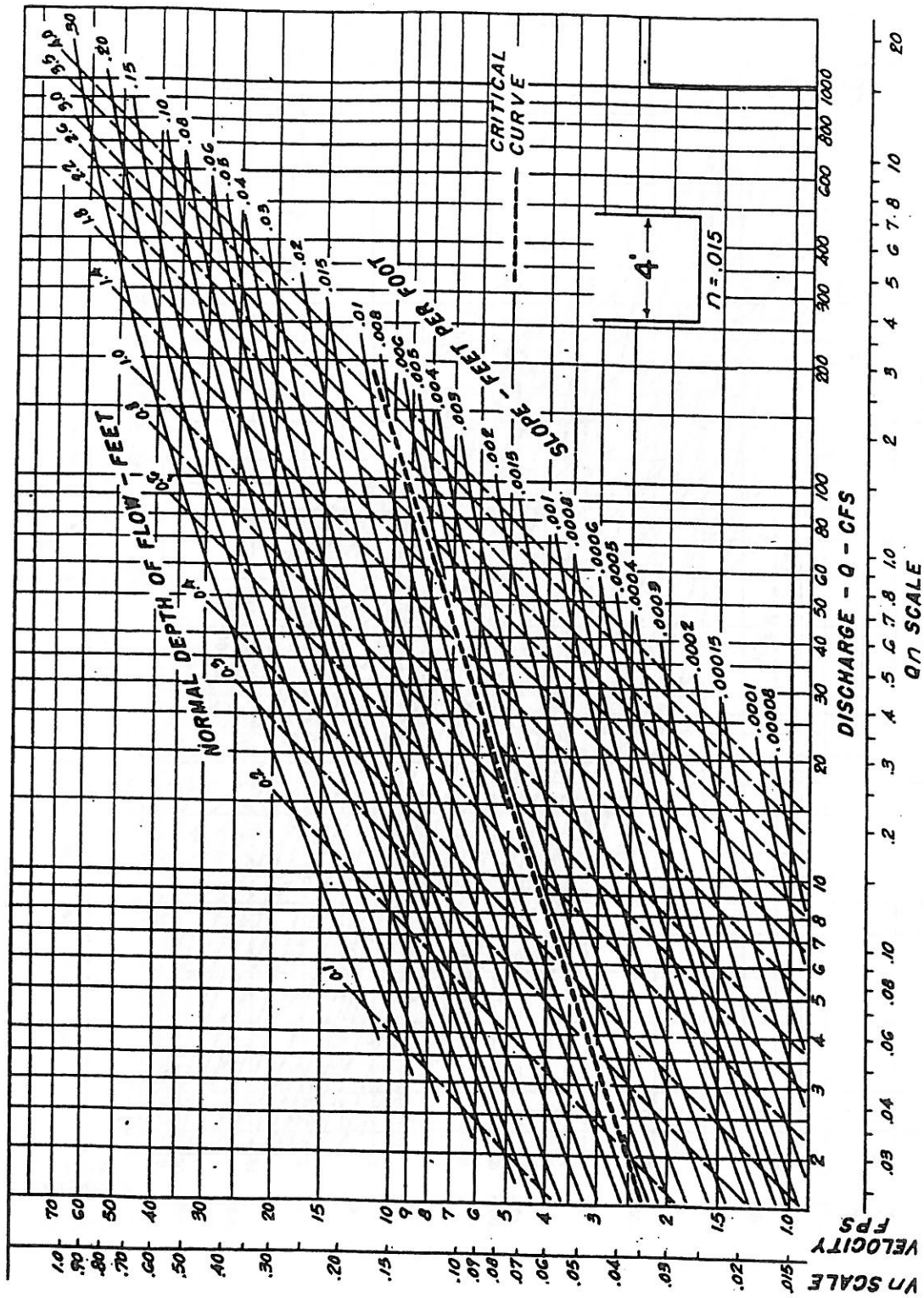
Figure 3.28



City of
SPRINGDALE
Arkansas

CHANNEL CHART
VERTICAL b = 3 Ft.

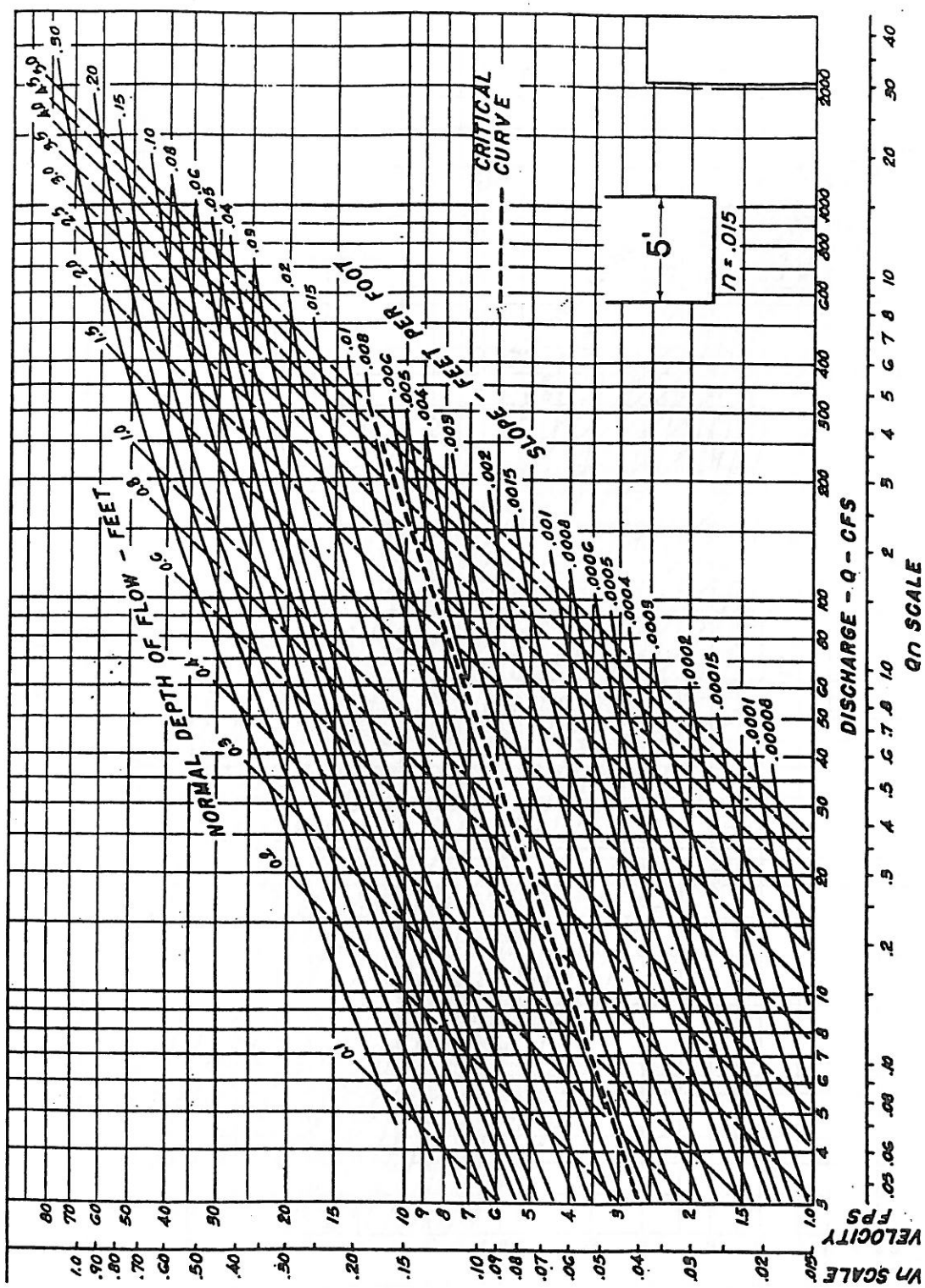
Figure 3.29



City of
SPRINGDALE
Arkansas

CHANNEL CHART
VERTICAL b = 4 Ft.

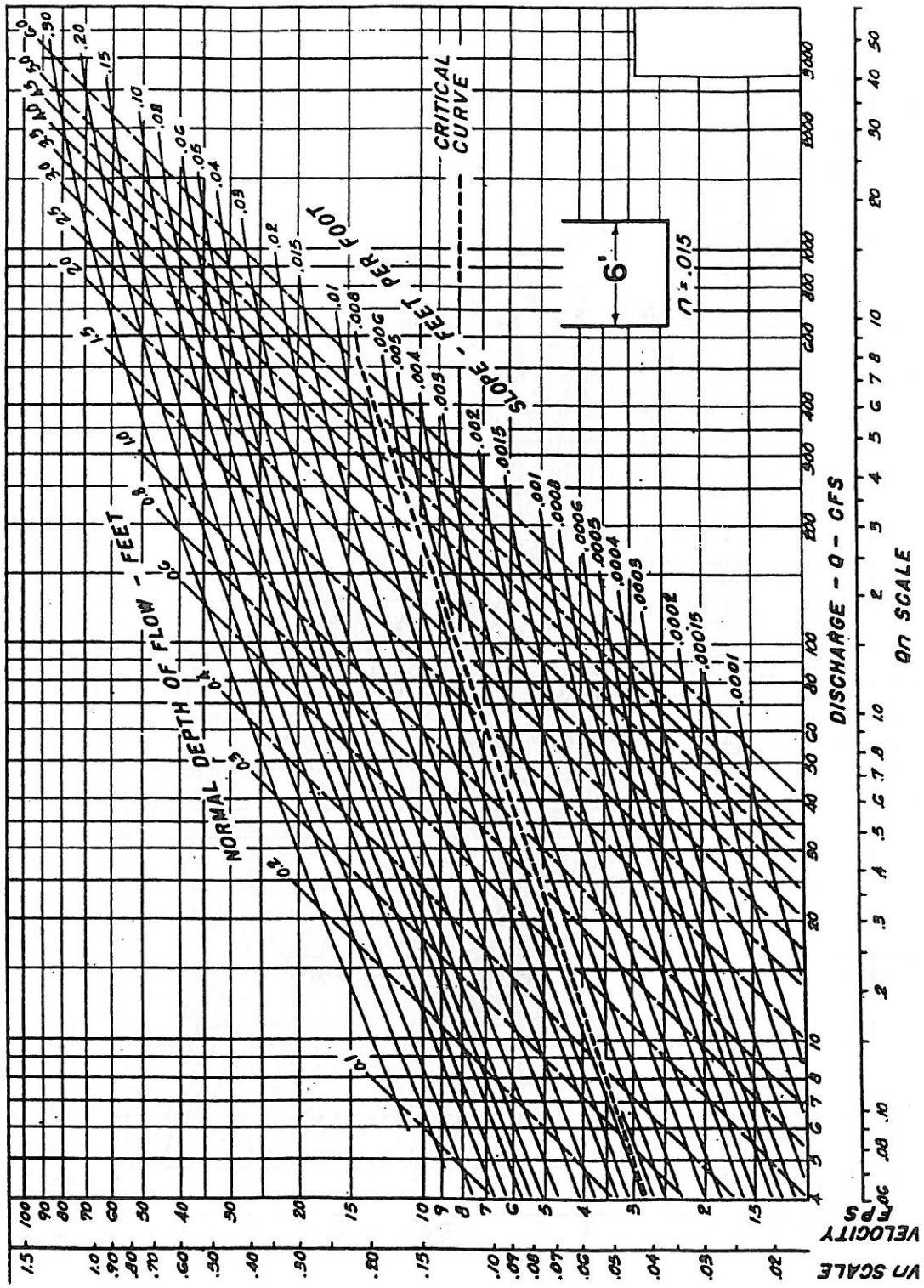
Figure 3.30



City of
SPRINGDALE
Arkansas

CHANNEL CHART
VERTICAL b = 5 Ft.

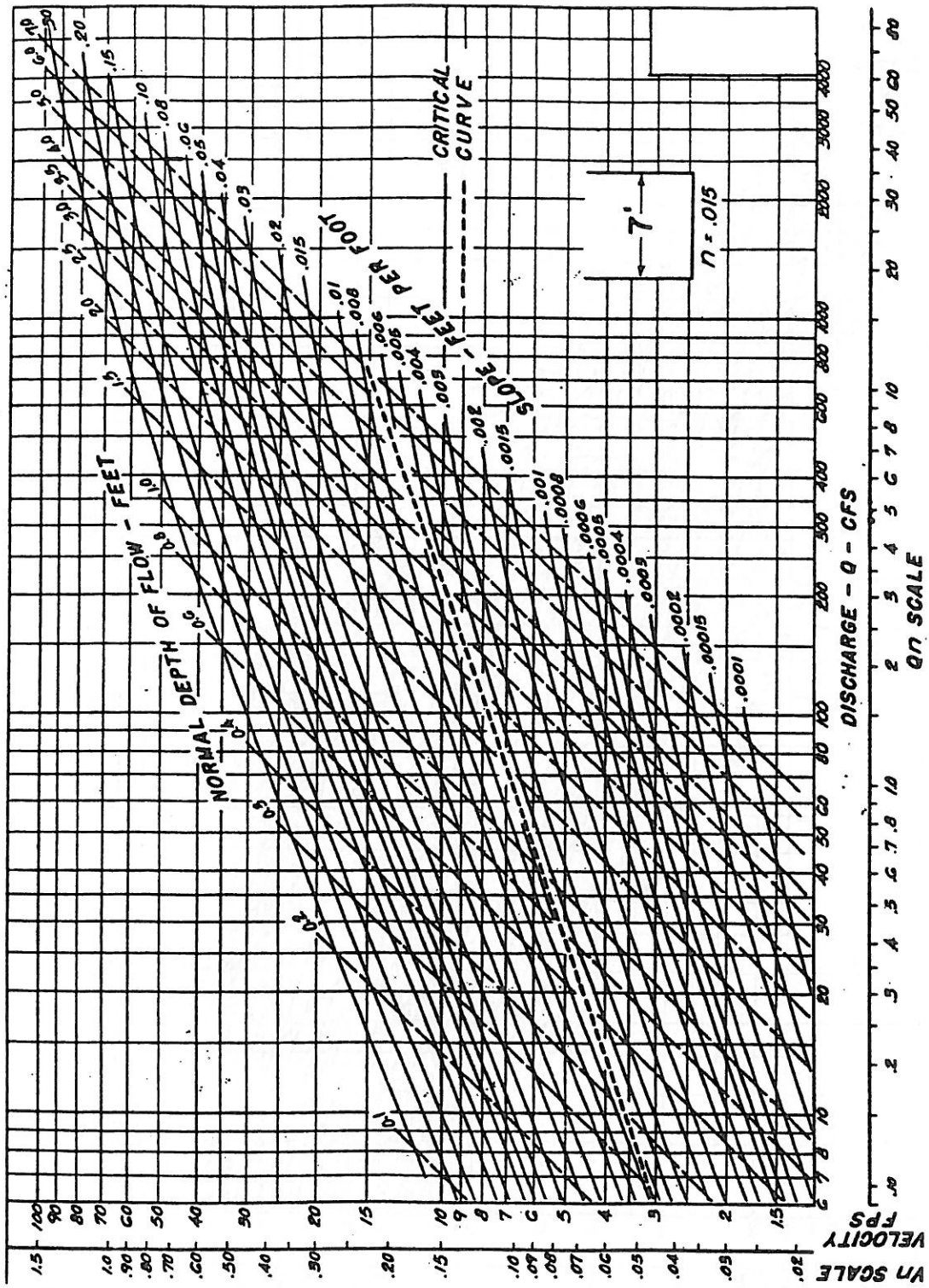
Figure 3.31



City of
SPRINGDALE
Arkansas

CHANNEL CHART
VERTICAL b = 6 Ft.

Figure 3.32



City of
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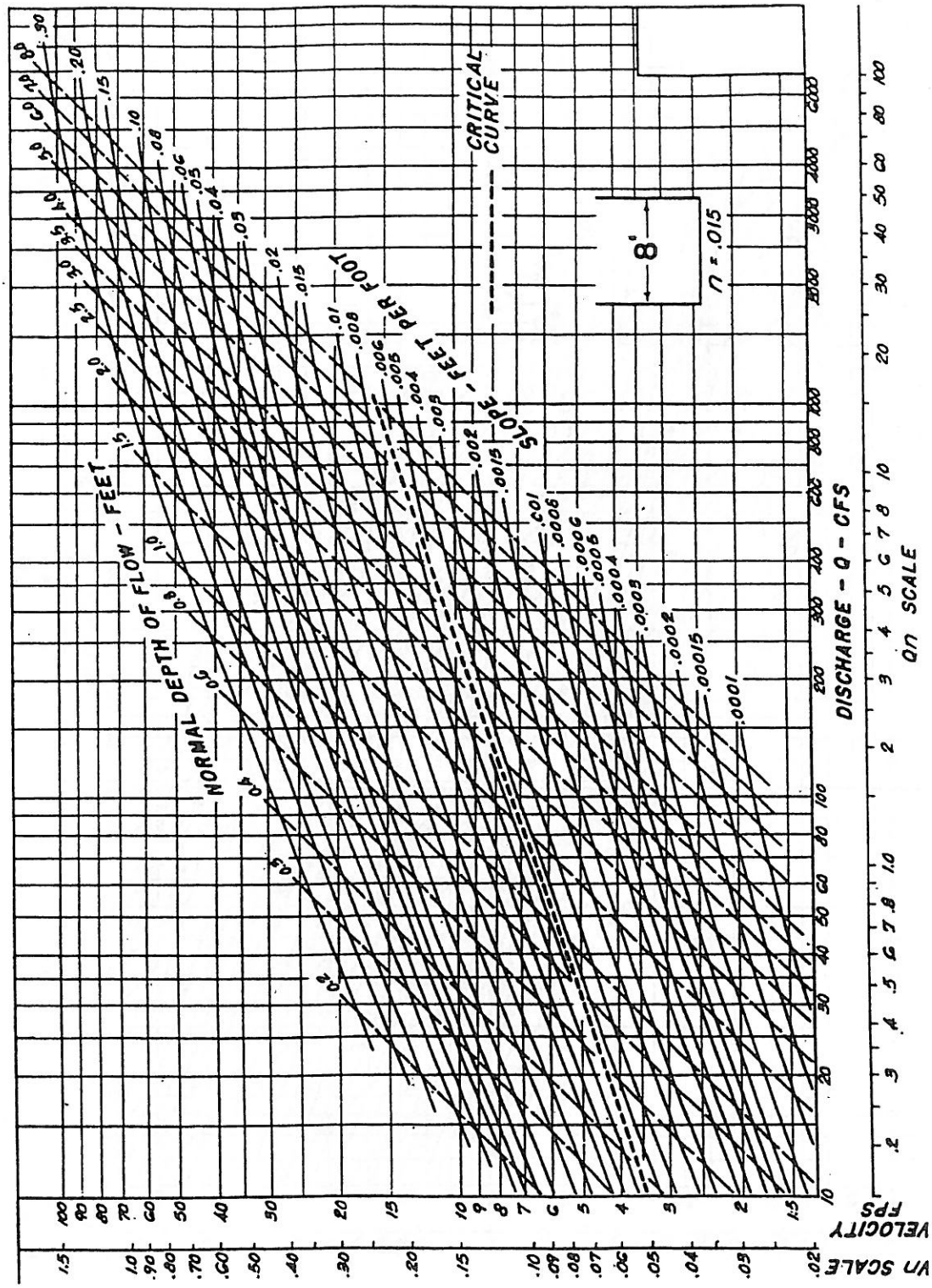
Arkansas

CHANNEL CHART
VERTICAL b = 7 Ft.

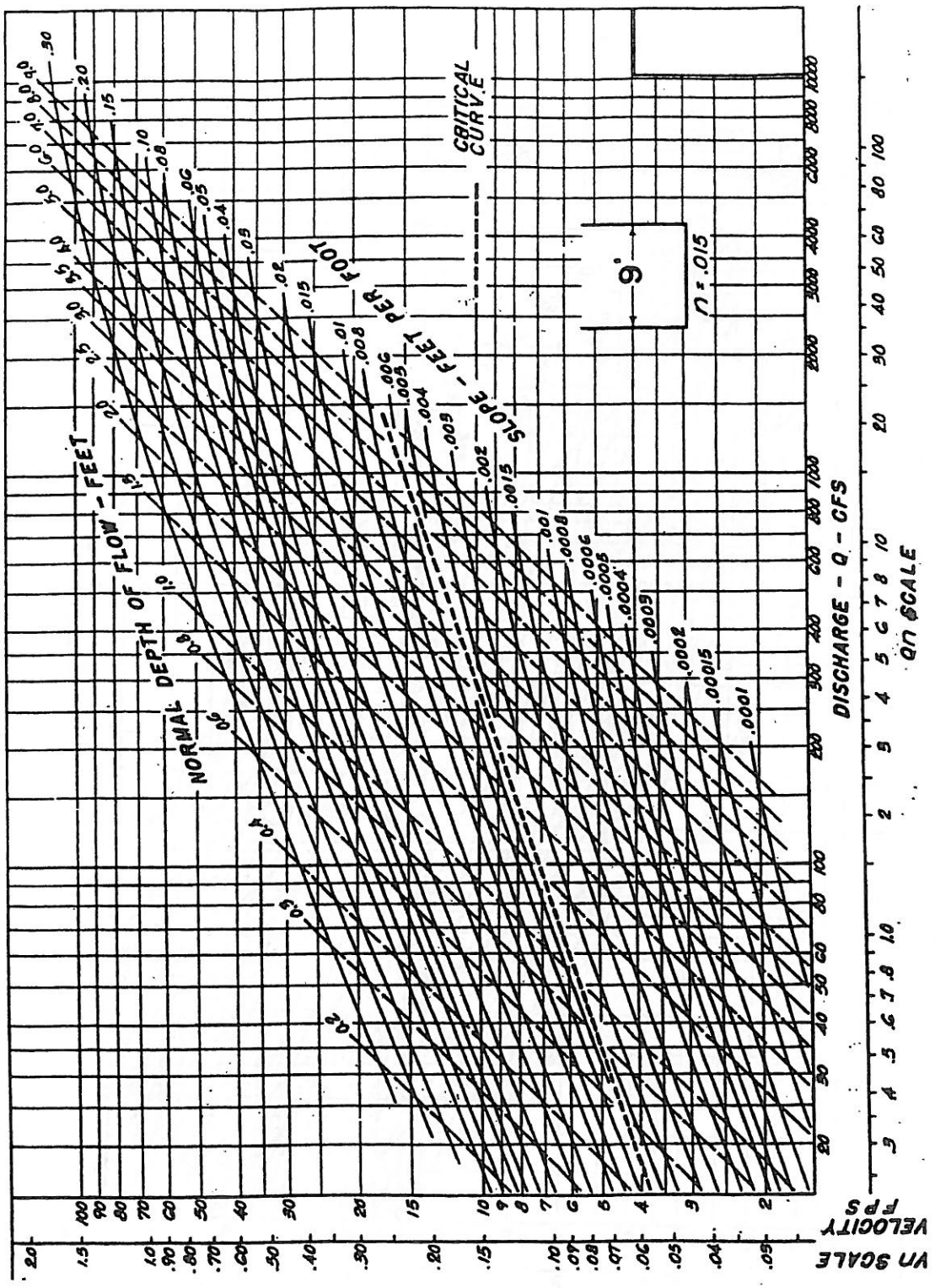
Figure 3.33



City of
SPRINGDALE
Arkansas

CHANNEL CHART
VERTICAL b = 8 Ft.

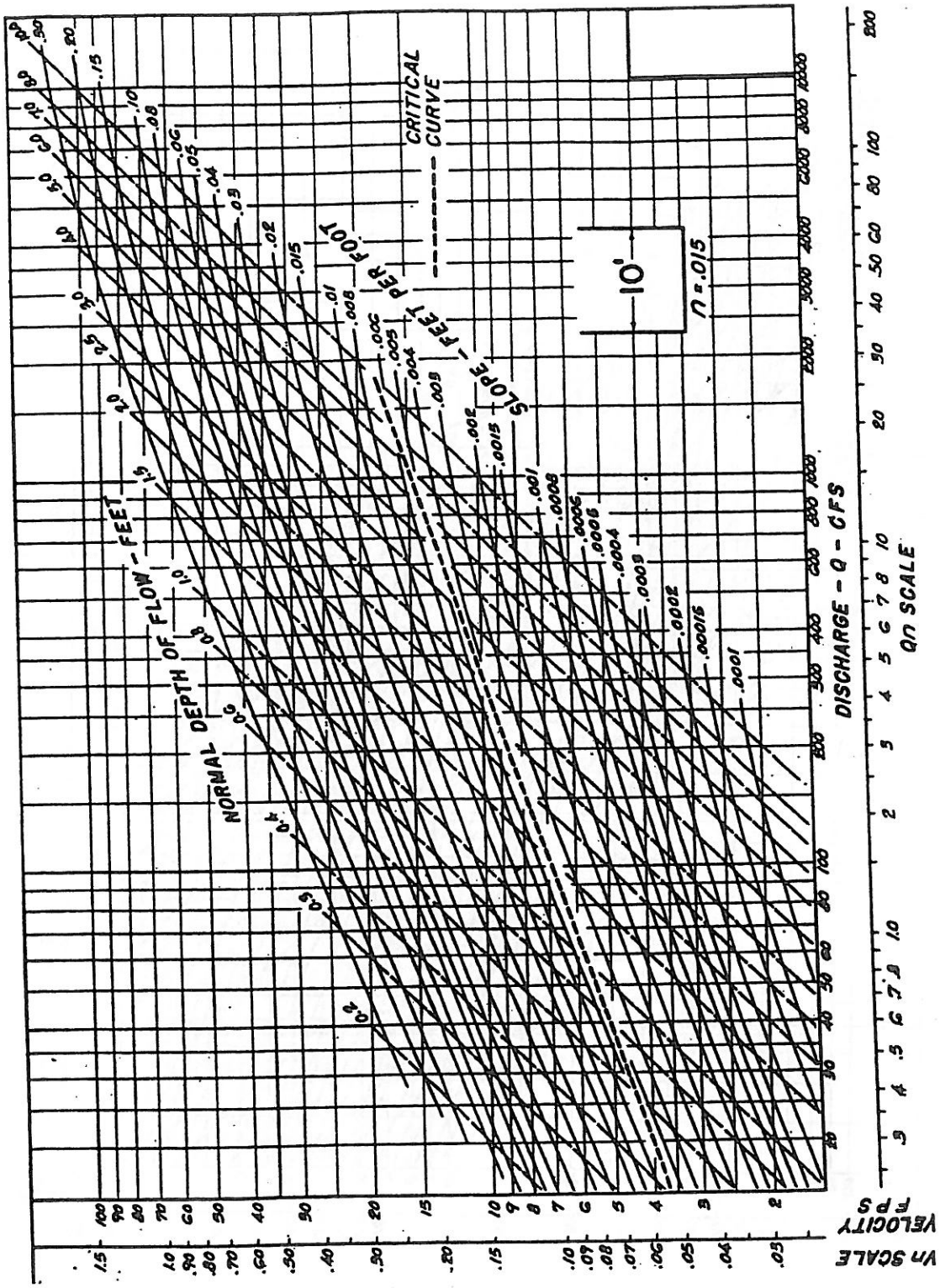
Figure 3.34



City of
SPRINGDALE
Arkansas

CHANNEL CHART
VERTICAL b = 9 Ft.

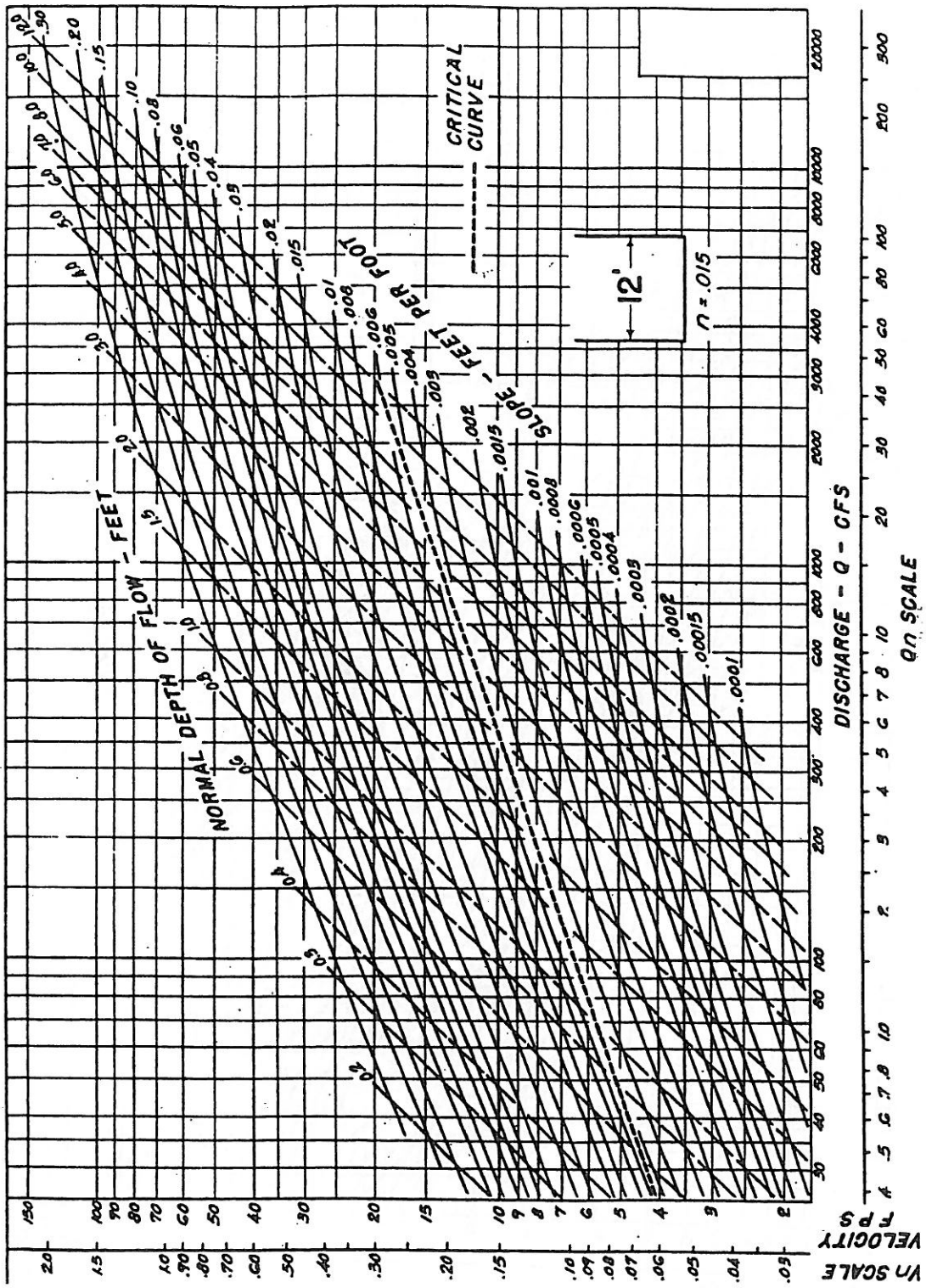
Figure 3.35



City of
SPRINGDALE
Arkansas

CHANNEL CHART
VERTICAL b = 10 Ft.

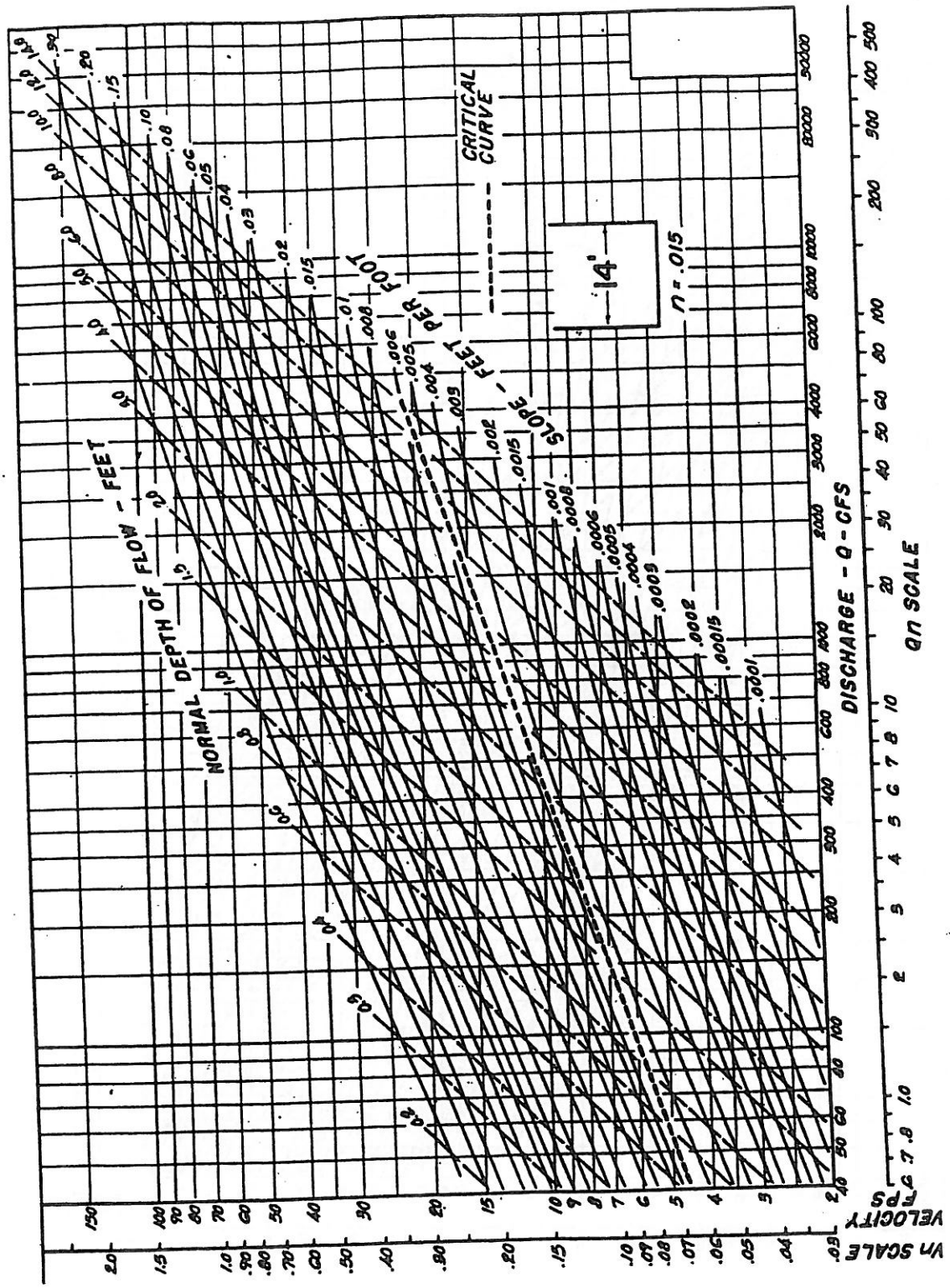
Figure 3.36



City of
SPRINGDALE
Arkansas

CHANNEL CHART
VERTICAL b = 12 Ft.

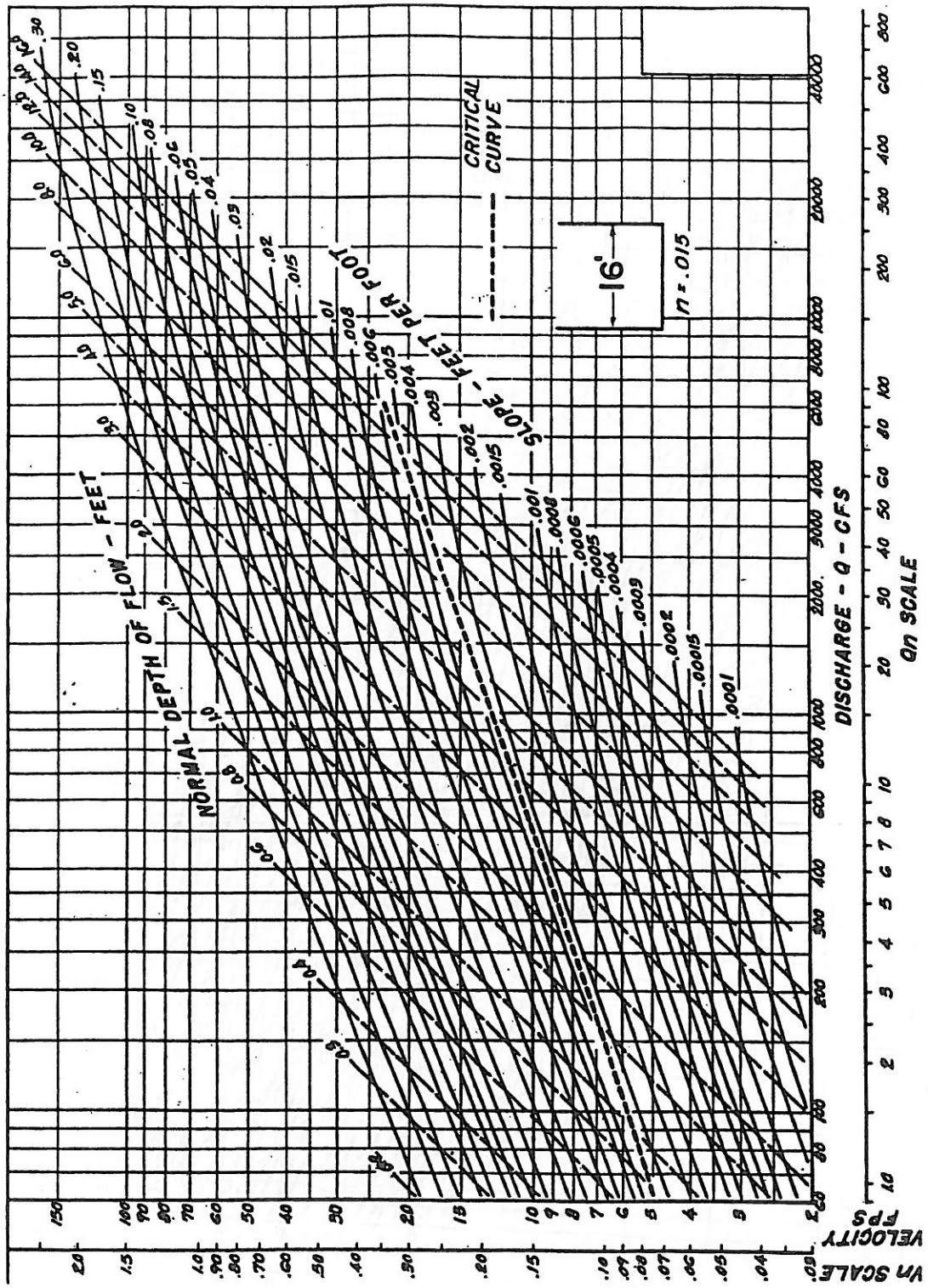
Figure 3.37



City of
SPRINGDALE
Arkansas

CHANNEL CHART
VERTICAL b = 14 Ft.

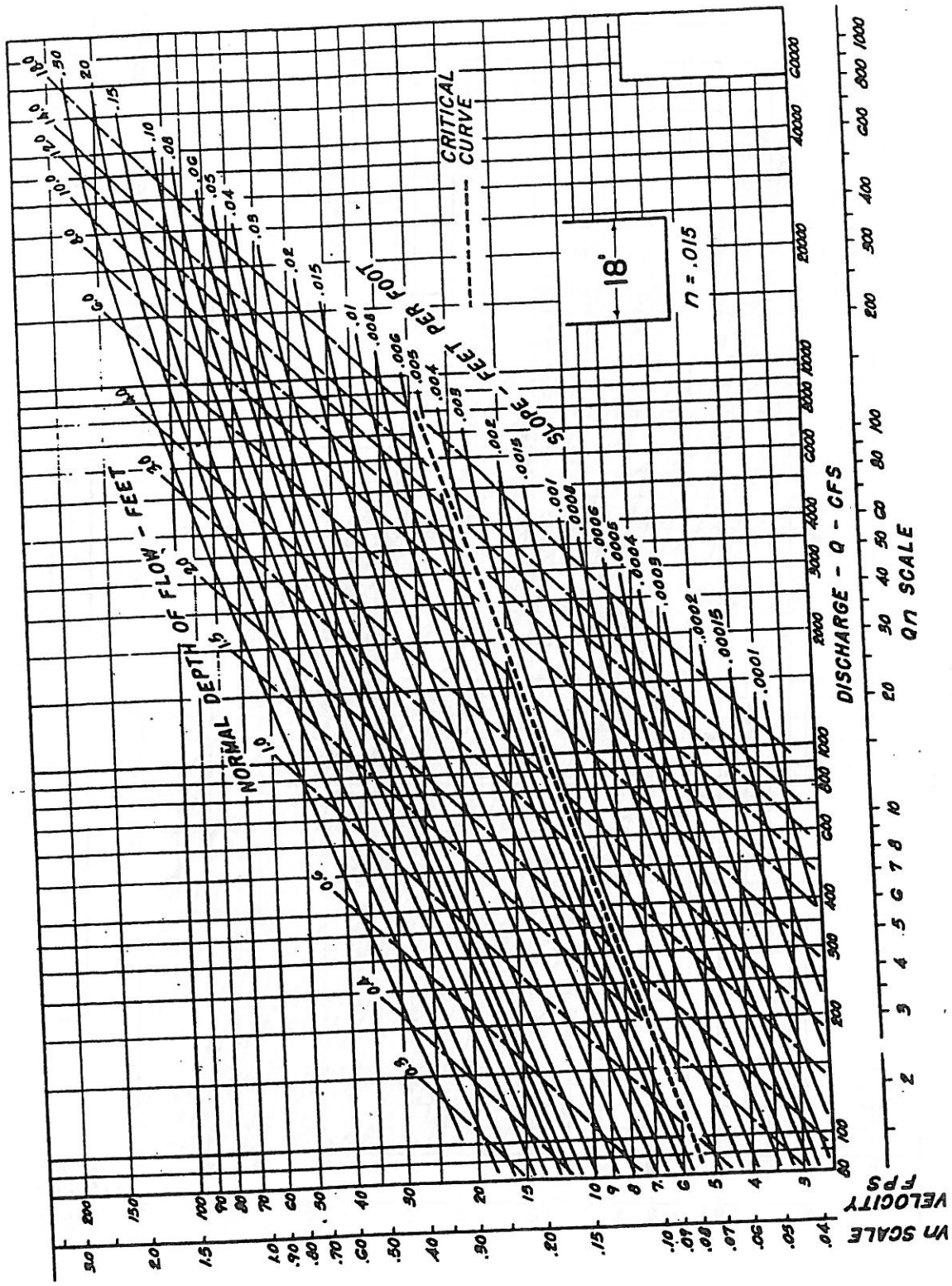
Figure 3.38



City of
SPRINGDALE
Arkansas

CHANNEL CHART
VERTICAL b = 16 Ft.

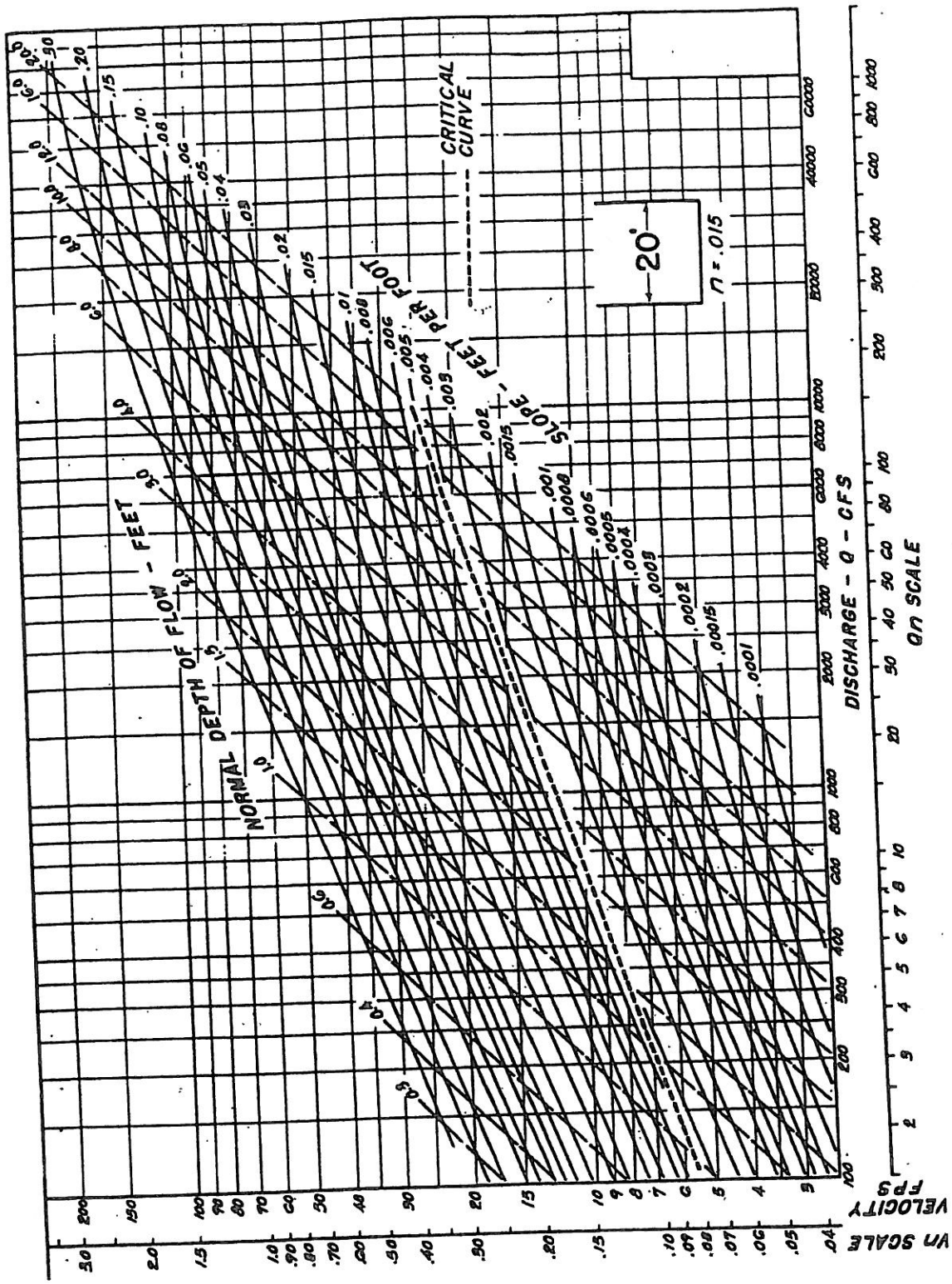
Figure 3.39



City of
SPRINGDALE
Arkansas

CHANNEL CHART
VERTICAL b = 18 Ft.

Figure 3.40



City of
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Arkansas

CHANNEL CHART
VERTICAL b = 20 Ft.

Figure 3.