

SCANNED

November 21, 1984

Dept. of Engineering
City Hall- Seventh Floor
455 North Main Street
Wichita, Ks. 67202

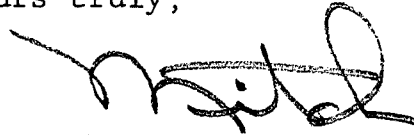
Subject: Encroachment Plan-
Davis Moore 3rd Addn.

Attn: Mr. Chris Breitenstein

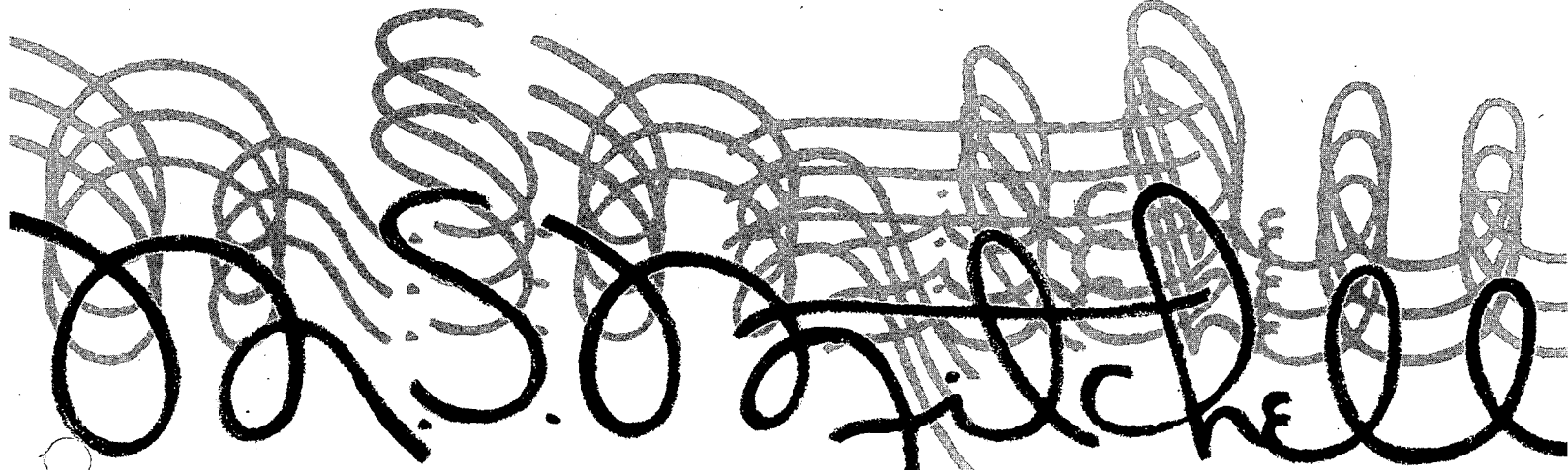
Dear Chris:

This letter transmits my report on establishing a new location and width of floodway for West Branch of Dry Creek in connection with subject plat. The report calculations show that a 60 foot wide floodway, part of which is shown on the plat, is adequate to pass the 100 year discharge assigned to West Branch at or below the elevations contained in the City of Wichita Flood Insurance Study. Please review the report and let me know if you wish to discuss it further.

Yours truly,



enc.
MSM/e



M. S. Mitchell
Flood Plain Management & Land Development Specialist
1215 Forest • Wichita, KS. 67203
(316) 265-9812

West Branch of Dry Creek
 Floodway Encroachment Plan
 For Davis-Moore 3rd Addition

Research of past flood studies for Dry Creek downstream from Kellogg was of little value in determining a reasonable floodway width for either branch in the reach between Orme and Kellogg. Each draft of the Flood Insurance Study (USGS version circa 1980, Review Contractor version circa Oct. 1983 and Review Contractor version circa Aug. 1984) has credited a Corps of Engineers "Flood Plain Information Report for Sedgwick County, Kansas-1973" (Their reference 7) with establishing 100 year and 500 year discharge values for the East and West Branches of Dry Creek. I have made telephone inquiries to the Tulsa District Office of the Corps; to the USGS office at Lawrence, Kansas and to the FEMA Review Contractor and none of them have any record that such a report was ever made. To further confuse the matter, Page 9 of the Aug. 1984 draft FIS lists Dry Creek as one of the streams where flood frequency values were determined by the SCS TR-20 hydrology computer model. A summary of Dry Creek discharges from the available reports is tabulated below

Report	Location	Drainage Area	Discharge (CFS)			
			10 yr	50 yr	100 yr	500 yr
COE-1976	Pinecrest-RM 4.6 (also Kellogg)	1.4			5150	7300
USGS 1980	East Br @ Orme	1.27	1700*	2250*	2550*	3650*
USGS 1980	West Br @ Orme	1.44	1100	1800	2000	2350
G&O 1983						
& 1984	East Br @ Orme	1.53	1700*	2250*	2550*	3650*
G&O 1983						
& 1984	West Br @ Orme	1.27	1100*	1800*	2000*	2800*

* From COE published flood frequency data (Reference 7)

It is obvious that the discharges used by USGS and G&O for the Wichita FIS did not come from the Corps 1976 report and telephone inquiries to the agencies responsible for the reports mentioned have done nothing to clear up the questions. G&O says that all FIS data on Dry Creek was taken directly from USGS which USGS says was taken from the Corps; however G&O used 6 Sections from Lincoln to Kellogg while the Corps and USGS used only two, --and those at locations different from any of the G&O Sections. The Corps has provided no water surface profile calculations for West Branch of Dry Creek, but then neither have USGS nor G&O. When the Regulatory Floodway location and width for Dry Creek between Orme and Kellogg shown on Panel 30 for each of the three Flood Insurance Studies are compared it is obvious that while significant revisions have been made to the RF boundaries downstream of Orme and upstream of Kellogg, nothing has changed between Orme and Kellogg. Without benefit of cross-sections to accurately define the Regulatory Floodway it widens from 60 feet south of Orme to 600 feet at its confluence halfway between Orme and Kellogg. The West Branch RF from that point to Kellogg measures 150-170 feet in width, but upstream from Kellogg is reduced to 135 feet at Section A. The East Branch RF measures 400 feet at the confluence and 370 feet at a point 50 feet downstream of Kellogg where it mysteriously disappears. The first published Section for the East Branch RF (after it reappears near English) lists the RF width as 62 feet.

From the above it appears that a more reasonable approach to locating and establishing a width for the RF on both branches of Dry Creek is in order. Although the source is still in question, the 100 year discharges for West Branch (2000cfs) and East Branch (2550cfs) are used in each of the FIS reports and seem to be reasonable. The proposed Floodway for West Branch was analysed by the HEC-2 Water Surface Profile method starting at a surveyed cross-section of the Main Branch at the location of FIS Section Z

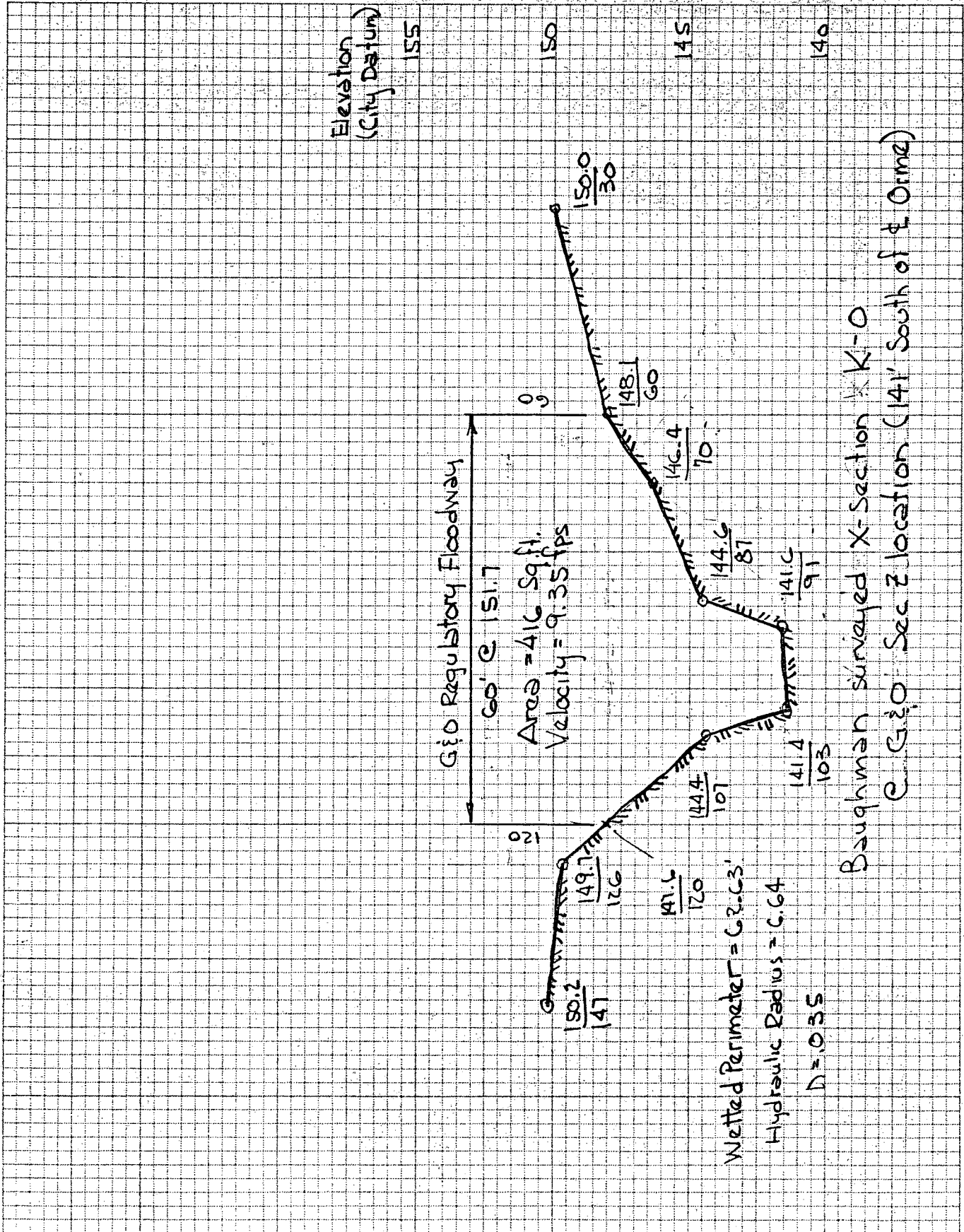
(scaled from Panel 30 to be 141 Feet south of the centerline of Orme) and continuing thru four surveyed sections on West Branch to Kellogg. At Kellogg, the head loss for full flow thru the 3- 9x4 RCBC was calculated and added to the head required for the weir flow crossing Kellogg to obtain the elevation for tying this analysis in to the FIS Section A (scaled from Panel 30 to be 250' upstream from Kellogg).

The geometric model for the West Branch analysis is on a 1"=30' scale topo map by Baughman Co., each section is plotted on a separate page and calculated section properties noted and the water surface profile calculations are shown on the HEC-2 program form. Results of those calculations show that a 60 foot wide floodway will accomodate the 100 year discharge of 2000cfs on West Branch at, or slightly below the elevation shown on FIS Profile 05P. A separate profile at expanded scale is provided for the reach from Section Z to Sec. A.

West Branch of Dry Creek - Floodway Plan

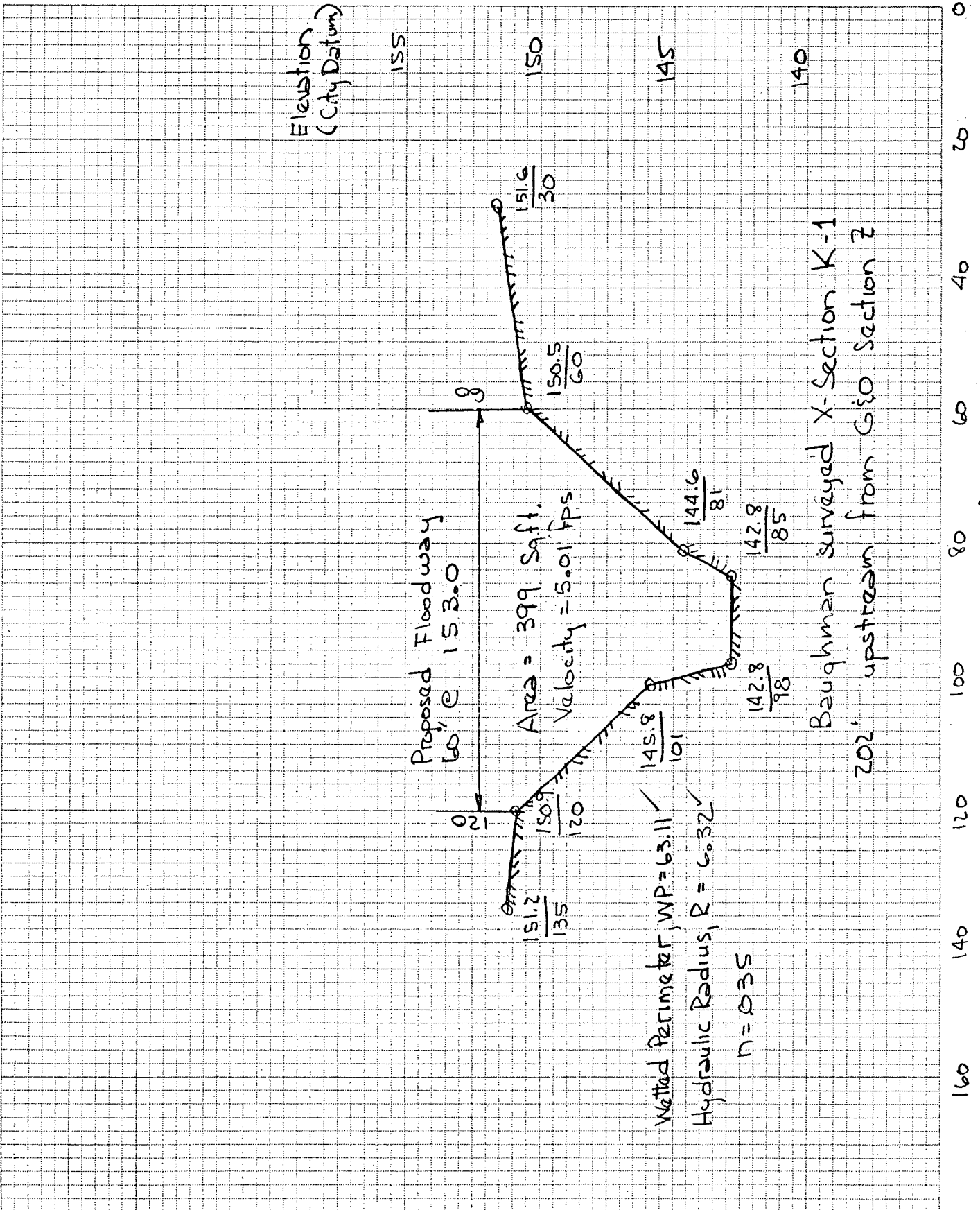
DATE Oct 24, 1984 PAGE 1 of 9

For Davis Moore 3rd Addition



West Branch of Dry Creek - Floodway Plan For Davis Moore 3rd Addition

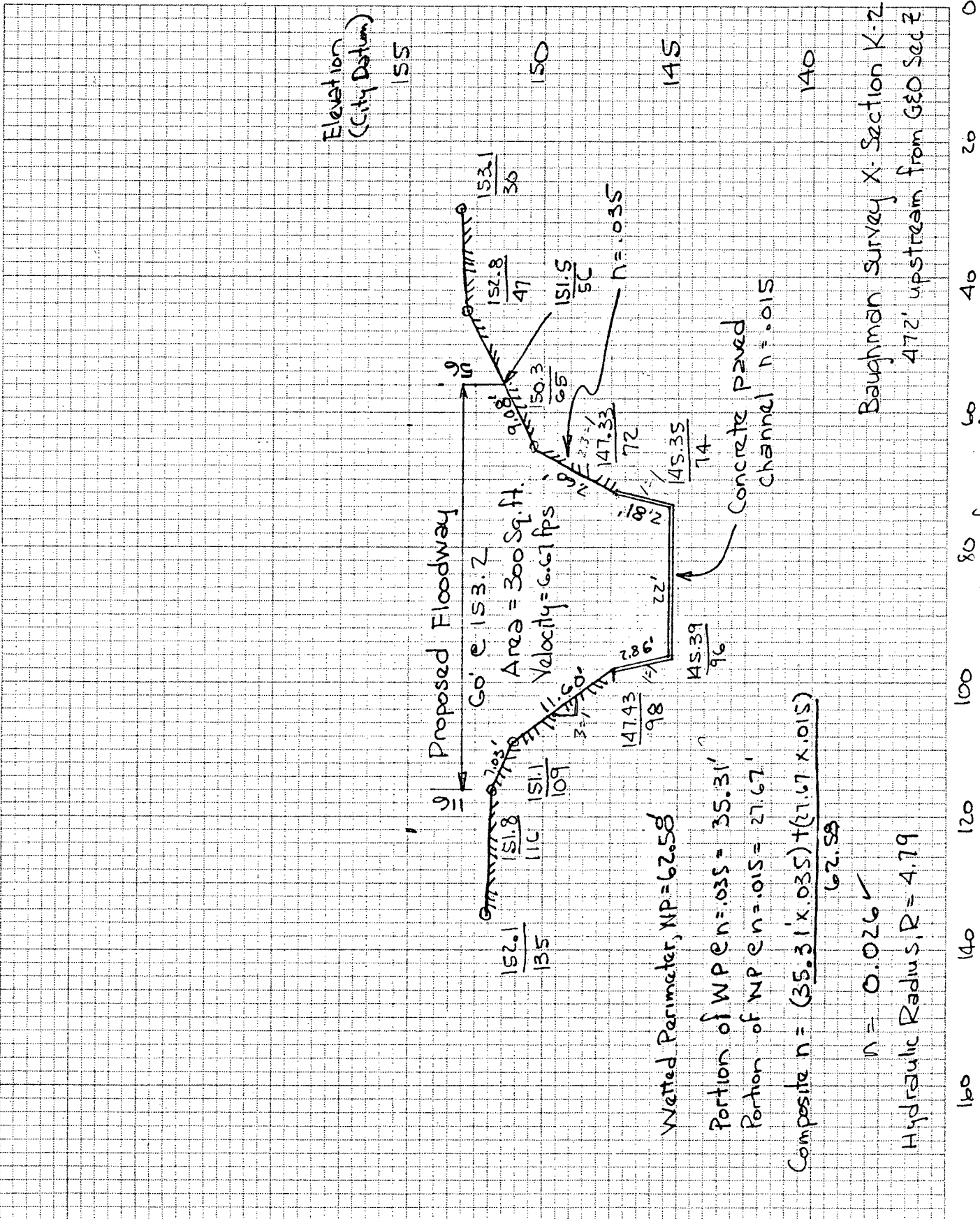
DATE Oct 24, 1984 PAGE 2 of 9



West Branch of Dry Creek - Floodway Plan

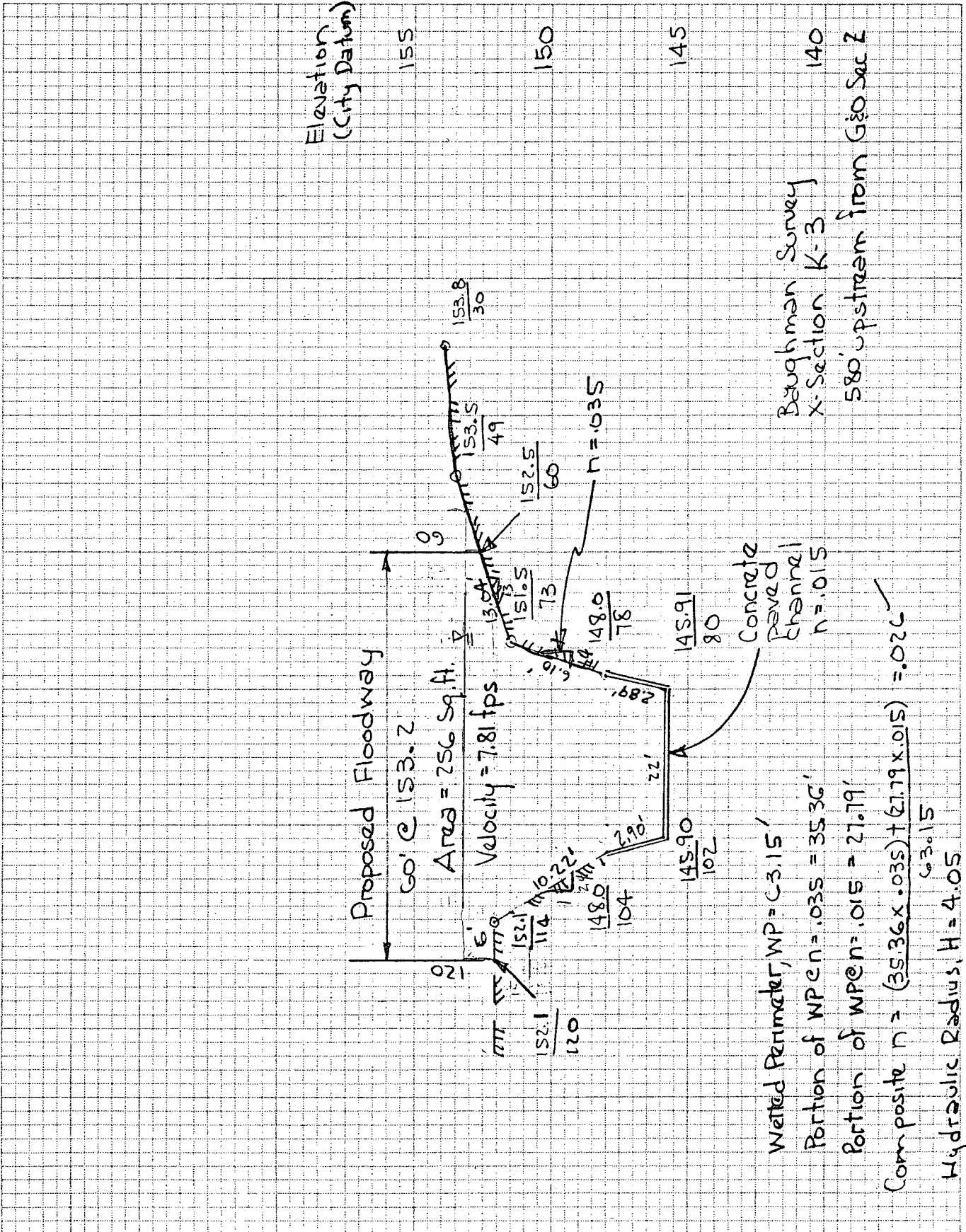
For Davis Moore 3rd Addition

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West Branch of Dry Creek - Floodway Plan For Davis Moore 3rd Addition

DATE Oct 25, 1984 PAGE 4 of 9

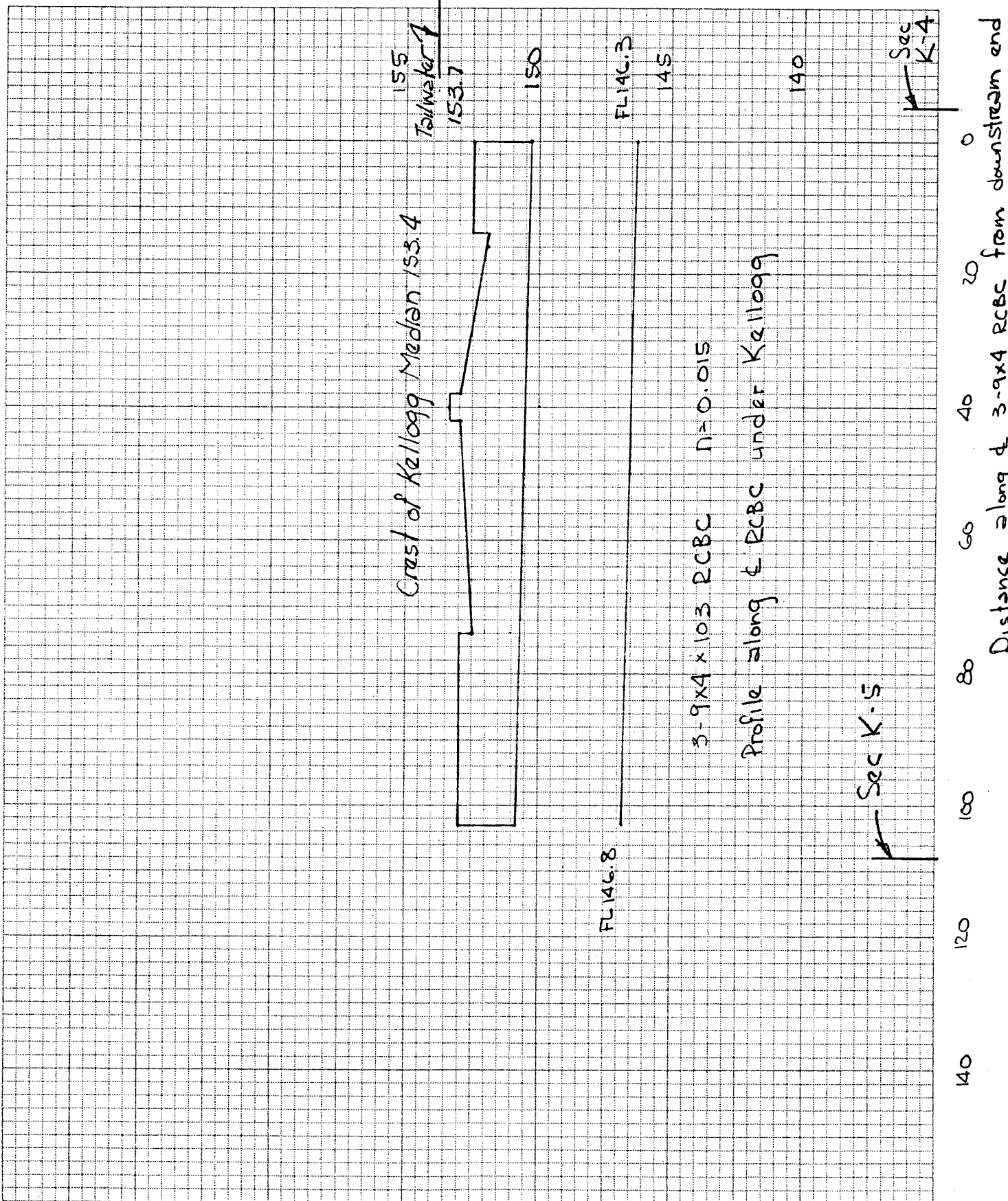


Distance from left bank zero point - See Model

West Branch of Dry Creek - Encroachment Plan

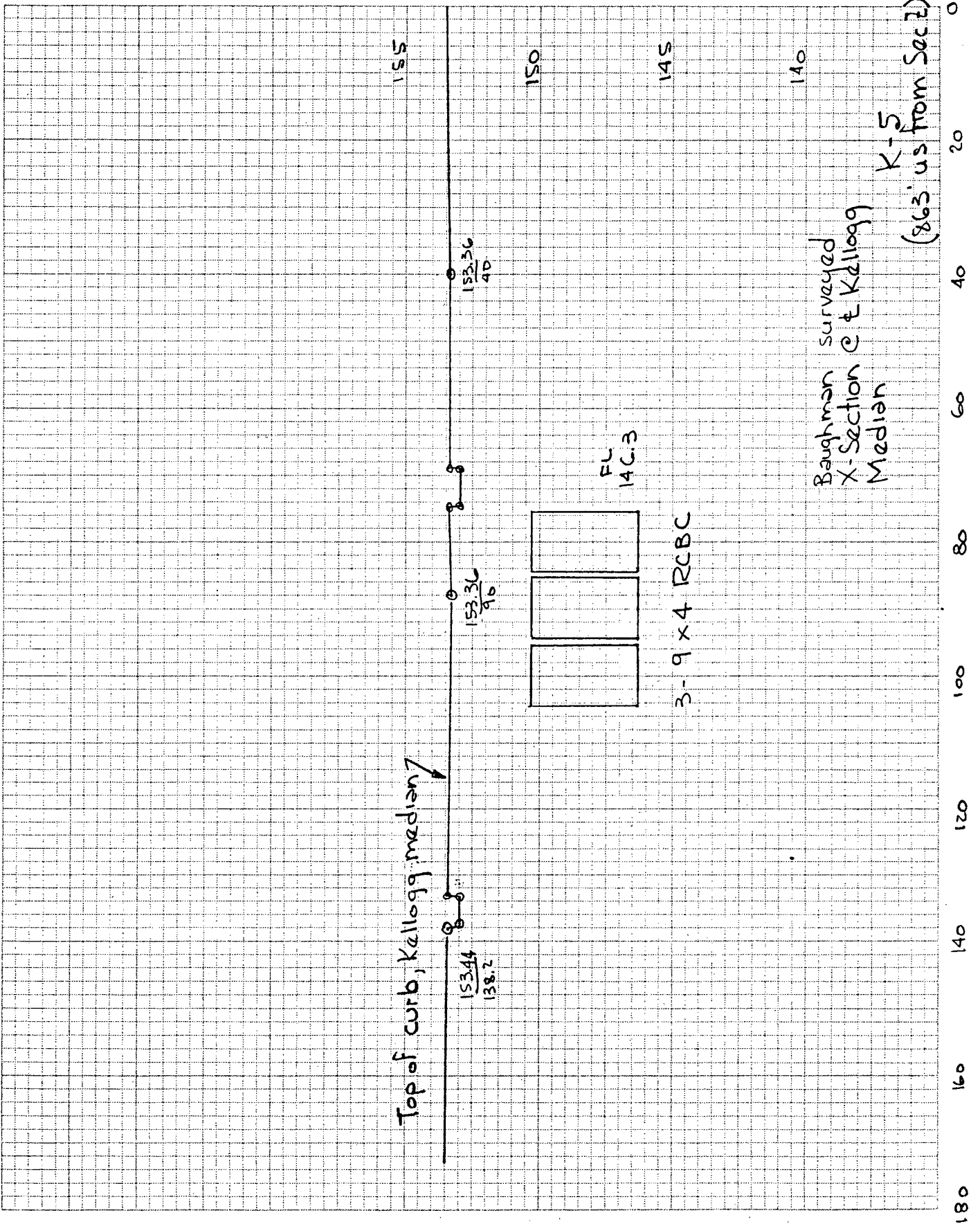
DATE Nov 21, 1984 PAGE 6 of 9

for Davis-Moore 3rd Addition



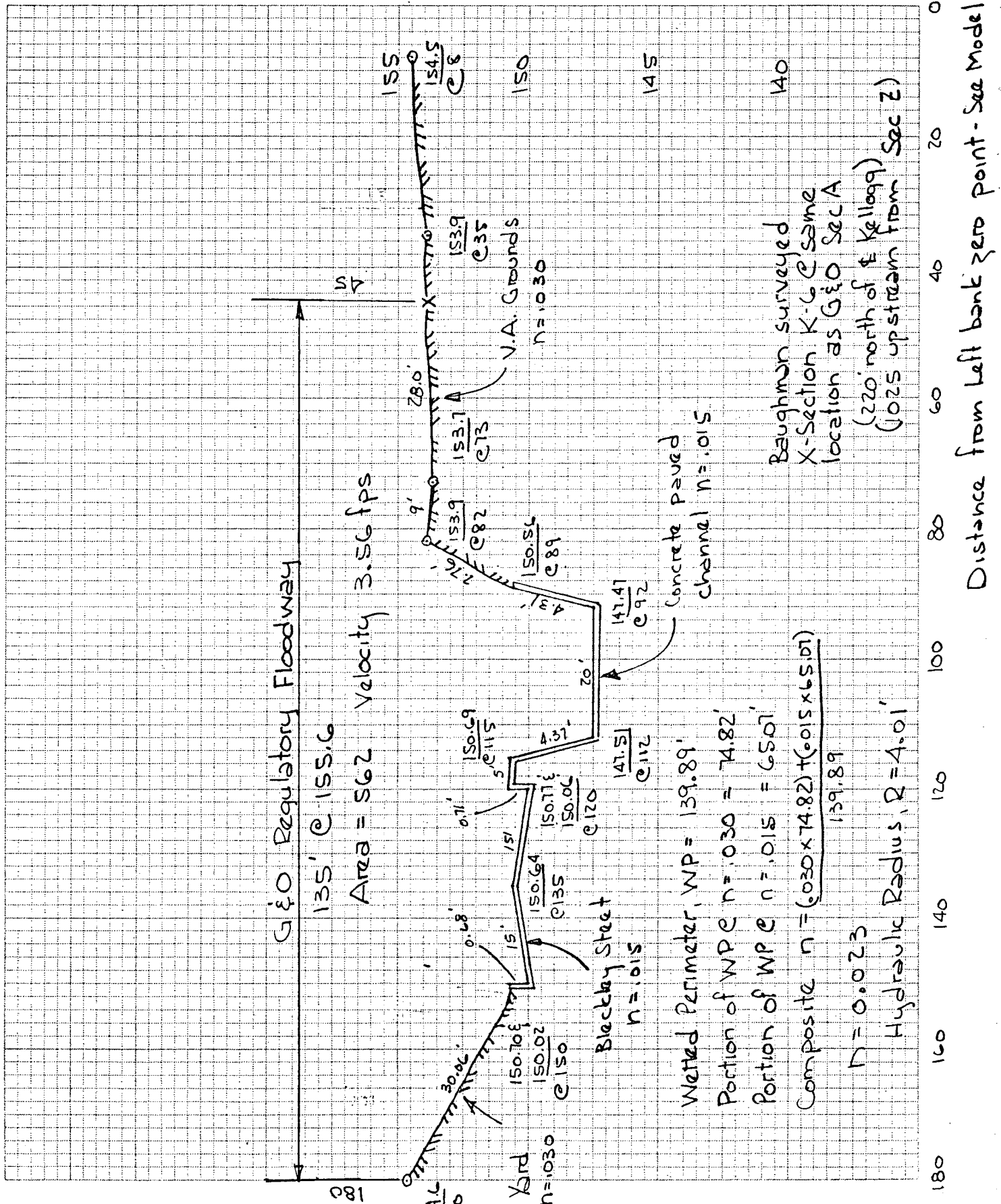
West Branch of Dry Creek - Floodway Plan for Davis-Moore 3rd Addition

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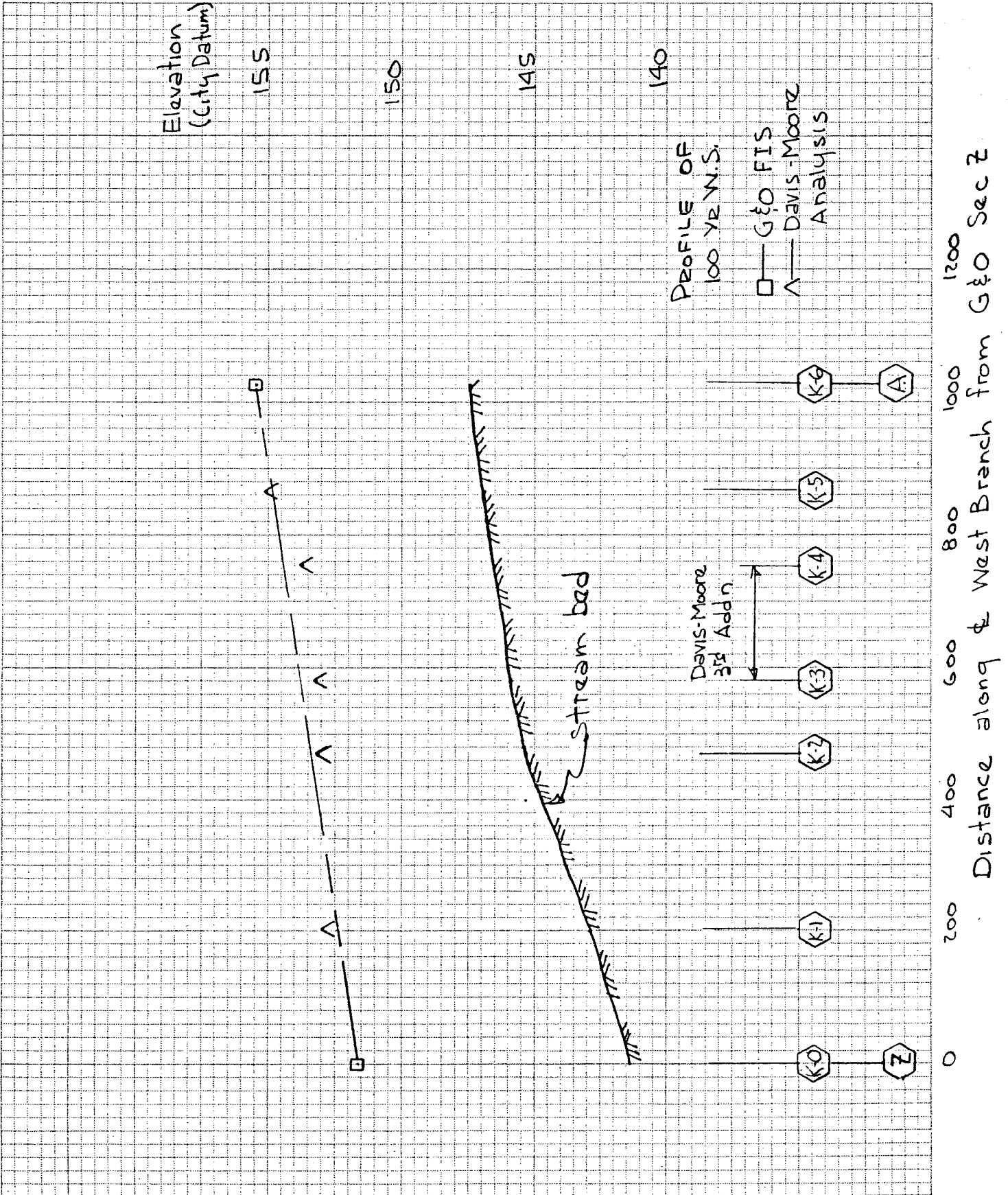
West Branch of Dry Creek - Floodway Plan for Davis - Moore 3rd Addition.

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West Branch of Dry Creek - Floodway Plan for Davis-Moore 3rd Addition

DATE Nov 23, 1984 PAGE 9 of 9



WEST BRANCH OF DRY CREEK
 FLOODWAY ENCROACHMENT PLAN FOR
 DAVIS-MOORE 3rd. ADDITION

Wichita FIS
 Section Z
 Same as this
 SECTION K-0

SECTION K-1

SECTION K-2

Elev.	151.7
	151.7
	120.
	151.7
	60.
	148.1
	60.
	146.4
	70.
	144.6
	87.
	141.6
	91.
	141.4
	108.
	144.4
	107.
	147.6
	120.
	0.
	2.
Area	416.
	CLR
62.6265537 WP	1/X
.0159676677	
.0159676677	X
	=
416.	
6.642549772 R	
6.642549772	Y
	=
0.67	
3.556021086 R 2/3	
	CLR

Elev.	153.
	153.
	120.
	153.
	60.
	150.5
	60.
	144.6
	81.
	142.8
	85.
	142.8
	98.
	145.8
	101.
	150.9
	120.
	0.
	2.
Area	398.7
	CLR
63.11462234 WP	1/X
.0158441889	
.0158441889	X
	=
398.	
6.321831379 R	
6.321831379	Y
	=
0.67	
3.440049947 R2/3	

Elev.	153.1
	153.1
	116.
	153.1
	56.
	151.5
	56.
	150.3
	65.
	147.33
	72.
	145.35
	74.
	145.39
	96.
	147.43
	98.
	151.1
	109.
	151.8
	116.
	0.
	2.
Area	300.49
	CLR
62.58 WP	1/X
.0159795462	
.0159795462	X
	=
300.	
4.793863854 R	
4.793863854	Y
	=
0.67	
2.85798152 R2/3	
2.85798152	

WEST BRANCH OF DRY CREEK
 FLOODWAY ENCROACHMENT PLAN FOR
 DAVIS-MOORE 3rd. ADDITION

SECTION K-3

SECTION K-4

SECTION K-6

Elev	1.
	153.2
	153.2
	120.
	153.2
	60.
	152.5
	60.
	151.5
	73.
	148.
	78.
	145.91
	80.
	145.9
	102.
	148.
	104.
	152.1
	114.
	152.1
	120.
	0.
	2.
Area	256.43
	63.15 WP CLR 1/X
	.0158353127 X
	.0158353127 RCL 3
	256.
	256.
	4.053840063 R
	4.053840063 X
	0.67
	2.554292505 R2/3 CLR

Elev	1.
	153.7
	153.7
	107.
	153.7
	47.
	152.7
	47.
	152.7
	61.
	148.5
	75.
	146.5
	77.
	146.5
	99.
	148.5
	101.
	152.3
	103.
	152.3
	107.
	0.
	2.
Area	252.8
	64.57 WP CLR 1/X
	.0154870683 X
	.0154870683 RCL 3
	253.
	253.
	3.918228279 R
	3.918228279 X
	0.67
	2.496721622 R2/3

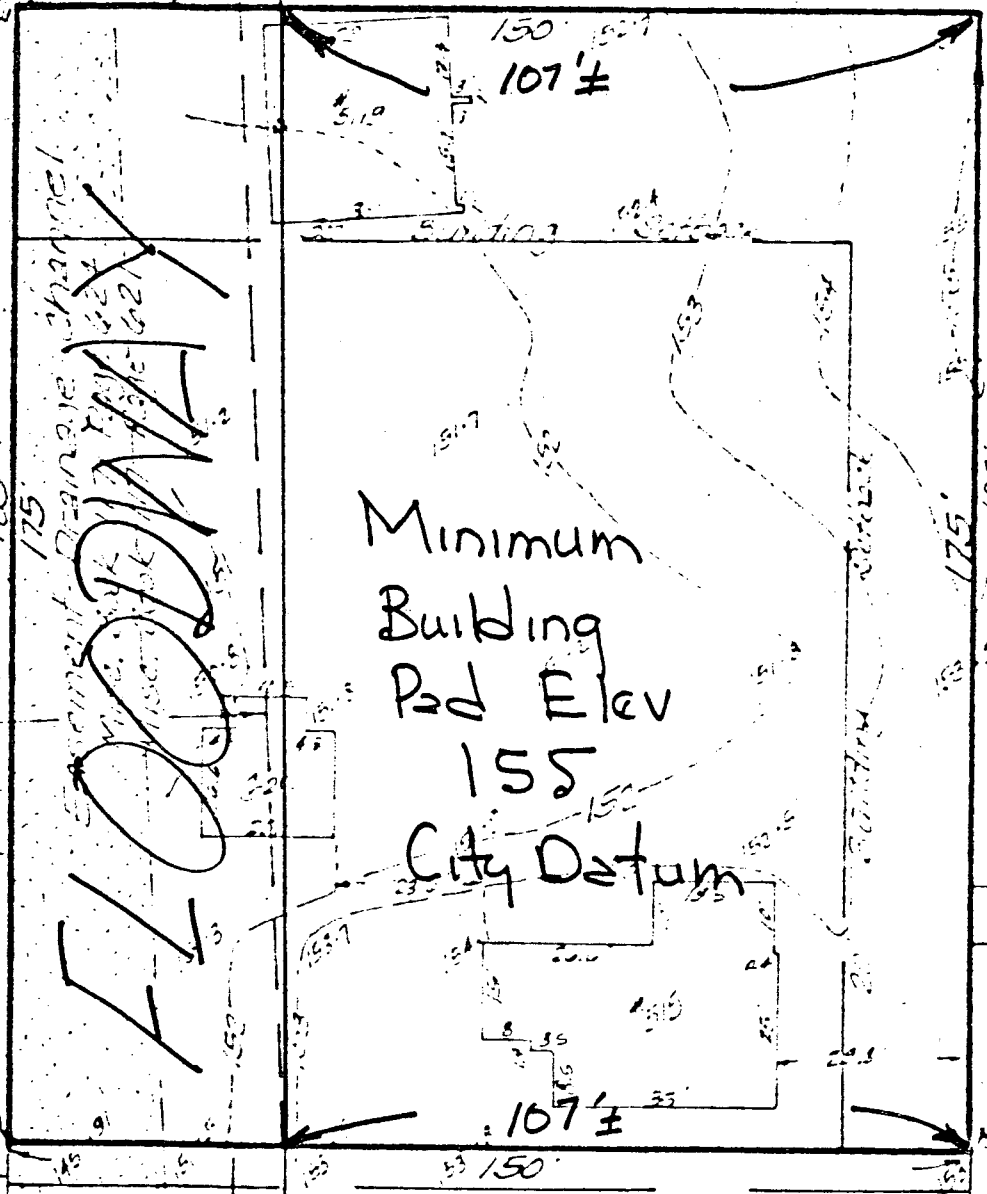
Elev	1.
	155.6
	155.6
	180.
	155.6
	45.
	153.9
	45.
	153.7
	73.
	153.9
	82.
	150.56
	89.
	147.47
	92.
	147.51
	112.
	150.69
	115.
	150.77
	120.
	150.06
	120.
	150.64
	135.
	150.02
	150.
	150.7
	150.
	154.6
	180.
	0.
	2.
Area	562.295
	562.295 CLR
	140. WP
	4.014285714 R
	4.014285714 X
	0.67
	2.537567173 R2/3

LOGG

ST.

Tripic # x 9' R.C.B.C.

Access Control Except ^{for} ~~the~~ Opening



FLOODWAY

Minimum Building Pad Elev 155 City Datum

Pinecrest

RECEIVED OCT 25 1984

Proposed Floodway Davis-Moore 3rd Addn
1" = 20'

AVE

UNPLATTED

SECTION

APPENDIX

Excerpts from G&O FIS for City of Wichita

Davis-Moore 3rd Addn

specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for each flooding source studied in detail affecting the community.

As specified in U.S. Water Resources Council Bulletin No. 15, the log-Pearson Type III flood-frequency analysis is the basis for determining the peak discharges for the 10-, 50-, 100-, and 500-year floods (Reference 5). The flood-frequency values for gaged (No. 07144300) locations on the Arkansas River were determined by this analysis, using a regional skew coefficient of -0.25. The use and determination of the regional skew is based on an open-file report by Hardison (Reference 6). The period of record for other gaged streams in Wichita were of insufficient lengths to be used in statistical analyses.

The 100- and 500-year flood discharge values for the Little Arkansas River were published in 1973 by the COE in the "Flood Plain Information Report for Sedgwick County, Kansas" (Reference 7). These flood discharge values, which are based on a log-normal distribution (skew coefficient of 0.0), have been included in this study. ~~The discharge values for East and West Branch Dry Creeks, which were calculated by and are the responsibility of the COE, Tulsa District, have also been included in the study. (Reference 7).~~ Discharge values for East and West Branch Dry Creeks were determined by a rainfall model and routing procedure.

Flood frequency values for Big Slough South, Big Slough North, Hoover Street Drain - Dugan Tributary, Center Drain Tributary, Pleasant Valley Tributary, Dry Creek, Gypsum Creek, and East, Middle, and West Branch Gypsum Creek were determined by the U.S. Department of Agriculture, Soil Conservation Service TR-20 hydrology computer model (Reference 8). Decreasing discharges in some of the downstream areas are due to the characteristics of the basin which include natural and manmade storage effects.

Flood-frequency values for the remaining streams that contribute to flooding in Wichita reflect rural conditions and were determined from statewide relations (Reference 9). These statewide relations use basin and climatic characteristics and are applicable only to rural basins. Discharges for certain of these streams that are affected by varying degrees of urbanization were determined as discussed in the following paragraph.

LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, Federal Emergency Management Agency, Federal Office Building, Room 305, 911 Walnut Street, Kansas City, Missouri 64106.

REFERENCES AND BIBLIOGRAPHY

1. U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population, Number of Inhabitants, Kansas, Washington, D.C., December 1981.
2. _____, National Oceanic and Atmospheric Administration, Climatological Data Kansas Annual Summary, 1933-1975.
3. U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Sedgwick County, Kansas, 1971.
4. U.S. Geological Survey, Hydrologic Investigation Atlas HA-63, Floods at Wichita, Kansas, D.W. Ellis, et. al., 1963.
5. U.S. Water Resources Council, Bulletin No. 15, A Uniform Technique for Determining Flood Flow Frequencies, December 1967.
6. U.S. Geological Survey, Open-file Report, Generalized Skew Coefficients of Annual Floods in the United States and Their Application, C.H. Hardison, 1974.
7. U.S. Army Corps of Engineers, Tulsa District, Flood Plain Information Report for Sedgwick County, Kansas, 1973.
8. U.S. Department of Agriculture, Soil Conservation Service, Engineering Division, Technical Release No. 20, Computer Program for Project Formulation, Hydrology, May 1965.
9. Kansas Water Resources Board, Technical Report No. 11, Magnitude and Frequency of Floods in Kansas, P.R. Jordan and T.J. Irza, 1975.
10. U.S. Geological Survey, Water Resources Investigation 3-73, Effects of Urbanization on Floods in the Houston, Texas Metropolitan Area, S.L. Johnson and D.M. Sayre, 1973.
11. _____, Water Supply Paper 2001-C, Effects of Urban Development on Floods in Northern Virginia, D.G. Anderson, 1970.
12. _____, Open-file Report, Effect of Urban Development on Floods in the Piedmont Province of North Carolina, A.L. Putnam, 1972.
13. _____, 7.5 Minute Series Topographic Maps, Scale 1:24000, Contour Interval 10 feet, 1960.

TABLE 3 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA SQ MILES	PEAK DISCHARGES (CFS)		
		10-YEAR	50-YEAR	100-YEAR
ARKANSAS RIVER				
Downstream of confluence of Wichita Drainage Canal	N/A	31,500	31,500	31,500
Downstream of confluence of the Little Arkansas River	N/A	25,500	25,500	25,500
Downstream of Control Structure No. IV	N/A	20,000	20,000	20,000
Upstream of Control Structure No. IV	40,490	24,000 ¹	44,800 ¹	55,200 ¹
LITTLE ARKANSAS RIVER				
Downstream of Control Structure No. 1	N/A	5,500	5,500	5,500
DRY CREEK				
At mouth	4.24	2,600	4,150	4,860
At Pawnee Avenue	3.96	2,560	4,090	4,790
At Lincoln Street	2.82	2,060	3,290	3,890
EAST BRANCH DRY CREEK				
At Orme Street	1.53	1,700 ²	2,250 ²	2,550 ²
WEST BRANCH DRY CREEK				
At Orme Street	1.27	1,100 ²	1,800 ²	2,000 ²
WICHITA DRAINAGE CANAL				
At mouth	57.8	12,500	20,500	24,000
At Mt. Vernon Street	32.5	7,500	12,300	14,400

1 log-Pearson Type III used with regional skew coefficient of -0.250
 2 from COE-published flood frequency data (Reference 7)

FLOODING SOURCE		FLOODWAY				BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)	
DRY CREEK									
V	14,780	94	683	6.1	1335.5	1335.5	1335.5	0.0	9.45
W	15,430	95	668	6.2	1336.5	1336.5	1336.5	0.0	
X	15,919	100	641	6.5	1336.8	1336.8	1337.2	0.4	
Y	16,081	103	566	7.4	1336.9	1336.9	1337.5	0.6	
Z	16,731	60	440	8.9	1338.9	1338.9	1339.1	0.2	3916
EAST BRANCH DRY CREEK									
USGS 650 WA'S									
4.84 AA (A,B)	20,163	62	203	11.3	1351.3	1351.3	1352.0	0.7	2294
4.99 AB (A,C)	21,008	80	226	9.5	1354.7	1354.7	1355.4	0.7	
5.20 AC (A,D)	22,380	150	376	5.7	1359.9	1359.9	1360.9	1.0	
5.49 AD (A,E)	23,595	100	129	13.6	1364.4	1364.4	1364.4	0.0	

¹ FEET ABOVE MOUTH

FEDERAL EMERGENCY MANAGEMENT AGENCY
CITY OF WICHITA, KS
 (SEDGWICK CO.)

FLOODWAY DATA

DRY CREEK -- EAST BRANCH DRY CREEK

TABLE 4

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
WEST BRANCH DRY CREEK								
A	0.19	135	701	2.9	1343.0	1343.0	1343.0	0.0 ✓
B	0.28	110	239	8.4	1343.1	1343.1	1343.1	0.0 ✓
C	0.45	110	375	5.3	1348.1	1348.1	1348.3	0.2 ✓
D	0.60	75	254	7.9	1351.0	1351.0	1351.1	0.1 ✓
E	0.72	70	232	8.6	1356.3	1356.3	1356.6	0.3 ✓
F	0.85	80	483	4.1	1359.4	1359.4	1359.8	0.4 ✓
G	1.94	90	207	4.4	1378.5	1378.5	1378.5	0.0 ✓
H	2.32	88	194	4.7	1389.3	1389.3	1389.3	0.0 ✓

20 3 2 2 5

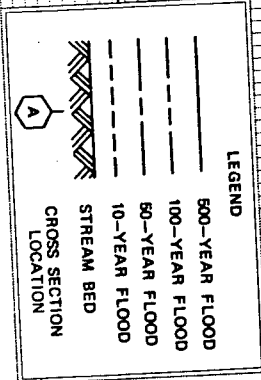
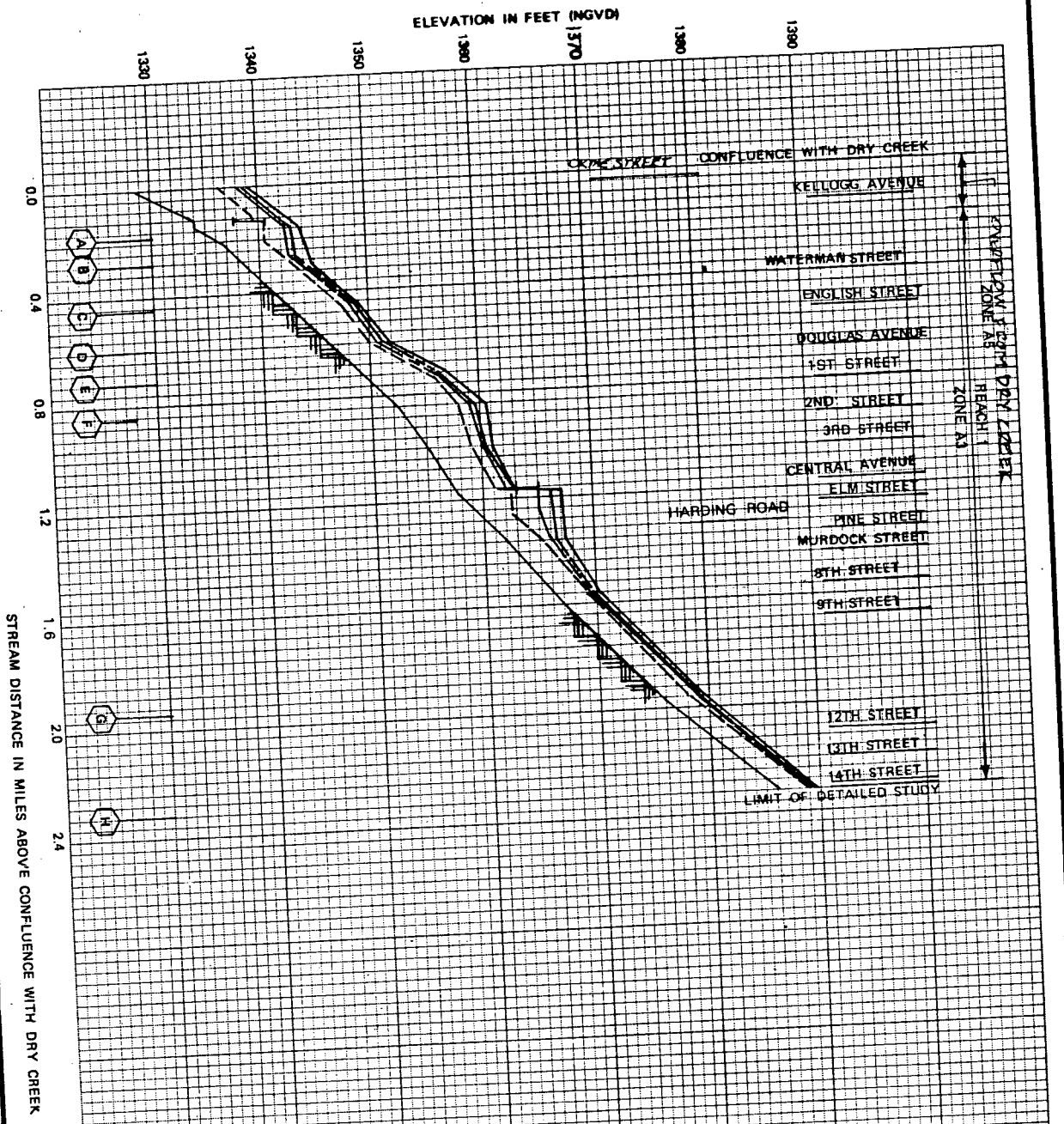
¹ MILES ABOVE CONFLUENCE WITH DRY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
CITY OF WICHITA, KS
 (SEDGWICK CO.)

FLOODWAY DATA

WEST BRANCH DRY CREEK

TABLE 4



FOLD HERE TO

HEC-2 WATER SURFACE PROFILE CALCULATIONS

DISCHARGE 100 YR = 2000 CFS
 PROJECT FLOODWAY ENCROACHMENT PLAN
 FOR DAVIS-MOORE 5th ADDN.
 STREAM/NEST BRANCH OF DRY CREEK

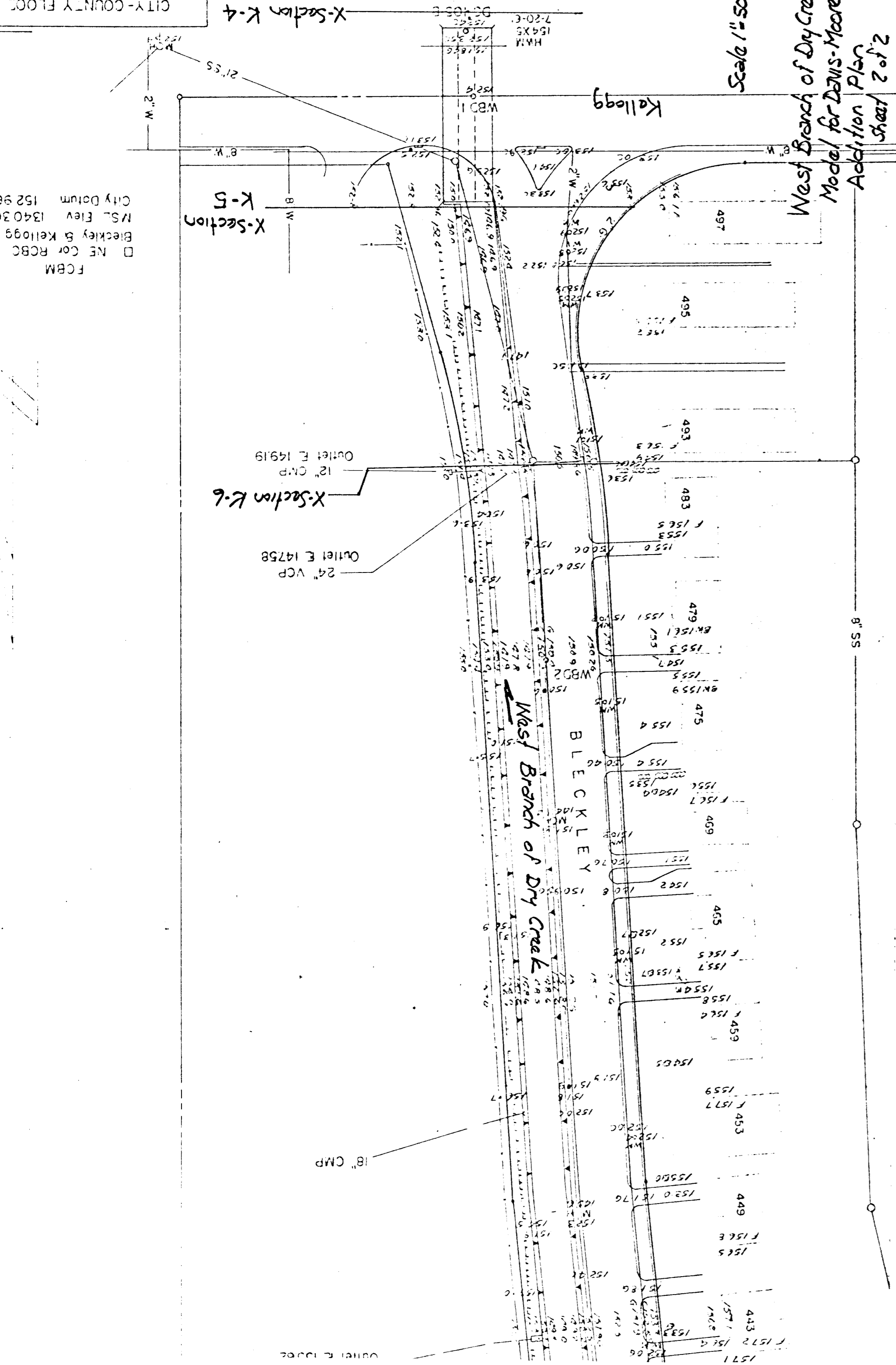
All elevations are City of Wichita datum (MSL minus 1187.4)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31			
Reach Length	Flowing Elev. W.S. Elev.	Area	R ₁	R ₂	n	K ₁ x 10 ¹⁰	K ₂ x 10 ¹⁰	S _f	10 H ₁	11 K ₁ x 10 ¹⁰	12 α	13 V	14 V ² /2g	15 (V ² /2g) Δh	16 Δh	17 h ₀	18 H	19	20	21	22	23	24	25	26	27	28	29	30	31			
CITY OF 1	WICHITA FLOOD INSURANCE	STUDY BY GREENHOPE & O'MARA																															
2	FOR THIS ANALYSIS AT K-0	THE 100 YR DISCHARGE FOR MAIN BRANCH DRY CREEK IS 3890 CFS.																															
K-0	141.4	416	3.56	0.35	0.035	62,877																											
K-1	702	399	3.44	0.35	0.035	58,215	60,576	0.0109	0.22																								
K-2	270	300	2.86	0.26	0.026	49,003	53,639	0.0139	0.38																								
K-3	108	256	2.55	0.26	0.026	37,310	43,157	0.0215	0.24																								
K-4	175	253	2.50	0.26	0.026	36,102	36,706	0.0297	0.52																								
K-5	108	336	3.94	0.15	0.015	13,267	10,933	0.10	0.70																								
5-9x4 RCBC	146.8	108	1.24	0.15	0.015	13,267	10,933	0.10	0.70																								
Kallogg Main	153.4	228	1.41	0.15	0.015	57,311	70,638	0.0175	0.70																								
Combined		336																															
From FIS 7	147.47	562	2.54	0.23	0.023	92,227	81,435	0.0060	0.10																								
A = K-6	162																																
Section A of G&O FIS																																	
$K = \sum \text{PRIMARYS}$ $C_m = 1.48C$ $R_2 = \frac{1}{2}(K_{u1} + K_{u2})$ $S_f = (P/K_f)^2$ $h_f = L S_f$ $\alpha = (K_1)^2 (K_2/A^2) \div (K_1)^2$ $V = Q/A$ $\Delta h_v = \alpha (V^2/2g)_{u2} - \alpha (V^2/2g)_{u1}$ $h_0 = C_c (C_d \Delta h_v) / C_c (4 \Delta h_v)$ $C_c = 0.5$ $C_d = 0.1$																																	

9

FCBM
NE Cor RCBC
Beckley & Kellogg
M.S. Elev 1340.36
City Datum 152.96

3-9' x 4' RCBC
N.E. 14682



Scale 1"=50'

West Branch of Dry Creek
Model for DeWitt-Moore
Addition Plan
Sheet 2 of 2

X-Section K-5

X-Section K-6

X-Section K-4

18" CMP

Outlet E 14919

Outlet E 14758

24" VCP

8" SS

Outlet E 14062

West Branch of Dry Creek

BLECKLEY

Kellogg

WBD2

WBD1

443

449

453

459

465

469

475

483

493

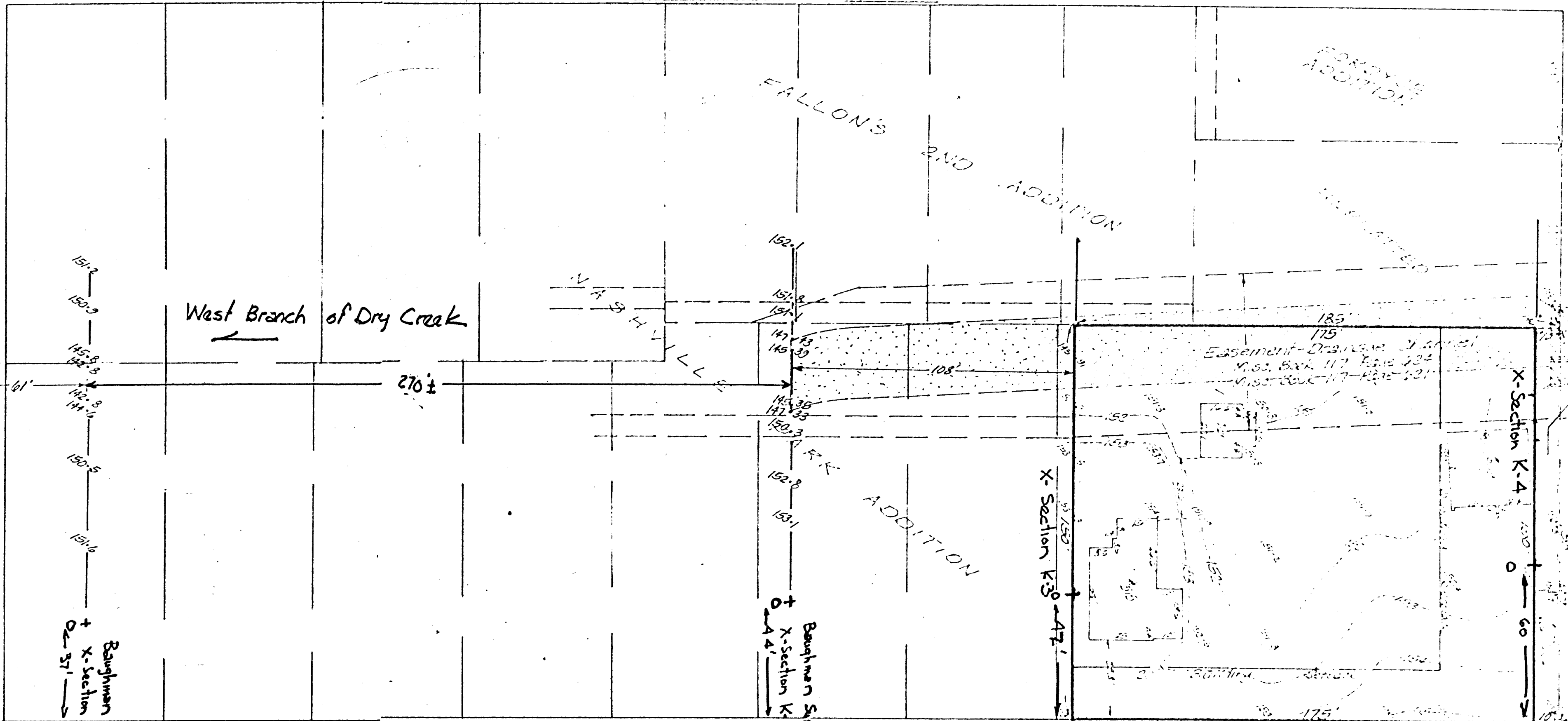
495

497

BLECKLEY DRIVE

KELLOGG ST.

PINECREST AVE



West Branch of Dry Creek

Baughman Surveyed
X-Section K-2
44'

Baughman Surveyed
X-Section K-1
31'

Scale 1"=50'

West Branch of Dry Creek
Model for Davis-Moore
3rd Addition Plan

RECEIVED OCT 2 5 1984
Baughman Surveyed
X-Section
G&O Section 2 location

150.2
149.3
148.4
147.5
146.6
145.7
144.8
143.9
143.0
142.1
141.2
140.3
139.4
138.5
137.6
136.7
135.8
134.9
134.0
133.1
132.2
131.3
130.4
129.5
128.6
127.7
126.8
125.9
125.0
124.1
123.2
122.3
121.4
120.5
119.6
118.7
117.8
116.9
116.0
115.1
114.2
113.3
112.4
111.5
110.6
109.7
108.8
107.9
107.0
106.1
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103.4
102.5
101.6
100.7
99.8
98.9
98.0
97.1
96.2
95.3
94.4
93.5
92.6
91.7
90.8
89.9
89.0
88.1
87.2
86.3
85.4
84.5
83.6
82.7
81.8
80.9
80.0
79.1
78.2
77.3
76.4
75.5
74.6
73.7
72.8
71.9
71.0
70.1
69.2
68.3
67.4
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65.6
64.7
63.8
62.9
62.0
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47.6
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44.9
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38.6
37.7
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35.0
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29.6
28.7
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26.9
26.0
25.1
24.2
23.3
22.4
21.5
20.6
19.7
18.8
17.9
17.0
16.1
15.2
14.3
13.4
12.5
11.6
10.7
9.8
8.9
8.0
7.1
6.2
5.3
4.4
3.5
2.6
1.7
0.8
0.0