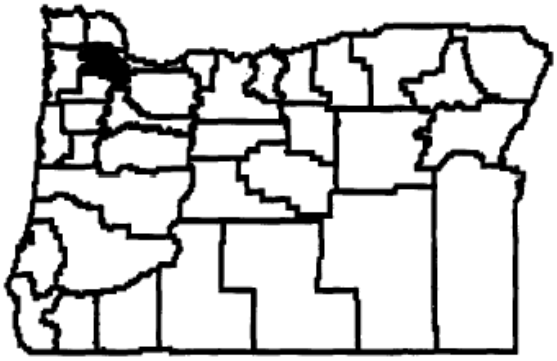
FLOOD INSURANCE STUDY

WASHINGTON COUNTY, OREGON
AND INCORPORATED AREAS

VOLUME 2 OF 3

COMMUNITY NAME	COMMUNITY NUMBER
BANKS, CITY OF	410239
BEAVERTON, CITY OF	410240
CORNELIUS, CITY OF	410261
DURHAM, CITY OF	410263
FOREST GROVE, CITY OF	410241
GASTON, CITY OF	410242
HILLSBORO, CITY OF	410243
KING CITY, CITY OF	410269
NORTH PLAINS, CITY OF	410270
SHERWOOD, CITY OF	410273
TIGARD, CITY OF	410276
TUALATIN, CITY OF	410277
WASHINGTON COUNTY UNINCORPORATED AREAS	410238



Effective: November 4, 2016

Federal Emergency Management Agency

Flood Insurance Study Number
41067CV002A

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

Selected Flood Insurance Rate Map panels for the community contain information that was previously shown separately on the corresponding Flood Boundary and Floodway Map panels (e.g., floodways, cross sections). In addition, former flood hazard zone designations have been changed as follows:

Old Zone	New Zone
A1 through A30	AE
V1 through V30	VE
B	X
C	X

Part or all of this FIS may be revised and republished at any time. In addition, part of this FIS may be revised by a Letter of Map Revision process, which does not involve republication or redistribution of the FIS. It is, therefore, the responsibility of the user to consult with community officials and to check the community repository to obtain the most current FIS report components.

Users should refer to Section 10.0, Revisions Descriptions. Section 10.0 is intended to present the most up-to-date information for specific portions of this FIS report. Therefore, users of this FIS report should be aware that the information presented in Section 10.0 supersedes information in Sections 1.0 through 9.0 of this FIS report.

Initial Countywide FIS Effective Date: November 4, 2016

Revised FIS Report Dates:

TABLE OF CONTENTS

Volume 1 – November 4, 2016

		Page
1.0	INTRODUCTION	1
1.1	Purpose of Study	1
1.2	Authority and Acknowledgements	2
1.3	Coordination	3
2.0	AREA STUDIED	4
2.1	Scope of Study	4
2.2	Community Description	4
2.3	Principal Flood Problems	10
2.4	Flood Protection Measures	15
3.0	ENGINEERING METHODS	17
3.1	Hydrologic Analyses	17
3.2	Hydraulic Analyses	25
3.3	Vertical Datum	29
4.0	FLOODPLAIN MANAGEMENT APPLICATIONS	31
4.1	Floodplain Boundaries	31
4.2	Floodways	32

Volume 2 – November 4, 2016

5.0	INSURANCE APPLICATION	108
6.0	FLOOD INSURANCE RATE MAP	109
7.0	OTHER STUDIES	110
8.0	LOCATION OF DATA	112
9.0	BIBLIOGRAPHY AND REFERENCES	113
10.0	REVISIONS DESCRIPTIONS	116
10.1	First Revision	116

TABLE OF CONTENTS (Continued)

Volume 1 – November 4, 2016

FIGURES

Figure 1 – Floodway Schematic 33

TABLES

Table 1 – Initial and Final CCO Meetings 3

Table 2 – Incorporated LOMRs 4

Table 3 – Summary of Discharges 19-24

Table 4 – Roughness Coefficient - Manning's "n" Values 27

Table 5 – Floodway Data 34-95

Volume 2 – November 4, 2016

Table 5 – Floodway Data (Continued) 96-107

Table 6 – Community Map History 111

Table 7 – Revised Waterway Study Reaches 118

EXHIBITS

Exhibit 1 – Flood Profiles

Ash Creek	Panels 01P-02P
Beal Creek	Panel 03P
Beaverton Creek	Panels 04P-13P
Bethany Creek	Panel 14P
Bronson Creek	Panels 15P-19P
Butternut Creek	Panels 20P-24P
Cedar Creek	Panels 25P-26P
Cedar Mill Creek	Panels 27P-30P
Cedar Mill Creek – North Overflow	Panel 31P
Cedar Mill Creek – South Overflow	Panel 32P
Cedar Mill Creek – Upper North Overflow	Panel 33P
Celebrity Creek	Panel 34P
Chicken Creek	Panels 35P-36P
Chicken Creek – West Tributary	Panel 37P
Council Creek	Panels 38P-43P
Dairy Creek	Panels 44P-48P
Dawson Creek	Panels 49P-51P
Deer Creek	Panel 52P
Erickson Creek	Panels 53P-54P

TABLE OF CONTENTS (Continued)

Fanno Creek	Panels 55P-60P
Gales Creek	Panels 61P-65P
Glencoe Swale	Panels 66P-69P

Volume 3 – November 4, 2016

Golf Creek	Panels 70P-71P
Gordon Creek	Panels 72P-73P
Hall Creek	Panels 74P-75P
Hall Creek – 106th Tributary	Panels 76P-77P
Hall Creek – North Fork	Panel 78P
Hall Creek – South Fork	Panel 79P
Hedges Creek	Panels 80P-81P
Holcomb Creek	Panels 82P-83P
McKay Creek	Panels 84P-86P
North Johnson Creek	Panels 87P-90P
North Johnson Creek – East Tributary	Panel 91P
North Johnson Creek – North Tributary	Panels 92P-94P
Nyberg Slough	Panels 95P-96P
Rock Creek North	Panels 97P-103P
Rock Creek South	Panels 104P-105P
South Johnson Creek	Panels 106P-107P
Storey Creek	Panels 108P-109P
Storey Creek – East Tributary	Panel 110P
Storey Creek – Middle Tributary	Panel 111P
Summer Creek	Panels 112P-113P
Tualatin River	Panels 114P-133P
Tualatin River - Golf Course Overflow	Panel 134P
Tualatin River - LaFolette Overflow	Panel 135P
Turner Creek	Panel 136P-137P
Unnamed Tributary of McKay Creek	Panels 138P-139P
Waible Creek	Panels 140P-142P
Waible Creek – South Tributary	Panel 143P
Waible Creek Tributary 1	Panel 144P
Waible Creek Tributary 2	Panel 145P
Wapato Creek	Panel 146P
West Fork Dairy Creek	Panel 147P
Willow Creek	Panels 148P-151P

PUBLISHED SEPARATELY

Flood Insurance Rate Map Index

Flood Insurance Rate Map

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ.FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
TUALATIN RIVER								
BA	217,311	2,233	28,663	1.2	148.7	147.3	147.9	0.6
BB	219,323	1,422	17,707	2.0	148.8	147.5	148.1	0.6
BC	221,593	1,174	17,034	1.8	149.1	147.9	148.4	0.5
BD	222,726	871	13,154	2.5	149.3	148.2	148.7	0.5
BE	223,235	806	13,426	2.3	149.5	148.4	148.9	0.5
BF	223,741	336	6,492	4.1	149.7	148.7	149.2	0.5
BG	224,390	1,467	22,664	1.3	150.0	149.0	149.5	0.5
BH	226,730	1,699	25,504	1.1	150.1	149.1	149.6	0.5
BI	228,021	2,418	40,601	0.6	150.2	149.2	149.6	0.4
BJ	231,304	1,773	29,358	1.0	150.2	149.2	149.7	0.5
BK	232,523	1,313	23,429	1.2	150.2	149.2	149.7	0.5
BL	232,955	1,403	25,216	1.0	150.2	149.3	149.8	0.5
BM	234,067	1,813	25,375	1.2	150.3	149.4	149.8	0.4
BN	235,438	4,157	63,549	0.5	150.4	149.4	149.9	0.5
BO	238,320	4,292	65,509	0.4	150.4	149.4	149.9	0.5
BP	239,100	4,048	53,848	0.6	150.6	149.7	150.1	0.4
BQ	241,242	2,841	43,797	0.4	150.6	149.7	150.2	0.5
BR	242,479	2,200	29,224	0.6	150.6	149.7	150.2	0.5
BS	244,011	1,646	18,860	1.1	150.7	149.8	150.3	0.5
BT	245,122	2,416	33,005	0.6	150.7	149.8	150.3	0.5
BU	246,362	3,129	37,738	0.5	150.7	149.9	150.4	0.5
BV	247,863	2,139	24,909	0.8	150.7	149.9	150.4	0.5
BW	249,989	1,499	17,142	1.3	150.8	150.0	150.5	0.5
BX	253,163	1,924	22,644	0.8	150.9	150.1	150.7	0.6
BY	254,474	1,922	21,616	0.9	151.0	150.2	150.7	0.5
BZ	255,565	1,461	13,740	1.6	151.0	150.3	150.9	0.6

[1]Feet above confluence with Willamette River

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

TUALATIN RIVER

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ.FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
TUALATIN RIVER								
CA	256,798	1,466	11,816	1.9	151.2	150.5	151.2	0.7
CB	259,904	2,269	20,512	1.0	151.5	150.9	151.5	0.6
CC	263,831	3,160	30,727	0.6	151.6	151.0	151.7	0.7
CD	267,035	2,897	20,735	0.9	151.6	151.0	151.7	0.7
CE	269,601	1,729	11,283	1.7	151.7	151.1	152.2	1.1
CF	272,457	2,370	10,495	2.4	152.5	152.2	152.8	0.6
CG	276,344	2,662	9,017	2.9	153.3	153.2	153.7	0.5
CH	279,491	2,041	11,179	1.9	155.1/154.5[2]	154.5	155.0	0.5
CI	280,650	442	3,867	3.0	155.8/155.2[2]	155.2	155.7	0.5
CJ	281,006	640	5,281	2.4	156.3	155.7	156.2	0.5
CK	282,345	1,287	10,297	1.2	156.5	156.0	156.5	0.5
CL	283,089	1,404	11,281	1.2	156.6	156.1	156.6	0.5
CM	285,799	1,407	7,629	1.8	157.0	156.6	157.2	0.6
CN	287,595	1,861	15,381	0.6	157.1/157.1[2]	156.7	157.4	0.7
CO	288,740	1,807	9,067	1.4	157.4/157.1[2]	156.8	157.5	0.7
CP	290,160	1,573	7,443	1.7	157.8/157.4[2]	157.1	157.7	0.6
CQ	290,683	1,210	5,774	2.2	158.0/157.5[2]	157.3	157.9	0.6
CR	291,511	1,336	5,457	2.7	158.4	157.8	158.4	0.6
CS	293,163	1,350	8,189	1.3	158.8	158.4	158.8	0.4
CT	294,353	1,181	5,293	2.2	159.0	158.6	159.1	0.5
CU	297,418	1,297	6,084	2.1	159.9	159.7	160.5	0.8
CV	298,748	1,634	9,627	1.2	160.3	160.2	160.8	0.6
CW	300,165	1,816	10,214	1.2	160.5	160.4	161.0	0.6
CX	301,036	2,116	11,015	1.1	160.7/160.6[2]	160.5	161.2	0.7
CY	301,979	3,473	20,188	0.8	162.1/160.8[2]	160.7	161.3	0.6
CZ	302,900	3,125	16,297	1.1	162.6/162.3[2]	160.8	161.5	0.7

[1]Feet above confluence with Willamette River

[2]Riverward of levees / Landward of levees

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ.FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
TUALATIN RIVER								
DA	303,252	2,724	12,480	1.2	163.1/162.3[3]	160.9	161.6	0.7
DB	304,049	3,134	15,878	1.1	163.7	163.3	163.4	0.1
DC	304,981	2,612	14,634	1.2	164.1/164.1[3]	163.8	164.1	0.3
DD	306,932	2,971	14,323	1.4	165.2/164.4[3]	164.1	164.4	0.3
DE	308,600	3,879	16,894	1.1	165.8/164.5[3]	164.3	164.7	0.4
DF	310,184	3,657	11,906	2.1	166.5/164.8[3]	164.6	165.0	0.4
DG	310,864	3,369	9,088	2.6	167.3/165.3[3]	165.2	165.5	0.3
DH	313,202	4,766	NA	NA	167.8	166.0	166.3	0.3
DI	315,004	3,626	NA	NA	167.8	166.1	166.4	0.3
DJ	317,283	2,352	23,065	0.3	167.8	166.1	166.4	0.3
DK	319,756	2,414	20,992	0.3	167.8	166.1	166.5	0.4
DL	321,765	2,275	12,707	0.6	167.8	166.1	166.5	0.4
DM	324,141	1,650	5,730	2.3	167.9	166.2	167.2	1.0
DN	328,153	730	4,239	2.3	170.1	170.4	170.7	0.3
DO	62.26[2]	660	4,062	2.8	170.6	170.6	171.4	0.8
DP	62.55[2]	1,700	12,197	0.9	171.5	171.5	172.5	1.0
DQ	63.20[2]	2,800	16,863	0.7	171.8	171.8	172.7	0.9
DR	63.69[2]	1,930	9,323	1.2	172.5	172.5	173.4	0.9
DS	63.75[2]	1,910	10,738	1.1	172.7	172.7	173.5	0.8
DT	64.29[2]	1,650	8,886	0.9	173.8	173.8	174.4	0.6
DU	64.74[2]	1,600	7,285	1.1	174.6	174.6	175.3	0.7
DV	65.15[2]	1,320	5,207	1.3	175.6	175.6	176.4	0.8
DW	65.62[2]	930	4,020	1.7	177.0	177.0	178.0	1.0
DX	65.73[2]	235	2,838	2.4	181.6	181.6	181.9	0.3
DY	65.75[2]	240	3,976	1.7	182.1	182.1	182.4	0.3
DZ	65.80[2]	230	1,181	5.8	182.2	182.2	182.6	0.4
EA	65.89[2]	650	3,480	2.0	184.6	184.6	185.0	0.4
EB	66.49[2]	600	2,961	2.3	187.4	187.4	188.1	0.7

[1]Feet above confluence with Willamette River

[2]Miles above confluence with Willamette River

[3]Riverward of levees / Landward of levees

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

TUALATIN RIVER

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ.FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
TUALATIN RIVER - GOLF COURSE OVERFLOW								
A	463	400	1813	1.8	155.3	154.7[3]	155.2	0.5
B	860	178	876	4.5	155.9	155.6[3]	156.3	0.7
C	1088	115	939	4.1	157.8	157.7[3]	157.9	0.2
D	1290	131	1066	3.7	158.7	158.6[3]	158.9	0.3
E	1805	335	2398	1.9	159.5	159.5[3]	159.9	0.4
F	2100	303	2546	2.2	159.7	159.7[3]	160.1	0.4
G	3352	622	3605	1.6	160.6	160.6[3]	161.1	0.5
H	4210	658	3739	1.5	161.1	161.1[3]	161.7	0.6
I	4999	854	4416	1.2	161.4	161.4[3]	162.1	0.7
J	5791	1081	6054	0.8	161.5	161.5[3]	162.4	0.9
TUALATIN RIVER - LaFOLETTE OVERFLOW								
A	852[2]	215	1,465	1.3	156.7	156.2[3]	156.8	0.6
B	1,535[2]	162	1,016	1.9	157.1	156.7[3]	157.3	0.6
C	2,203[2]	143	1,000	2.1	157.8	157.6[3]	158.2	0.6
D	2,650[2]	165	1,234	1.6	158.2	158.0[3]	158.7	0.7
E	3,194[2]	91	728	2.8	159.8	159.7[3]	160.2	0.5

[1]Feet above confluence with Tualatin River

[2]Feet above confluence with Tualatin River

[3]Elevations computed without consideration of levees along Tualatin River

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

TUALATIN RIVER - GOLF COURSE AND LaFOLETTE OVERFLOWS

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ.FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
TURNER CREEK								
A	201	55	337	1.2	147.0	133.5[2]	134.4[2]	0.9
B	580	45	183	2.8	147.0	133.6[2]	134.6[2]	1.0
C	1,214	40	136	3.5	147.0	135.6[2]	136.0[2]	0.4
D	1,437	20	126	3.3	147.0	139.0[2]	139.1[2]	0.1
E	1,846	39	213	2.2	147.0	139.3[2]	139.9[2]	0.6
F	2,048	40	207	2.3	147.0	139.4[2]	140.2[2]	0.8
G	2,451	51	237	2.3	147.0	139.7[2]	140.7[2]	1.0
H	3,149	84	273	1.5	147.0	140.5[2]	141.2[2]	0.7
I	3,734	42	64	7.3	147.0	142.6[2]	142.8[2]	0.2
J	4,079	43	142	3.2	147.0	144.8[2]	145.4[2]	0.6
K	4,341	47	140	3.0	147.0	145.4[2]	146.1[2]	0.7
L	4,704	85	204	1.9	147.0	146.2[2]	146.8[2]	0.6
M	4,868	35	123	3.4	149.7	149.7	149.7	0.0
N	5,162	53	237	1.4	149.9	149.9	150.0	0.1
O	5,524	42	140	2.3	150.0	150.0	150.4	0.4
P	5,782	70	200	1.6	150.3	150.3	150.8	0.5
Q	6,219	47	102	3.5	151.2	151.2	151.6	0.4
R	6,421	16	54	4.3	152.3	152.3	152.8	0.5
S	6,788	25	84	3.0	153.2	153.2	154.1	0.9
T	6,997	15	53	4.3	154.0	154.0	155.0	1.0
U	7,302	43	194	0.9	157.2	157.2	157.6	0.4
V	7,565	23	100	1.7	157.2	157.2	157.7	0.5
W	7,729	5	25	8.7	157.1	157.1	157.4	0.3
X	7,837	21	115	1.7	158.3	158.3	158.5	0.2
Y	8,201	10	43	4.5	158.4	158.4	158.9	0.5
Z	8,356	9	37	5.2	160.9	160.9	161.3	0.4

[1]Feet above confluence with Rock Creek North

[2]Elevations computed without consideration of backwater effects from Rock Creek North and Tualatin River

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

TURNER CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ.FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
TURNER CREEK								
AA	8,593	24	85	2.1	161.8	161.8	162.5	0.7
AB	8,861	23	69	1.9	162.0	162.0	163.0	1.0
AC	9,390	23	47	2.8	163.7	163.7	164.7	1.0
AD	9,900	72	184	0.8	164.6	164.6	165.2	0.6
AE	10,123	26	33	2.9	164.7	164.7	165.2	0.5
AF	10,373	11	24	4.0	166.7	166.7	167.1	0.4
AG	10,483	12	26	3.7	168.1	168.1	168.1	0.0

[1]Feet above confluence with Rock Creek North

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

TURNER CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ.FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
UNNAMED TRIBUTARY OF McKAY CREEK								
A	32	142	504	0.6	172.9	172.9[2]	173.8[2]	0.9
B	434	70	866	0.4	172.9	172.9[2]	173.9[2]	1.0
C	1370	6	72	4.4	172.9	172.9[2]	173.9[2]	1.0
D	1440	25	333	1.0	175.1	175.1	176.1	1.0
E	3080	160	1,137	0.3	175.2	175.2	176.2	1.0
F	3820	21	116	2.8	176.2	176.2	177.0	0.8
G	4610	60	241	1.3	176.7	176.7	177.6	0.9
H	4990	27	106	2.6	177.2	177.2	178.0	0.8
I	5340	80	180	1.5	178.9	178.9	179.5	0.6
J	5590	100	311	0.9	179.1	179.1	179.6	0.5
K	6060	100	675	0.4	179.3	179.3	180.2	0.9
L	6210	8	59	4.7	180.8	180.8	181.8	1.0
M	6450	200	1,057	0.3	183.0	183.0	184.0	1.0
N	6750	160	699	0.4	183.0	183.0	184.0	1.0

[1]Feet above confluence with McKay Creek

[2]Elevations computed with consideration of backwater effects from McKay Creek

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

UNNAMED TRIBUTARY OF McKAY CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ.FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
WAIBLE CREEK								
A	1,795	147	875	3.3	160.0	154.8[2]	155.4[2]	0.6
B	3,661	125	729	3.7	160.0	156.9[2]	157.8[2]	0.9
C	5,017	174	1,061	2.9	160.0	158.3[2]	159.3[2]	1.0
D	7,646	250	1,380	2.5	160.0	159.8[2]	160.8[2]	1.0
E	8,074	41	323	6.0	160.8	160.8	161.5	0.7
F	11,056	260	1,077	3.0	163.5	163.5	164.0	0.5
G	12,421	161	533	3.6	165.9	165.9	166.3	0.4
H	13,228	166	566	3.0	167.6	167.6	168.1	0.5
I	14,305	69	332	4.0	170.0	170.0	170.7	0.7
J	14,377	85	455	3.8	173.1	173.1	173.1	0.0
K	15,962	80	301	3.1	174.5	174.5	175.4	0.9
L	16,532	90	282	3.7	175.4	175.4	176.4	1.0
M	16,633	103	318	3.3	175.6	175.6	176.6	1.0
N	17,540	124	363	2.8	177.3	177.3	178.0	0.7
O	18,524	139	359	3.0	178.9	178.9	179.4	0.5
P	19,742	27	87	5.8	179.8	179.8	180.0	0.2
Q	20,829	10	79	9.5	184.0	184.0	184.5	0.5

[1]Feet above confluence with McKay Creek

[2]Elevations computed without consideration of backwater effects from McKay Creek

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

WAIBLE CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ.FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
WAIBLE CREEK - SOUTH TRIBUTARY								
A	1,457	22	71	5.6	182.9	182.9	183.9	1.0
B	1,610	70	207	2.1	185.7	185.7	186.4	0.7
C	2,523	80	130	3.8	187.1	187.1	187.6	0.5

[1]Feet above confluence with Waible Creek

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

WAIBLE CREEK - SOUTH TRIBUTARY

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ.FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
WAPATO CREEK								
A	0.37	778	4,817	0.3	173.9	173.3[3]	174.3[3]	1.0
B	1.34	520	3,152	0.4	174.6	173.4[3]	174.4[3]	1.0
C	1.76	312	1,962	0.6	175.5	173.4[3]	174.4[3]	1.0
D	1.90	110	1,045	1.1	175.6	173.5[3]	174.5[3]	1.0
E[4]	NA	NA	NA	NA	NA	NA	NA	NA
F[4]	NA	NA	NA	NA	NA	NA	NA	NA
G[4]	NA	NA	NA	NA	NA	NA	NA	NA
WEST FORK DAIRY CREEK								
A	15.70[2]	1,995	10,690	0.8	189.8	189.8	190.8	1.0
B	16.02[2]	1,941	12,626	0.7	193.9	193.9	194.8	0.9
C	16.28[2]	2,300	21,187	0.4	194.6	194.6	195.6	1.0
D	16.84[2]	2,700	17,943	0.4	194.8	194.8	195.8	1.0
E	17.82[2]	2,450	16,122	0.4	200.3	200.3	201.3	1.0
F	18.68[2]	1,200	6,645	1.1	206.3	206.3	207.2	0.9
G	18.98[2]	1,500	10,148	0.7	206.5	206.5	207.4	0.9
H	19.41[2]	690	1,305	5.4	206.9	206.9	207.5	0.6

[1]Miles above confluence with Tualatin River

[2]Miles above confluence with Dairy Creek

[3]Elevations computed without consideration of backwater effects from Tualatin River

[4]Cross sections are located in Yamhill County, OR

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

WAPATO CREEK - WEST FORK DAIRY CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ.FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
WILLOW CREEK								
A	634	72	245	7.4	161.7	154.2[2]	155.2[2]	1.0
B	1,055	80	382	4.7	161.7	157.1[2]	157.5[2]	0.4
C	1,475	67	252	5.7	161.7	158.1[2]	158.9[2]	0.8
D	1,812	25	138	8.6	161.7	160.0[2]	160.8[2]	0.8
E	2,550	89	534	2.4	163.2	163.2	163.6	0.4
F	3,099	91	478	2.3	163.5	163.5	163.9	0.4
G	3,671	75	418	2.7	164.1	164.1	164.7	0.6
H	4,056	75	359	3.6	164.6	164.6	165.4	0.8
I	4,578	34	178	7.2	166.7	166.7	167.2	0.5
J	4,723	57	421	2.6	168.8	168.8	169.4	0.6
K	5,268	62	360	2.4	169.1	169.1	169.8	0.7
L	5,930	39	197	3.2	169.2	169.2	170.1	0.9
M	6,344	22	110	5.8	170.1	170.1	171.1	1.0
N	6,455	33	241	2.8	176.3	176.3	176.9	0.6
O	6,754	49	406	2.0	176.3	176.3	177.0	0.7
P	7,352	50	248	3.4	176.5	176.5	177.3	0.8
Q	7,688	53	250	2.7	177.0	177.0	177.8	0.8
R	8,186	69	226	3.2	177.7	177.7	178.6	0.9
S	8,383	16	133	4.5	182.2	182.2	182.2	0.0
T	9,009	50	221	3.1	182.9	182.9	183.6	0.7
U	9,433	50	246	2.5	183.3	183.3	184.0	0.7
V	9,850	42	165	3.9	183.9	183.9	184.6	0.7
W	10,334	44	196	3.0	185.0	185.0	185.8	0.8
X	11,481	43	112	5.5	189.3	189.3	189.8	0.5
Y	11,652	34	164	3.4	191.3	191.3	192.1	0.8
Z	12,000	61	191	3.4	192.1	192.1	193.1	1.0

[1]Feet above confluence with Beaverton Creek

[2]Elevations computed without consideration of backwater effects from Beaverton Creek

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

WILLOW CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ.FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
WILLOW CREEK								
AA	12,444	60	124	5.4	194.8	194.8	195.1	0.3
AB	12,686	135	311	2.7	195.7	195.7	196.2	0.5
AC	12,965	116	196	3.9	196.6	196.6	196.9	0.3
AD	13,396	55	137	3.7	198.4	198.4	198.9	0.5
AE	13,596	14	105	4.0	202.7	202.7	202.8	0.1
AF	13,865	16	114	3.7	202.8	202.8	203.2	0.4
AG	14,652	23	95	4.4	205.0	205.0	205.2	0.2
AH	15,104	46	124	3.5	207.4	207.4	207.9	0.5
AI	15,441	32	99	4.9	209.3	209.3	210.0	0.7
AJ	15,823	19	78	5.2	212.4	212.4	213.3	0.9
AK	16,327	26	111	4.0	216.0	216.0	216.7	0.7
AL	16,644	32	117	3.6	217.2	217.2	218.0	0.8
AM	16,766	29	114	2.9	218.2	218.2	219.0	0.8
AN	16,911	56	304	1.7	220.7	220.7	221.5	0.8
AO	17,222	30	100	3.6	221.1	221.1	221.6	0.5
AP	17,530	33	110	3.0	222.2	222.2	223.2	1.0
AQ	17,840	24	81	4.0	223.7	223.7	224.3	0.6
AR	18,331	13	49	7.5	227.4	227.4	227.9	0.5
AS	18,609	18	66	5.4	230.4	230.4	230.9	0.5
AT	18,907	27	90	4.4	232.0	232.0	232.8	0.8
AU	19,203	13	46	6.9	233.9	233.9	234.6	0.7
AV	19,541	48	204	1.5	235.6	235.6	236.5	0.9
AW	19,595	45	204	1.5	235.7	235.7	236.5	0.8
AX	19,789	49	170	1.8	236.2	236.2	236.9	0.7
AY	19,871	75	244	1.2	238.0	238.0	238.1	0.1
AZ	20,085	48	127	2.4	238.1	238.1	238.2	0.1
BA	20,282	36	125	2.4	238.9	238.9	239.0	0.1

[1]Feet above confluence with Beaverton Creek

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR

AND INCORPORATED AREAS

FLOODWAY DATA

WILLOW CREEK

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 1-percent-annual-chance floodplains that are determined in the FIS report by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no Base (1-percent-annual-chance) Flood Elevations (BFEs) or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 1-percent-annual-chance floodplains that are determined in the FIS report by detailed methods. Whole-foot BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 0.2-percent-annual-chance floodplain, areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 sq. mi., and areas protected from the base flood by levees. No BFEs or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The FIRM is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 1-percent-annual-chance floodplains that were studied by detailed methods, shows selected whole-foot BFEs or average depths. Insurance agents use zones and BFEs in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 1- and 0.2-percent-annual-chance floodplains, floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

The countywide FIRM presents flooding information for the entire geographic area of Washington County. Previously, FIRMs were prepared for each incorporated community and the unincorporated areas of the County identified as flood-prone. This countywide FIRM also includes flood-hazard information that was presented separately on the FBFMs, where applicable. Historical data relating to the maps prepared for each community are presented in Table 6, "Community Map History."

7.0 OTHER STUDIES

In 1969, the USACE prepared a Floodplain Information report for Washington County (Reference 28). The 1-percent-annual-chance flood profiles of the Tualatin River tributary streams in this report are based on available data at scattered locations along those Streams. The 1-percent-annual-chance flood profiles of this study are based on mathematical computer analyses using topographic maps and field surveys. Thus, the difference in flood heights is a result of two factors: (1) improved data obtained for the FISs; and (2) lower frequency-discharges that reflect the 1974 completion of the upstream Henry Hagg Lake Project.

FISs have been published for the adjacent Counties of Clackamas (Reference 29) and Tillamook (Reference 30). FHBMs have been published for Columbia County (Reference 31) and the City of Lake Oswego (Reference 32). This FIS is in agreement with these studies.

The published FIS for the City of Portland (Reference 33) does not match this FIS concerning the southwestern corporate limits of Portland. Three "finger" areas of Portland extend into Washington County where flooding is shown in the Washington County study but not studied for the Portland study. The Portland study will be revised to match the adjacent flooded areas in Washington County.

An FHBM for Washington County has been previously published (Reference 26). This FIS is more detailed; therefore, the FIRM supersedes that map.

The engineering consulting firm Kramer, Chin and Mayo, Inc., prepared the Beaverton Creek Flood Study for the City of Beaverton in April 1979 (Reference 34). The study included flood profiles for the 10-, 2-, and 1-percent-annual-chance floods. In August 1982, an updated study was prepared to reflect differences in hydrology and hydraulics resulting from culvert improvements at the SPRR and in the Canyon Road area (Reference 14).

An FIS for the unincorporated areas of Yamhill County, Oregon, is being prepared (Reference 35). Wapato Creek was studied by approximate methods in that study and the 1-percent-annual-chance flood boundaries generally agree between the Yamhill County study and this study.

This FIS report either supersedes or is compatible with all previous studies published on streams studied in this report and should be considered authoritative for the purposes of the NFIP.

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISION DATE(S)	FLOOD INSURANCE RATE MAP EFFECTIVE DATE	FLOOD INSURANCE RATE MAP REVISION DATE(S)
* Banks, City of	N/A	N/A	N/A	-
Beaverton, City of	February 1, 1974	June 25, 1976	September 28, 1984	February 4, 1987 February 8, 2005
Cornelius, City of	November 5, 1976	N/A	January 6, 1982	-
Durham, City of	November 12, 1976	N/A	January 6, 1982	February 18, 2005
Forest Grove, City of	March 1, 1974	April 16, 1976	March 15, 1982	-
Gaston, City of	July 5, 1982	N/A	July 5, 1982	-
Hillsboro, City of	April 12, 1974	April 15, 1977	May 17, 1982	-
King City, City of	February 18, 2005	N/A	February 18, 2005	-
North Plains, City of	July 16, 1976	N/A	April 1, 1982	March 16, 1989
Sherwood, City of	August 13, 1976	N/A	January 6, 1982	-
Tigard, City of	February 14, 1978	N/A	March 1, 1982	February 18, 2005
Tualatin, City of	May 20, 1977	May 2, 1978	February 17, 1982	February 19, 1987
Washington County, Unincorporated Areas	January 24, 1975	September 13, 1977	September 30, 1982	March 18, 1987 February 18, 2005

* This community does not have map history prior to the first countywide mapping.

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR

AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting Federal Insurance and Mitigation Division, FEMA Region X, Federal Regional Center, 130 228th Street, SW, Bothell, Washington 98021-9796.

9.0 BIBLIOGRAPHY AND REFERENCES

1. State of Oregon, Secretary of State, Oregon Blue Book, 1979-1980

2. U.S. Department of Commerce, Census Bureau, American Fact-Finder Population Estimates from: http://factfinder2.census.gov

3. U.S. Department of the Army, Corps of Engineers, Portland District, Review of Survey Report on Tualatin River, Oregon, Appendix A, December 1953

4. Portland State University, Population Estimates: Oregon Counties and Incorporated Cities, July 1978

5. Federal Emergency Management Agency, Flood Insurance Study, Washington County, Oregon, Unincorporated Areas, March 1982, revised February 1987 and February 2005

6. Federal Emergency Management Agency, Flood Insurance Study, City of Tualatin, Washington County, Oregon, February 19, 1987

7. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Code of Federal Regulations, Title 24, Chapter 10, Parts 1910.3A and 3B, Federal Register, Vol. 41, No. 207

8. U.S. Water Resources Council, Hydrology Committee, "Guidelines for Determining Flood Flow Frequency," Bulletin 17A, June 1977

9. U.S. Geological Survey, Open-File Report 79-553, Magnitude and Frequency of Floods in Western Oregon, 1979

10. U.S. Department of Agriculture, Soil Conservation Service, SCS National Engineering Handbook, August 1972

11. U.S. Department of the Army, Corps of Engineers, Hydrologic Engineering Center, Unit Graph and Hydrograph Computation, Computer Program 23-j2-L228, Davis California, July 1966

12. U.S. Department of the Army, Corps of Engineers, Hydrologic Engineering Center, Hydrographic Combining and Routings, Computer Program 23-j2-L232, Davis, California, August 1966

13. U.S. Department of the Army, Corps of Engineers, Hydrologic Engineering Center, Flood Hydrograph Package (HEC-1), Davis, California, January 1973

14. Kramer, Chin and Mayo, Inc., Beaverton Creek Flood Insurance Update, August 1982

15. Federal Emergency Management Agency, Flood Insurance Study, City of Durham, Washington County, Oregon, July 1981

16. U.S. Department of the Army, Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water-Surface Profiles, Generalized Computer Program, Davis, California, November 1976, updated October 1977

17. Unified Sewerage Agency of Washington County, Orthophoto Topographic Maps, Scale 1:4,800, Contour Interval 2 feet, 1975

18. City of Beaverton, Oregon, Topographic Maps, Scale 1:4,800, Contour Interval 4 feet, Spencer B. Gross, May 1971

19. City of Tigard, Oregon, Topographic Maps, Scale 1:4,800, Contour Interval 4 feet, Aerial mapping Company of Oregon, 1974

20. City of Tualatin, Oregon, Topographic Maps, Scale 1:2,400, Contour Interval 2 feet, Aerial Mapping Company of Oregon, 1972

21. U.S. Department of the Army, Corps of Engineers, Topographic Maps, Scale 1:4,800, Contour Interval 4 feet, Spencer B. Gross, May 1977

22. Washington County Land Use and Transportation, Aerial Orthophotographics, 1999

23. Federal Emergency Management Agency, Flood Insurance Study, City of West Linn, Clackamas County, Oregon, September 1976

24. David Smith and Associates, Inc., Aerial Topography, 2-foot contour interval, December 1997

25. Washington County, Oregon, Department of Public Works, Floodplain Delineation Maps, Washington County, Oregon, Scale 1:12,000, Contour Interval variable, 1974

26. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Washington County, Oregon (Unincorporated Areas), Scale 1:24,000, Revised 1977

27. U.S. Department of the Interior, Geological Survey, 7.5-Minute Series Topographic Maps, Scale 1:24,000, Contour Interval 10 feet: Beaverton, Oregon (1961), Photorevised (1970 and 1975)

28. U.S. Department of the Army, Corps of Engineers, Portland District, Floodplain Information, Washington County, Oregon, June 1969

29. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Study, Clackamas County, Oregon (Unincorporated Areas), March 1978

30. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Study, Tillamook County, Oregon (Unincorporated Areas), May 1978.

31. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Columbia County, Oregon (Unincorporated Areas), Scale 1:24,000, Revised 1977

32. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, City of Lake Oswego, Clackamas County, Oregon, November 22, 1977

33. Federal Emergency Management Agency, Flood Insurance Study, City of Portland; Multnomah, Clackamas, and Washington Counties, Oregon, July 16, 1980

Federal Emergency Management Agency, CHECK-2 – Automated HEC-2 Review Program – User's Manual, Version 1.0, September 1996

Federal Emergency Management Agency, Flood Insurance Study Guidelines and Specifications for Study Contractors, January 1995

10.0 REVISIONS DESCRIPTIONS

This section has been added to provide information regarding significant revisions made since the original FIS reports for the individual communities were printed. Future revisions may be made that do not result in the republishing of the FIS report. To assure that user is aware of all revisions, it is advisable to contact the community repository of flood-hazard data located at the Department of Land and Water Resources, 201 South Jackson Street, Suite 600, Seattle, Washington 981-3855.

10.1 First Revision

Countywide Update

The countywide update was performed by Black & Veatch Corporation for the Federal Emergency Management Agency (FEMA), under Contract No. HSFEHQ-04-D-0025 and was completed in September 2010.

This update combined the Flood Insurance Rate Maps and Flood Insurance Study reports for Washington County and incorporated communities into the countywide format. Under the countywide format, Flood Insurance Rate Map panels have been produced using a single layout format for the entire area within the County instead of separate layout formats for each community. The single-layout format facilitates the matching of adjacent panels and depicts the flood-hazard area within the entire panel border, even in areas beyond a community's corporate boundary line. In addition, under the countywide format, this single Flood Insurance Study report provides all Flood Insurance Study information and data for the entire County area.

All flood elevations shown in this FIS report and on the FIRM panels were converted from NGVD 29 to NAVD 88. The conversion factor from NGVD to NAVD for all streams in this report is +3.52 feet.

As apart of the countywide format, Tualatin River and its major tributaries were studied. Approximately 167.20 miles of waterways located in Washington County, Oregon were either newly studied or restudied. A total of 46.68 miles were redelineated from the effective flood insurance rate maps.

Tualatin River and its tributaries study was completed by Pacific Water Resources, Inc. (PWR) under contract to Clean Water Services (CWS) in January 2006. Table 7 shows the streams that were studied and restudied in Washington County.

In June 2000, as part of a comprehensive project called Watersheds 2000, CWS contracted with three consulting engineering firms to create HEC-HMS and HEC-RAS models of streams in its service area. CWS divided the streams into three regions: East, Central, and South. PWR created models in the East region plus the upper Tualatin River, TetraTech/KCM (TTKCM) created models in the Central region, and Phil Williams & Associates, Inc. (PWA) created models in the South region plus the lower Tualatin River.

In November 2001, as part of the Tualatin Basin Floodplain Mapping project, CWS contracted with PWR to take about 167.2 miles of the HEC-RAS models in Washington County developed for the Watersheds 2000 project and complete a detailed riverine flood insurance restudy for all three regions plus the upper and lower Tualatin River. This work included incorporating models originally developed by TTKCM and PWA and developing floodway models, then creating the mapping layers and the compiling the FEMA submission.

The February 1996 flood on the Tualatin River was the largest flood flow ever recorded with an estimated 1.2-percent-annual-chance flood. However, for almost all of the smaller urbanized Tualatin River tributaries that were studied, the November 1996 flood is thought to be the largest flood ever observed with an estimated 25-year return interval and an annual probability of recurrence of 4 percent.

Table 7 - Revised Waterway Study Reaches

Reach Name	Reach Location	Approximate Reach Miles
Beal Creek	Mouth to 700 feet above Main St	0.52
Beaverton Creek	Mouth to SW 78th Ave	11.70
Bethany Creek	Mouth to 1200 feet above NW 174th Ave	1.13
Bronson Creek	Mouth to below NW Laidlaw Road	5.45
Butternut Creek	Mouth to SW Farmington Road	5.11
Cedar Creek	Mouth to above SW Sunset Blvd	2.93
Cedar Mill Creek	Mouth to 800 feet upstream of NW 113th Ave	4.90
Celebrity Creek	Mouth to below SW Farmington Road	1.05
Chicken Creek	Mouth to SW Edy Road	2.90
Chicken Creek - West Fork	Mouth to to 1500 feet upstream	0.29
Council Creek	Mouth to Purdin Road (Verboort Road)	6.68
Dairy Creek	Mouth to mile 4.7	4.71
Dawson Creek	Mouth to 1500 feet above NE Shute Road	3.06
Deer Creek	Mouth to NW 174th Ave	0.65
Erickson Creek	Mouth to 350 feet above SW 10th Ave	1.64
Glencoe Swale	Mouth to 2800 feet above NW Sewell Road	4.07
Golf Creek	Mouth to SW Canyon Road	0.67
Gordon Creek	Mouth to to 500 feet below T.V. Hwy	1.91
Hall Creek	Mouth to SW 99th Ave	2.20
Hall - Middle Fork	Mouth (SW 99th Ave) to SW 87th Ave	0.76
Hall - North Fork	Mouth to below Hwy 217 Ramp	0.61
Hall - South Fork	Mouth (SW 99th Ave) to SW 86th Ave	0.80
Hall - SW 106th Ave Trib	Mouth to below SW Walker Road	0.54
Hedges Creek	Mouth to edge of mapping near SW Myslony Street	2.69
Holcomb Creek	Mouth to below gravel road 2800 feet below Dick Rd.	2.02
Johnson Creek North	Mouth to 800 feet below SW Brookside Drive	2.73
Johnson Creek North - East Trib	Mouth to 600 feet SW 99th Ave	0.36
Johnson Creek North – N. Trib	Mouth to below SW 107th Ave	0.60
Johnson Creek South	Mouth to SW Hart Road	2.37
McKay Creek	Mouth to P&W Railroad, above NW West Union Rd	10.30
Nyberg Creek	Mouth to below SW Boones Ferry Road	2.54
Rock Creek	Mouth to below P&W Railroad	16.80
Rock Creek South	Mouth to Oregon Street	2.05
Storey Creek	Mouth to mile 2.0	1.97
Storey Creek - East Trib	Mouth to mile 0.8	0.84
Storey Creek - Middle Trib	Mouth to NW West Union Road	0.77
Tualatin River	Mouth to to River Mile 17.1	17.11
Tualatin River	500 feet below Butternut Creek to 7500 feet above Gales Creek	26.78
Turner Creek	Mouth to below NE Cornell Rd. near Hillwood Dr.	1.99
Waible Creek	Mouth to NW West Union Road	4.93
Waible - North Trib	Mouth to NW West Union Road	0.60
Waible - South Trib	Mouth to NW Jacobson Road	1.62
Willow Creek	Mouth to NW 141st Place	3.85

The flood peak discharges used for mapping the flooding along the mainstem of the Tualatin River including the Rivergrove Gap and Oswego Canals were based on a flood frequency analysis of historic gaged annual peak flows after accounting for the effect of the upstream regulation at Hagg Lake. This analysis was documented in the report entitled "Estimated Flood Peak Discharges of the Tualatin River" dated May 2003 (revised), prepared for CWS of Washington County Oregon by Roger Sutherland, PE and Seth Jelen, PE of PWR. The flood peak discharges for mapping the flooding along the tributary waterways of the Tualatin River were based on HEC-HMS hydrologic modeling of these watersheds. The hydrologic modeling techniques used were documented in the report entitled "Hydrologic Modeling for the Watersheds 2000 Project" (Tributary Report) dated June 2, 2003, prepared for CWS of Washington County Oregon by Phillip Pommier, PE, of PWR.

The proposed discharges for the Tualatin tributary stream, which were developed from HEC-HMS modeling and account for snowmelt and antecedent moisture conditions, are reasonable and appropriate.

The Peak discharge for the February 1996 flood along the Tualatin River was recorded at the following USGS gaging stations: Dilley; Golf Course Road; Road Bridge; Farmington; and West Linn.

Digital methods were used wherever possible to reduce redundant work effort and automate the direct transfer of data. They were used to directly convert a network of sections and alignments into section positions and distances, and to convert survey and data to the model ground cross sections, and to automatically map the 1- and 0.2-percent-annual-chance floodplain boundaries using digital three-dimensional face data. Digital methods were used to directly map the floodway boundaries based on widths from the model output and to use that same data for the floodway data table in a spreadsheet.

Analyses for water surface profiles were done with the USACE HEC-RAS Version 3.11 and PWR confirmed that reaches can be executed in Version 3.12.

In keeping with NFIP standard methods, PWR used normal depth (using average floodplain slope at the bottom) as the downstream boundary condition for modeling the base and encroached-floodway profiles, then applied backwater from downstream sources to obtain the regulatory 1-percent-annual-chance flood elevation used for the floodway data table, the profiles, and the floodplain mapping. This is also consistent with the downstream condition used in the effective profiles for those streams being restudied.

In some cases, PWR concluded that two stream systems were so near each other and so similar in size and orientation that it would be more appropriate to model their flood peak as coincident in time from the same flooding source. In these cases, the models were combined into a single HEC-RAS model and the hydraulics of their junction modeled within HEC-RAS automatically. These streams include the Cedar Mill-North Johnson Creek system, the Storey Creek system, the Waible Creek system, and the Beaverton-Hall Creek system. Even in these cases, the downstream boundary condition of the primary creek was modeled using normal depth with backwater from its receiving water as described above.

Note that the City of Tualatin is a multi-county community with areas in Washington and Clackamas counties. The Washington County DFIRM was previously clipped to the Washington County boundary, and as a result the City of Tualatin was split between Washington County and Clackamas County. In order to avoid having two reference maps and FIS reports for the City of Tualatin, and also considering the FEMA guidelines for multi-county communities, the Washington County DFIRM was extended into Clackamas County to include the full extent of the City of Tualatin. This inclusion adds a 5541 ft reach of the Tualatin River and a 1805 ft reach of Nyberg Slough to the Washington County DFIRM and FIS. Cross section lettering along the Tualatin River matches the Clackamas County DFIRM to cross section “AF” (county boundary), at which point the cross section lettering sequence resets to “A”. The cross section lettering on the Nyberg Slough is continuous.

Note that with the Beaverton-Hall Creek system the junction involved a hydraulically complex underground junction modeled externally using the Water Surface Pressure Gradient for Windows (WSPGW) model with overflow balanced using HEC-RAS. Although Hall and Beaverton Creeks share hydraulics of this junction as if they were tributaries to a single larger watershed, Hall Creek is modeled as a separate HEC-RAS model using a starting (downstream) condition rating curve developed from the WSPGW model at that junction.

As noted in the April 2003 Guidelines, PWR did check water surface elevations in each tributary that was modeled separately from its main stream and found that the main stream was always higher.

Channel and overbank roughness factors (Mannings “n” values) were assigned based on field visits and recent high resolution aerial photos. The range of both channel and overbank “n” values used in each of the hydraulic models are shown in Table 4. In 2000, PWR submitted the Fanno Creek FIS restudy, which is also in the Tualatin Basin (between the East and South regions). The calibration of Fanno Creek hydraulic model supported much higher “n” values than those that are generally found in

common literature sources such as Chow and USGS, the “n” values were ultimately lowered to a more reasonable range.

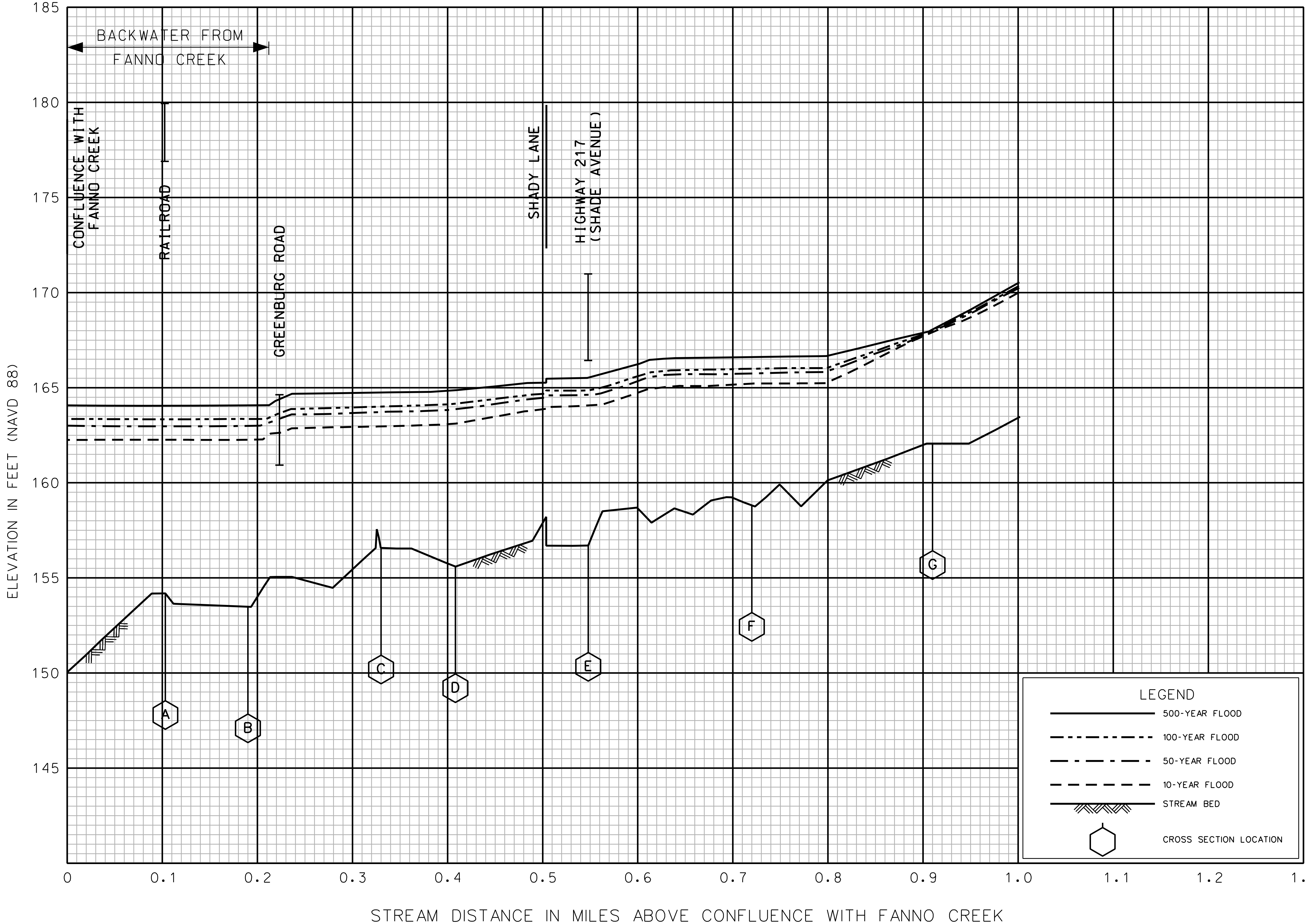
The “n” values used for the Tualatin Basin Floodplain Mapping Project were based on a tabulation of values and their corresponding description of channel and overbank characteristics. The three modeling teams (from the Watersheds 2000 work) for this project coordinated and agreed based on professional engineering judgment to use these “n” value tables.

Water surface profile computations at bridges are based on present normal bridge openings. Consideration was not given either to the possible blockage of bridge openings by sediment and debris or to future bridge enlargement.

All elevations are referenced to the North American Vertical Datum of 1988 (NAVD 88).

New 2-foot contour maps for Ash Creek, Fanno Creek and Summer Creek, based on aerial photography taken in December, 1997 (Reference 24), were developed by David Smith and Associates.

This study matches downstream backwater elevations from the existing published FIS for the Tualatin River. An additional study for areas of Fanno Creek upstream of Washington County (i.e., City of Portland) has not been published yet.



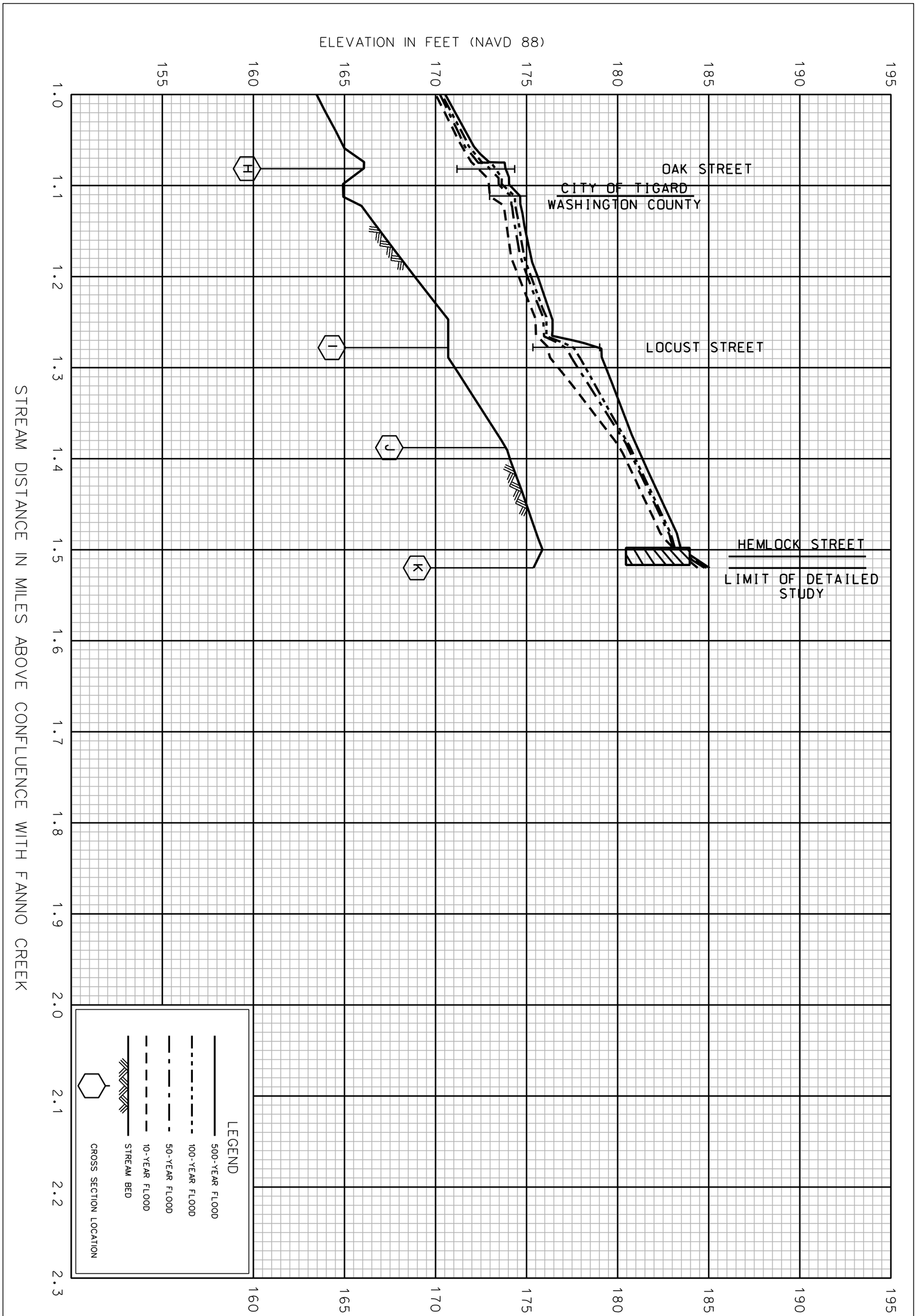
FLOOD PROFILES

ASH CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR AND INCORPORATED AREAS

01P

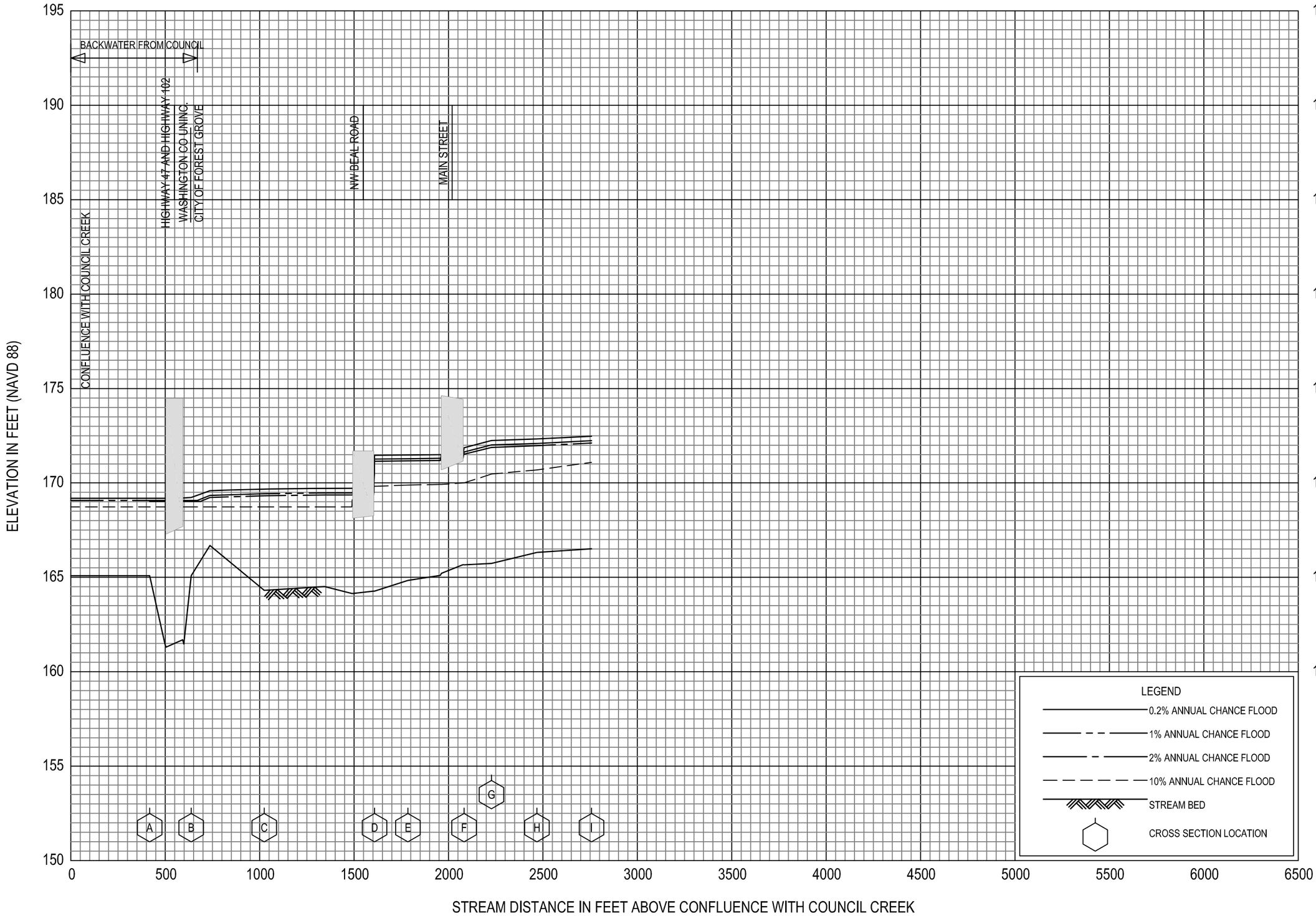


02P

FEDERAL EMERGENCY MANAGEMENT AGENCY
WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

FLOOD PROFILES

ASH CREEK



FLOOD PROFILES

BEAL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

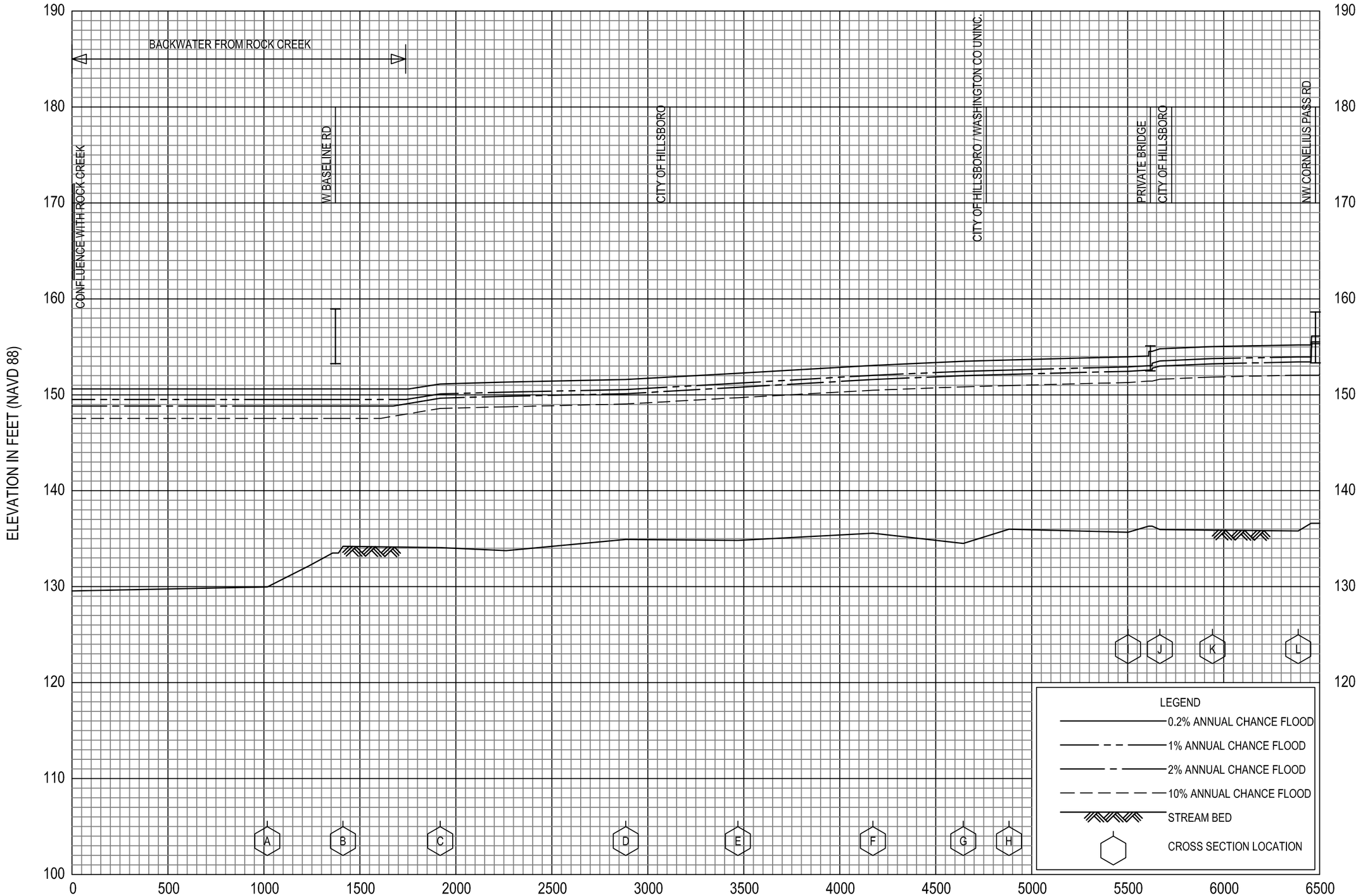
03P

FLOOD PROFILES

BEAVERTON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS



04P

FLOOD PROFILES

BEAVERTON CREEK

ELEVATION IN FEET (NAVD 88)

200
190
180
170
160
150
140
130
120
110

WASHINGTON CO UNINC.
FOOTBRIDGE
SW 206TH AVE
CONFLUENCE WITH BRONSON CREEK

M N O P Q R S T U V

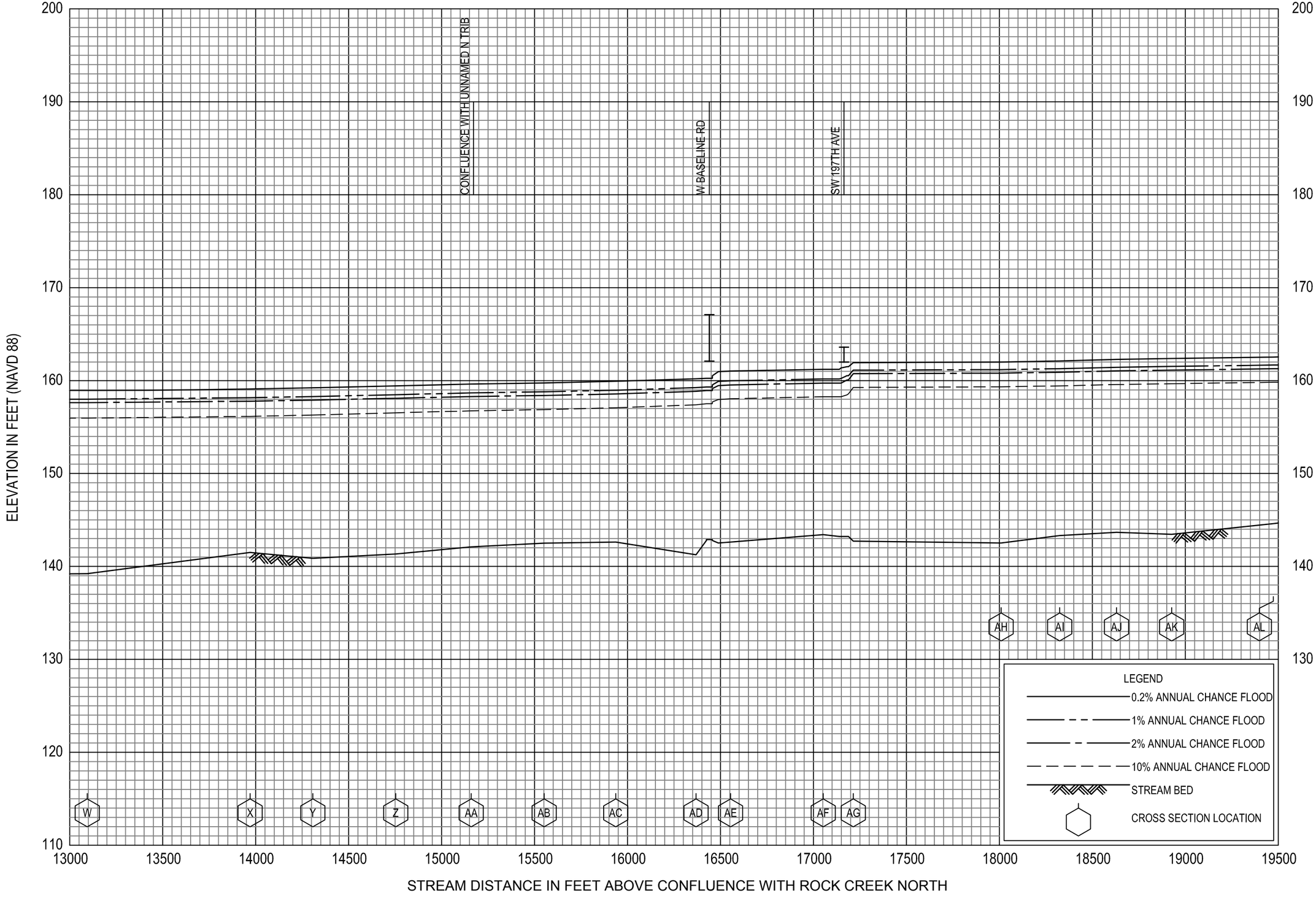
LEGEND
- 0.2% ANNUAL CHANCE FLOOD
- 1% ANNUAL CHANCE FLOOD
- 2% ANNUAL CHANCE FLOOD
- 10% ANNUAL CHANCE FLOOD
- STREAM BED
- CROSS SECTION LOCATION

6500 7000 7500 8000 8500 9000 9500 10000 10500 11000 11500 12000 12500 13000

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH ROCK CREEK NORTH

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS



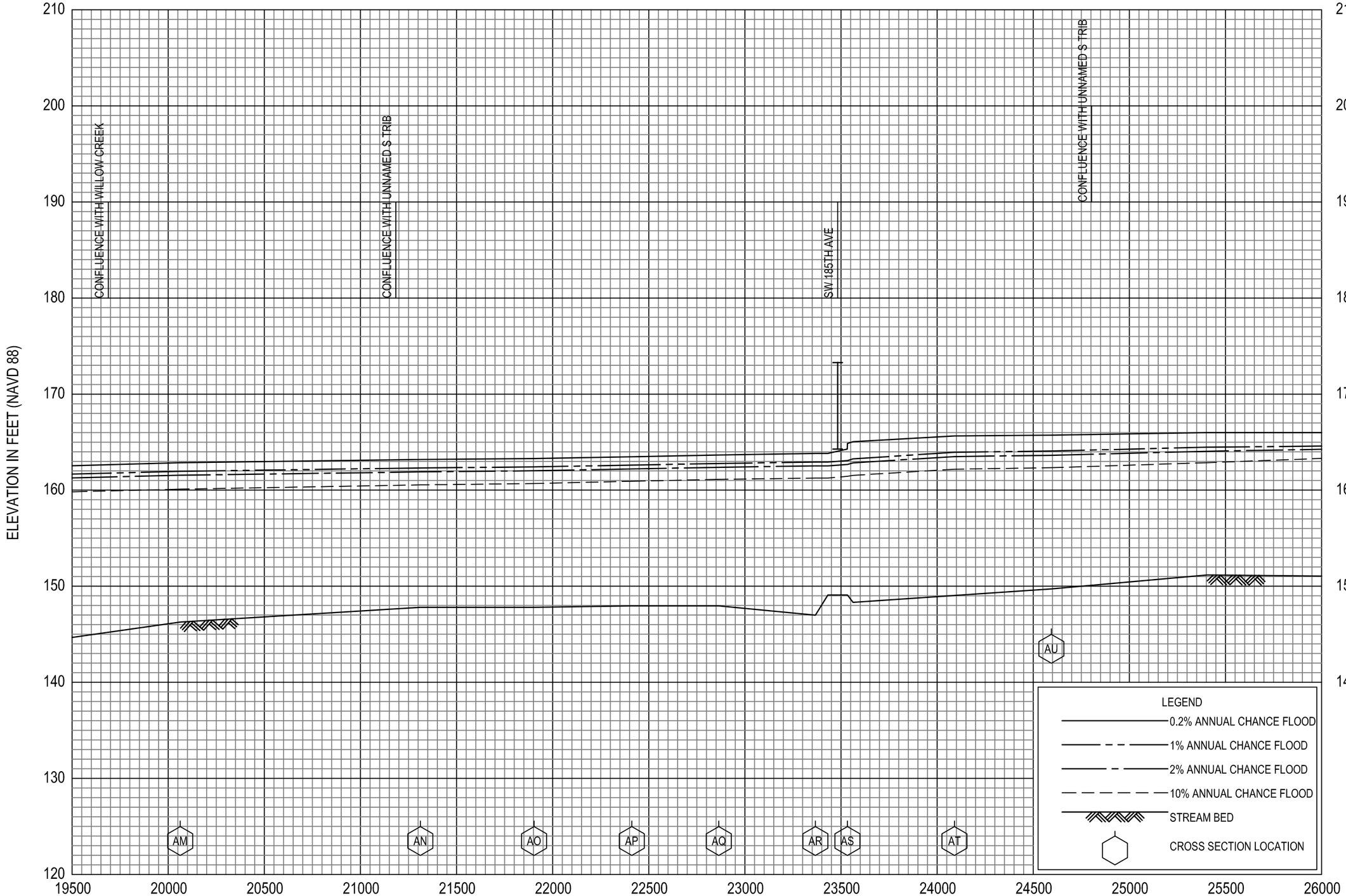
FLOOD PROFILES

BEAVERTON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

06P



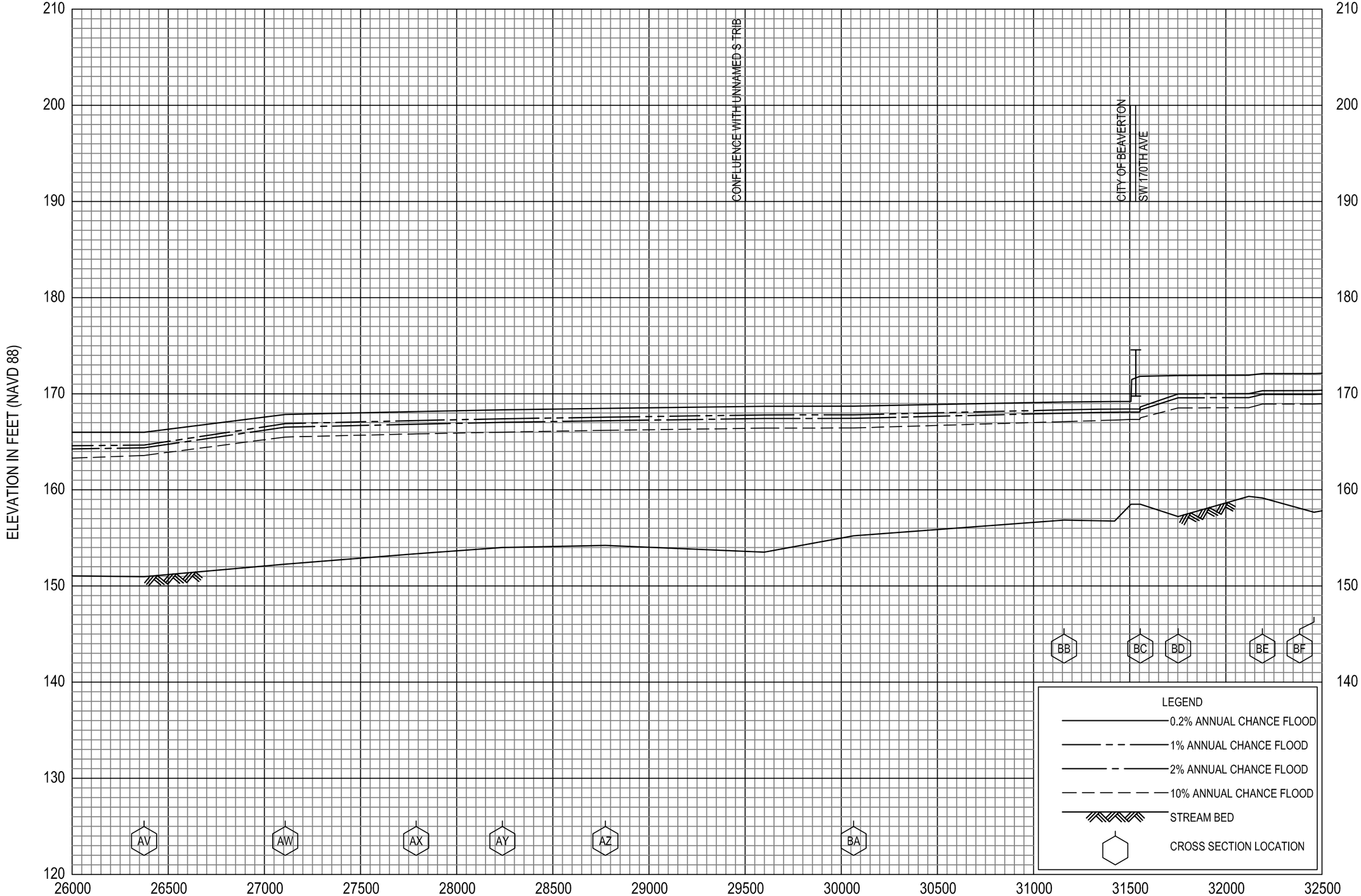
FLOOD PROFILES

BEAVERTON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

07P



FLOOD PROFILES

BEAVERTON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

08P

FLOOD PROFILES

BEAVERTON CREEK

ELEVATION IN FEET (NAVD 88)

220
210
200
190
180
170
160
150
140
130

CONFLUENCE WITH CEDAR MILL
FOOTBRIDGE
CONFLUENCE WITH UNNAMED S TRIB
CONFLUENCE WITH UNNAMED S TRIB
SW MILLIKAN BLVD
P & W RAILROAD
FOOTPATH
CONFLUENCE WITH SOUTH JOHNSON CREEK

BG BH BI BJ BK BL BM BN BO BP BQ BR BS

LEGEND
0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION

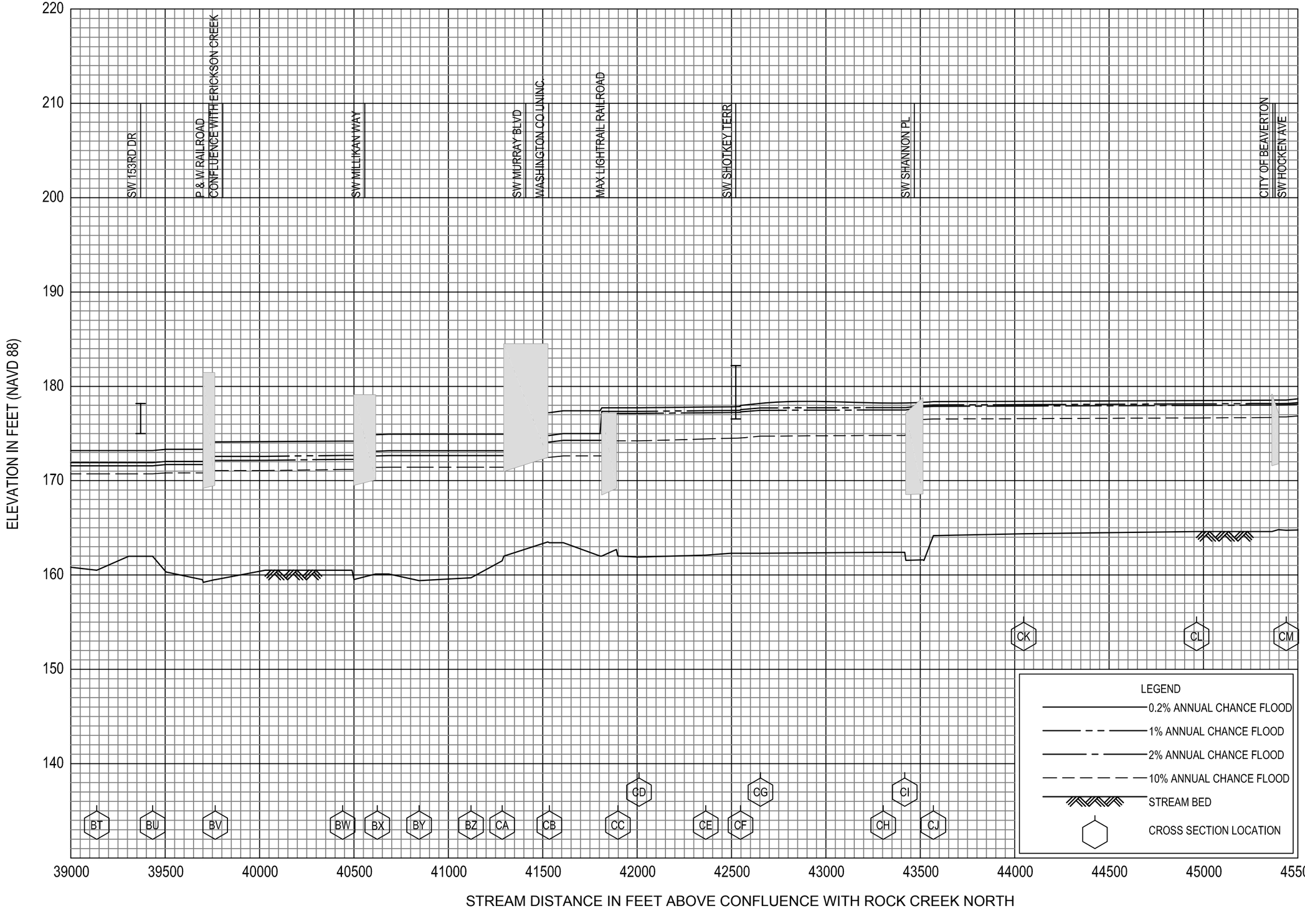
32500 33000 33500 34000 34500 35000 35500 36000 36500 37000 37500 38000 38500 39000

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH ROCK CREEK NORTH

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

09P

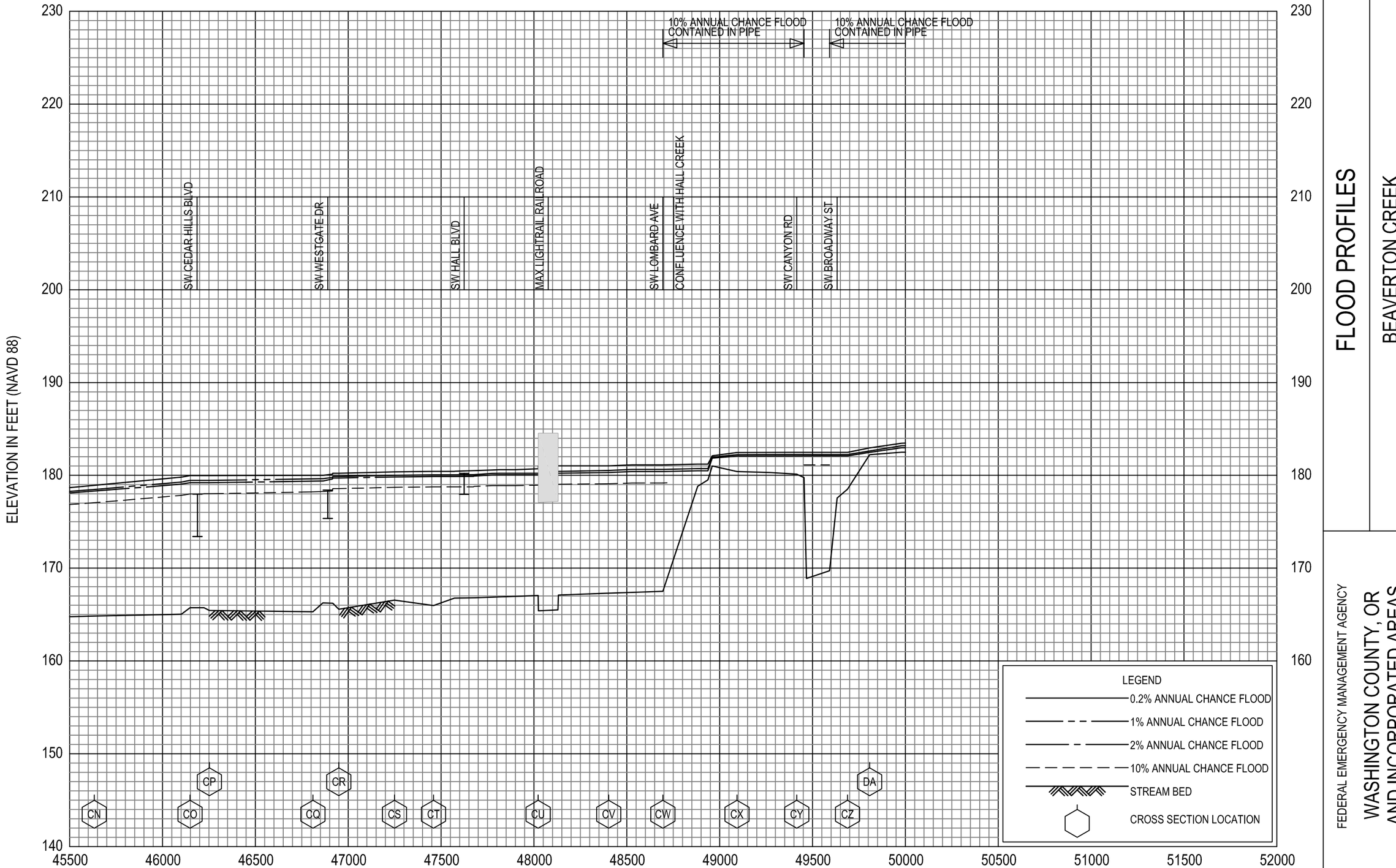


FLOOD PROFILES

BEAVERTON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

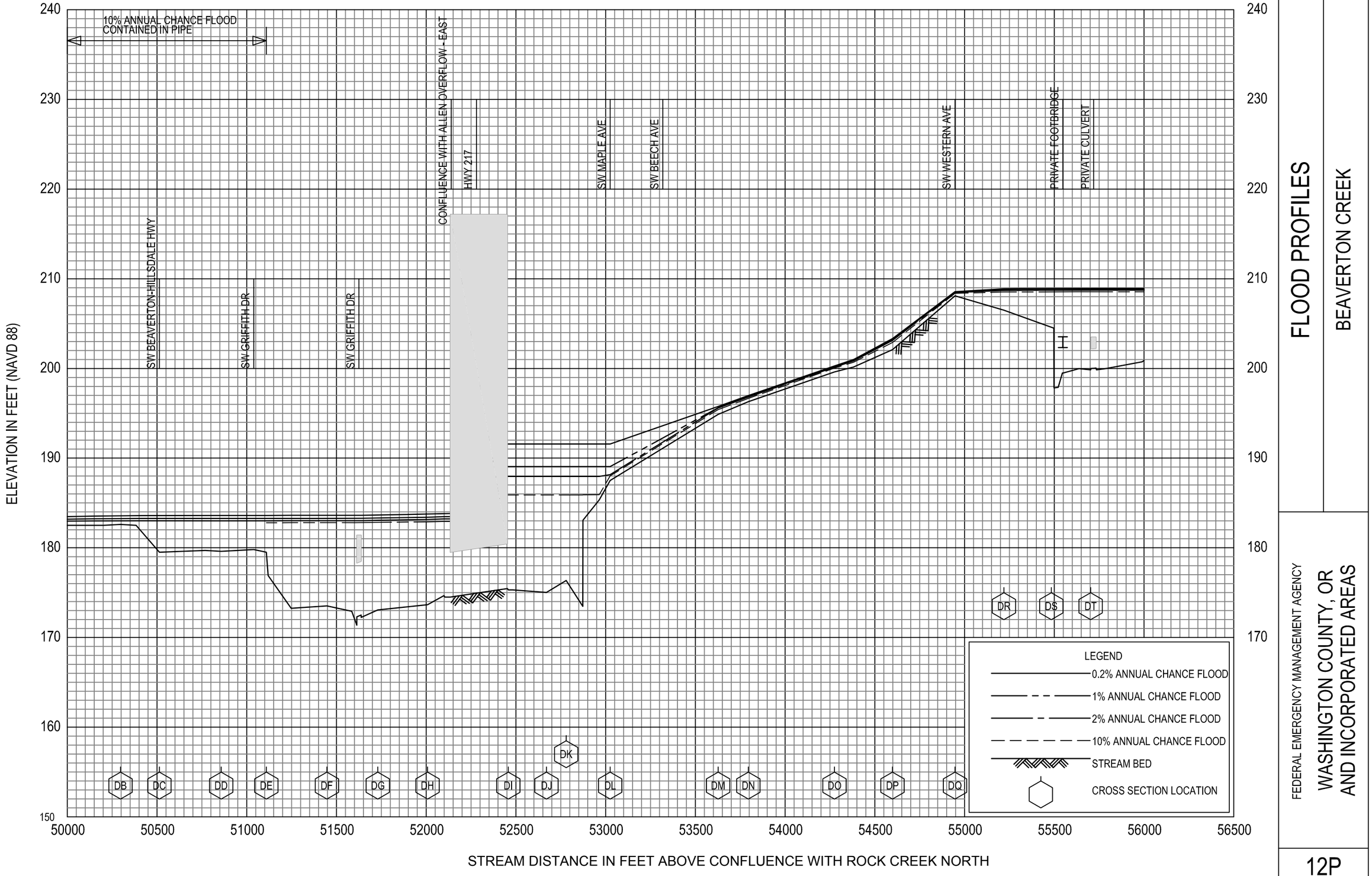


FLOOD PROFILES

BEAVERTON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS



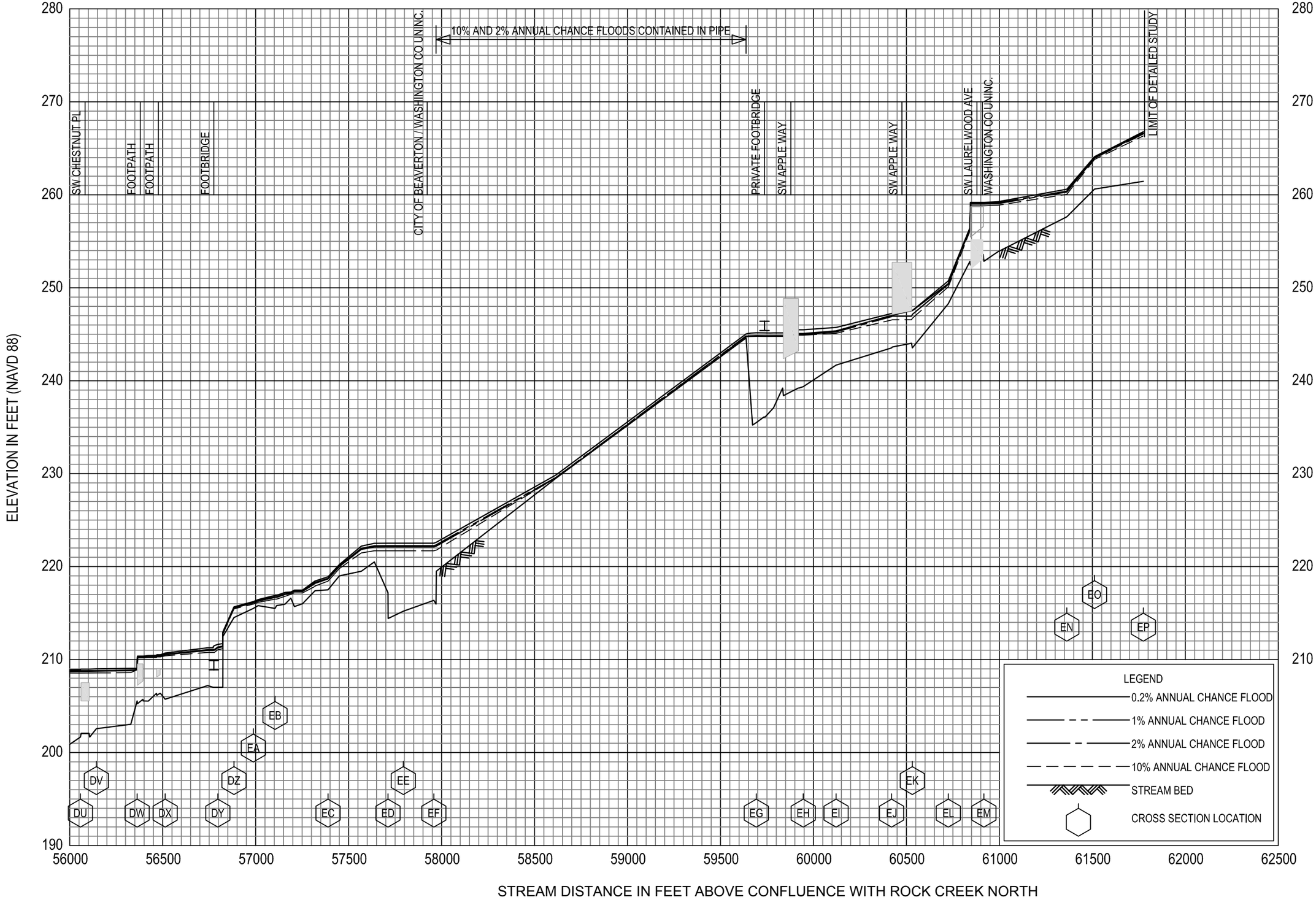
FLOOD PROFILES

BEAVERTON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

12P

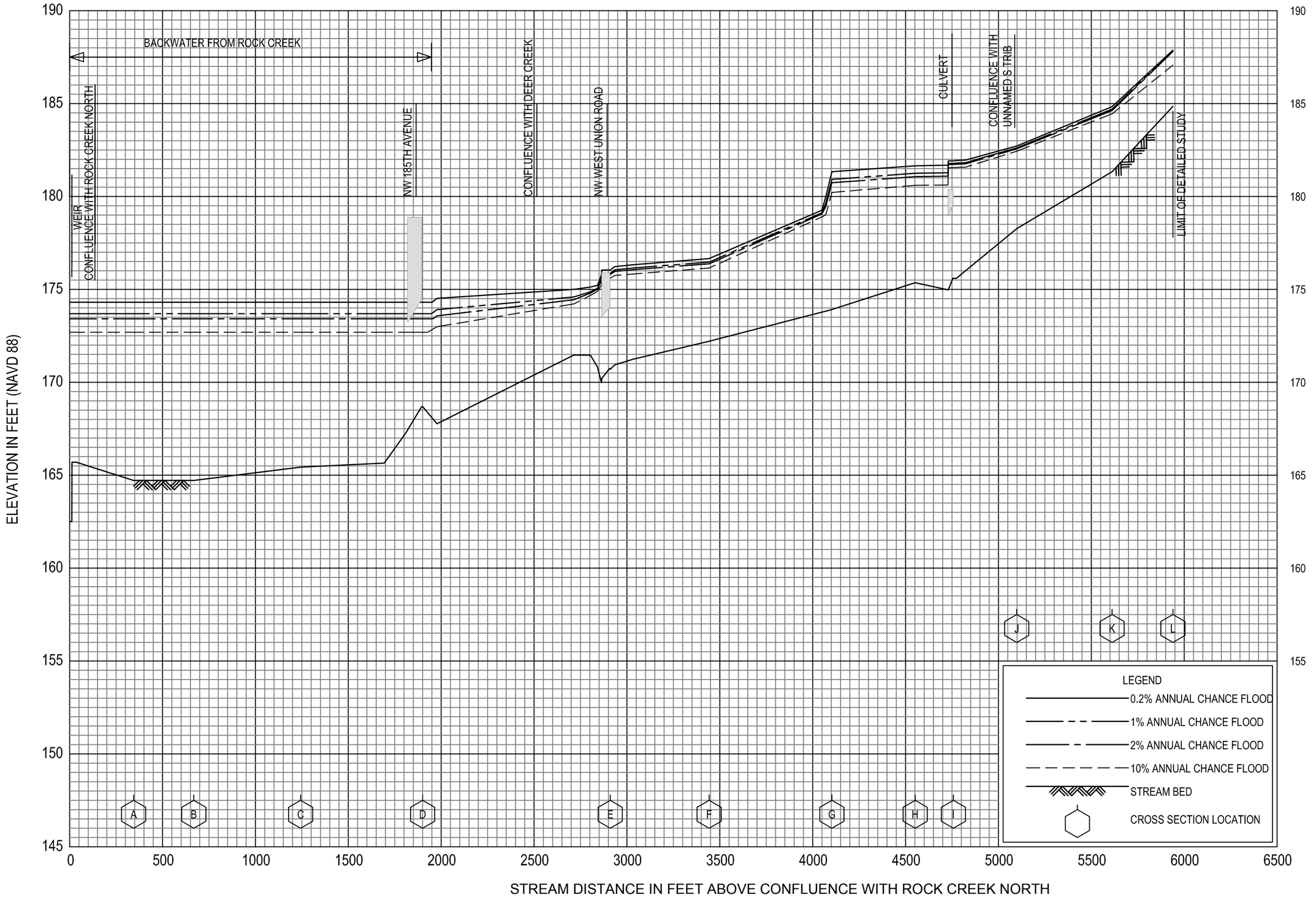


FLOOD PROFILES

BEAVERTON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

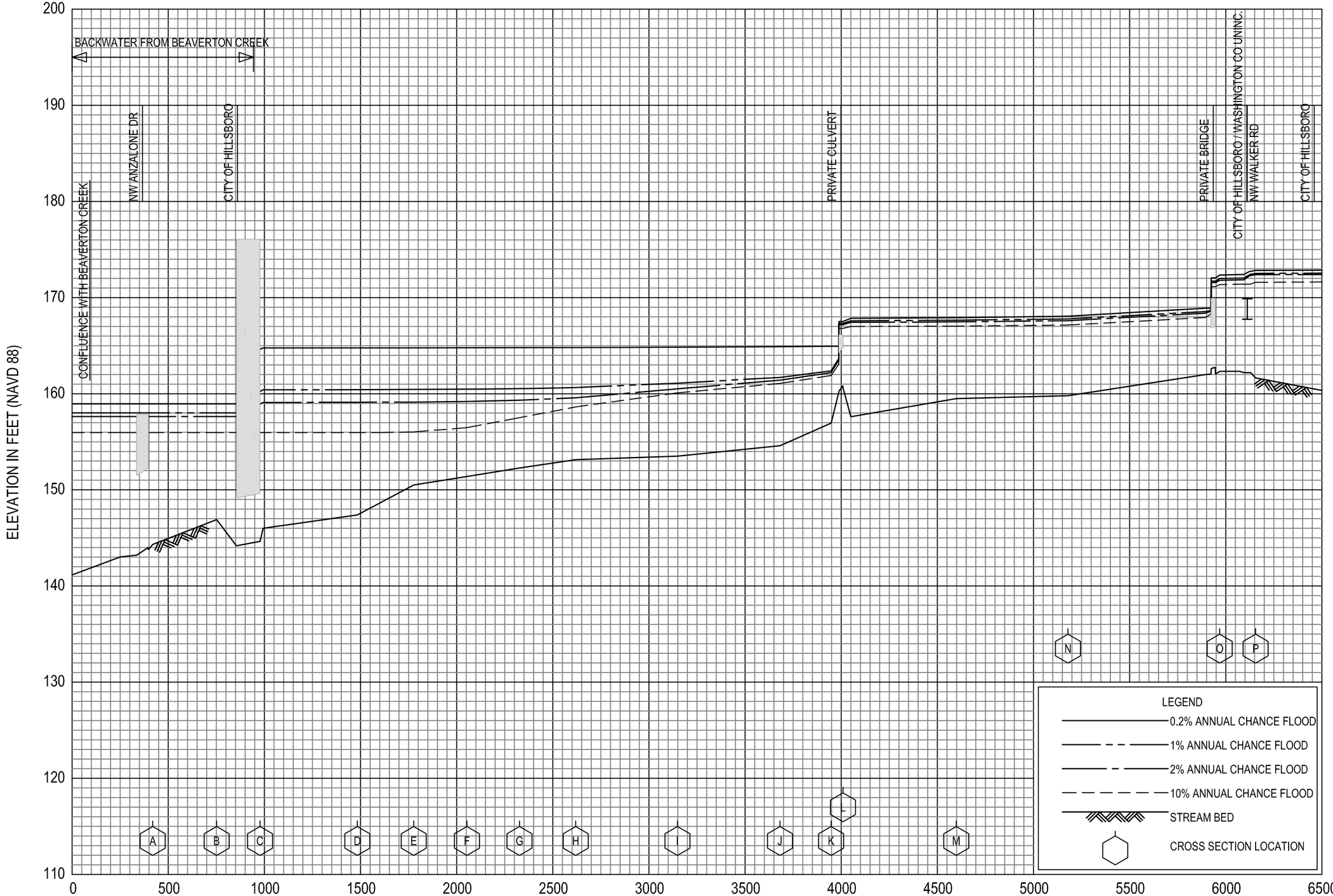


FLOOD PROFILES

BETHANY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS



FLOOD PROFILES

BRONSON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

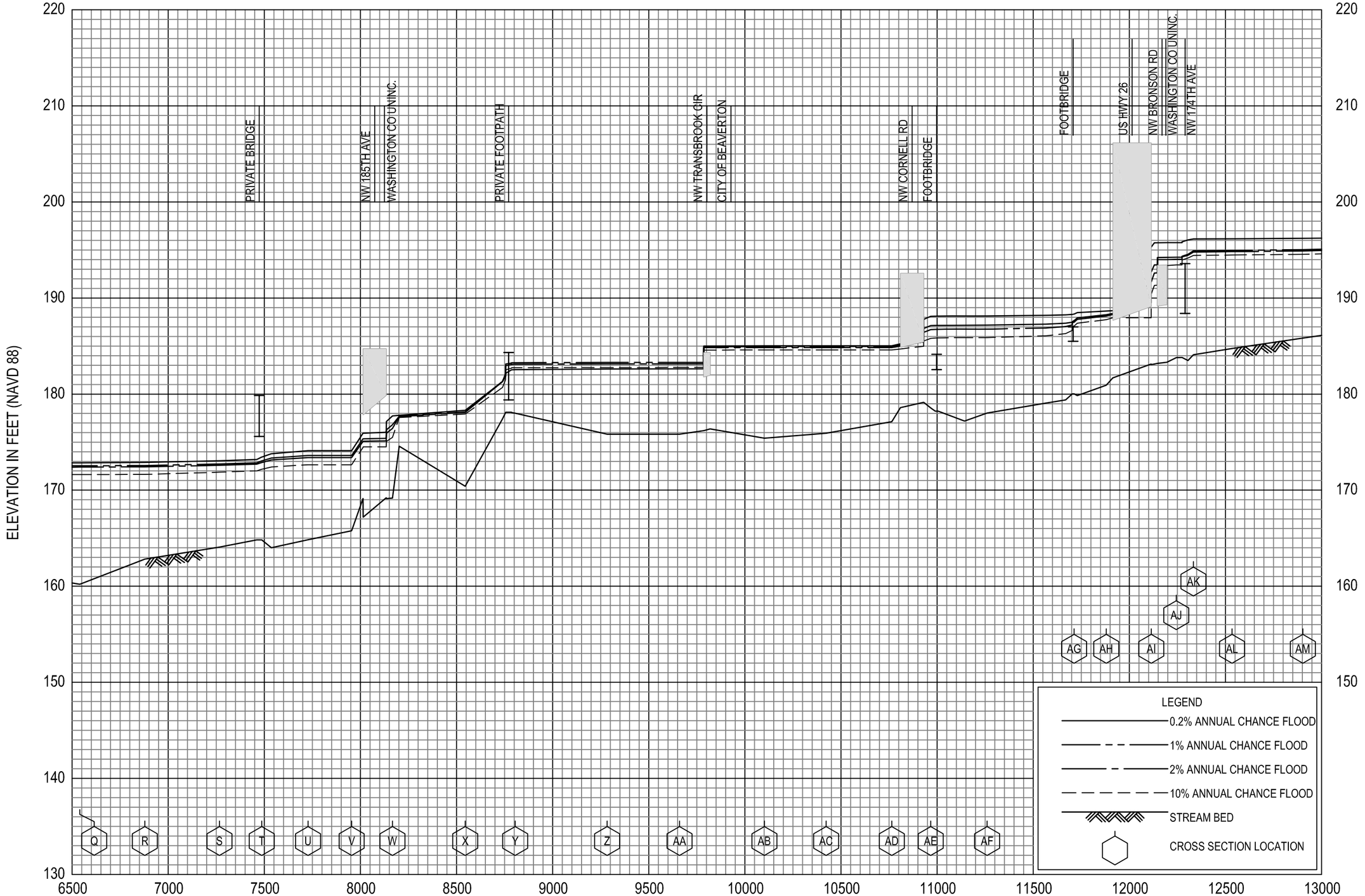
15P

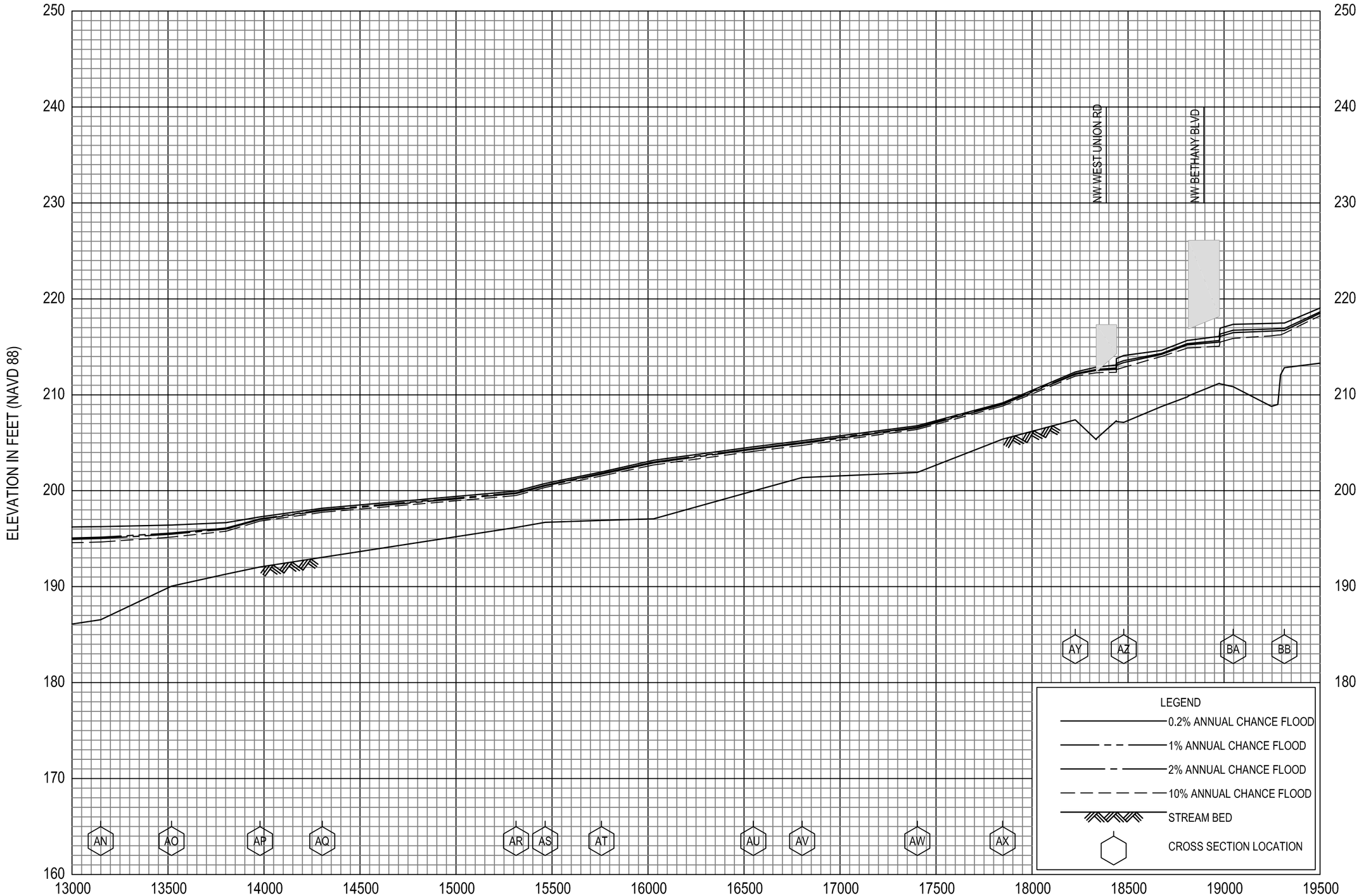
FLOOD PROFILES

BRONSON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS



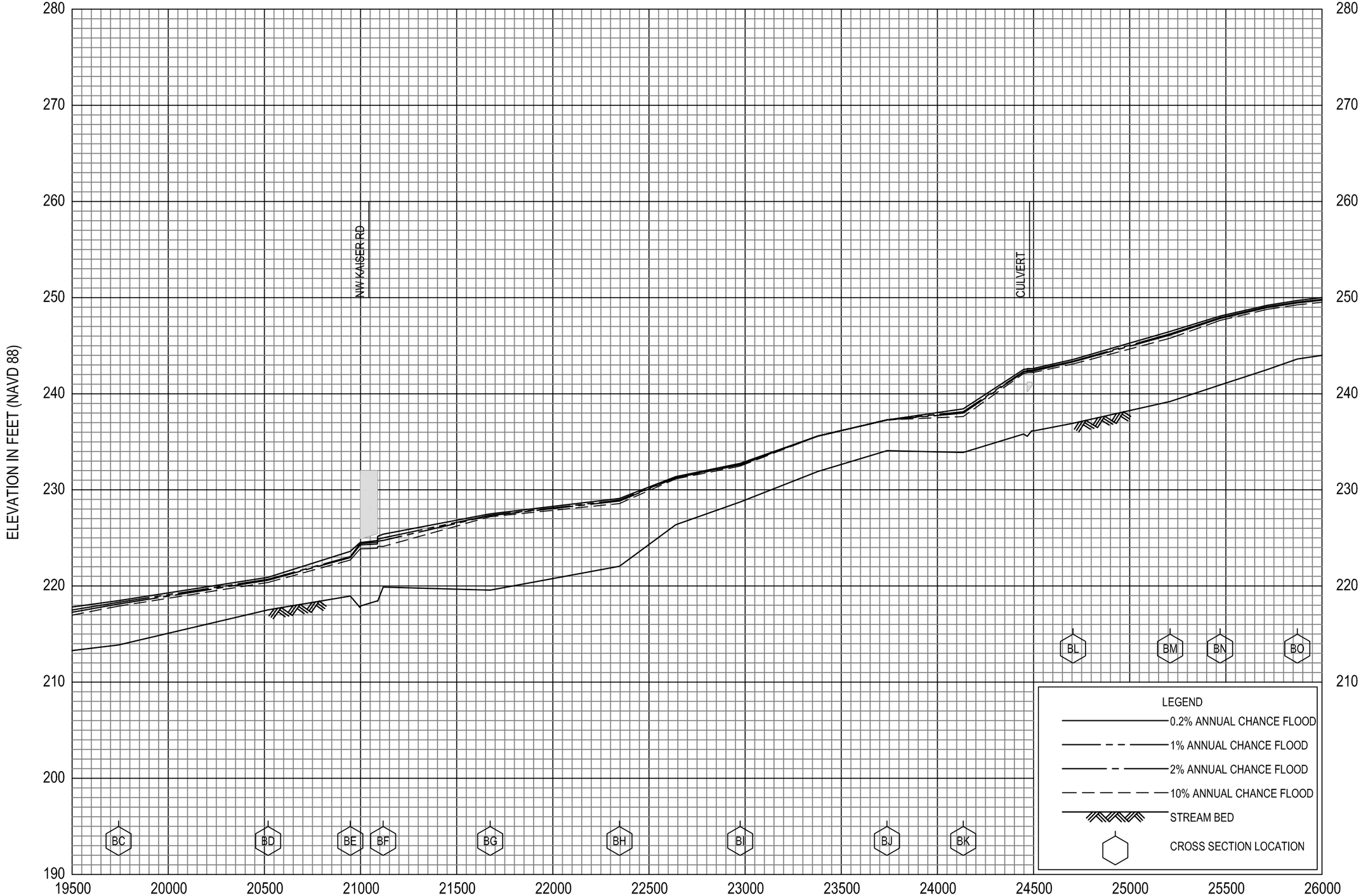


FLOOD PROFILES

BRONSON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY , OR
AND INCORPORATED AREAS

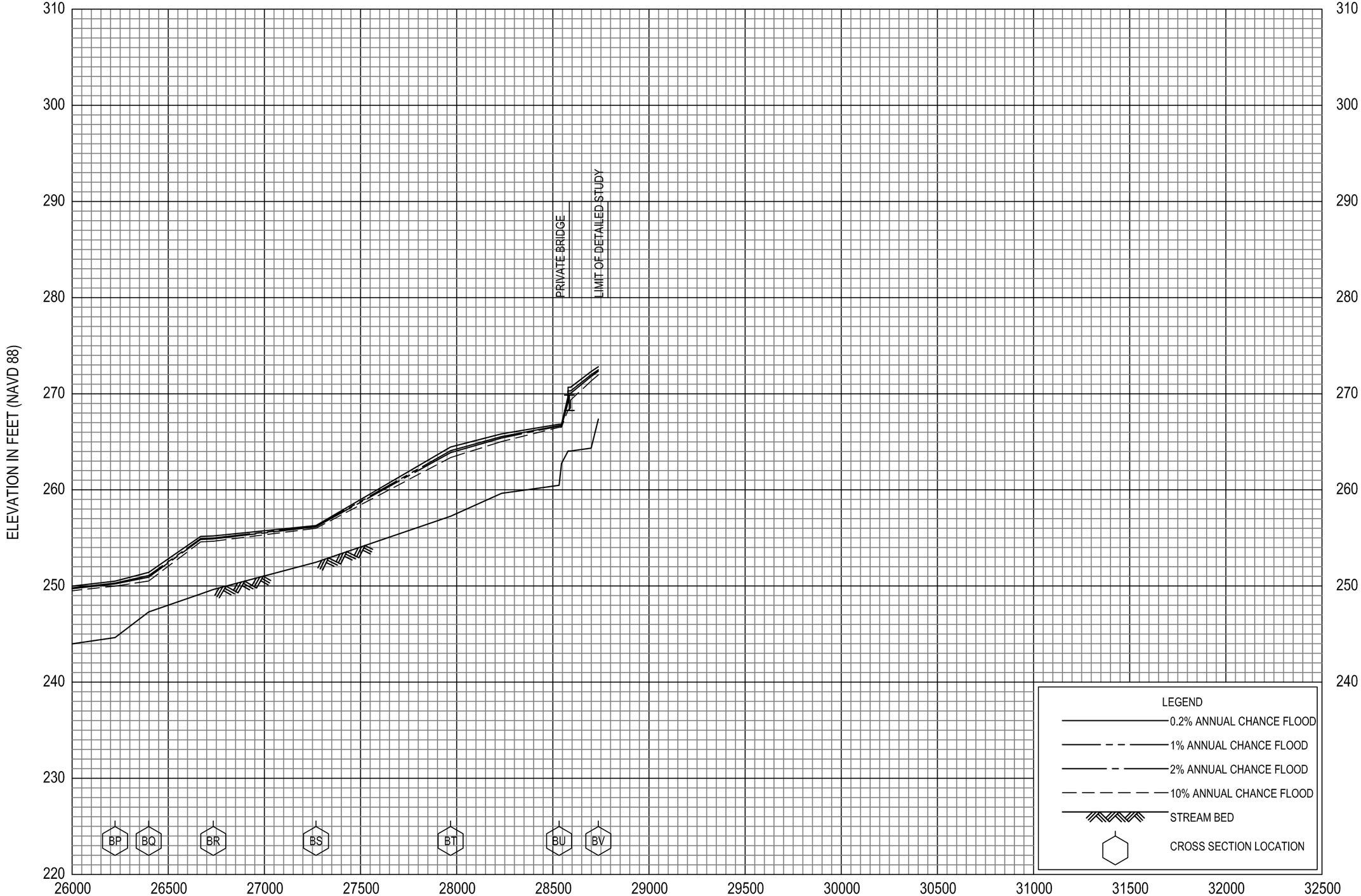


FLOOD PROFILES

BRONSON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY , OR
AND INCORPORATED AREAS

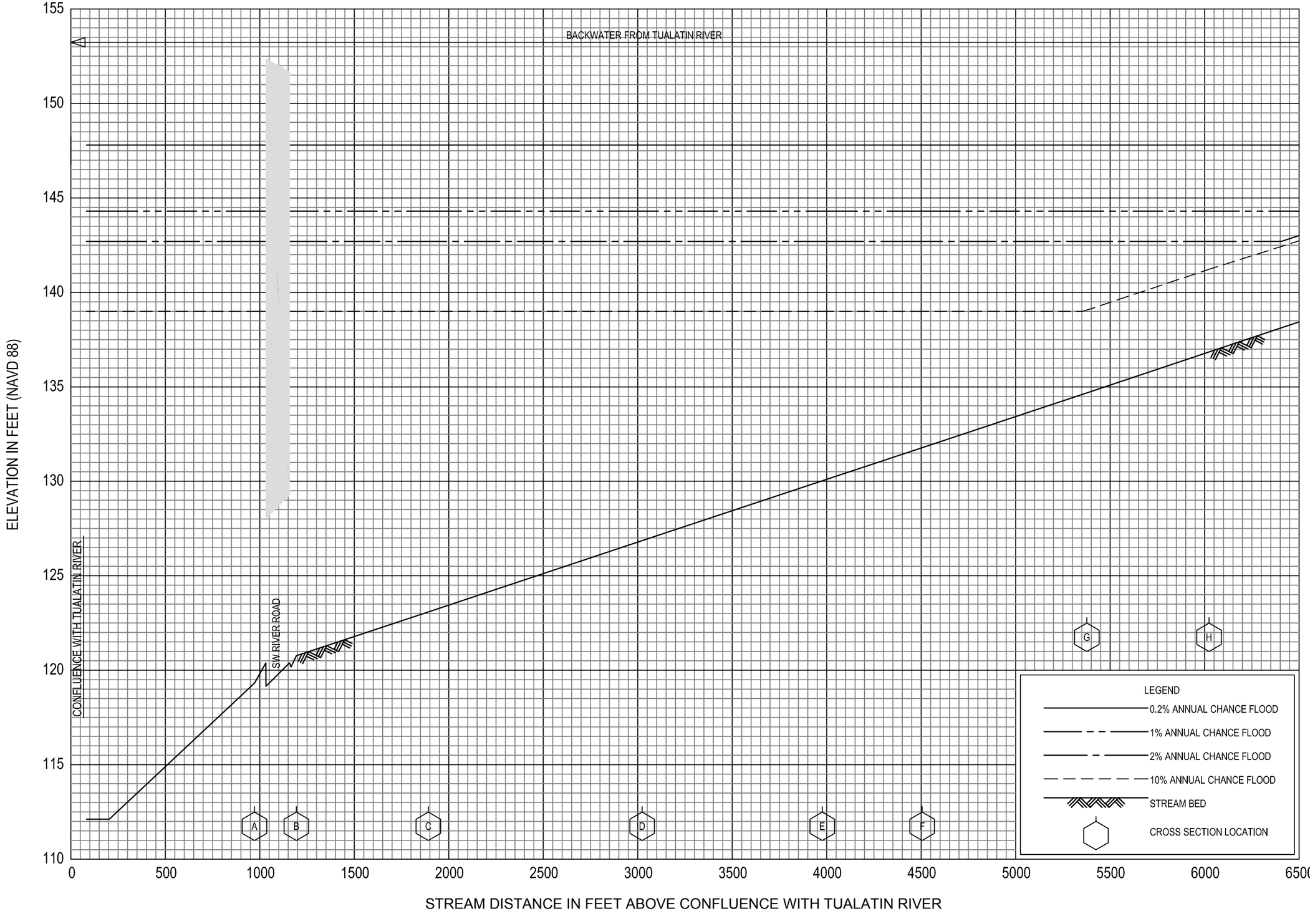


FLOOD PROFILES

BRONSON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY , OR
AND INCORPORATED AREAS

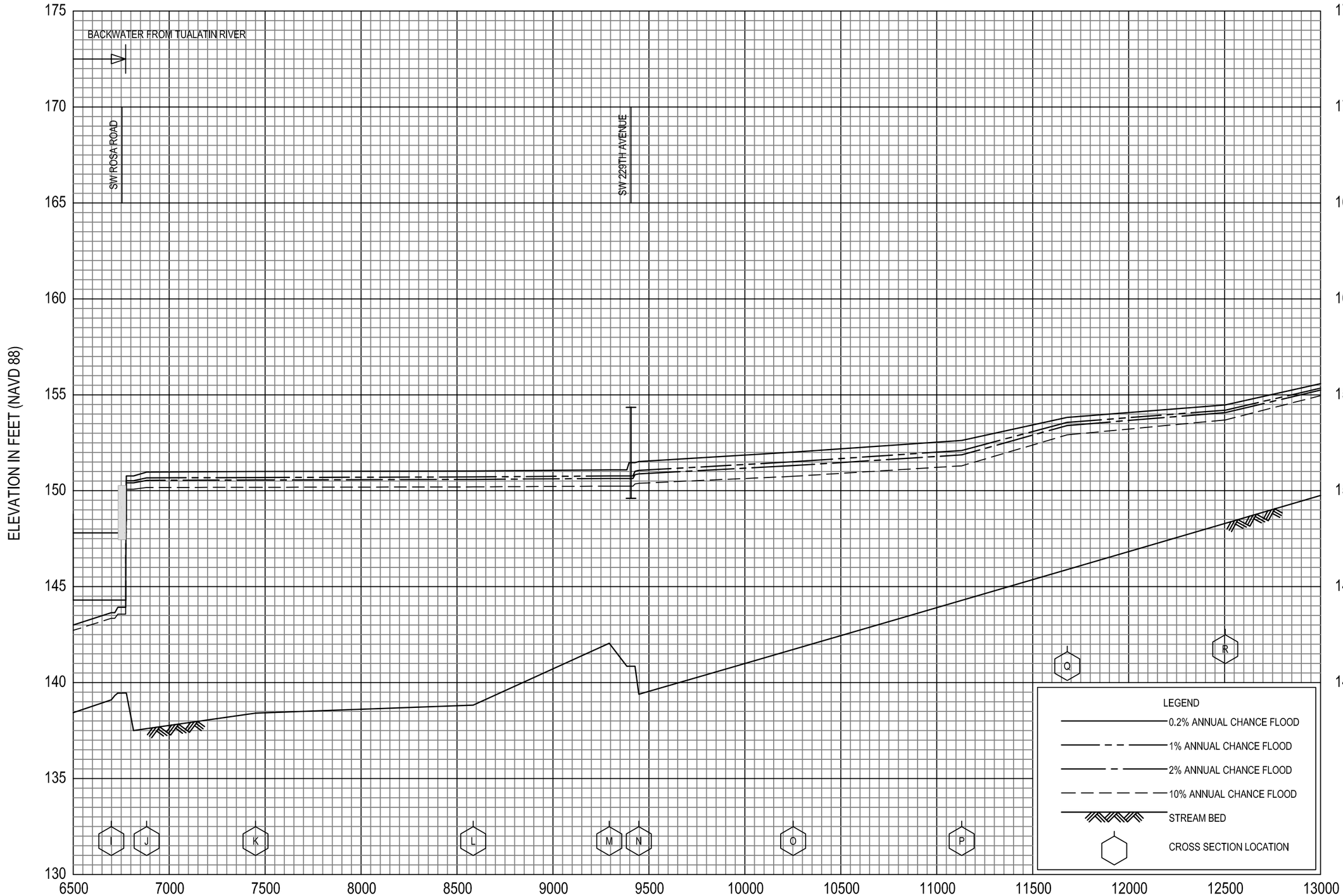


FLOOD PROFILES

BUTTERNUT CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS



FLOOD PROFILES

BUTTERNUT CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

FLOOD PROFILES

BUTTERNUT CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

ELEVATION IN FEET (NAVD 88)

185
180
175
170
165
160
155
150
145
140

13000 13500 14000 14500 15000 15500 16000 16500 17000 17500 18000 18500 19000 19500

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH TUALATIN RIVER

SW 209TH AVENUE

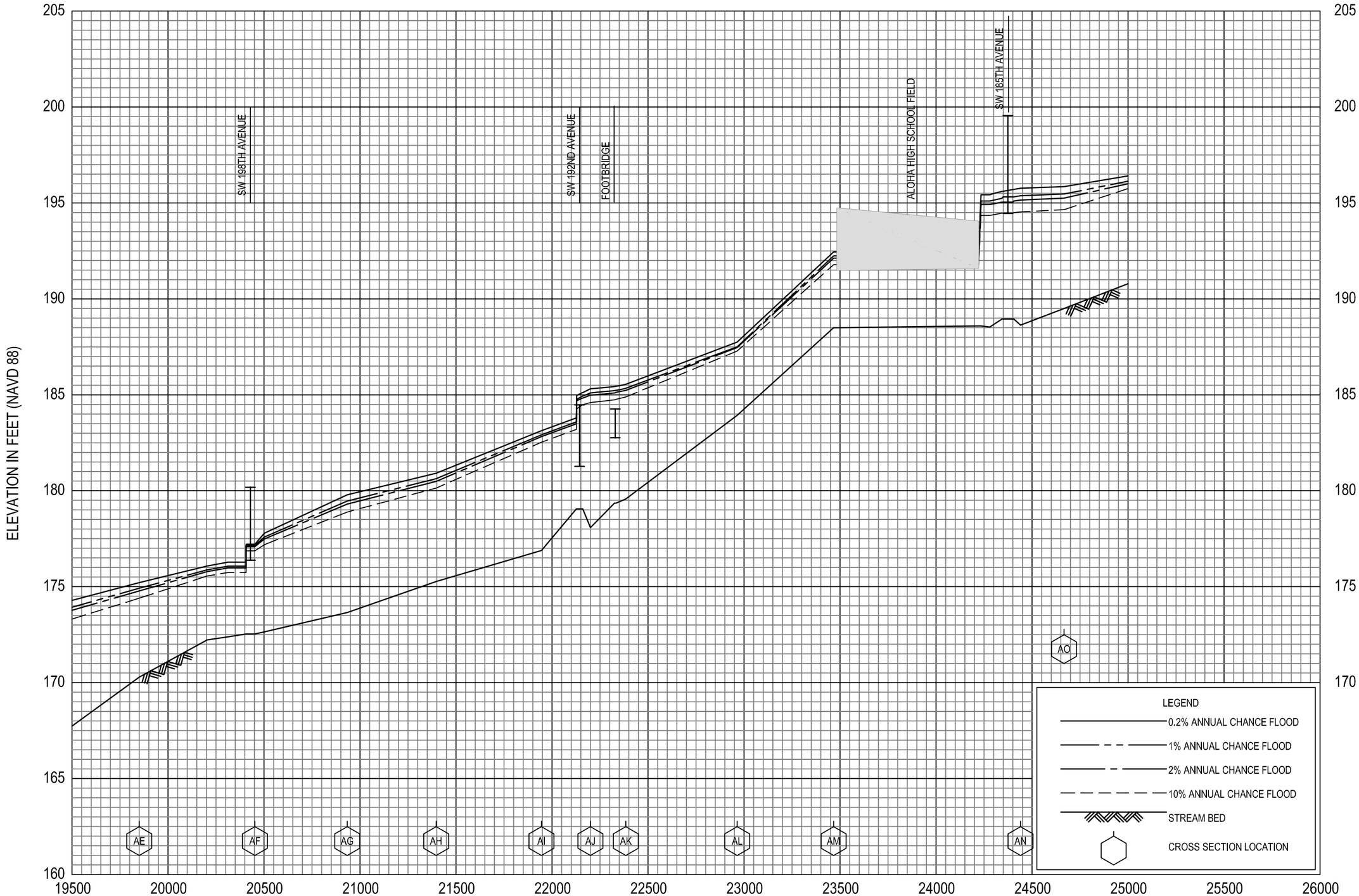
CONFLUENCE WITH UNNAMED S.TRIB

ALOHA HIGH SCHOOL FOOTBRIDGE

S T U V W X Y Z AA AB AC AD

LEGEND

- 0.2% ANNUAL CHANCE FLOOD
- 1% ANNUAL CHANCE FLOOD
- 2% ANNUAL CHANCE FLOOD
- 10% ANNUAL CHANCE FLOOD
- STREAM BED
- CROSS SECTION LOCATION

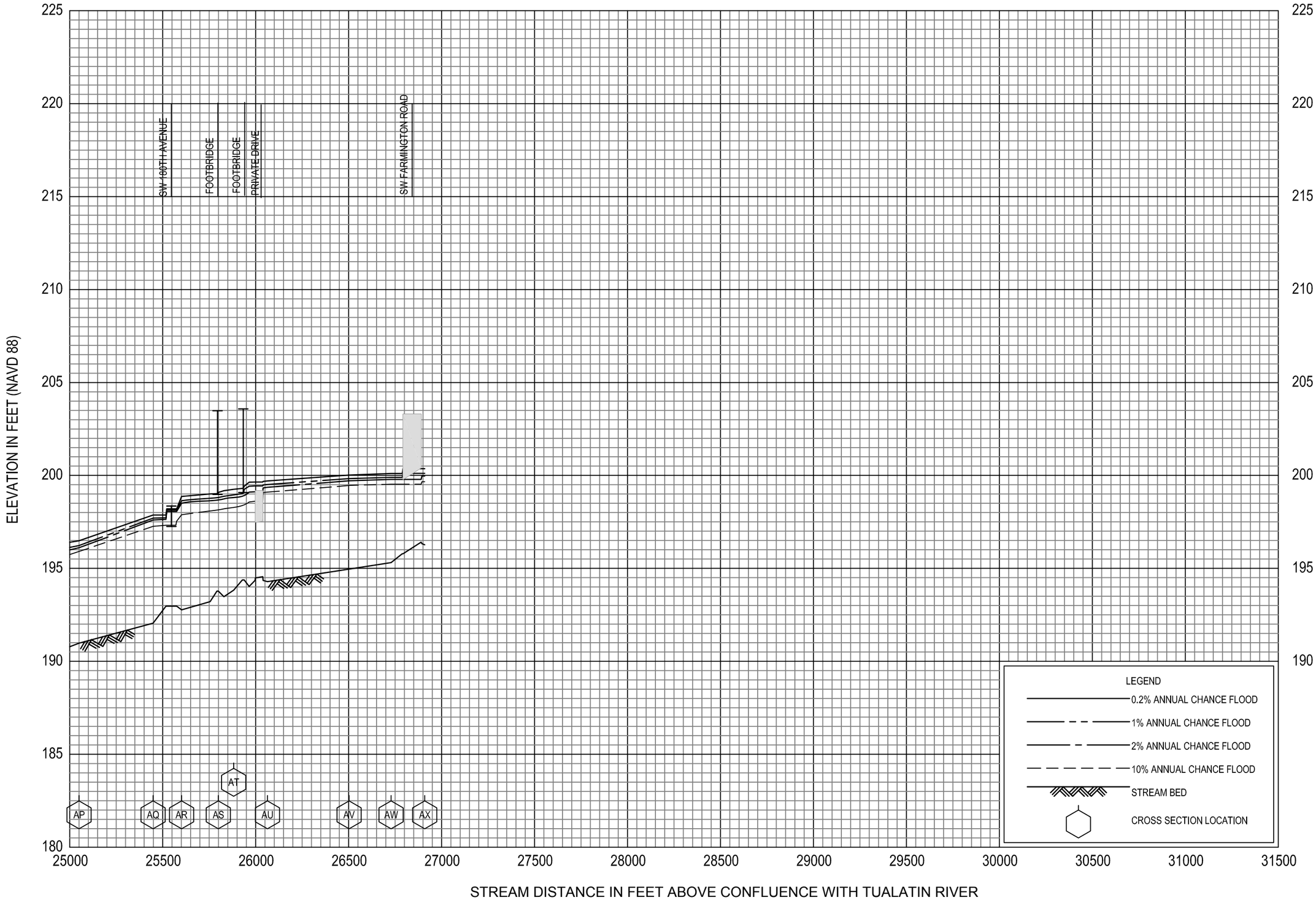


FLOOD PROFILES

BUTTERNUT CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

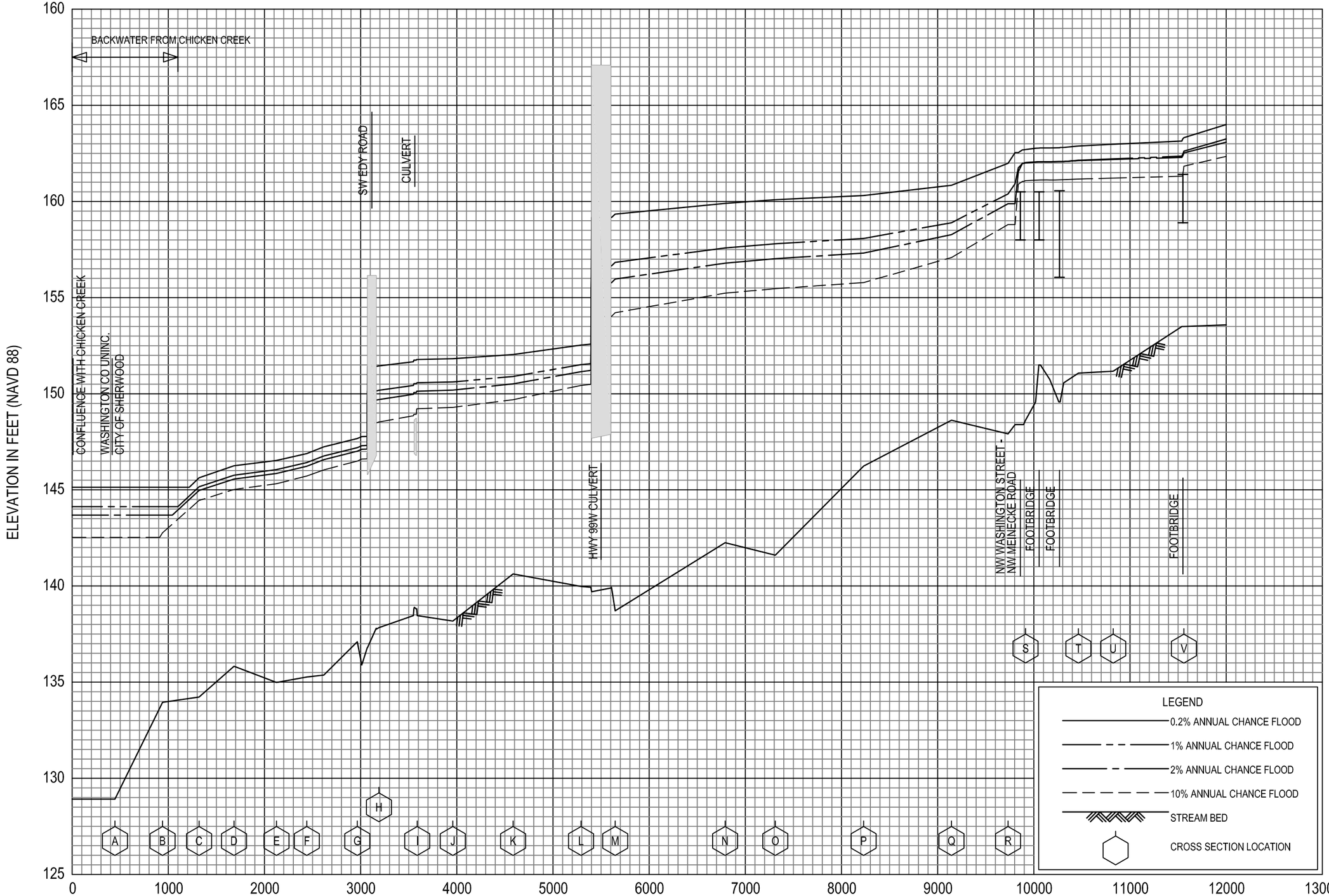


FLOOD PROFILES

BUTTERNUT CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS



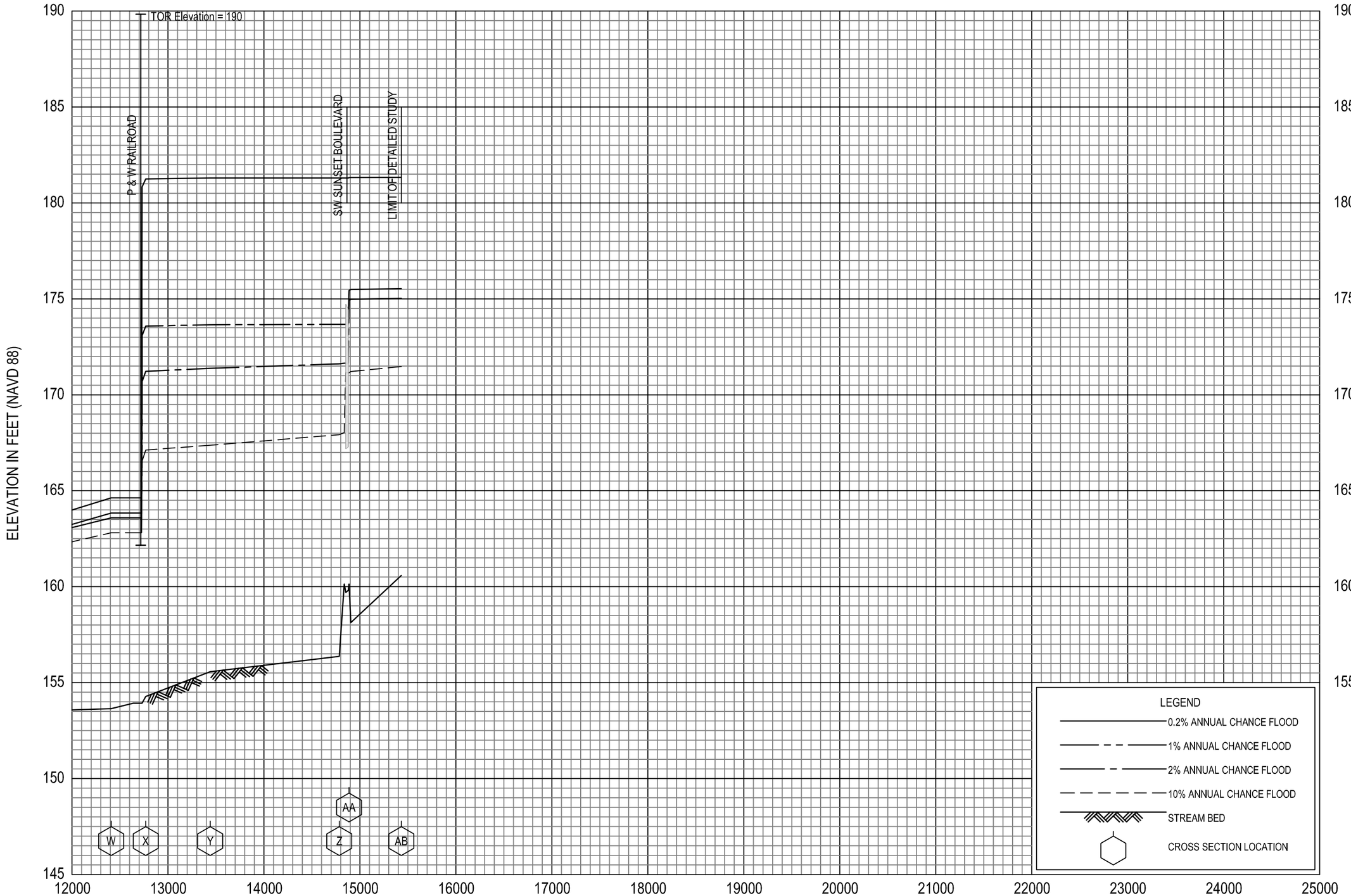
FLOOD PROFILES

CEDAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

25P

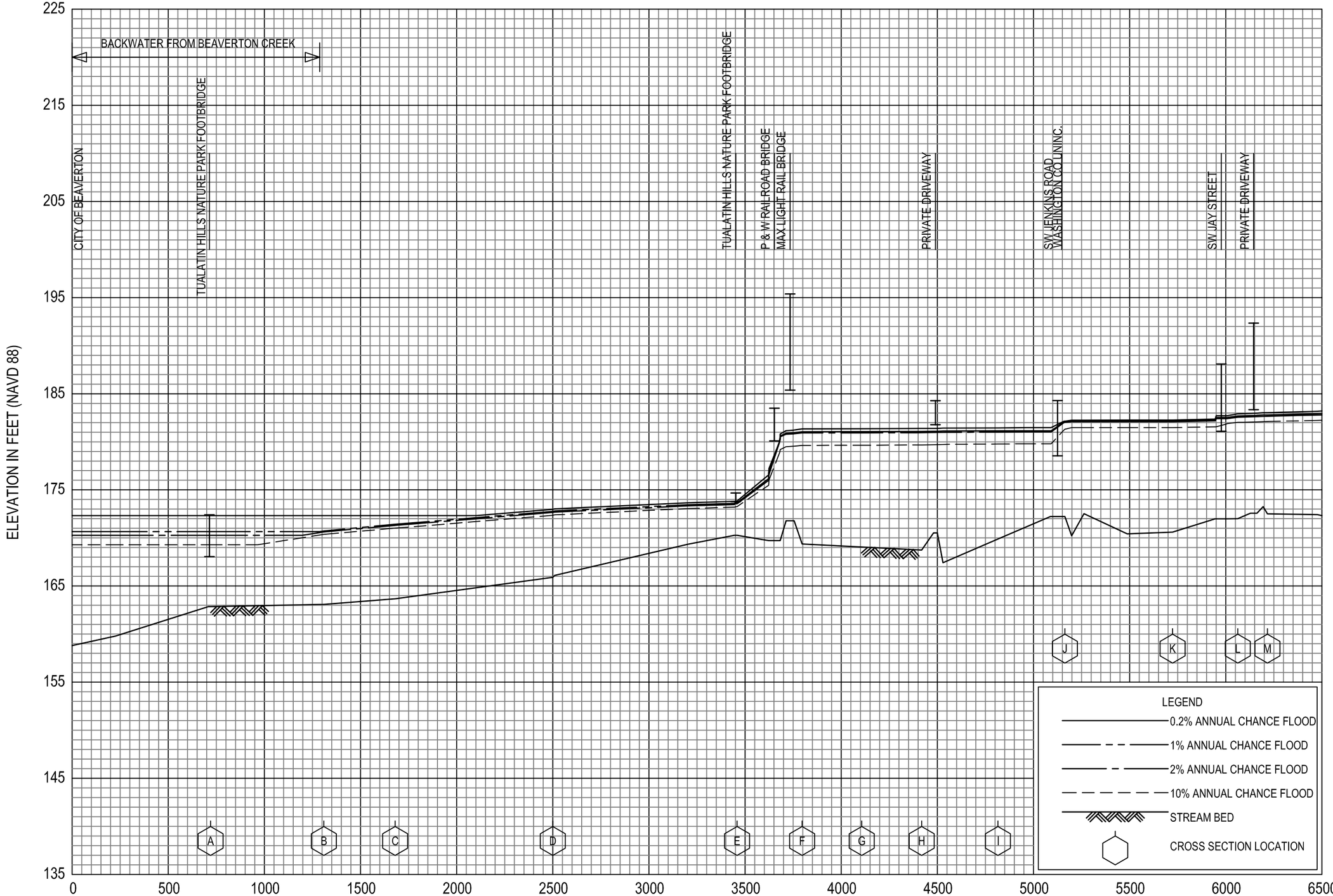


FLOOD PROFILES

CEDAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

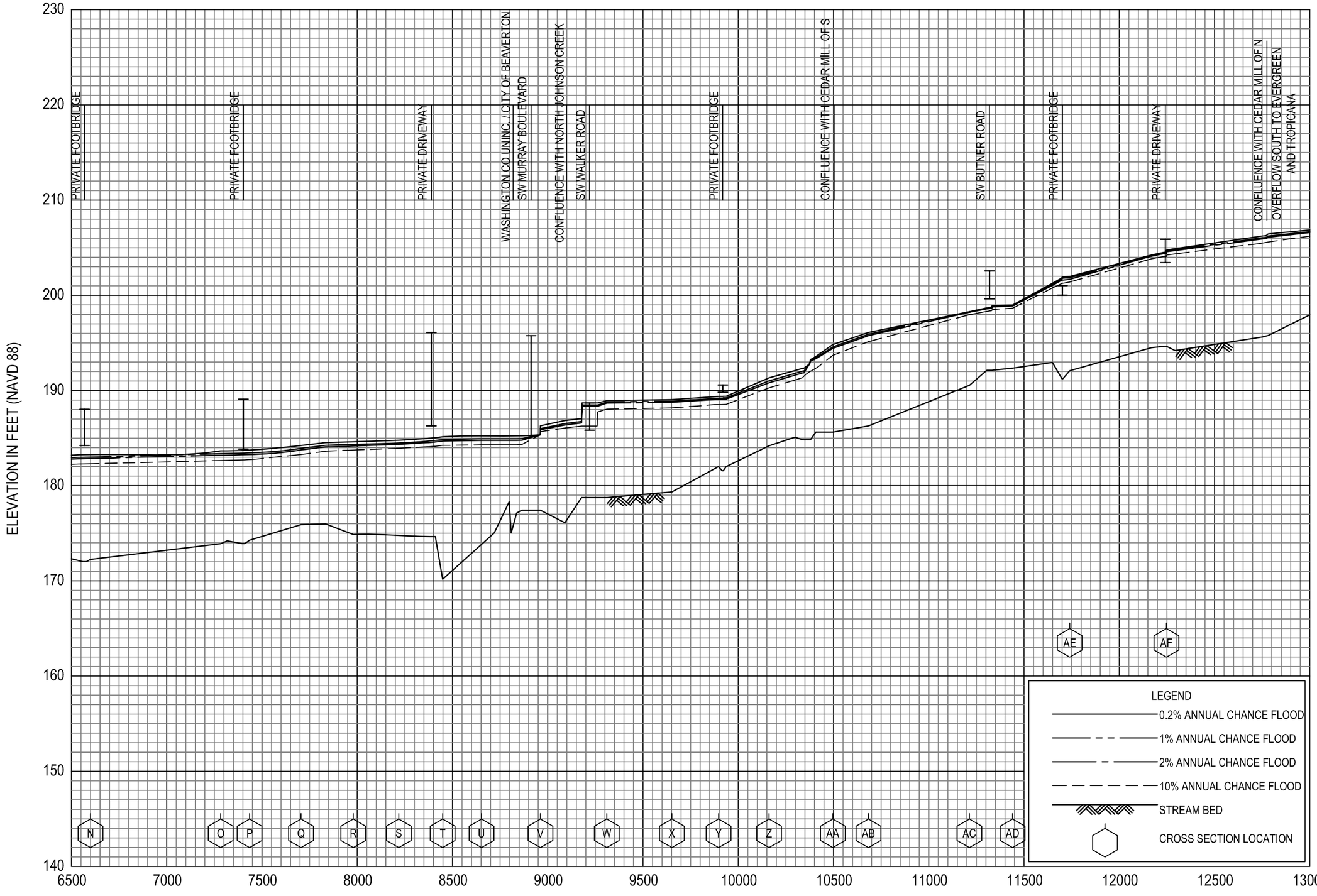


FLOOD PROFILES

CEDAR MILL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY , OR
AND INCORPORATED AREAS

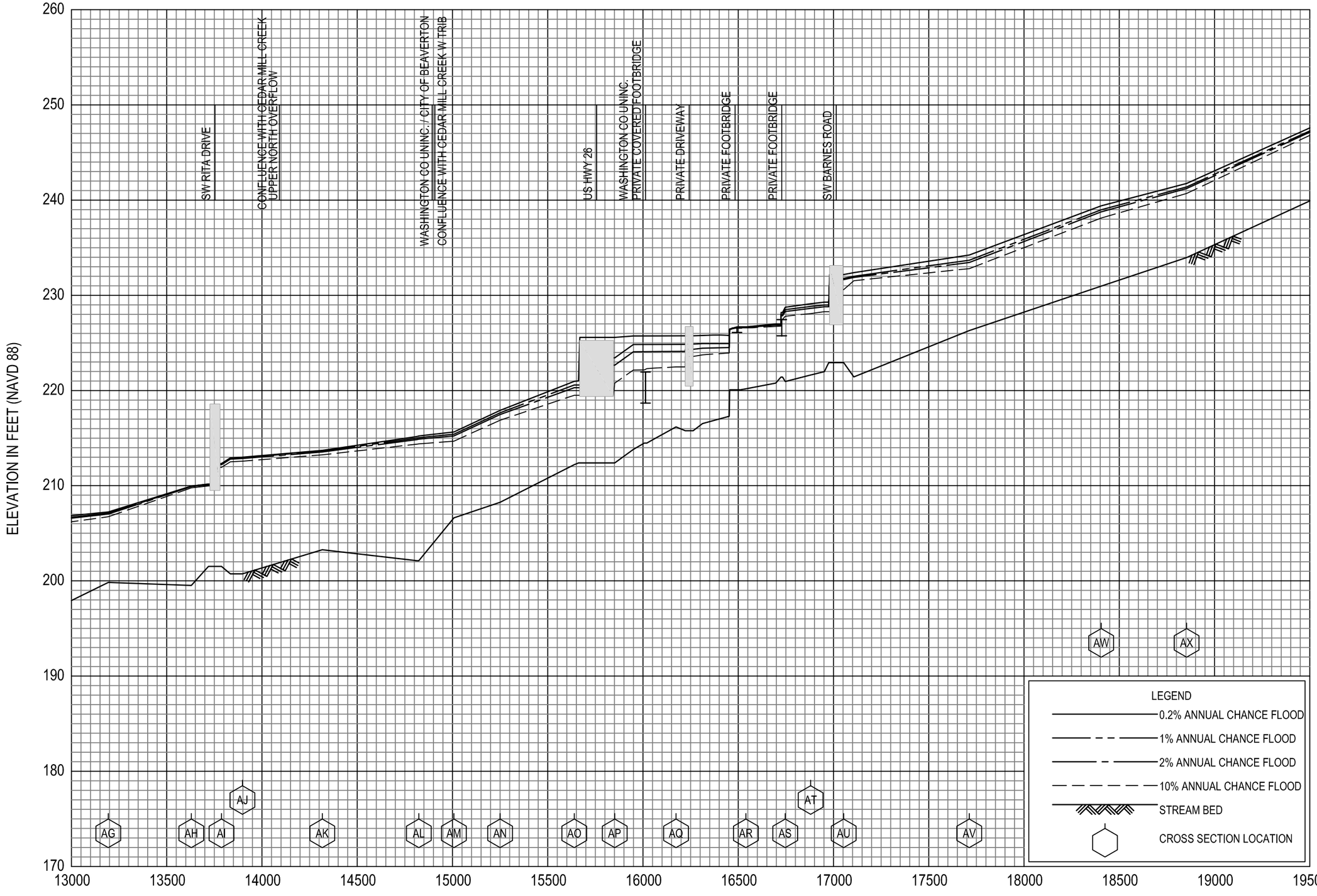


FLOOD PROFILES

CEDAR MILL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY , OR
AND INCORPORATED AREAS



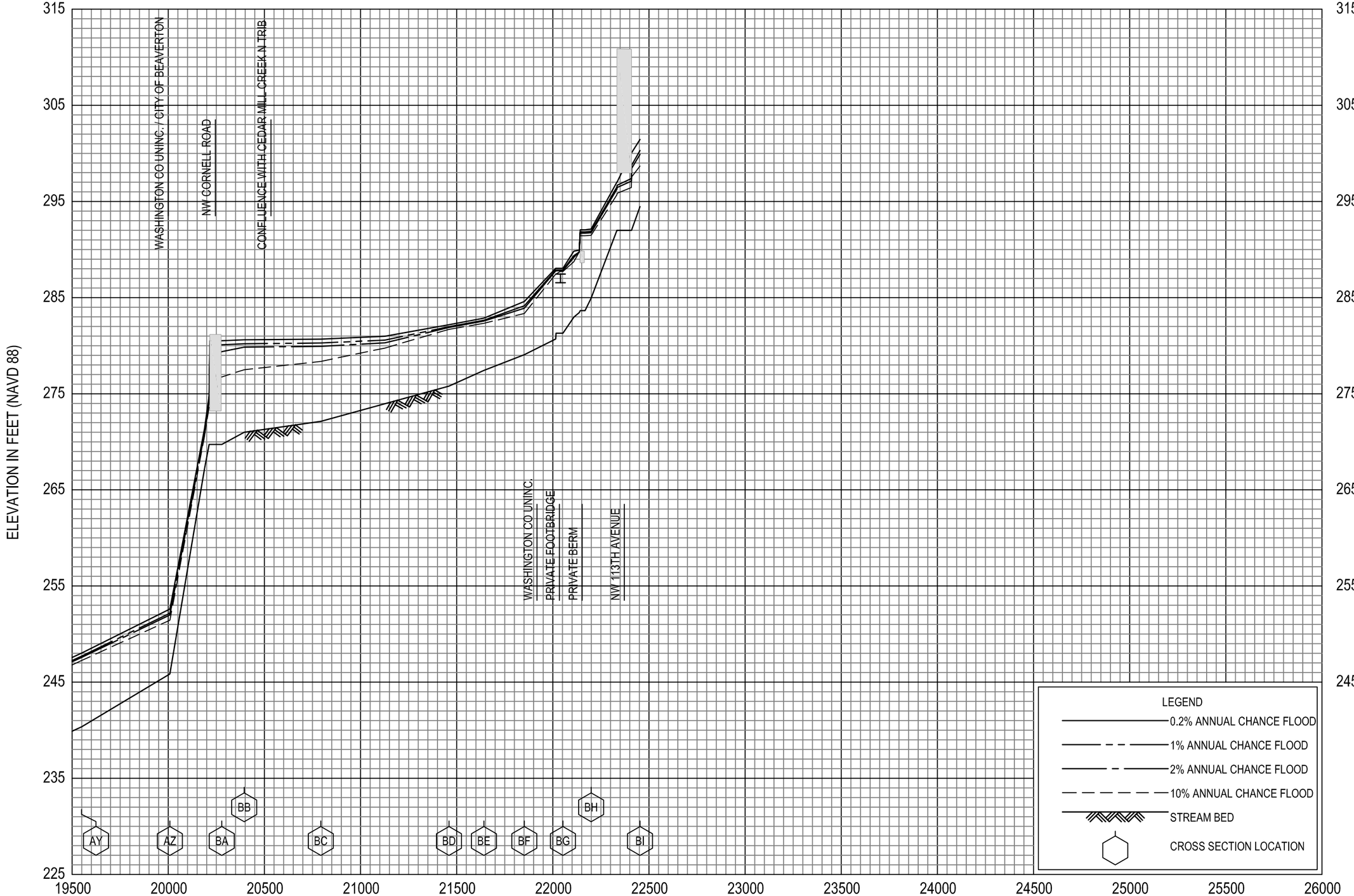
FLOOD PROFILES

CEDAR MILL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY , OR
AND INCORPORATED AREAS

29P

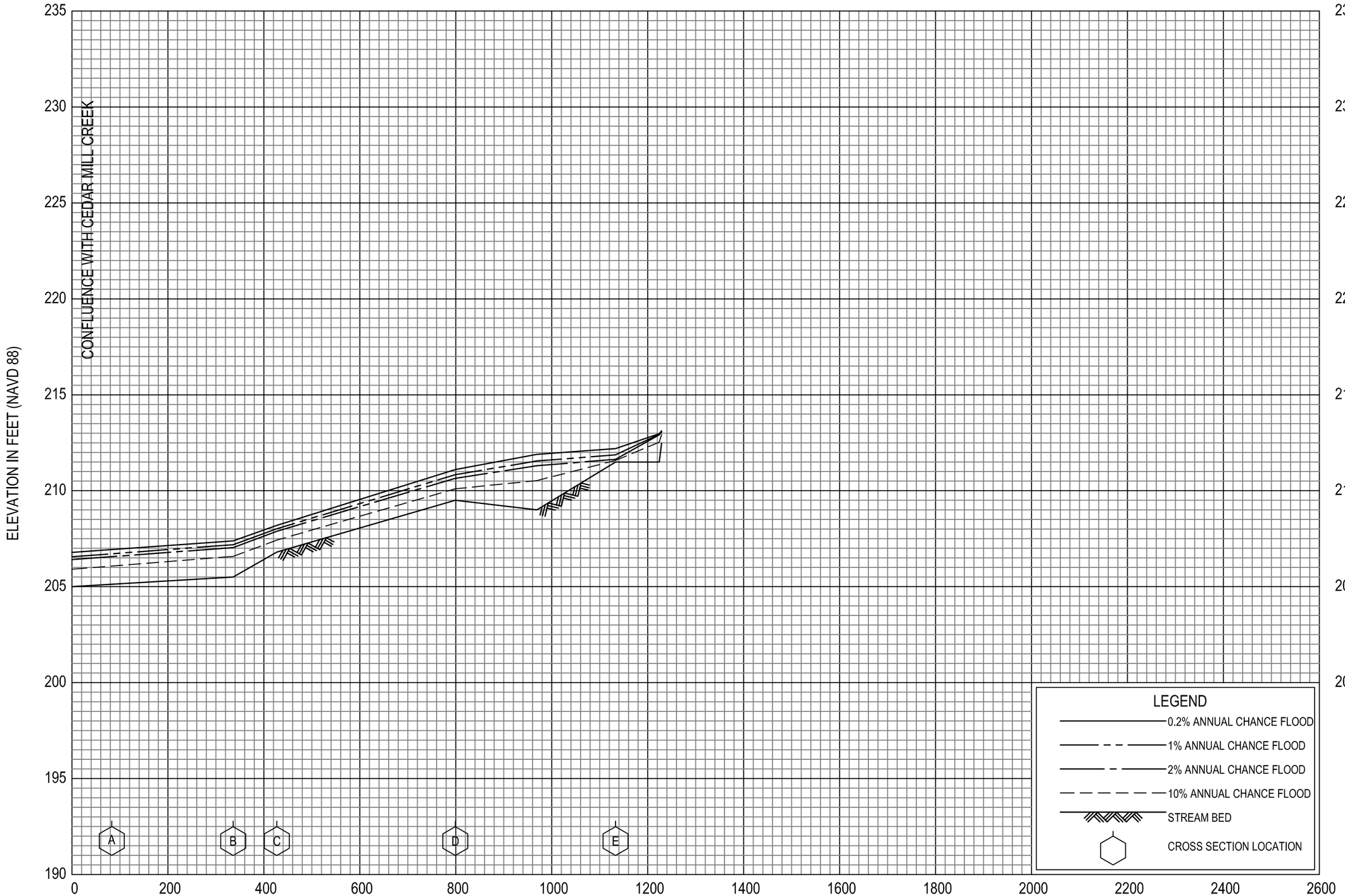


FLOOD PROFILES

CEDAR MILL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY , OR
AND INCORPORATED AREAS

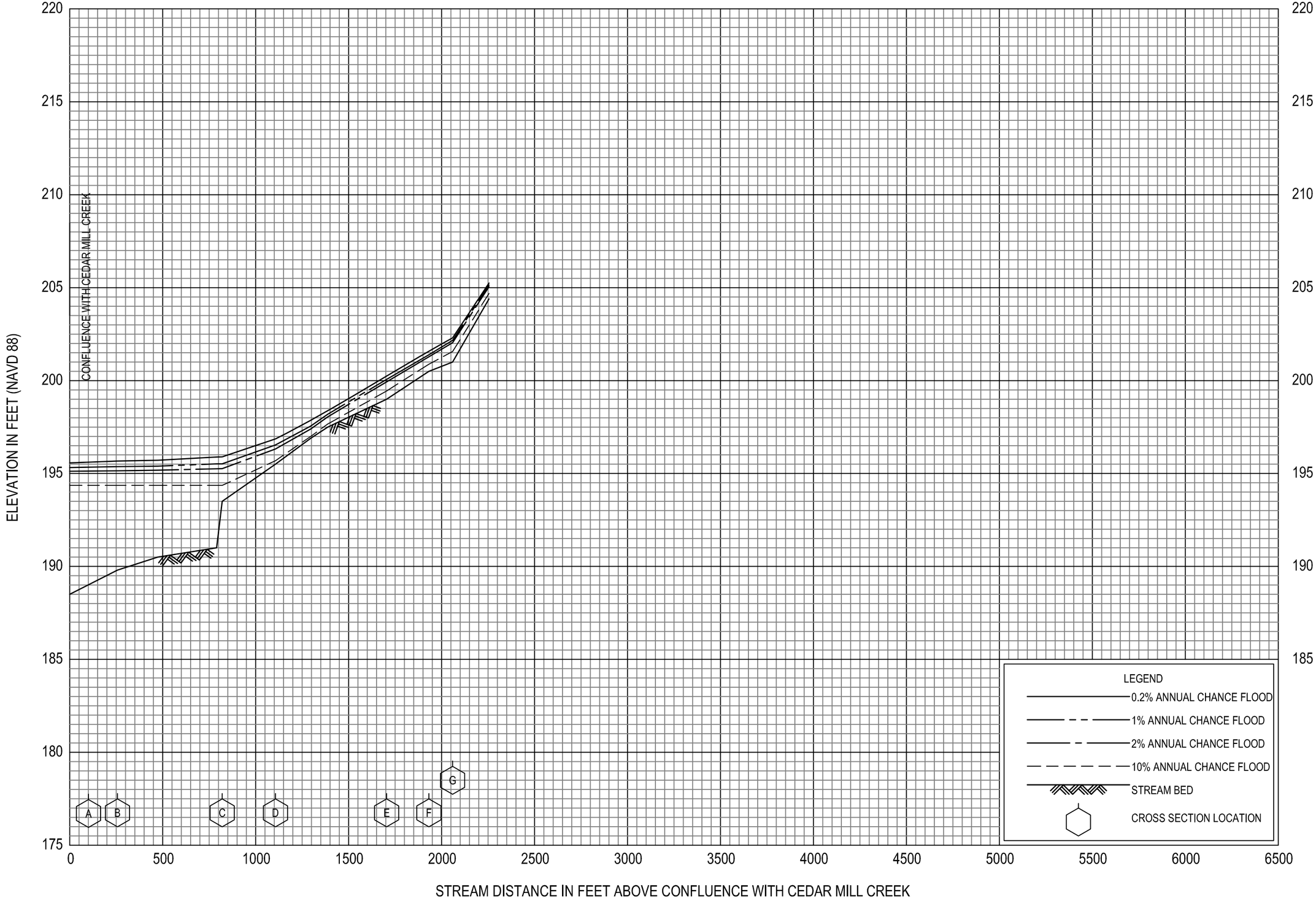


FLOOD PROFILES

CEDAR MILL CREEK - NORTH OVERFLOW

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

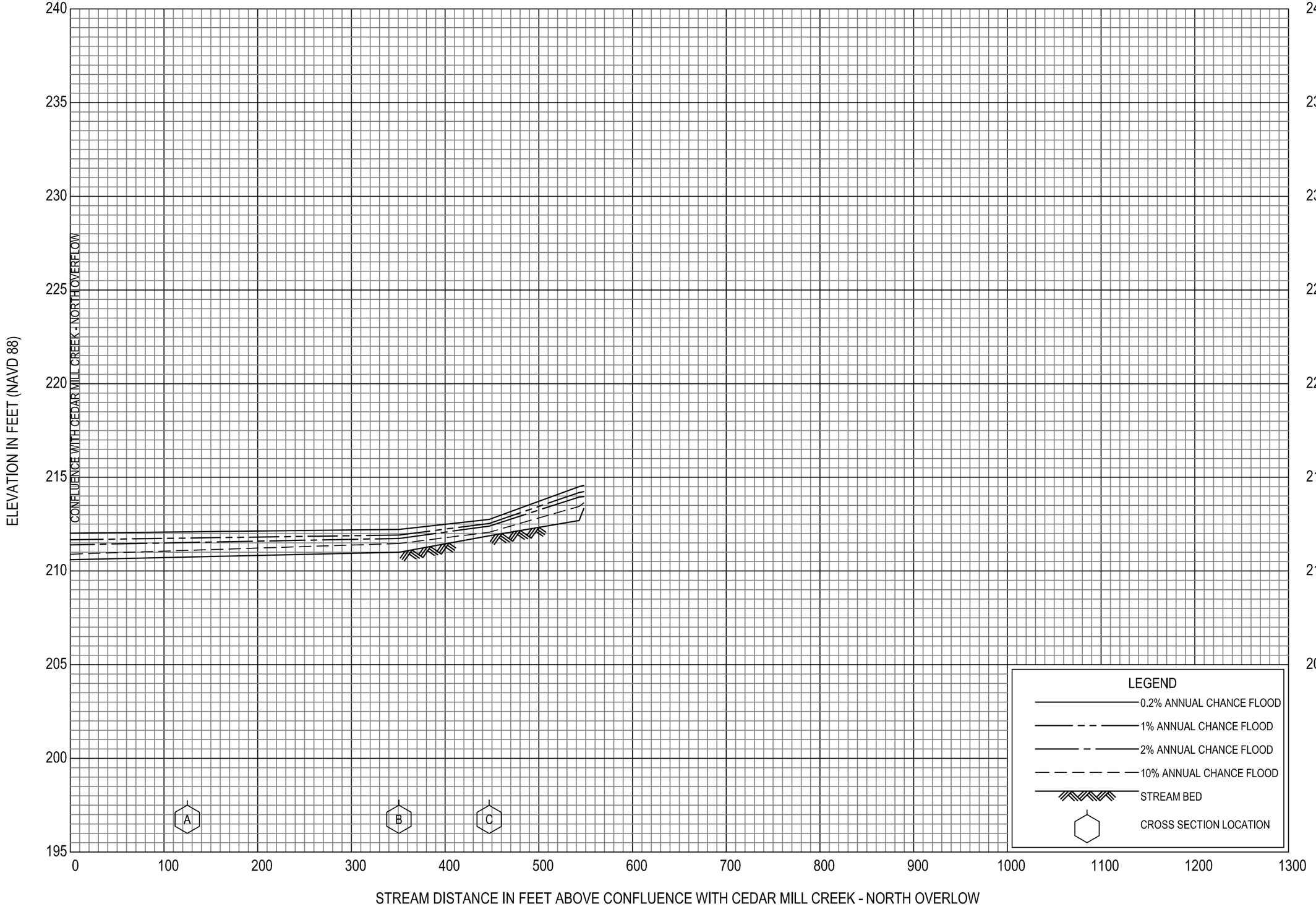


FLOOD PROFILES

CEDAR MILL CREEK - SOUTH OVERFLOW

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY , OR
AND INCORPORATED AREAS



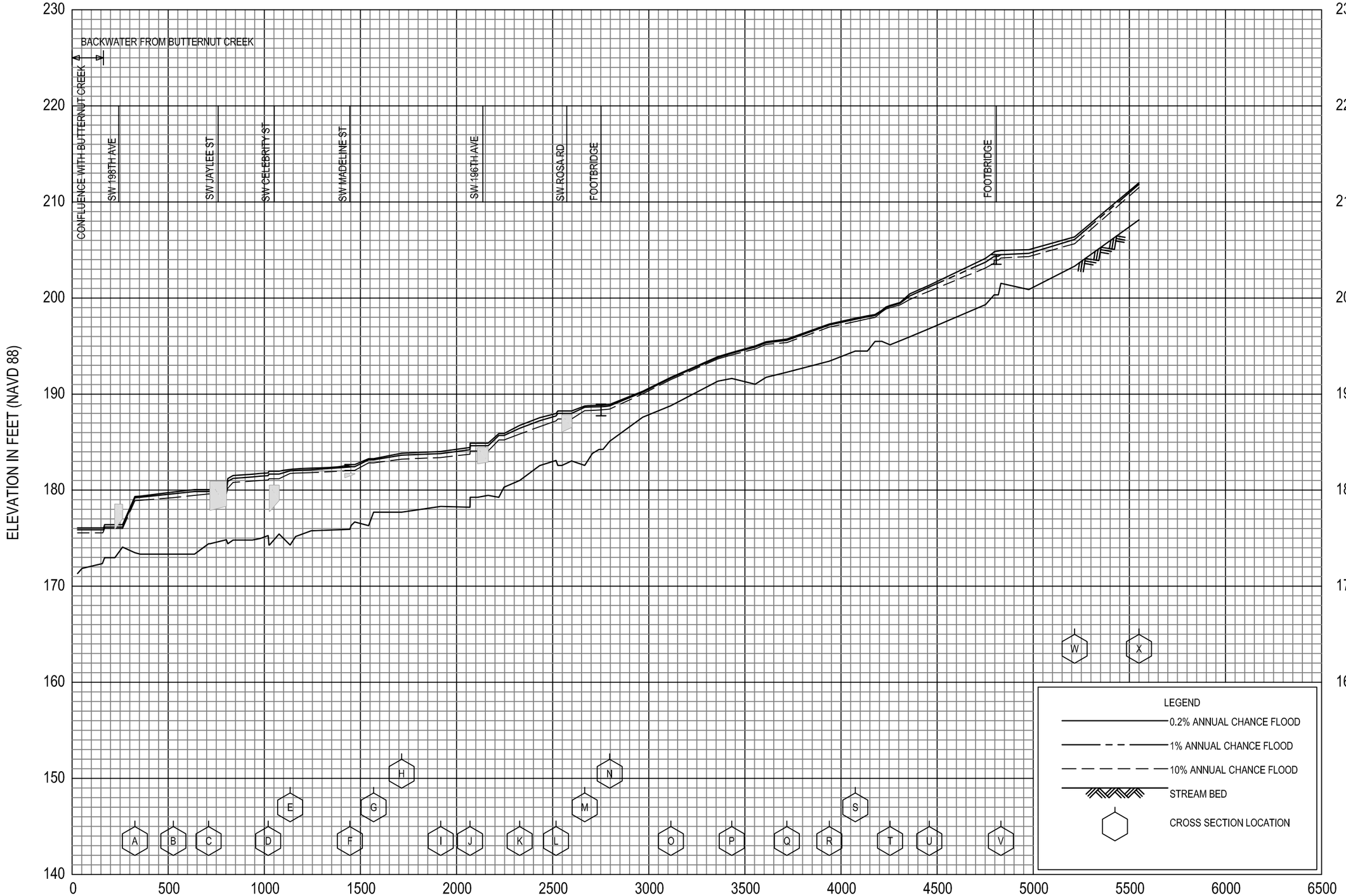
FLOOD PROFILES

CEDAR MILL CREEK - UPPER NORTH OVERFLOW

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

33P

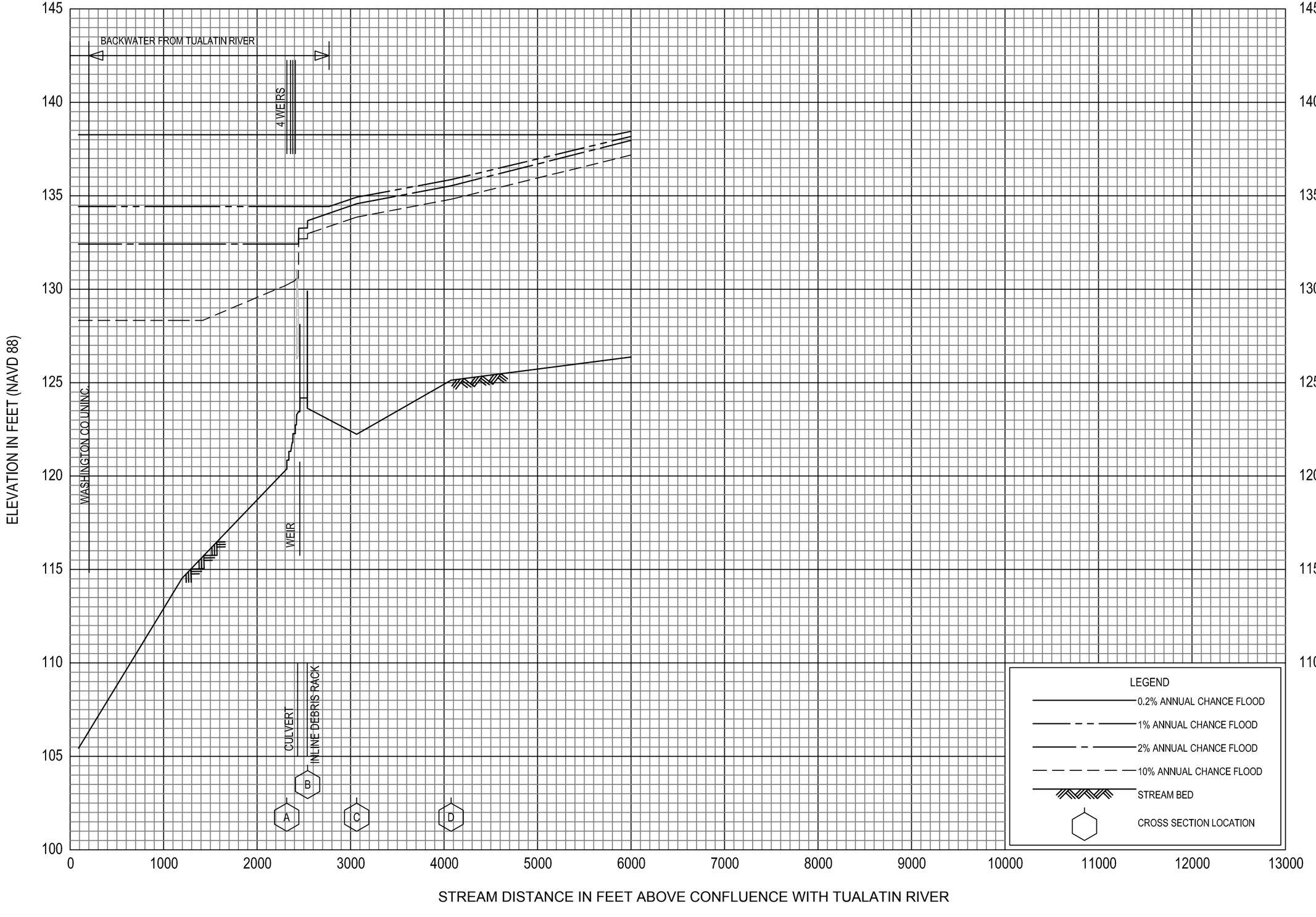


FLOOD PROFILES

CELEBRITY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS



FLOOD PROFILES

CHICKEN CREEK

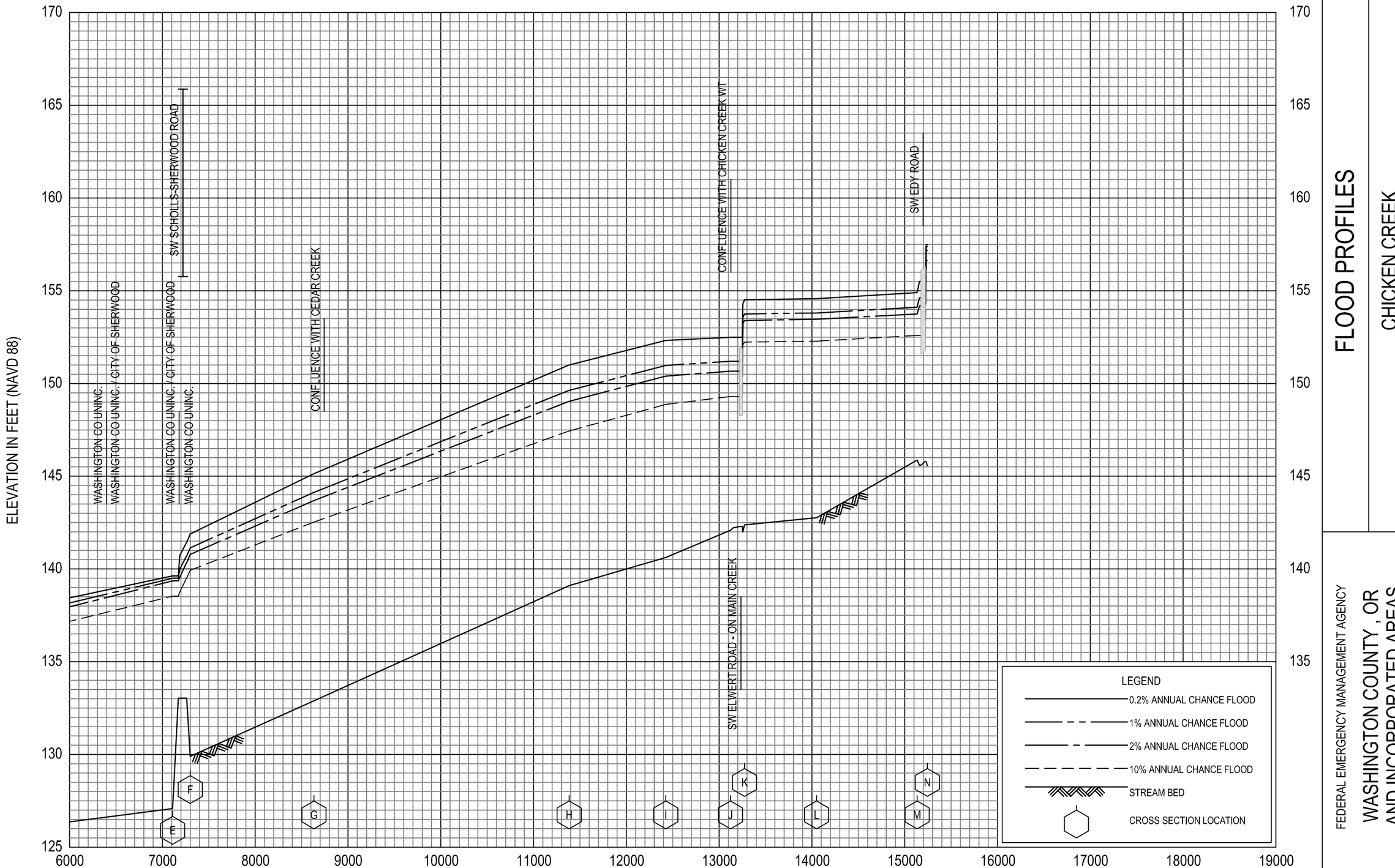
FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY , OR
AND INCORPORATED AREAS

35P

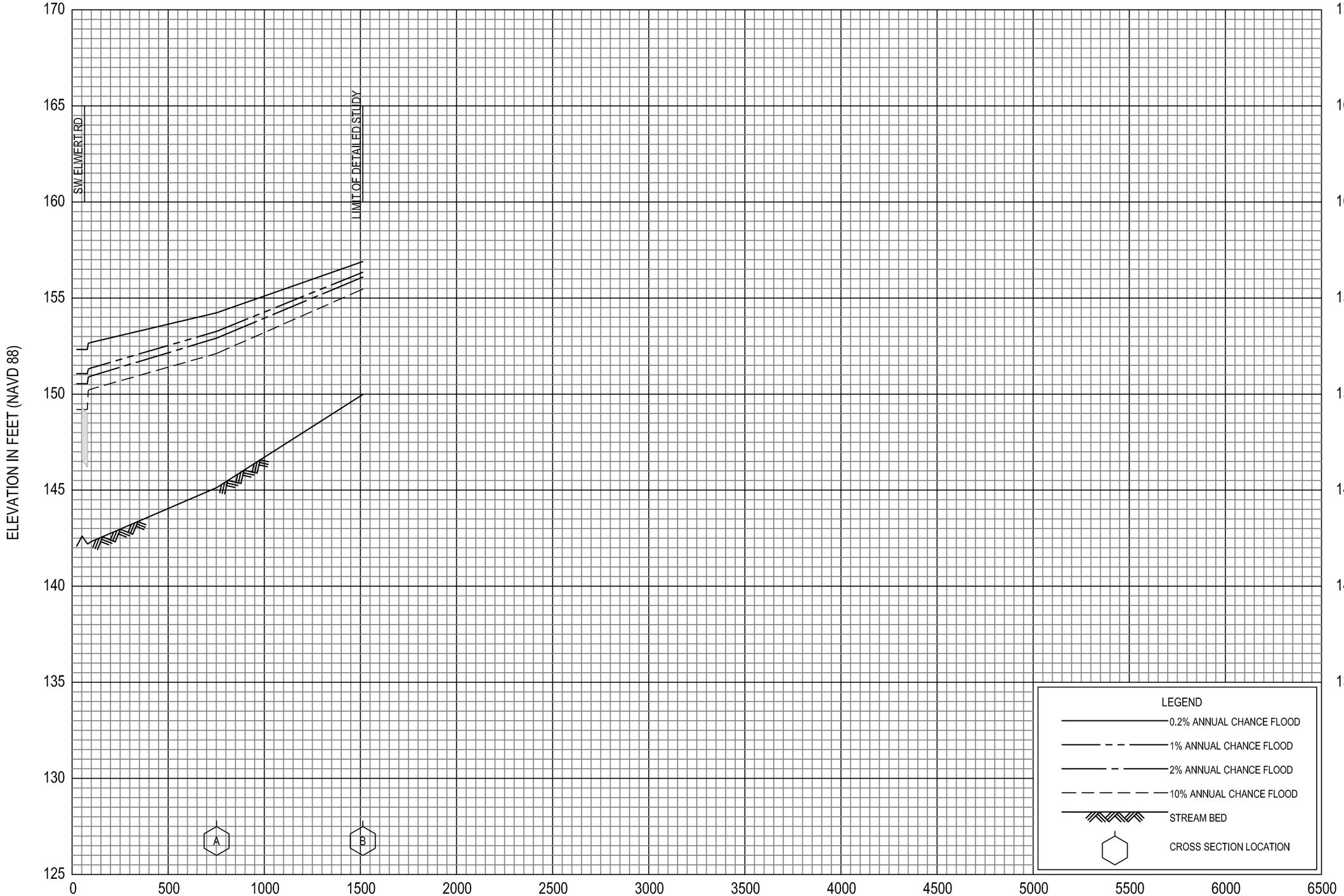
FLOOD PROFILES

CHICKEN CREEK



FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY , OR
AND INCORPORATED AREAS

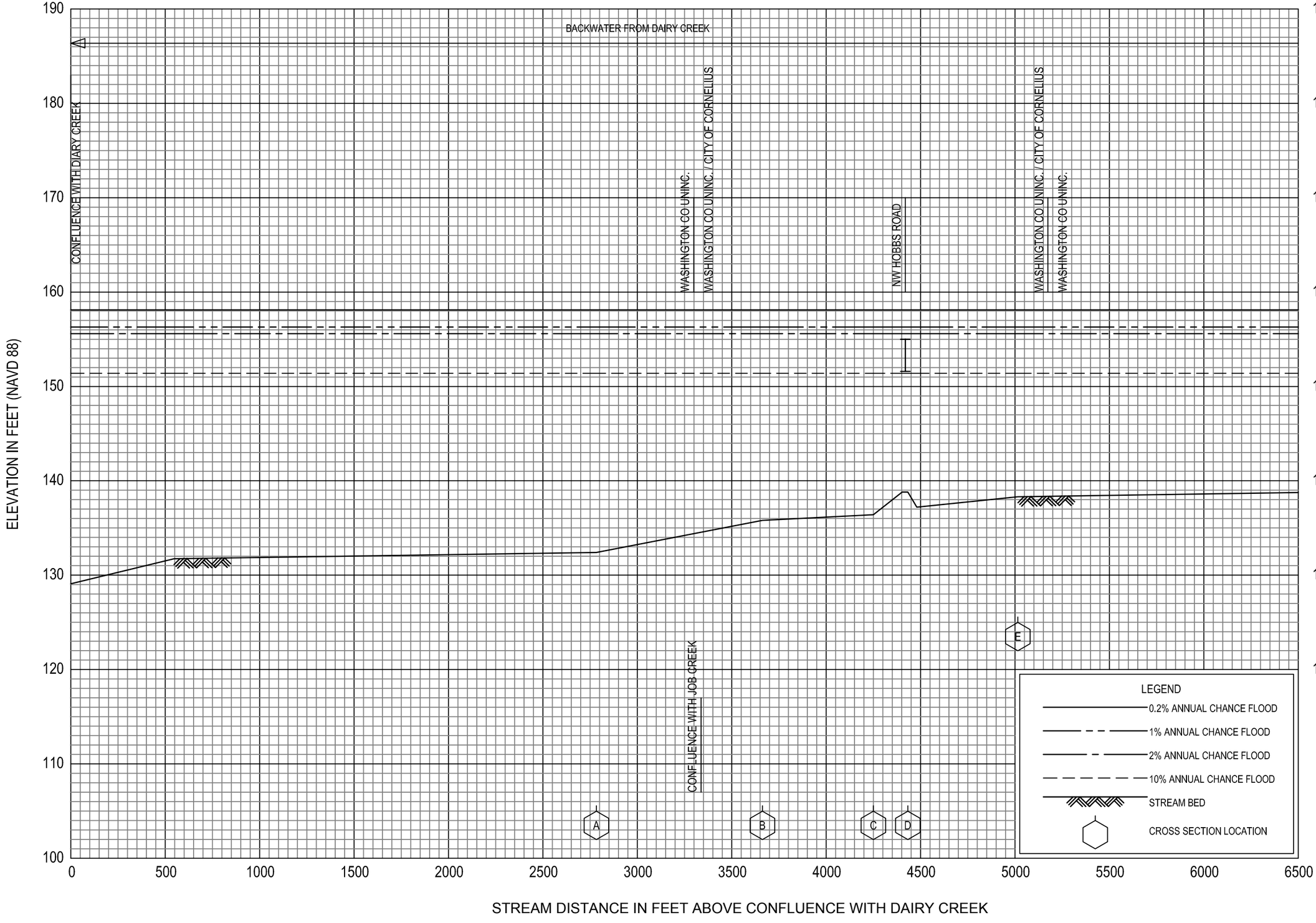


FLOOD PROFILES

CHICKEN CREEK - WEST TRIBUTARY

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

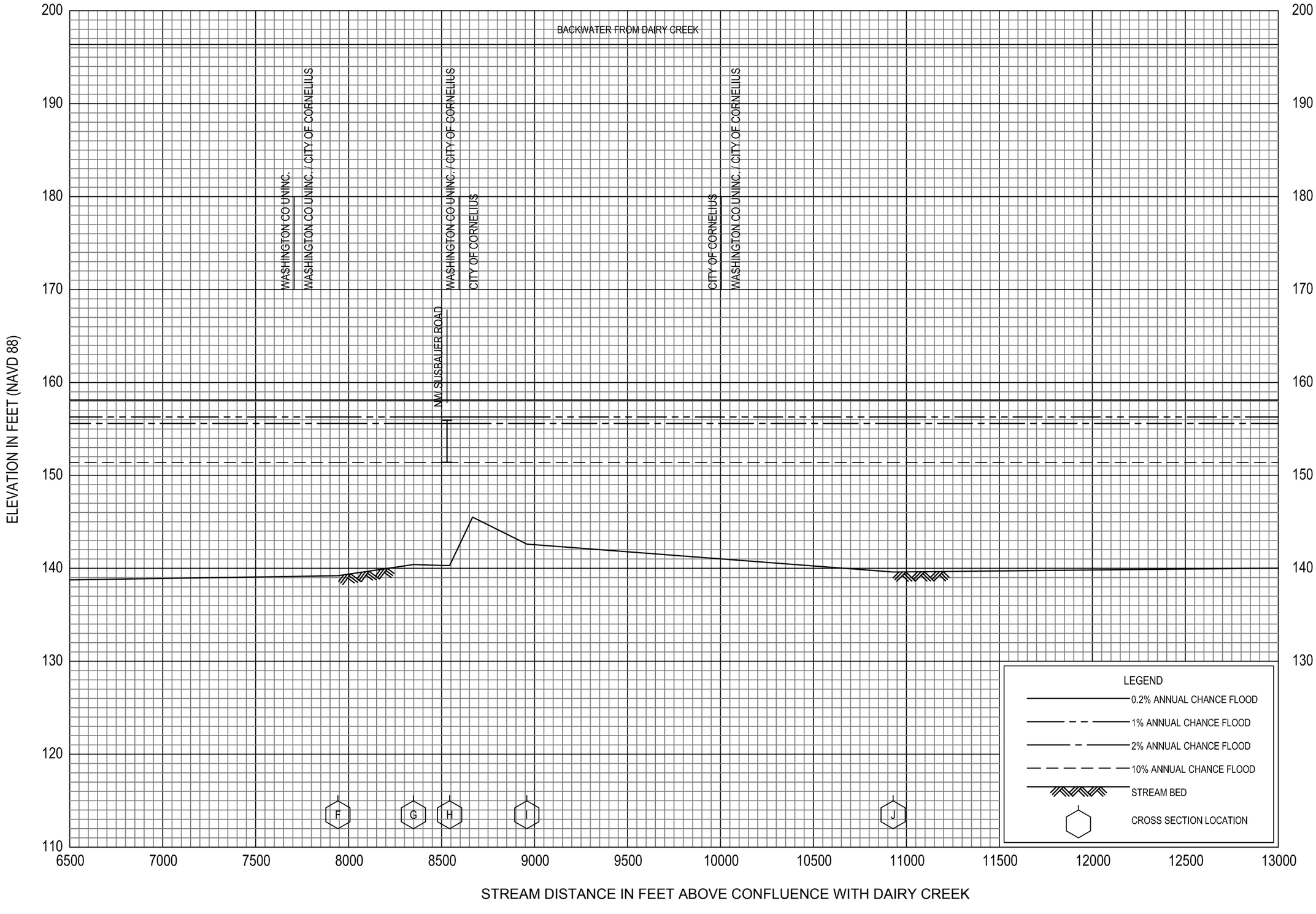


FLOOD PROFILES

COUNCIL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

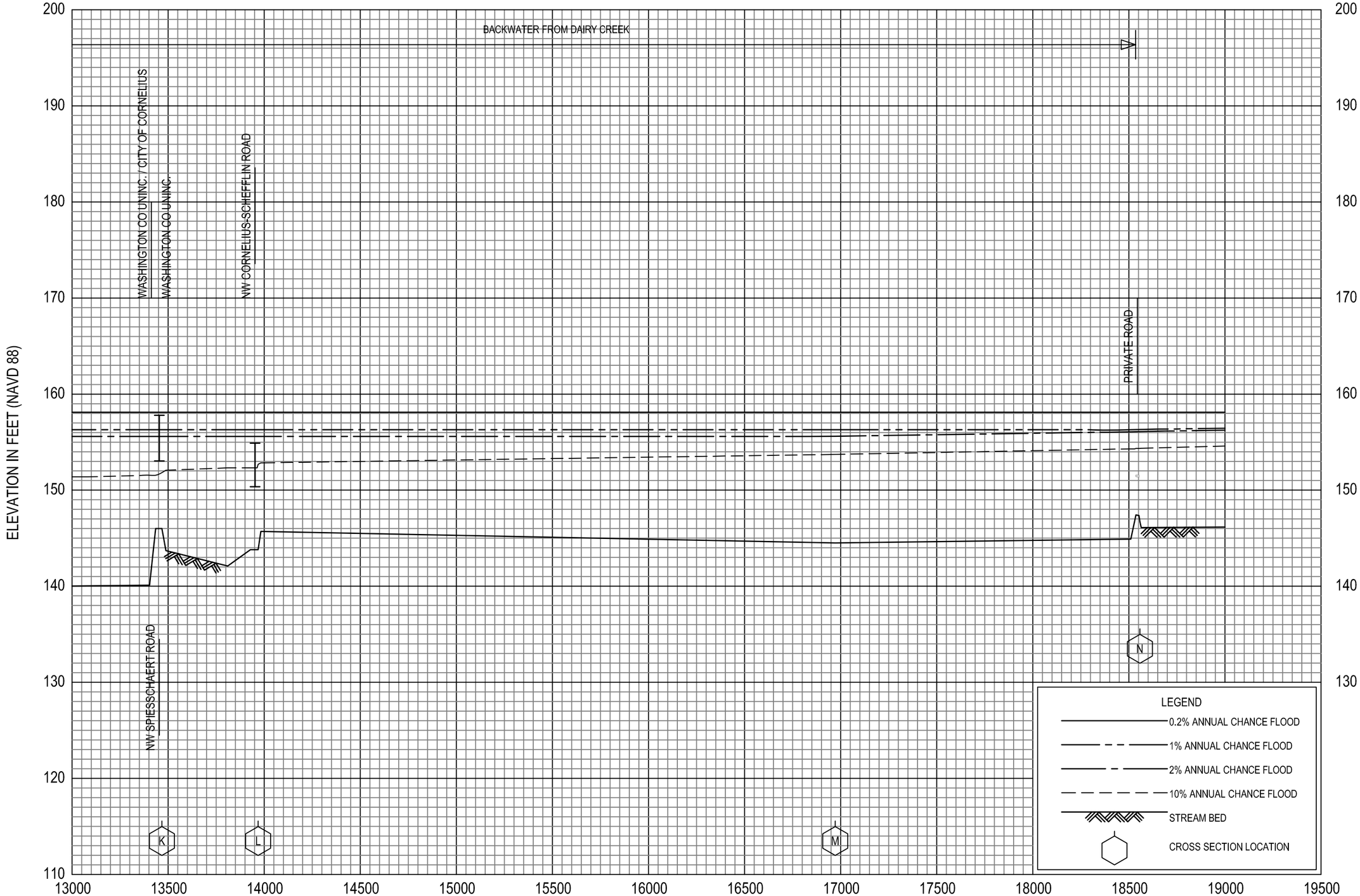


FLOOD PROFILES

COUNCIL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

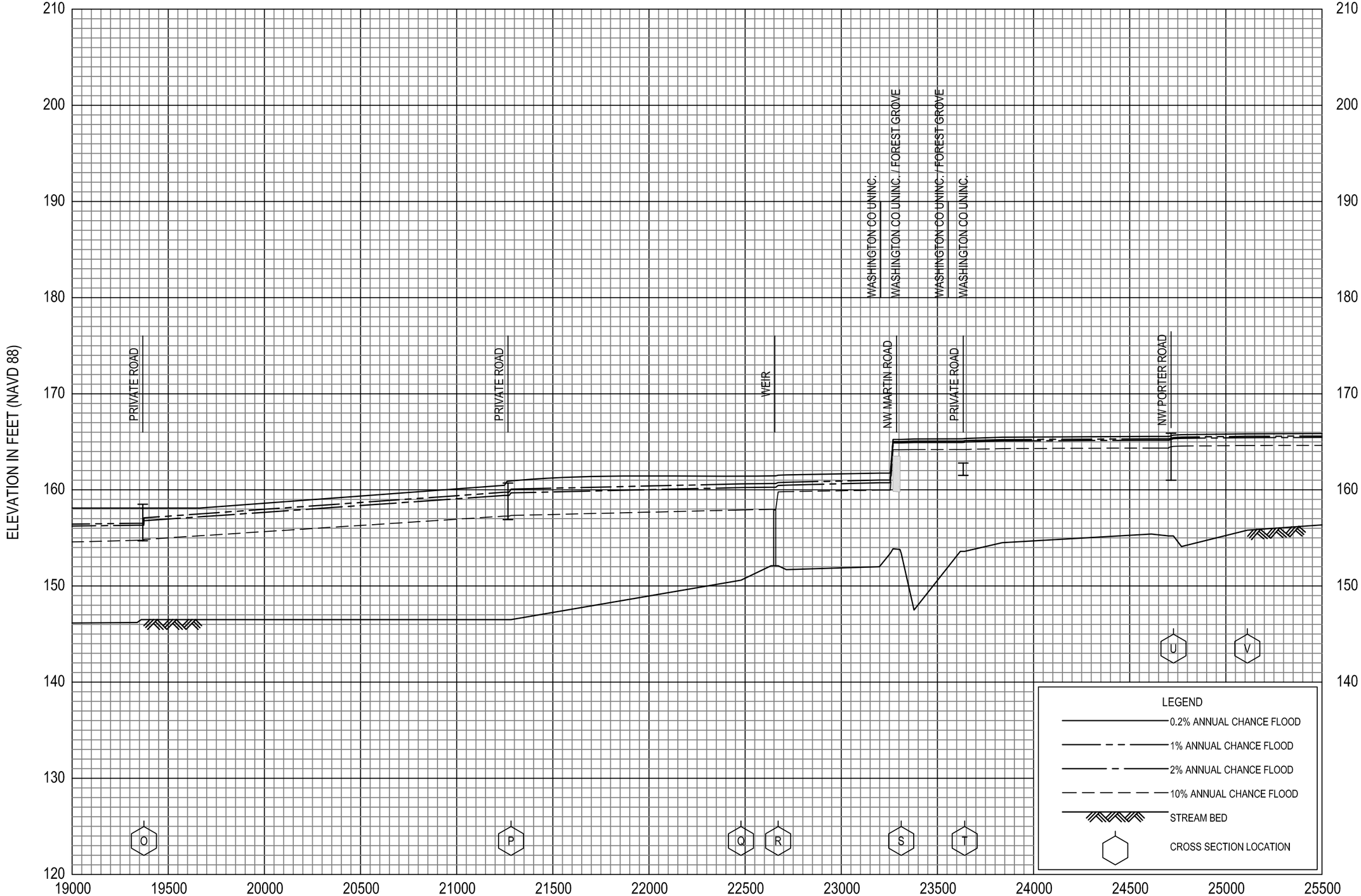


FLOOD PROFILES

COUNCIL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

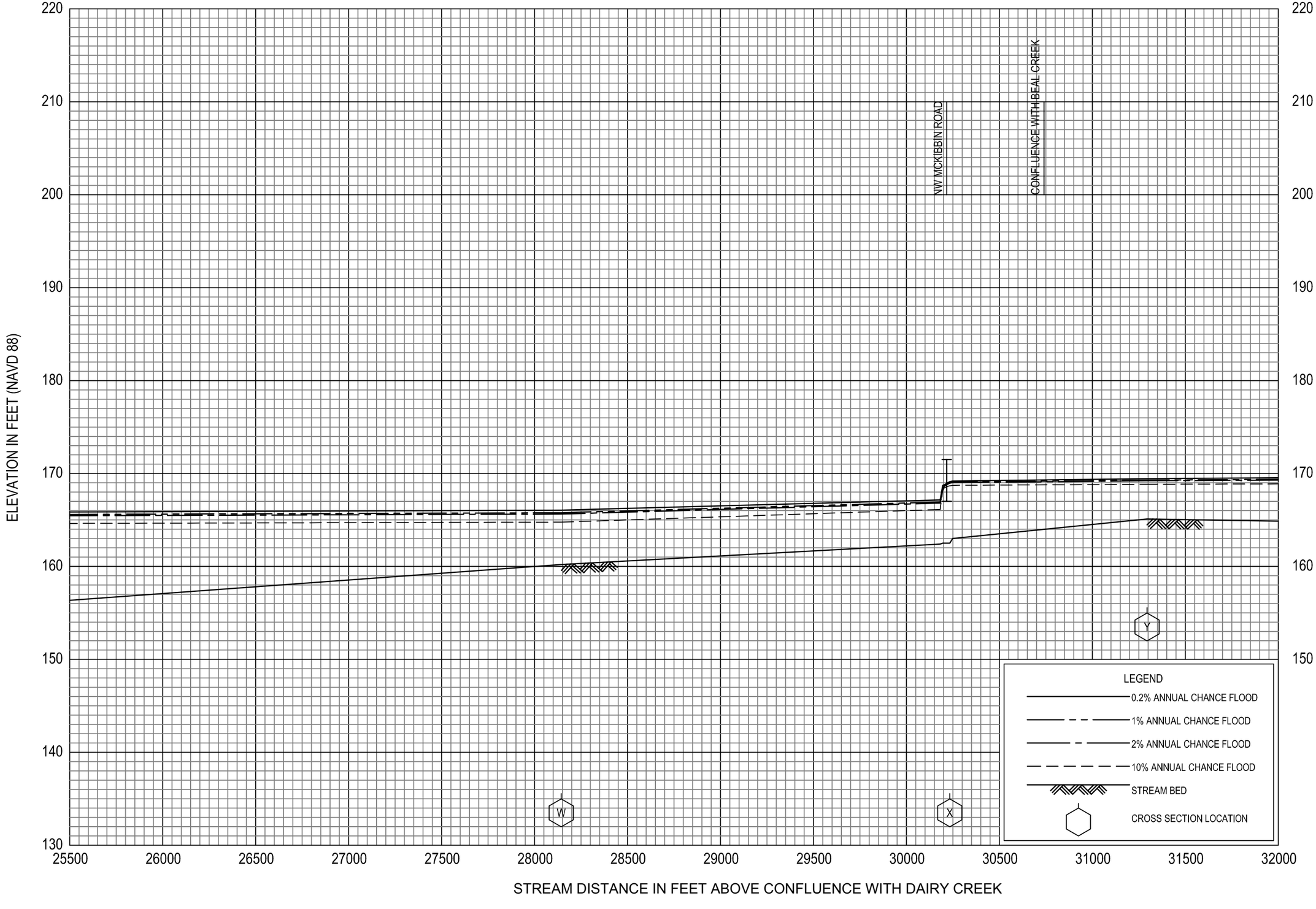


FLOOD PROFILES

COUNCIL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

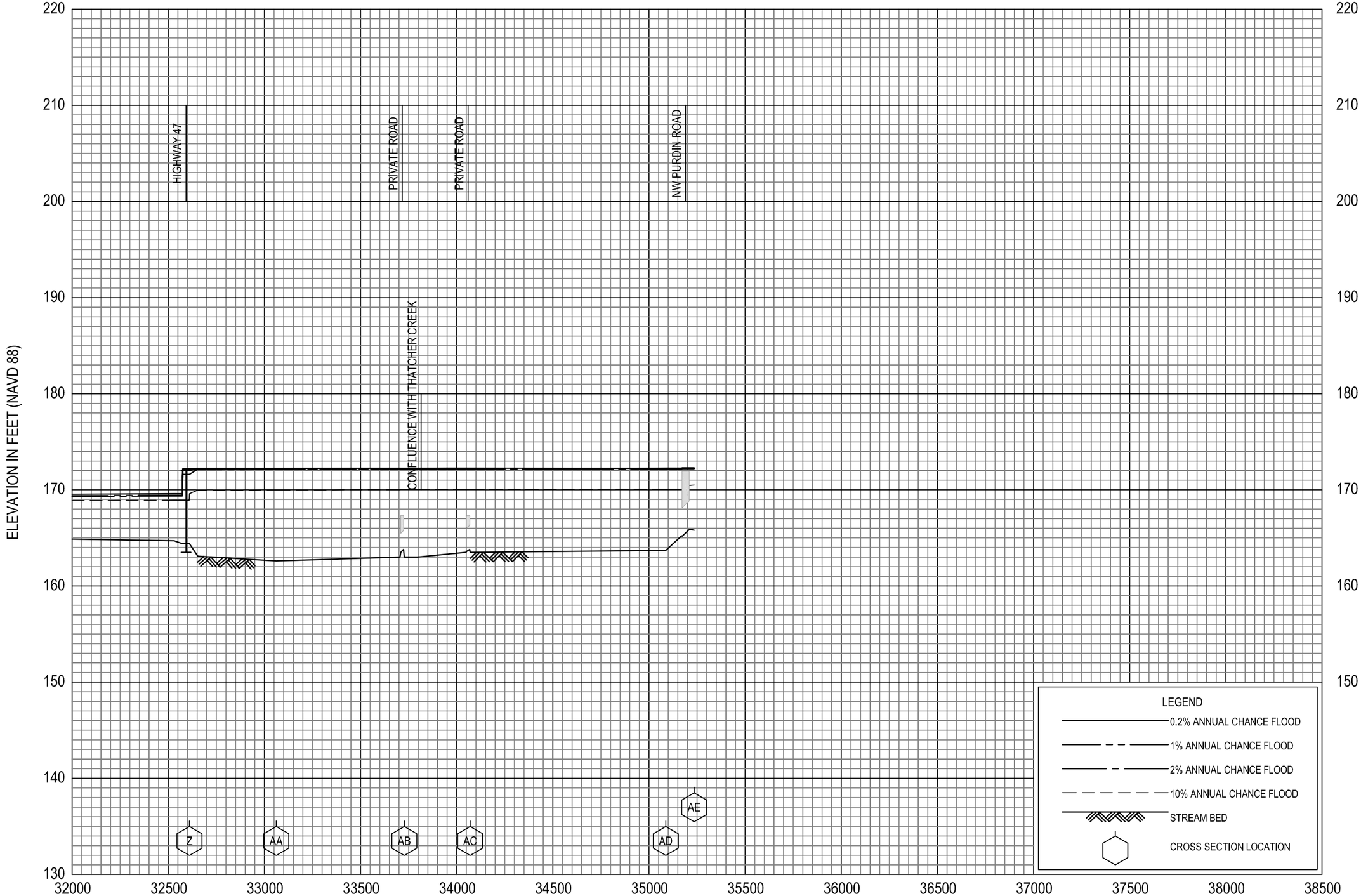


FLOOD PROFILES

COUNCIL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS



FLOOD PROFILES

COUNCIL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

FLOOD PROFILES

DAIRY CREEK

ELEVATION IN FEET (NAVD 88)

170
160
150
140
130
120
110
100
90
80

CONFLUENCE WITH TUALATIN RIVER

0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000 5500 6000 6500

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH TUALATIN RIVER

A

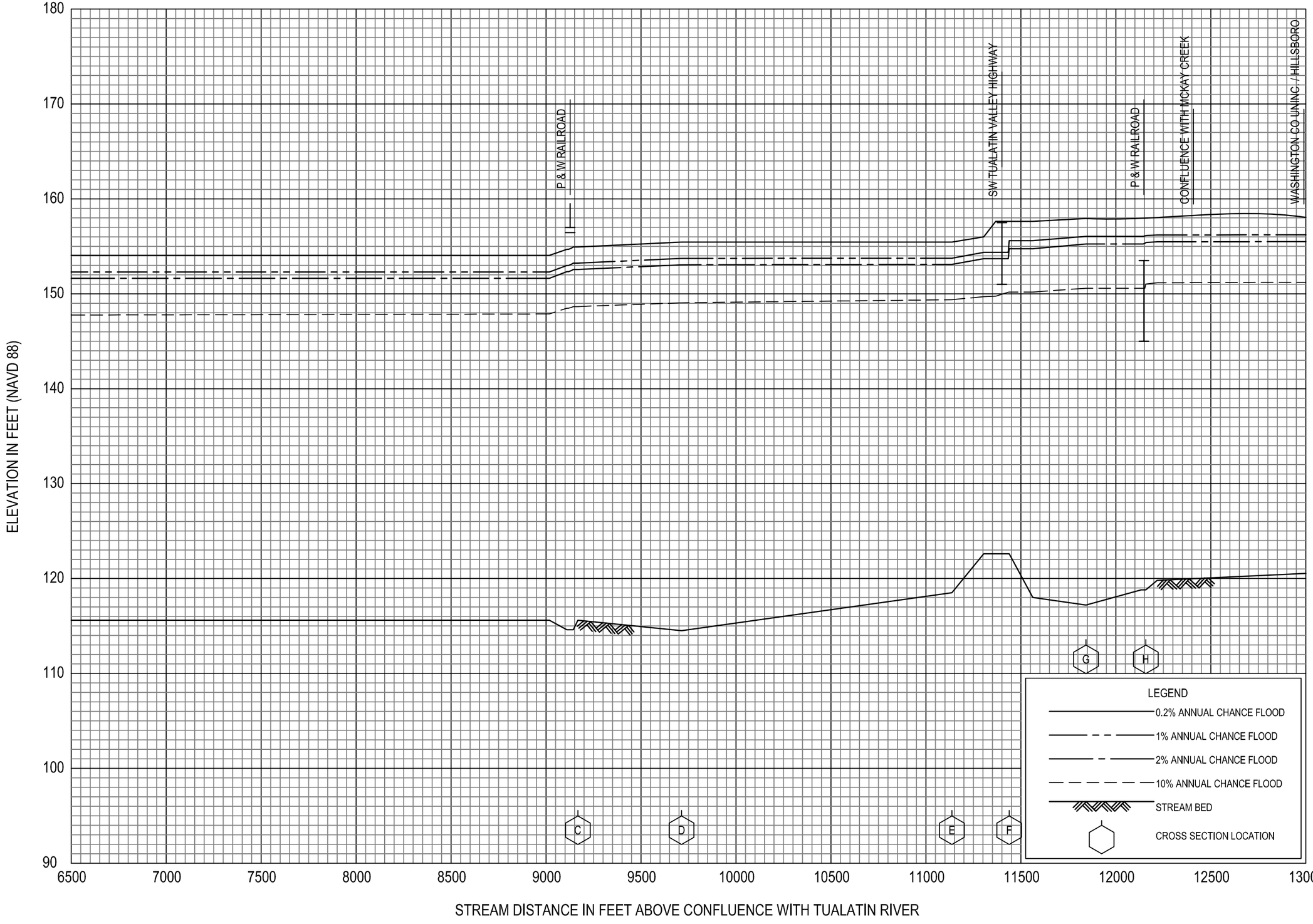
B

LEGEND

- 0.2% ANNUAL CHANCE FLOOD
- 1% ANNUAL CHANCE FLOOD
- 2% ANNUAL CHANCE FLOOD
- 10% ANNUAL CHANCE FLOOD
- STREAM BED
- CROSS SECTION LOCATION

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

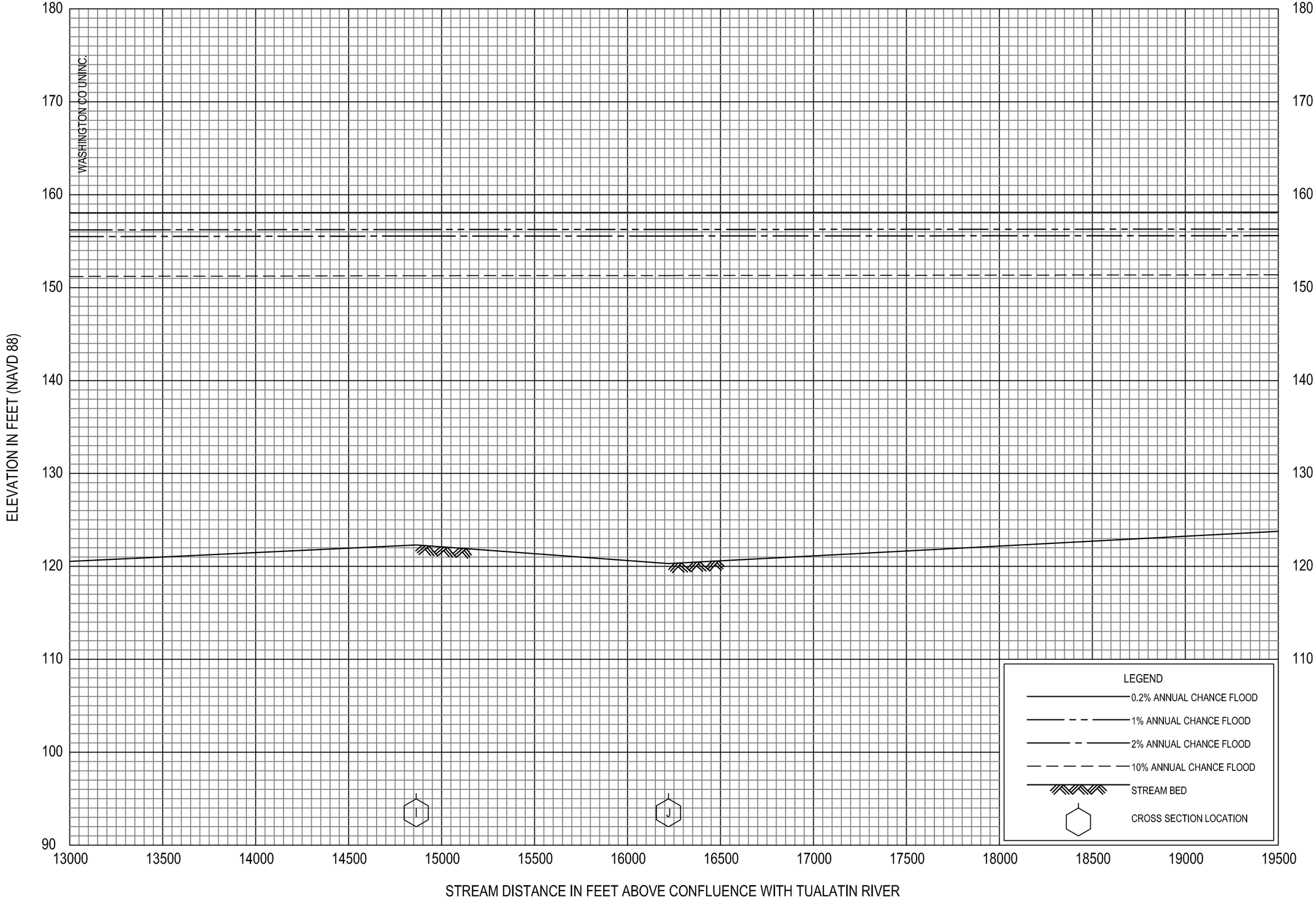


FLOOD PROFILES

DAIRY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS



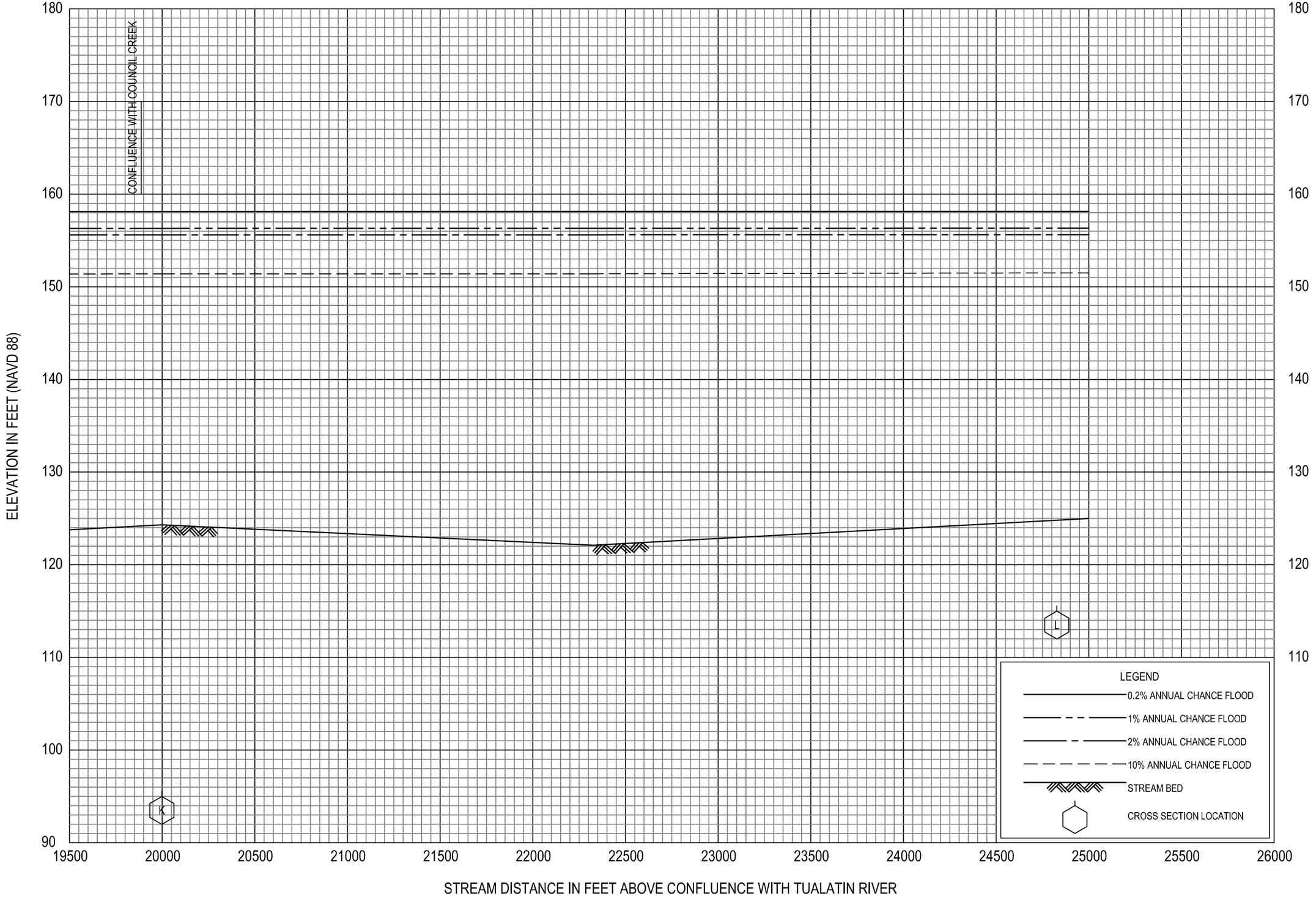
FLOOD PROFILES

DAIRY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

46P



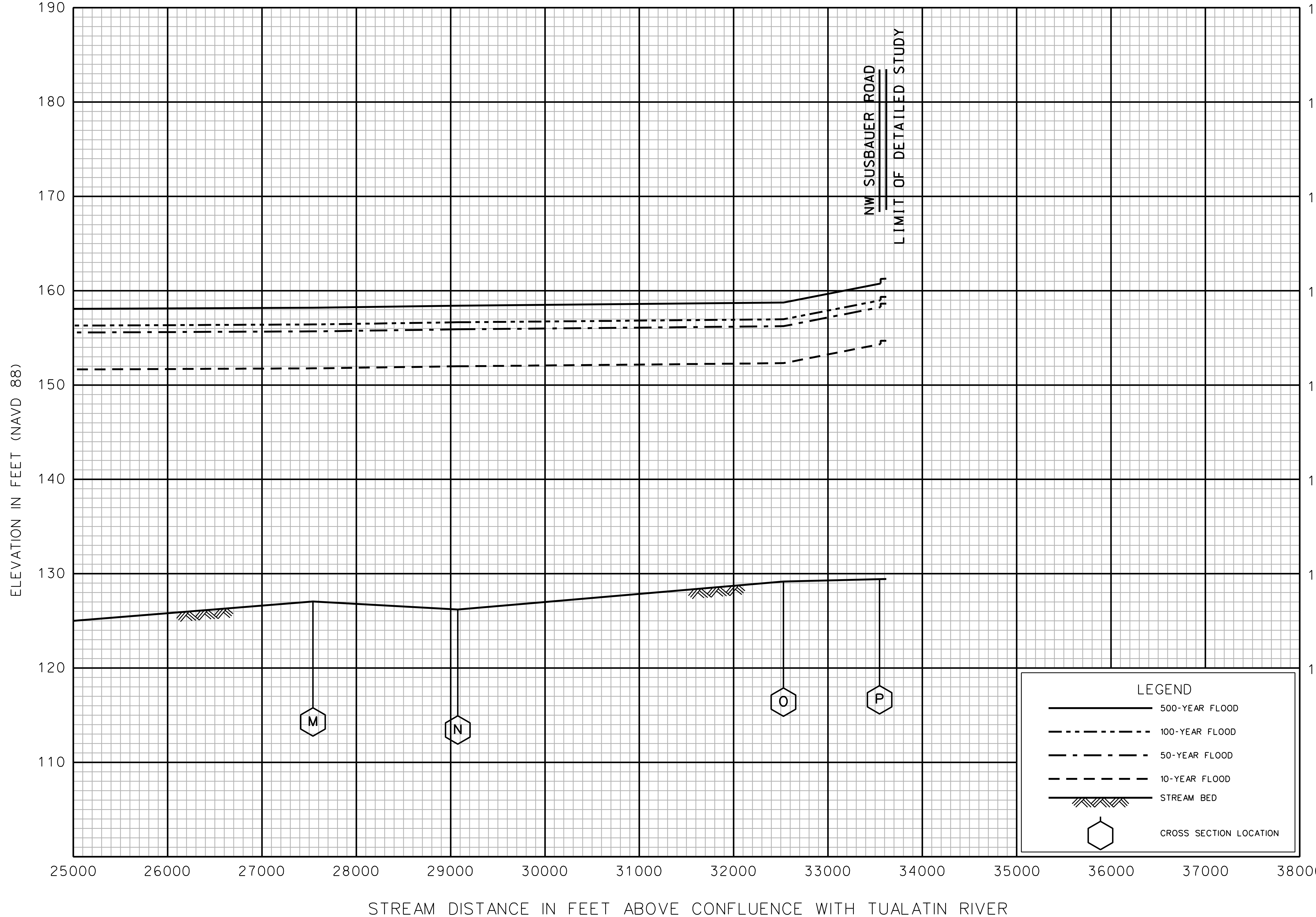
FLOOD PROFILES

DAIRY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

47P

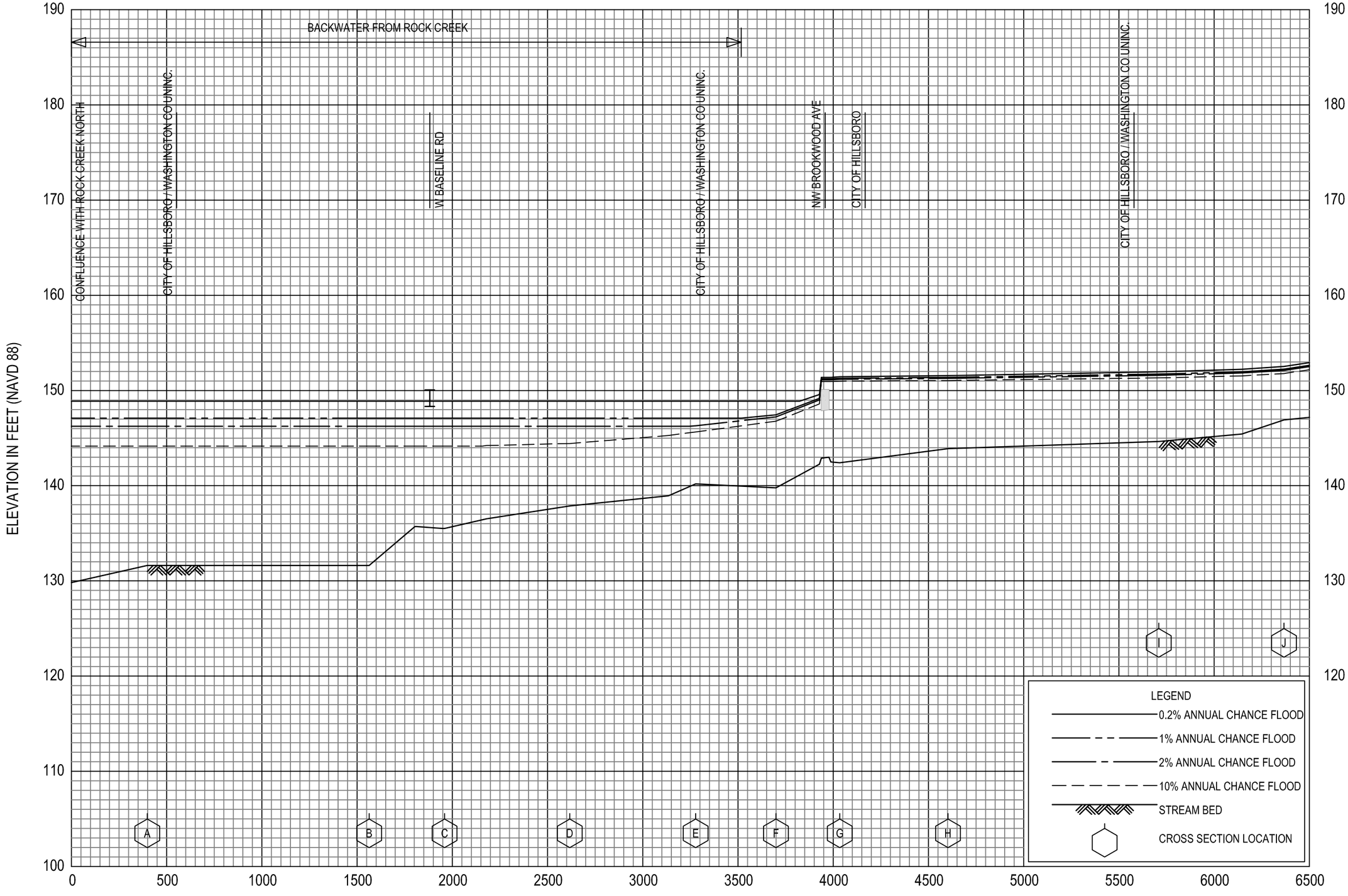


FLOOD PROFILES

DAIRY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR AND INCORPORATED AREAS

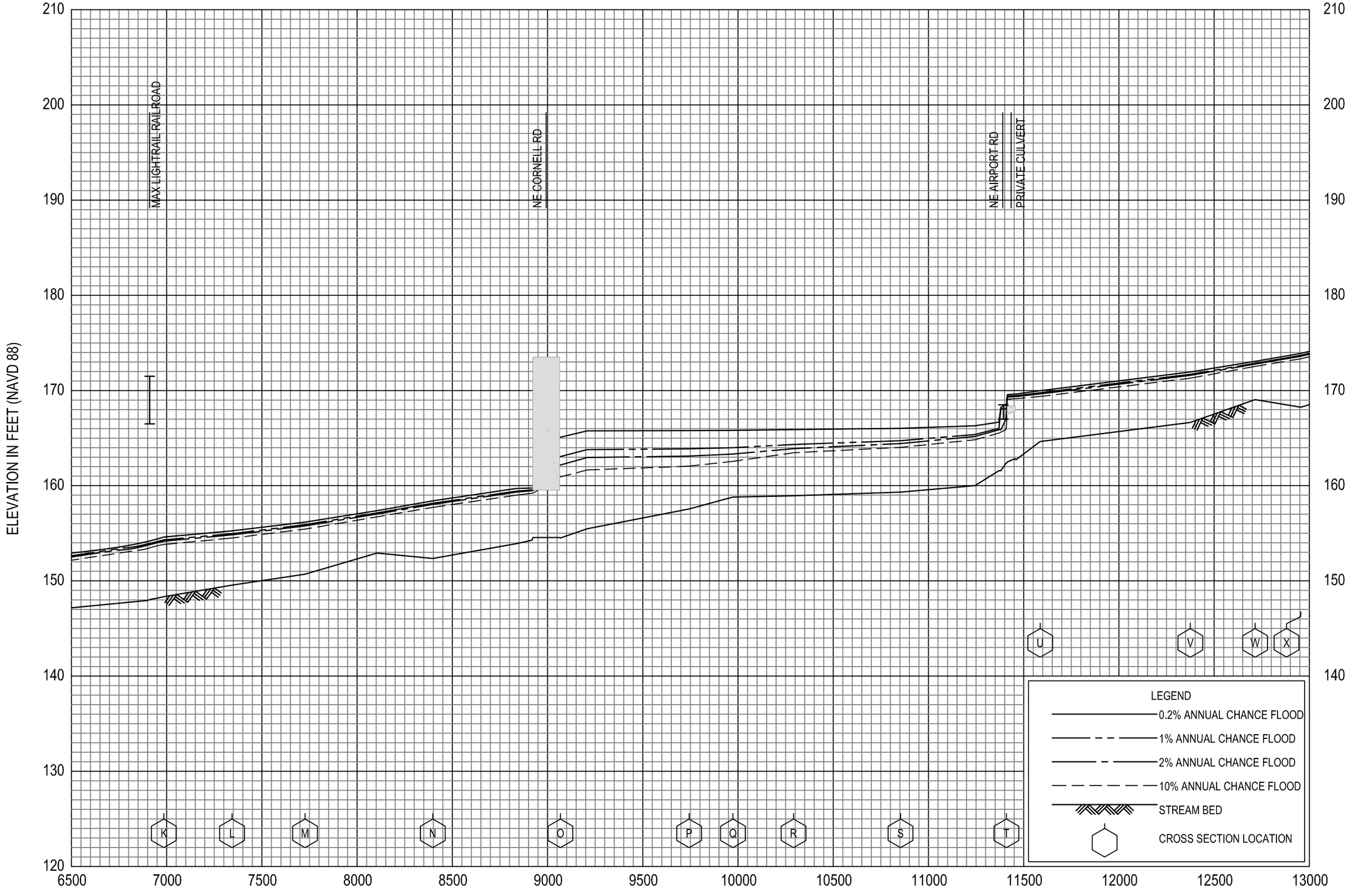


FLOOD PROFILES

DAWSON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

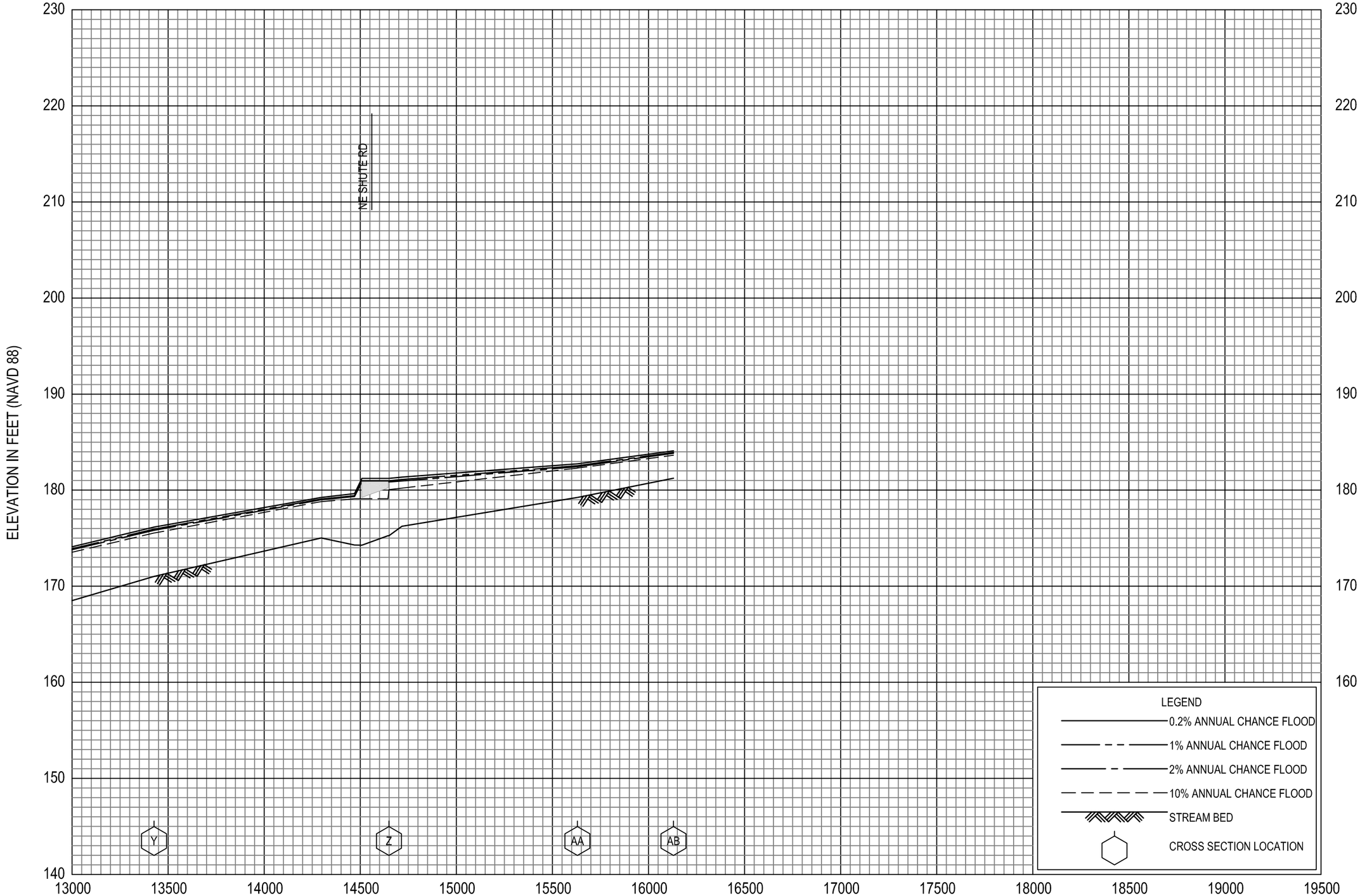


FLOOD PROFILES

DAWSON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

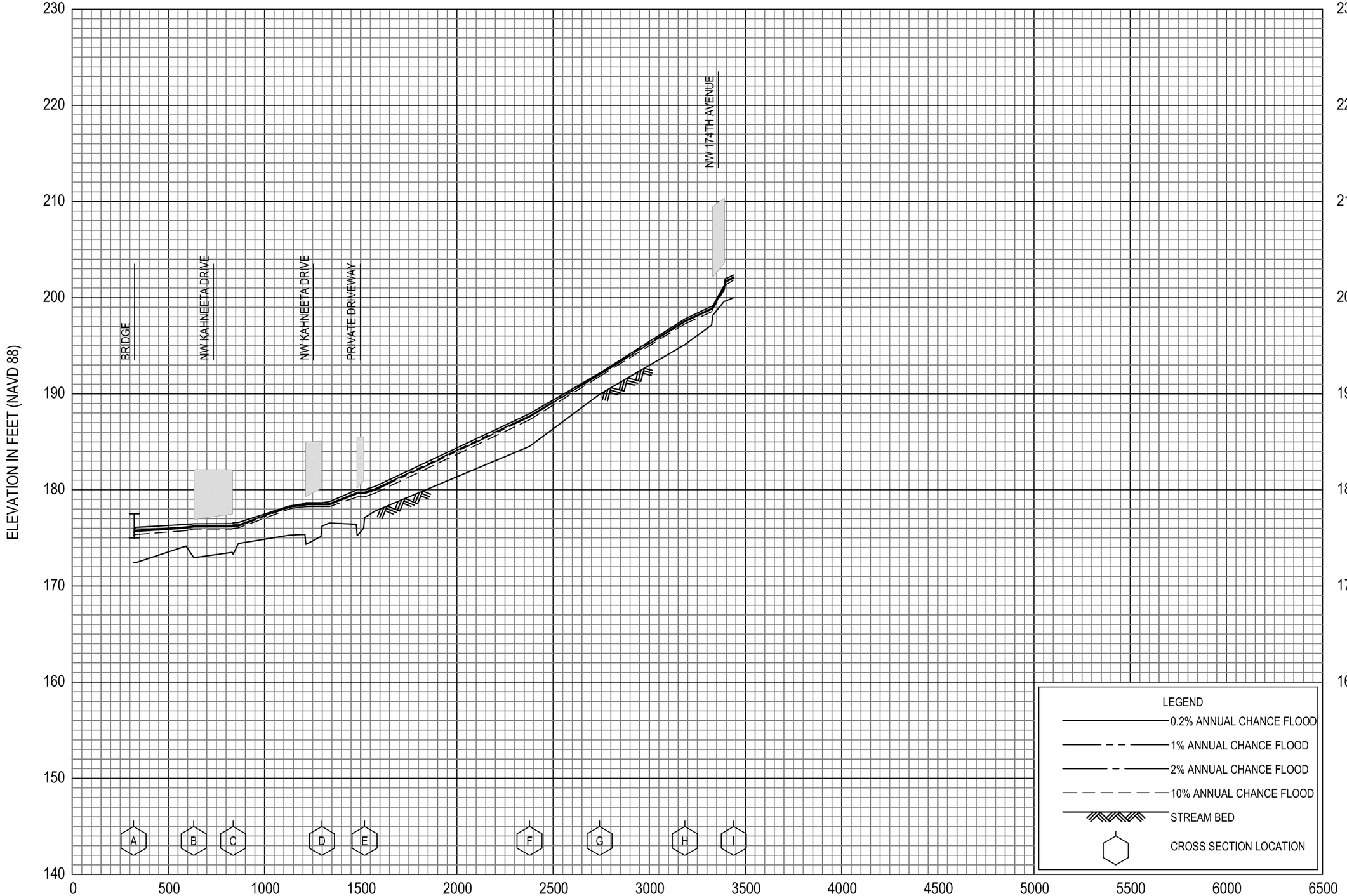


FLOOD PROFILES

DAWSON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

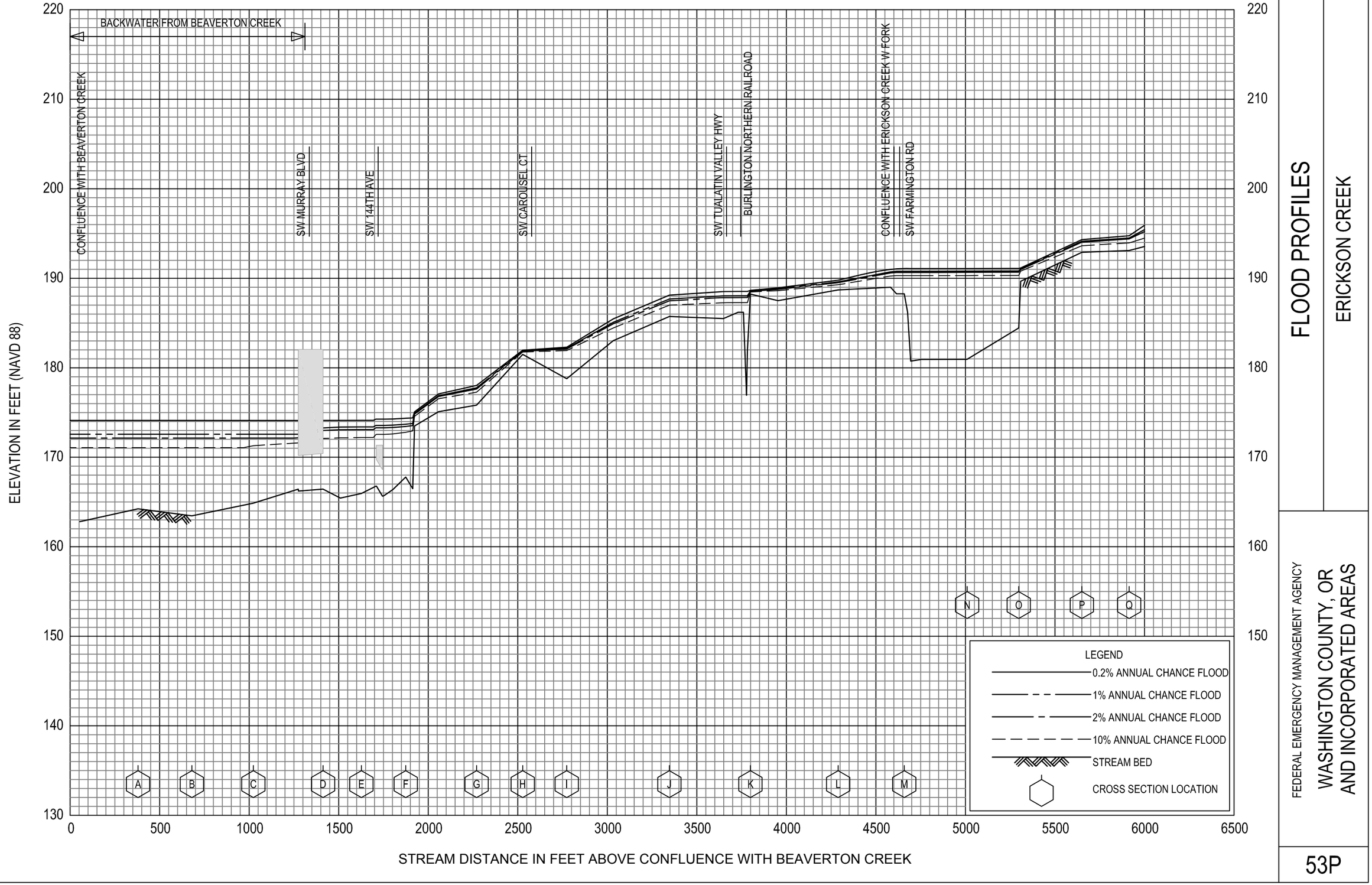


FLOOD PROFILES

DEER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

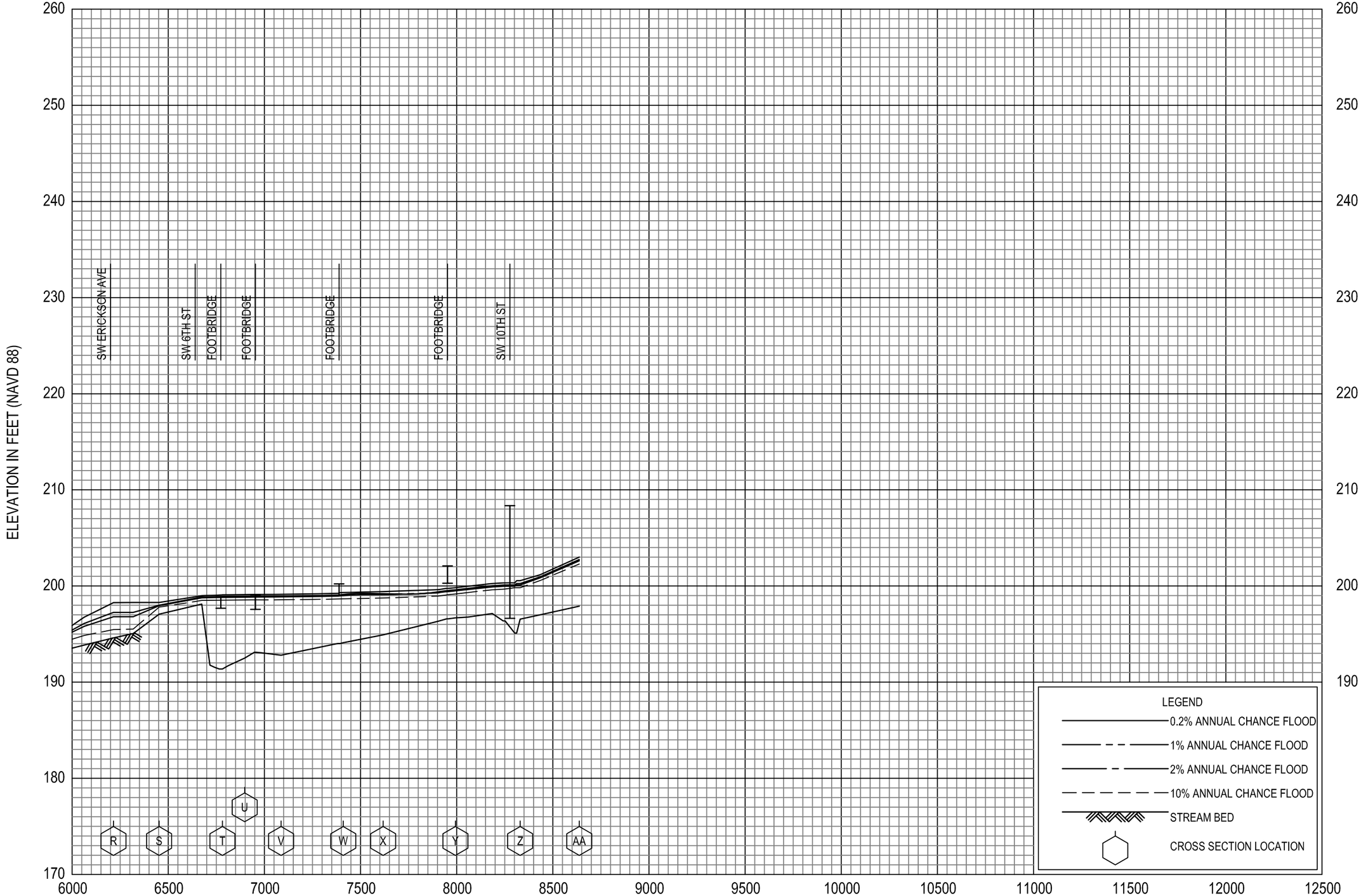


FLOOD PROFILES

ERICKSON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

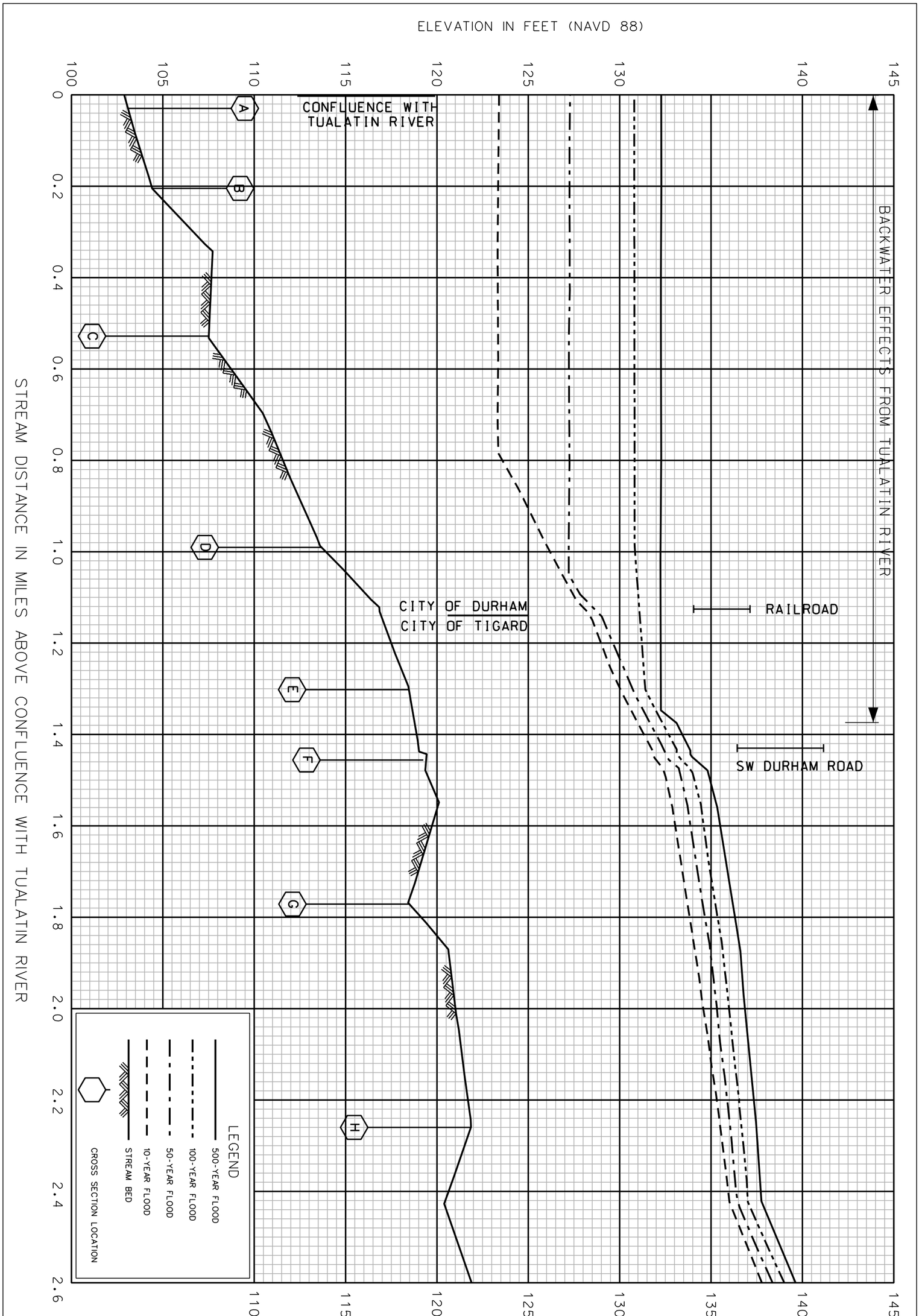


FLOOD PROFILES

ERICKSON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS



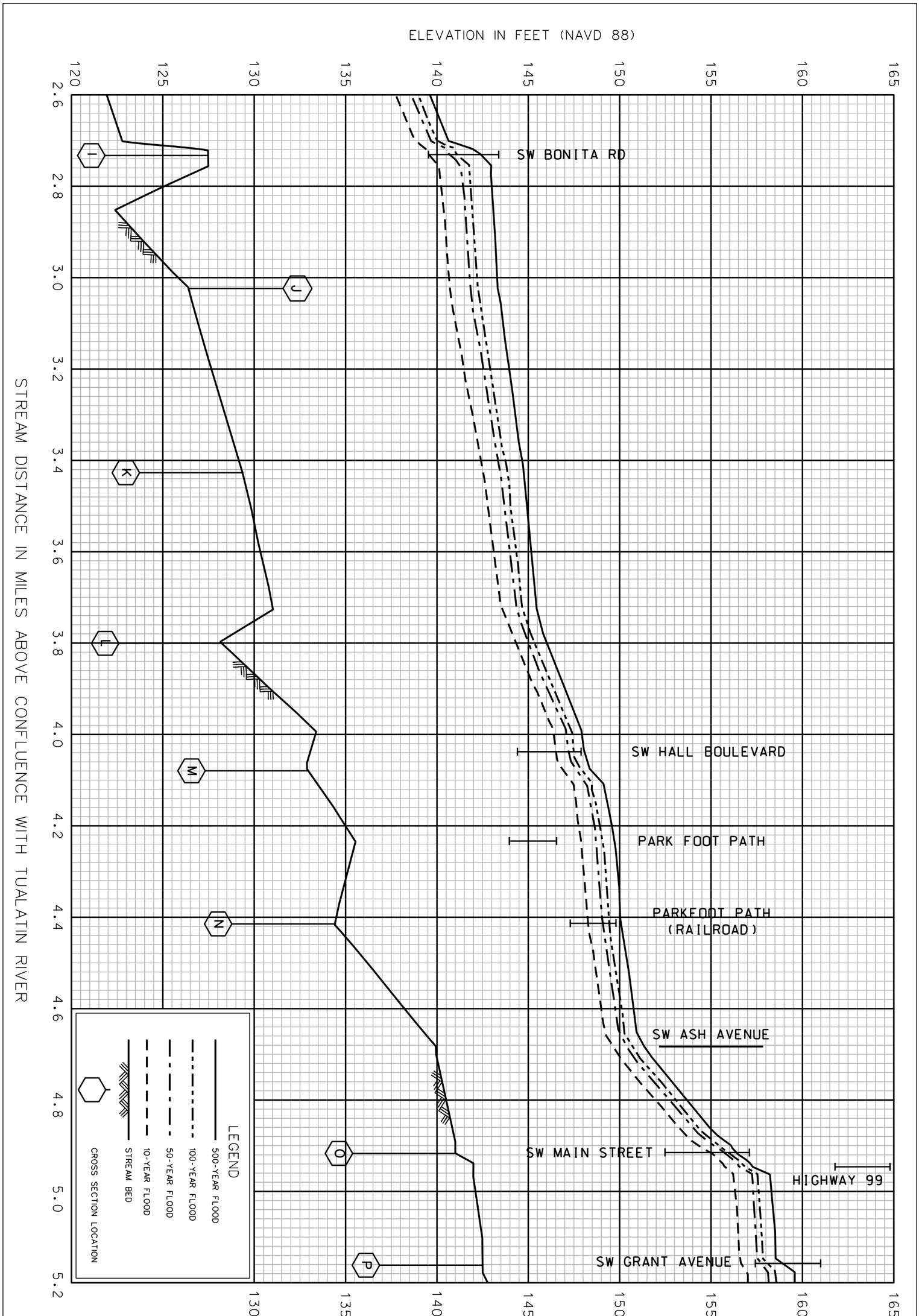
55P

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR AND INCORPORATED AREAS

FLOOD PROFILES

FANNO CREEK



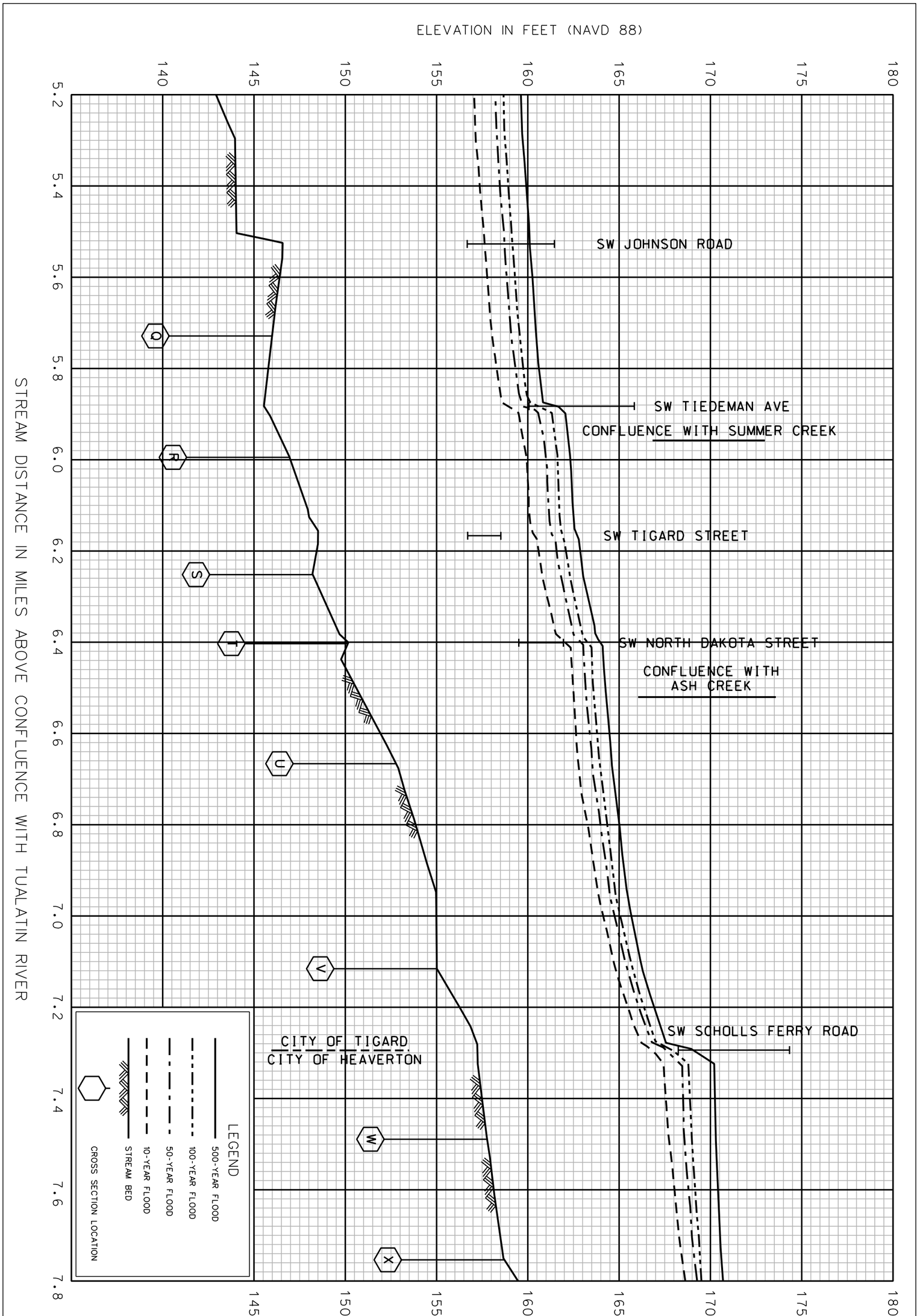
56P

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

FLOOD PROFILES

FANNO CREEK



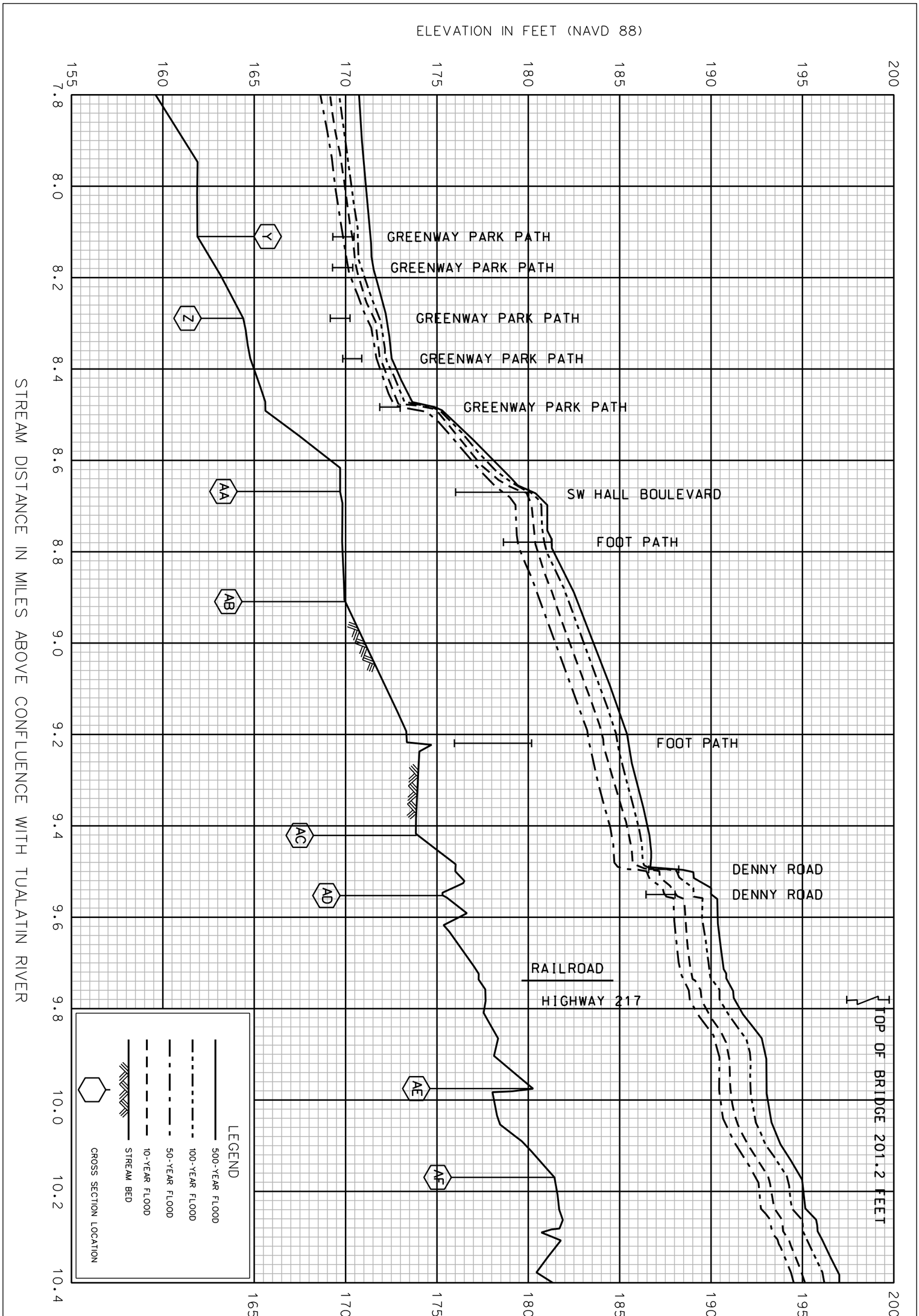
57P

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

FLOOD PROFILES

FANNO CREEK



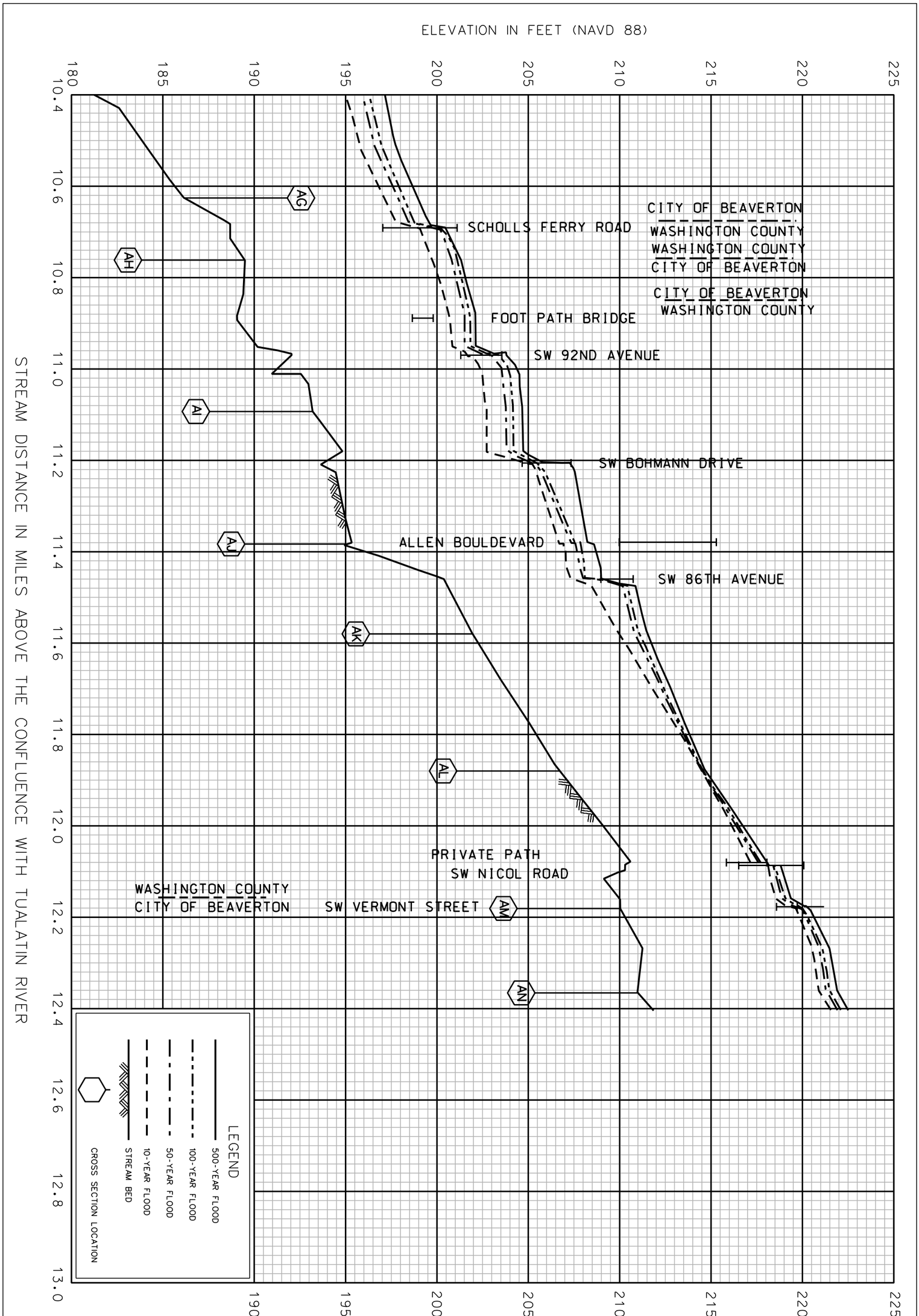
58P

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR AND INCORPORATED AREAS

FLOOD PROFILES

FANNO CREEK

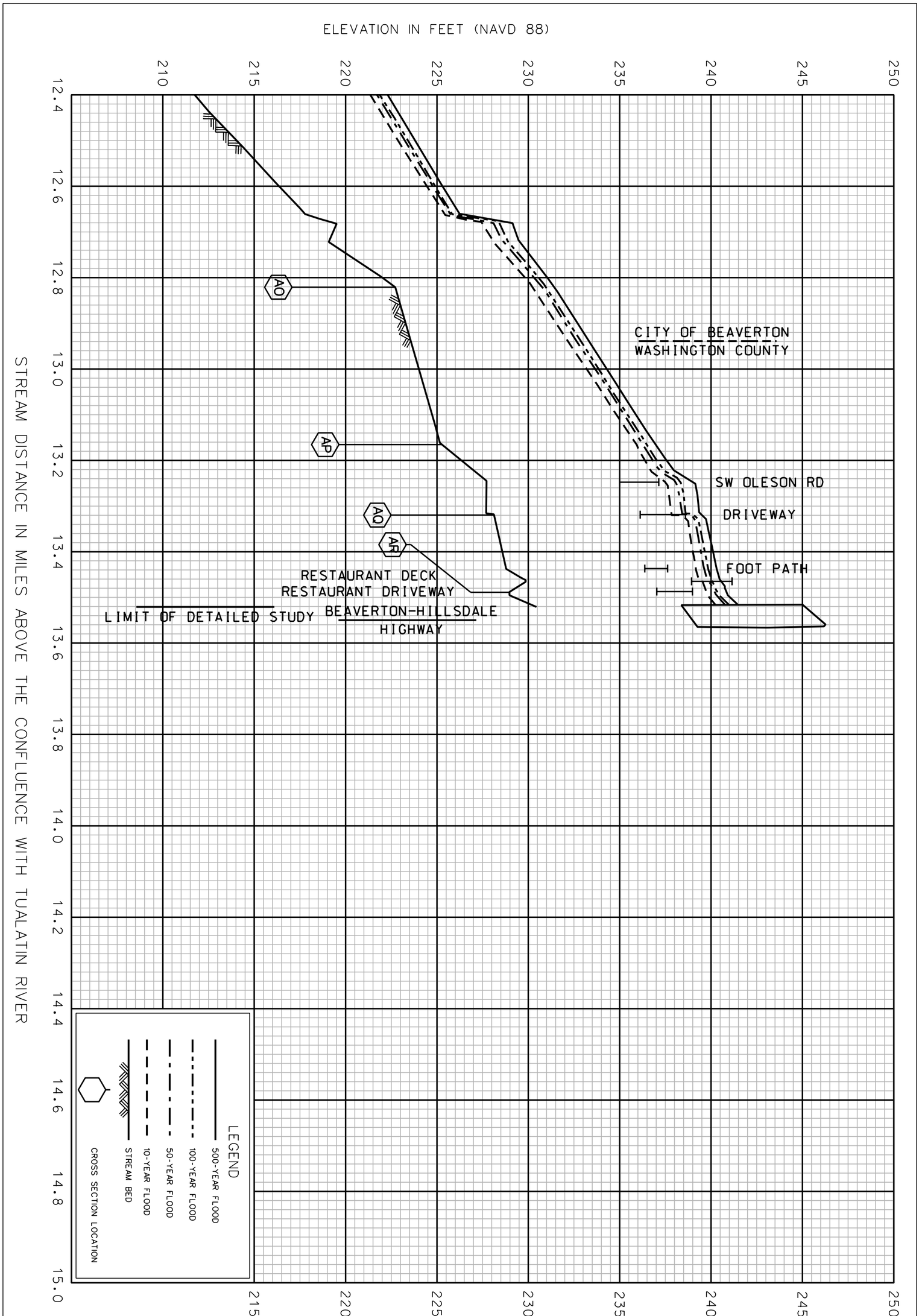


59P

FEDERAL EMERGENCY MANAGEMENT AGENCY
WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

FLOOD PROFILES

FANNO CREEK



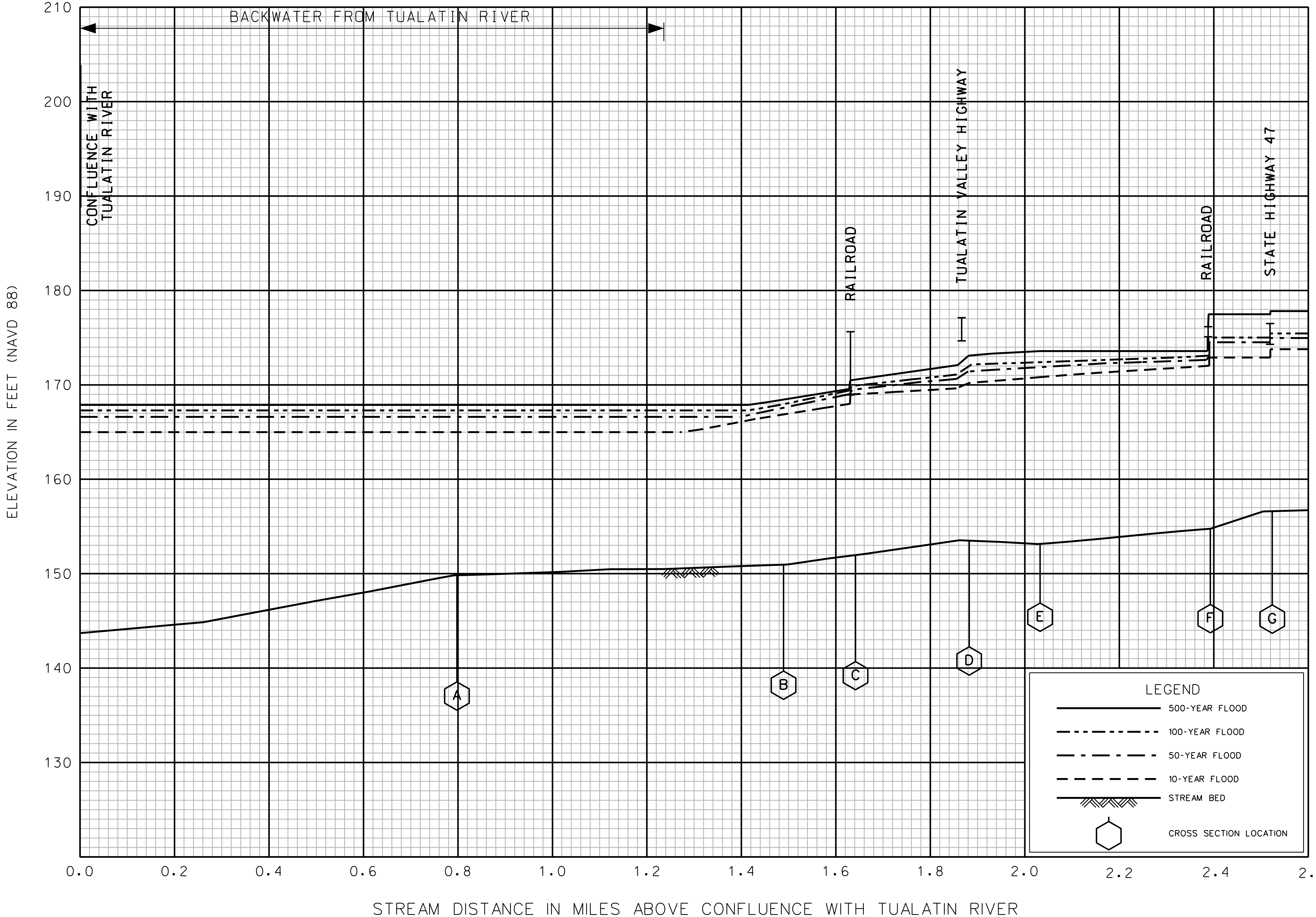
60P

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR AND INCORPORATED AREAS

FLOOD PROFILES

FANNO CREEK

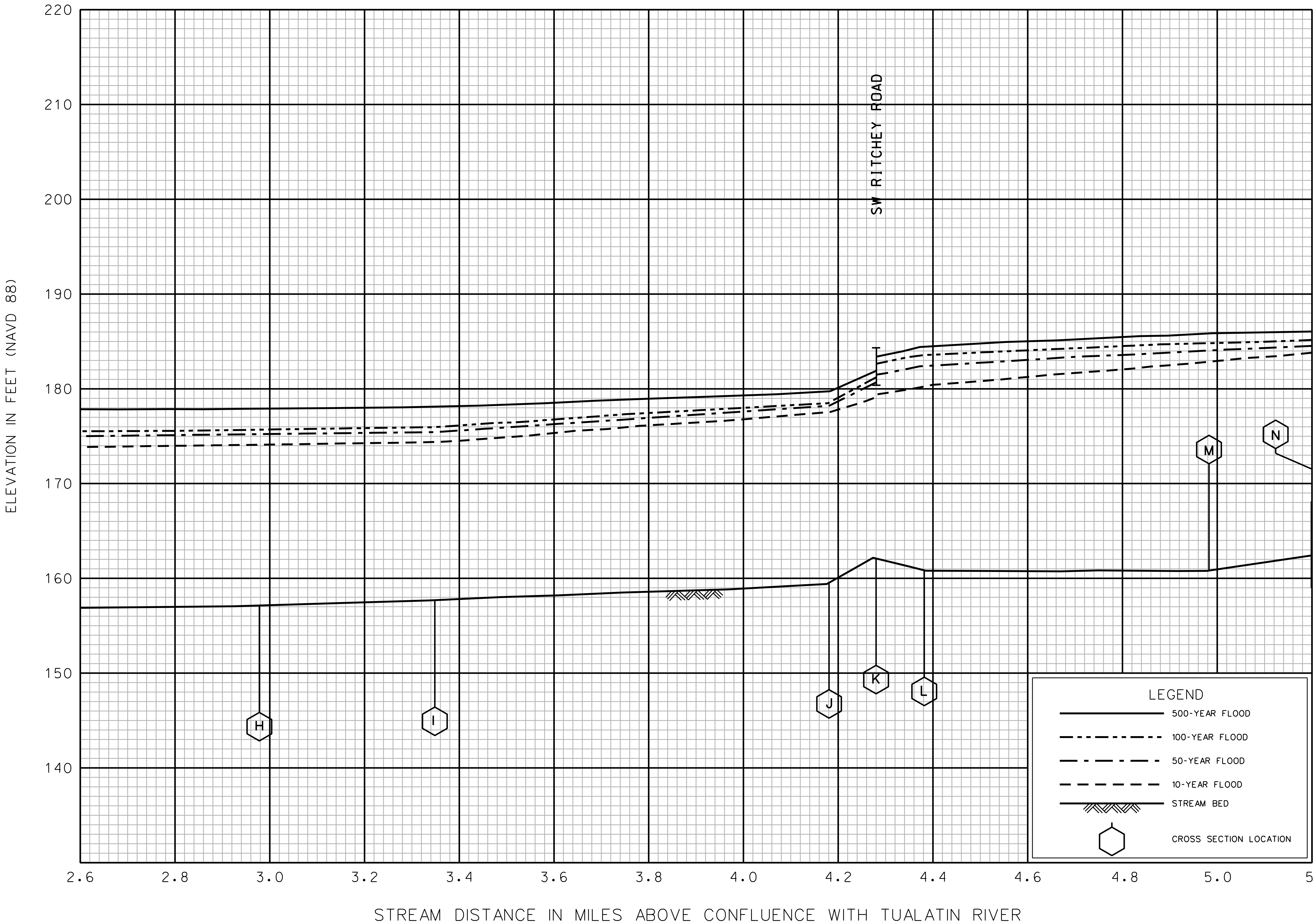


FLOOD PROFILES

GALES CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR AND INCORPORATED AREAS



FLOOD PROFILES

GALES CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

FLOOD PROFILES

GALES CREEK

ELEVATION IN FEET (NAVD 88)

240
230
220
210
200
190
180
170
160
150

5.2 5.4 5.6 5.8 6.0 6.2 6.4 6.6 6.8 7.0 7.2 7.4 7.6 7.8

STREAM DISTANCE IN MILES ABOVE CONFLUENCE WITH TUALATIN RIVER

N O P Q R S T

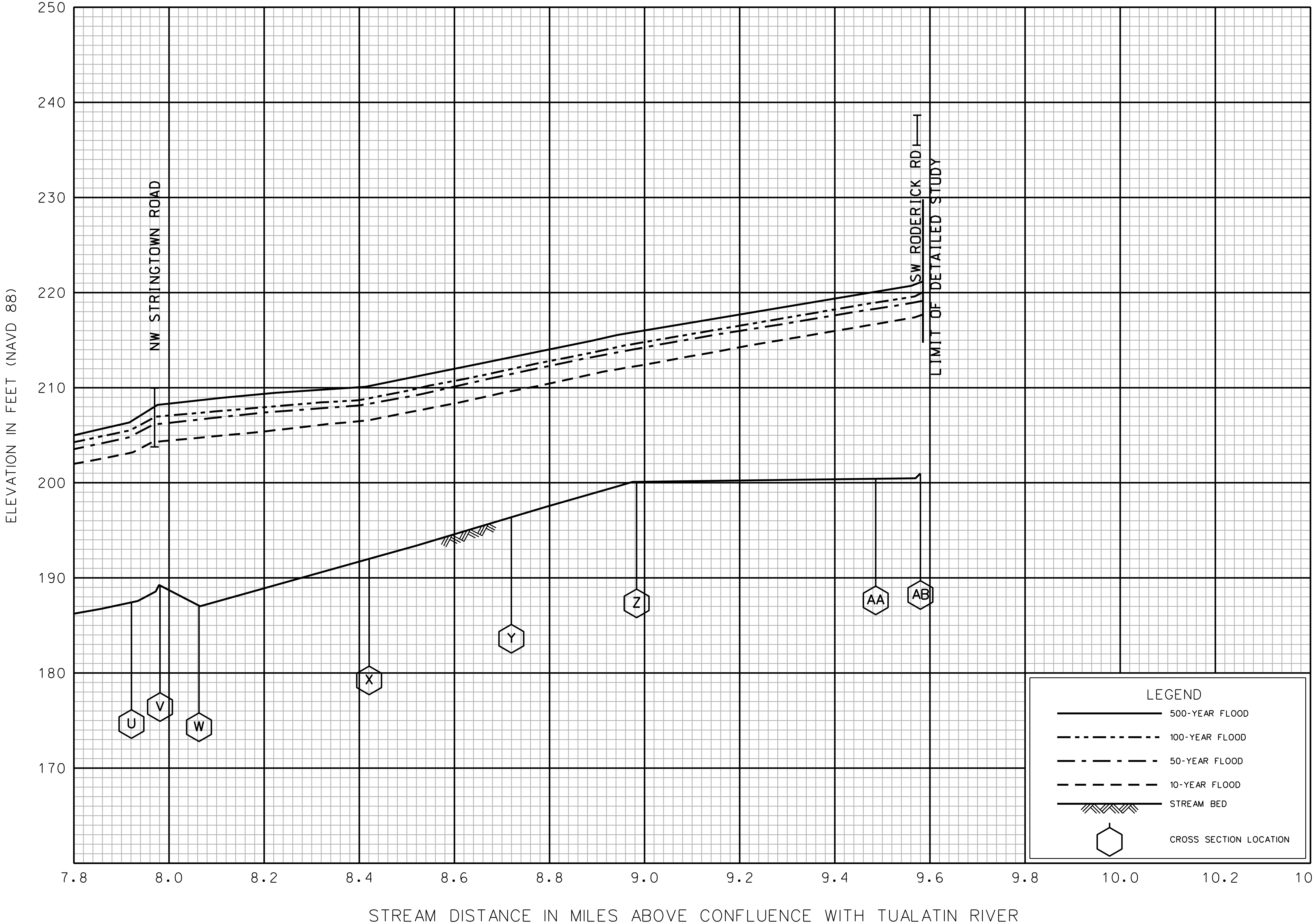
LEGEND

- 500-YEAR FLOOD
- 100-YEAR FLOOD
- 50-YEAR FLOOD
- 10-YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

63P

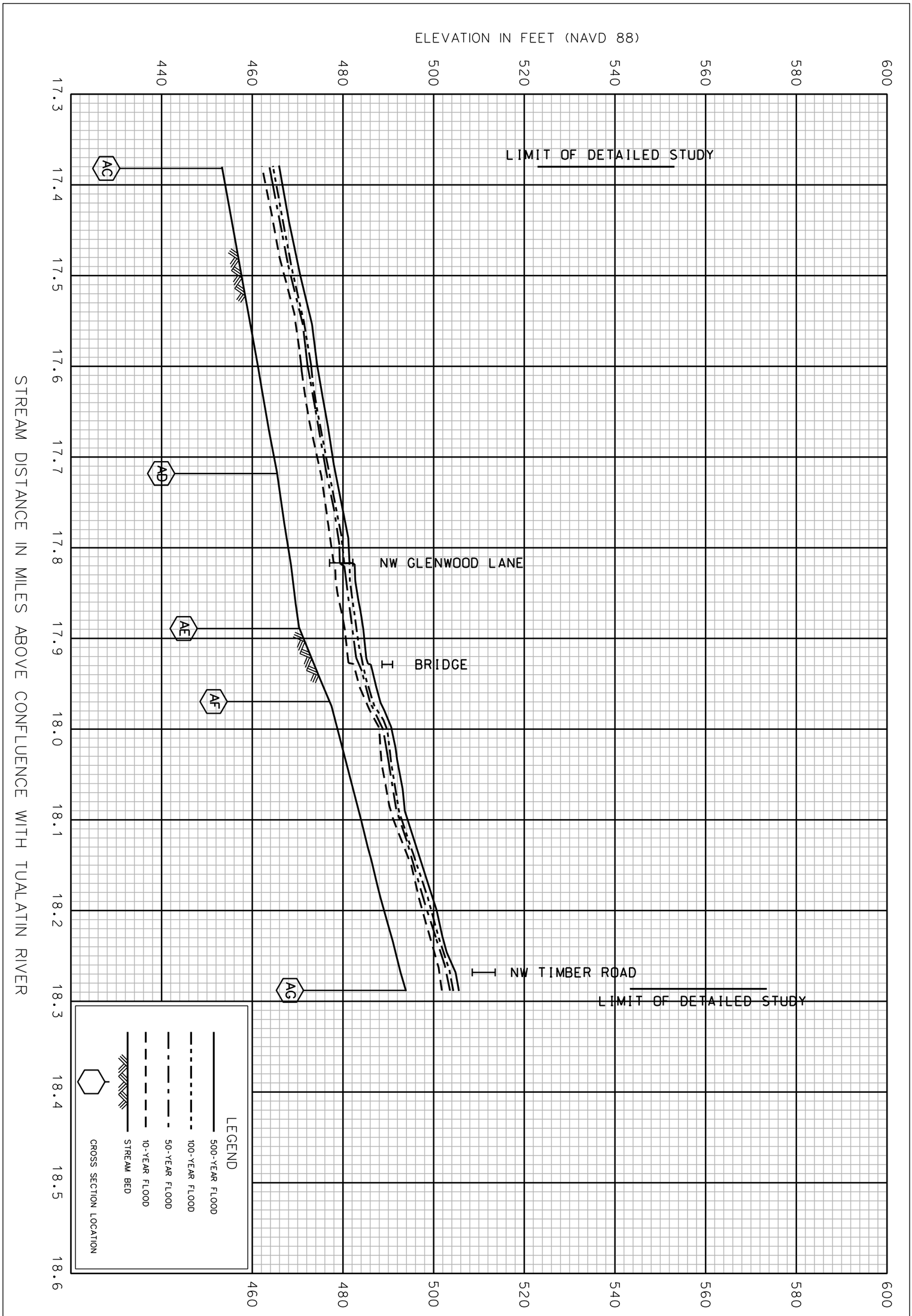


FLOOD PROFILES

GALES CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR AND INCORPORATED AREAS



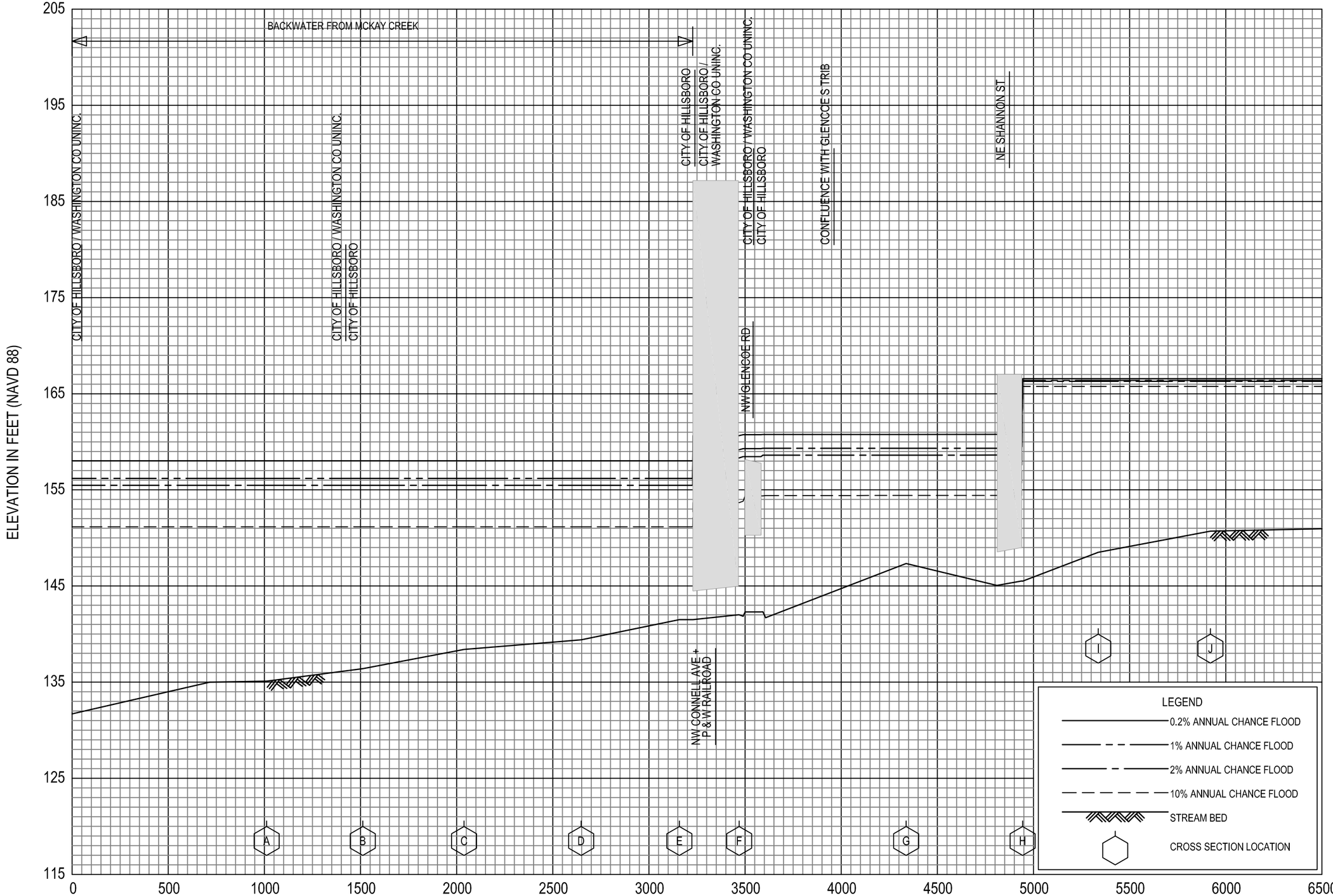
65P

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR AND INCORPORATED AREAS

FLOOD PROFILES

GALES CREEK



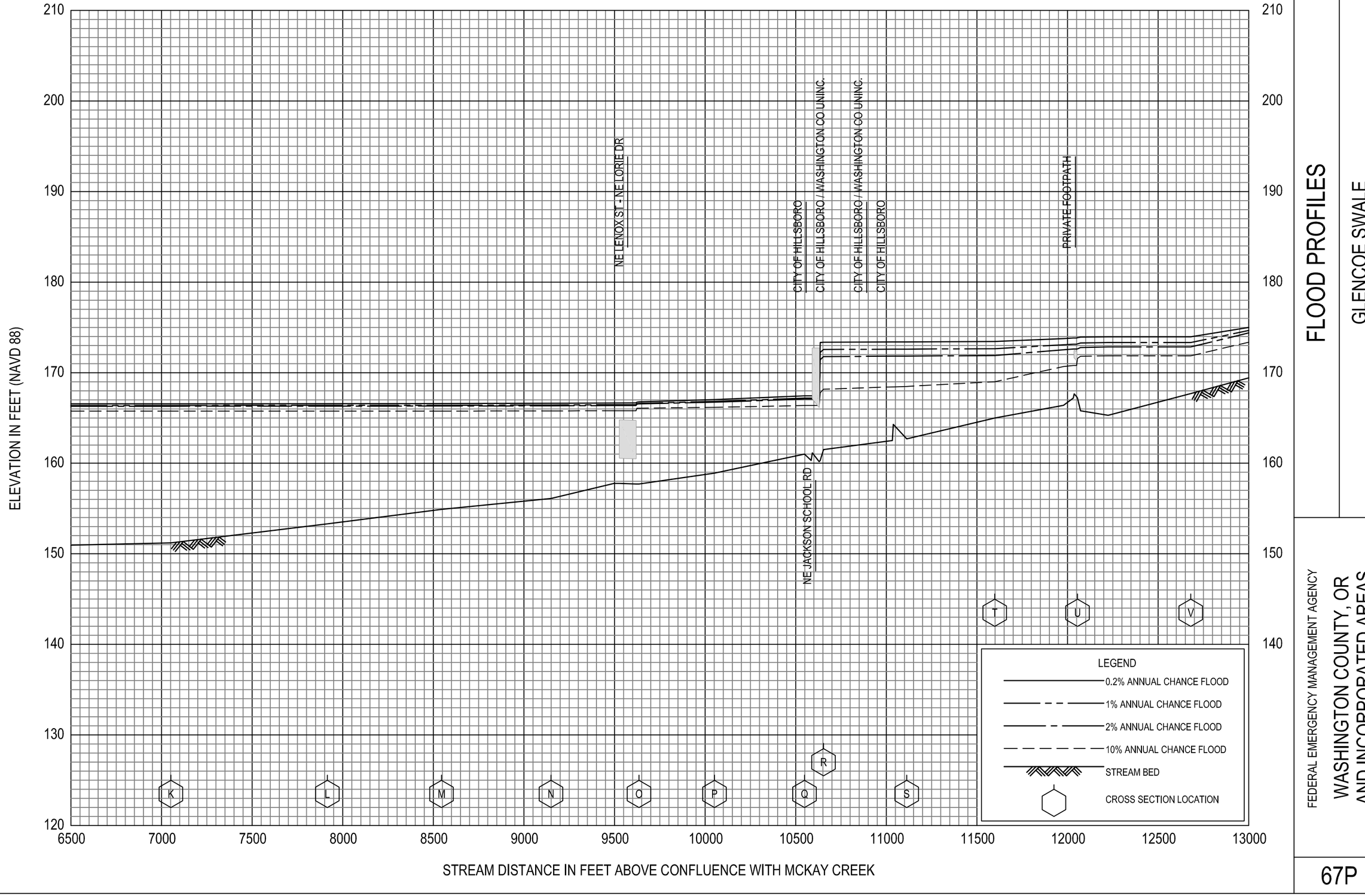
FLOOD PROFILES

GLENCOE SWALE

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

66P



FLOOD PROFILES

GLENCOE SWALE

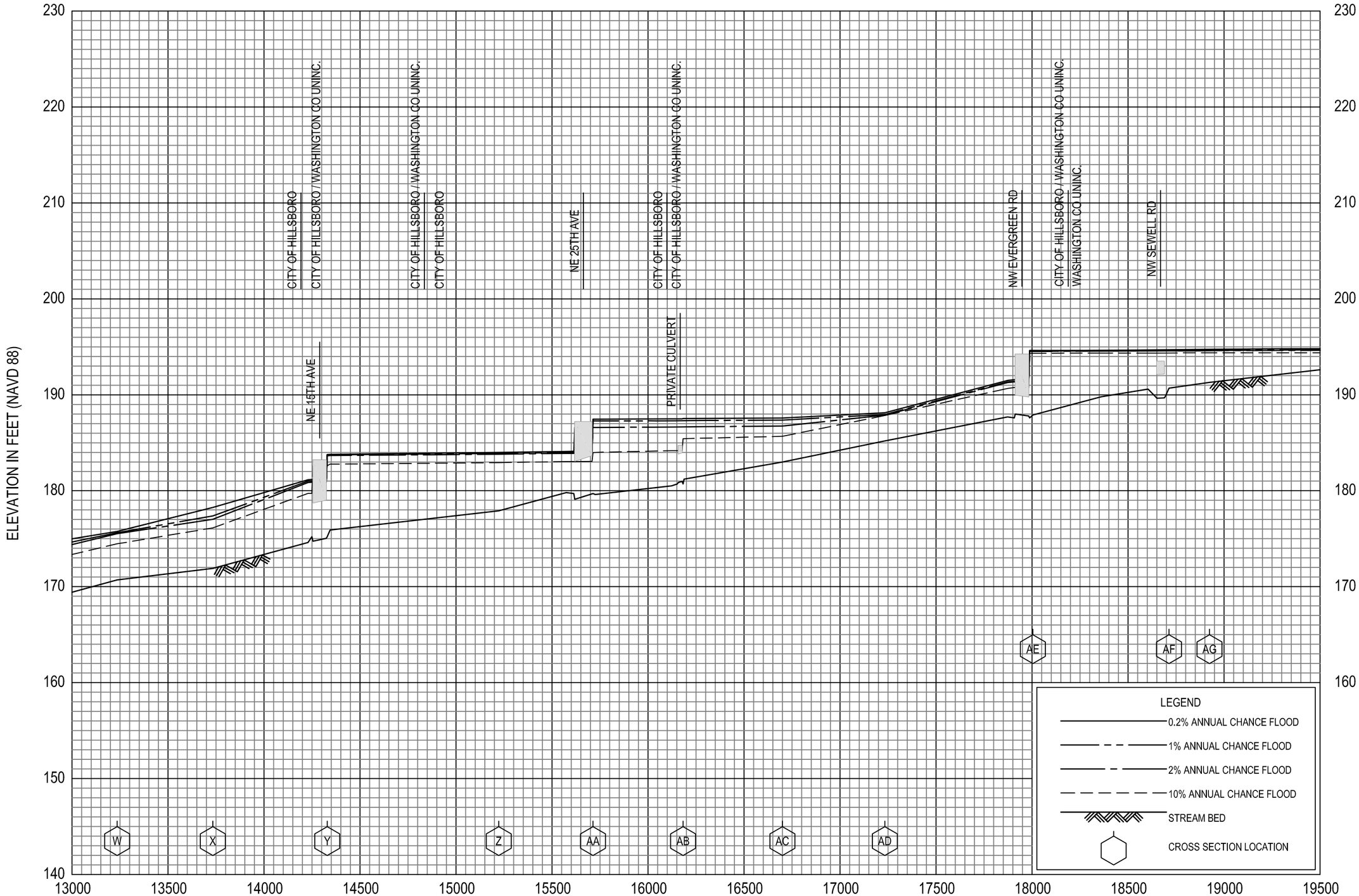
FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

67P

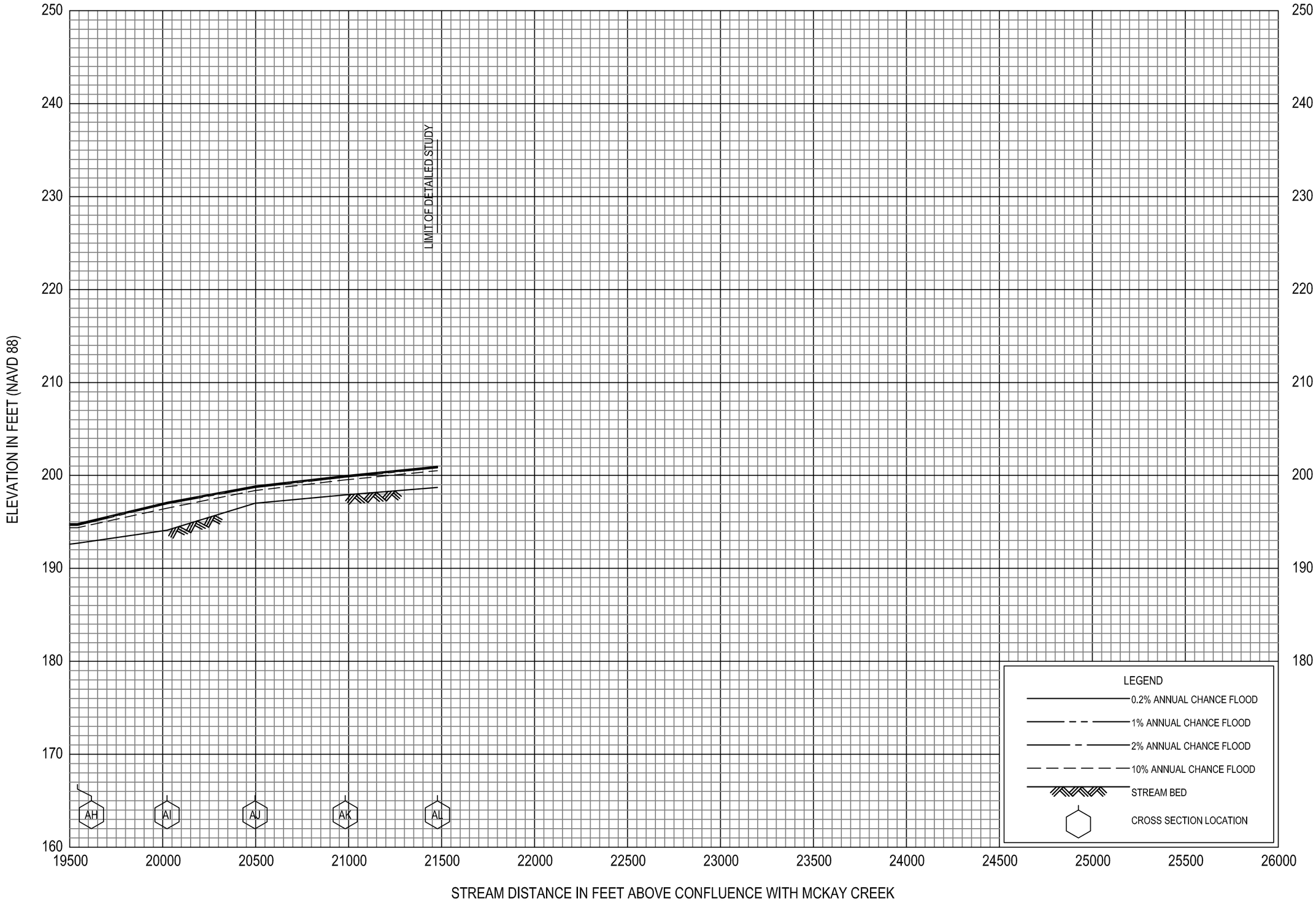
FLOOD PROFILES

GLENCOE SWALE



FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS



FLOOD PROFILES

GLENCOE SWALE

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, OR
AND INCORPORATED AREAS

69P