FLOOD INSURANCE STUDY

MATANUSKA-SUSITNA BOROUGH, ALASKA
AND INCORPORATED AREAS

COMMUNITY NAME	COMMUNITY NUMBER
MATANUSKA-SUSITNA, BOROUGH OF	020021
HOUSTON, CITY OF	
PALMER, CITY OF	
WASILLA, CITY OF	

Effective:
March 17, 2011

Federal Emergency Management Agency
FLOOD INSURANCE STUDY NUMBER
02170CV000A

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AND INCORPORATED AREAS

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MATANUSKA-SUSITNA, BOROUGH OF	020021
PALMER, CITY OF	020021[1]

[1]Use the Borough's CID

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02170CV000A

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) report may not contain all data available within the Community Map Repository. Please contact the Community Map 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

This Preliminary Flood Insurance Study contains profiles presented in a reduced scale to minimize reproduction costs. All profiles will be included and printed at full scale in the final published report.

The Federal Emergency Management Agency (FEMA) may revise and republish part or all of this FIS report at any time. In addition, FEMA may revise part of this FIS report by the Letter of Map Revision process, which does not involve republication or redistribution of the FIS report. Therefore, users should consult with community officials and check the Community Map Repository to obtain the most current FIS report components.

A portion of this FIS report was revised on (To be determined), 2009. Users should refer to Section 10.0, Revisions Description, for further information. 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 may supersede information in Sections 1.0 through 9.0 of this FIS report.

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FLOOD INSURANCE STUDY
MATANUSKA-SUSITNA BOROUGH, ALASKA
AND INCORPORATED AREAS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Matanuska-Susitna Borough, Alaska, and within the incorporated Cities of Palmer, Houston, and Wasilla, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. Local and regional planners will use this study in their efforts to promote sound flood plain management.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the State (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this FIS are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for the original study were performed by the U.S. Army Corps of Engineers, Alaska District, for the Federal Emergency Management Agency under Interagency Agreement No. IAA-H-1878, Project Order No. 15. This work, which was completed in April 1982, covered call significant flooding sources affecting Matanuska-Susitna Borough.

A Type 19 Flood Insurance Study was also performed by the study contractor, under Interagency Agreement No. EMW-E-1153, Project Order No. 1, Amendment No. 5. This work was completed in April 1985. It covers portions of Matanuska River and Knik River in the Bodenburg Butte area.

1.3 Coordination

A meeting was help on July 20, 1977, and attended by representative of the study contractor, the Federal Emergency Management Agency, and Matanuska-Susitna Borough. The purpose of the meeting was to determine which streams would require detailed study and which would require approximate study. A priority list of the streams to be studied was determined. Coordination was made with the U.S. Geological Survey and the U.S. Soil Conservation Service.

Three final coordination meetings were held during the week of September 29, 1983. These meetings were attended by representatives of the Federal Emergency Management

Agency, the study contractor, and the community. All problems and questions that were raised at the meetings have been resolved.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS covers the incorporated Cities of Wasilla, Houston, and Palmer, and the unincorporated areas of Matanuska-Susitna Borough, Alaska.

Deception Creek; Deception Creek Tributaries 1, 2, and 3; Willow Creek; Willow Creek Tributary; Little Susitna River; and Little Susitna River Split Flows 1, 2, and 3 were studied by detailed methods. Each stream was studied from a downstream location, below which little development is expected by the borough due to wetland conditions, to an upstream location where the 1-percent-annual-chance-flood plain narrows.

Flooding in the Bodenburg Butte area along Matanuska River and Knik River was initially studied by approximate methods. Results from the Type 19 Flood Insurance Study were used to revise the approximate flood boundaries. The latter study evaluated flood hazards on Matanuska River in the vicinity of a flood protection dike along Old Glenn Highway, and on Knik River from Windsong and Heritage Park Subdivision development to Old Glenn Highway Bridge. Information generated by this study is not sufficient to define detail flood boundaries on these streams.

Those areas studied by detailed methods were chosen with consideration given to all proposed construction and forecasted development through 1987.

Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to and agreed upon by the Federal Emergency Management Agency and the borough.

2.2 Community Description

Matanuska-Susitna Borough, located in the Third Judicial District in south-central Alaska, governs an area of over 23,000 square miles extending from the Municipality of Anchorage in the south to Mt. McKinley National Park in the north. It is surrounded by unorganized area to the north, east, and west, and by Greater Anchorage Area and Kenai Peninsula Boroughs to the south. The population of Matanuska-Susitna Borough was 6,509 in 1970 and increased 174 percent to 17,816 by 1980 (Reference 1). The population of the borough was 39,683 in 1990 and 59,322 in 2000 (Reference 2).

Most of the land along Deception Creek, Willow Creek, and the Little Susitna River is developing as a low density residential area. The watershed basins for these streams are located in south-central Alaska, approximately 30 air miles and 70 miles by highway north of Anchorage. The area has been a focal point of increasing use for recreational activities such as boating, hiking, snowmobiling, fishing, and hunting. This increased

recreational usage can be attributed to the area's esthetic qualities and closeness to Anchorage, the largest city in the State.

The streams studied by detailed methods originate in the Talkeetna Mountains and flow west to the Susitna River or Cook Inlet. Physiographic characteristics are quite varied having developed from glacial activities and volcanic action. The study area is underlain primarily by bedrock consisting of weakly consolidated, coal-bearing rocks of Tertiary Age. It has been glaciated several times, so there are thick deposits of glacial drift and alluvial sediments made up of sandy and gravelly material. The relative proportions of the materials in the glacial drift vary quite a bit, as does the compactness of the soil. Thus, permeability and internal drainage are highly variable, even over short distances. Poorly drained soils often occur on the slopes of moraines in close association with well-drained soils. Most of the area is also covered with a mantle of silty loess probably derived from the Susitna River flood plains to the west. The loess ranges from a few inches to several feet in thickness. Poorly drained peat is common in scattered depressions, shallow basins between moraine hills, and other low-lying areas. The Willow area contains fifteen varying vegetative habitat types composed of mature stands of mixed coniferous and deciduous forests with an understory of a variety of forbs and woody plants, muskeg-black spruce bogs, and grassland areas. Ferns, horsetails, and clubmosses are present throughout the entire borough. Generally, the vegetative ground cover is dense and provides substantial protection from erosion activity, particularly in the higher elevations where better drained soil conditions are found. Willow and birch/aspen stands under 10 feet high are generally lacking, with low woody shrubs such as Vaccinum being very common throughout the borough. Elevations range from 10,000 feet in the mountains to less than 100 feet in the southern valleys.

The region is in a transitional climatic zone between maritime and continental conditions. Pronounced temperature variations and cloudy weather are common during a large portion of the year. Mountain ranges to the south act as a barrier to the influx of warm air from the Gulf of Alaska, resulting in an average annual precipitation which is only 10 to 15 percent of that at stations located on the Gulf of Alaska.

Annual precipitation in the study area averages 25 inches with annual snowfall of 80 inches. Rainfall is generally heaviest in August and September with monthly precipitation amounts approximately equal for the rest of the year. The Alaska Mountain range lies in a long arc, approximately 70 miles north of the detailed study area and serves as an effective barrier to the flow of extreme cold winter weather from the north. The streams remain frozen during the winter with ice jam flooding occurring occasionally in the spring. Annual temperatures range from -20°F to 80°F.

2.3 Principal Flood Problems

Floods in Matanuska-Susitna Borough can occur as a result of a combination of factors, including heavy snow pack, temperature, sunshine, and precipitation. The sequence of events affects the flooding potential. Spring floods on streams may occur as a result of an above-normal snowfall during the winter followed by an unusually cold spring and a rapid snowmelt. Summer and fall floods usually result from intense precipitation. In

addition, an ice jam could occur during the winter or during spring breakup causing overbank flooding. Ice jams have caused the highest flooding on these streams, but no frequency has been applied to this type of flood. Typical of most of Alaska, there is little information available concerning historical floods in Matanuska-Susitna Borough. Public agencies and longtime residents, however, substantiate that floods have occurred. Information of historical floods was obtained primarily from interviews with residents in the area. A tabulation of floods in recent years and an analysis of conditions resulting from these floods are shown in Table 1. The principal flood problems are natural obstructions such as trees and vegetation along the banks, manmade obstructions such as bridges and boatdocks, ice jams, the accumulation of brush and debris along and within the streambed which can be carried downstream by high water and block bridge openings or other constrictions, and inadequately-sized culverts.

Willow Creek crosses the Parks Highway at mile 72. It originates in the Talkeetna Mountains and generally flows west to join the Susitna River. It has a total length of approximately 35 miles of which only the lower 18 is developable. The two major tributaries to this stream are Peters Creek and Deception Creek. The lower reaches of the stream, especially above the Parks Highway, are under intense pressure for subdivision and development in spite of the fact that there are obvious flood hazards within the area.

Deception Creek also originates in the Talkeetna Mountains and generally flows north and west for approximately 20 miles to join Willow Creek just upstream of the Parks Highway. At the present time, the entire length of Deception Creek is sparsely developed with very few crossings.

The Little Susitna River drains the southern slopes of the Talkeetna Mountains and has its headwaters in the mountains. The land form is such that the river intercepts numerous minor tributaries directly from the mountain slopes to the north. It is an extreme meandering stream and has a total length of approximately 75 miles.

Table 1: Historical Flooding

Year	Flooding Source and Resulting Damage
1938	Willow Creek; water overtopped the railroad, caused by ice jam.
1943	Little Susitna River; pier in railroad bridge washed out.
1949	Little Susitna River; rain on rapid snowmelt caused roads to wash out, damaged culvert.
1955	Willow Creek; heavy rainfall damaged railroad.
1959	Little Susitna River; massive road washouts at Houston and Little Susitna Inn, track and culverts washed out.
1963	Little Susitna River; roads washed out, damaged culverts.
1964	Little Susitna River; ice jam flooding.
1964	Willow Creek; ice jam flooding.
1971	Willow Creek; log jam caused flooding near Willow, damage to highways and residences.
1971	Little Susitna River; railroad undermined at Houston caused derailment of 13 cars. Man-made dam broke during rainfall. Lower Hatcher Pass Road bridge over the Little Susitna River washed out.
1971	Matanuska River; flooding resulted when a landslide-formed dam on Granite Creek (a tributary to the Matanuska River) broke during a period of rainfall and snowmelt. Water overtopped Old Palmer Highway in the Bodenburg Butte area, and residential and commercial buildings were flooded. Discharge was estimated at 80,000 cubic feet per second (cfs). Estimated 1%-annual-chance discharge for the Matanuska River at Palmer is 40,000 cfs.
1975	Willow Creek; ice and log jams caused flooding. Approximately five homes were flooded off Hatcher Pass Road, 2 to 5 miles east of the Parks Highway.
1986	Heavy precipitation associated with a large storm system resulted in major flooding in several areas of south-central Alaska from October 10th through 12th.
2006	Major flooding occurred in the Matanuska-Susitna Borough August 18th through 20th from intense rainfall delivered by a storm that tracked in a southeast direction from Nome toward Cordova.

2.4 Flood Protection Measures

A dike was constructed along Old Glenn Highway in Bodenburg Butte to prevent spring runoff of Matanuska River from overtopping the highway. The dike does not provide protection against the 1-percent-annual-chance flood.

Matanuska-Susitna Borough passed a zoning ordinance to restrict development in areas noted for flood hazard. These areas have been determined by previous U.S. Army Corps of Engineers or U.S. Geological Survey studies.

3.0 ENGINEERING METHODS

For the flooding sources studied by detailed methods in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term, average period between floods of a 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 1-percent-annual-chance flood 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 peak discharge-frequency relationships for floods of the selected recurrence intervals for each flooding source studied in detail affecting the borough.

Peak discharges for selected recurrence intervals on Deception Creek; Deception Creek Tributaries 1, 2, and 3; Willow Creek; and Willow Creek Tributary were determined utilizing Clarks time-area unit hydrograph analysis sub-routine in the computer program HEC-1 developed by the U.S. Army Corps of Engineers (Reference 3). Precipitation was determined from the U.S. Weather Bureau Technical Paper No. 53 (Reference 4) and used in the HEC-1 program. These frequencies were confirmed through a regional-frequency analysis developed for other gaged basins in the same geographic area.

Peak discharges for selected recurrence intervals on the Little Susitna River were determined utilizing a regional analysis of drainage area-peak discharge relationships for other stream-gaging stations within the geographic area of the Little Susitna River.

Peak discharge-drainage area relationships for streams studied by detailed methods are shown in Table 2 (Reference 5).

The hydrologic analysis included a review of all existing flood frequency data for the area and the utilization of analytical techniques best suited to the specific stream data. Statistical analyses were conducted in accordance with approved procedures recommended by the U.S. Water Resources Council guidelines for determining flood flow frequency (Reference 6).

Reference 7 provides the 1-percent-annual-chance peak discharges. It is based on frequency analysis of the data obtained at U.S. Geological Survey gaging station 15248000 on Matanuska River. Four recorded discharges resulting from Lake George breakout events (Reference 8) were used for the Knik River analysis.

Table 2: Summary of Discharges

Flooding Source and Location	Drainage Area (square miles)	Peak Discharges (cfs)			
		10%-annual-chance	2%-annual-chance	1%-annual-chance	0.2%-annual-chance
Deception Creek at Mouth	58	3,650	5,400	6,300	9,000
Deception Creek Tributary 1 at Mouth	N/A	1,110	1,620	1,840	2,450
Deception Creek Tributary 2 at Mouth	N/A	1,050	1,550	1,840	2,580
Deception Creek Tributary 3 at Mouth	N/A	690	1,030	1,200	1,720
Willow Creek Downstream of Parks Highway	256	9,800	14,600	16,900	24,200
Willow Creek Tributary at Mouth	N/A	2,800	4,600	5,900	9,200
Little Susitna River Downstream of Alaska Railroad	169	8,300	12,900	15,200	21,600
Little Susitna River at Schrock Road	140	7,400	11,400	13,500	19,000
Little Susitna River Downstream of Welsh Road	99	5,800	8,900	10,500	14,900

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the flooding sources studied in the borough were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each of these flooding sources.

Water-surface profiles were computed for Willow Creek, Deception Creek, and the Little Susitna River utilizing a computerized HEC-2 step-backwater program developed by the U.S. Army Corps of Engineers (Reference 9).

Cross sections were developed from survey notes, field reconnaissance, photographs, previous studies, and the use of topographic maps at a scale of 1:4,800 (References 10 and 11). Intermediate cross sections were developed utilizing cross-sectional area of the stream in conjunction with the topographic maps. The cross sections were located at close intervals in the vicinity of structures to determine the backwater effects of these structures. In addition, numerous intermediate cross sections have been added when the slope of the stream or the total loss was excessive between any two cross sections. Except where noted in the computations, road and bridge failure was not considered in this study. In effect, the backwaters were computed so as to show the maximum flooding effect regardless of the structure being present.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway is computed (Section 4.2), selected cross section locations are also shown on the Flood Map (Exhibit 2).

Channel roughness factors (Manning's "n") for these computations were assigned on the basis of field inspection of the flood plain areas and standard published factors for utilization of "n" values through pipes or culverts. The Manning's "n" values used are as follows:

	Manning's Roughness Factors	
Stream	Channel	Overbank
Willow Creek	0.030-0.035	0.035-0.075
Willow Creek Tributary	0.035	0.035-0.075
Little Susitna River	0.035	0.080-0.120
Little Susitna River Split Flow 1	0.035	0.080
Little Susitna River Split Flow 2	0.035	0.120
Little Susitna River Split Flow 3	0.035	0.120

Starting water-surface elevations were based on utilization of the slope-area method.

During the early stages of examination of both Willow Creek and the Little Susitna River, it was determined there were several possibilities of divided flow, in essence, split flow throughout the stream reach. It was, therefore, necessary to split these areas, computing one side as a tributary and balancing the flows between the two. In some cases, as will be noted in the computations and on the work maps, floodways were necessary for both portions of this split flow condition.

The Little Susitna River has extensive flow divisions, and three extremely braided areas required split flow analysis. The secondary channels (braids) were modeled as tributaries with water surfaces balancing at the upstream division point.

Approximate 1-percent-annual-chance flooding from the Matanuska River along Old Palmer Highway in the Bodenburg Butte area was studied using high-water marks from a flood which occurred in August 1971. High-water marks were determined from field surveys and interviews with local residents. No recurrence interval was assigned to this event.

Field-surveyed cross sections were used in the Type 19 analysis for Matanuska River and Knik River (Reference 12). Additional cross sectional data were obtained from the Alaska Department of Transportation and Public Facilities. HEC-2 analysis for Matanuska River utilized the levee option to evaluate the effect of the flood protection dike along Old Palmer Highway.

Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals (Exhibit 1).

3.3 Vertical Datum

All FIS reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum in use for newly created or revised FIS reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD29). With the finalization of the North American Vertical Datum of 1988 (NAVD88), many FIS reports and FIRMs are being prepared using NAVD88 as the referenced vertical datum.

For this FIS report and FIRM, elevations were converted from NGVD29 to NAVD88 by adding 6.1 feet to the NGVD29 elevations for Deception Creek, Deception Creek Tributaries, Willow Creek, and Willow Creek Tributaries. A conversion factor of 6.2 feet was used for Little Susitna and Little Susistna Split Flows. All flood elevations shown in this FIS report and on the FIRM are referenced to NAVD88. Structure and ground elevations in the community must, therefore, be referenced to NAVD88. It is important to note that adjacent counties may be referenced to NGVD29. This may result in differences in Base Flood Elevations (BFEs) across the borough boundaries.

For more information on NAVD88, see the FEMA publication entitled *Converting the National Flood Insurance Program to the North American Vertical Datum of 1988* (FEMA, June 1992), or contact the Vertical Network Branch, National Geodetic Survey, Coast and Geodetic Survey, National Oceanic and Atmospheric Administration, 1315 East-West Highway, Silver Spring, Maryland 20910-3282 (Internet address http://www.ngs.noaa.gov).

Temporary vertical monuments are often established during the preparation of a flood hazard analysis for the purpose of establishing local vertical control. Although these monuments are not shown on the FIRM, they may be found in the Technical Support Data Notebook associated with the FIS report and FIRM for this community. Interested individuals may contact FEMA to access these data.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages state and local governments to adopt sound floodplain management programs. Therefore, each FIS provides 1-percent-annual-chance flood elevations and delineations of the 1- and 0.2-percent-annual-chance floodplain boundaries and 1-percent-annual-chance floodway to assist communities in developing floodplain management measures. This information is presented on the FIRM and in many components of the FIS report, including Flood Profiles, Floodway Data Table and Summary of Stillwater Elevations Table. Users should reference the data presented in the FIS report as well as additional information that may be available at the local map repository before making flood elevation and/or floodplain boundary determinations.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent-annual-chance flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent-annual-chance flood is employed to indicate additional areas of flood risk in the community. For each stream studied by detailed methods, the 1- and 0.2-percent-annual-chance floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:4,800, with a contour interval of 5 feet (Reference 10 and 11).

Approximate flood boundaries for flooding from the Matanuska River along Old Palmer Highway in the Bodenburg Butte area were initially determined using high-water marks from the 1971 event, and were revised using the Type 19 study results. Delineations were done on topographic maps at a scale of 1:2,400, with a contour interval of 2 feet (Reference 13).

Approximate flood boundaries on Susitna River, Kroto Creek, and Kroto Slough (in the vicinity of their confluences) were delineated based on information supplied by the community.

Approximate flood boundaries in some portions of the study are were taken from the Flood Hazard boundary Map and from Flood Hazard Studies (References 14 through 21).

The 1- and 0.2-percent-annual-chance floodplain boundaries are shown on the FIRM (Exhibit 2). On this map, the 1-percent-annual-chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AE, V, and VE); and the 0.2-percent-annual-chance floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 1- and 0.2-percent-annual-chance floodplain boundaries are close together, only the 1-percent-annual-chance floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 1-percent-annual-chance floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 1-percent-annual-chance flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

Weir flow can occur only to the north of the Alaska Railroad bridge, and a floodway must be left clear along the railroad embankment between Willow Creek and Willow Creek Tributary to permit flow from the main channel to the weir area.

On the Little Susitna River in two of the split flow areas, a split floodway was designed, and in some other areas the floodway is to follow the natural 1%-annual-chance boundary. The latter was necessary because of excessive velocities and the large number of high ground areas. The extreme meandering nature of this stream required that the floodways go from meander to meander rather than attempt to follow the stream

The floodway presented in this FIS report and on the FIRM was computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations have been tabulated at selected cross sections (Table 3). In cases where the floodway and 1-percent-annual-chance floodplain boundaries are either close together or collinear, only the floodway boundary has been shown.

The area between the floodway and 1-percent-annual-chance floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water surface elevation of the 1-percent-annual-chance flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 1.

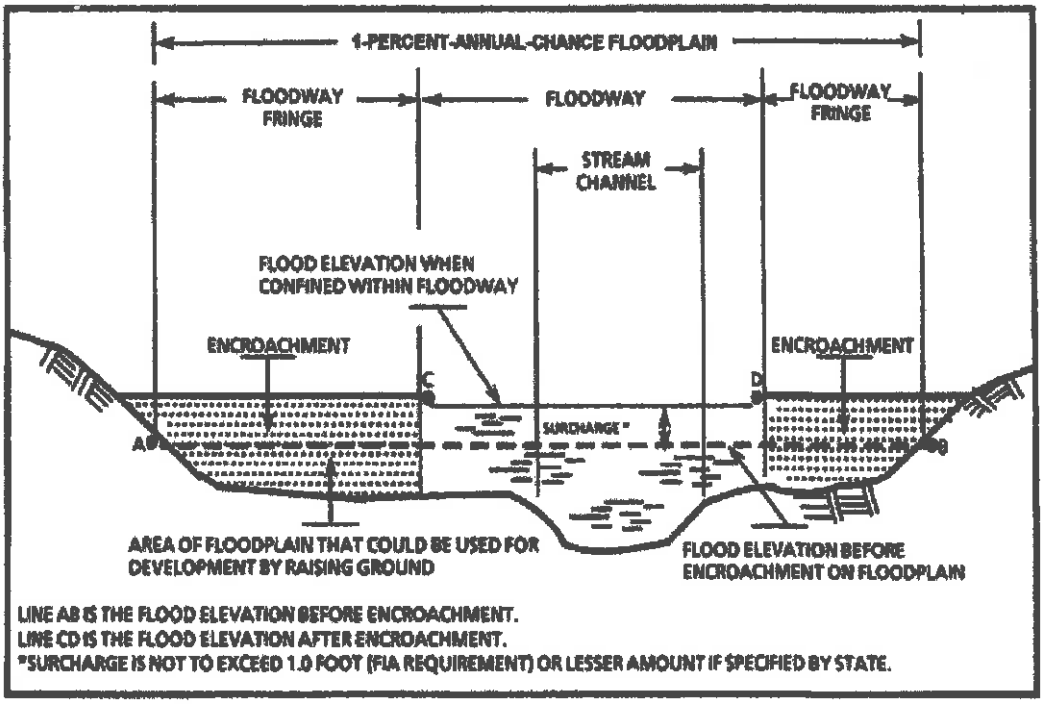


Figure 1: Floodway Schematic

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Deception Creek								
A	600	500	1,706	3.6	180.8	180.8	181.8	1.0
B	750	500	1,903	3.2	182.3	182.3	182.3	0.0
C	880	500	2,153	2.8	182.5	182.5	182.6	0.1
D	2,140	350	1,249	4.9	184.3	184.3	184.9	0.6
E	3,420	290	864	7.1	189.9	189.9	190.0	0.1
F	4,540	350	1,410	4.3	194.4	194.4	194.5	0.1
G	6,360	243	850	7.1	200.2	200.2	200.3	0.1
H	7,680	210	970	6.2	205.0	205.0	205.6	0.6
I	8,655	300	1,231	4.9	208.0	208.0	208.8	0.8
J	10,415	450	1,161	5.2	213.9	213.9	214.8	0.9
K	11,635	450	1,558	3.9	218.0	218.0	219.0	1.0
L	13,735	450	1,253	4.8	224.3	224.3	224.8	0.5
M	14,505	632	1,269	4.8	228.1	228.1	228.7	0.6
N	15,305	550	1,252	4.8	233.4	233.4	233.5	0.1
O	17,255	650	1,823	3.3	238.5	238.5	239.0	0.5
P	18,330	800	1,483	4.0	242.2	242.2	242.5	0.3
Q	18,620	800	1,580	2.6	243.7	243.7	244.1	0.4
R	19,705	400	686	4.3	247.0	247.0	247.0	0.0
S	20,985	400	1,557	3.2	250.2	250.2	250.5	0.3
T	22,285	500	1,085	3.7	252.7	252.7	253.0	0.3
U	23,400	285	666	5.3	257.3	257.3	257.3	0.0
V	24,765	250	1,018	2.7	259.2	259.2	259.9	0.7
W	26,130	52	155	8.8	264.0	264.0	264.3	0.3
X	27,180	439	721	3.9	269.4	269.4	269.8	0.4
Y	28,230	132	343	9.6	275.3	275.3	275.3	0.0
Z	29,730	500	1,019	4.7	282.8	282.8	283.4	0.6

[1] Stream distance in feet from confluence with Willow Creek

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

FLOODWAY DATA

DECEPTION CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Deception Creek								
AA	31,230	920	1,296	3.0	288.6	288.6	288.9	0.3
AB	32,950	379	726	4.8	294.4	294.4	294.7	0.3
AC	33,400	162	303	7.4	295.2	295.2	295.6	0.4
AD	34,930	544	772	2.9	302.5	302.5	302.5	0.0
AE	36,460	503	633	3.5	308.0	308.0	308.1	0.1
AF	37,185	579	1,272	3.2	312.1	312.1	312.9	0.8
AG	37,705	300	664	5.6	316.4	316.4	316.4	0.0
AH	38,340	500	1,271	2.9	318.4	318.4	318.7	0.3
AI	41,350	295	596	5.0	336.8	336.8	337.0	0.2
AJ	43,160	331	574	5.2	352.2	352.2	352.2	0.0
AK	44,255	450	677	6.8	363.5	363.5	363.5	0.0
AL	45,235	324	658	6.4	376.0	376.0	376.5	0.5
AM	46,190	98	402	10.5	384.1	384.1	384.3	0.2
AN	47,400	400	753	5.6	397.4	397.4	397.9	0.5
AO	48,525	184	473	9.0	412.9	412.9	412.9	0.0
AP	49,700	154	468	9.1	424.1	424.1	424.8	0.7
AQ	50,750	144	414	10.3	437.3	437.3	437.3	0.0
AR	51,705	90	365	11.6	450.2	450.2	450.2	0.0
AS	52,470	259	656	6.5	458.3	458.3	458.4	0.1
AT	53,020	188	523	7.7	465.2	465.2	465.2	0.0
AU	53,410	188	521	7.7	470.6	470.6	470.6	0.0
AV	53,800	300	652	6.1	477.2	477.2	477.3	0.1
AW	54,620	300	660	6.1	485.7	485.7	486.0	0.3
AX	55,530	300	680	5.8	491.8	491.8	491.8	0.0
AY	55,700	134	434	9.2	492.9	492.9	493.0	0.1
AZ	56,675	490	864	4.6	508.0	508.0	508.7	0.7

[1] Stream distance in feet from confluence with Willow Creek

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

FLOODWAY DATA

DECEPTION CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Deception Creek								
BA	58,120	536	815	4.9	524.1	524.1	525.1	1.0
BB	59,410	142	445	8.9	540.0	540.0	540.0	0.0
BC	59,650	152	419	8.8	542.4	542.4	542.4	0.0
BD	59,920	97	350	10.5	545.7	545.7	545.8	0.1
BE	60,610	175	475	7.7	556.6	556.6	556.6	0.0
BF	61,385	267	623	5.9	562.8	562.8	563.2	0.4
BG	61,785	136	410	9.2	567.4	567.4	567.4	0.0
BH	62,410	135	405	8.7	573.8	573.8	573.8	0.0

[1] Stream distance in feet from confluence with Willow Creek

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

FLOODWAY DATA

DECEPTION CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Deception Creek Tributary 1								
A	380	400	945	1.9	243.7	243.7	244.1	0.4
B	1,030	400	878	3.4	246.5	246.5	246.6	0.1
C	1,710	400	396	2.5	251.6	251.6	251.6	0.0
D	2,240	400	859	1.8	253.3	253.3	253.9	0.6
E	2,710	400	641	3.3	257.0	257.0	257.1	0.1
F	3,120	500	1,392	2.0	258.5	258.5	259.0	0.5
G	4,370	600	1,191	3.5	264.2	264.2	264.4	0.2
H	5,170	600	1,140	2.3	268.1	268.1	268.3	0.2
I	6,520	330	604	3.6	275.0	275.0	275.5	0.5
J	7,660	300	196	2.7	282.9	282.9	283.4	0.5
K	8,560	500	586	2.4	288.9	288.9	289.2	0.3

[1] Stream distance in feet from confluence with Deception Creek

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

FLOODWAY DATA

DECEPTION CREEK TRIBUTARY 1

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Deception Creek Tributary 2								
A	360	185	469	3.8	294.4	294.4	294.8	0.4
B	680	165	569	5.3	295.7	295.7	296.6	0.9
C	1,780	400	1,014	3.0	302.0	302.0	302.8	0.8
D	2,580	253	594	5.1	308.7	308.7	309.5	0.8
E	3,000	500	558	2.2	312.6	312.6	313.2	0.6
F	3,650	193	289	3.8	316.4	316.4	317.4	1.0
G	3,920	490	488	2.3	319.9	319.9	319.9	0.0
H	4,620	645	1,145	3.4	323.8	323.8	324.1	0.3
I	5,790	500	557	2.9	336.3	336.3	336.9	0.6
J	7,140	300	470	3.5	352.3	352.3	352.4	0.1
Deception Creek Tributary 3								
A	610	150	231	5.2	315.9	315.9	316.5	0.6
B	1,010	183	314	3.8	318.6	318.6	319.4	0.8
C	1,770	200	444	2.7	321.5	321.5	322.0	0.5
D	2,400	200	305	3.9	324.9	324.9	324.9	0.0

[1] Stream distance in feet from confluence with Deception Creek

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

FLOODWAY DATA

DECEPTION CREEK TRIBUTARY 2 / DECEPTION CREEK TRIBUTARY 3

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Little Susitna River								
A	0	1,650	7,738	2.0	236.7	236.7	237.2	0.5
B	1,520	2,400	7,729	2.0	238.6	238.6	239.0	0.4
C	6,070	2,140	7,995	1.9	242.9	242.9	243.6	0.7
D	10,760	300	3,012	5.1	247.8	247.8	248.3	0.5
E	10,880	290	4,912	3.1	251.5	251.5	251.7	0.2
F	15,060	1,360	8,506	1.8	253.2	253.2	253.5	0.3
G	18,380	350	3,991	3.8	254.7	254.7	255.1	0.4
H	18,720	500	4,169	3.7	255.4	255.4	255.7	0.3
I	21,915	1,060	6,067	2.5	257.5	257.5	257.8	0.3
J	26,400	1,235	8,622	1.8	259.5	259.5	260.5	1.0
K	27,730	1,305	7,118	2.1	260.7	260.7	261.5	0.8
L	29,830	1,350	7,030	2.2	262.7	262.7	263.4	0.7
M	32,580	1,050	6,006	2.5	264.9	264.9	265.5	0.6
N	35,790	1,500	9,803	1.6	266.7	266.7	267.7	1.0
O	38,000	1,200	7,791	2.0	268.3	268.3	269.2	0.9
P	41,140	1,180	7,225	2.1	271.0	271.0	271.6	0.6
Q	45,360	1,200	6,629	2.3	273.8	273.8	274.6	0.8
R	47,685	1,000	4,513	3.4	277.2	277.2	277.7	0.5
S	49,995	1,200	6,725	2.3	280.7	280.7	281.1	0.4
T	53,400	1,100	6,484	2.4	283.7	283.7	284.2	0.5
U	57,025	1,220	6,980	2.2	286.8	286.8	287.5	0.7
V	59,180	1,350	6,876	2.2	288.7	288.7	289.6	0.9
W	61,950	1,450	8,137	1.9	291.0	291.0	291.9	0.9
X	64,000	1,395	5,890	2.6	294.0	294.0	294.7	0.7
Y	67,090	1,100	4,836	3.2	299.7	299.7	300.2	0.5
Z	69,060	1,059	5,657	2.7	303.6	303.6	304.0	0.4

[1] Stream distance in feet from downstream limit of detailed study

TABLE 3	FEDERAL EMERGENCY MANAGEMENT AGENCY	FLOODWAY DATA
	MATANUSKA-SUSITNA BOROUGH, AK	LITTLE SUSITNA RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Little Susitna River								
AA	70,780	1,060	6,329	2.2	306.0	306.0	306.3	0.3
AB	73,690	1,060	4,983	2.8	310.1	310.1	310.4	0.3
AC	75,510	1,250	7,734	1.8	312.1	312.1	312.8	0.7
AD	78,600	1,100	5,045	2.6	314.6	314.6	315.4	0.8
AE	80,050	1,200	6,740	2.0	316.6	316.6	317.2	0.6
AF	80,160	1,140	7,520	1.8	316.8	316.8	317.3	0.5
AG	81,183	875	2,864	4.6	318.2	318.2	318.5	0.3
AH	83,355	768	2,671	5.0	324.9	324.9	325.2	0.3
AI	86,615	1,337	6,510	2.0	330.2	330.2	331.0	0.8
AJ	88,840	1,200	4,666	2.9	332.9	332.9	333.7	0.8
AK	91,090	1,080	4,048	3.3	337.3	337.3	337.8	0.5
AL	94,910	1,150	5,574	2.2	342.6	342.6	343.0	0.4
AM	97,145	1,550	4,052	3.0	347.7	347.7	348.3	0.6
AN	99,555	1,445	7,106	1.7	351.8	351.8	352.4	0.6
AO	101,590	1,765	1,305	9.4	355.2	355.2	355.2	0.0
AP	103,145	2,454	1,837	6.7	361.5	361.5	361.5	0.0
AQ	103,340	3,309	9,264	1.3	363.6	363.6	363.6	0.0
AR	103,870	3,003	6,637	1.9	364.0	364.0	364.0	0.0
AS	104,610	2,598	4,329	2.8	367.1	367.1	367.1	0.0
AT	105,130	2,474	8,195	1.5	369.2	369.2	369.2	0.0
AU	105,835	2,482	7,813	1.6	369.9	369.9	369.9	0.0
AV	106,050	1,840	4,863	2.5	369.9	369.9	369.9	0.0
AW	107,440	1,060	2,728	4.5	374.2	374.2	374.2	0.0
AX	109,060	1,010	3,548	3.5	379.1	379.1	379.3	0.2
AY	110,055	1,020	3,113	5.8	382.6	382.6	383.0	0.4
AZ	111,985	630	3,518	4.9	386.2	386.2	387.1	0.9

[1] Stream distance in feet from downstream limit of detailed study

TABLE 3	FEDERAL EMERGENCY MANAGEMENT AGENCY	FLOODWAY DATA
	MATANUSKA-SUSITNA BOROUGH, AK	LITTLE SUSITNA RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Little Susitna River								
BA	113,200	745	2,243	5.5	389.0	389.0	389.1	0.1
BB	114,385	444	1,536	8.0	392.4	392.4	392.4	0.0
BC	116,365	990	4,405	2.8	397.9	397.9	398.4	0.5
BD	118,335	676	1,825	6.7	402.6	402.6	402.6	0.0
BE	120,085	1,949	4,048	2.8	407.4	407.4	407.6	0.2
BF	121,860	172	770	12.5	412.1	412.1	412.1	0.0
BG	123,240	660	1,984	4.8	419.1	419.1	419.1	0.0
BH	123,470	222	1,550	6.2	419.6	419.6	419.6	0.0
BI	124,055	109	772	12.4	419.9	419.9	419.9	0.0
BJ	124,520	1,732	3,967	2.8	424.4	424.4	424.4	0.0
BK	125,095	200	979	5.7	425.4	425.4	425.4	0.0
BL	125,620	91	697	8.0	426.4	426.4	426.4	0.0
BM	126,510	96	444	12.6	429.8	429.8	429.8	0.0
BN	127,190	100	535	10.4	435.2	435.2	435.2	0.0
BO	128,135	195	716	7.8	440.2	440.2	440.2	0.0
BP	129,035	160	1,021	5.5	443.3	443.3	443.4	0.1
BQ	130,495	120	550	10.1	446.3	446.3	446.4	0.1
BR	131,835	758	1,559	3.6	452.6	452.6	452.6	0.0
BS	132,060	840	2,424	2.3	453.4	453.4	453.4	0.0
BT	132,280	750	1,885	3.0	453.6	453.6	453.6	0.0
BU	133,260	449	1,603	3.5	455.2	455.2	455.2	0.0
BV	134,115	970	2,349	4.8	457.7	457.7	457.7	0.0
BW	135,645	720	2,315	4.5	463.9	463.9	464.2	0.3
BX	136,925	750	3,188	3.3	469.0	469.0	469.9	0.9
BY	138,315	1,025	3,337	3.1	474.4	474.4	475.4	1.0
BZ	139,685	1,135	3,378	3.1	481.2	481.2	481.7	0.5

[1] Stream distance in feet from downstream limit of detailed study

TABLE 3	FEDERAL EMERGENCY MANAGEMENT AGENCY	FLOODWAY DATA
	MATANUSKA-SUSITNA BOROUGH, AK	LITTLE SUSITNA RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Little Susitna River								
CA	140,770	1,260	3,421	3.1	487.2	487.2	488.2	1.0
CB	141,815	980	3,164	3.3	492.9	492.9	493.8	0.9
CC	142,640	1,020	2,500	4.2	498.4	498.4	498.6	0.2
CD	143,505	820	2,424	4.3	502.4	502.4	503.0	0.6
CE	144,835	620	1,837	5.7	508.7	508.7	508.9	0.2
CF	146,170	365	1,478	7.1	516.0	516.0	516.2	0.2
CG	147,455	1,100	2,691	3.9	522.5	522.5	522.8	0.3
CH	148,590	495	2,241	4.7	525.9	525.9	526.8	0.9
CI	149,985	1,000	2,390	4.4	533.0	533.0	533.3	0.3
CJ	151,365	740	2,975	2.9	538.9	538.9	539.7	0.8
CK	151,815	171	451	9.5	541.9	541.9	541.9	0.0
CL	152,320	800	1,901	2.3	544.1	544.1	544.7	0.6
CM	152,450	691	1,684	2.6	547.5	547.5	547.9	0.4
CN	154,110	700	1,843	2.3	553.5	553.5	554.4	0.9
CO	155,405	350	768	5.6	560.5	560.5	560.7	0.2
CP	156,755	239	615	7.0	567.1	567.1	567.1	0.0
CQ	157,620	200	416	10.3	569.4	569.4	569.4	0.0
CR	158,070	250	475	9.1	577.0	577.0	577.0	0.0
CS	158,955	115	452	9.5	582.8	582.8	582.8	0.0
CT	159,665	200	391	11.0	589.5	589.5	589.5	0.0
CU	160,530	2,008	1,395	3.1	593.6	593.6	593.6	0.0
CV	161,430	2,000	1,898	2.3	601.7	601.7	601.7	0.0
CW	162,125	2,280	4,516	1.9	603.9	603.9	603.9	0.0
CX	162,980	800	2,160	4.0	608.8	608.8	608.8	0.0
CY	163,845	1,500	1,846	4.7	615.5	615.5	615.5	0.0
CZ	164,715	2,400	4,455	1.9	623.3	623.3	623.3	0.0

[1] Stream distance in feet from downstream limit of detailed study

TABLE 3	FEDERAL EMERGENCY MANAGEMENT AGENCY MATANUSKA-SUSITNA BOROUGH, AK	FLOODWAY DATA LITTLE SUSITNA RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Little Susitna River								
DA	165,610	1,000	3,151	2.7	628.2	628.2	628.2	0.0
DB	166,405	1,040	3,265	2.6	633.1	633.1	633.1	0.0
DC	167,230	2,640	4,223	2.0	639.2	639.2	639.2	0.0
DD	168,070	1,520	4,215	2.0	642.3	642.3	642.3	0.0
DE	168,905	1,600	2,176	3.5	651.0	651.0	651.0	0.0
DF	169,565	1,800	5,267	1.5	654.0	654.0	654.0	0.0
DG	170,245	800	2,607	3.0	658.1	658.1	658.1	0.0
DH	171,115	450	1,557	4.9	663.9	663.9	663.9	0.0
DI	171,980	620	2,250	3.4	672.2	672.2	672.2	0.0
DJ	172,300	500	1,638	4.7	676.7	676.7	676.7	0.0
DK	172,600	550	1,475	5.2	680.3	680.3	680.3	0.0
DL	173,225	1,250	2,159	3.6	687.2	687.2	687.2	0.0
DM	173,870	1,600	2,401	3.2	693.4	693.4	693.4	0.0
DN	174,210	1,880	3,147	2.4	697.9	697.9	697.9	0.0
DO	174,565	1,250	2,774	2.8	702.1	702.1	702.1	0.0
DP	174,950	1,300	2,828	2.7	705.8	705.8	705.8	0.0
DQ	175,250	1,000	2,318	3.3	710.1	710.1	710.1	0.0
DR	175,815	850	2,703	2.8	716.3	716.3	716.3	0.0
DS	176,400	600	1,556	4.9	724.7	724.7	724.7	0.0
DT	176,970	700	1,720	4.5	732.5	732.5	732.5	0.0
DU	177,770	906	2,143	3.6	740.5	740.5	740.5	0.0
DV	178,015	708	1,947	4.0	742.7	742.7	742.7	0.0
DW	178,265	294	720	10.7	752.9	752.9	752.9	0.0
DX	178,695	294	720	10.7	752.9	752.9	752.9	0.0
DY	179,125	328	837	9.2	759.1	759.1	759.1	0.0
DZ	179,470	187	694	11.1	764.9	764.9	764.9	0.0

[1] Stream distance in feet from downstream limit of detailed study

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

FLOODWAY DATA

LITTLE SUSITNA RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Little Susitna River Split Flow 1								
A	200	3,309	9,264	1.3	363.6	363.6	363.6	0.0
B	600	3,003	6,637	1.9	364.0	364.0	364.0	0.0
C	1,150	2,598	4,329	2.8	367.1	367.1	367.1	0.0
D	1,550	2,474	8,195	1.5	369.2	369.2	369.2	0.0
E	1,800	2,482	7,813	1.6	369.9	369.9	369.9	0.0
Little Susitna River Split Flow 2								
A	120	1,949	4,048	2.8	407.4	407.4	407.6	0.2
B	2,220	1,164	1,459	1.2	413.4	413.4	413.4	0.0
C	3,420	515	1,026	1.7	420.2	420.2	420.2	0.0
D	3,880	773	1,321	1.3	423.6	423.6	423.6	0.0
E	4,070	816	3,955	2.9	424.3	424.3	424.3	0.0
F	4,530	1,731	3,955	2.9	424.3	424.3	424.3	0.0
G	5,720	450	2,151	2.7	426.4	426.4	426.5	0.1
H	7,025	300	1,462	3.9	429.6	429.6	430.6	1.0
I	8,650	620	2,190	2.6	434.0	434.0	435.0	1.0
J	9,780	600	1,795	3.2	438.3	438.3	438.7	0.4
K	10,560	500	1,119	5.1	442.6	442.6	442.8	0.2
L	11,110	600	2,174	2.6	444.6	444.6	445.1	0.5
M	11,995	800	1,995	2.9	448.9	448.9	448.9	0.0
N	12,490	1,125	5,232	1.1	450.7	450.7	450.7	0.0
O	12,620	1,194	2,405	2.4	453.2	453.2	453.2	0.0
P	13,475	820	2,837	2.0	454.7	454.7	454.7	0
Q	13,715	670	1,333	4.3	455.1	455.1	455.1	0

[1] Stream distance in feet from confluence with Susitna River

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

FLOODWAY DATA

LITTLE SUSITNA RIVER SPLIT FLOW 1 / LITTLE SUSITNA RIVER SPLIT FLOW 2

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Little Susitna River Split Flow 3								
A	450	620	1,048	4.1	541.8	541.8	542.5	0.7
B	1,265	330	1,131	3.8	546.7	546.7	546.9	0.2
C	1,380	340	811	5.3	548.6	548.6	548.7	0.1
D	2,940	480	1,548	2.8	554.6	554.6	555.2	0.6
E	4,240	425	1,177	2.7	561.9	561.9	561.9	0.0
F	5,775	630	1,593	2.7	572.7	572.7	573.5	0.8
G	6,515	816	1,747	2.5	576.8	576.8	576.8	0.0
H	7,285	1,020	1,680	2.6	582.7	582.7	582.7	0.0
I	7,960	680	926	4.6	586.9	586.9	586.9	0.0
J	8,610	740	1,184	3.6	593.1	593.1	593.1	0.0
K	9,240	491	1,294	3.3	595.8	595.8	595.8	0.0
L	9,880	950	1,346	3.2	600.1	600.1	600.1	0.0

[1] Stream distance in feet from confluence with Little Susitna River

TABLE 3	FEDERAL EMERGENCY MANAGEMENT AGENCY	FLOODWAY DATA
	MATANUSKA-SUSITNA BOROUGH, AK	LITTLE SUSITNA RIVER SPLIT FLOW 3

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Susitna River								
A	0	6,935	44,922	4.8	335.8	335.8	336.0	0.2
B	2,460	5,729	35,411	6.1	337.3	337.3	337.4	0.1
C	4,649	4,952	30,859	7.0	339.7	339.7	339.9	0.2
D	6,964	5,330	39,878	5.4	342.2	342.2	342.6	0.4
E	8,830	5,012	34,873	6.2	343.8	343.8	344.1	0.3
F	12,271	5,953[2]	36,486	5.1	346.7	346.7	346.9	0.2
G	14,242	3,480[2]	22,669	8.2	349.9	349.9	350.1	0.2
H	15,585	3,693[2]	25,432	7.3	351.7	351.7	352.2	0.5
I	16,836	3,983	27,828	6.1	355.2	355.2	355.9	0.7

[1] Feet above downstream limit of detailed study
[2] Floodway width includes flow for the Susitna River only

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

FLOODWAY DATA

SUSITNA RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Talkeetna River								
A	3,487	[2]	11,333	7.1	347.7	347.7	348.5	0.8
B	4,422	[2]	8,507	9.5	353.4	353.4	353.4	0.0
C	4,954	[2]	15,909	5.1	354.9	354.9	355.2	0.3
D	6,941	[2]	29,086	2.8	356.0	356.0	356.2	0.2
E	9,155	4,742	29,109	2.8	357.7	357.7	357.9	0.2
F	10,463	3,182	16,090	5.0	360.0	360.0	360.4	0.4
G	11,220	3,840	22,035	3.7	362.0	362.0	362.5	0.5
H	12,066	4,134	22,926	3.5	364.7	364.7	365.4	0.7
I	13,272	5,166	21,983	3.7	366.2	366.2	367.0	0.8
J	13,743	5,827	26,248	3.1	367.7	367.7	368.4	0.7
K	15,346	4,966	21,243	3.8	370.8	370.8	371.4	0.6
L	16,198	4,564	17,531	4.6	373.1	373.1	373.7	0.6
M	17,411	3,585	14,055	5.8	375.0	375.0	375.7	0.7
N	17,857	3,137	14,371	5.6	376.2	376.2	376.9	0.7
O	18,474	2,855	16,003	5.1	378.3	378.3	379.0	0.7
P	19,415	2,757	14,915	5.4	379.8	379.8	380.7	0.9
Q	19,898	2,812	17,214	4.7	381.0	381.0	381.9	0.9
R	20,370	2,803	15,930	5.1	381.3	381.3	382.2	0.9
S	21,255	3,012	20,160	4.0	384.8	384.8	385.6	0.8
T	21,928	2,672	19,123	4.2	386.2	386.2	386.8	0.6
U	24,392	1,745	11,125	7.3	389.0	389.0	389.6	0.6
V	25,439	1,658	10,770	7.5	391.0	391.0	391.6	0.6
W	25,952	1,281	5,831	13.9	391.2	391.2	391.8	0.6
X	26,674	1,388	9,252	8.7	393.5	393.5	394.0	0.5
Y	27,099	1,330	7,800	10.4	393.6	393.6	394.4	0.8

[1] Feet above confluence with Susitna River
[2] Cross-section does not cross entire floodway, therefore, no width is reported

TABLE 3	FEDERAL EMERGENCY MANAGEMENT AGENCY	FLOODWAY DATA
	MATANUSKA-SUSITNA BOROUGH, AK	TALKEETNA RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Willow Creek								
A	0	1,600	5,438	3.1	113.6	113.6	114.6	1.0
B	810	949	2,335	7.2	115.7	115.7	116.0	0.3
C	3,200	1,505	5,509	3.1	121.5	121.5	122.1	0.6
D	4,710	1,600	5,357	3.2	123.0	123.0	123.7	0.7
E	6,870	650	2,732	6.2	125.9	125.9	126.8	0.9
F	8,870	1,500	6,993	2.4	129.5	129.5	130.5	1.0
G	12,230	1,700	5,514	3.1	136.4	136.4	136.8	0.4
H	17,780	1,600	5,831	2.9	145.6	145.6	146.6	1.0
I	20,000	1,600	4,315	3.9	150.6	150.6	151.5	0.9
J	22,655	1,920	4,831	3.5	157.6	157.6	158.1	0.5
K	22,785	2,000	11,745	1.4	161.5	161.5	161.5	0.0
L	23,100	2,100	11,077	1.5	161.6	161.6	161.6	0.0
M	24,590	675	2,163	4.6	162.8	162.8	162.9	0.1
N	27,215	85	738	13.6	169.4	169.4	170.3	0.9
O	27,320	1,649	5,355	2.7	173.6	173.6	174.1	0.5
P	33,170	400	1,950	5.9	188.7	188.7	189.4	0.7
Q	33,870	500	2,762	4.2	191.0	191.0	191.6	0.6
R	34,680	800	2,176	4.6	192.4	192.4	193.1	0.7
S	36,630	550	1,768	5.7	203.2	203.2	203.3	0.1
T	39,780	793	2,493	4.0	213.6	213.6	214.3	0.7
U	41,840	373	1,226	8.2	224.5	224.5	224.8	0.3
V	43,700	1,007	2,854	3.5	233.4	233.4	233.6	0.2
W	48,000	450	1,583	6.3	254.7	254.7	255.4	0.7
X	48,115	400	1,694	5.9	256.5	256.5	256.5	0.0
Y	50,220	800	1,820	5.5	267.3	267.3	267.3	0.0
Z	53,370	811	1,786	5.6	280.9	280.9	281.6	0.7

[1] Stream distance in feet above downstream limit of detailed study

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

FLOODWAY DATA

WILLOW CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Willow Creek								
AA	56,250	180	818	12.2	307.6	307.6	307.6	0.0
AB	58,550	177	698	14.3	331.5	331.5	331.5	0.0
AC	59,070	159	1,073	14.8	337.6	337.6	337.6	0.0
AD	62,470	203	1,162	13.7	373.9	373.9	373.9	0.0
AE	66,110	163	1,085	14.7	413.9	413.9	413.9	0.0
AF	67,600	190	1,168	13.6	433.3	433.3	433.7	0.4
AG	68,430	132	1,006	15.8	445.2	445.2	445.2	0.0
AH	68,470	133	1,009	15.8	458.3	458.3	458.3	0.0

[1] Stream distance in feet above downstream limit of detailed study

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

FLOODWAY DATA

WILLOW CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Willow Creek Tributary								
A	1,185	1,450	3,961	1.7	161.8	161.8	162.5	0.7
B	2,665	1,262	5,535	1.2	166.1	166.1	166.2	0.1
C	2,725	931	1,704	4.0	170.1	170.1	170.1	0.0
D	9,700	517	833	3.0	187.3	187.3	187.5	0.2
E	10,920	500	1,313	1.9	191.4	191.4	191.5	0.1
F	12,355	450	1,102	4.7	198.8	198.8	198.8	0.0
G	14,205	600	2,219	2.3	204.1	204.1	204.3	0.2
H	15,650	600	1,255	4.1	210.5	210.5	210.6	0.1
I	17,940	450	1,439	3.6	218.9	218.9	219.4	0.5
J	21,400	650	1,751	3.0	230.6	230.6	231.5	0.9
K	23,500	870	1,780	2.9	237.8	237.8	237.9	0.1
L	26,740	1,197	2,010	2.6	252.6	252.6	252.9	0.3
M	28,540	800	1,548	3.3	260.5	260.5	260.9	0.4
N	29,130	650	1,244	4.2	265.7	265.7	265.9	0.2
O	30,280	500	1,061	4.9	275.6	275.6	275.6	0.0
P	31,110	250	933	5.6	279.8	279.8	279.8	0.0
Q	31,730	500	1,202	4.3	287.1	287.1	287.2	0.1
R	35,080	600	1,412	3.7	316.5	316.5	317.0	0.5
S	36,560	177	428	12.1	331.6	331.6	331.8	0.2

[1] Stream distance in feet above confluence with Willow Creek

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

FLOODWAY DATA

WILLOW CREEK TRIBUTARY

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 by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no BFEs or base flood 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 determined in the FIS by detailed methods. In most instances, whole-foot BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance risk zone that corresponds to the areas of 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance risk zone that corresponds to the areas of 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot base flood depths derived from the detailed hydraulic analyses are shown within this zone.

Zone AR

Zone AR is the flood insurance risk zone that corresponds to an area of special flood hazard formerly protected from the 1-percent-annual-chance flood event by a flood-control system that was subsequently decertified. Zone AR indicates that the former flood-control system is being restored to provide protection from the 1-percent-annual-chance or greater flood event.

Zone A99

Zone A99 is the flood insurance risk zone that corresponds to areas of the 1-percent-annual-chance floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No BFEs or depths are shown within this zone.

Zone V

Zone V is the flood insurance risk zone that corresponds to the 1-percent-annual-chance coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no BFEs are shown within this zone.

Zone VE

Zone VE is the flood insurance risk zone that corresponds to the 1-percent-annual-chance coastal floodplains that have additional hazards associated with storm waves. 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 risk 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 square mile, and areas protected from the 1-percent-annual-chance flood by levees. No BFEs or base flood depths are shown within this zone.

Zone X (Future Base Flood)

Zone X (Future Base Flood) is the flood insurance risk zone that corresponds to the 1-percent-annual-chance floodplains that are determined based on future-conditions hydrology. No BFEs or base flood depths are shown within this zone.

Zone D

Zone D is the flood insurance risk zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

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 the 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 current FIRM presents flooding information for the geographic area of the Matanuska-Susitna Borough. Historical data relating to the maps prepared for each community are presented in Table 4.

7.0 OTHER STUDIES

The U.S. Soil Conservation Service has prepared three Flood Hazard Studies, two Flood Plain Management Studies and a Flood Plain Inventory Report for various streams in Matanuska-Susitna Borough (References 16 through 21). These reports were the sources of some of the approximate flood boundaries presented in this study.

The Expanded Flood Plain Information Study for Willow, Alaska (Reference 22) utilized the same hydrologic and hydraulic procedures; however, through the use of spatial analysis, it reported the effects of flooding and development on the environment and considered the effects of evacuation, floodproofing, and zoning on existing conditions in the year 2000. This study is in agreement with the flood Plain Information Study.

A flood Insurance Study has been prepared for the Municipality of Anchorage (Reference 23). This study is in agreement with the Anchorage Flood Insurance Study. Flood Hazard Boundary Maps have been prepared for the unincorporated areas of Matanuska-Susitna Borough and the City of Palmer (References 14 and 15). Due to the more detailed nature of this study, it supersedes the Flood Hazard Boundary Maps.

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

8.0 LOCATION OF DATA

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

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISION DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Matanuska-Susitna Borough	February 28, 1978	December 4, 1979	May 1, 1985	June 3, 1986
City of Palmer	February 28, 1978	December 4, 1979	May 1, 1985	June 3, 1986

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, ALASKA

COMMUNITY MAP HISTORY

9.0 BIBLIOGRAPHY AND REFERENCES

1. U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population, November 1981

2. U.S. Department of Commerce, U.S. Census Bureau, Alaska: 2000 Summary Population and Housing Unit Counts, PHC-3-3, July 2003

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

4. U.S. Department of Commerce, Weather Bureau, "Technical Paper No. 53", 1973

5. Federal Emergency Management Agency, Flood Insurance Study, Matanuska-Susistna Borough, Alaska, June 3, 1986

6. U.S. Water Resources Council, "A Uniform Method for Determining Flood Flow Frequency", Bulletin 17, March 1976

7. U.S. Department of the Interior, Geological Survey, "Flood Characteristics of Alaska Streams", 1979

8. U.S. Department of the Interior, Geological Survey, "The Breakout of Alaska's Lake George", 1969

9. U.S. Department of the Army, Corps of Engineers, Hydrologic Engineering Center, Computer Program HEC-2 Water-Surface Profiles, Davis, California, 1976

10. North Pacific Aerial Surveys, Inc., Topographic Maps, Willow and Deception Creeks, Scale 1:4,800, Contour Interval 5 feet, 1977

11. North Pacific Aerial Surveys, Inc., Topographic Maps, Little Susitna River, Scale 1:4,800, Contour Interval 5 feet, 1978

12. U.S. Department of the Army, Corps of Engineers, Anchorage Alaska District, Flood Insurance Study, Matanuska-Susitna Borough, Matanuska River Cross Section, June 1984

13. North Pacific Aerial Surveys, Inc., Topographic Maps, Bodenburg Butte Area - Palmer, Scale 1:2,400, Contour Interval 2 feet, 1980

14. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Matanuska-Susitna Borough, Alaska, Scale 1:24,000, 1979

15. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, City of Palmer, Alaska, Scale 1:6,000, 1979

16. U.S. Department of Agriculture, Soil Conservation Service, Flood Hazard Study, 196 Mile, Caswell, Sheep, Goose, Montana, Answer, and Birch Creeks and Tributaries, Matanuska-Susitna Borough, Alaska, Scale 1:25,944, April 1981

17. U.S. Department of Agriculture, Soil Conservation Service, Flood Hazard Study, Troublesome, Byers, and Honolulu Creeks, East and Middle Forks of Chulitna River, Matanuska-Susitna Borough, Alaska, Scale 1:25,263, September 1981

18. U.S. Department of Agriculture, Soil Conservation Service, Flood Hazard Study, Kroto, Rabideux, Trapper, and Peters Creeks, Matanuska-Susitna Borough, Alaska, Scale 1:25,263, January 1982

19. U.S. Department of Agriculture, Soil Conservation Service, Flood Plain Inventory Report, Lower Little Susitna River and Little Willow Creek, Matanuska-Susitna Borough, Alaska, Scale 1:63,360, February 1980

20. U.S. Department of Agriculture, Soil Conservation Service, Flood Plain Management Study, Kashwitna River, Wasilla, Cottonwood, and Lucille Creeks, Matanuska-Susitna Borough, Alaska, Scales 1:6,000 and 1:25,000, May 1982

21. U.S. Department of Agriculture, Soil Conservation Service, Flood Plain Management Study, Beluga Subbasin Streams, Matanuska-Susitna and Kenai Peninsula Boroughs, Alaska, Scale 1:63,600, September 1982

22. U.S. Department of the Army, Corps of Engineers, Expanded Flood Plain Information Study for Willow, Alaska, June 1980

23. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Study, Municipality of Anchorage, Alaska, March 1979

24. United States Department of Agriculture Farm Services Agency, 2004 Aerial Photography.

25. Northwest Hydraulic Consultants, QA/QC Floodplain Mapping Submittal for Talkeetna and Susitna Rivers Memorandum, To Debra Heiden, Map Modernization Team Region X, from Chris Frei and Bob Elliot, Dated June 18th, 2008.

U.S. Department of the Army, Corps of Engineers, North Pacific Division, SSARR (Stream Flow Synthesis and Reservoir Regulation), Portland, Oregon, September 1972

U.S. Department of the Army, Corps of Engineers, Water Resources Development by the U.S. Army Corps of Engineers in Alaska, 1977

U.S. Department of Commerce, Weather Bureau, "Technical Paper No. 47"

Waterways Experiment Station, Technical Report H743, May 1974, Vickburg, Mississippi

10.0 REVISIONS DESCRIPTION

This section has been added to provide information regarding significant revisions made since the original FIS report and FIRM were printed. Future revisions may be made that do not result in the republishing of the FIS report. All users are advised to contact the Community Map Repository at the address below to obtain the most up-to-date flood hazard data.

Matanuska-Susitna Borough
Planning Department
350 E. Dahlia Avenue
Palmer, AK 99645

Borough Update
The partial borough update was completed in July 2009 by Northwest Hydraulic Consultants, Inc. (nhc) and L-3 Communications, Inc. for FEMA under Contract No. EMS-2001-CO-0067.

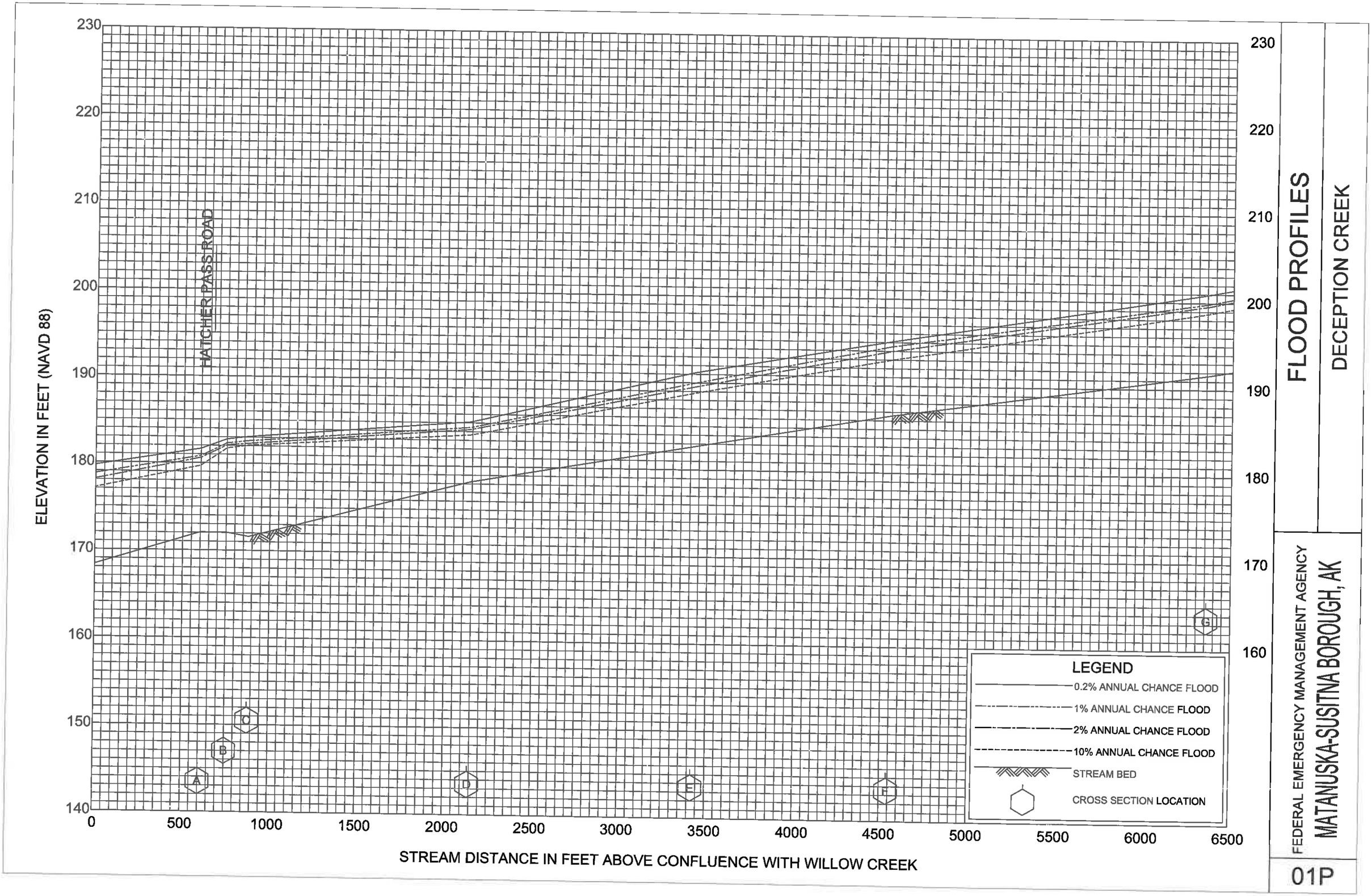
For this project, floodplain and floodway boundaries were digitized from the effective FIRM and Floodway panels. Aerial photography (Reference 24) was used to adjust these boundaries where appropriate. Flood elevations shown in this FIS report and on the FIRM panels were converted from NGVD 29 to NAVD 88. The conversion factor from NGVD to NAVD is discussed in Section 3.3.

As part of this revision, the format of the map panels has changed. Previously, flood-hazard information was shown on both FIRMs and Flood Boundary and Floodway Maps (FBFMs). In the new format, all base flood elevations, cross sections, zone designations, and floodplain and floodway boundary delineations are shown on the FIRM; the FBFM has been eliminated. Some of the flood insurance zone designations were changed to reflect the new format. Areas previously shown as numbered Zone A were changed to Zone AE. Areas previously shown as Zone B were changed to Zone X (shaded). Areas previously shown as Zone C were changed to Zone X (unshaded). In addition, all Flood Insurance Zone Data Tables were removed from the FIS report and all zone designations and reach determinations were removed from the profile panels.

As part of the map modernization effort for the borough update, hydraulic analyses were conducted by nhc for the Talkeetna River (including overflows to Twister Creek and Billion Slough) and the Susitna River using FESWMS and HEC-RAS models. The 1-percent-annual-chance floodplain and floodway boundaries were then mapped for these areas (Reference 25) tying in with the downstream Susitna River approximate study. Tabulated below are the 1-percent-annual chance discharges used in this study.

Study Reach	1%-Annual Chance Discharge (cfs)
Talkeetna River at Mouth	80,900
Susitna River Upstream of the Talkeetna River Confluence	185,000
Susitna River Downstream of the Talkeetna River Confluence	216,000

There were no Letters of Map Revision to incorporate into the revised mapping.



FLOOD PROFILES

DECEPTION CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

01P

FLOOD PROFILES

DECEPTION CREEK

ELEVATION IN FEET (NAVD 88)

250
240
230
220
210
200
190
180
170
160

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

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH WILLOW CREEK

B I J K

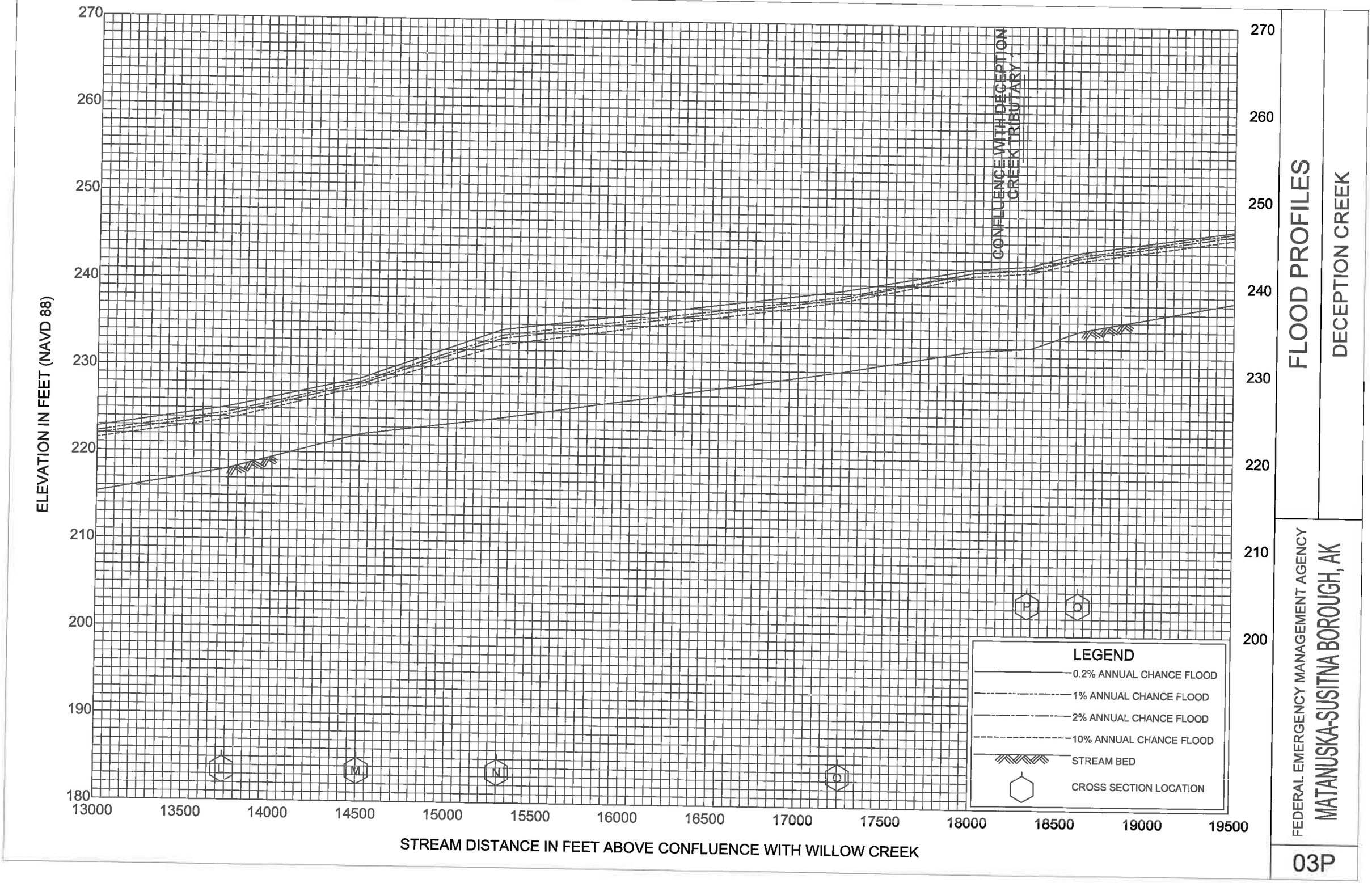
LEGEND

- 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

MATANUSKA-SUSITNA BOROUGH, AK

02P



FLOOD PROFILES

DECEPTION CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

03P

FLOOD PROFILES

DECEPTION CREEK

ELEVATION IN FEET (NAVD 88)

300
290
280
270
260
250
240
230
220
210

19500 20000 20500 21000 21500 22000 22500 23000 23500 24000 24500 25000 25500 26000

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH WILLOW CREEK

R S T U V

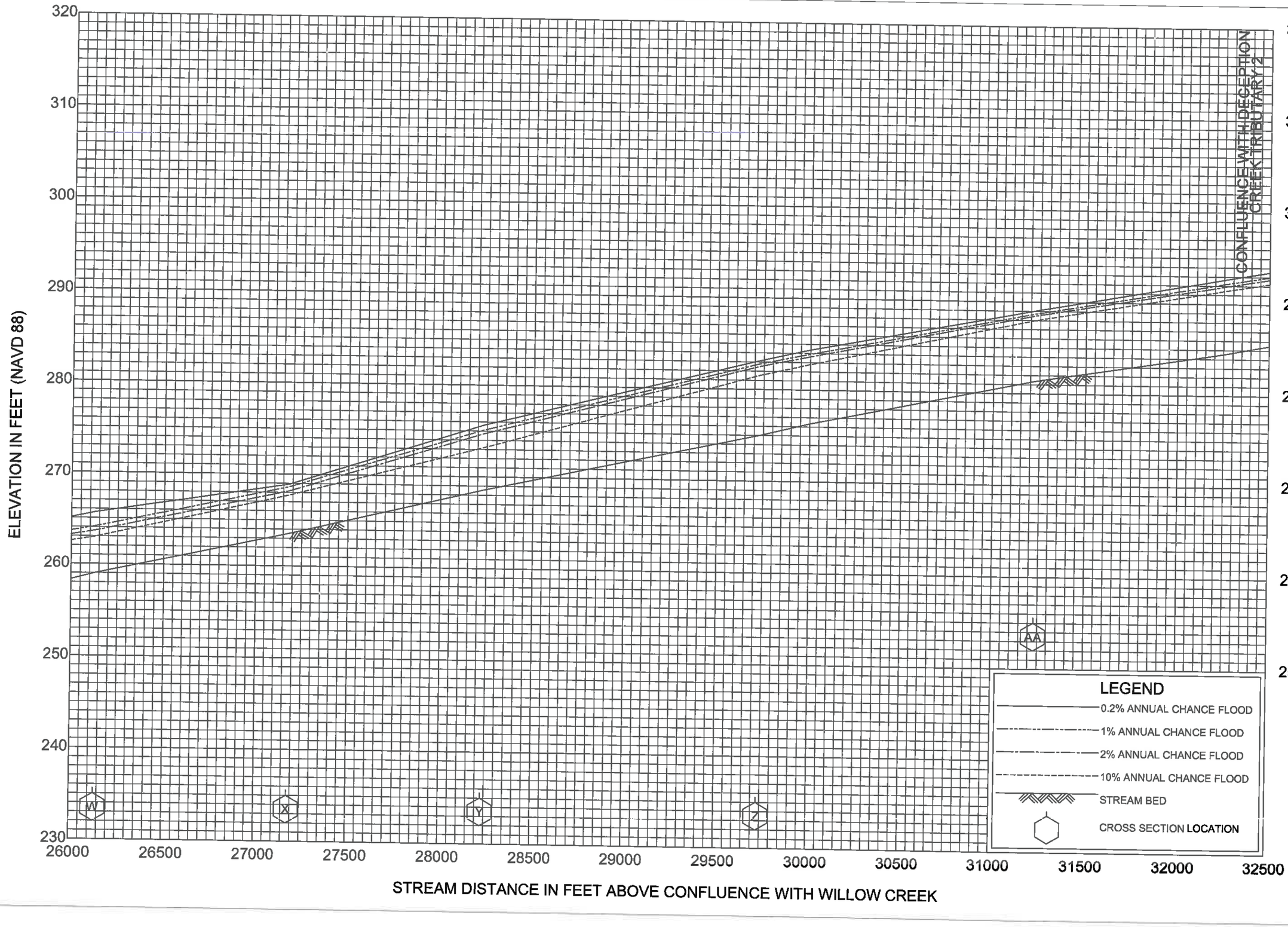
LEGEND

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

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

04P



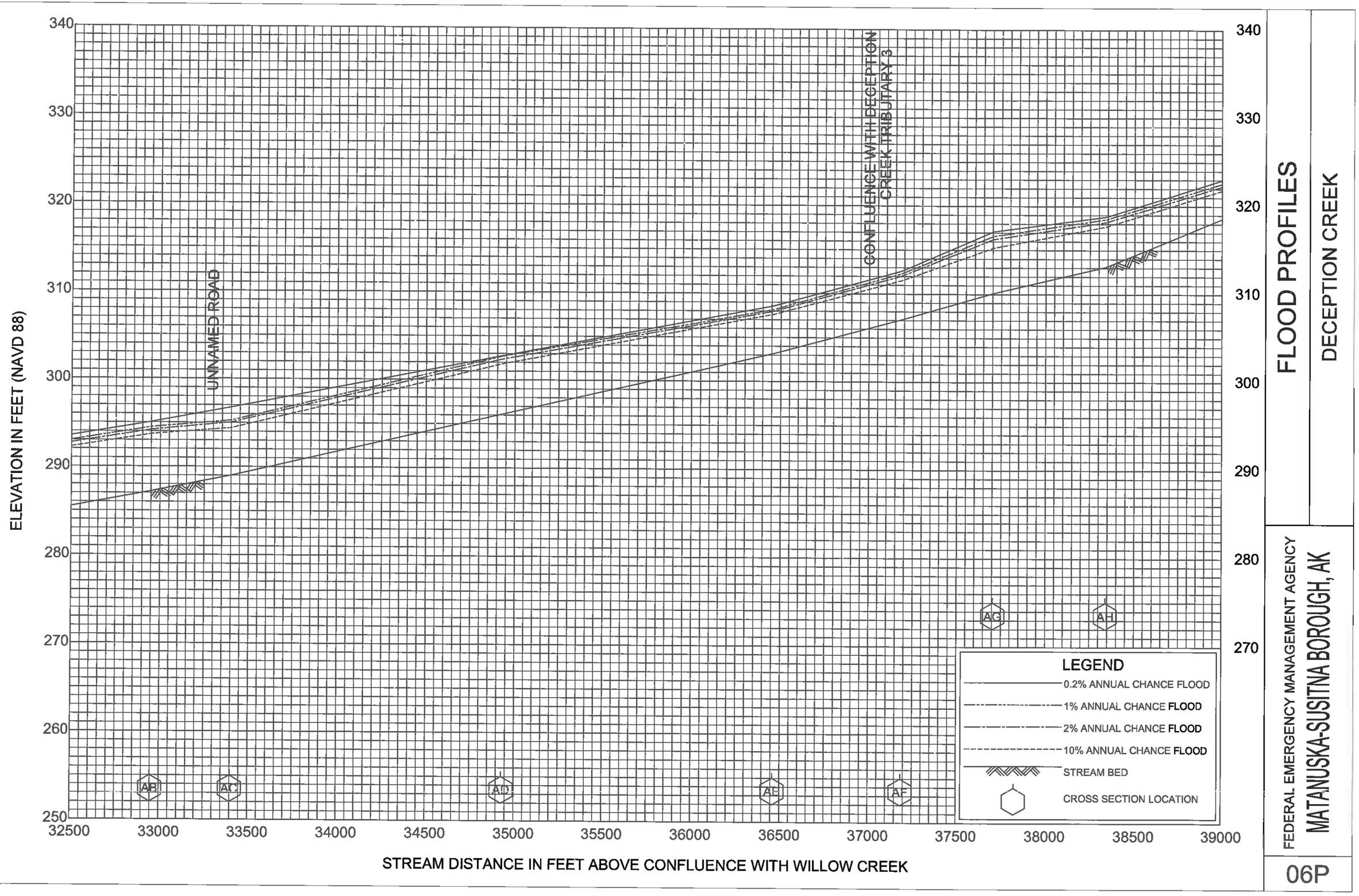
FLOOD PROFILES

DECEPTION CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

05P



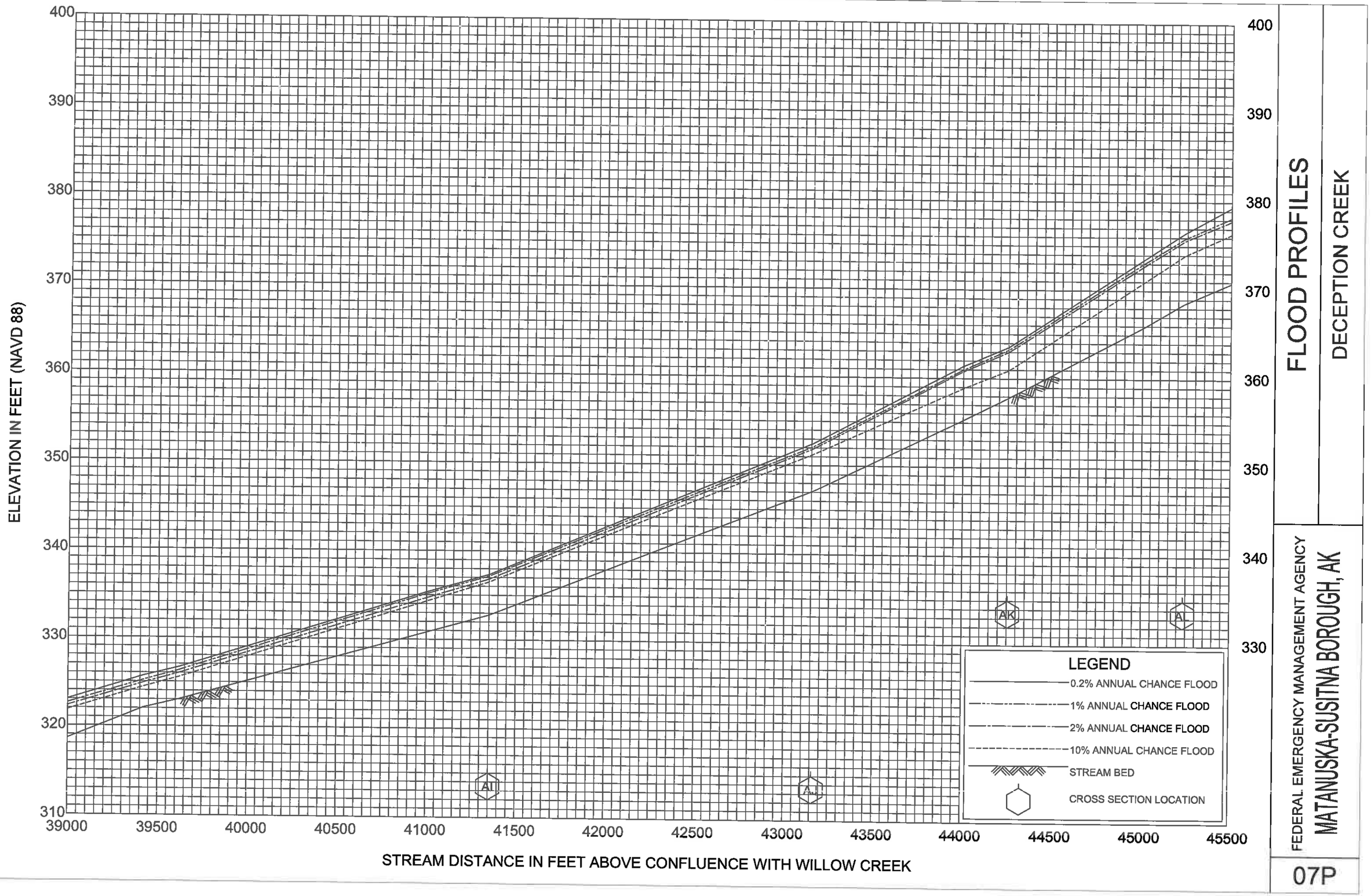
FLOOD PROFILES

DECEPTION CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

06P



FLOOD PROFILES

DECEPTION CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

07P

FLOOD PROFILES

DECEPTION CREEK

ELEVATION IN FEET (NAVD 88)

460
450
440
430
420
410
400
390
380
370

45500 46000 46500 47000 47500 48000 48500 49000 49500 50000 50500 51000 51500 52000

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH WILLOW CREEK

AM AN AO AP AQ AR

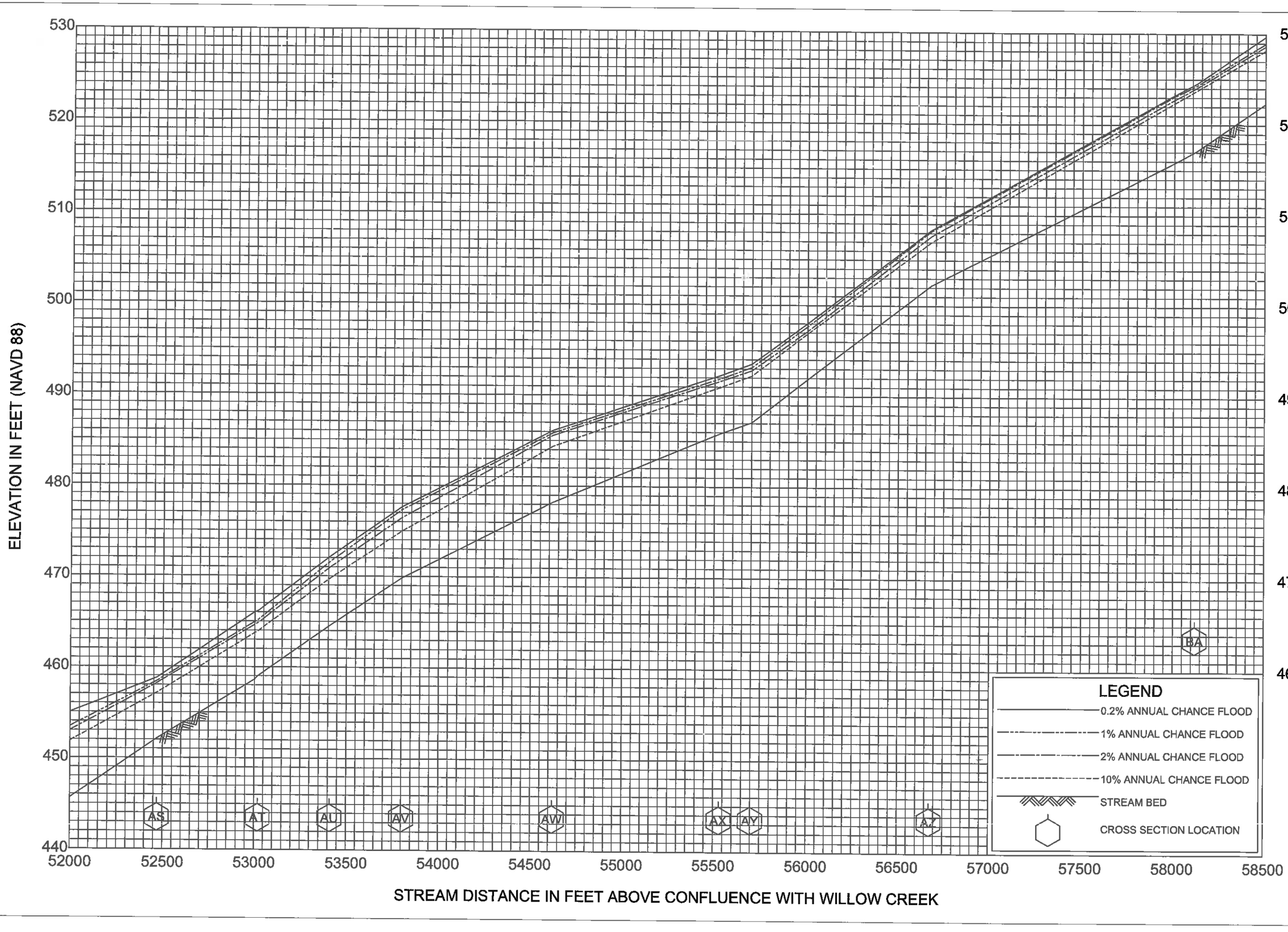
LEGEND

- 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

MATANUSKA-SUSITNA BOROUGH, AK

08P



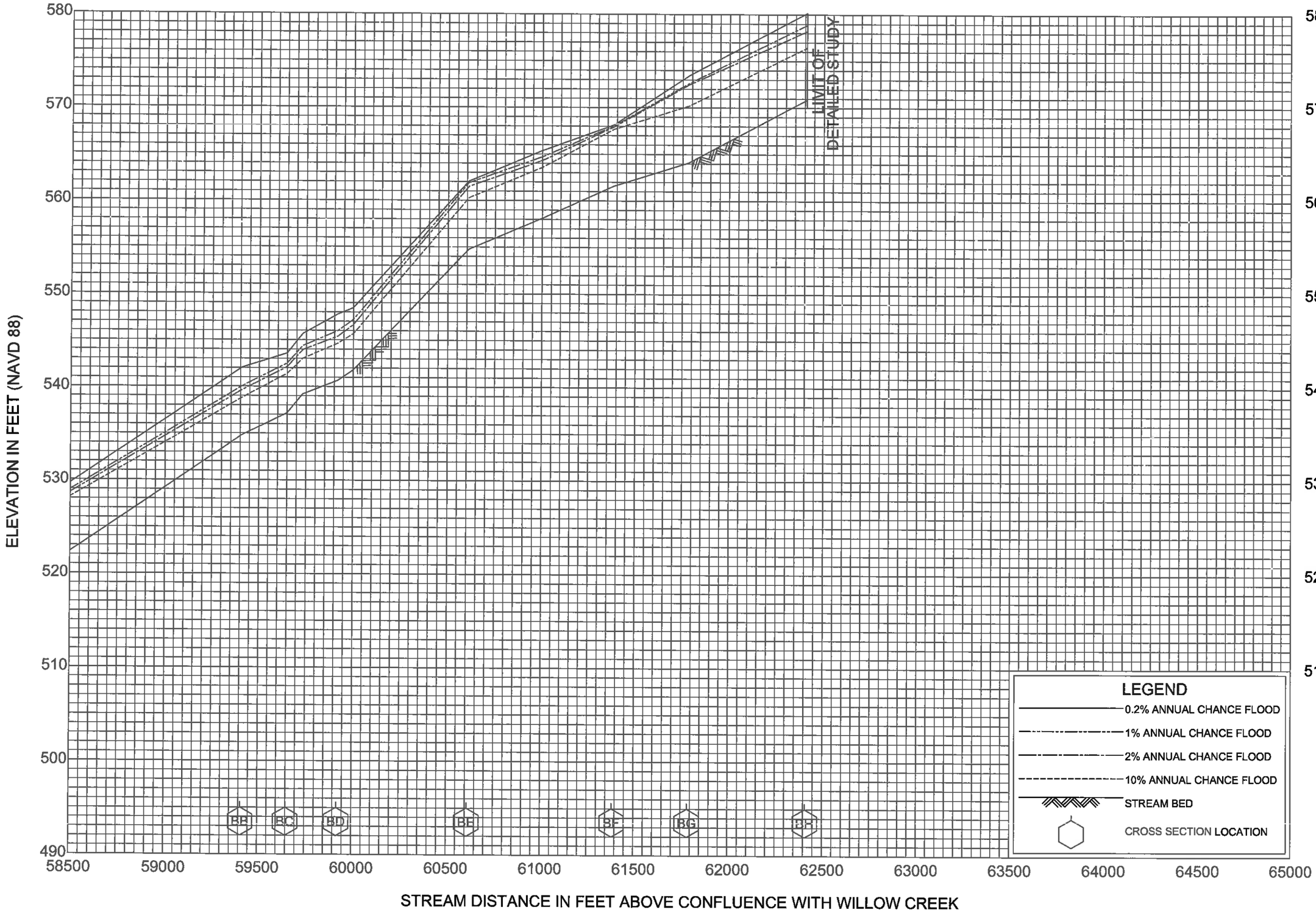
FLOOD PROFILES

DECEPTION CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

09P

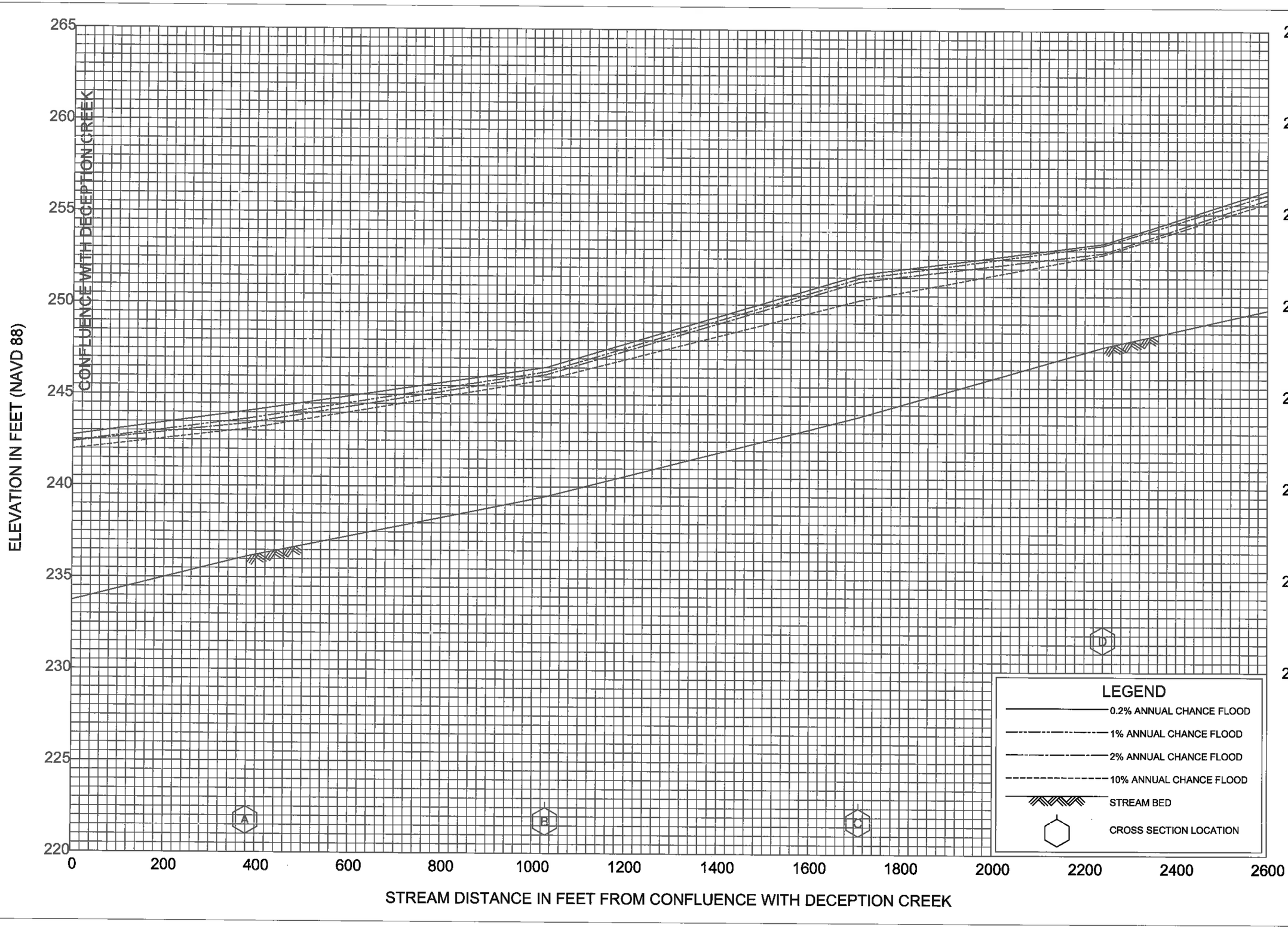


FLOOD PROFILES

DECEPTION CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

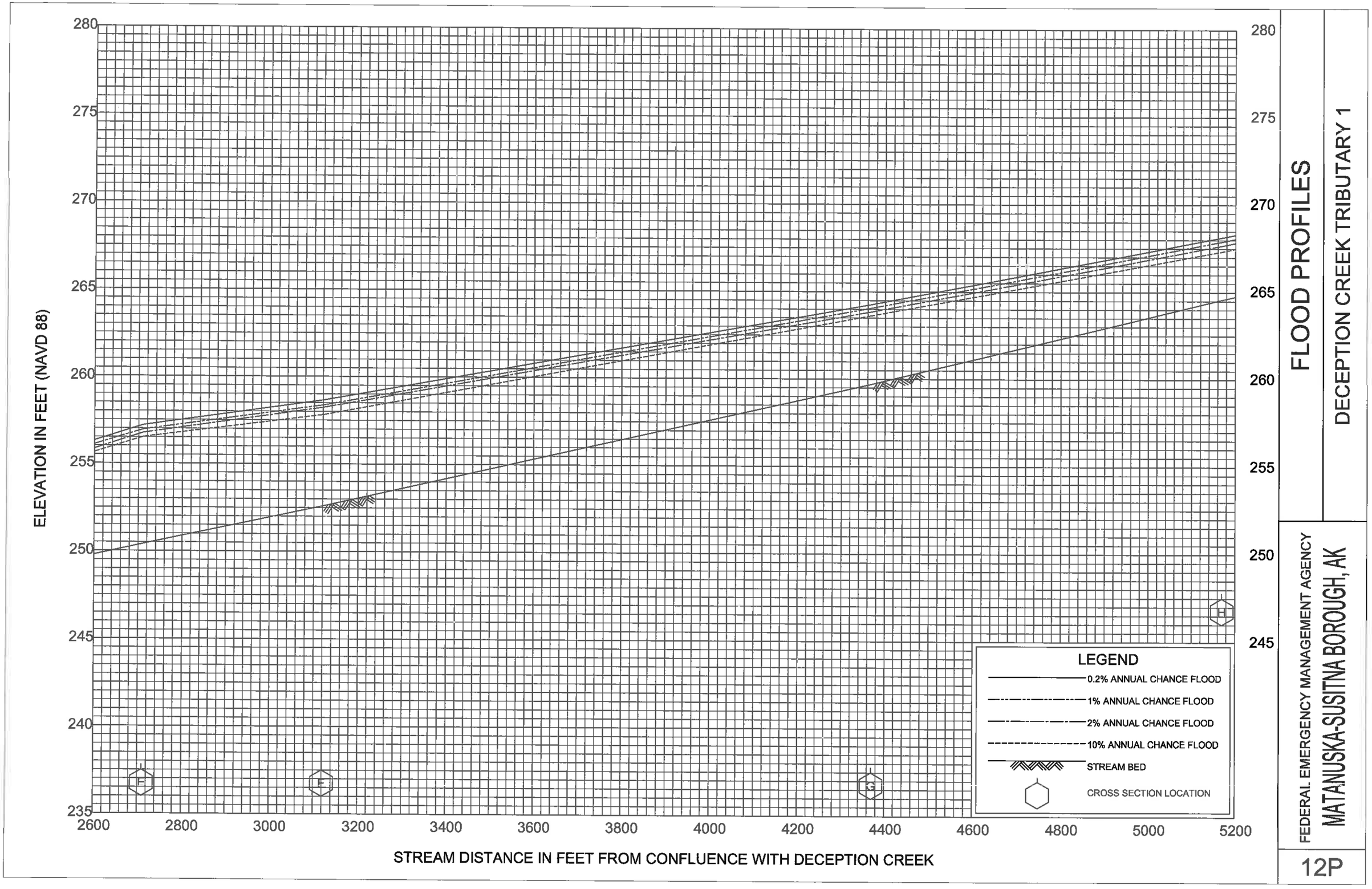


FLOOD PROFILES

DECEPTION CREEK TRIBUTARY 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK



FLOOD PROFILES

DECEPTION CREEK TRIBUTARY 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

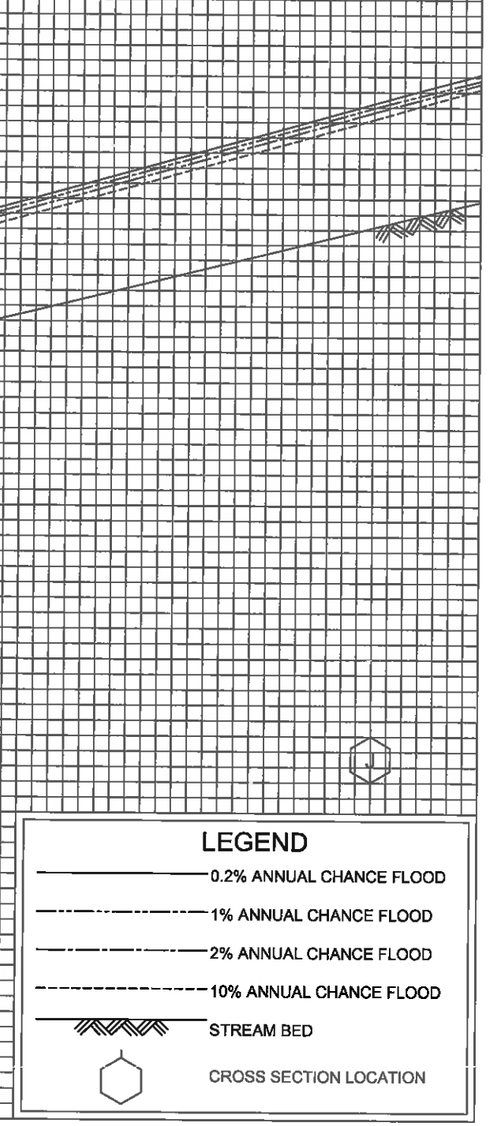
MATANUSKA-SUSITNA BOROUGH, AK

ELEVATION IN FEET (NAVD 88)

295
290
285
280
275
270
265
260
255
250

5200 5400 5600 5800 6000 6200 6400 6600 6800 7000 7200 7400 7600 7800

STREAM DISTANCE IN FEET FROM CONFLUENCE WITH DECEPTION CREEK



FLOOD PROFILES

DECEPTION CREEK TRIBUTARY 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

ELEVATION IN FEET (NAVD 88)

310
305
300
295
290
285
280
275
270
265

7800 8000 8200 8400 8600 8800 9000 9200 9400 9600 9800 10000 10200 10400

STREAM DISTANCE IN FEET FROM CONFLUENCE WITH DECEPTION CREEK

LIMIT OF DETAILED STUDY

K

LEGEND

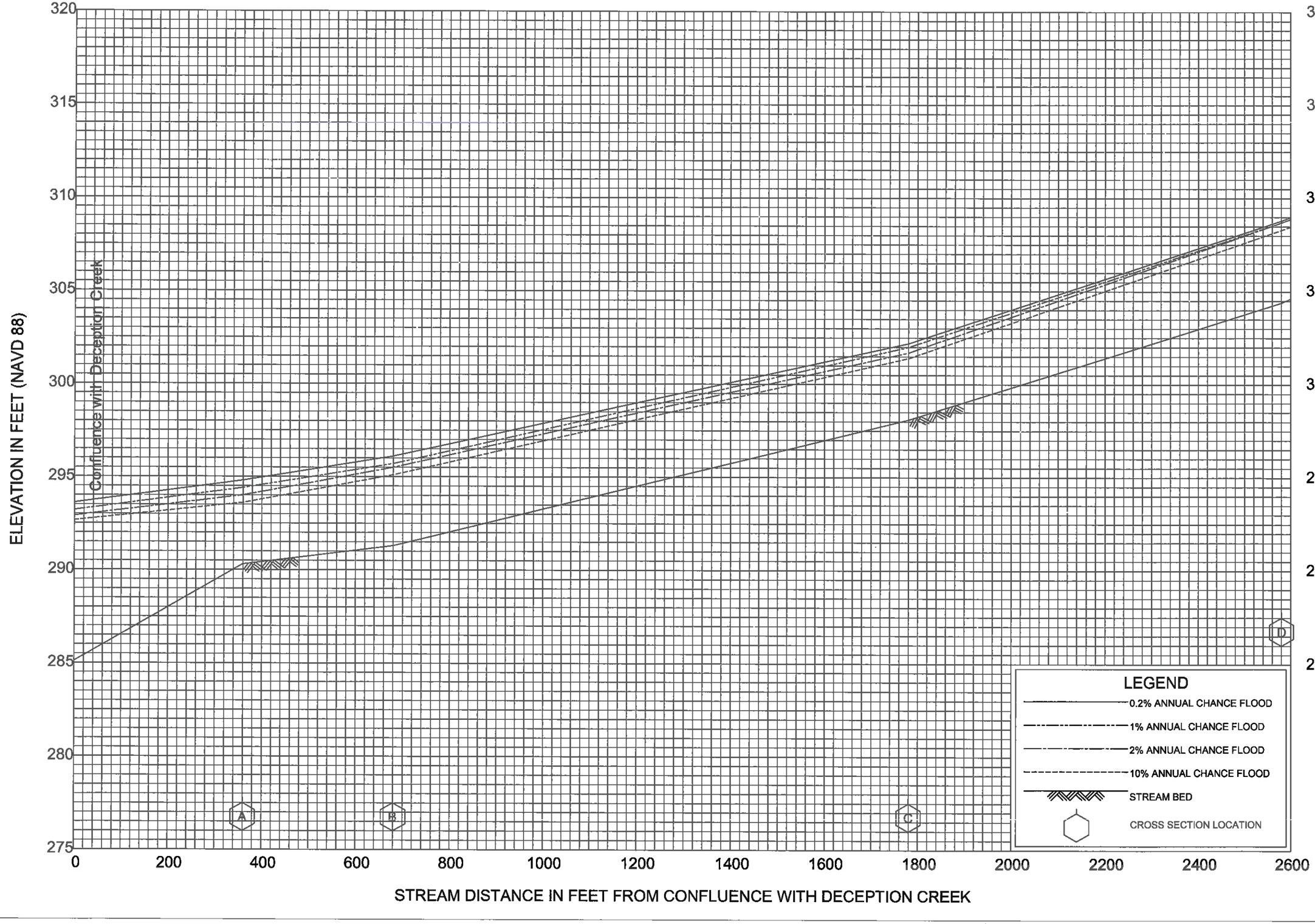
- 0.2% ANNUAL CHANCE FLOOD
- 1% ANNUAL CHANCE FLOOD
- 2% ANNUAL CHANCE FLOOD
- 10% ANNUAL CHANCE FLOOD
- STREAM BED
- CROSS SECTION LOCATION

FLOOD PROFILES

DECEPTION CREEK TRIBUTARY 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

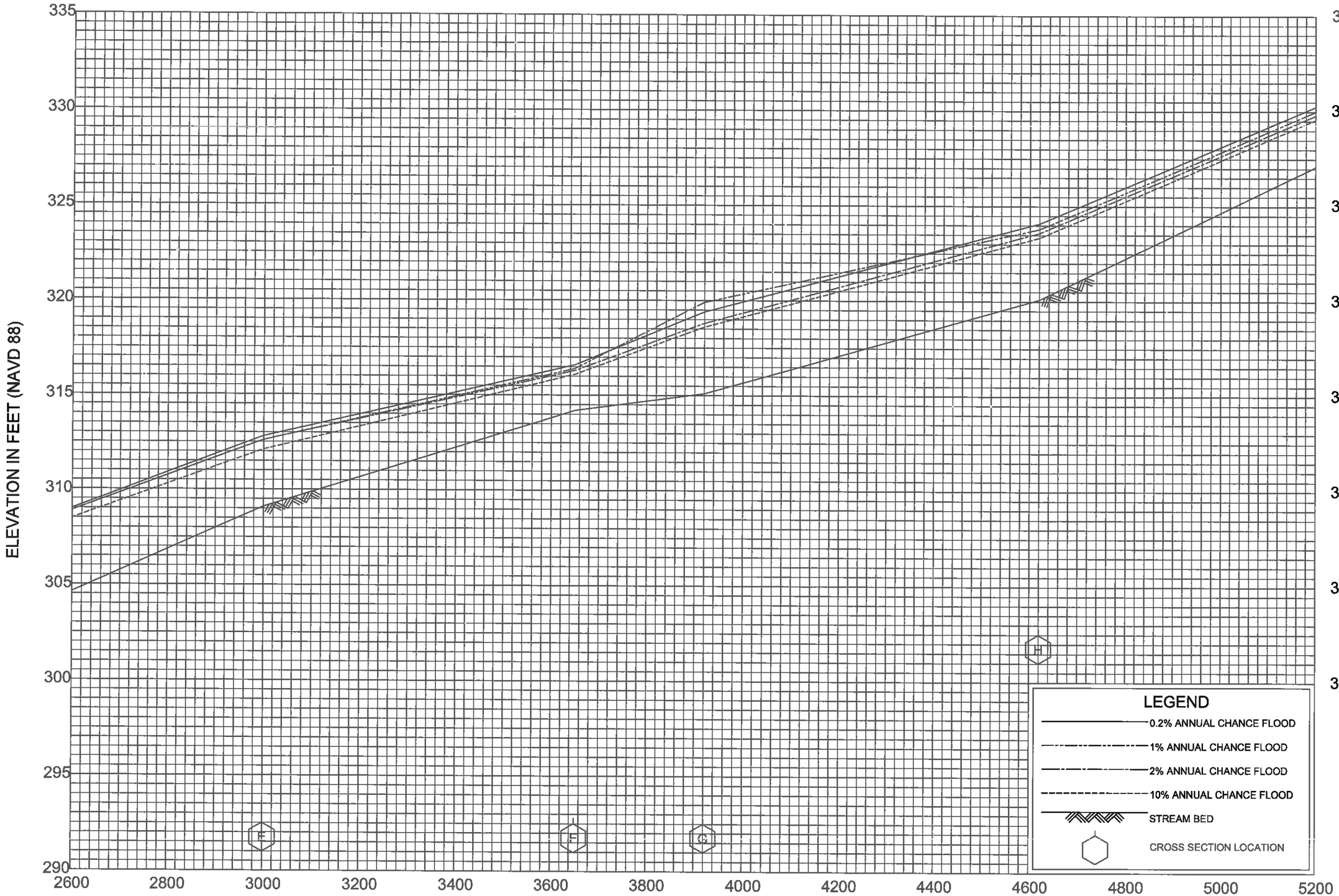


FLOOD PROFILES

DECEPTION CREEK TRIBUTARY 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

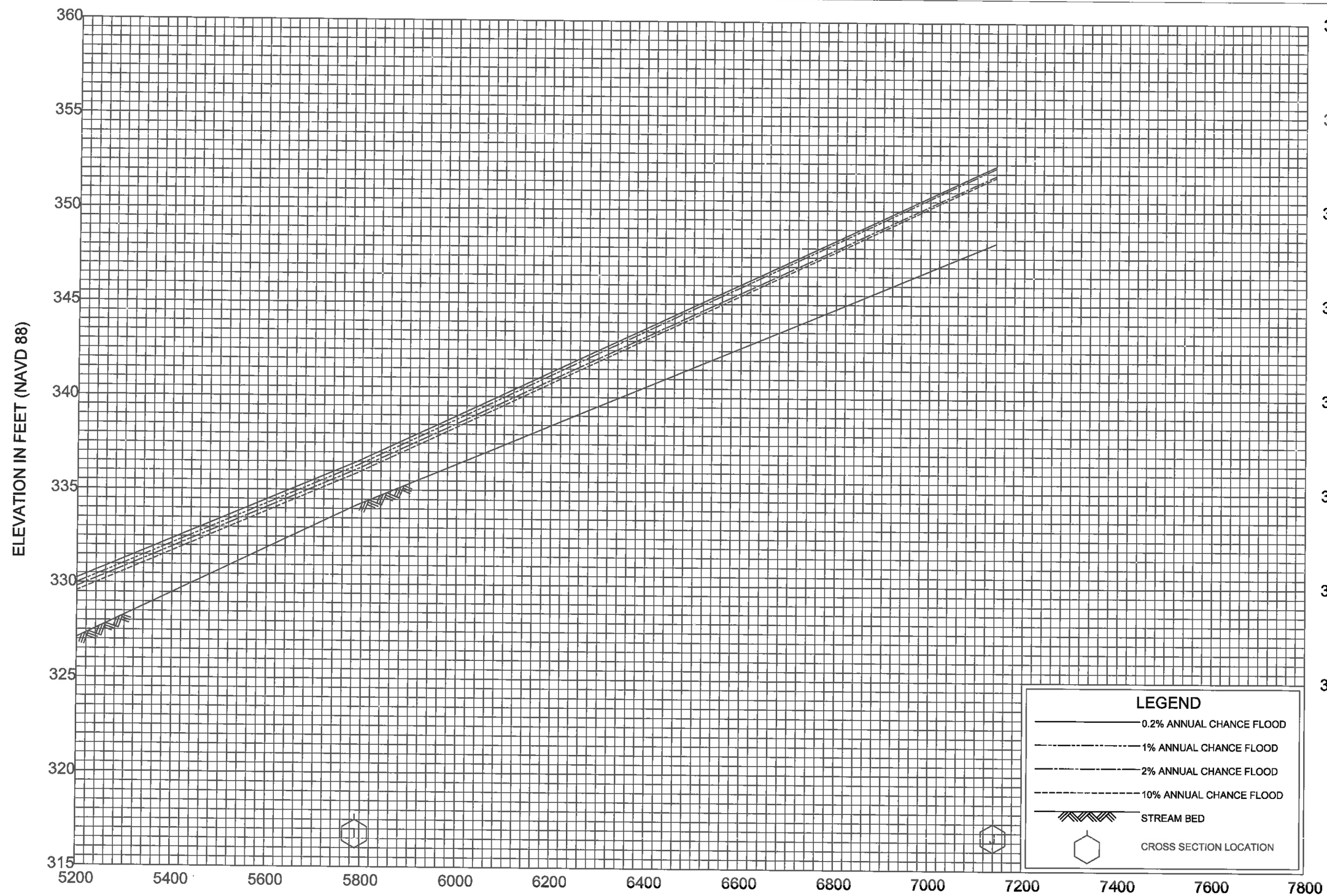


FLOOD PROFILES

DECEPTION CREEK TRIBUTARY 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK



FLOOD PROFILES

DECEPTION CREEK TRIBUTARY 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

FLOOD PROFILE

DECEPTION CREEK TRIBUTARY 3

ELEVATION IN FEET (NAVD 88)

340
335
330
325
320
315
310
305
300
295

0 200 400 600 800 1000 1200 1400 1600 1800 2000 2200 2400 2600

STREAM DISTANCE IN FEET FROM CONFLUENCE WITH DECEPTION CREEK

LIMIT OF DETAILED STUDY

A B C D

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

MATANUSKA-SUSITNA BOROUGH, AK

FLOOD PROFILES

LITTLE SUSITNA RIVER

ELEVATION IN FEET (NAVD 88)

360
340
320
300
280
260
240
220
200
180

0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 11000 12000 13000

STREAM DISTANCE IN FEET FROM DOWNSTREAM LIMIT OF DETAILED STUDY

CITY OF HOUSTON CORPORATE LIMITS

ALASKA RAILROAD

A B C D E F

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

MATANUSKA-SUSITNA BOROUGH, AK

ELEVATION IN FEET (NAVD 88)

360
340
320
300
280
260
240
220
200
180

PARKS HIGHWAY

F
G
H
I

13000 14000 15000 16000 17000 18000 19000 20000 21000 22000 23000 24000 25000 26000

STREAM DISTANCE IN FEET FROM DOWNSTREAM LIMIT OF DETAILED STUDY

LEGEND

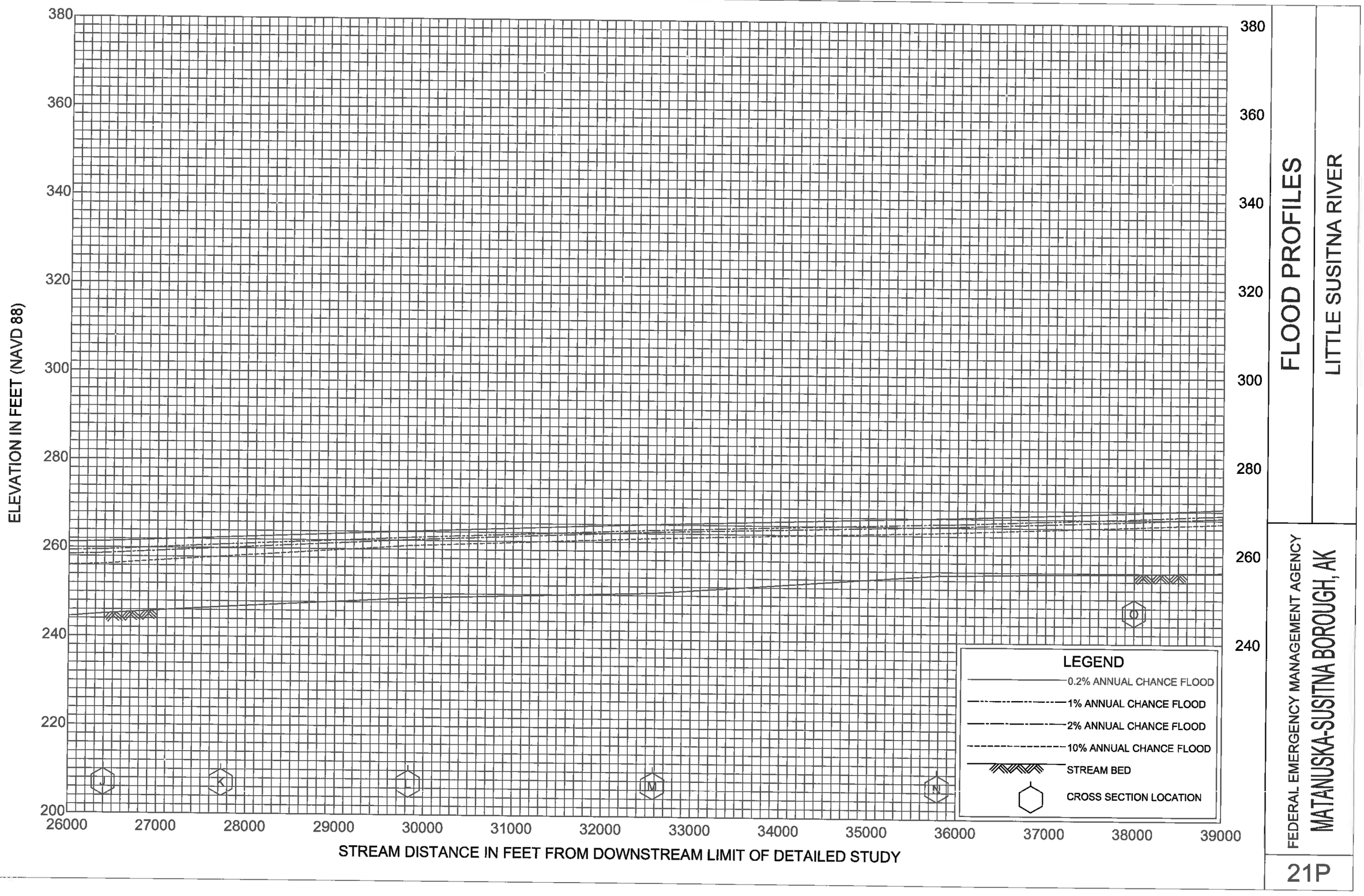
- 0.2% ANNUAL CHANCE FLOOD
- 1% ANNUAL CHANCE FLOOD
- 2% ANNUAL CHANCE FLOOD
- 10% ANNUAL CHANCE FLOOD
- STREAM BED
- CROSS SECTION LOCATION

FLOOD PROFILES

LITTLE SUSITNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK



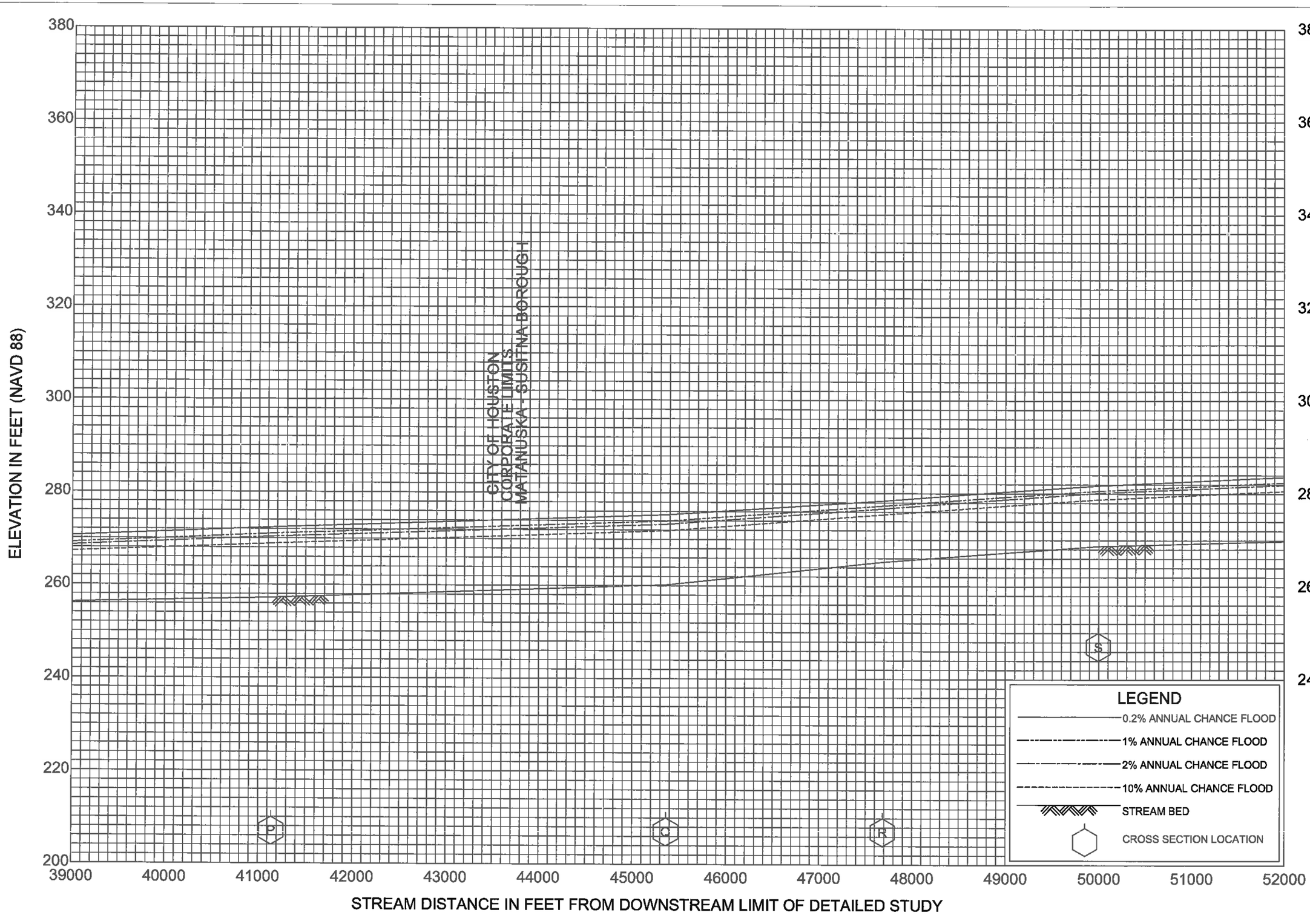
FLOOD PROFILES

LITTLE SUSITNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

21P



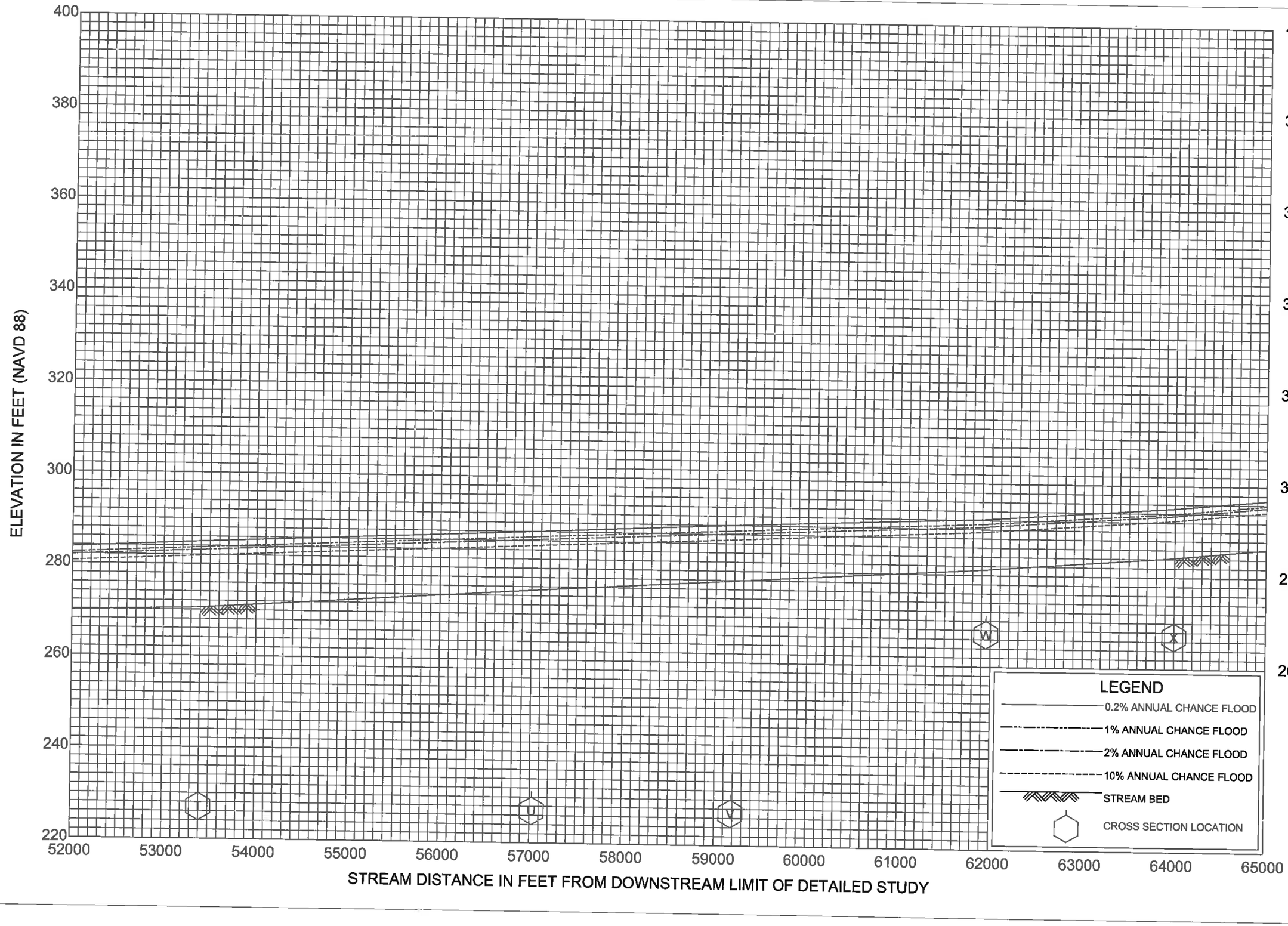
FLOOD PROFILES

LITTLE SUSITNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

22P

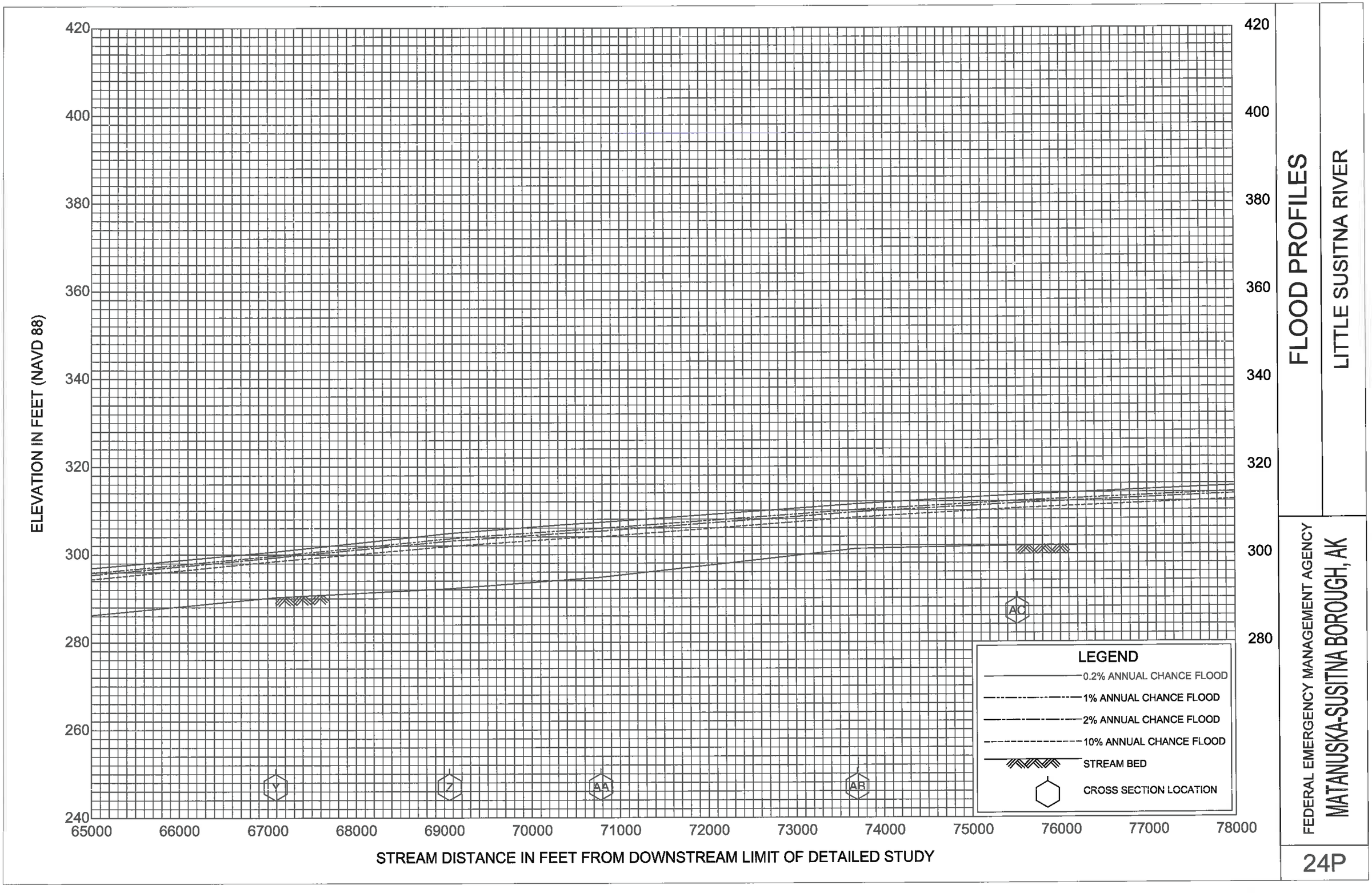


FLOOD PROFILES

LITTLE SUSITNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK



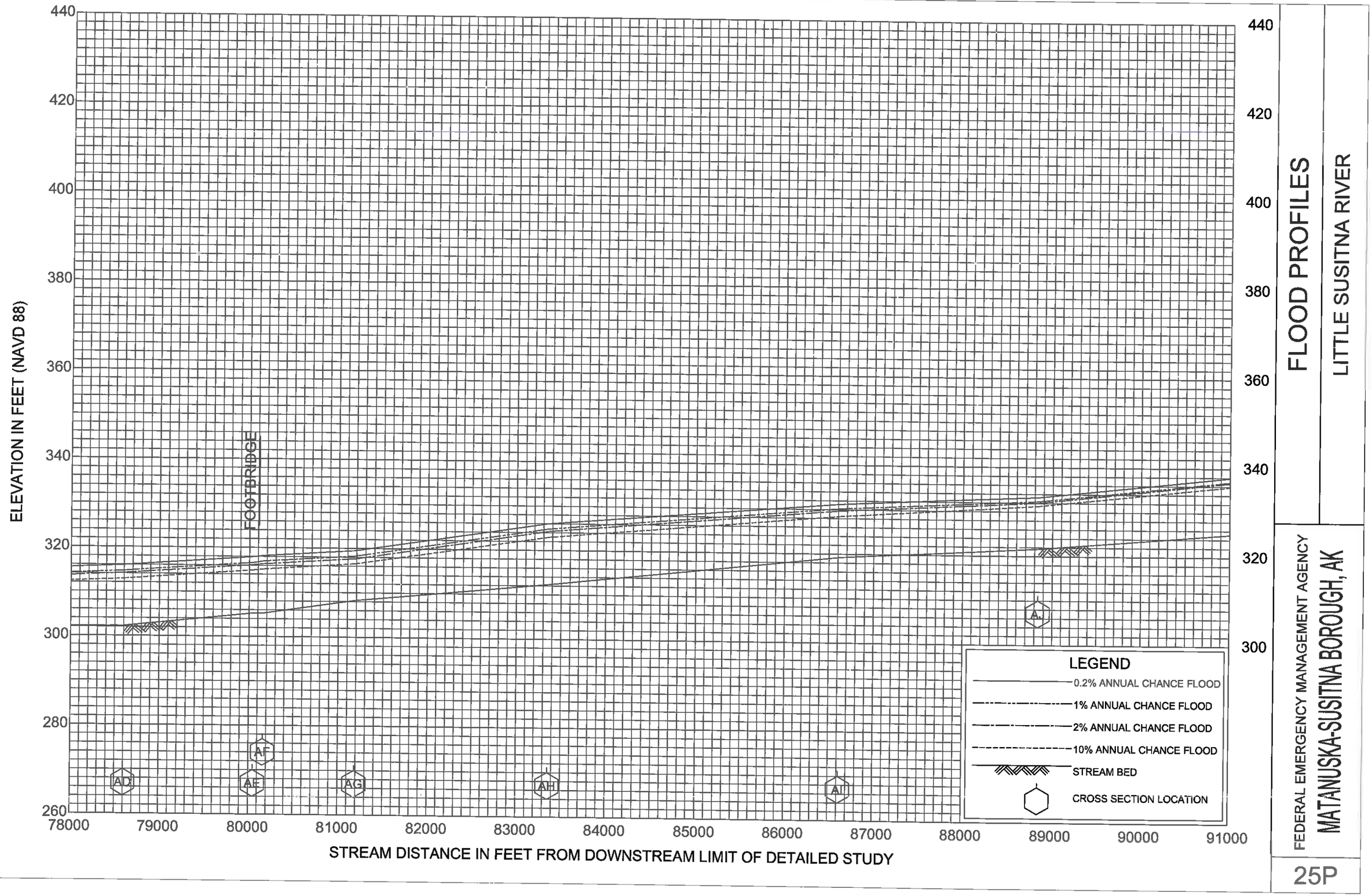
FLOOD PROFILES

LITTLE SUSITNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

24P



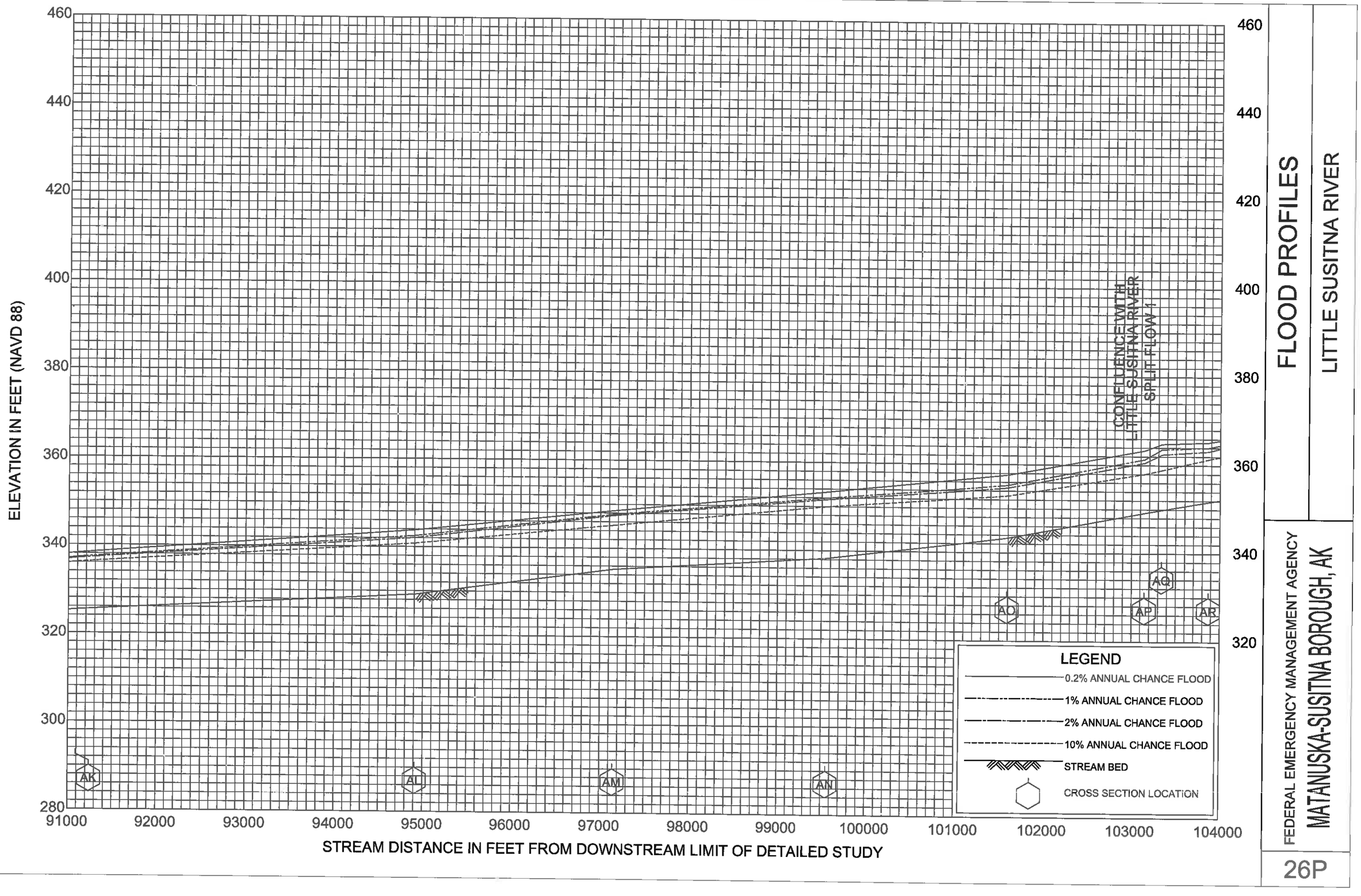
FLOOD PROFILES

LITTLE SUSITNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

25P

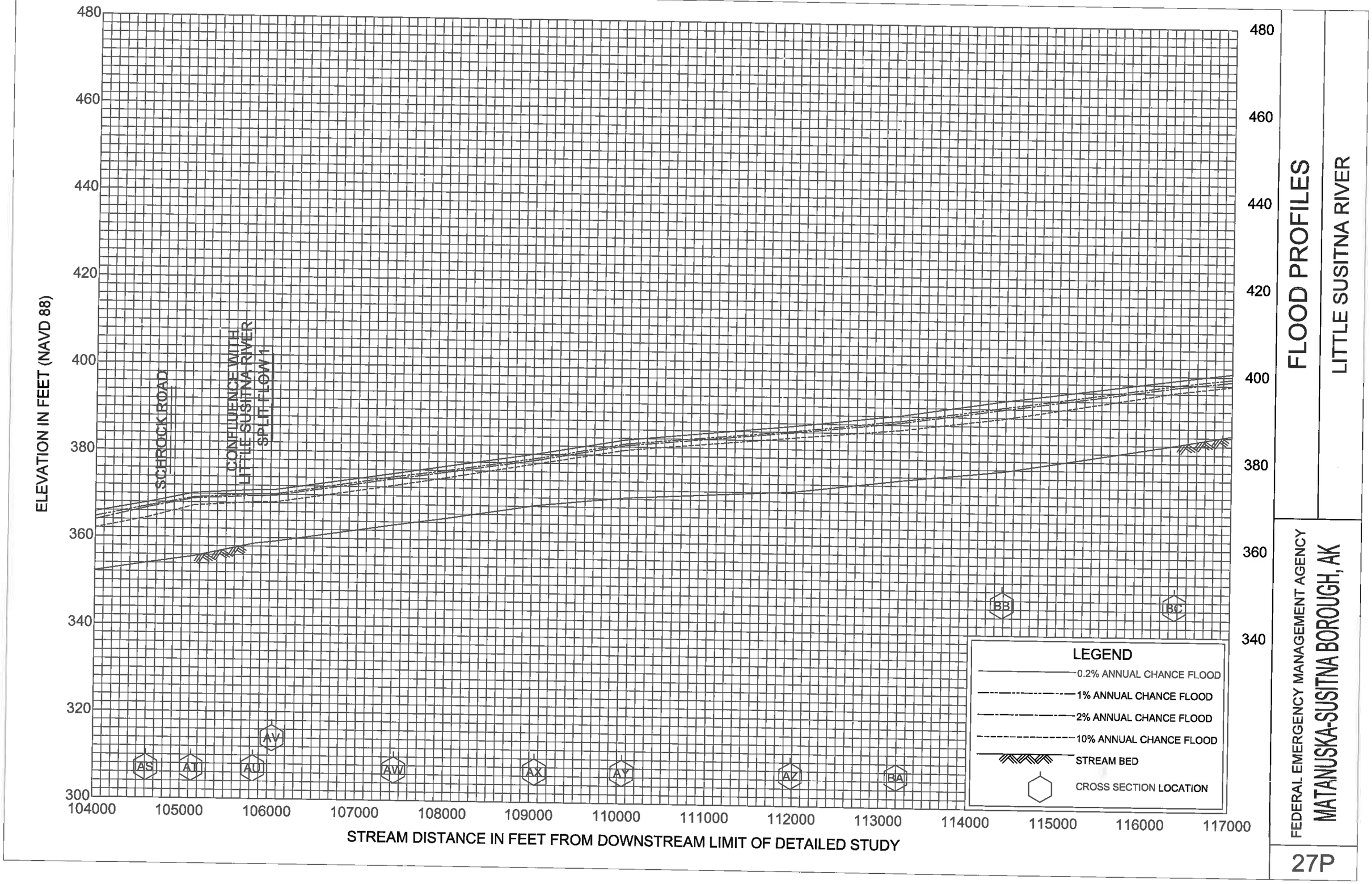


FLOOD PROFILES

LITTLE SUSITNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK



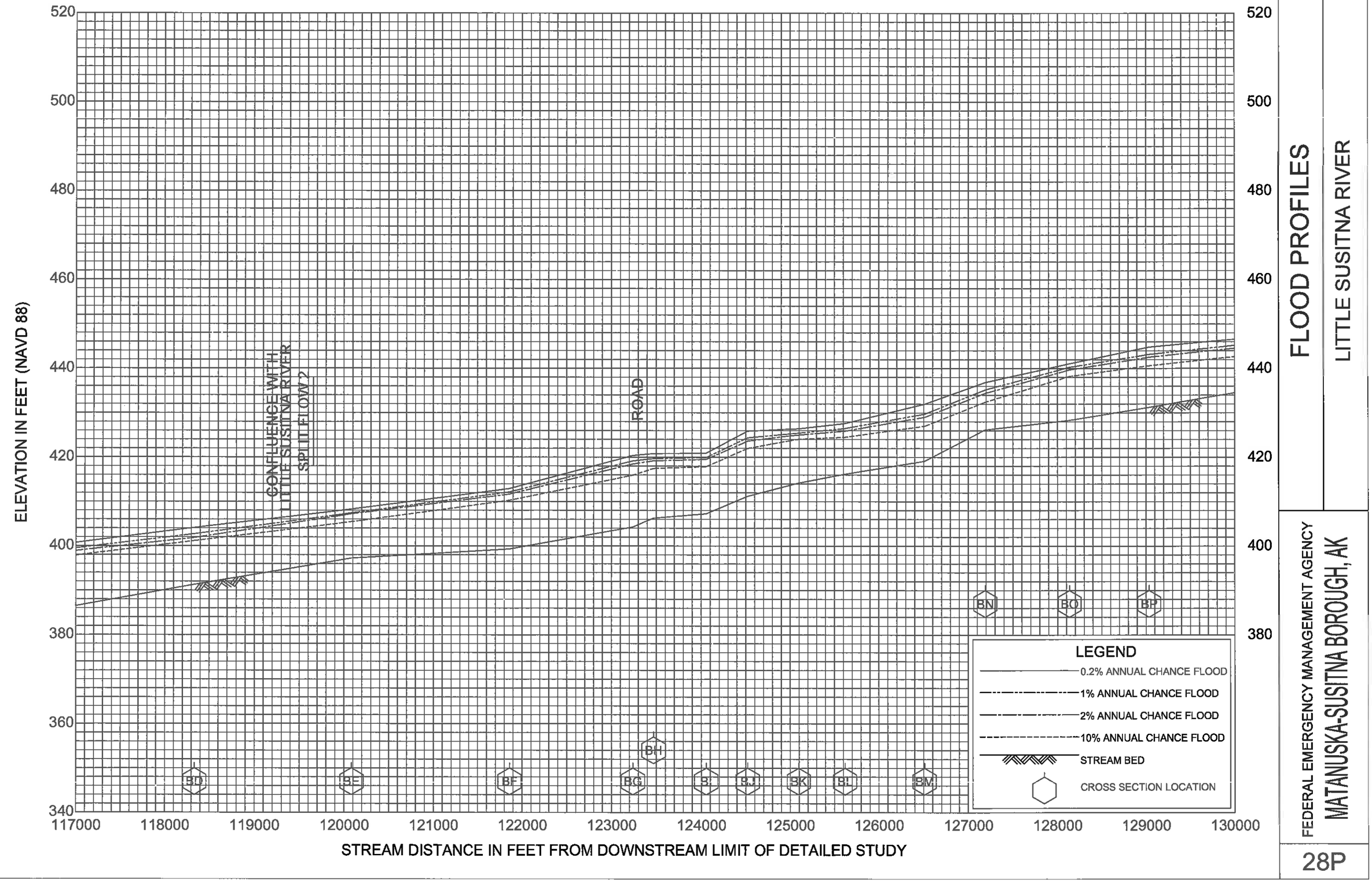
FLOOD PROFILES

LITTLE SUSITNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

27P



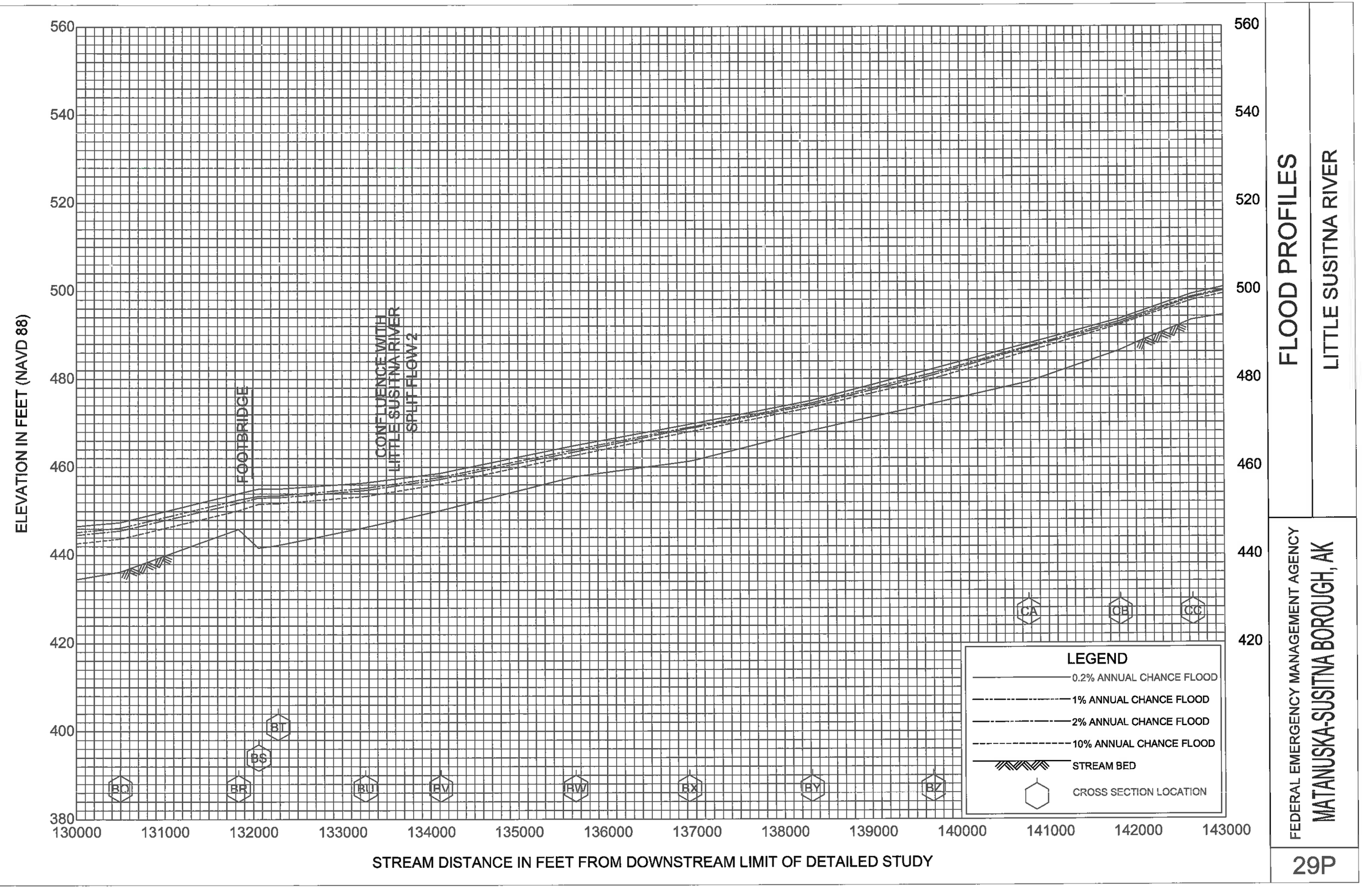
FLOOD PROFILES

LITTLE SUSITNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

28P



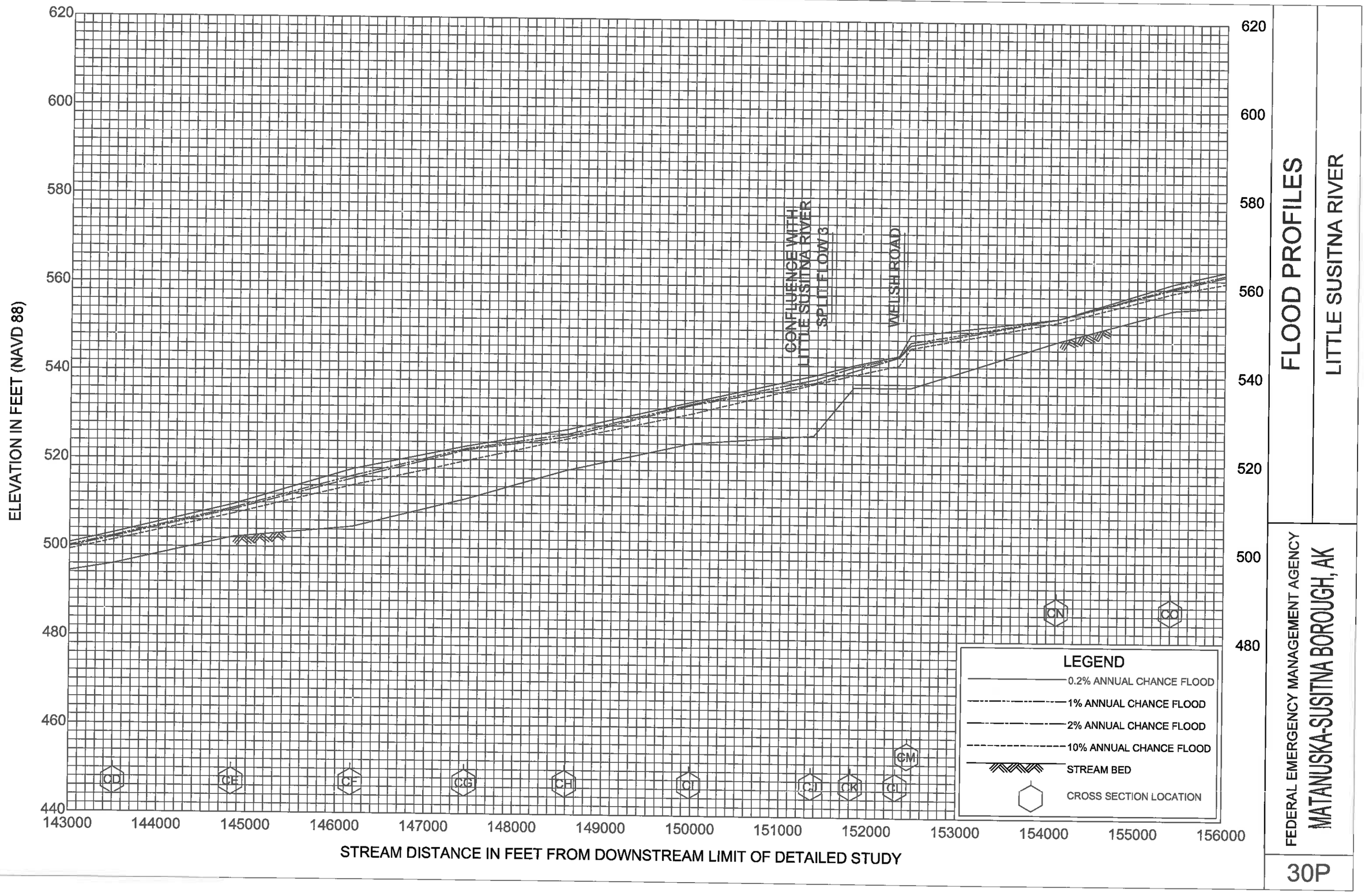
FLOOD PROFILES

LITTLE SUSITNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

29P

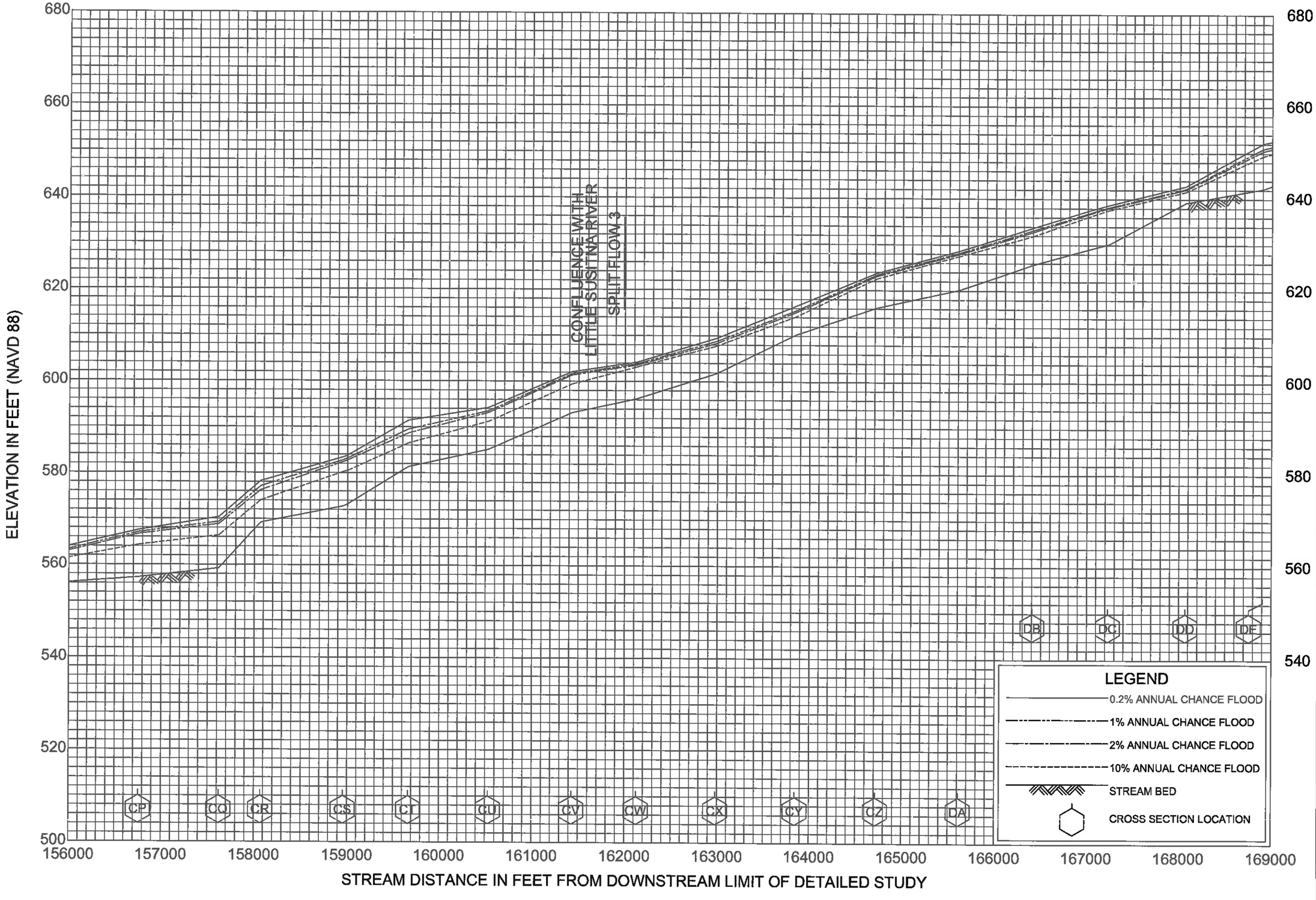


FLOOD PROFILES

LITTLE SUSITNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

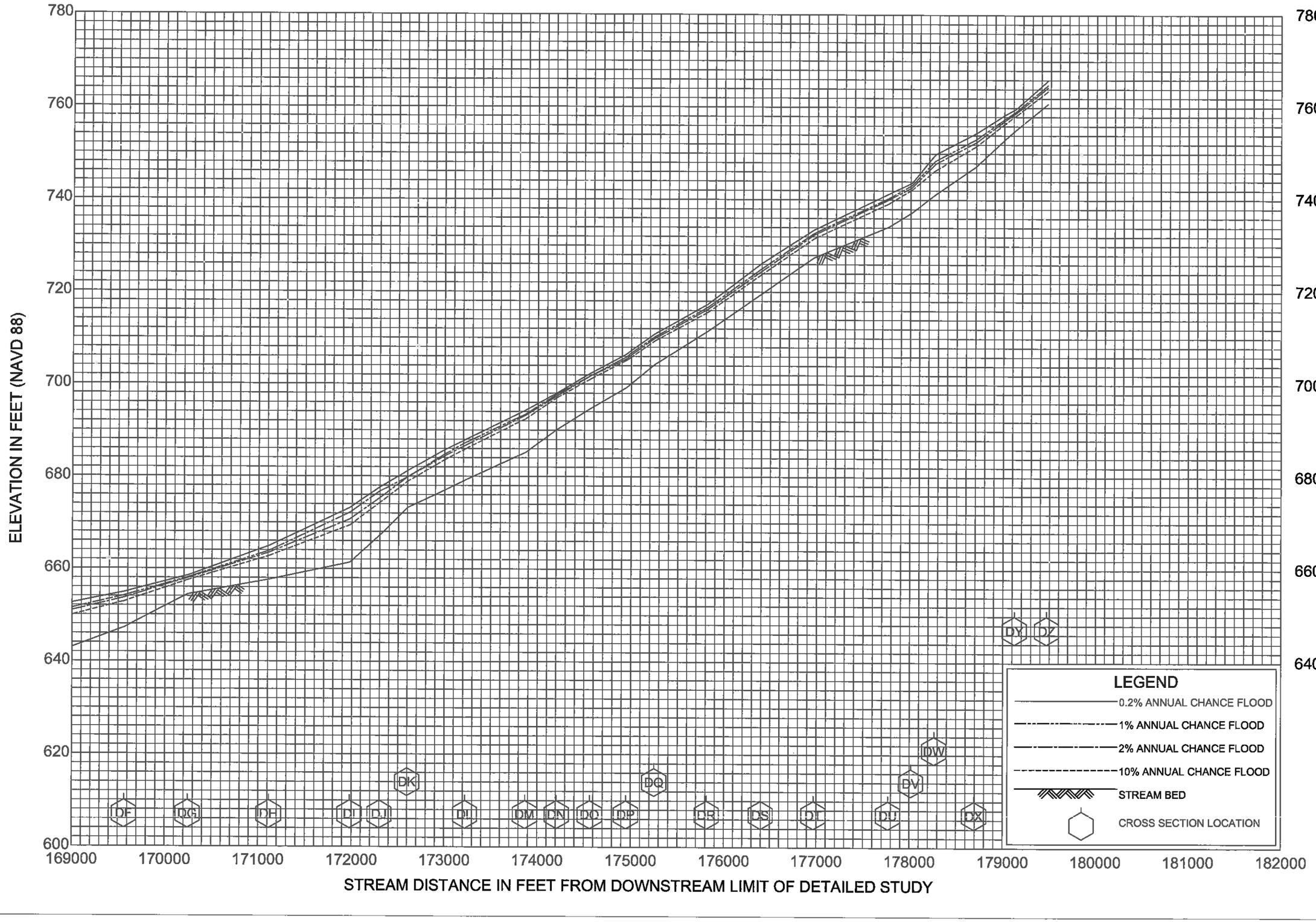


FLOOD PROFILES

LITTLE SUSITNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

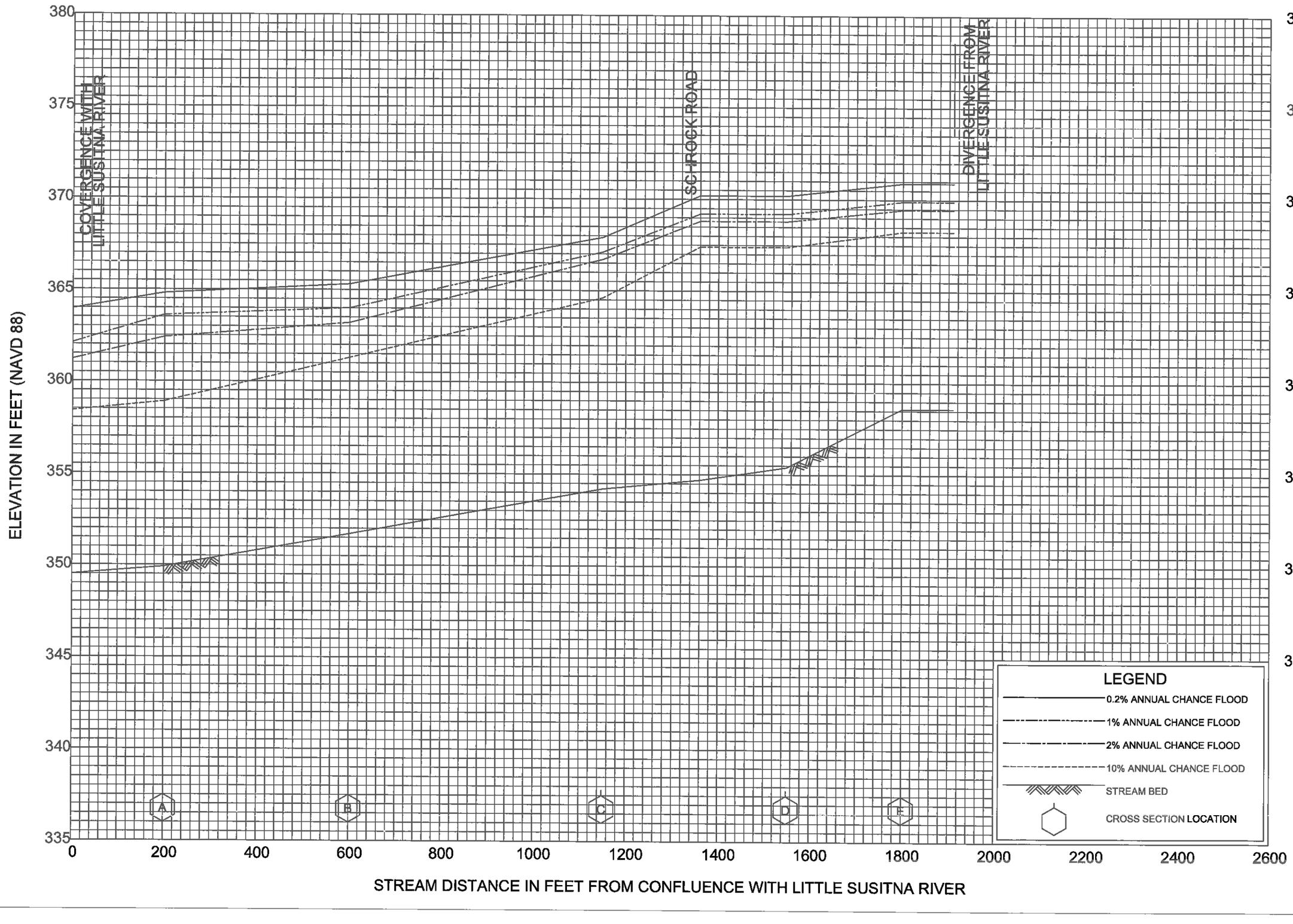


FLOOD PROFILES

LITTLE SUSITNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

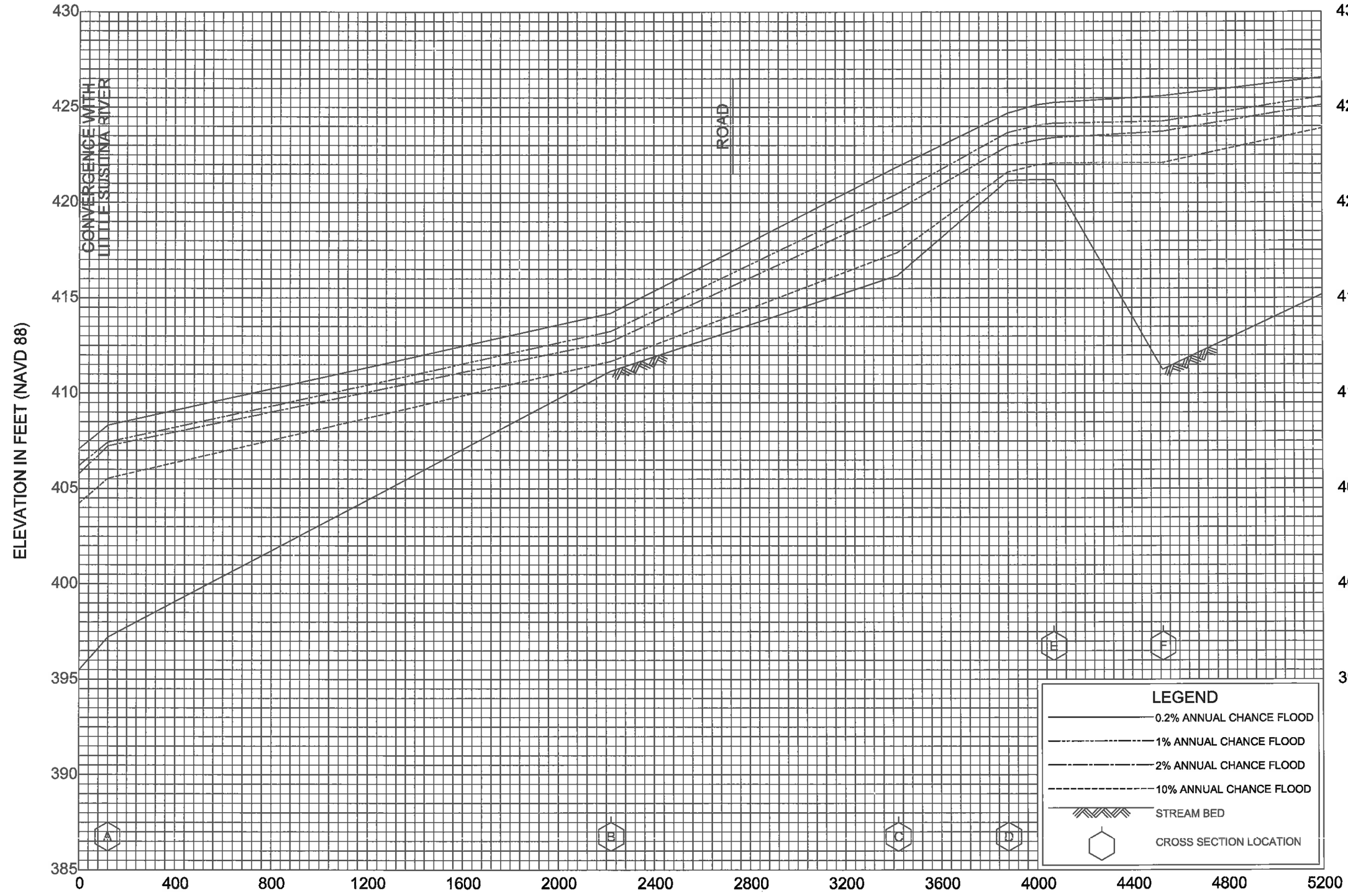


FLOOD PROFILES

LITTLE SUSITNA RIVER SPLIT FLOW 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK



FLOOD PROFILES

LITTLE SUSITNA RIVER SPLIT FLOW 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

ELEVATION IN FEET (NAVD 88)

450
445
440
435
430
425
420
415
410
405

5200 5600 6000 6400 6800 7200 7600 8000 8400 8800 9200 9600 10000 10400

STREAM DISTANCE IN FEET FROM CONFLUENCE WITH LITTLE SUSITNA RIVER

G H I K

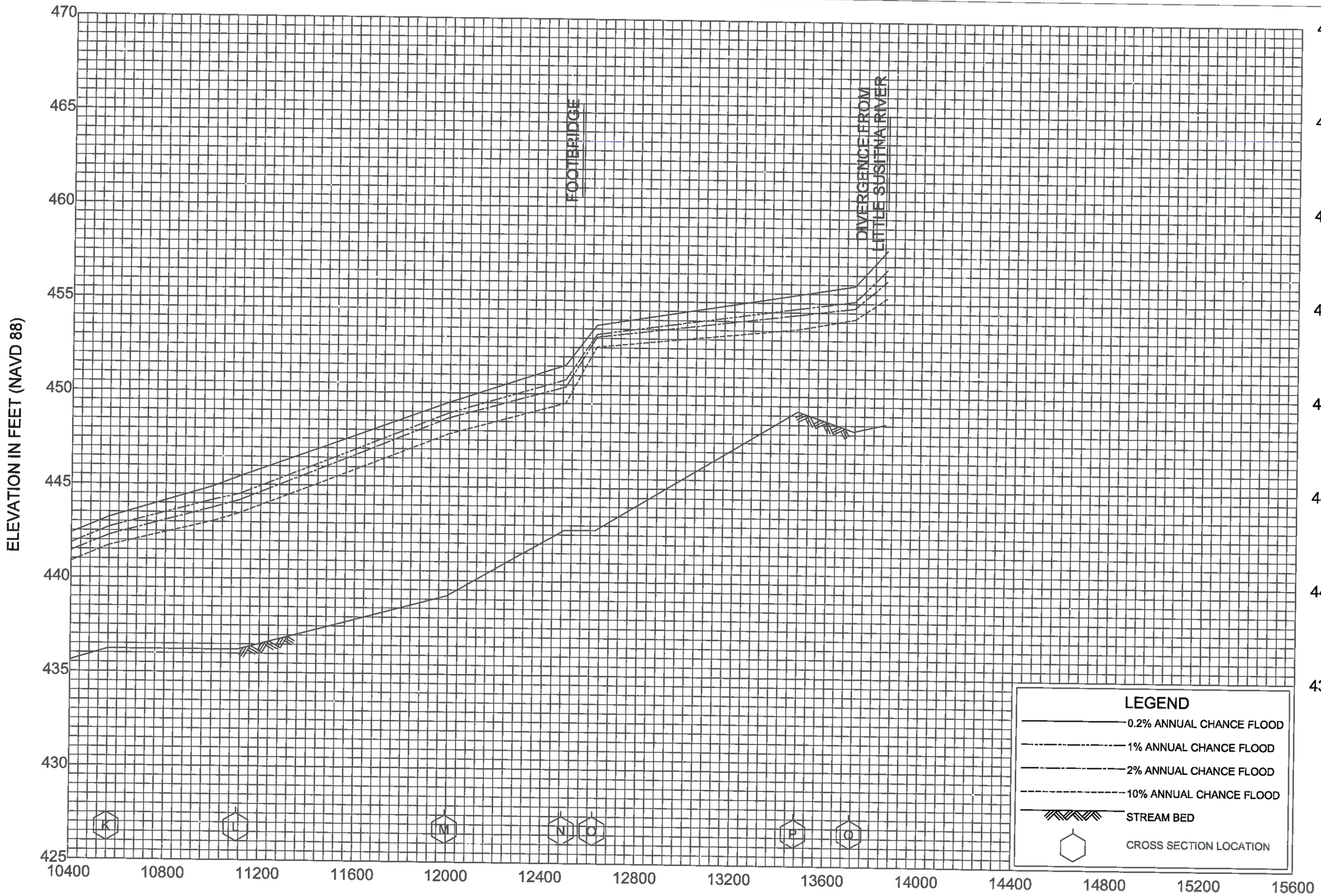
LEGEND
- 0.2% ANNUAL CHANCE FLOOD
- 1% ANNUAL CHANCE FLOOD
- 2% ANNUAL CHANCE FLOOD
- 10% ANNUAL CHANCE FLOOD
- STREAM BED
- CROSS SECTION LOCATION

FLOOD PROFILES

LITTLE SUSITNA RIVER SPLIT FLOW 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

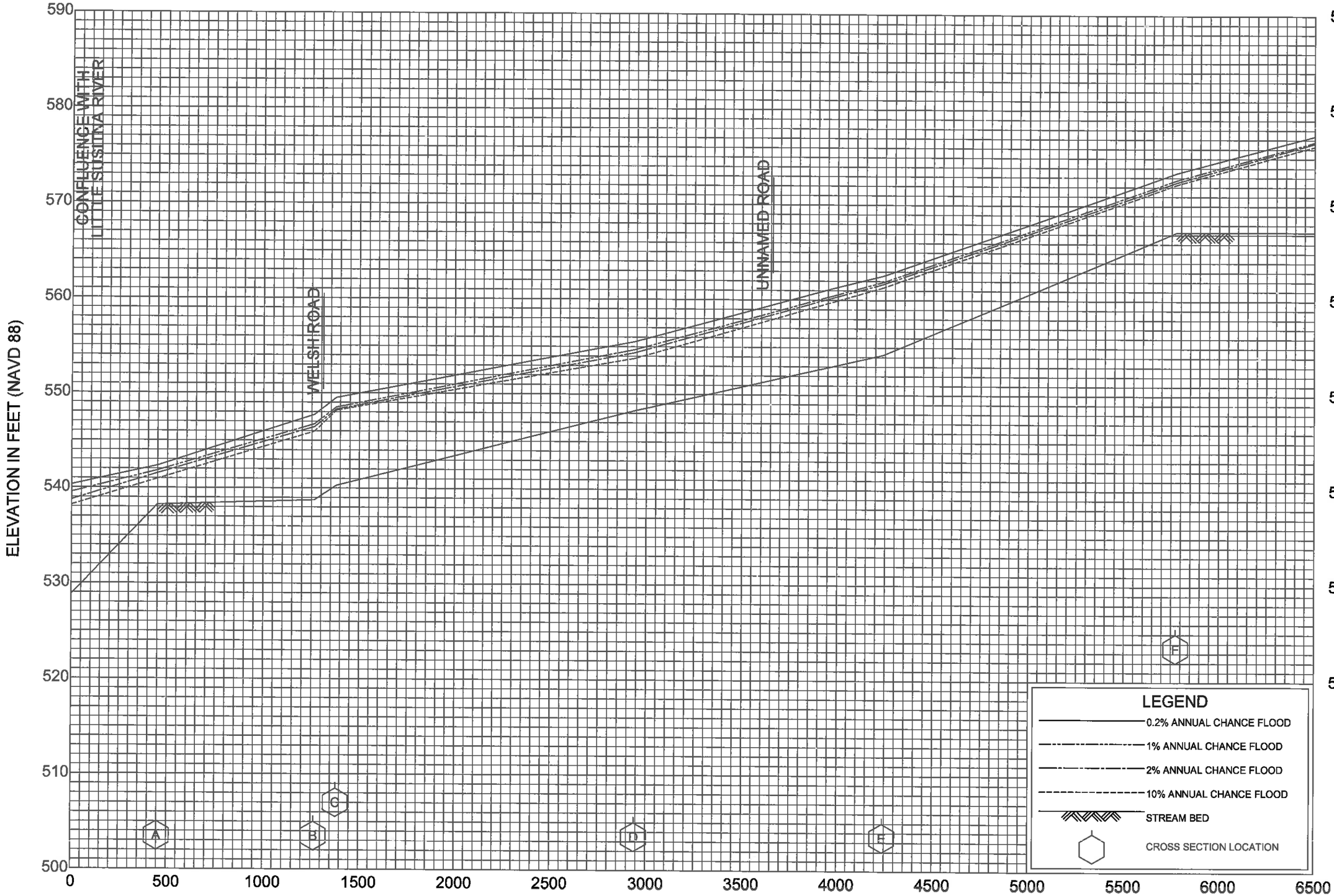


FLOOD PROFILES

LITTLE SUSITNA RIVER SPLIT FLOW 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK



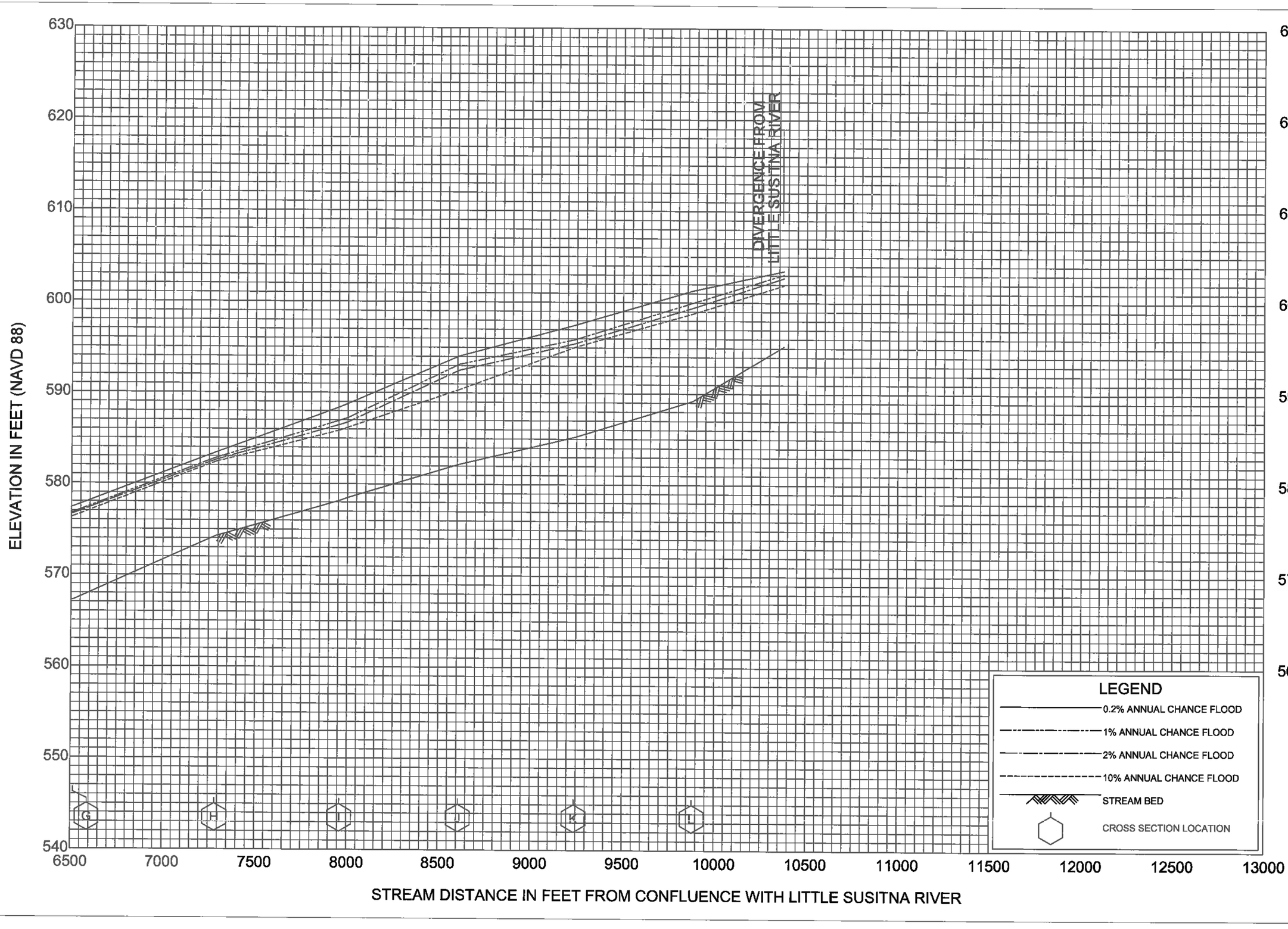
FLOOD PROFILES

LITTLE SUSITNA RIVER SPLIT FLOW 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

37P

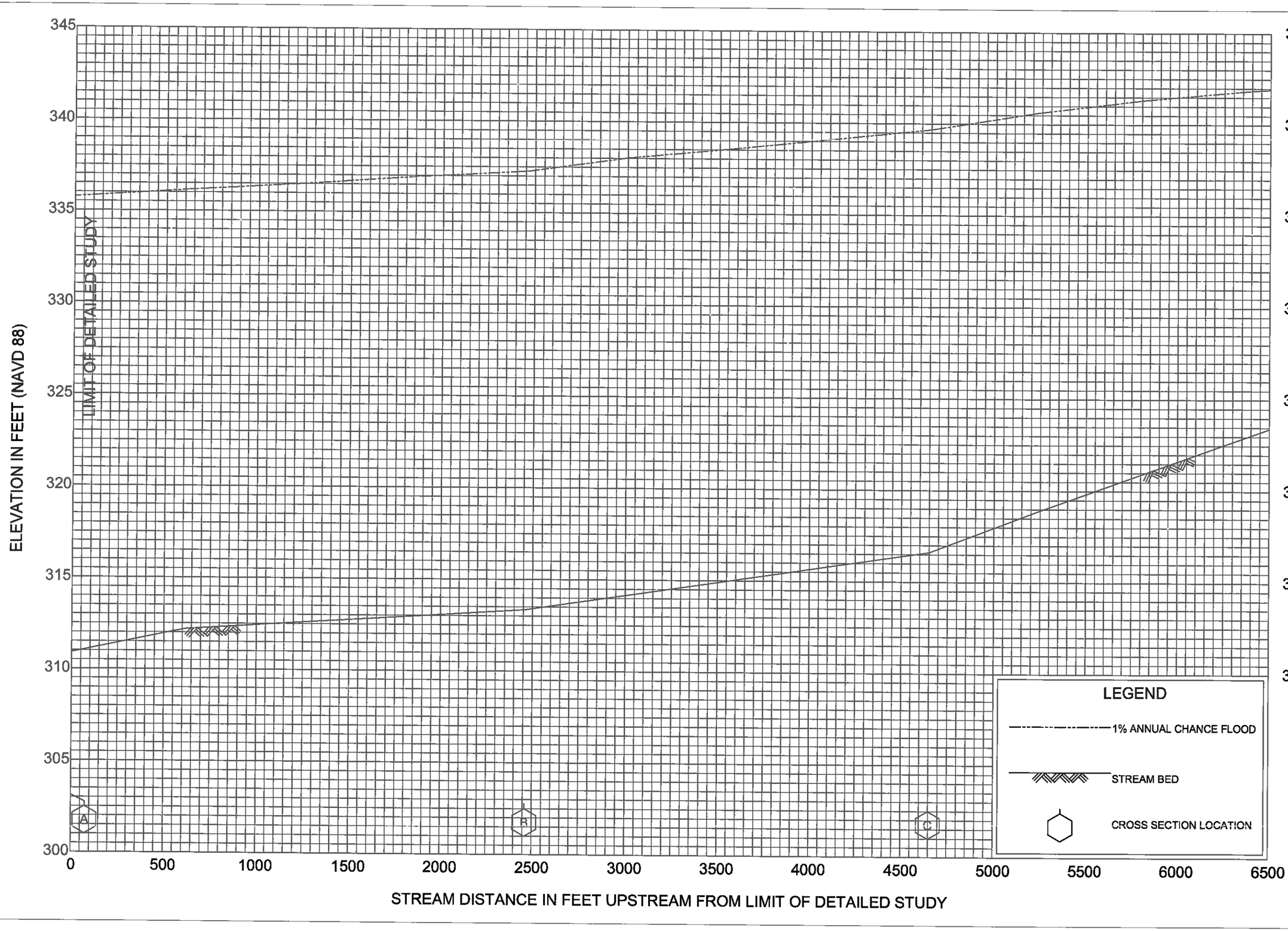


FLOOD PROFILES

LITTLE SUSITNA RIVER SPLIT FLOW 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK



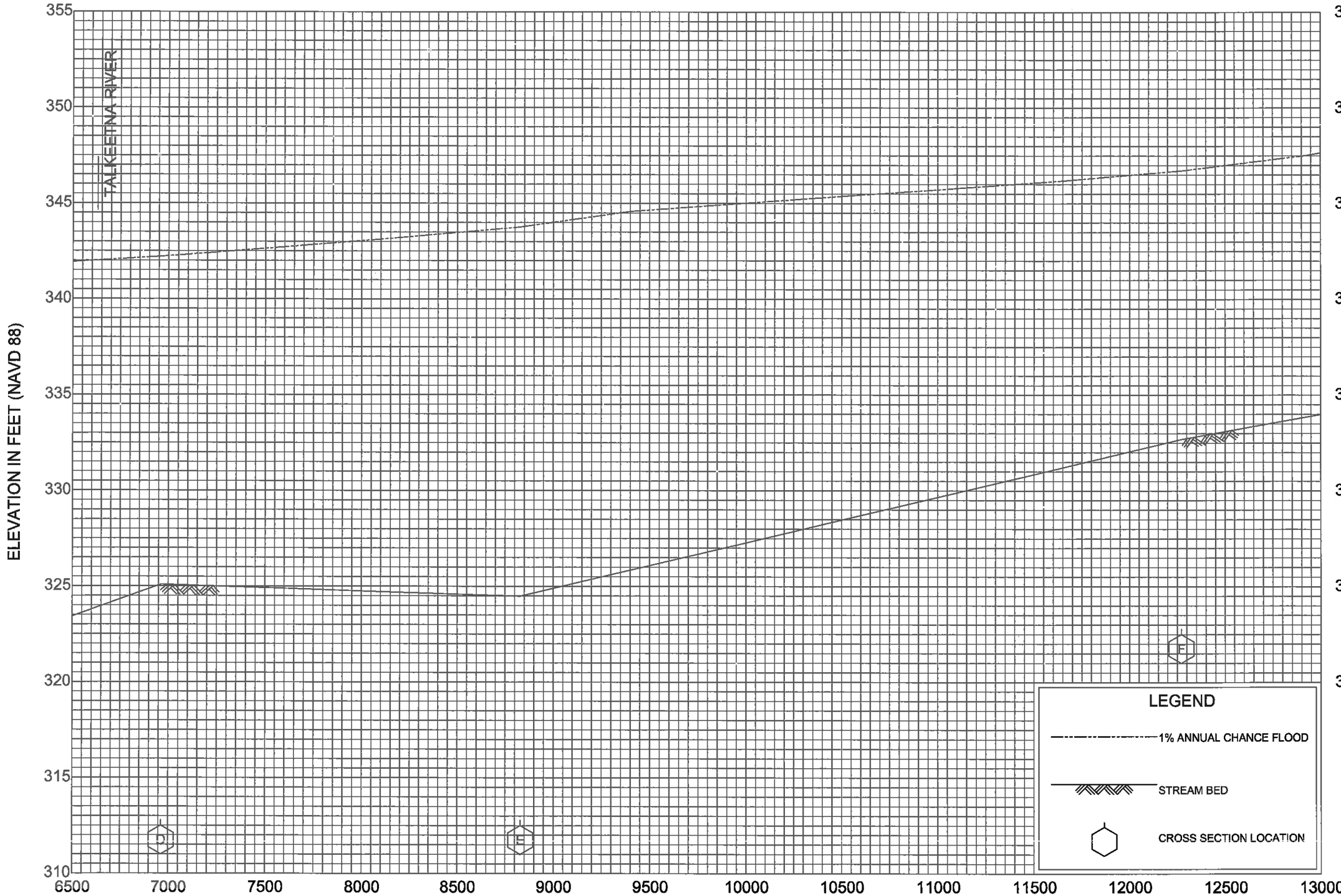
FLOOD PROFILES

SUSITNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

39P

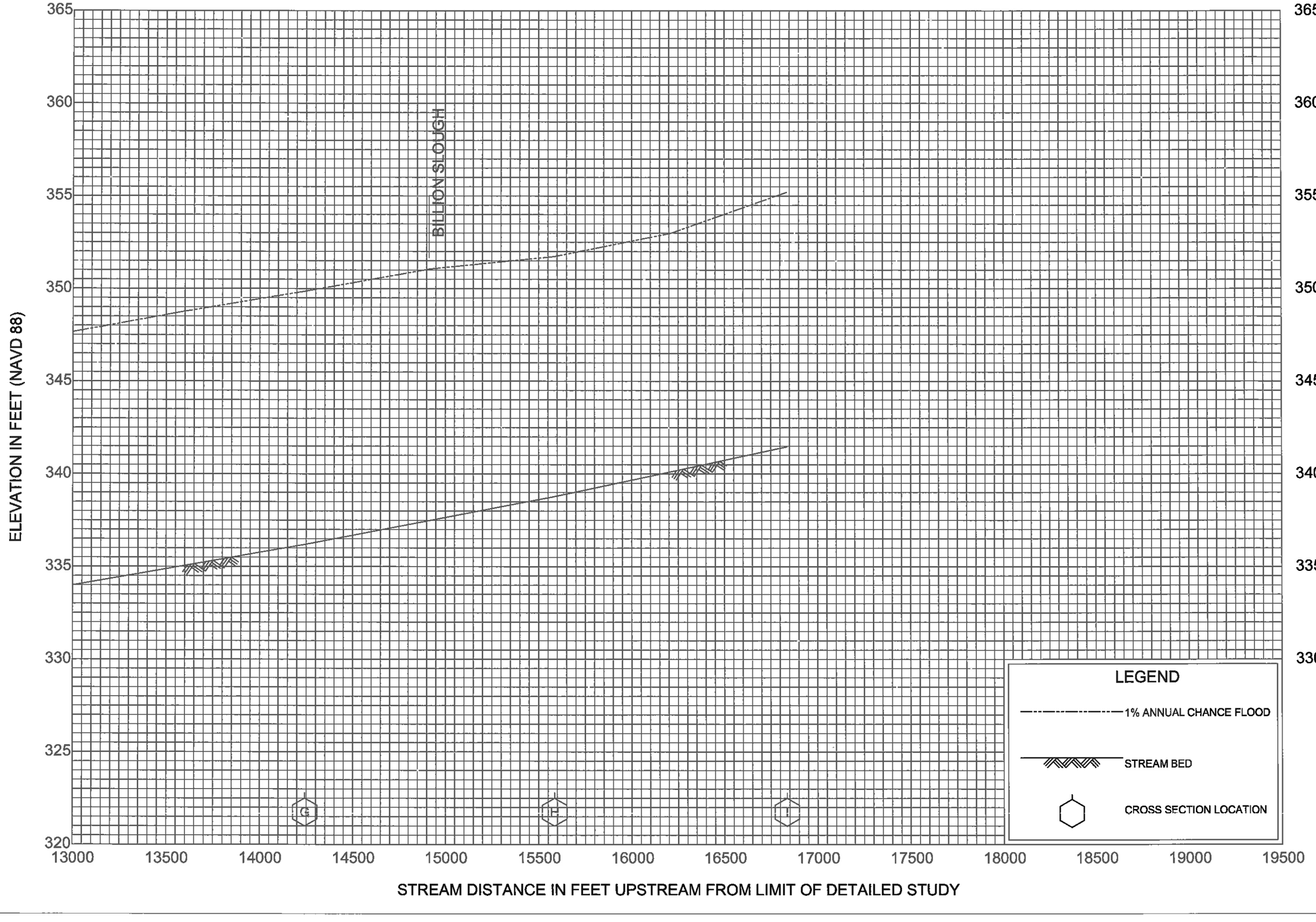


FLOOD PROFILES

SUSITNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK



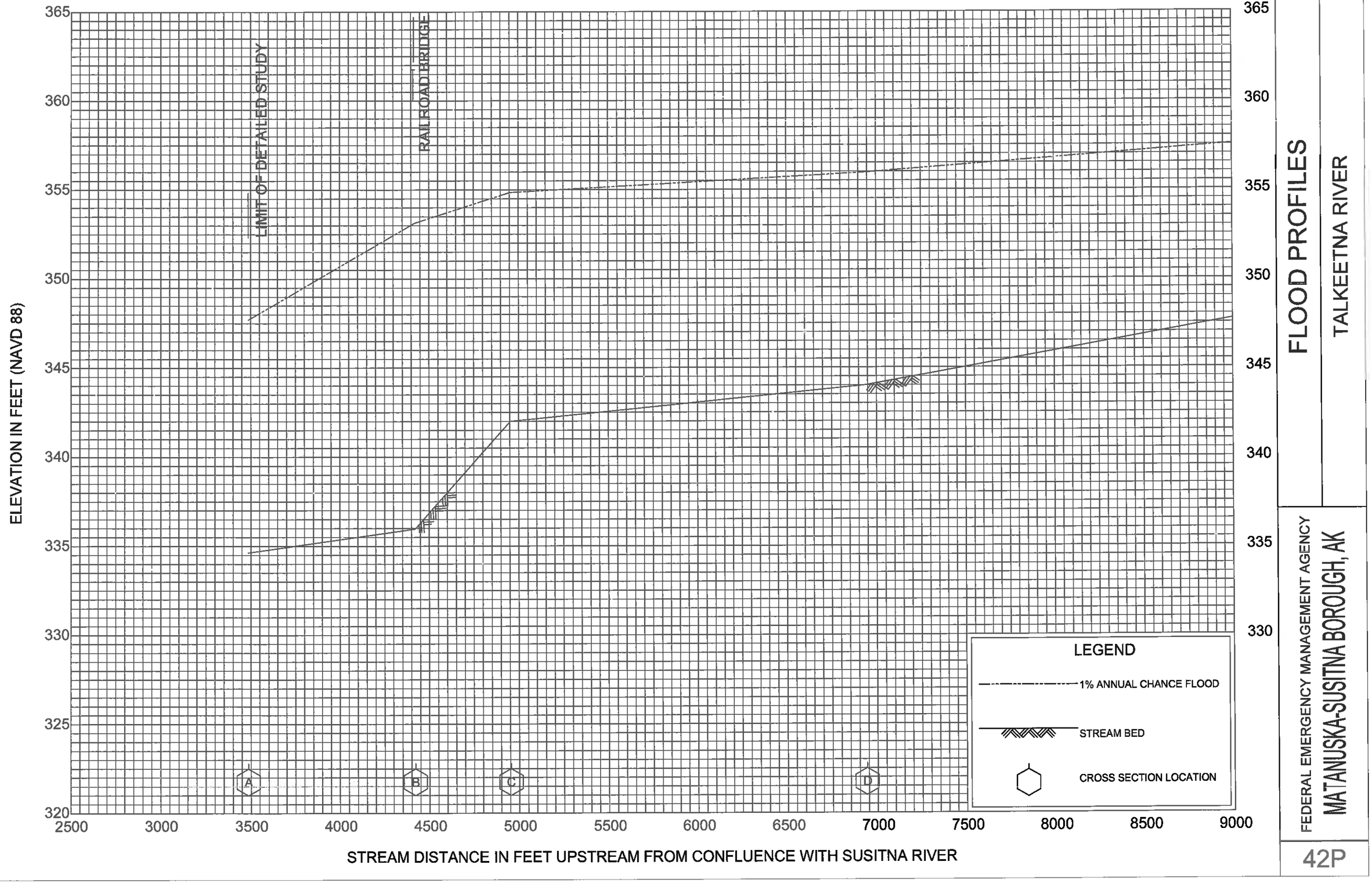
FLOOD PROFILES

SUSITNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

41P

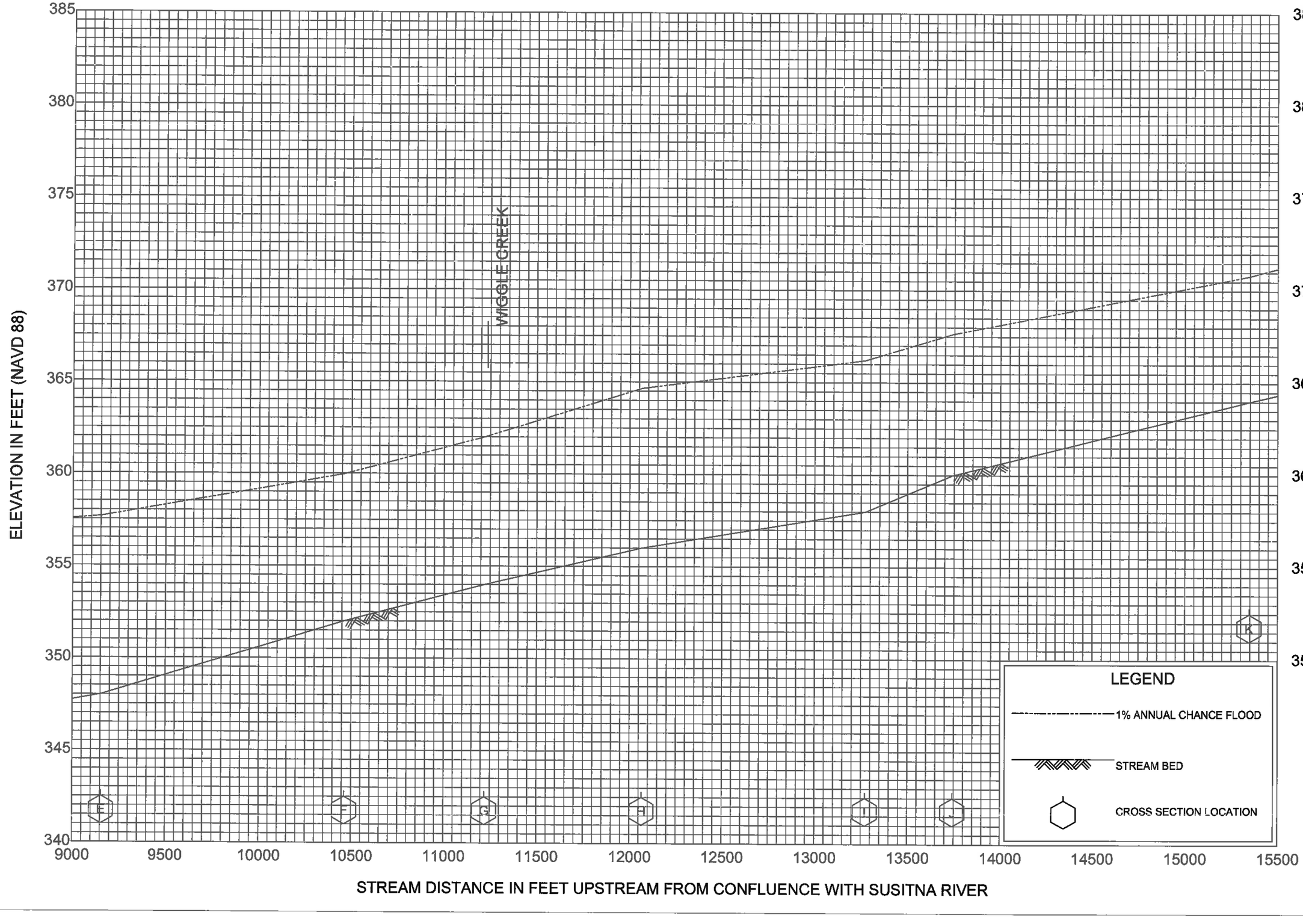


FLOOD PROFILES

TALKEETNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

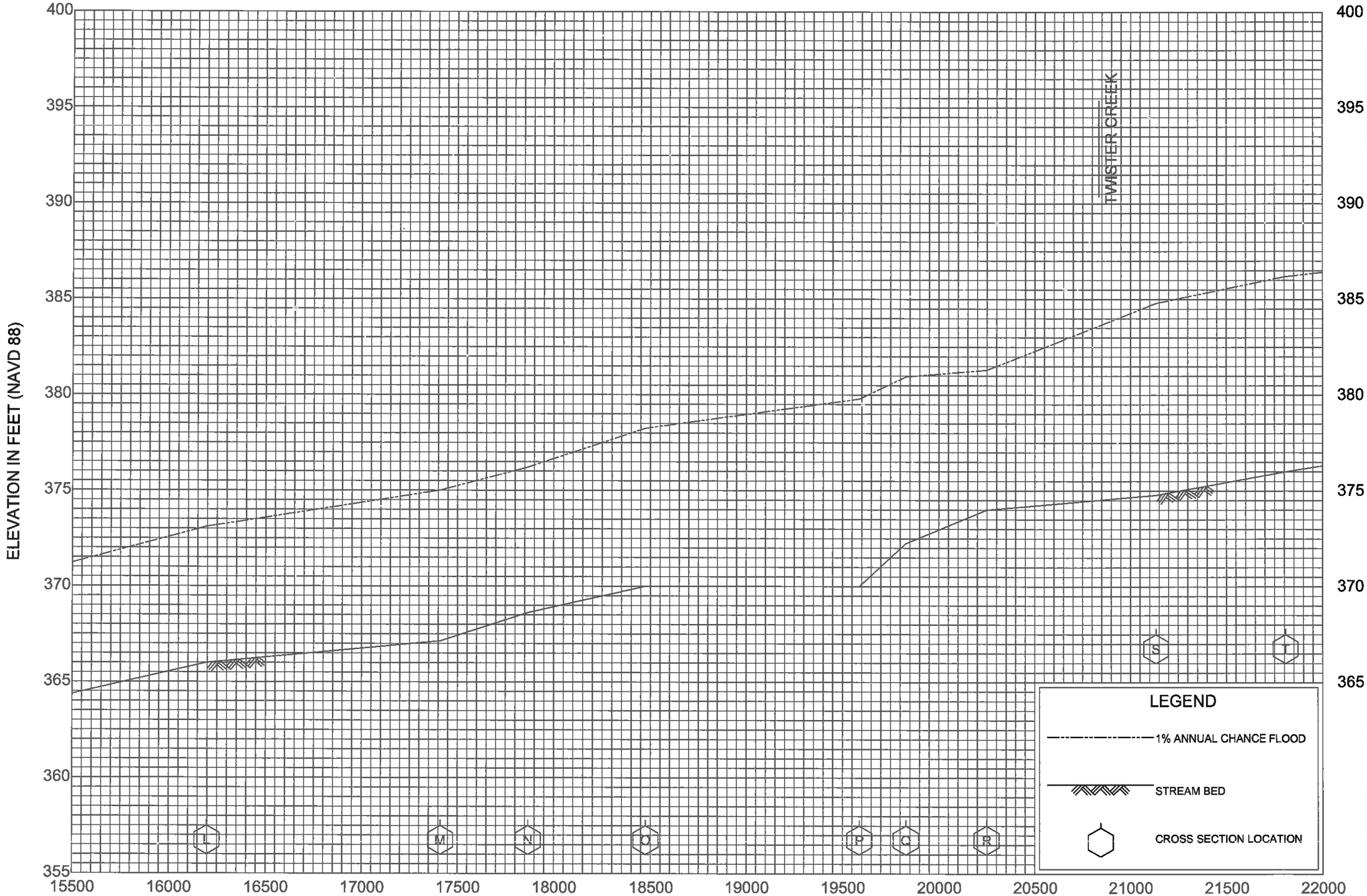


FLOOD PROFILES

TALKEETNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

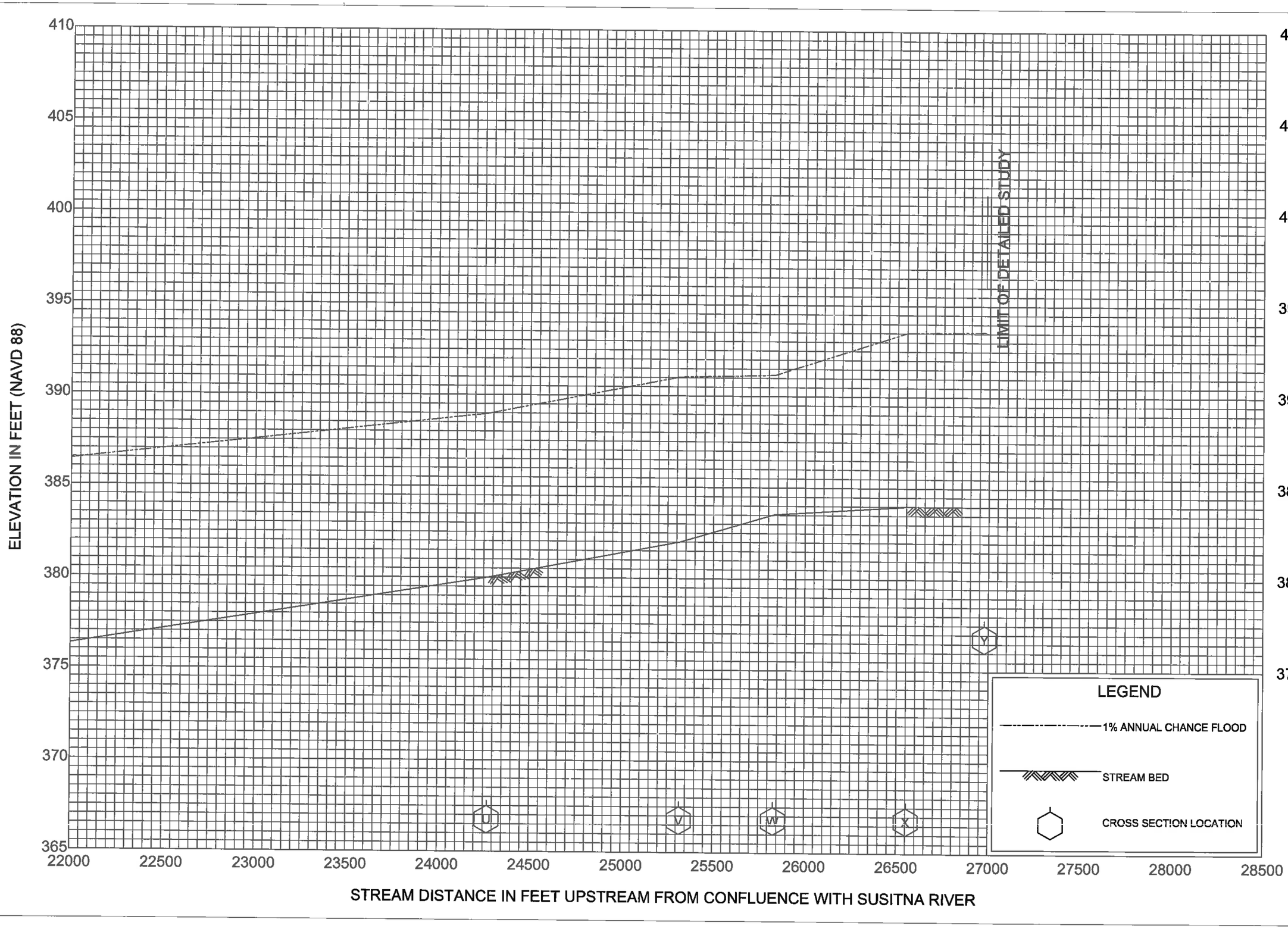


FLOOD PROFILES

TALKEETNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK



FLOOD PROFILES

TALKEETNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

ELEVATION IN FEET (NAVD 88)

380
375
370
365
360
355
350
345
340
335

1500 2000 2500 3000 3500 4000 4500 5000 5500 6000 6500 7000 7500 8000

STREAM DISTANCE IN FEET ABOVE SOUTH TALKEETNA SPUR ROAD CROSSING

A B C D E F

LEGEND

1% ANNUAL CHANCE FLOOD

STREAM BED

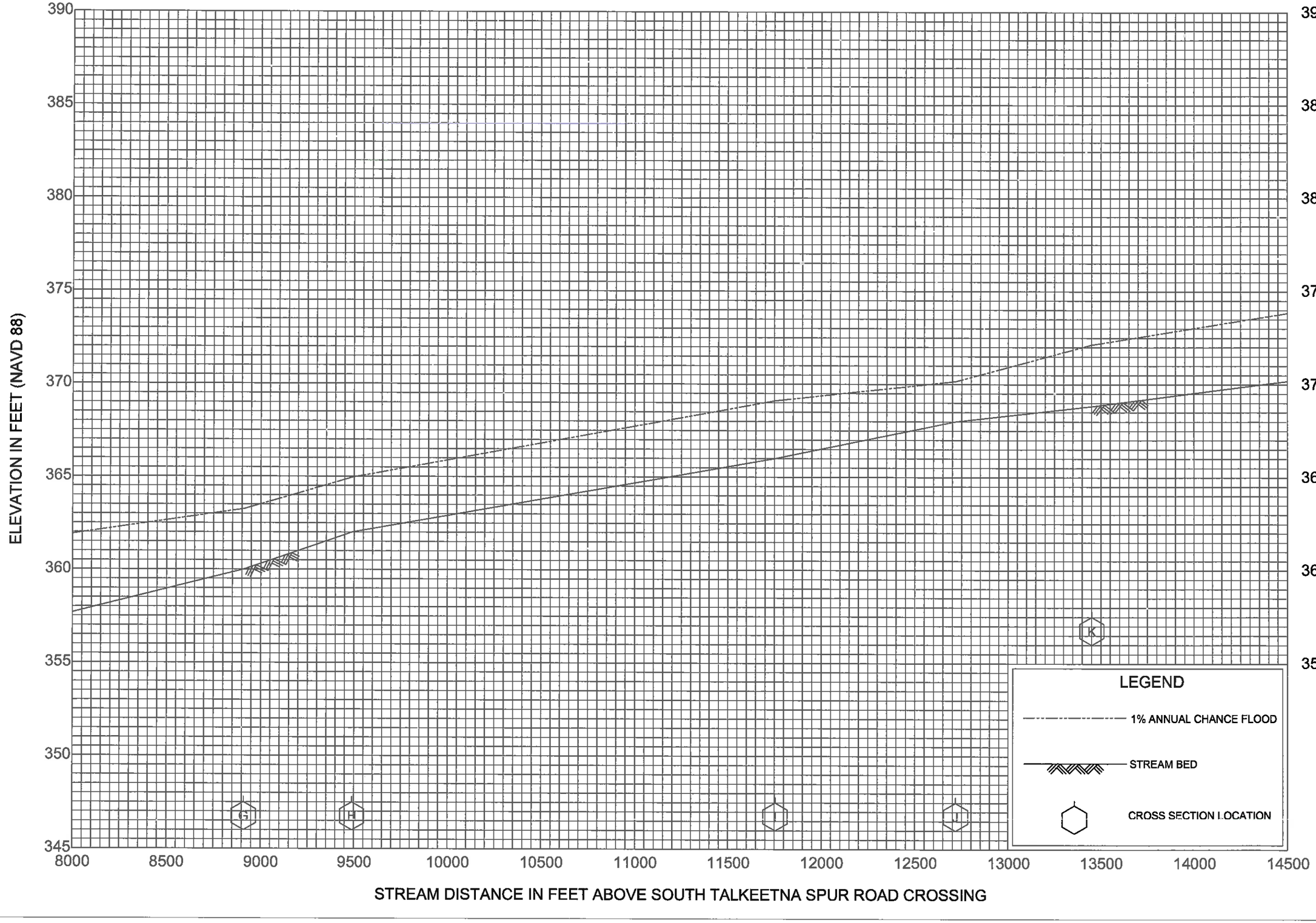
CROSS SECTION LOCATION

FLOOD PROFILES

TWISTER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK



FLOOD PROFILES

TWISTER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

ELEVATION IN FEET (NAVD 88)

405
400
395
390
385
380
375
370
365
360

14500 15000 15500 16000 16500 17000 17500 18000 18500 19000 19500 20000 20500 21000

STREAM DISTANCE IN FEET ABOVE SOUTH TALKEETNA SPUR ROAD CROSSING

L M N O P

LEGEND

1% ANNUAL CHANCE FLOOD

STREAM BED

CROSS SECTION LOCATION

FLOOD PROFILES

TWISTER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

48P

ELEVATION IN FEET (NAVD 88)

240
220
200
180
160
140
120
100
80
60

0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 11000 12000 13000

STREAM DISTANCE IN FEET ABOVE DOWNSTREAM LIMIT OF DETAILED STUDY

A B C D E F G

LEGEND

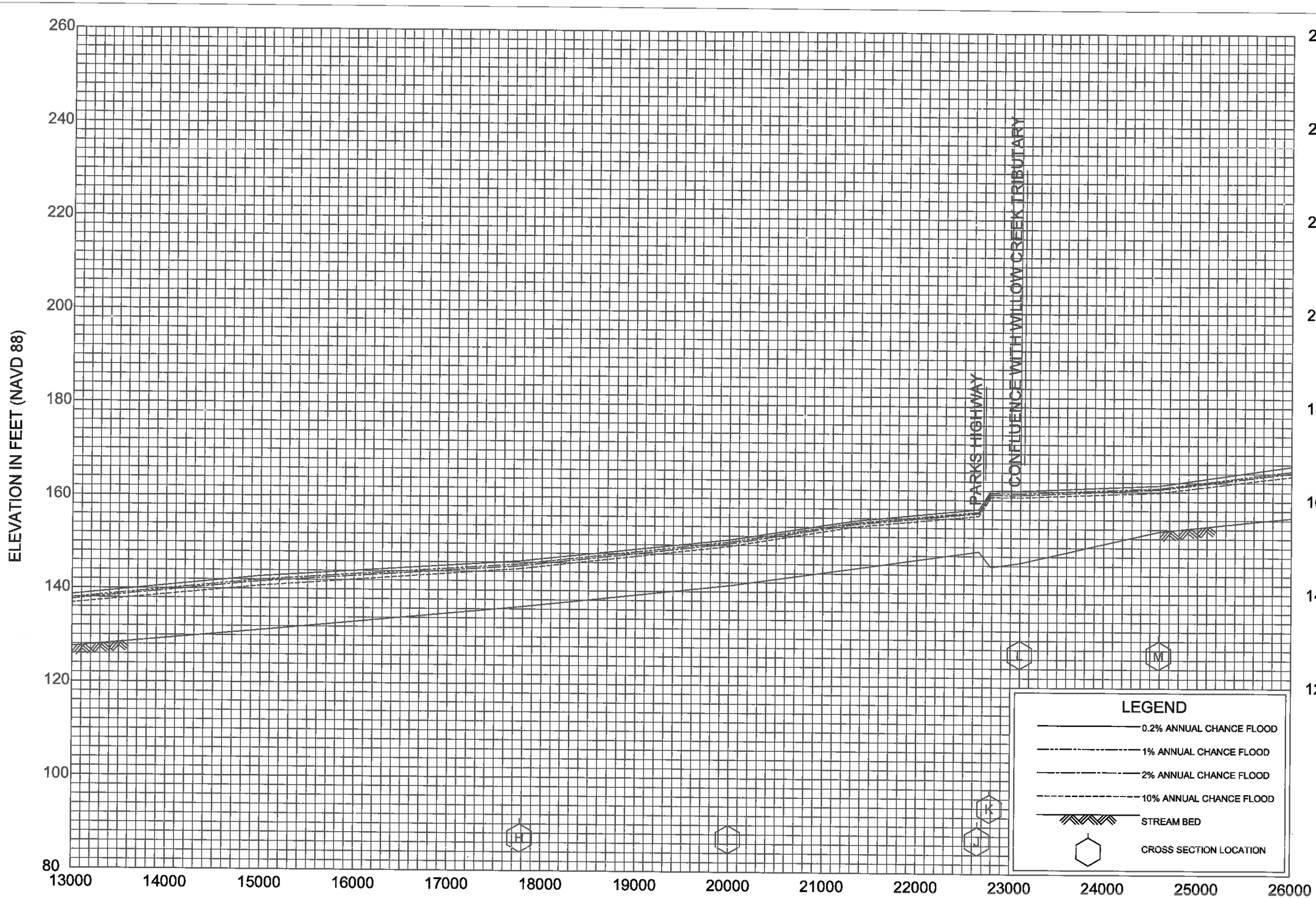
- 0.2% ANNUAL CHANCE FLOOD
- 1% ANNUAL CHANCE FLOOD
- 2% ANNUAL CHANCE FLOOD
- 10% ANNUAL CHANCE FLOOD
- STREAM BED
- CROSS SECTION LOCATION

FLOOD PROFILES

WILLOW CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

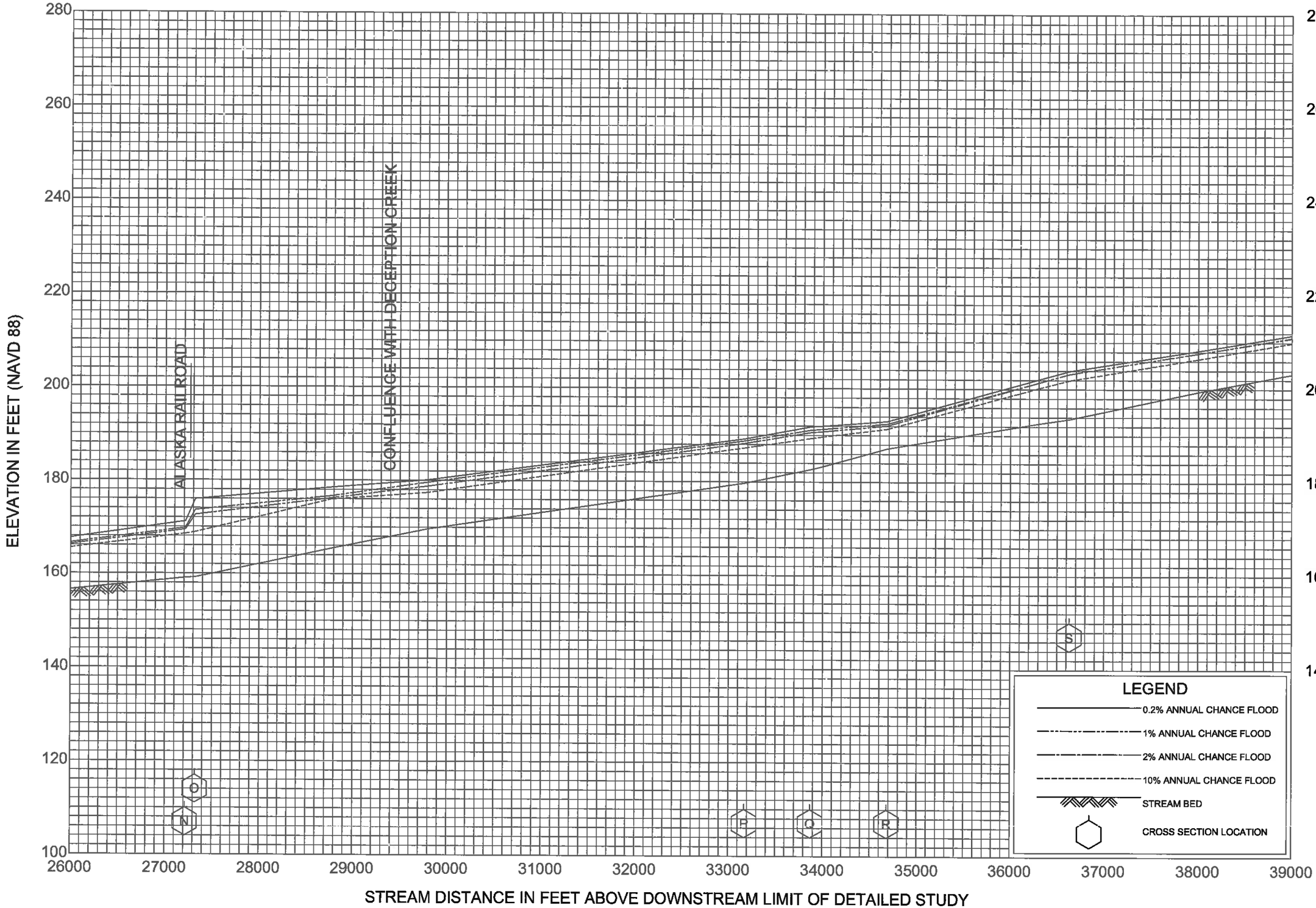


FLOOD PROFILES

WILLOW CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK



FLOOD PROFILES

WILLOW CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

51P

ELEVATION IN FEET (NAVD 88)

340
320
300
280
260
240
220
200
180
160

39000 40000 41000 42000 43000 44000 45000 46000 47000 48000 49000 50000 51000 52000

STREAM DISTANCE IN FEET ABOVE DOWNSTREAM LIMIT OF DETAILED STUDY

T U V W X Y

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

WILLOW CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

ELEVATION IN FEET (NAVD 88)

420
400
380
360
340
320
300
280
260
240

52000 53000 54000 55000 56000 57000 58000 59000 60000 61000 62000 63000 64000 65000

STREAM DISTANCE IN FEET ABOVE DOWNSTREAM LIMIT OF DETAILED STUDY

CONFLUENCE WITH WILLOW CREEK TRIBUTARY

Z AA AB AC AD

LEGEND

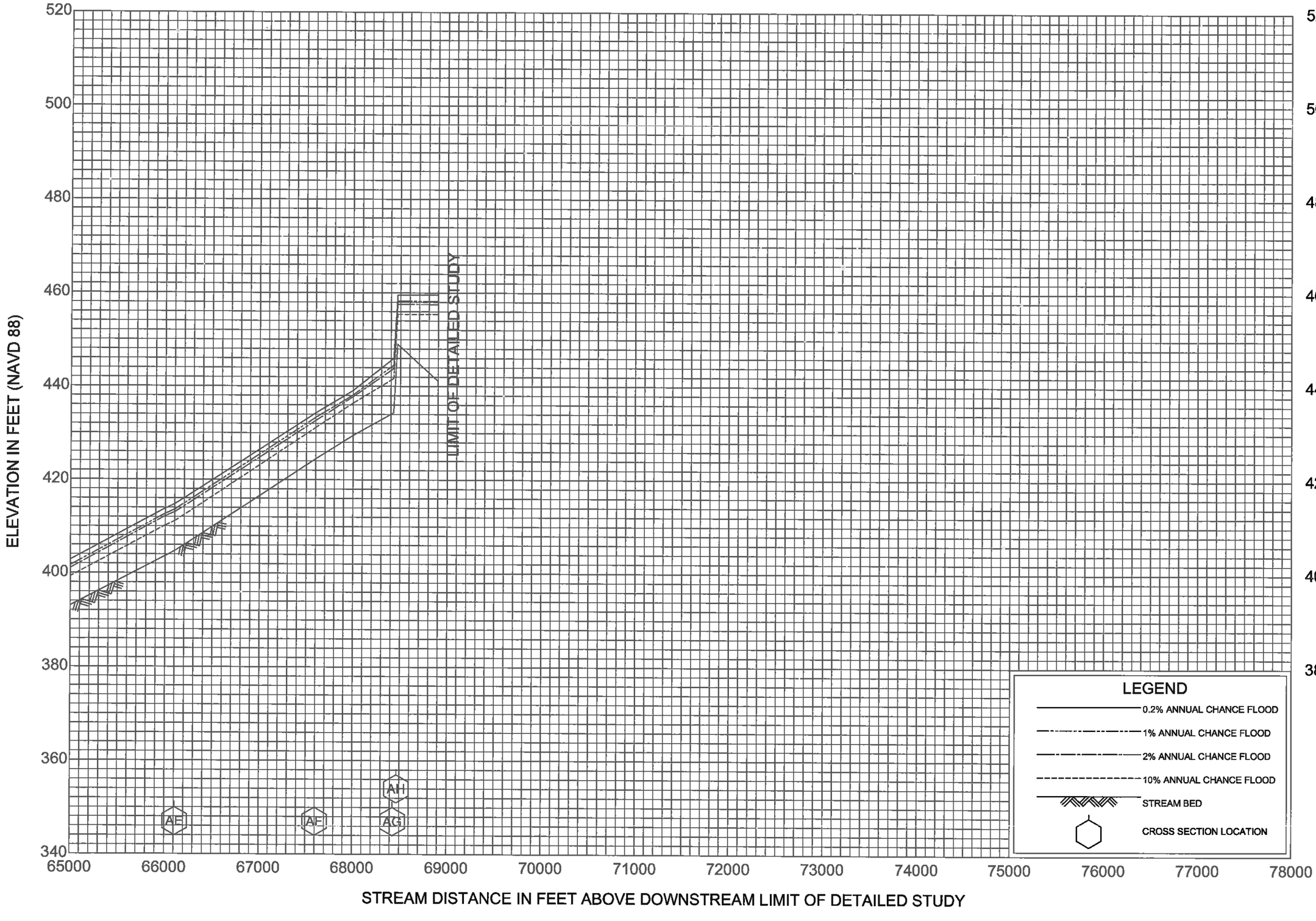
- 0.2% ANNUAL CHANCE FLOOD
- 1% ANNUAL CHANCE FLOOD
- 2% ANNUAL CHANCE FLOOD
- 10% ANNUAL CHANCE FLOOD
- STREAM BED
- CROSS SECTION LOCATION

FLOOD PROFILES

WILLOW CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

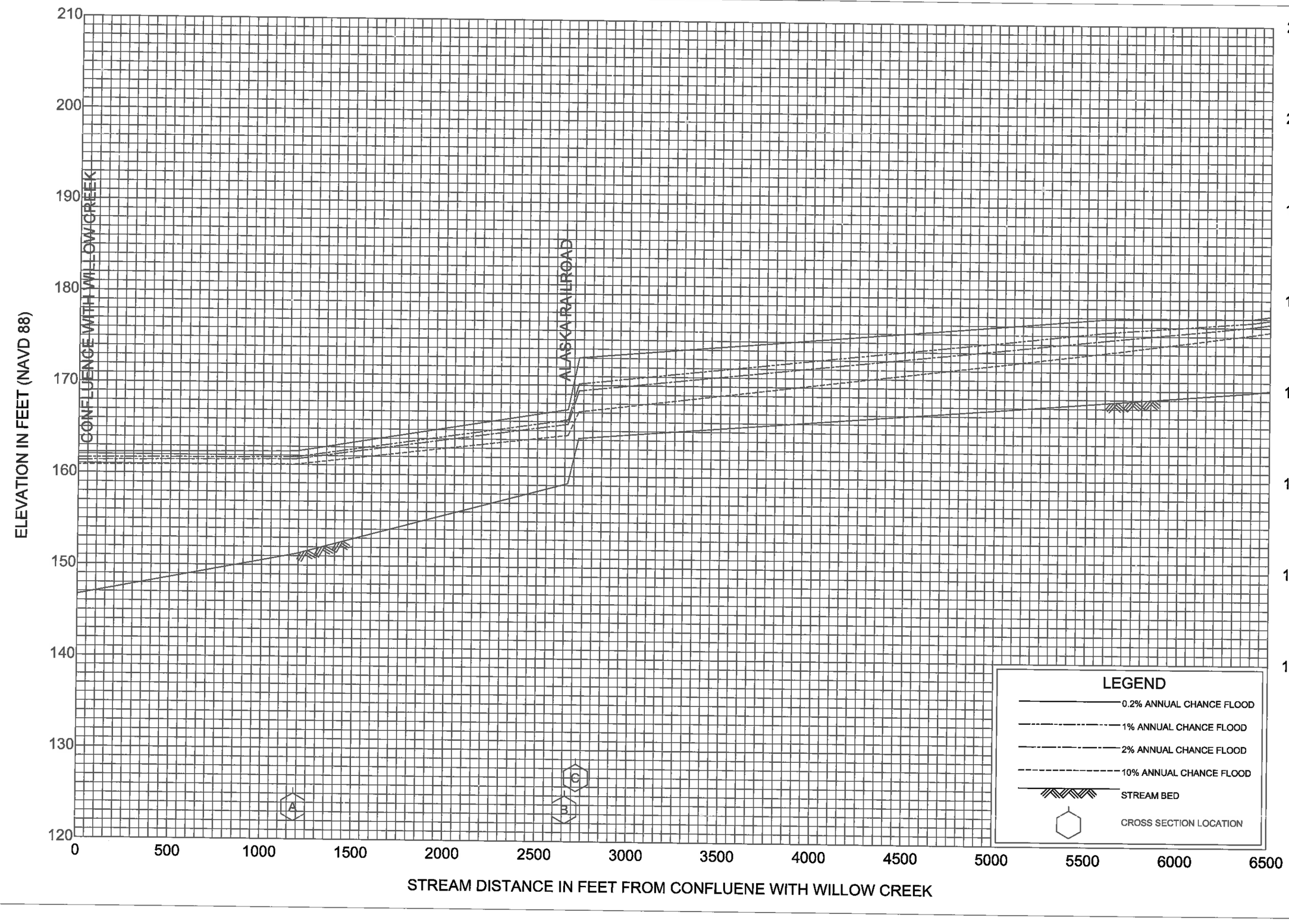


FLOOD PROFILES

WILLOW CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

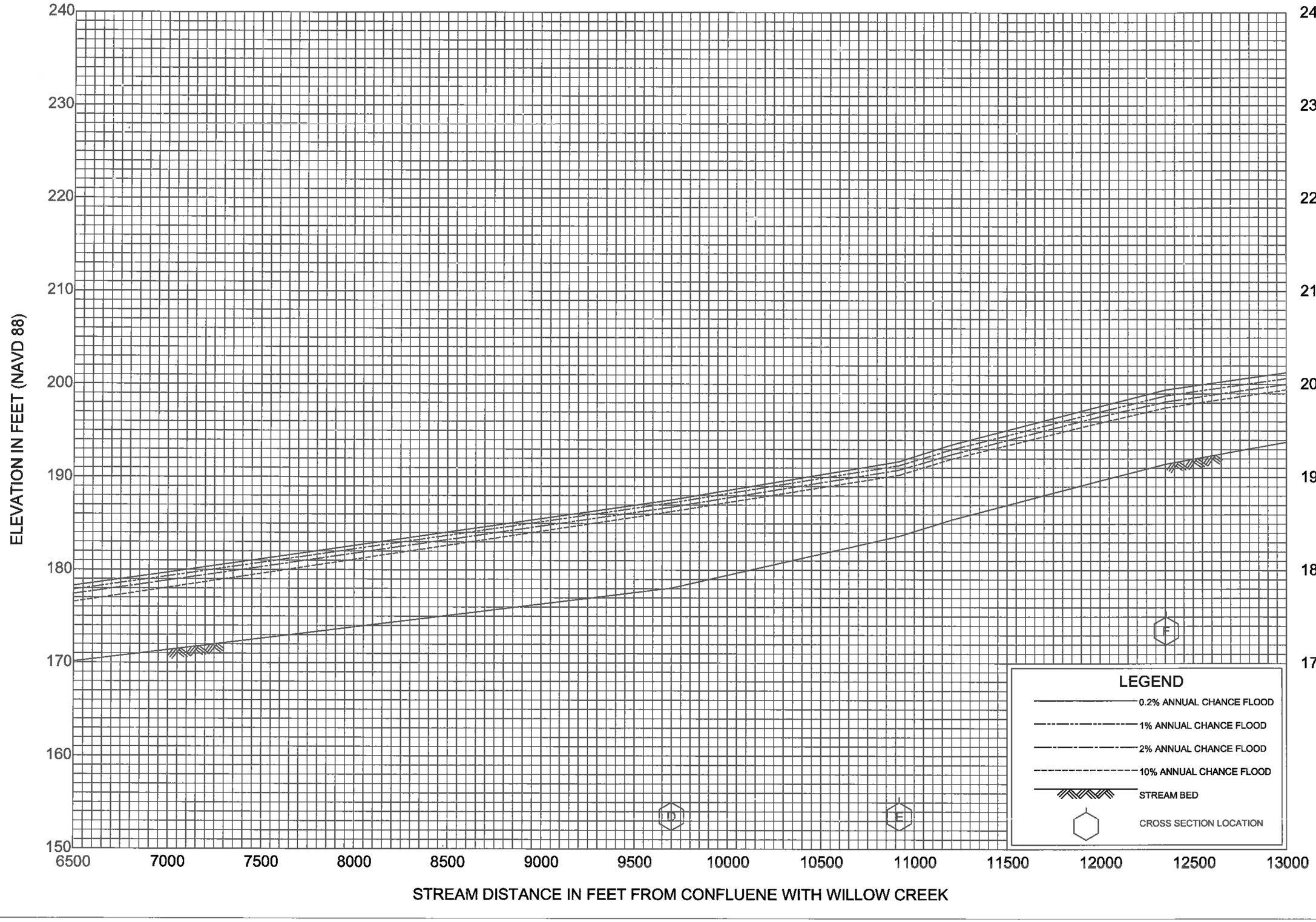


FLOOD PROFILES

WILLOW CREEK TRIBUTARY

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

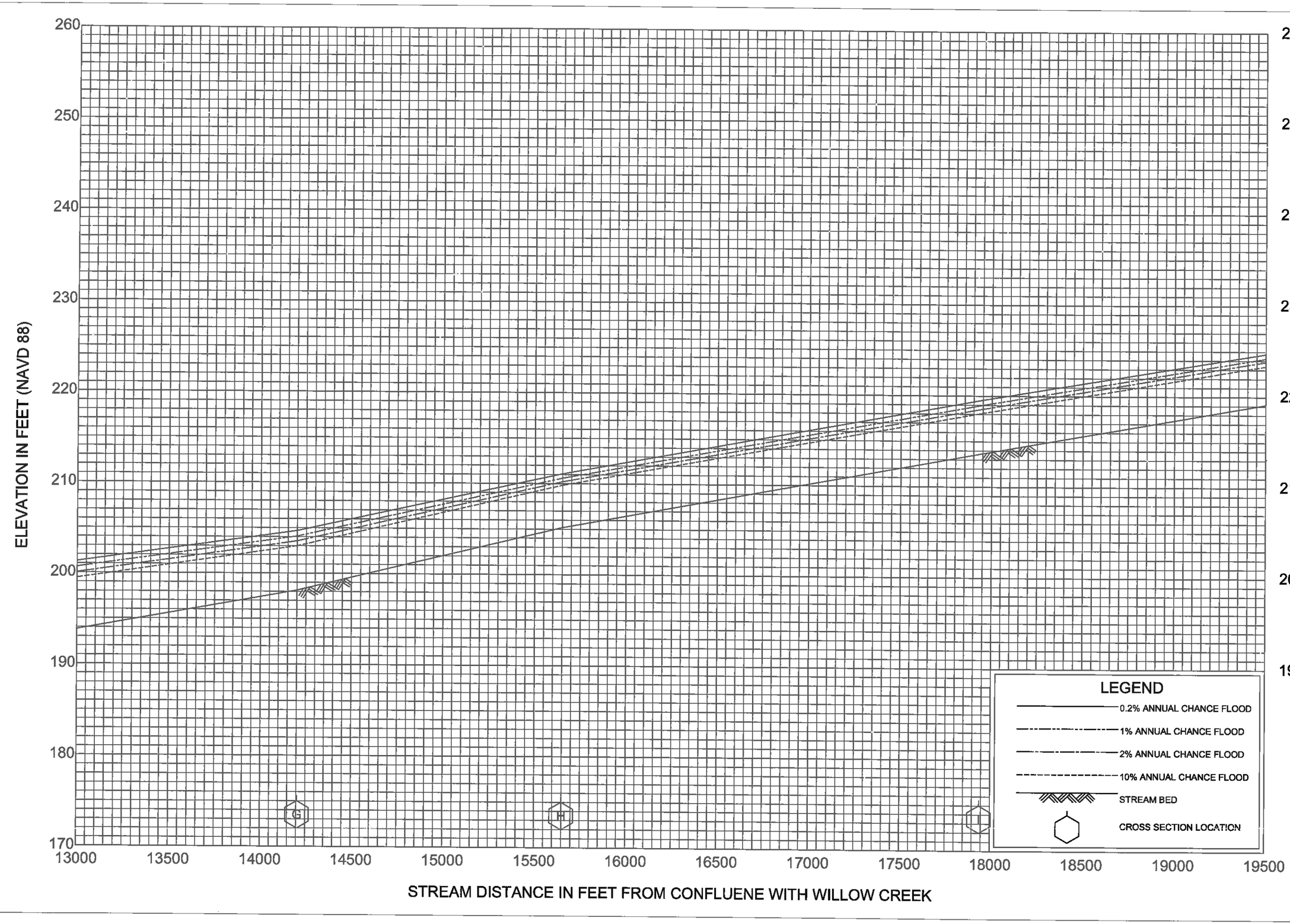


FLOOD PROFILES

WILLOW CREEK TRIBUTARY

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK



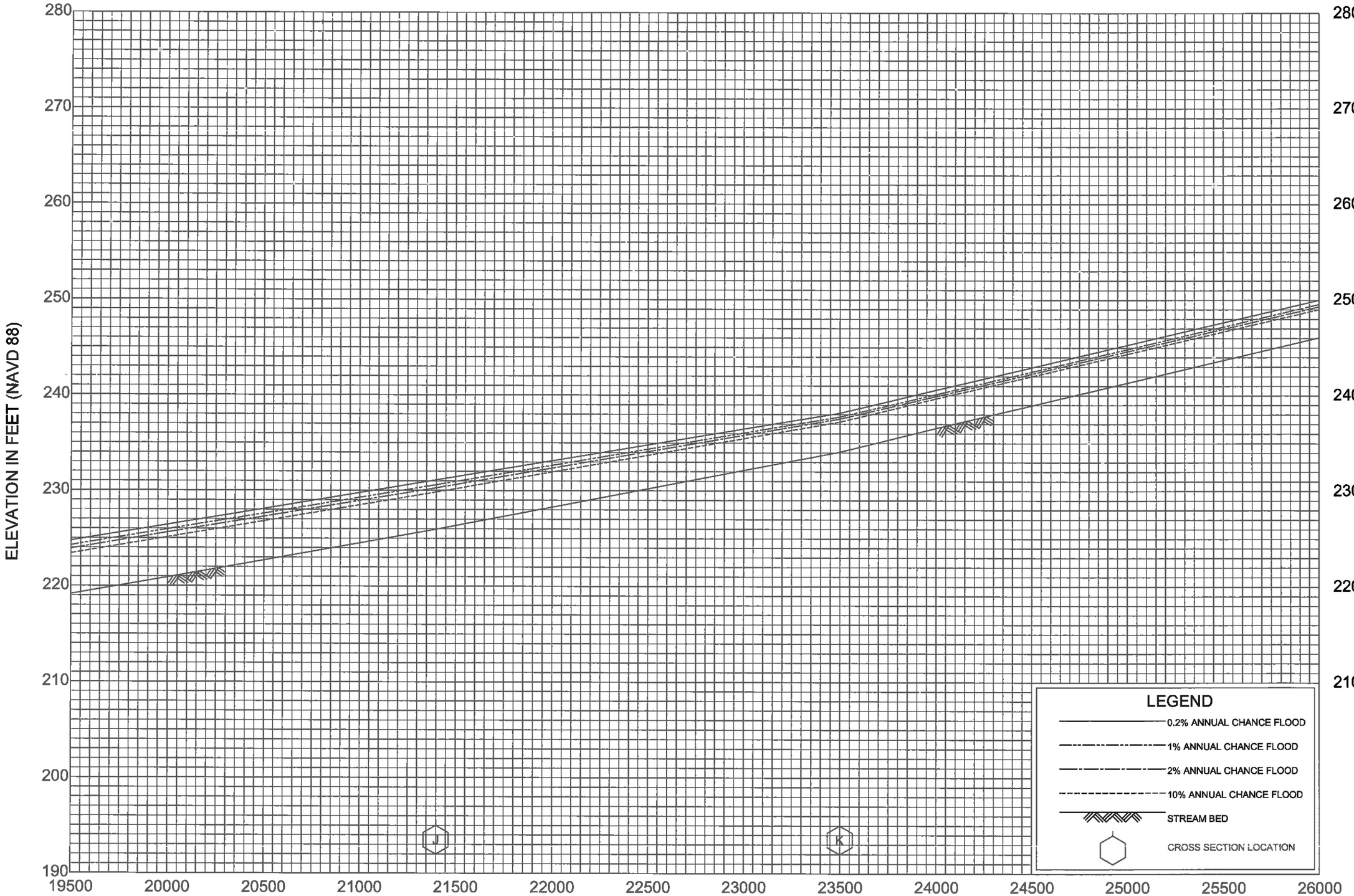
FLOOD PROFILES

WILLOW CREEK TRIBUTARY

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

57P

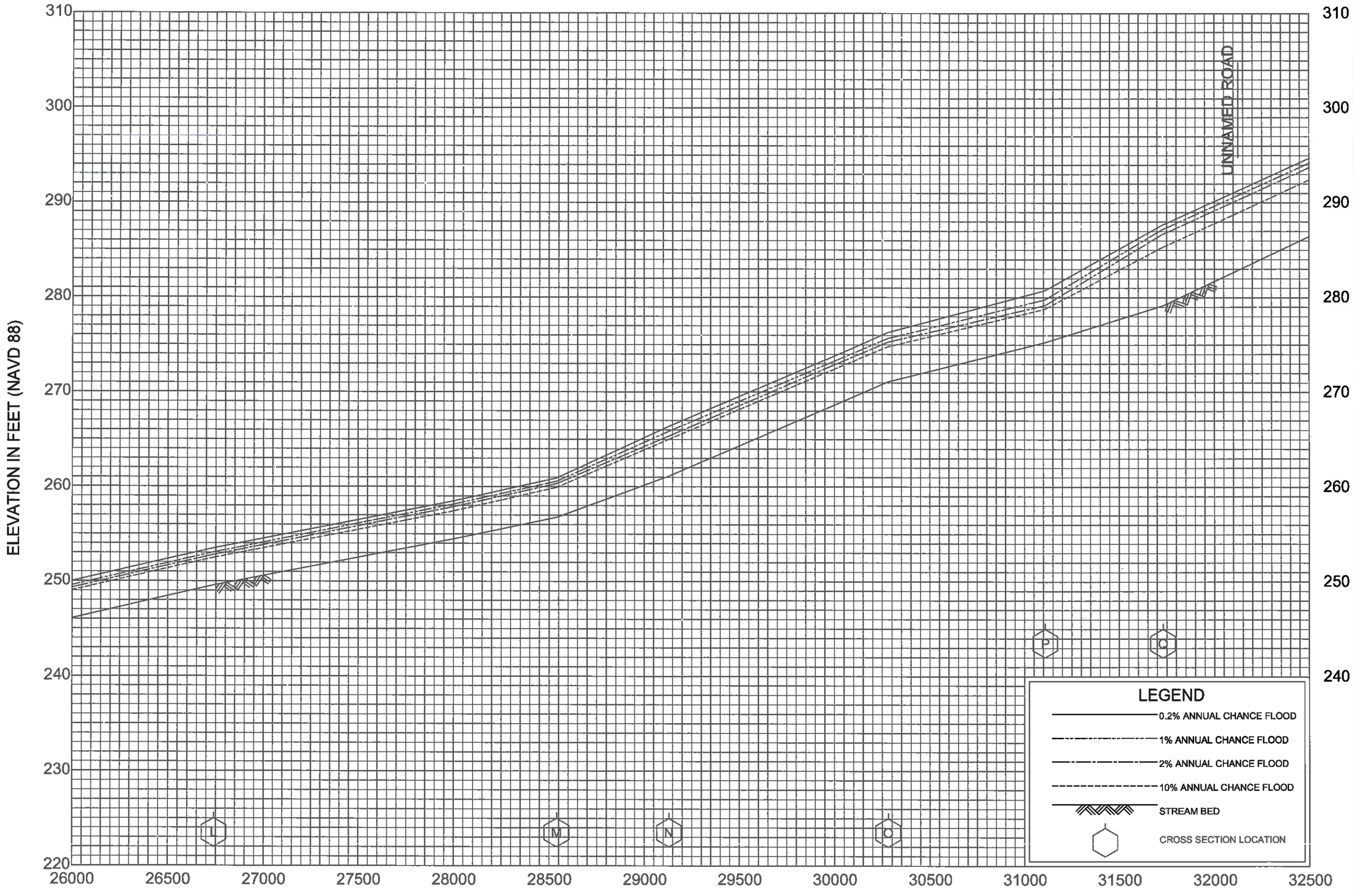


FLOOD PROFILES

WILLOW CREEK TRIBUTARY

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

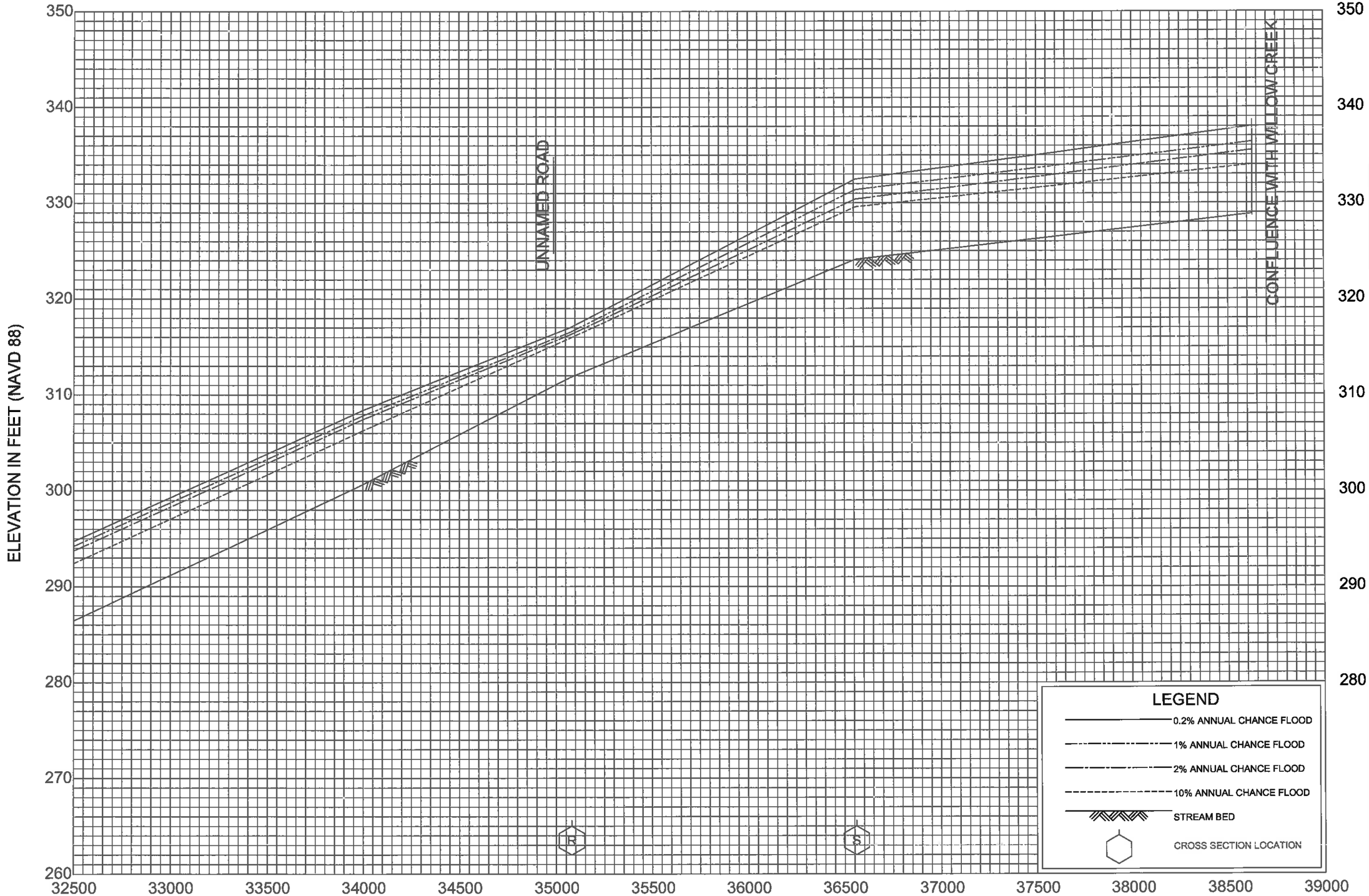


FLOOD PROFILES

WILLOW CREEK TRIBUTARY

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK



FLOOD PROFILES

WILLOW CREEK TRIBUTARY

FEDERAL EMERGENCY MANAGEMENT AGENCY

MATANUSKA-SUSITNA BOROUGH, AK

60P