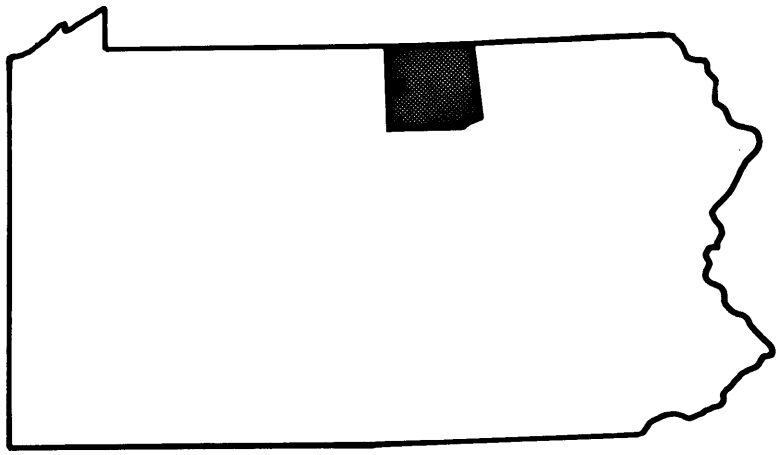
FLOOD INSURANCE STUDY

TOWNSHIP OF GAINES, PENNSYLVANIA
TIOGA COUNTY



MARCH 1978

U.S. DEPARTMENT of HOUSING & URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION

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PUBLISHED SEPARATELY:

Flood Insurance Rate Map Index	
Flood Insurance Rate Map	Panels 421005 0001B-0010B

FLOOD INSURANCE STUDY
TOWNSHIP OF GAINES, PENNSYLVANIA

1.0 INTRODUCTION

1.1 Purpose of Study

The purpose of this Flood Insurance Study is to investigate the existence and severity of flood hazards in the Township of Gaines, Tioga County, Pennsylvania, and to aid in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. Initial use of this information will be to convert the Township of Gaines to the regular program of flood insurance by the Federal Insurance Administration (FIA). Further use of the information will be made by local and regional planners in their efforts to promote sound land use and flood plain development.

1.2 Coordination

The identification of streams requiring detailed study was performed at a meeting attended by personnel of the study contractor, the FIA, and representatives of the community in March 1975. Study areas were finalized at a community coordination meeting in November 1975. On April 5, 1977, the results of the study were reviewed at a final coordination meeting attended by personnel of the study contractor, the FIA, and community officials.

1.3 Authority and Acknowledgements

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968, as amended.

The hydrologic and hydraulic analyses for this study were performed by Gannett Fleming Corddry and Carpenter, Inc. for the Federal Insurance Administration, under Contract No. H-3813. This work, which was completed in February 1977, covered all significant flooding sources in the Township of Gaines.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the

Township of Gaines. Not included in the scope of this study are the areas of the Tioga State Forest and the State Game Lands 208. The area of study is shown on the Vicinity Map (Figure 1).

The entire reach of Pine Creek within the corporate limits, and the reach of Phoenix Run from its mouth at Pine Creek to a point 5,100 feet upstream were studied by detailed methods.

The areas studied by detailed methods were selected with priority given to known flood hazard areas and areas of projected development and proposed construction until November of 1980.

The reaches of Elk Run, Lick Run, Painter Run, Mill Run, Long Run, Gormania Branch, McCracken Hollow, Upper Phoenix Run, and Left Branch Fourmile Run within the corporate limits were studied by approximate methods.

Approximate methods of analysis were used to study those areas having low development potential and/or a minimal flood hazard, as could be ascertained at the initiation of this study. The scope and methods of study were proposed to and accepted by the FIA, the study contractor, and community officials.

2.2 Community Description

Located 13 miles west of Wellsboro, and 45 miles southwest of Elmira, New York, the Township of Gaines lies in western Tioga County in northern Pennsylvania. The total area within the township is 48 square miles. The population has decreased from 462 persons in 1960 to 457 persons in 1970 (Reference 1).

Pine Creek is a tributary of the West Branch of the Susquehanna River. The creek originates west of the Township of Gaines in Potter County, flows east through the township and then south until it joins with the West Branch of the Susquehanna River between Lock Haven and Williamsport. The drainage area encompasses 981 square miles.

Phoenix Run is one of many tributaries to Pine Creek. It originates northwest of the township in Potter County. The stream flows in a southeasterly direction before joining Pine Creek in the west portion of the Township of Gaines. Its drainage area is 23.2 square miles.

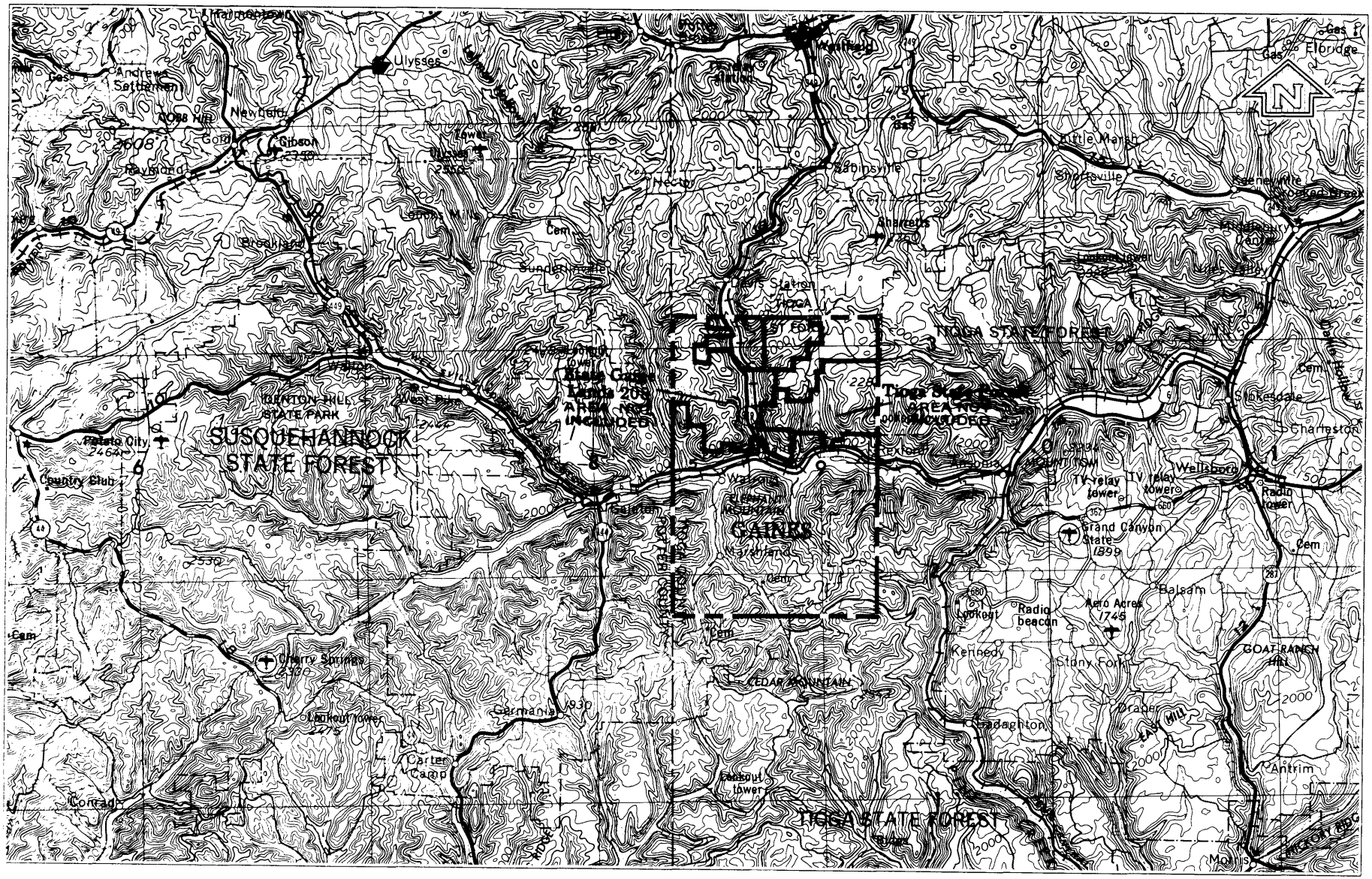


FIGURE 1

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWNSHIP OF GAINES, PA

(TIOGA CO.)

APPROXIMATE SCALE

4 0 4 8 12 MILES

VICINITY MAP

The first inhabitants of what is now the Township of Gaines were the Seneca Indians. The land comprising Tioga and other counties was purchased from the Indians in 1784. General Gaines, for whom the township was named, was one of the leaders in the skirmishes against the hostile Indians of the area. In 1804 a group of men led by Bill Furman of Sunbury were hunting in the area and were impressed by the variety and number of animals that they saw. Elk, deer, squirrel, wolf, fox, and bear all inhabited the woods, while trout and other fishes were plentiful in the streams. He liked the country so much he convinced his two brothers to settle there with him. Lumbering of the pine and hemlock trees was the early leading enterprise. In March of 1804, Tioga County was created from part of Lycoming County. The Township of Gaines was created from the western section of the Township of Shippen in December 1837 (Reference 2).

The Township of Gaines, located in the Appalachian Plateau Province of Pennsylvania, is characterized by mountainous land. The range in local elevation varies from 1,180 to 2,320 feet. The land form is a result of geologic activity in which layers of rock were folded upwards by internal pressure. Glaciation, rain, and other climatic elements have gradually eroded some of these protrusions. The podzolic soil supports diversified vegetation with hard and soft wood trees prevalent in the surrounding mountains.

Pine Creek, the largest flooding source in the township, has broad flood plains containing some residential development, as opposed to the narrow flood plains of small mountain creeks found in the township. The flood plains of Phoenix Run consist of limited residential development.

Less than five percent of the township has been developed, with the majority taking place adjacent to U.S. Route 6, which runs east-west through the township. State gamelands comprise much of the undeveloped land within the township. U.S. Route 6 and State Route 349 are the two major highways serving the Township of Gaines. The Chessie System Railroad traverses the township parallel to U.S. Route 6.

The climate in northern Pennsylvania has the characteristics of humid continental. Summer and winter temperatures average 66.8° F. and 24.7° F., respectively. Annual average precipitation of the region is 37.1 inches, while average annual recorded snowfall totals 39.9 inches (Reference 3).

2.3 Principal Flood Problems

The past history of flooding of the streams within the community indicates that flooding may occur during any season of the year. The worst flooding conditions are normally a result of spring rains, combined with snowmelt, or summer storms resulting from tropical storms moving north along the east coast of the United States.

The most severe flooding conditions within the Township of Gaines occurred in June 1972, according to township officials, when tropical storm Agnes moved up the east coast of the United States. Pine Creek overflowed its banks causing first floor flooding to buildings adjacent to the creek.

Flooding that occurs on Phoenix Run is often compounded by flooding from Pine Creek, due to the backwater effect that results. A sudden downpour could cause flooding of Phoenix Run, independent of Pine Creek.

Constriction of flow caused by the Pine Creek Road, Legislative Route 58001, and the Chessie System bridges over Pine Creek; and the U.S. Route 6 bridge over Phoenix Run increases flood hazards.

Estimates of frequencies of major floods were unavailable due to a lack of hydrographic data for the study area.

2.4 Flood Protection Measures

At present there are no planned or existing flood protection structures within the corporate limits of the Township of Gaines. There are, however, non-structural measures being utilized to aid in the prevention of future flood damage. These measures are in the form of local land-use regulations, adopted from the code of Federal Regulations, which control building within areas that have a high risk of flooding (Reference 4).

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Floods having recurrence intervals of 10, 50, 100, and 500 years have been selected as having special significance for flood plain management and for flood insurance premium rates.

The analyses reported here reflect current conditions in the drainage areas of the streams.

3.1 Hydrologic Analyses

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

The hydrologic analysis for the detailed study of Pine Creek was performed using data presented in a U.S. Geological Survey (USGS) report, which is a regional method developed from regression analysis relating drainage area, channel slope, percent area of storage, and an index of average annual excess precipitation through empirical equations (Reference 5).

For the detailed study of Phoenix Run, the hydrologic analysis was a modification of the U.S. Department of Agriculture, Soil Conservation Service (SCS) procedure designated in this study as McSparran Tp, Condition III, which relates basin characteristics to streamflow characteristics (Reference 6).

Rainfall data were calculated using the Pennsylvania State University's Design Procedures for Rainfall-Duration-Frequency in Pennsylvania as prepared in August 1970, for the Department of Forests and Waters. These data were combined with basin characteristics such as drainage area, stream slope, vegetation, soil cover and land use characteristics to estimate the resulting discharge values considering a time lapse to the peak discharge calculated by empirical equations (Reference 7).

Flood discharges for approximate stream studies were determined using a modification of the SCS procedure designated in this study as McSparran Tp, Condition III, which relates basin characteristics to streamflow characteristics (Reference 6).

Drainage area-peak discharge data for the flooding sources studied in detail in the community are summarized in Table 1.

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the streams studied in detail in the community were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each of these streams.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
PINE CREEK					
Downstream corporate limits	266.6	14,800	24,100	28,900	42,200
Upstream of confluence of Mill Run	261.8	14,600	23,800	28,450	40,600
Upstream of confluence of Lick Run	253.6	14,300	23,250	27,800	39,600
Upstream of confluence of Long Run	232.1	13,500	21,800	25,950	36,900
Upstream of confluence of Elk Run	208.1	12,550	20,100	23,850	33,950
Upstream of confluence of Phoenix Run	184.9	11,500	18,350	21,800	31,050
PHOENIX RUN					
Confluence with Pine Creek	22.5	3,200	4,840	5,740	8,100

Cross sections for the backwater analyses of Pine Creek and Phoenix Run were obtained from aerial photographs flown in April 1975, at a negative scale of 1 inch equals 1,200 feet. The below-water sections were obtained by field measurement. All bridges, dams, and culverts were field surveyed to obtain elevation data and structural geometry.

Channel roughness factors (Manning's "n"), used in the hydraulic computations, were chosen by engineering judgment and based on field observations of the streams and overbank areas. Roughness values for the main channel of Pine Creek ranged from 0.030 to 0.039 with overbank roughness values ranging from 0.050 to 0.100 for all floods. Roughness values for the main channel of Phoenix Run ranged from 0.030 to 0.054 with overbank roughness values ranging from 0.055 to 0.085 for all floods. The acceptability of all assumed hydraulic factors, cross sections, and hydraulic structure data was checked by computations that duplicated historic floodwater profiles.

Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence

intervals. 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 was computed (Section 4.2), selected cross section locations are also shown on the Flood Boundary and Floodway Map (Exhibit 3). Water-surface elevations of floods of the selected recurrence intervals were computed through use of the U.S. Army Corps of Engineers (COE) HEC-2 step-backwater computer program (Reference 8). Starting elevations for Pine Creek were calculated using slope-area methods. Starting elevations for Phoenix Run were taken from the Pine Creek profiles.

Approximate hydraulic analyses of Elk Run, Lick Run, Painter Run, Mill Run, lower Long Run, and Left Branch Fourmile Run consisted of normal depth calculations. Approximate analyses of upper Phoenix Run, Gormania Branch, upper Long Run, and McCracken Hollow involved transfer of flood boundaries only (Section 4.1).

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD), formerly referred to as Sea Level Datum of 1929; elevation reference marks used in this study are shown on the maps.

The hydraulic analyses for this study are based only on the effects of unobstructed flow. The flood elevations as shown on the profiles are thus considered valid only if hydraulic structures in general remain unobstructed and dams and other flood control structures described above operate properly and do not fail.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

A prime purpose of the National Flood Insurance Program is to encourage state and local governments to adopt sound flood plain management programs. Each Flood Insurance Study, therefore, includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the FIA as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the boundaries of the 100- and the 500-year floods 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 1:24,000, with a contour interval of 20 feet (Reference 9). In cases where the 100- and the 500-year flood boundaries are close together, only the 100-year boundary has been shown.

For the reaches of Elk Run, Lick Run, Painter Run, Mill Run, Long Run, and Left Branch Fourmile Run, studied by approximate methods, the boundary of the 100-year flood was developed from normal depth calculations based upon information obtained from field reconnaissance and the topographic maps referenced above. Approximate flood boundaries for upper Phoenix Run, upper Long Run, Gormania Branch, and McCracken Hollow were transferred from FIA Flood Hazard Boundary Maps (Reference 10).

The boundaries of the 100- and 500-year floods are shown on the Flood Boundary and Floodway Map (Exhibit 3). Small areas within the flood boundaries may lie above the flood elevations, and therefore, may not be subject to flooding; owing to limitations of the map scale, or lack of detailed topographic data, such areas are not shown.

4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity, increases the flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent flood plain areas, that must be kept free of encroachment in order that the 100-year flood may be carried without substantial increases in flood heights. Minimum standards of the FIA limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this report are presented to local agencies as minimum standards that can be adopted or that can be used as a basis for additional studies.

The floodways presented in this study were computed on the basis of equal conveyance reduction from each side of the flood plains. The

results of these computations are tabulated at selected cross sections for each stream segment for which a floodway was computed (Table 2).

As shown on the Flood Boundary and Floodway Map (Exhibit 3), the floodway widths were determined at cross sections; between cross sections, the boundaries were interpolated. In cases where the boundaries of the floodway and the 100-year flood are either close together, or collinear, only the floodway boundary has been shown.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 2.

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the FIA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHFs), and flood insurance zone designations for each flooding source affecting the Township of Gaines.

5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach.

Average Difference Between 10- and 100-year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot

Two reaches meeting the above criteria were required for the flooding sources of Gaines. These included one on Pine Creek and one on Phoenix Run. The locations of the reaches are shown on the Flood Profile (Exhibit 1).

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
Pine Creek							
A	900	267	3,322	8.7	1,190.4	1,189.4	1.0
B	1,930	373	4,037	7.2	1,192.9	1,192.0	0.9
C	2,930	233	2,888	10.0	1,194.9	1,193.9	1.0
D	3,780	151	2,192	13.2	1,196.4	1,195.4	1.0
E	4,340	185	3,050	9.3	1,198.8	1,198.3	0.5
F	4,760	293	4,051	7.0	1,199.8	1,199.1	0.7
G	5,190	390	4,682	6.1	1,200.4	1,199.5	0.9
H	5,860	508	6,333	4.5	1,201.6	1,200.6	1.0
I	6,190	503	5,858	4.9	1,201.9	1,200.9	1.0
J	6,420	458	5,721	5.0	1,202.3	1,201.3	1.0
K	6,600	428	5,227	5.4	1,202.4	1,201.4	1.0
L	7,420	414	4,270	6.7	1,203.2	1,202.2	1.0
M	8,120	386	3,643	7.8	1,204.7	1,203.7	1.0
N	9,010	400	3,644	7.8	1,207.2	1,206.2	1.0
O	9,940	400	4,197	6.8	1,209.7	1,208.9	0.8
P	11,160	270	2,945	9.7	1,211.8	1,210.8	1.0
Q	12,150	252	3,723	7.6	1,215.0	1,214.2	0.8
R	12,420	252	3,398	8.4	1,215.2	1,214.4	0.8

[1] FEET ABOVE CORPORATE LIMITS

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWNSHIP OF GAINES, PA
(TIOGA CO.)

FLOODWAY DATA

PINE CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
Pine Creek (continued)							
S	12,680	260	3,289	8.7	1,215.6	1,214.7	0.9
T	13,640	272	3,288	8.7	1,217.8	1,216.9	0.9
U	15,530	250	3,111	8.9	1,223.1	1,222.1	1.0
V	16,330	260	2,980	9.3	1,224.5	1,223.5	1.0
W	17,350	192	2,636	9.8	1,227.3	1,226.3	1.0
X	18,220	279	3,530	7.4	1,229.9	1,228.9	1.0
Y	19,030	235	3,126	8.3	1,231.1	1,230.4	0.7
Z	19,660	250	2,900	8.9	1,231.8	1,230.9	0.9
AA	20,660	360	3,613	7.2	1,234.1	1,233.1	1.0
AB	21,470	210	2,579	10.1	1,235.5	1,234.5	1.0
AC	21,790	385	4,254	6.1	1,237.3	1,236.6	0.7
AD	22,050	370	3,897	6.7	1,237.6	1,236.7	0.9
AE	22,680	475	4,086	6.3	1,238.7	1,238.0	0.7
AF	23,500	439	3,566	7.3	1,240.1	1,239.2	0.9
AG	24,730	250	2,586	10.0	1,242.3	1,241.5	0.8
AH	26,480	742	5,930	4.4	1,247.3	1,246.3	1.0
AI	27,450	670	4,697	5.5	1,248.7	1,247.7	1.0

[1] FEET ABOVE CORPORATE LIMITS

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWNSHIP OF GAINES, PA
(TIOGA CO.)

FLOODWAY DATA

PINE CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
Pine Creek (continued)							
AJ	28,750[1]	200	2,075	12.5	1,252.0	1,251.0	1.0
AK	30,130[1]	249	2,830	9.2	1,257.7	1,256.9	0.8
AL	32,640[1]	208	2,721	8.8	1,262.8	1,262.3	0.5
AM	34,120[1]	382	3,670	6.5	1,266.4	1,265.7	0.7
AN	34,570[1]	270	2,980	8.0	1,267.4	1,266.5	0.9
AO	34,970[1]	269	3,283	7.3	1,269.2	1,268.3	0.9
AP	35,600[1]	418	3,859	6.2	1,270.6	1,269.6	1.0
AQ	35,800[1]	396	4,151	5.7	1,271.2	1,270.6	0.6
AR	36,440[1]	369	3,809	6.3	1,272.4	1,271.9	0.5
AS	36,800[1]	288	2,708	8.8	1,272.6	1,272.1	0.5
AT	37,770[1]	384	2,891	7.5	1,274.7	1,274.1	0.6
AU	38,610[1]	250	2,255	9.7	1,276.7	1,275.9	0.8
Phoenix Run							
A	830[2]	93	618	9.3	1,277.1	1,277.1	0.0
B	1,230[2]	115	519	11.1	1,279.4	1,279.0	0.4
C	2,210[2]	69	436	13.2	1,289.9	1,289.9	0.0

[1]FEET ABOVE CORPORATE LIMITS

[2]FEET ABOVE MOUTH

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWNSHIP OF GAINES, PA
(TIOGA CO.)

FLOODWAY DATA

PINE CREEK AND PHOENIX RUN

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
Phoenix Run (continued)							
D	3,270	288	1,164	4.9	1,300.4	1,299.4	1.0
E	3,930	67	430	13.3	1,306.1	1,305.1	1.0
F	4,510	98	515	11.1	1,314.6	1,314.6	0.0
G	5,100	119	810	7.1	1,320.7	1,320.1	0.6

[1]FEET ABOVE CORPORATE LIMITS

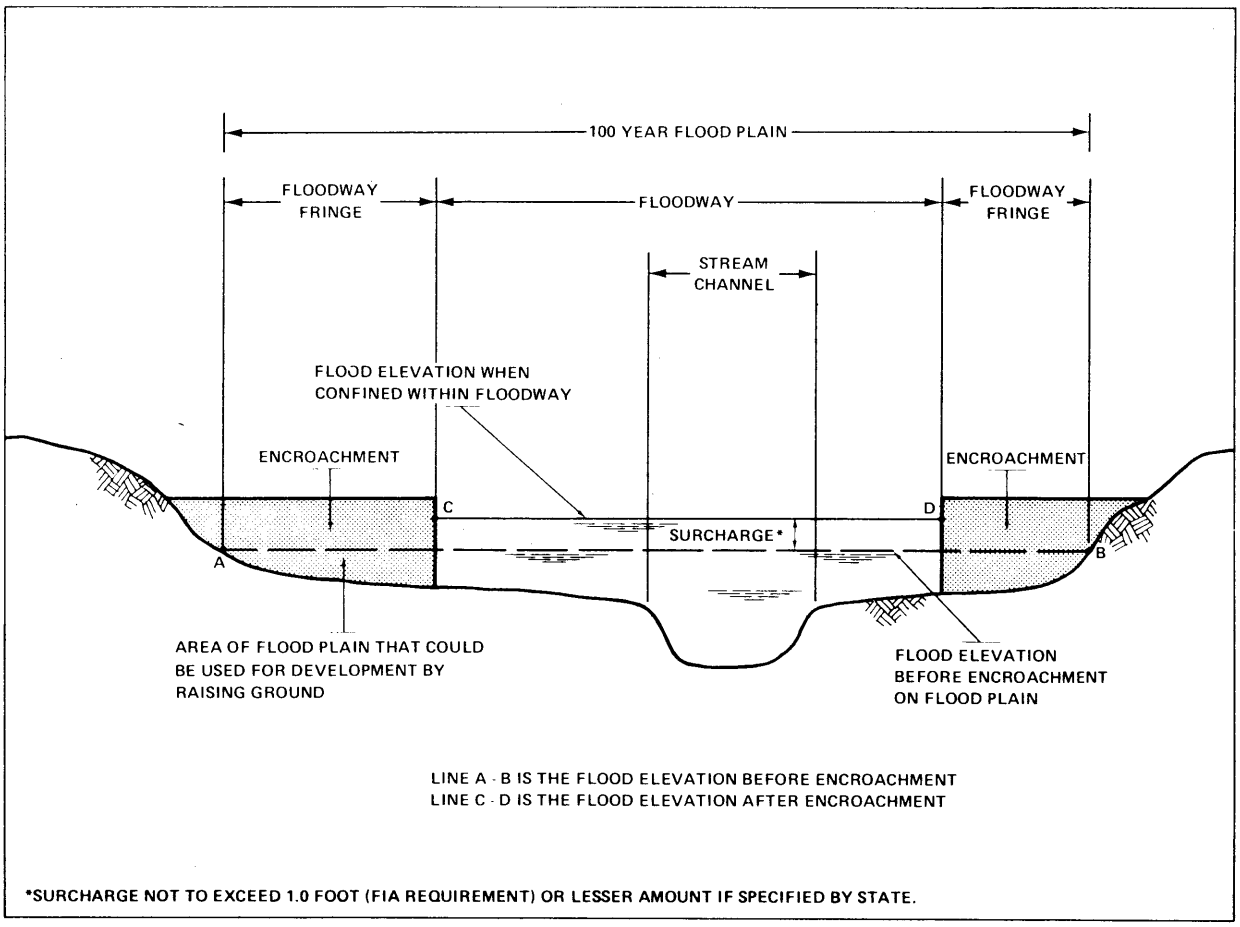
TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWNSHIP OF GAINES, PA
(TIOGA CO.)

FLOODWAY DATA

PHOENIX RUN



FLOODWAY SCHEMATIC Figure 2

5.2 Flood Hazard Factors

The FHF is the FIA device used to correlate flood information with insurance rate tables. Correlation between property damages from floods and their FHFs are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest one-half foot, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year flood water-surface elevations is greater than 10.0 feet, accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective FHFs, the entire incorporated area of the Township of Gaines was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

Zone A:	Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods, no base flood elevations shown or FHFs determined.
Zones A4, A8:	Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations shown, and zones assigned according to FHFs.
Zone B:	Areas between the Special Flood Hazard Areas and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; or, areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot. Zone B is not subdivided.
Zone C:	Areas of minimal flooding.

Table 3, "Flood Insurance Zone Data," summarizes the flood elevation differences, FHFs, flood insurance zones, and base flood elevations for each flooding source studied in detail in the community.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the Township of Gaines is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by the FIA.

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3]
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Pine Creek Reach 1	10	-4.1	-1.3	+3.1	040	A8	Varies
Phoenix Run Reach 1	05,10	-1.9	-0.6	+1.1	020	A4	Varies

[1] FLOOD INSURANCE RATE MAP PANEL
[2] WEIGHTED AVERAGE
[3] ROUNDED TO NEAREST FOOT – SEE MAP

TABLE 3

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWNSHIP OF GAINES, PA
(TIOGA CO.)

FLOOD INSURANCE ZONE DATA

PINE CREEK AND PHOENIX RUN

6.0 OTHER STUDIES

Presently, no other Flood Insurance Studies or similar such investigations are being conducted or have been conducted in the Township of Gaines or the surrounding communities.

This study is authoritative for purposes of the Flood Insurance Program and the data presented here either supersede or are compatible with previous determinations.

7.0 LOCATION OF DATA

Survey, hydrologic, hydraulic, and other pertinent data used in this study can be obtained by contacting the Office of the Federal Insurance Administration, Regional Director, Curtis Building, Sixth and Walnut Streets, Philadelphia, Pennsylvania 19106.

8.0 BIBLIOGRAPHY AND REFERENCES

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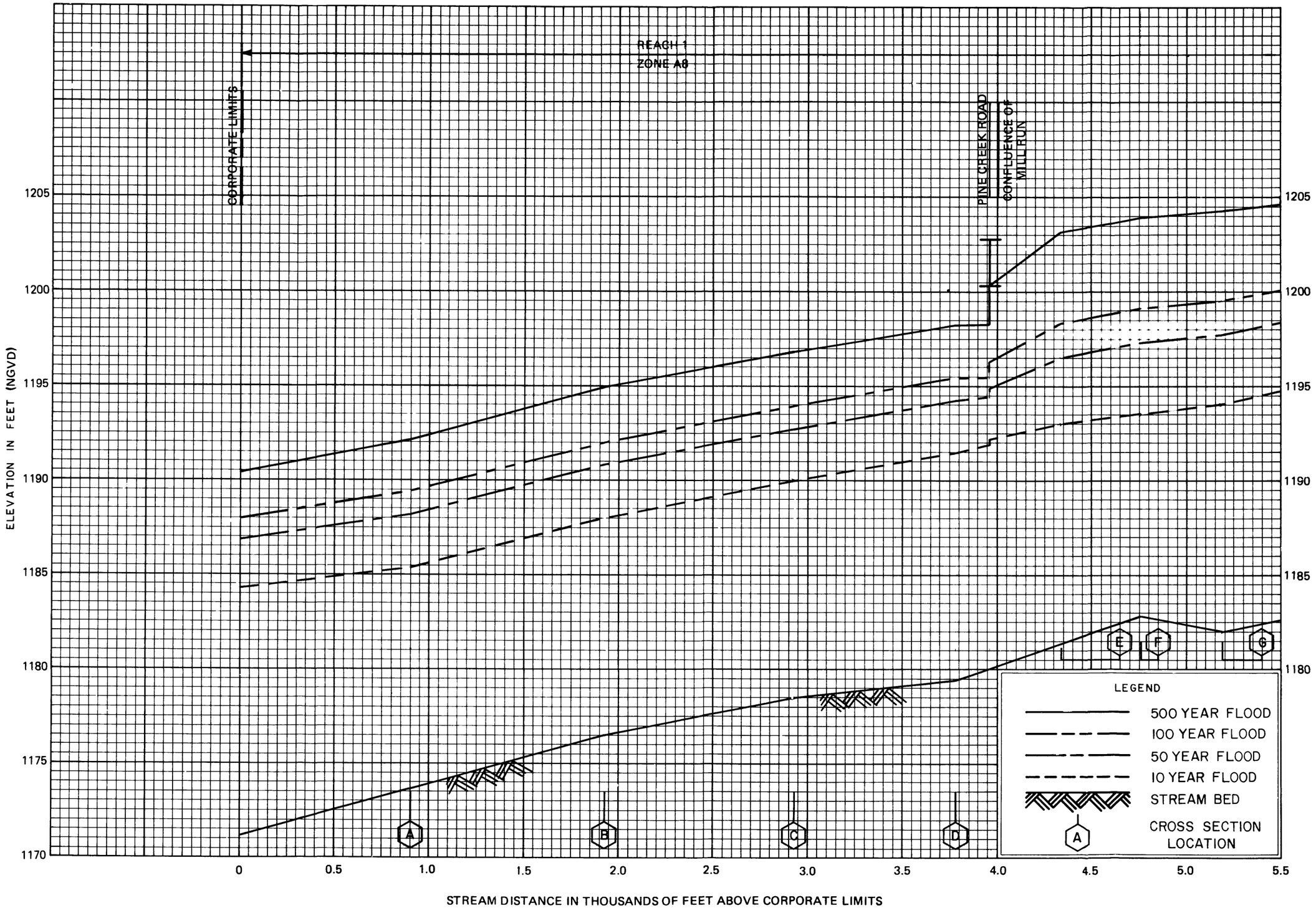

FLOOD PROFILES

PINE CREEK

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWNSHIP OF GAINES, PA
(TIOGA CO.)

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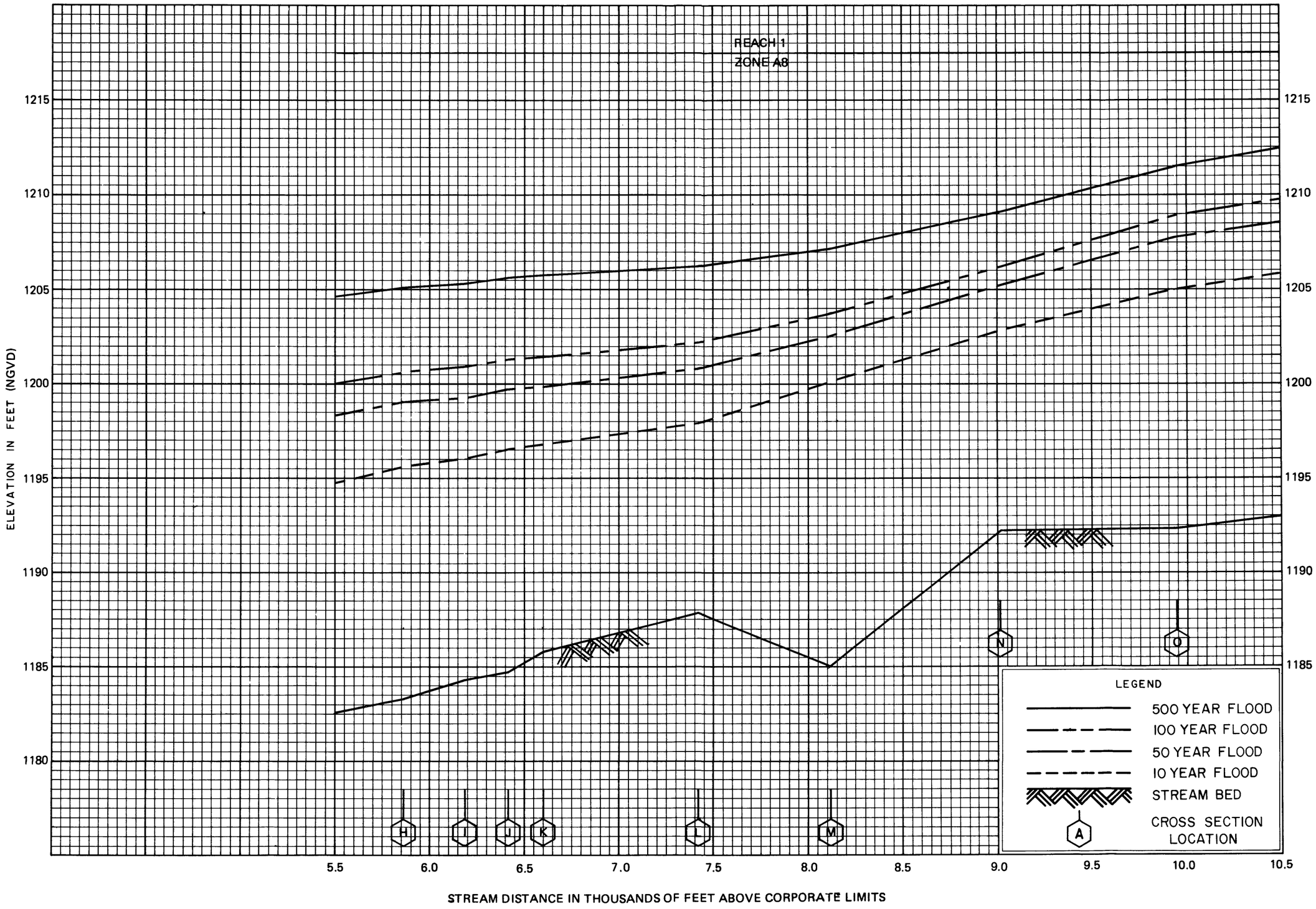

FLOOD PROFILES

PINE CREEK

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Federal Insurance Administration

TOWNSHIP OF GAINES, PA
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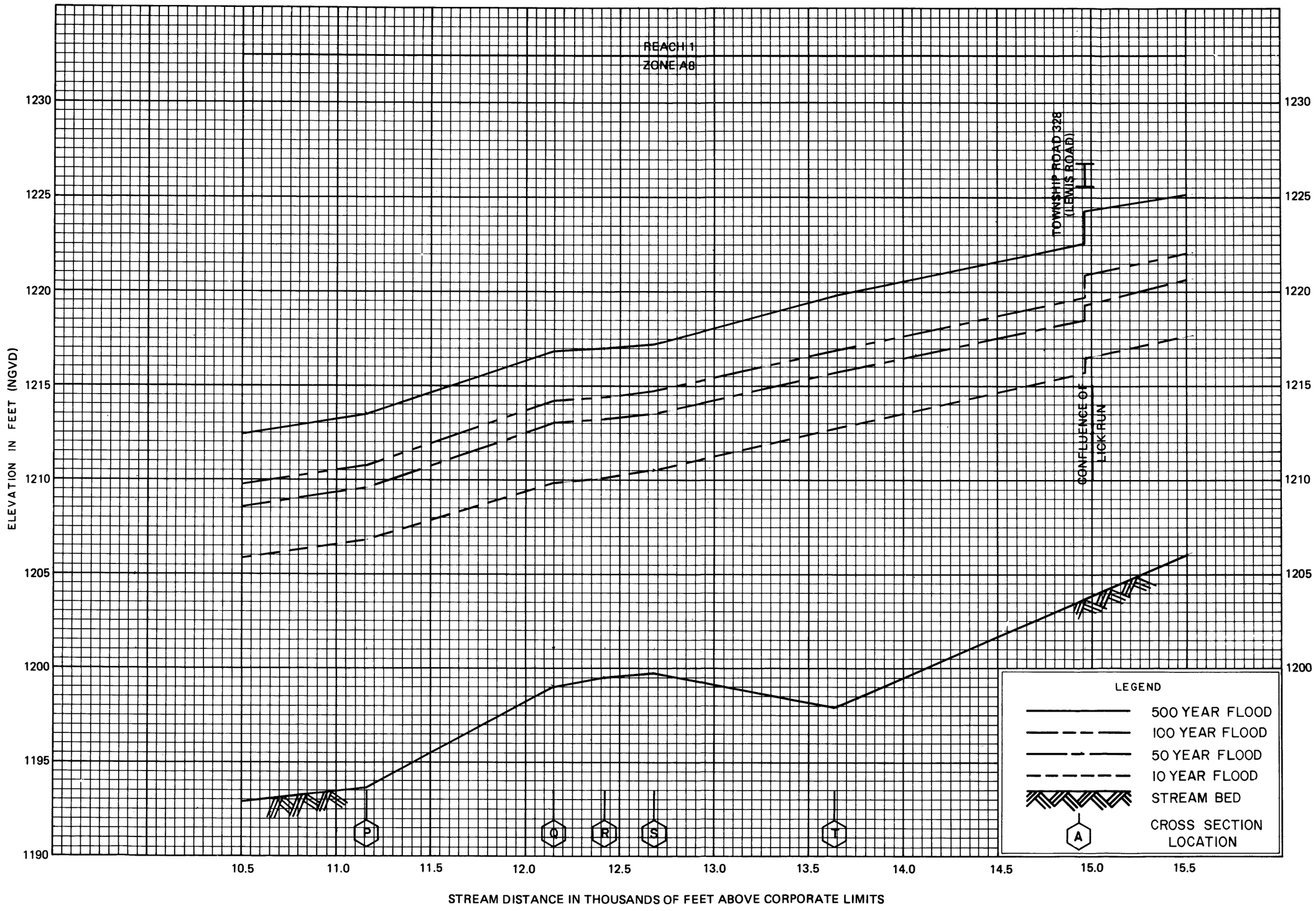

FLOOD PROFILES

PINE CREEK

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWNSHIP OF GAINES, PA

(TIOGA CO.)

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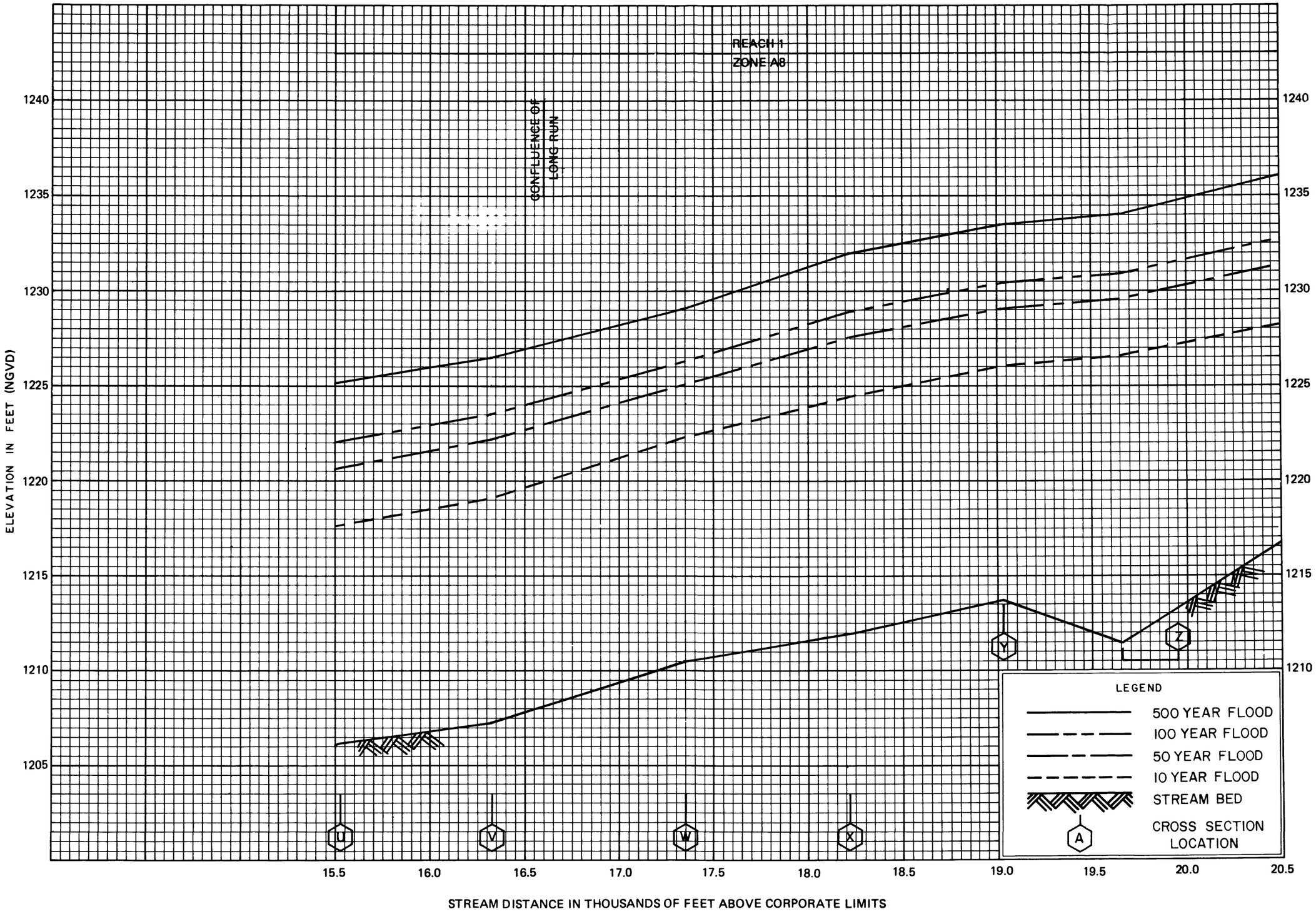

FLOOD PROFILES

PINE CREEK

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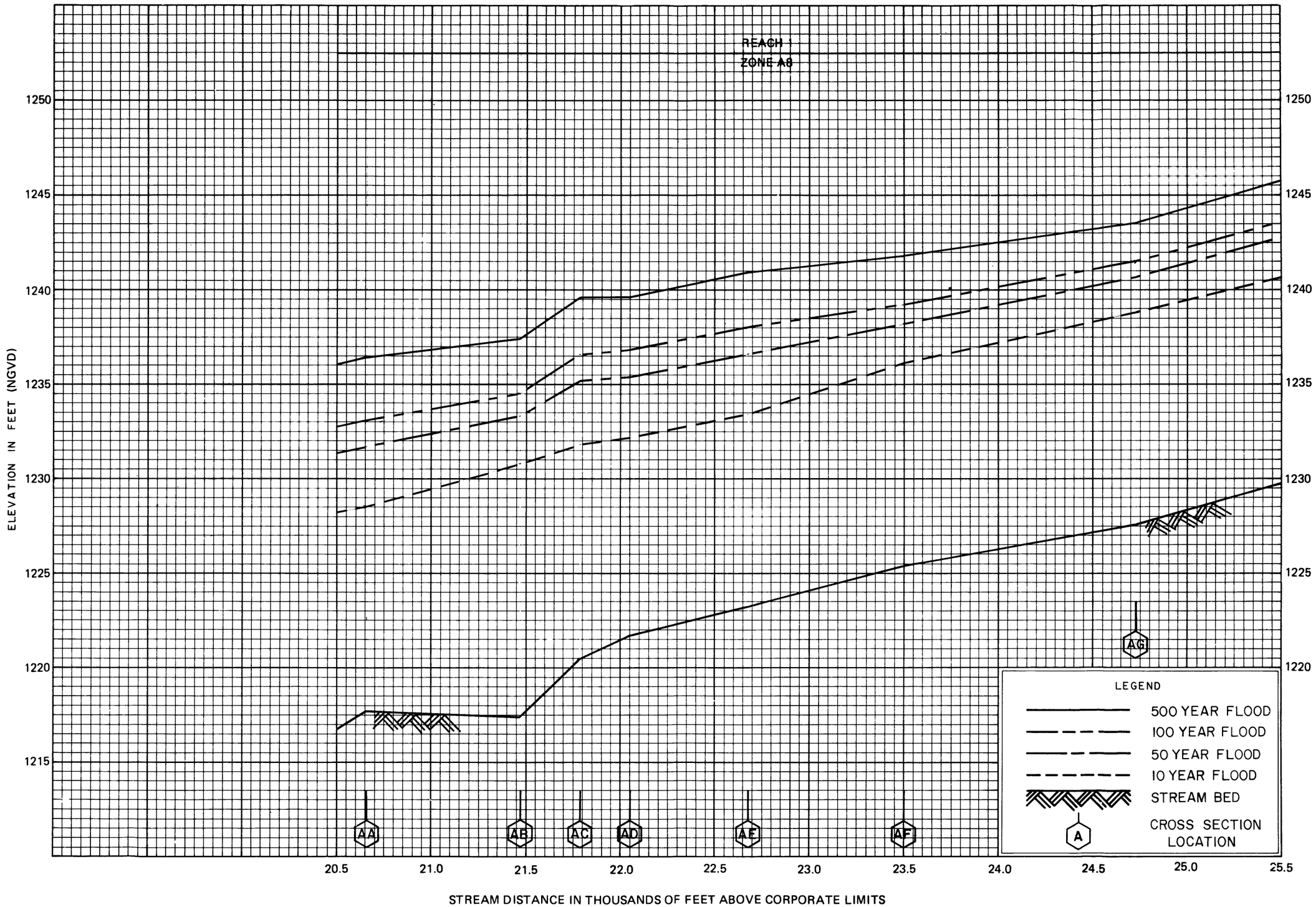

FLOOD PROFILES

PINE CREEK

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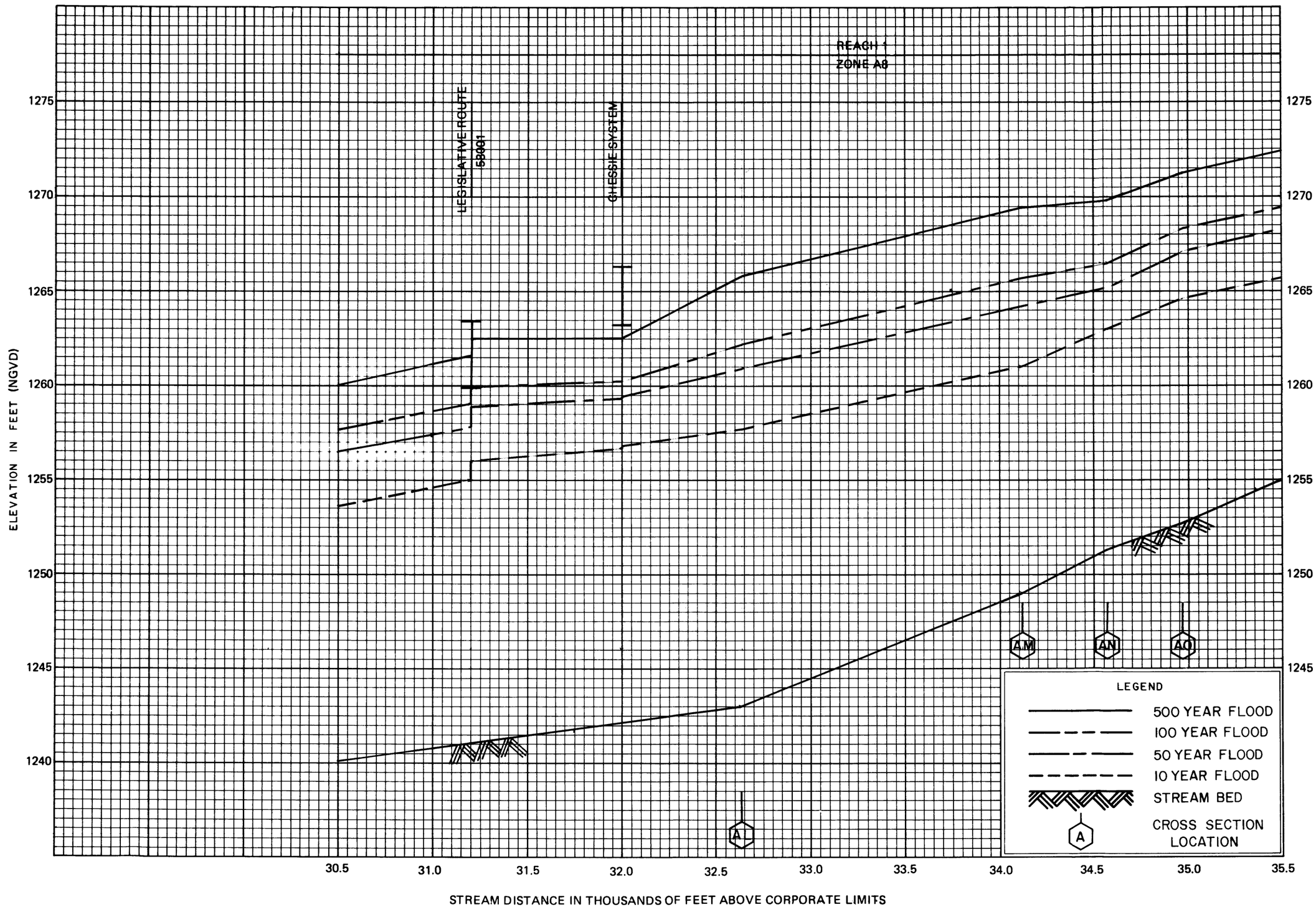

FLOOD PROFILES

PINE CREEK

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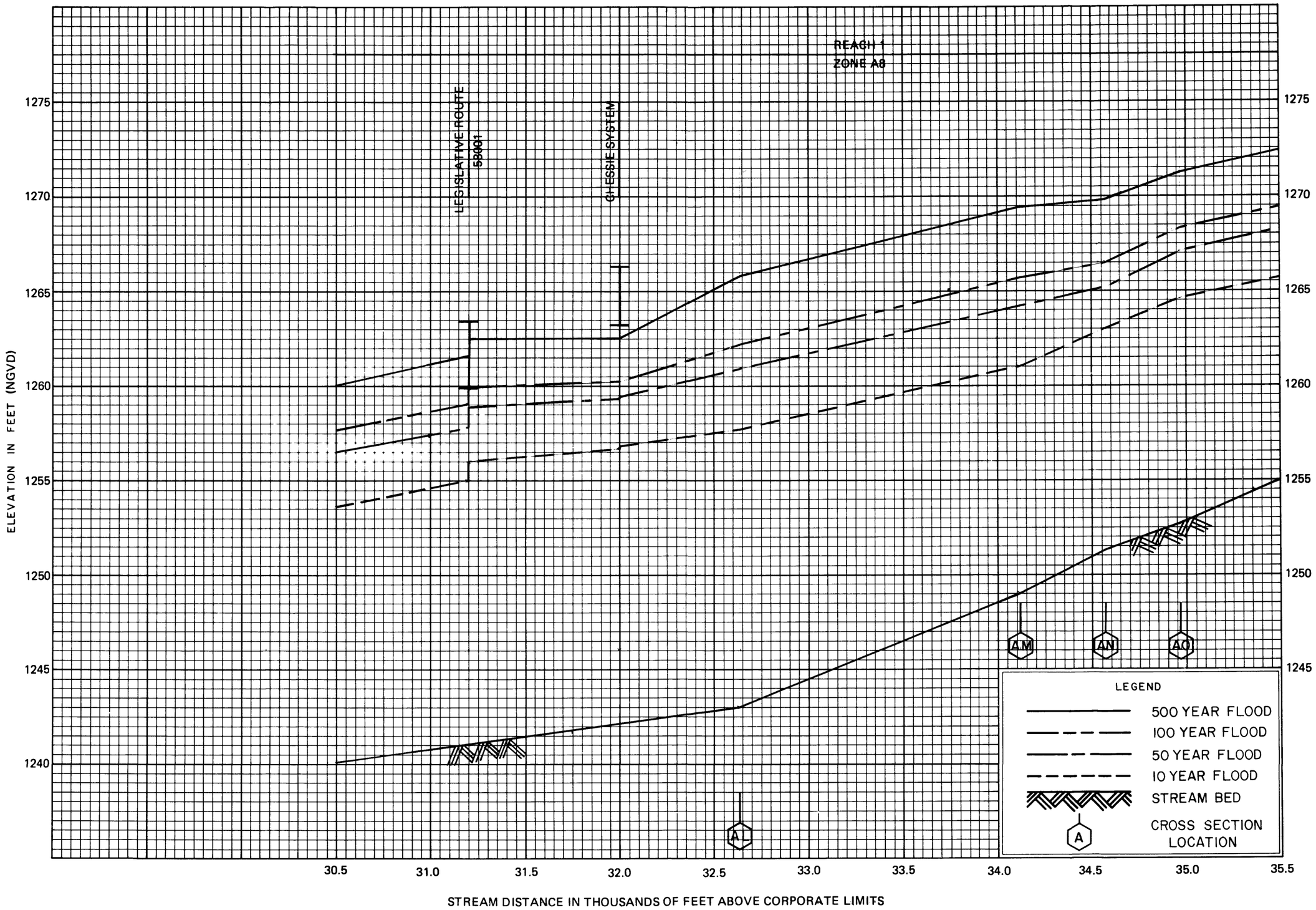

FLOOD PROFILES

PINE CREEK

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Federal Insurance Administration

TOWNSHIP OF GAINES, PA
(TIOGA CO.)

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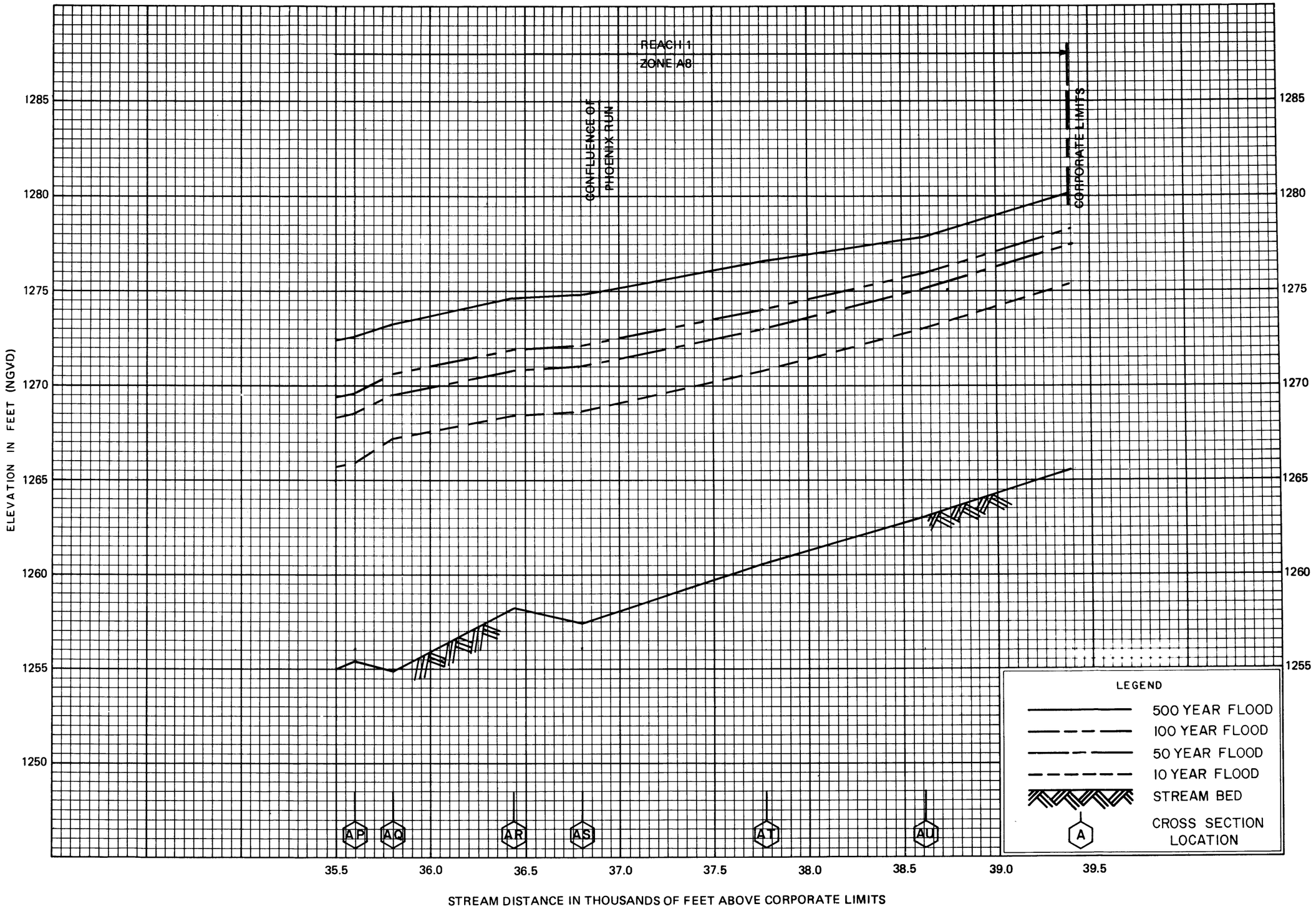

FLOOD PROFILES

PINE CREEK

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TOWNSHIP OF GAINES, PA
(TIOGA CO.)

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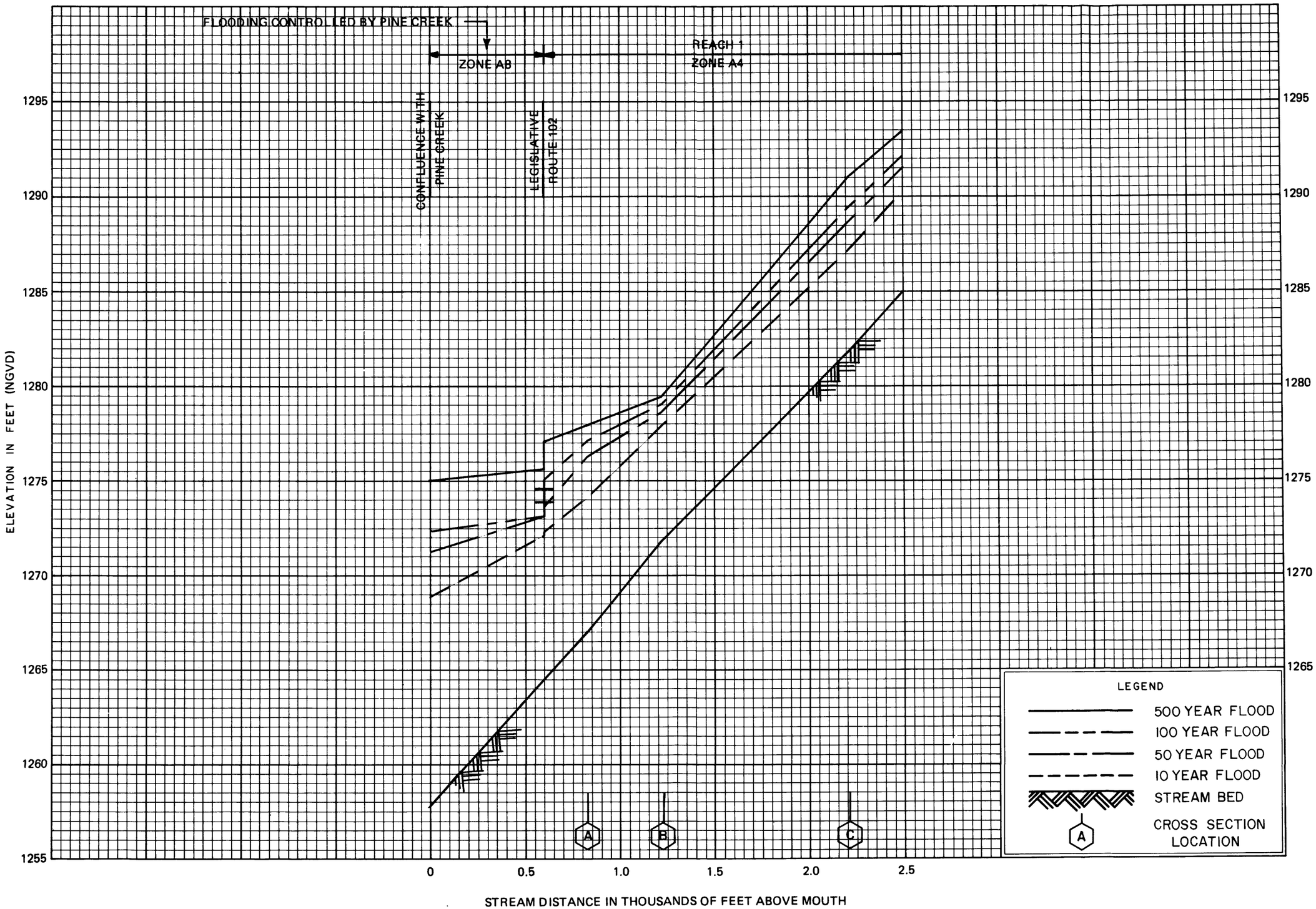

FLOOD PROFILES

PHOENIX RUN

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWNSHIP OF GAINES, PA
(TIOGA CO.)

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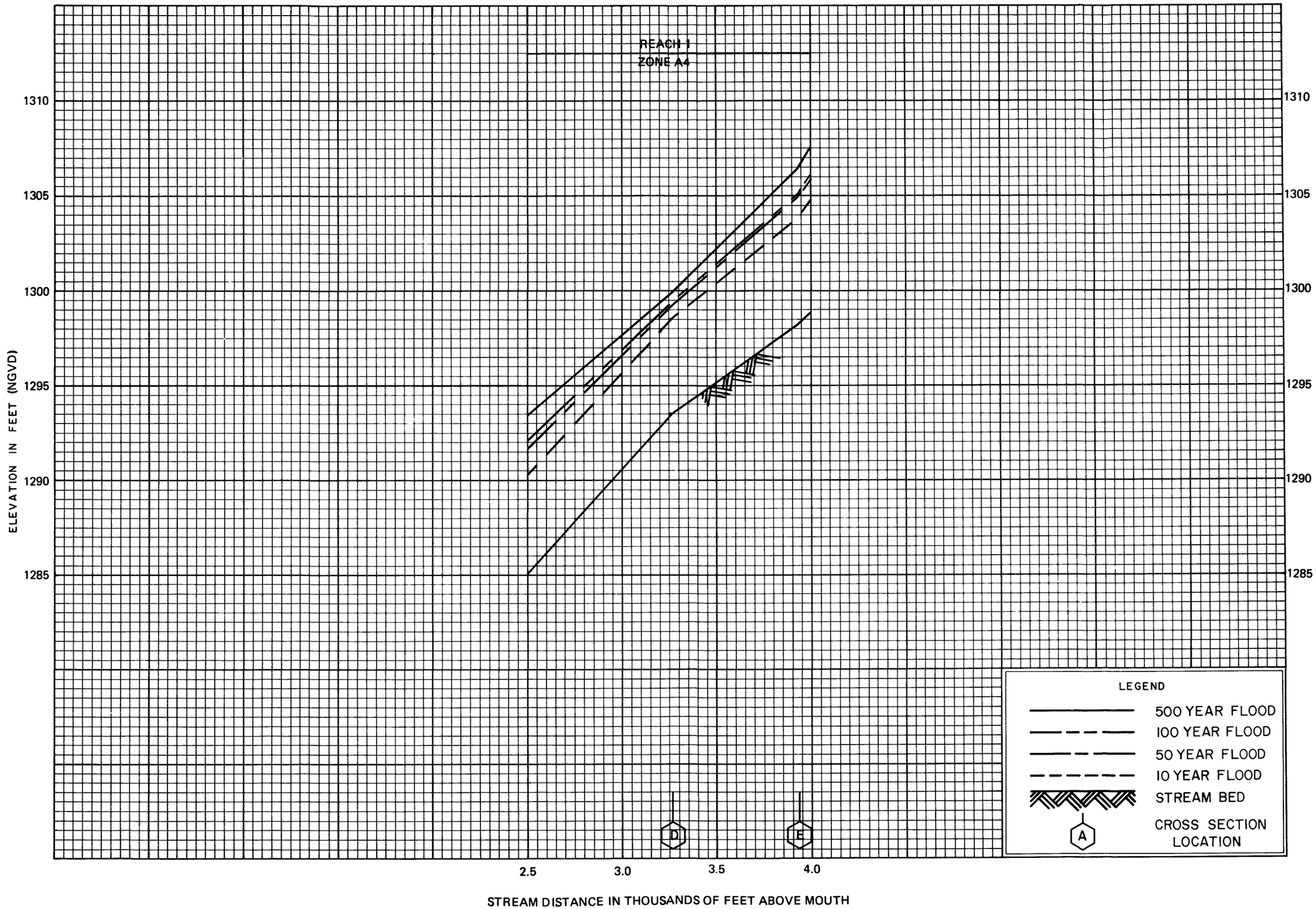

FLOOD PROFILES

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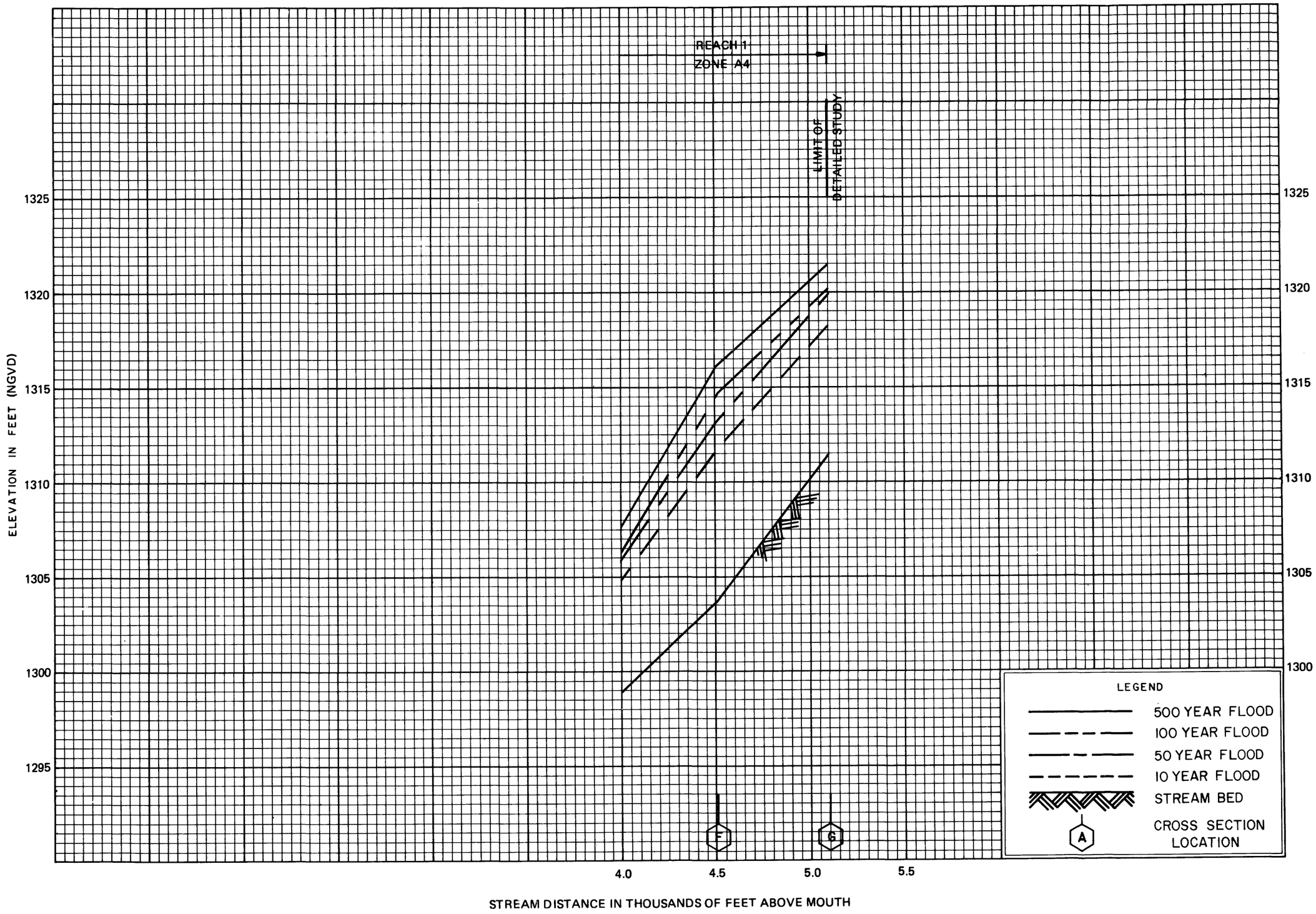

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