Appendices

Appendix A:
Topographic Information

Appendix B:
FEMA

ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION IN FT. (NGVD)[1]	DESCRIPTION OF LOCATION
RM 3	63.0	Pavement surface over north abutment on centerline of Millstone Road bridge over the Millstone River.
RM 4	57.5	Pavement surface on centerline of Washington Road, stream crossing over the centerline of Little Bear Brook.
RM 5	63.5	Pavement surface on centerline of Cranbury Road bridge over centerline of Big Bear Brook.
RM 6	66.5	Pavement surface at intersection of centerlines of Bolemar Avenue and Cranbury Road.
RM 7	86.5	Pavement surface on centerline of Hightstown Road (State Route 539) bridge over centerline of Canoe Brook.

[1] National Geodetic Vertical Datum 1929.

100-Year Flood Boundary
Zone Designations*
100-Year Flood Boundary
500-Year Flood Boundary
Base Flood Elevation Line With Elevation In Feet**
Base Flood Elevation in Feet Where Uniform Within Zone**
Elevation Reference Mark
Zone D Boundary
River Mile

ZONE B
ZONE A1
ZONE A5
ZONE B
513
(EL 987)
RM7×
•M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
AO	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

For adjoining map panels, see separately printed Index To Map Panels.

INITIAL IDENTIFICATION:
JULY 19, 1974
FLOOD HAZARD BOUNDARY MAP REVISIONS:
SEPTEMBER 24, 1976
NOVEMBER 14, 1980

FLOOD INSURANCE RATE MAP EFFECTIVE:
MAY 1, 1984
FLOOD INSURANCE RATE MAP REVISIONS:

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE date shown on this map to determine when actuarial rates apply to structures in the zones where elevations or depths have been established.

To determine if flood insurance is available in this community, contact your insurance agent, or call the National Flood Insurance Program, at (800) 638-6620.

APPROXIMATE SCALE
400 0 400 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

TOWNSHIP OF
WEST WINDSOR,
NEW JERSEY
MERCER COUNTY

PANEL 4 OF 10
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
340256 0004 C
EFFECTIVE DATE:
MAY 1, 1984

FLOOD INSURANCE STUDY

TOWNSHIP OF WEST WINDSOR, NEW JERSEY
MERCER COUNTY

NOVEMBER 1, 1983

Federal Emergency Management Agency

COMMUNITY NUMBER - 340256

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PUBLISHED SEPARATELY:

FLOOD INSURANCE STUDY
TOWNSHIP OF WEST WINDSOR, NEW JERSEY

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Township of West Windsor, Mercer County, New Jersey, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study will be used to convert West Windsor to the regular program of flood insurance by the Federal Emergency Management Agency (FEMA). Local and regional planners will use this study in their efforts to promote sound flood plain management.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than those on which these federally-supported studies are based. These criteria take precedence over the minimum federal criteria for purposes of regulating development in the flood plain, as set forth in the Code of Federal Regulations at 44 CFR, 60.3. In such cases, however, it shall be understood that the state (or other jurisdictional agency) shall be able to explain these requirements and criteria.

1.2 Authority and Acknowledgements

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were prepared by the New Jersey Department of Environmental Protection for the Federal Emergency Management Agency, under Contract No. H-3959. This work was completed in May 1980. The hydrologic and hydraulic analyses for this study were conducted by Justin & Courtney, Inc. under subcontract to the New Jersey Department of Environmental Protection.

1.3 Coordination

On March 16, 1976, an initial Consultation and Coordination Officer's (CCO) meeting, attended by representatives of the Township of West Windsor, the FEMA and the New Jersey Department of Environmental Protection (NJDEP - the study contractor), was held to identify the streams to be studied by detailed methods. A search for data was made at all levels of government.

On May 16, 1983, a final CCO meeting, attended by representatives of the Township of West Windsor, the FEMA and the study contractor, was held to review the results of the study.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Township of West Windsor, Mercer County, New Jersey. The area of study is shown on the Vicinity Map (Figure 1).

The following streams were studied by detailed methods for their entire lengths within the community: The Millstone River, Big Bear Brook, Bear Creek and Assunpink Creek. In addition, Canoe Brook, from its confluence with Big Bear Brook to just upstream of Penn-Lyle Road; Little Bear Brook, from its confluence with the Millstone River to Meadow Road; Duck Pond Run, from the corporate limits to just upstream of Penn-Lyle Road; and Bridgegroom Run, from the confluence with Assunpink Creek to Old Trenton Road were studied by detailed methods. Stony Brook, including the Delaware and Raritan Canal, was studied in detail for its entire length affecting the community. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction for the next five years, through May 1985.

The remaining portion of Bridegroom Run was studied by approximate methods. In addition, an unnamed tributary to Beaver Brook and an unnamed tributary to the Millstone River were studied by approximate methods. Approximate methods of analysis were used to study those areas having low development potential and minimal flood hazards as identified at the initiation of the study. The scope and methods of study were proposed to and agreed upon by the FEMA.

2.2 Community Description

The Township of West Windsor is located in Mercer County in west-central New Jersey. The Township of West Windsor is bordered by the Town of Plainsboro and the Township of Princeton to the north, the Township of East Windsor to the east, the Townships of Washington and Hamilton to the south and the Township of Lawrence to the west. The 1960 population of the community was 4,016 and the 1970 population was 6,431 (Reference 1). The 1975 population was estimated to be approximately 8,100.

Development within the township is primarily agricultural and residential, with small areas of commercial development and light industry. Recently, there has been a considerable increase in

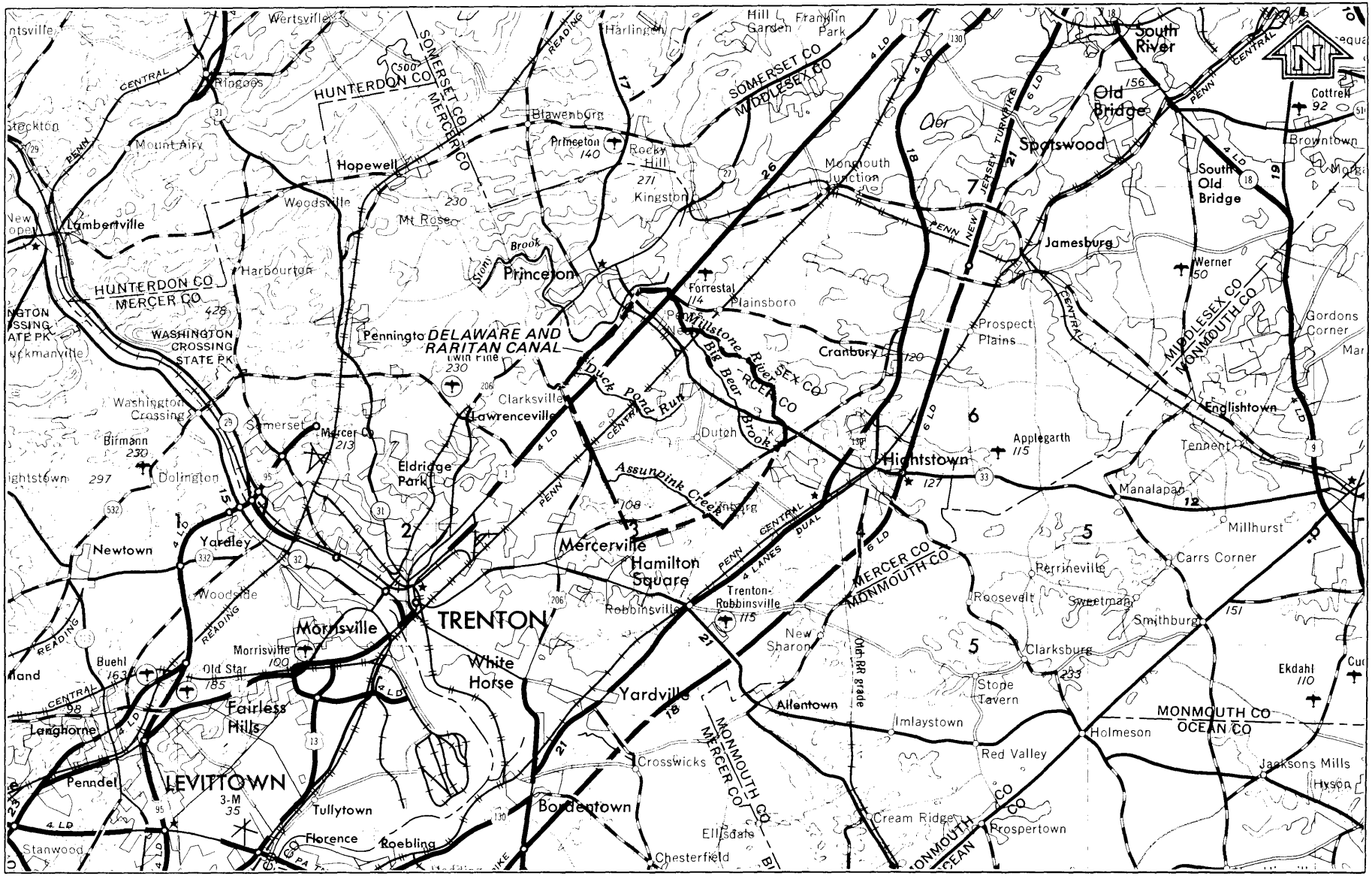


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF WEST WINDSOR, NJ
(MERCER CO.)

VICINITY MAP

residential development in West Windsor. The township was formed on February 9, 1797 from the Township of Windsor in Middlesex County. Since then, there have been several changes made to the corporate limits of the community.

The primary routes of transportation in the township are Washington Road-Princeton Junction-Hightstown Road, running northwest and southeast through Princeton Junction; Charlesville-Grovers Mill Road, running northeast and southwest through Princeton Junction; and U. S. Route 1, running northeast to Brunswick and southwest to Trenton. Washington Road connects Princeton Junction with U. S. Route 1 and the Borough of Princeton. The main line of Conrail from Philadelphia to New York crosses the west-central portion of the township.

Most of the residential areas in the community are located outside the flood plains of the Millstone River, Big Bear Brook, Bear Brook, Stony Brook and Assunpink Creek. Residential developments are located in the flood plains of Canoe Brook and Duck Pond Run at elevations of 7 to 10 feet above the normal stream level. One residential development is partially located within the flood plain of Bridesgroom Run at elevations of 3 to 4 feet above the normal stream level.

The Millstone River flows east to west through West Windsor and forms the northeast corporate limits of the township. The Millstone River has a drainage area of 99.0 square miles at the confluence of Stony Brook.

Big Bear Brook flows southeast to northwest through the northern portion of the township. Big Bear Brook has a drainage area of 12.0 square miles at its confluence with the Millstone River.

Bear Creek flows south to north through the eastern portion of the Township of West Windsor and has a drainage area of 3.2 square miles at its confluence with Big Bear Brook.

Canoe Brook flows south to north through the north-central portion of the township and has a drainage area at its confluence with Big Bear Brook of 0.8 square mile.

Little Bear Brook flows from southwest to northeast through the western portion of the township. Little Bear Brook has a drainage area of 3.3 square miles at its confluence with the Millstone River.

Duck Pond Run flows east to west through the western portion of the township and has a drainage area of 5.8 square miles at its confluence with Stony Brook in the western portion of the community.

Stony Brook flows west to east along the northwest corporate limits of the township. Stony Brook has a drainage area of 58.7 square miles at its confluence with the Millstone River.

Assunpink Creek flows east to west in the southern end of the township. The drainage area of Assunpink Creek is 33.2 square miles at the downstream corporate limits.

Bridegroom Run, with a drainage area of 1.2 square miles, flows east to west in the southern part of the township.

The climate of the area is continental due to the prevailing westerly winds. The average annual temperature is approximately 53 degrees Fahrenheit (°F), with temperature extremes ranging from approximately 5°F to 95°F. The average annual precipitation is approximately 33 inches. Most storm systems affecting the study area originate in the west with occasional coastal storms affecting the area from the east.

2.3 Principal Flood Problems

Low-lying areas along the streams studied by detailed methods are subject to flooding within the Township of West Windsor. The flood of record for the area was recorded along the Millstone River on July 21, 1975, at the Plainsboro gaging station (No. 014010000 with 23 years of record). This flood had a discharge of 3,970 cubic feet per second. The same storm which caused this flow also caused flooding of Little Bear Brook, Canoe Brook, Big Bear Brook, Duck Pond Run, Bridegroom Run and Assunpink Creek. Floods have been recorded along Stony Brook on September 21, 1938, August 13, 1955, January 9, 1964 and July 14, 1975. The most severe flooding usually occurs after intense rainfall or after repeated heavy rainfall. Potential 100- and 500-year flood heights in the township are shown in Figures 2 and 3.

2.4 Flood Protection Measures

There are no completed flood protection measures on the streams in the Township of West Windsor. The Assunpink Creek Flood Prevention Project under direction of the Soil Conservation Service has completed four flood protection dams upstream of the township in Monmouth County. An additional flood control dam (Site-20) is under construction in the eastern part of the township. These dams will help to reduce flood flow on Assunpink Creek further downstream within the township.

In addition, non-structural measures of flood protection aid in the reduction of flood hazards within the township. New development is subject to the requirements of a township ordinance restricting

Figure 2 - Potential 100- and 500-year flood heights along Duck Pond Run on the upstream side of the U. S. Route 1 bridge.

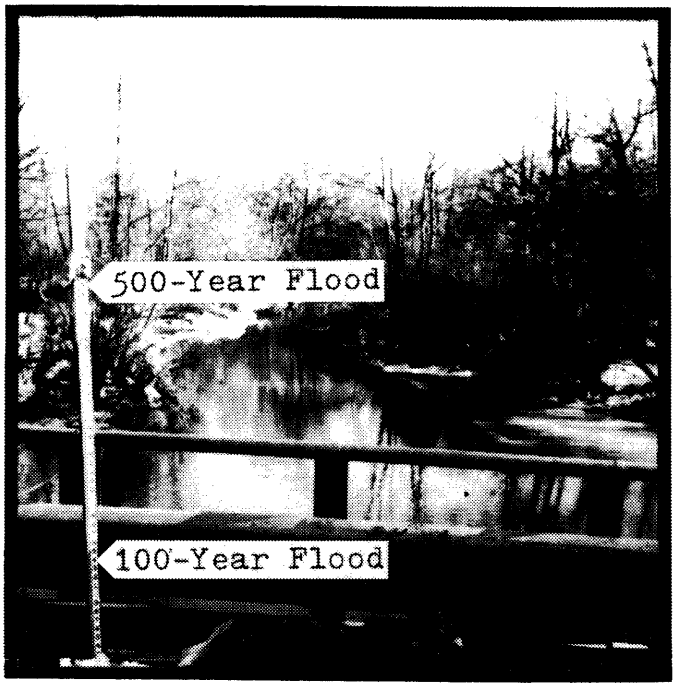


Figure 3 - Potential 100- and 500-year flood heights along Big Bear Brook at Cranbury Road, looking upstream.

construction in the flood plain areas in accordance with FEMA regulations. In an effort to minimize flood damages, the Division of Water Resources of the NJDEP has adopted rules, regulations and minimum standards concerning development and use of land within the floodway.

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 for this study. Flood events of a magnitude which are expected to be equalled 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 flood plain management and for flood insurance premium 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 equalled 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 one year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (one-percent chance of annual occurrence) in any 50-year period is about 40 percent (four in ten) and, for any 90-year period, the risk increases to about 60 percent (six in ten). The analyses reported here reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

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

The discharges for the 10-, 50-, 100- and 500-year recurrence interval floods for the Millstone River were based on stream gage records. The peak discharges were calculated using a log Pearson Type III analysis of annual peak flow data and the natural gage skew (Reference 2). Flows calculated for the gage (No. 01460500 with 29 years of record) located at Kingston were transposed to specific locations on the Millstone River according to the drainage area discharge formula:

$$Q_T/Q_g = [A_1/A_2]^T$$

where Q_T is the discharge at a specific location, A_1 is the drainage area at that point, Q_g is the discharge at the gage and A_2 is the drainage area at the gage with T being the transfer exponent. A value for T of 0.75 was used for the Millstone River.

For Big Bear Brook, Bear Creek, Little Bear Brook, Duck Pond Run, Stony Brook and the upstream portions of Bridegroom Run, the hydrolgic analyses were based upon the method for estimating flood peaks shown in Special Report 38 (Reference 3). Special Report 38 was developed under a cooperative program between the NJDEP and the U. S. Geological Survey (USGS). This method is based on a multiple regression analysis used to develop mathematical relationships between flood discharges of various recurrence intervals (2-, 10-, 50- and 100-years) obtained from gaging station data and hydrologic characteristics. Flood information from 103 sites was used in this analysis. Hydrologic parameters include drainage area, main channel slope, surface storage area and an index of man-made impervious cover based upon basin population and development conditions. The 500-year discharge is extrapolated from the other frequency floods.

The Rational Method was utilized for Canoe Brook and the farthest upstream portions of Big Bear Brook and Bridegroom Run since they have drainage areas less than one square mile in area. The Rational Method obtains flood flows using the watershed area, a coefficient (C) of runoff basin on surface conditions within the watershed and the intensity of rainfall based on concentration time. Varying values of runoff coefficients (C) were used for different flood frequencies as suggested in Modified Rational Method of Estimating Flood Flows (Reference 4).

For Assunpink Creek, stream flow data was coordinated with the Flood Insurance Studies for the Townships of Washington and Lawrence and a SCS publication for the Assunpink Creek watershed (References 5, 6 and 7). For these studies, the SCS standard hydrologic model TR-20, which develops runoff hydrographs and performs reach and reservoir routings, was used to determine flood discharges (Reference 8). Calibration for the model was provided by data from 53 years of record at USGS gage No. 01464000 (Reference 9). This gage was installed in 1923 on Assunpink Creek at Trenton, New Jersey.

A summary of the drainage area-peak discharge relationhips for the streams studied by detailed methods is shown in Table 1, "Summary of Discharges."

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
MILLSTONE RIVER					
At confluence with Stony Brook	99.0	4,485	7,570	9,030	12,950

TABLE 1 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
MILLSTONE RIVER (continued)					
Above confluence of Little Bear Brook	81.8	4,230	6,555	7,820	11,215
Above confluence of Big Bear Brook	65.8	3,600	5,575	6,650	9,535
Above conflunce of Cranbury Brook	42.7	2,600	4,025	4,800	6,885
At upstream corporate limits	39.3	2,445	3,785	4,515	6,475
BIG BEAR BROOK					
At confluence with Millstone River	12.0	875	1,430	1,745	2,710
Above confluence of Canoe Brook	11.7	765	1,250	1,530	2,360
Above confluence of Bear Creek	3.3	280	480	600	900
BEAR CREEK					
At confluence with Big Bear Brook	3.2	280	480	600	900
CANOE BROOK					
At confluence with Big Bear Brook	0.8	285	445	520	720
LITTLE BEAR BROOK					
At confluence with Millstone River	3.3	120	205	250	385
DUCK POND RUN					
At confluence with Stony Brook	5.8	355	520	590	780
At U. S. Route 1	5.2	335	485	560	740
STONY BROOK					
At confluence with Millstone River	58.7	6,220	8,930	10,200	13,900
At confluence with Duck Pond Run	55.7	6,050	8,690	10,010	13,530

TABLE 1 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
ASSUNPINK CREEK					
At downstream corporate limits	33.2	1,510	2,170	2,480	3,250
BRIDEGROOM RUN					
At confluence with Assunpink Creek	1.2	315	530	660	1,045

3.2 Hydraulic Analyses

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

Overbank cross-section data for the streams studied by detailed methods were obtained from aerial photographs (References 10 and 11). The below-water sections were obtained from field survey. All bridges and culverts were surveyed to obtain elevation data and structural geometry. Cross sections were located at close intervals above and below bridges and culverts in order to compute the significant backwater effects of these structures.

Channel roughness factors (Manning's "n") for the streams studied by detailed methods were assigned on the basis field inspection of the streams and flood plain areas. The channel and overbank "n" values for the streams studied by detailed methods are shown in the following tabulation:

Stream	Channel "n"	Overbank "n"
Millstone River	0.030-0.040	0.050-0.110
Big Bear Brook	0.040-0.050	0.060-0.120
Bear Creek	0.040	0.110
Canoe Brook	0.030-0.040	0.060-0.110
Little Bear Brook	0.035-0.037	0.090-0.110
Duck Pond Run	0.012-0.050	0.060-0.120
Stony Brook	0.032-0.060	0.080-0.120
Assunpink Creek	0.030-0.035	0.090-0.100
Bridegroom Run	0.013-0.035	0.090-0.100

Water-surface elevations of the floods of the selected recurrence intervals were computed through the use of the U. S. Army Corps of Engineers HEC-2 step-backwater computer program for all the streams studied by detailed methods with the exception of Assunpink Creek and the lower portion of Bridegroom Run (Reference 12).

For Assunpink Creek and the lower portion of Bridegrooom Run, elevation-discharge relationships were established using the SCS water-surface profile computer program, WSP-2 (Reference 7).

Starting water-surface elevations for the Millstone River were taken from the Flood Insurance Study for the Town of Plainsboro (Reference 13). Starting water-surface elevations for Big Bear Brook and Little Bear Brook were taken at their confluences with the Millstone River. For Bear Creek and Canoe Brook, the starting water-surface elevations were taken at their confluences with Big Bear Brook. The starting water-surface elevations for Duck Pond Run were taken at its confluence with Stony Brook. The starting water-surface elevations for Stony Brook were taken at its confluence with the Millstone River. The starting water-surface elevations for Assunpink Creek were taken from the Flood Insurance Study for the Township of Hamilton (Reference 14). The starting water-surface elevations for Bridegroom Run were taken at its confluence with Assunpink Creek.

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 is computed (Section 4.2), selected cross-section locations are also shown on the Flood Boundary and Floodway Map (Exhibit 3).

For the streams studied by approximate methods, the 100-year flood elevations were determined using depth-discharge-frequency relations for coastal and non-coastal plain sites in New Jersey (Reference 3).

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

The hydraulic analyses for this study are based on the effects of unobstructed flow. The flood elevations shown on the profiles are valid only if hydraulic structures remain unobstructed and do not fail.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study 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 FEMA 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 500-year floods have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using photogrammetric maps a scale of 1:2,400 with contour intervals of 5 and 2 feet, respectively (References 10 and 11). In cases where the 100- and 500-year flood boundaries are close together, only the 100-year boundary has been shown.

For the streams studied by approximate methods, the 100-year flood boundary was delineated using the Flood Hazard Boundary Map of the Township of West Windsor and USGS topographic maps enlarged to a scale of 1:4,800 with a contour interval of 20 feet (References 15 and 16).

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 and 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 can be carried

without substantial increases in flood heights. Minimum standards of the FEMA limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. However, the State of New Jersey has established criteria limiting the increase in flood heights to 0.2 foot. Thus, floodways having no more than a 0.2-foot surcharge have been delineated for this study. 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 is computed (Table 2).

The floodways for Assunpink Creek and Bridegroom Run were taken from a flood hazard analysis of the Assunpink Creek Watershed prepared by the SCS (Reference 7).

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. Portions of the floodway widths for the Millstone River, Stony Brook and Assunpink Creek extend beyond the corporate limits.

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 by more than 0.2 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 4.

Near the mouths of streams studied in detail, floodway computations are made without regard to flood elevations on the receiving water body. Therefore, "With Floodway" elevations presented in Table 2 for certain downstream cross sections of Little Bear Brook and Duck Pond Run are lower than the regulatory flood elevations in that area, which must take into account the 100-year flooding due to backwater from other sources.

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the FEMA has developed a process to transform the data from the engineering study into flood insurance

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE [1]	WIDTH [2] (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Millstone River								
A	165	1090/980	7,131	1.3	57.8	57.8	57.9	0.1
B	1,485	960/640	6,047	1.5	58.6	58.6	58.7	0.1
C	2,045	750/645	6,749	1.3	60.8	60.8	60.9	0.1
D	3,195	600/400	4,570	2.0	60.9	60.9	61.0	0.1
E	4,395	770/590	5,651	1.6	61.2	61.2	61.3	0.1
F	5,455	830/100	5,407	1.7	61.6	61.6	61.7	0.1
G	6,355	870/190	6,101	1.3	62.0	62.0	62.1	0.1
H	8,015	1330/210	9,613	0.8	62.3	62.3	62.5	0.2
I	9,985	910/485	6,428	1.2	62.4	62.4	62.6	0.2
J	10,955	1510/1050	9,419	0.8	62.5	62.5	62.7	0.2
K	11,965	1890/420	11,864	0.6	64.9	64.9	65.0	0.1
L	12,925	930/530	6,689	0.7	64.9	64.9	65.0	0.1
M	13,445	870/205	5,609	0.9	65.1	65.1	65.2	0.1
N	14,345	729/439	4,654	1.0	65.1	65.1	65.2	0.1
O	15,575	568/223	3,744	1.3	65.3	65.3	65.4	0.1
P	17,135	707/257	4,492	1.1	65.5	65.5	65.6	0.1
Q	18,255	650/80	3,389	1.4	65.6	65.6	65.7	0.1
R	19,595	480/370	2,380	2.0	66.0	66.0	66.1	0.1
S	20,415	460/195	2,391	2.0	66.2	66.2	66.4	0.2
T	20,745	670/235	3,504	1.4	66.9	66.9	67.0	0.1
U	21,685	780/380	2,567	1.9	67.2	67.2	67.3	0.1
V	21,945	765/300	2,441	2.0	67.8	67.8	67.8	0.0

[1]Feet above corporate limits

[2]Width/width within corporate limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF WEST WINDSOR, NJ

(Mercer Co.)

FLOODWAY DATA

MILLSTONE RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Millstone River (continued)								
W	22,795[1]	875/555[3]	3,901	1.2	68.4	68.4	68.4	0.0
X	23,815[1]	755/435[3]	3,284	1.5	68.8	68.8	68.8	0.0
Y	24,465[1]	650/65[3]	2,345	2.0	69.0	69.0	69.0	0.0
Z	25,765[1]	1060/550[3]	5,446	0.9	69.7	69.7	69.7	0.0
AA	26,765[1]	936/326[3]	5,211	0.9	69.9	69.9	69.9	0.0
AB	27,775[1]	720/380[3]	3,732	1.3	70.0	70.0	70.0	0.0
AC	28,715[1]	663/163[3]	2,334	2.1	70.2	70.2	70.2	0.0
AD	29,915[1]	800/690[3]	2,040	2.4	70.9	70.9	70.9	0.0
AE	30,105[1]	770/575[3]	2,322	2.1	71.4	71.4	71.4	0.0
AF	31,185[1]	680/95[3]	3,077	1.6	71.9	71.9	71.9	0.0
Big Bear Brook								
A	1,705[2]	352	3,385	0.5	64.8	64.8	64.9	0.1
B	2,960[2]	341	3,071	0.6	64.8	64.8	64.9	0.1
C	3,245[2]	253	2,235	0.8	64.8	64.8	64.9	0.1
D	3,955[2]	273	2,188	0.8	64.9	64.9	65.0	0.1
E	4,775[2]	337	3,005	0.6	64.9	64.9	65.0	0.1
F	5,013[2]	532	4,279	0.4	67.3	67.3	67.3	0.0
G	6,513[2]	491	3,236	0.5	67.4	67.4	67.4	0.0
H	7,533[2]	411	1,962	0.9	67.4	67.4	67.4	0.0
I	8,213[2]	495	2,154	0.8	67.5	67.5	67.5	0.0
J	8,615[2]	160	2,878	0.6	68.7	68.7	68.8	0.1

[1]Feet above corporate limits

[2]Feet above confluence with Millstone River

[3]Width/width within corporate limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF WEST WINDSOR, NJ

(Mercer Co.)

FLOODWAY DATA

MILLSTONE RIVER AND BIG BEAR BROOK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Big Bear Brook (continued)								
K	9,915	453	3,091	0.6	68.8	68.8	68.9	0.1
L	11,115	333	920	1.9	68.8	68.8	68.9	0.1
M	12,615	320	1,340	1.3	70.7	70.7	70.8	0.1
N	12,815	382	1,847	0.9	71.8	71.8	71.9	0.1
O	13,175	341	1,250	1.4	71.9	71.9	72.0	0.1
P	14,085	251	948	1.8	72.5	72.5	72.6	0.1
Q	14,316	120	398	4.4	73.0	73.0	73.0	0.0
R	15,462	262	1,318	1.3	74.5	74.5	74.6	0.1
S	15,692	297	1,587	1.1	74.8	74.8	74.9	0.1
T	16,737	277	1,176	1.5	75.2	75.2	75.3	0.1
U	18,337	309	1,055	1.7	76.3	76.3	76.4	0.1
V	19,487	393	1,285	1.4	77.6	77.6	77.7	0.1
W	19,747	537	2,240	0.7	79.2	79.2	79.3	0.1
X	20,682	270	1,070	1.6	79.5	79.5	79.6	0.1
Y	21,742	251	1,167	1.4	80.2	80.2	80.3	0.1
Z	23,140	230	729	2.3	80.7	80.7	80.8	0.1
AA	23,899	405	2,118	0.5	82.3	82.3	82.4	0.1
AB	25,079	130	714	1.5	82.3	82.3	82.4	0.1

[1]Feet above confluence with Millstone River

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF WEST WINDSOR, NJ

(Mercer Co.)

FLOODWAY DATA

BIG BEAR BROOK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Bear Creek								
A	580	109	446	2.6	82.2	82.2	82.3	0.1
B	1,350	87	797	1.5	82.5	82.5	82.6	0.1
C	1,657	91	712	1.6	82.6	82.6	82.7	0.1
D	1,725	98	219	5.3	84.8	84.8	84.8	0.0
E	3,155	290	1,263	0.9	87.1	87.1	87.3	0.2
F	4,412	190	851	1.3	87.7	87.7	87.9	0.2
Canoe Brook								
A	700	58	160	3.3	67.3	67.3	67.4	0.1
B	812	110	554	0.9	70.0	70.0	70.0	0.0
C	1,712	55	76	6.8	71.0	71.0	71.0	0.0
D	2,422	97	230	2.3	73.8	73.8	74.0	0.2
E	3,322	104	94	5.5	80.3	80.3	80.3	0.0
F	3,517	102	308	1.7	84.7	84.7	84.7	0.0
G	3,697	123	592	0.6	87.3	87.3	87.3	0.0
H	4,093	21	57	6.5	87.3	87.3	87.3	0.0
I	4,593	20	64	3.0	88.2	88.2	88.2	0.0
J	5,533	18	28	6.8	91.5	91.5	91.5	0.0
K	6,213	30	46	4.2	100.1	100.1	100.1	0.0
L	6,399	192	115	1.6	103.2	103.2	103.4	0.2

[1]Feet above confluence with Big Bear Brook

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF WEST WINDSOR, NJ

(Mercer Co.)

FLOODWAY DATA

BEAR CREEK AND CANOE BROOK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						(FEET NGVD)		
Little Bear Brook								
A	2,460[1]	44	110	2.3	62.0	53.8[3]	53.9	0.1
B	2,676[1]	50	176	1.4	62.0	54.8[3]	54.9	0.1
C	3,806[1]	53	169	1.5	62.0	55.1[3]	55.2	0.1
D	3,899[1]	60	122	2.1	62.0	56.9[3]	56.9	0.0
E	5,209[1]	115	204	1.2	62.0	58.0[3]	58.1	0.1
F	5,300[1]	24	105	1.7	62.0	58.2[3]	58.3	0.1
G	6,750[1]	202	375	0.5	62.0	58.7[3]	58.8	0.1
H	7,940[1]	90	194	0.9	62.0	59.3[3]	59.4	0.1
I	9,540[1]	382	807	0.1	62.0	59.6[3]	59.7	0.1
J	10,818[1]	163	359	0.3	62.0	59.6[3]	59.7	0.1
K	12,081[1]	71	163	0.6	62.0	59.9[3]	60.0	0.1
Duck Pond Run								
A	210[2]	379	1,202	0.5	66.3	56.9[4]	57.0	0.1
B	1,175[2]	136	156	3.8	66.3	56.9[4]	57.0	0.1
C	2,170[2]	321	783	0.8	66.3	58.3[4]	58.5	0.2
D	2,705[2]	202	623	0.9	66.3	58.6[4]	58.8	0.2
E	2,944[2]	62	280	2.0	66.3	59.3[4]	59.4	0.1
F	4,124[2]	438	617	0.9	66.3	59.9[4]	60.1	0.2
G	5,479[2]	883	1,778	0.3	66.3	60.5[4]	60.6	0.1
H	7,049[2]	97	159	3.5	66.3	65.8[4]	65.8	0.0
I	8,224[2]	168	291	1.9	71.2	71.2	71.4	0.2

[1]Feet above confluence with Millstone River

[2]Feet above corporate limits

[3]Elevation computed without consideration of backwater effects from the Millstone River

[4]Elevation computed without consideration of backwater effects from Stony Brook

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF WEST WINDSOR, NJ

(MERCER CO.)

FLOODWAY DATA

LITTLE BEAR BROOK AND DUCK POND RUN

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						(FEET NGVD)		
Duck Pond Run (continued)								
J	8,944[1]	124	260	2.2	73.2	73.2	73.2	0.0
K	9,814[1]	185	315	1.8	75.0	75.0	75.2	0.2
L	9,911[1]	118	254	2.2	75.5	75.5	75.6	0.1
M	10,276[1]	99	266	2.1	76.6	76.6	76.7	0.1
N	10,549[1]	127	626	0.6	79.0	79.0	79.2	0.2
O	10,879[1]	210	891	0.4	79.0	79.0	79.2	0.2
P	11,024[1]	260	1,145	0.3	79.6	79.6	79.8	0.2
Q	11,684[1]	319	1,139	0.3	79.6	79.6	79.8	0.2
R	12,539[1]	114	530	0.7	79.7	79.7	79.9	0.2
S	13,599[1]	132	337	1.1	80.0	80.0	80.2	0.2
T	15,149[1]	155	265	1.3	81.3	81.3	81.4	0.1
U	15,542[1]	48	76	4.7	82.2	82.2	82.2	0.0
V	15,798[1]	59	213	1.2	85.1	85.1	85.1	0.0
W	16,538[1]	83	249	1.0	85.2	85.2	85.2	0.0
X	17,453[1]	129	108	2.3	87.1	87.1	87.2	0.1
Y	18,833[1]	75	189	1.3	89.6	89.6	89.8	0.2
Z	19,064[1]	135	597	0.4	92.0	92.0	92.0	0.0
Stony Brook								
A	770[2]	750/45[3]	4,737	2.2	57.8	57.8	57.9	0.1
B	2,334[2]	695/20[3]	4,863	2.1	58.0	58.0	58.1	0.1
C	3,884[2]	735/20[3]	5,673	1.8	58.1	58.1	58.2	0.1

[1]Feet above corporate limits
[2]Feet above confluence with Millstone River
[3]Width/width within corporate limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF WEST WINDSOR, NJ

(MERCER CO.)

FLOODWAY DATA

DUCK POND RUN AND STONY BROOK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Stony Brook (continued)								
D	5,762[1]	780/20[3]	5,344	1.9	58.2	58.2	58.3	0.1
E	7,472[1]	830/10[3]	4,449	2.3	58.4	58.4	58.5	0.1
F	7,835[1]	550/20[3]	2,541	4.0	59.1	59.1	59.1	0.0
G	8,740[1]	540/30[3]	3,539	2.9	61.1	61.1	61.1	0.0
H	11,270[1]	1,130/20[3]	7,474	1.4	62.3	62.3	62.4	0.1
I	12,870[1]	1,030/20[3]	5,741	1.7	62.7	62.7	62.8	0.1
J	14,790[1]	1,065/30[3]	6,468	1.5	63.4	63.4	63.6	0.2
K	16,840[1]	1,470/30[3]	7,042	1.4	64.1	64.1	64.3	0.2
L	20,470[1]	1,295/40[3]	6,811	1.5	66.2	66.2	66.3	0.1
M	22,120[1]	1,765/35[3]	7,977	1.2	66.5	66.5	66.6	0.1
Assunpink Creek								
A	14,810[2]	415	1,132	0.6	70.3	70.3	70.5	0.2
B	15,810[2]	424	850	0.7	71.2	71.2	71.4	0.2
C	16,940[2]	730	1,146	0.5	71.7	71.7	71.9	0.2
D	18,050[2]	470/295[3]	705	0.8	72.3	72.3	72.5	0.2
E	19,885[2]	290/240[3]	658	0.8	72.9	72.9	73.1	0.2
F	21,390[2]	375/150[3]	919	0.6	73.7	73.7	73.9	0.2

[1]Feet above confluence with Millstone River

[2]Feet above corporate limits

[3]Width/width within corporate limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF WEST WINDSOR, NJ

(Mercer Co.)

FLOODWAY DATA

STONY BROOK AND ASSUNPINK CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Bridegroom Run								
A	1,860	650	1,140	0.3	70.8	70.8	70.8	0.0
B	2,580	530	1,176	0.3	71.7	71.7	71.7	0.0
C	3,580	374	481	0.7	74.7	74.7	74.7	0.0
D	4,465	410	590	0.6	75.9	75.9	75.9	0.0
E	4,575	363	777	0.4	76.5	76.5	76.5	0.0
F	5,040	417	1,195	0.3	76.6	76.6	76.6	0.0
G	6,105	300	1,145	0.2	76.9	76.9	76.9	0.0
H	6,875	228	428	0.4	77.6	77.6	77.6	0.0
I	7,410	220	313	0.6	78.1	78.1	78.1	0.0
J	7,510	350	757	0.3	80.2	80.2	80.2	0.0

[1]Feet above confluence with Assunpink Creek

TABLE 2

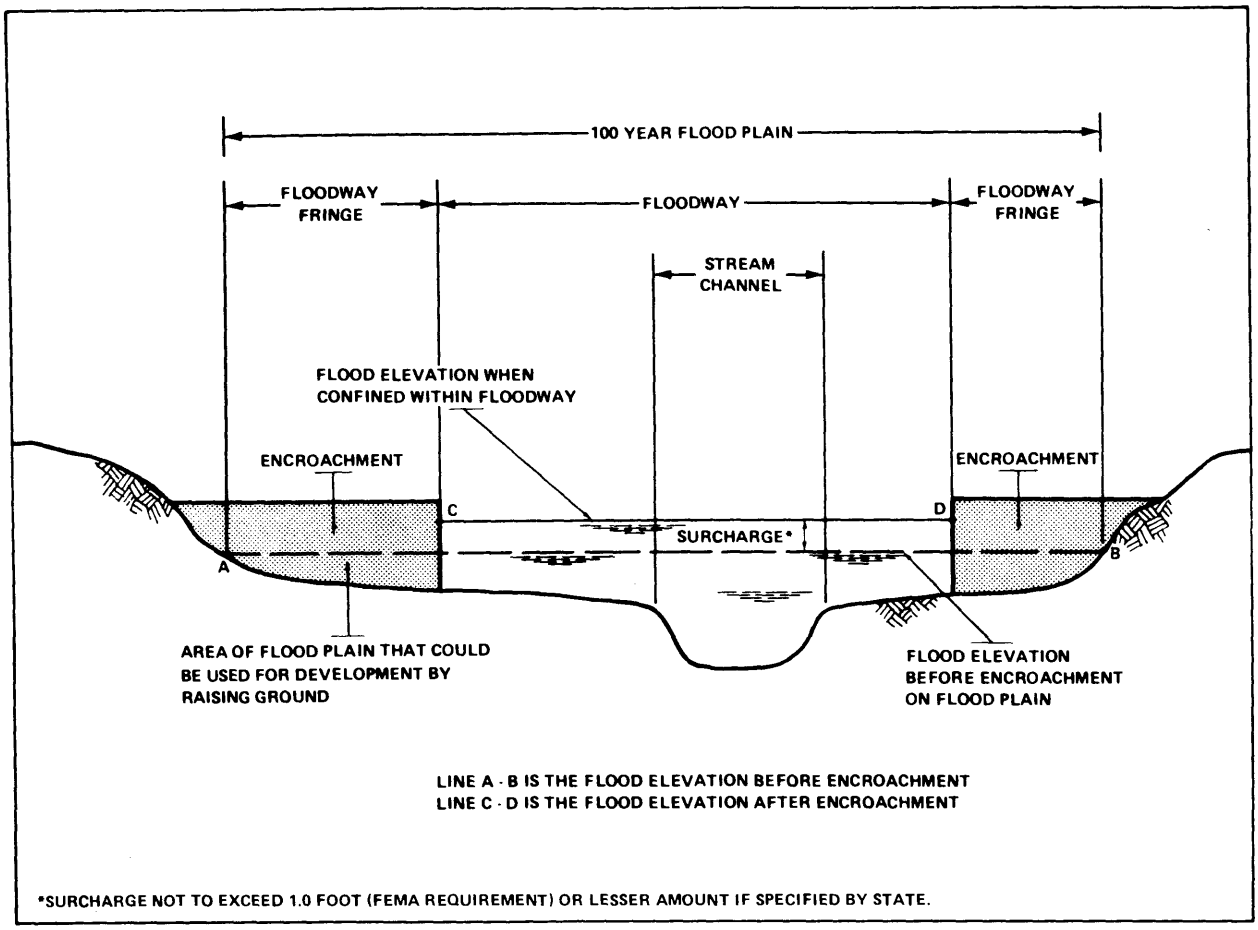
FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF WEST WINDSOR, NJ

(Mercer Co.)

FLOODWAY DATA

BRIDGROOM RUN



FLOODWAY SCHEMATIC Figure 4

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 West Windsor.

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
7.1 to 12 feet	2.0 feet
More than 12 feet	3.0 feet

The locations of the reaches determined for the flooding sources of the Township of West Windsor are shown on the Flood Profiles (Exhibit 1) and are summarized in the Flood Insurance Zone Data Table (Table 3).

5.2 Flood Hazard Factors

The FHF is the FEMA device used to correlate flood information with insurance rate tables. Correlations between property damage 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 0.5 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 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 West Windsor 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 A1, A2, A3, A4, A5 and A7:	Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations shown, and zones subdivided according to FHF.
Zone B:	Areas between the Special Flood Hazard Area 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; also, areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.
Zone C:	Areas of minimal flooding.

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Millstone River							
Reach 1	02	-1.9	-0.6	+2.6	020	A4	Varies
Reach 2	02,03,04, 05,06	-2.4	-0.8	+2.3	025	A5	Varies
Big Bear Brook							
Reach 1	04	-3.3	-1.3	+3.2	035	A7	Varies
Reach 2	04	-0.9	-0.3	+0.8	010	A2	Varies
Reach 3	04,05,08	-1.7	-0.7	+1.5	015	A3	Varies
Reach 4	08	-1.8	-0.5	+0.8	020	A4	Varies
Reach 05	08	-2.6	-0.4	+0.7	025	A5	Varies
Bear Creek							
Reach 1	08	-2.5	-0.3	+0.4	025	A5	Varies
Reach 2	08	-1.0	-0.6	+0.6	010	A2	Varies
Canoe Brook							
Reach 1	04	-0.7	-0.2	+0.5	005	A1	Varies

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF WEST WINDSOR, NJ

(Mercer Co.)

FLOOD INSURANCE ZONE DATA

MILLSTONE RIVER, BIG BEAR BROOK, BEAR CREEK, CANOE BROOK

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Duck Pond Run Reach 1	06,07	-0.9	-0.2	+0.6	010	A2	Varies
Stony Brook Reach 1	01,03,06	-2.2	-0.7	+2.7	020	A4	Varies
Assunpink Creek Reach 1	05,09,10	-1.1	-0.3	+0.6	010	A2	Varies
Bridegroom Run Reach 1	08,09,10	-0.5	-0.1	+0.3	005	A1	Varies

[1]Flood Insurance Rate Map Panel
[2]Weighted Average
[3]Rounded to the nearest foot - see map

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF WEST WINDSOR, NJ

(Mercer Co.)

FLOOD INSURANCE ZONE DATA

DUCK POND RUN, STONY BROOK, ASSUNPINK CREEK, BRIDEGROOM RUN

Table 3, "Flood Insurance Zone Data," summarizes the flood elevation differences, FHFs, flood insurance zones, and base flood elevations for the flooding sources studied in detail in the Township of West Windsor.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the Township of West Windsor 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 FEMA.

6.0 OTHER STUDIES

Flood Insurance Studies have been published for the Townships of Washington, Lawrence and Hamilton (References 5, 6 and 14). Flood Insurance Studies are currently being prepared for the Town of Plainsboro and the Townships of Princeton and East Windsor (References 13, 17 and 18). The study for the Township of West Windsor will be in exact agreement with the contiguous studies mentioned above.

In 1973, a study of the Millstone River was made as part of a study of the flood hazard areas in the Raritan River basin (Reference 19). The results of that study will be compatible with the results of this study. In 1967, a study was also prepared for Stony Brook as a part of the study of the flood hazard areas in the Raritan River basin (Reference 20). The results of that study were compared with the 50- and 100-year flood levels developed in this study. Differences in flood levels were attributed to differences in methods of analysis.

The NJDEP, in cooperation with the USGS, made a study of the magnitude and frequency of floods in New Jersey and the effects of urbanization (Reference 3). The study has been used as a basis for determining flood flows on ungaged streams in New Jersey. The study has also been used to determine approximate 100-year flood elevations in conjunction with graphical depth-discharge-frequency relations for coastal and non-coastal plain sites in New Jersey.

A study by the USGS of the extent and frequency of floods in the upper Millstone River basin provided data for the Millstone River, Big Bear Brook and Bear Creek (Reference 21).

The effects of tropical storms on flood flows in the Millstone River, Stony Brook, Duck Pond Run, Big Bear Brook, Bear Creek, Little Bear Brook, Upper

Bear Swamp and Assunpink Creek were studied in USGS Sepcial Report 37 (Reference 22). Some of the data in Special Report 37 indicate greater flood flows than previously recorded.

A study of the extent and frequency of inundation of the flood plains of the Millstone River, Stony Brook and Lake Carnegie has been prepared by the USGS (Reference 23).

A Flood Hazard Analysis has been prepared for the Assunpink Creek watershed SCS (Reference 7).

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

Information concerning the pertinent data used in preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, Federal Emergency Management Agency, Regional Director, Region II Office, 26 Federal Plaza, Room 19-100, New York, New York 10278.

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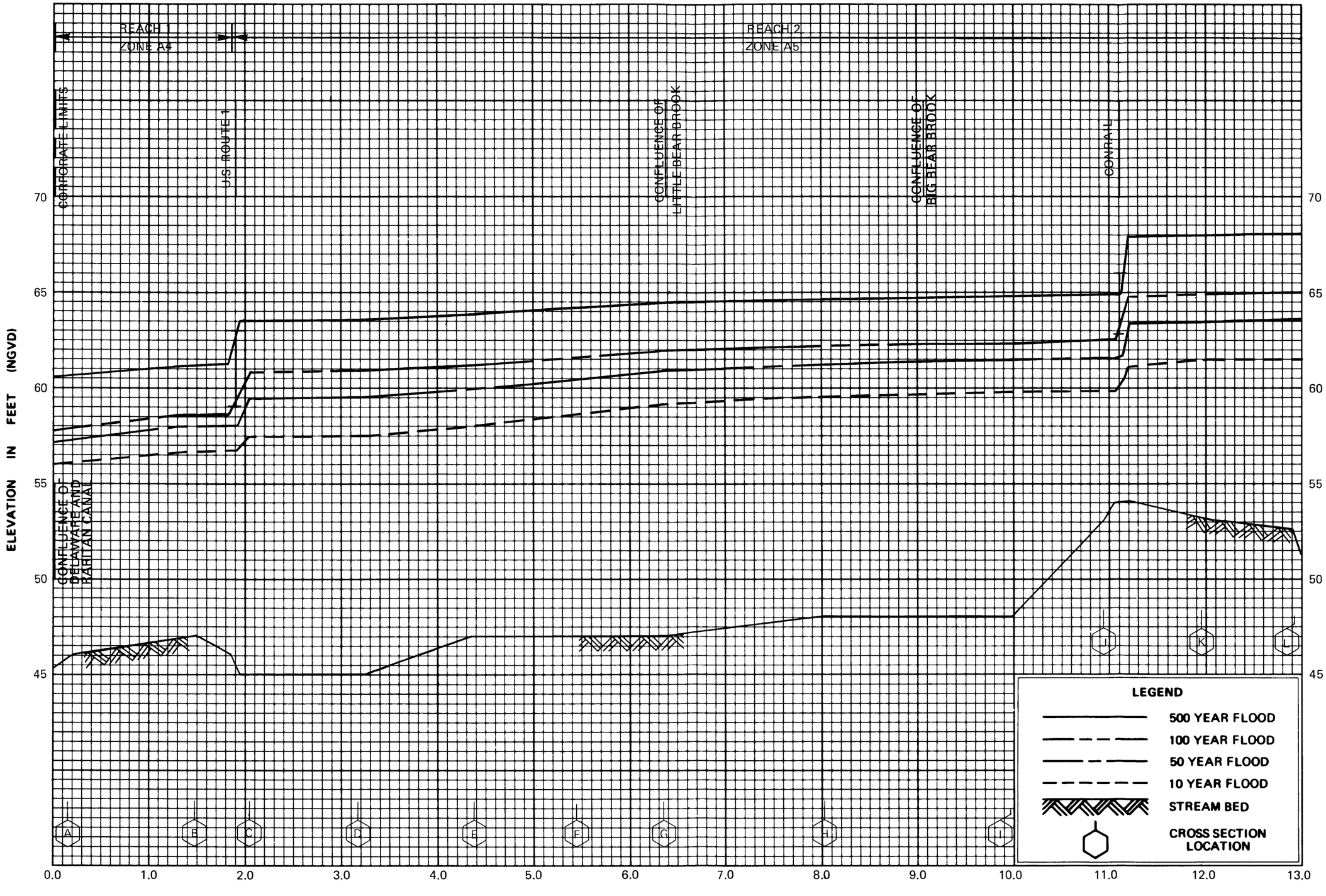


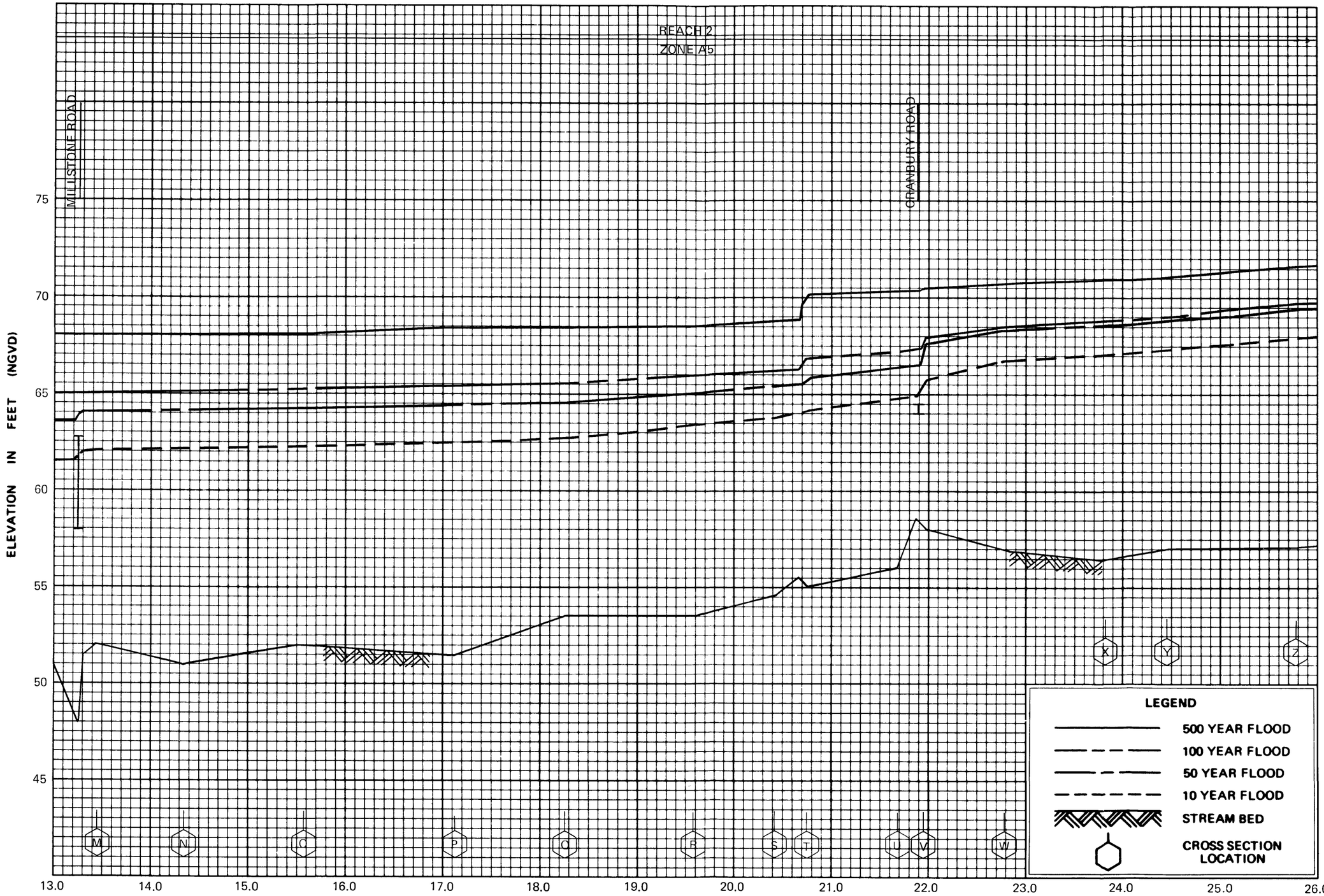
FLOOD PROFILES

MILLSTONE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF WEST WINDSOR, NJ
(MERCER CO.)

01P



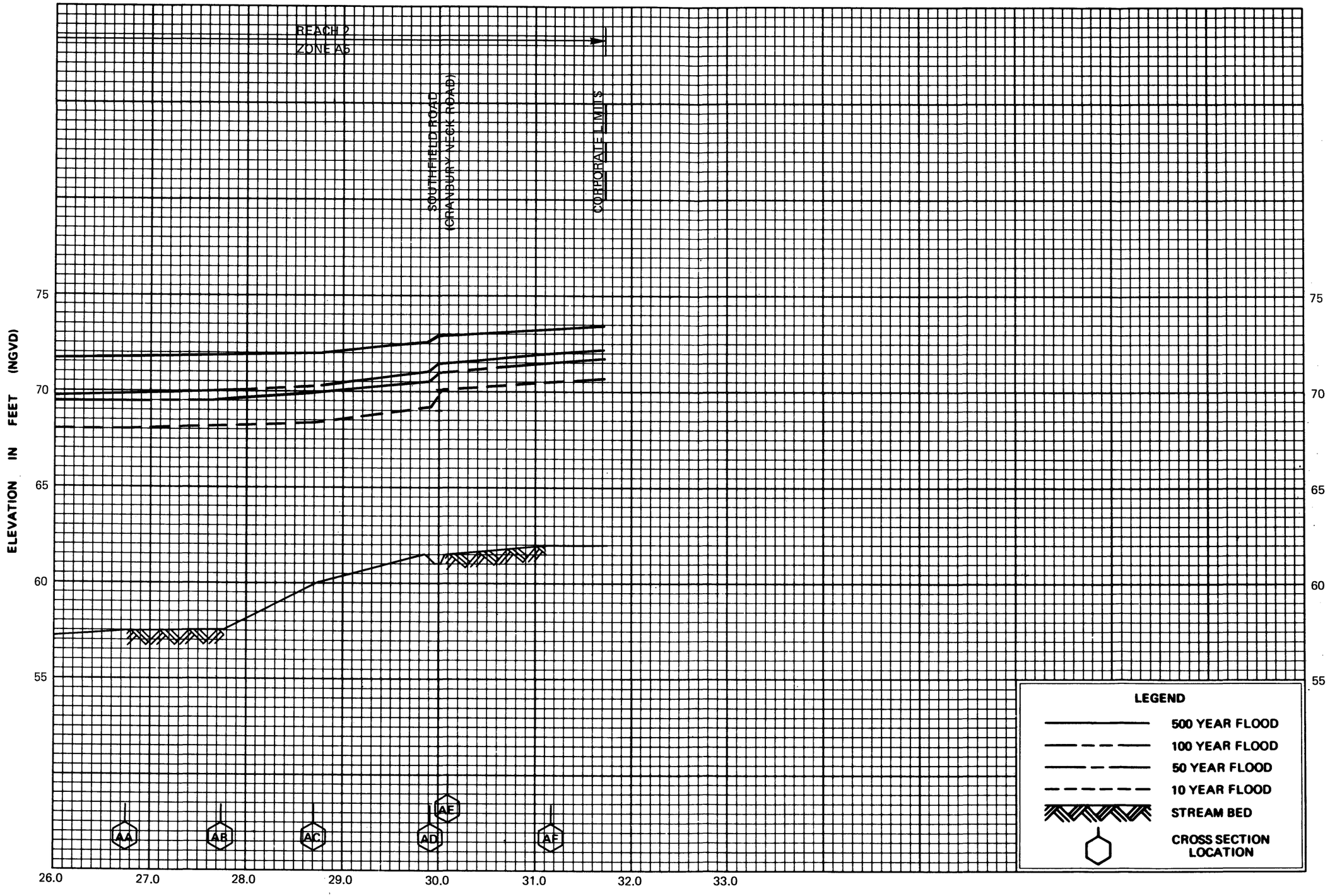
FLOOD PROFILES

MILLSTONE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF WEST WINDSOR, NJ
(MERCER CO.)

02P



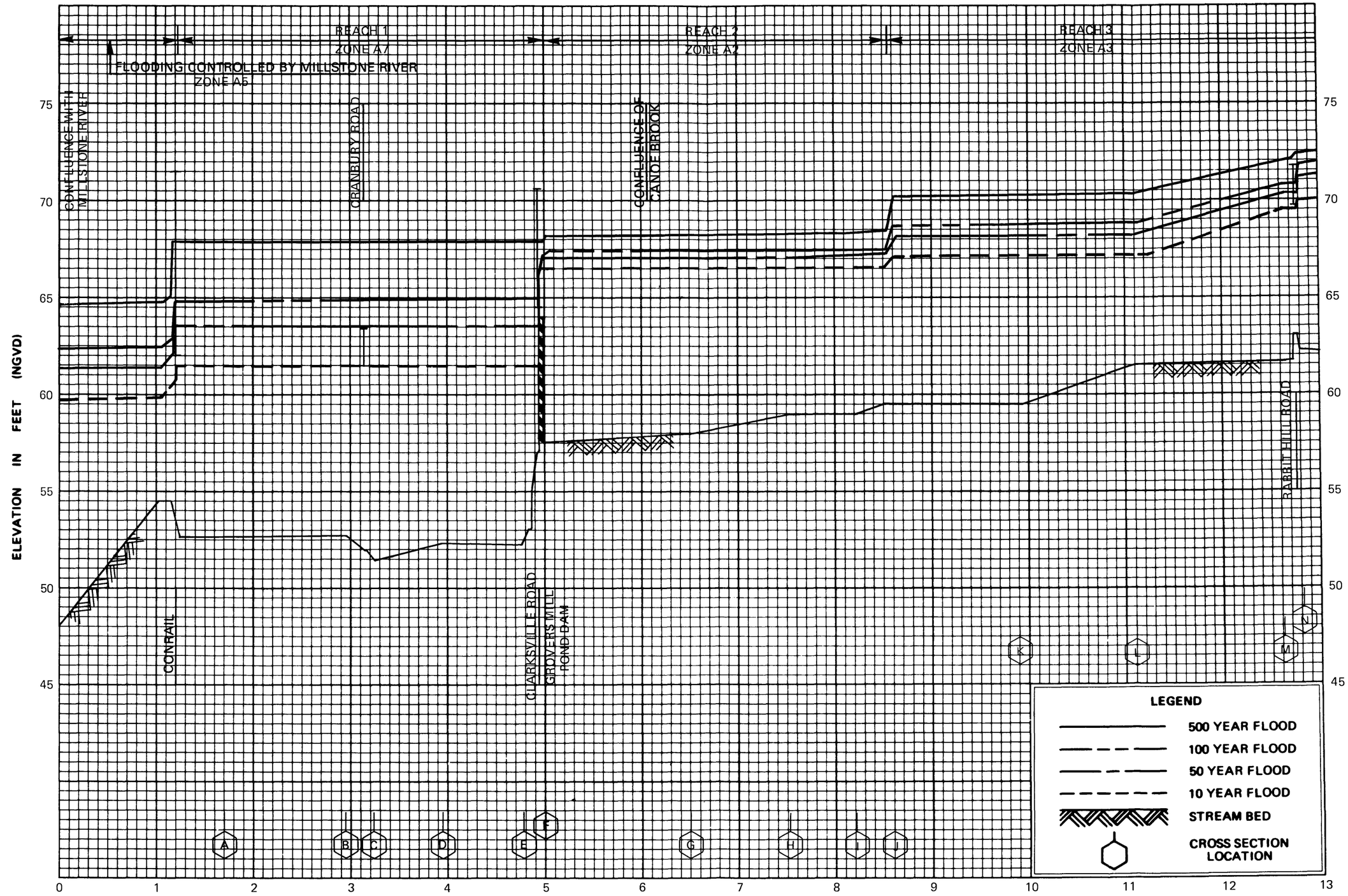
FLOOD PROFILES

MILLSTONE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF WEST WINDSOR, NJ
(MERCER CO.)

03P



FLOOD PROFILES

BIG BEAR BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF WEST WINDSOR, NJ
(MERCER CO.)

04P

REACH 3
ZONE A3

REACH 4
ZONE A4

REACH 5
ZONE A5

HIGHTSTOWN ROAD

SOUTHFIELD ROAD

OLD TRENTON ROAD

CONFLUENCE OF BEAR CREEK

CORPORATE LIMITS

ELEVATION IN FEET (NGVD)

85
80
75
70
65
60

13 14 15 16 17 18 19 20 21 22 23 24 25 26

STREAM DISTANCE IN THOUSANDS OF FEET ABOVE CONFLUENCE WITH MILLSTONE RIVER

C P Q R S T U V W X Y Z AA AB

LEGEND

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

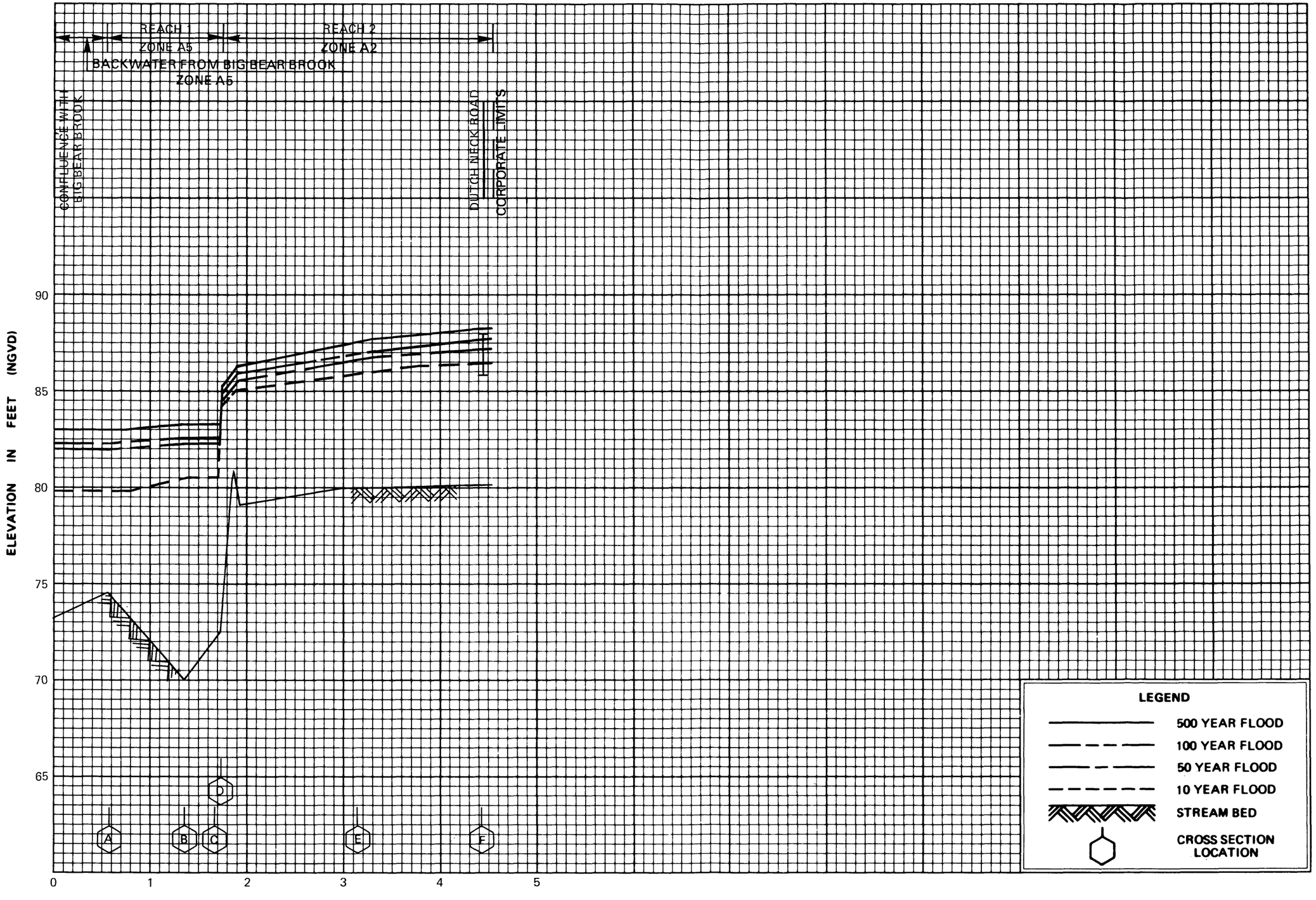
FLOOD PROFILES

BIG BEAR BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF WEST WINDSOR, NJ
(MERCER CO.)

05P



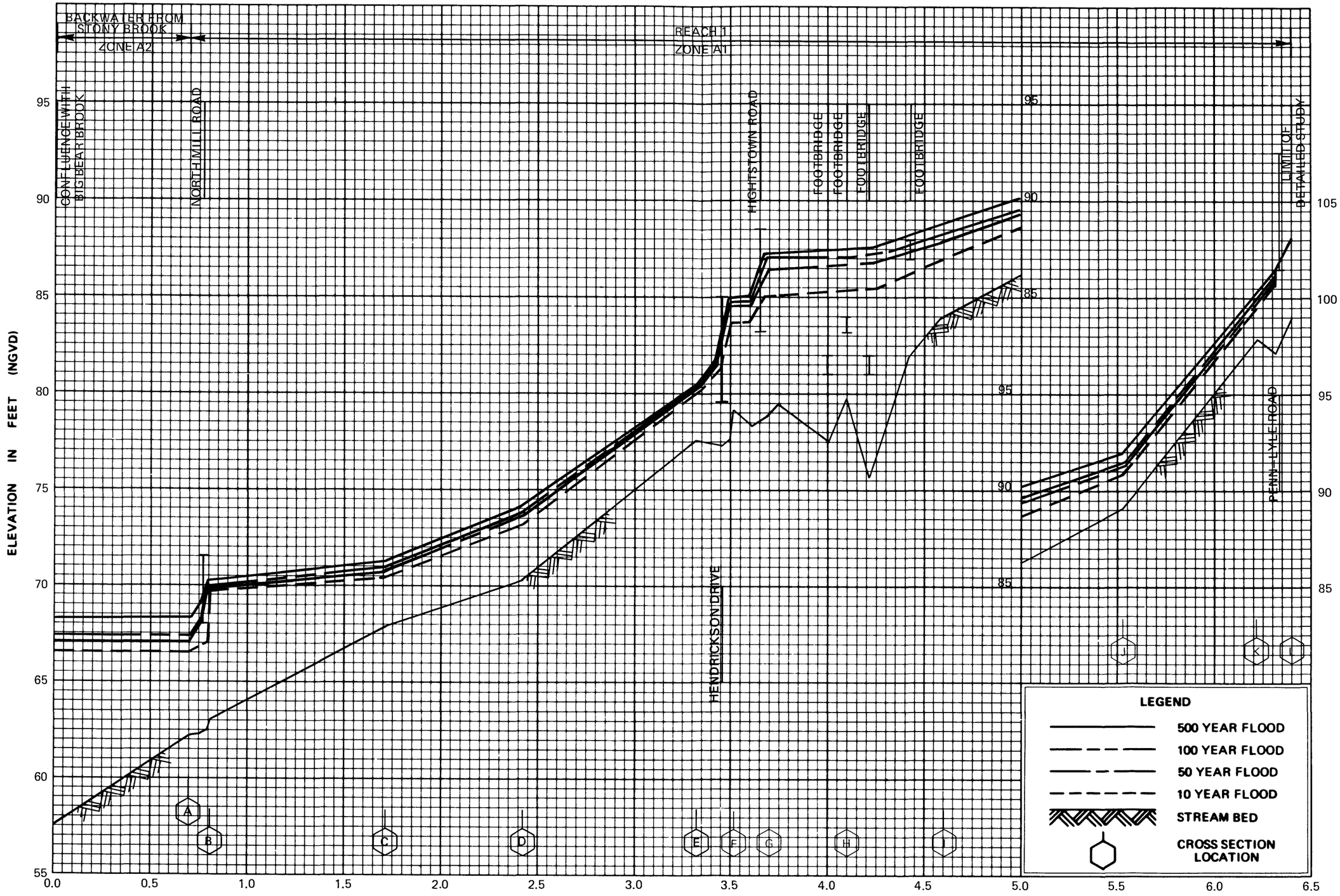
FLOOD PROFILES

BEAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF WEST WINDOR, NJ
(MERCER CO.)

06P



FLOOD PROFILES

CANOE BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF WEST WINDSOR, NJ
(MERCER CO.)

07P

BACKWATER FROM MILLSTONE RIVER

ZONE A5

CONFLUENCE WITH MILLSTONE RIVER

HIGHTSTOWN ROAD

CONRAIL

ALEXANDER ROAD

LIMIT OF DETAILED STUDY

ELEVATION IN FEET (NGVD)

70
65
60
55
50
45

0 1 2 3 4 5 6 7 8 9 10 11 12 13

STREAM DISTANCE IN THOUSANDS OF FEET ABOVE CONFLUENCE WITH MILLSTONE RIVER

A B C D E F G H I J K

LEGEND

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

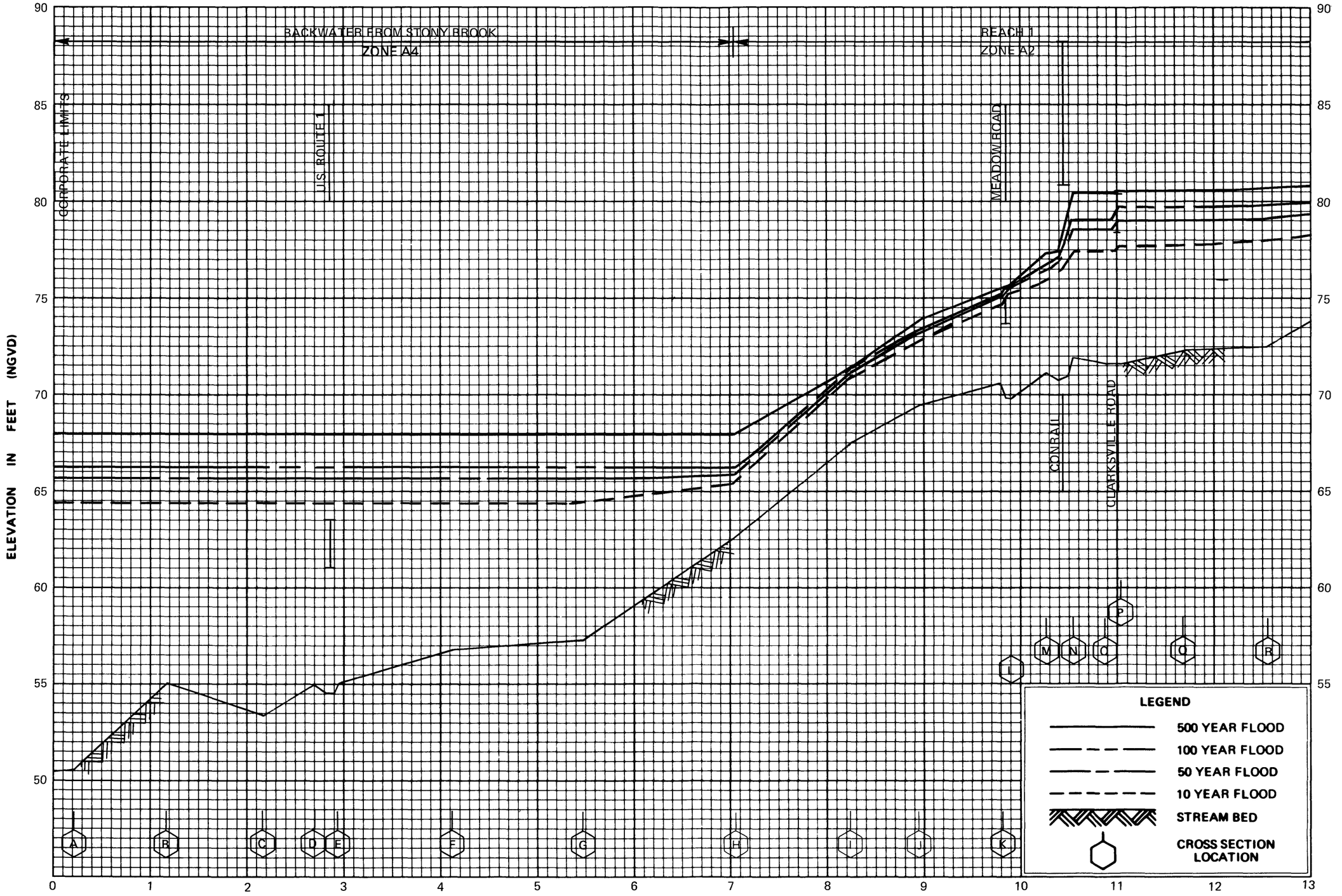
FLOOD PROFILES

LITTLE BEAR BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF WEST WINDSOR, NJ
(MERCER CO.)

08P



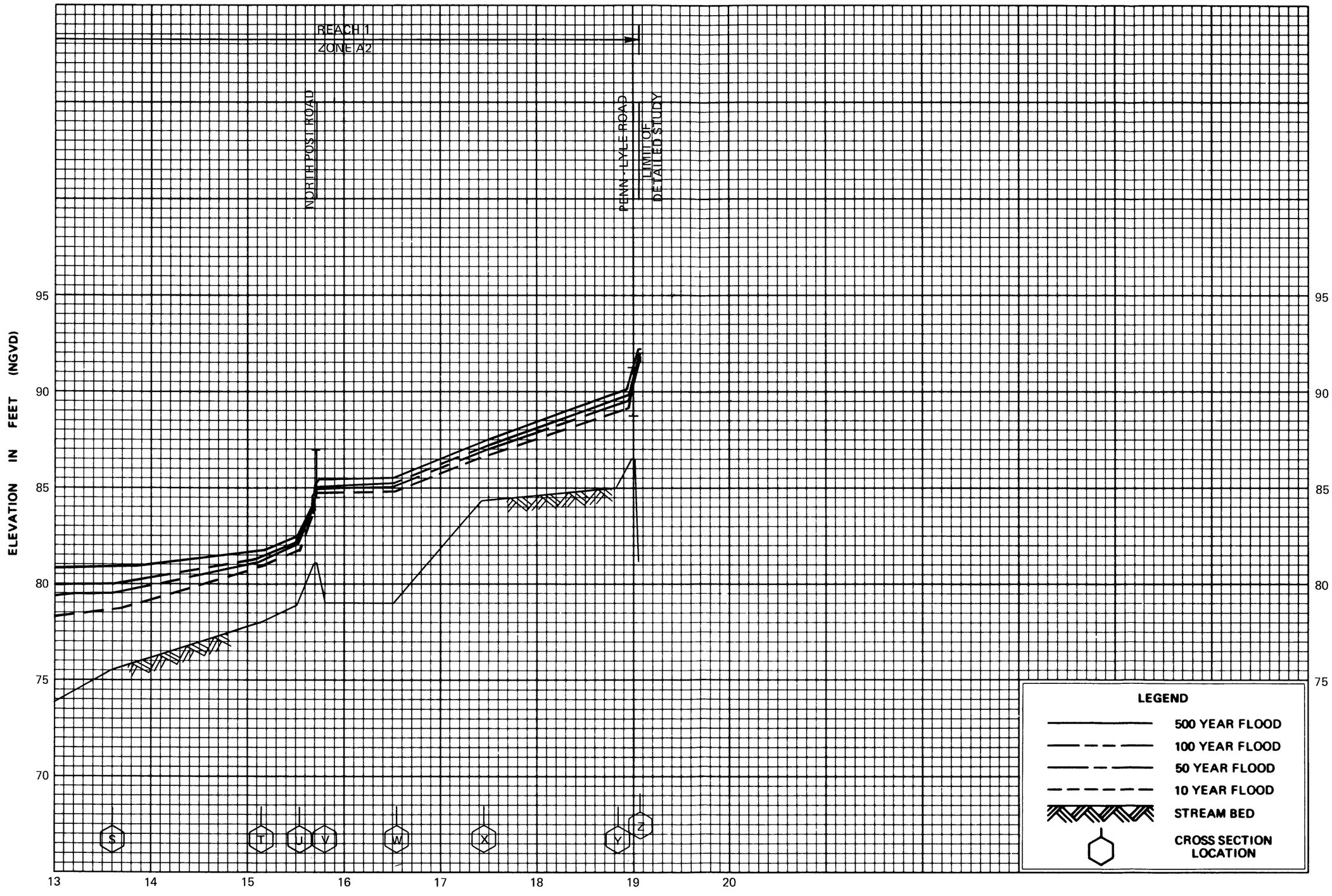
FLOOD PROFILES

DUCK POND RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF WEST WINDSOR, NJ
(MERCER CO.)

09P



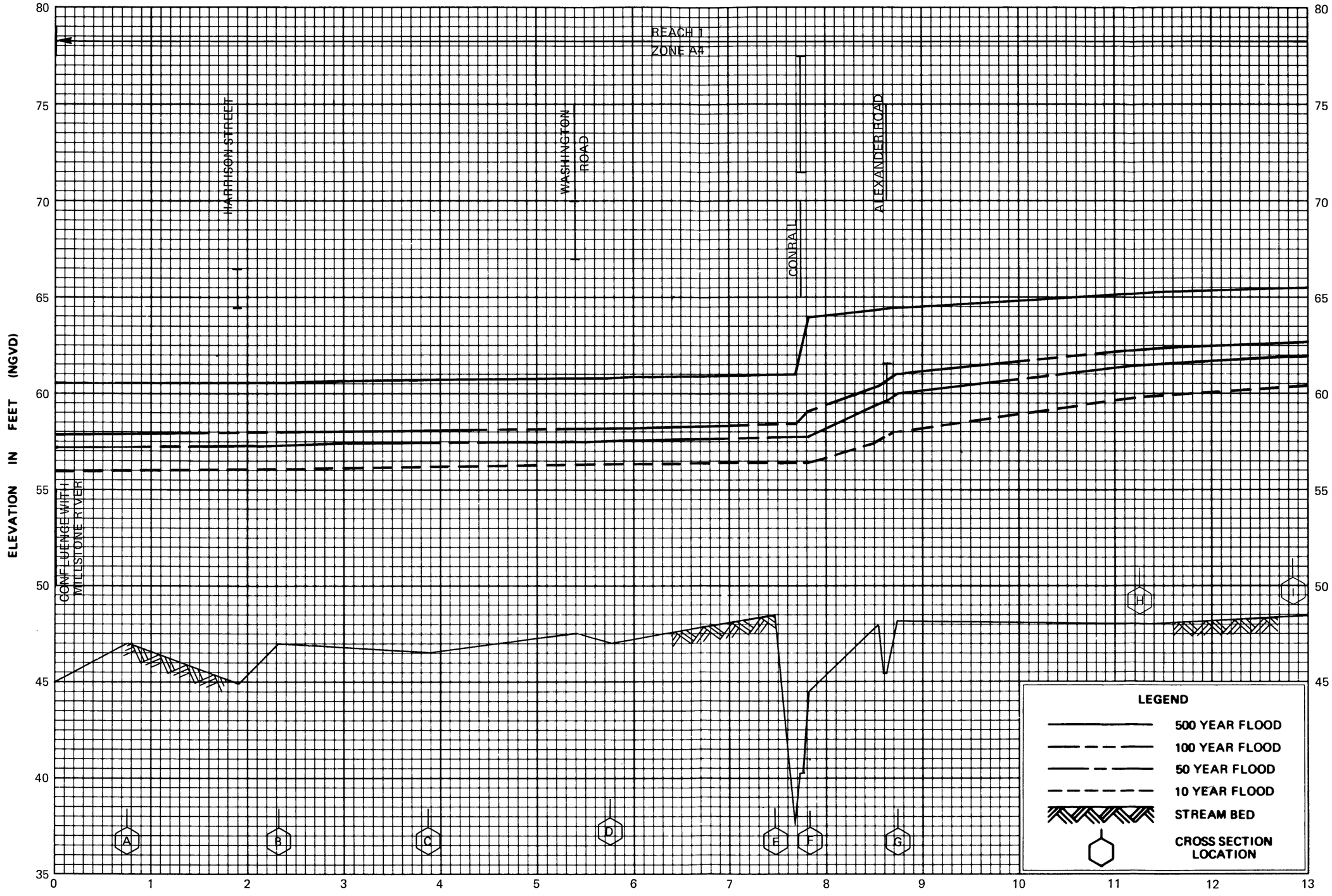
FLOOD PROFILES

DUCK POND RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF WEST WINDSOR, NJ
(MERCER CO.)

10P



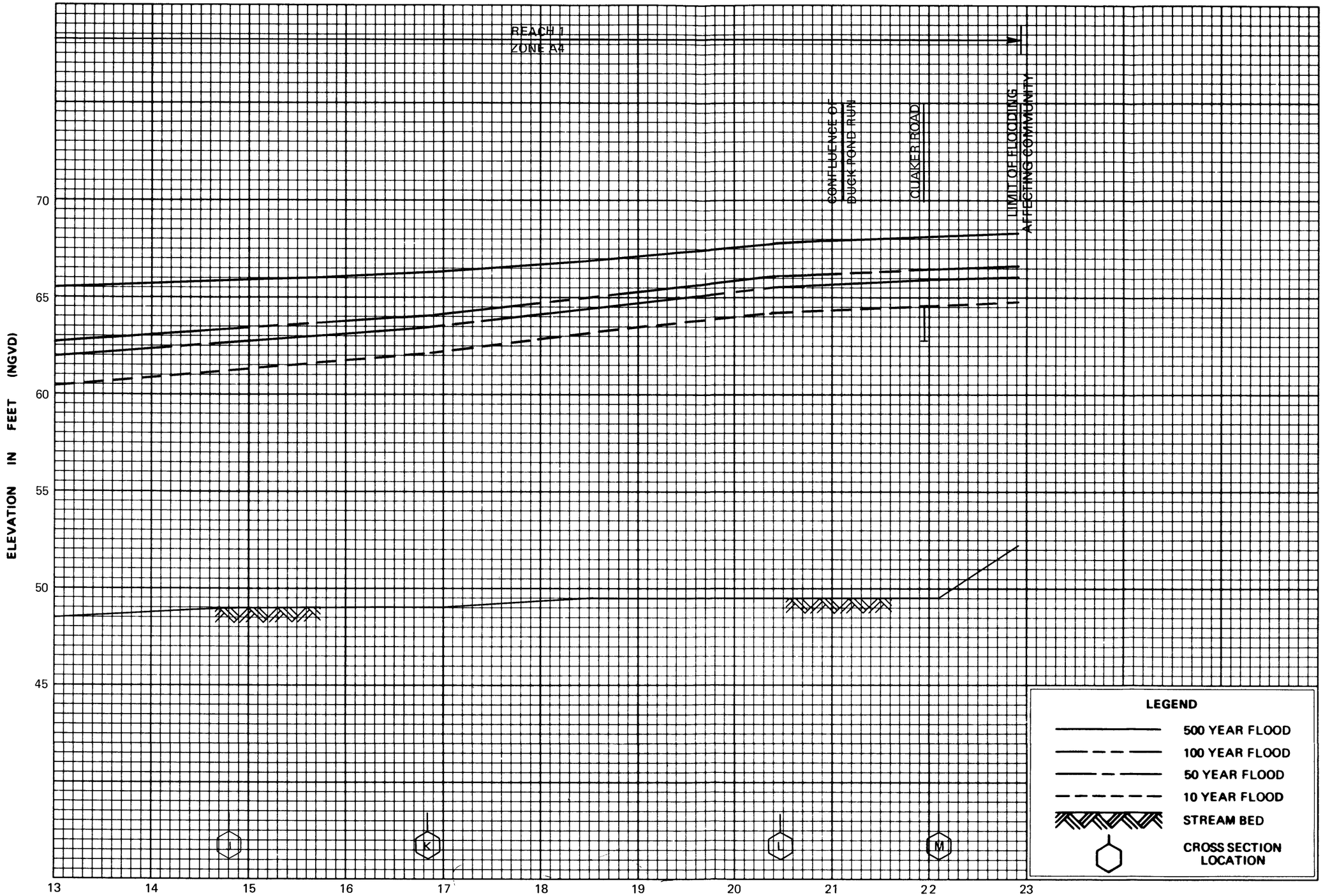
FLOOD PROFILES

STONY BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF WEST WINDSOR, NJ
(MERCER CO.)

11P



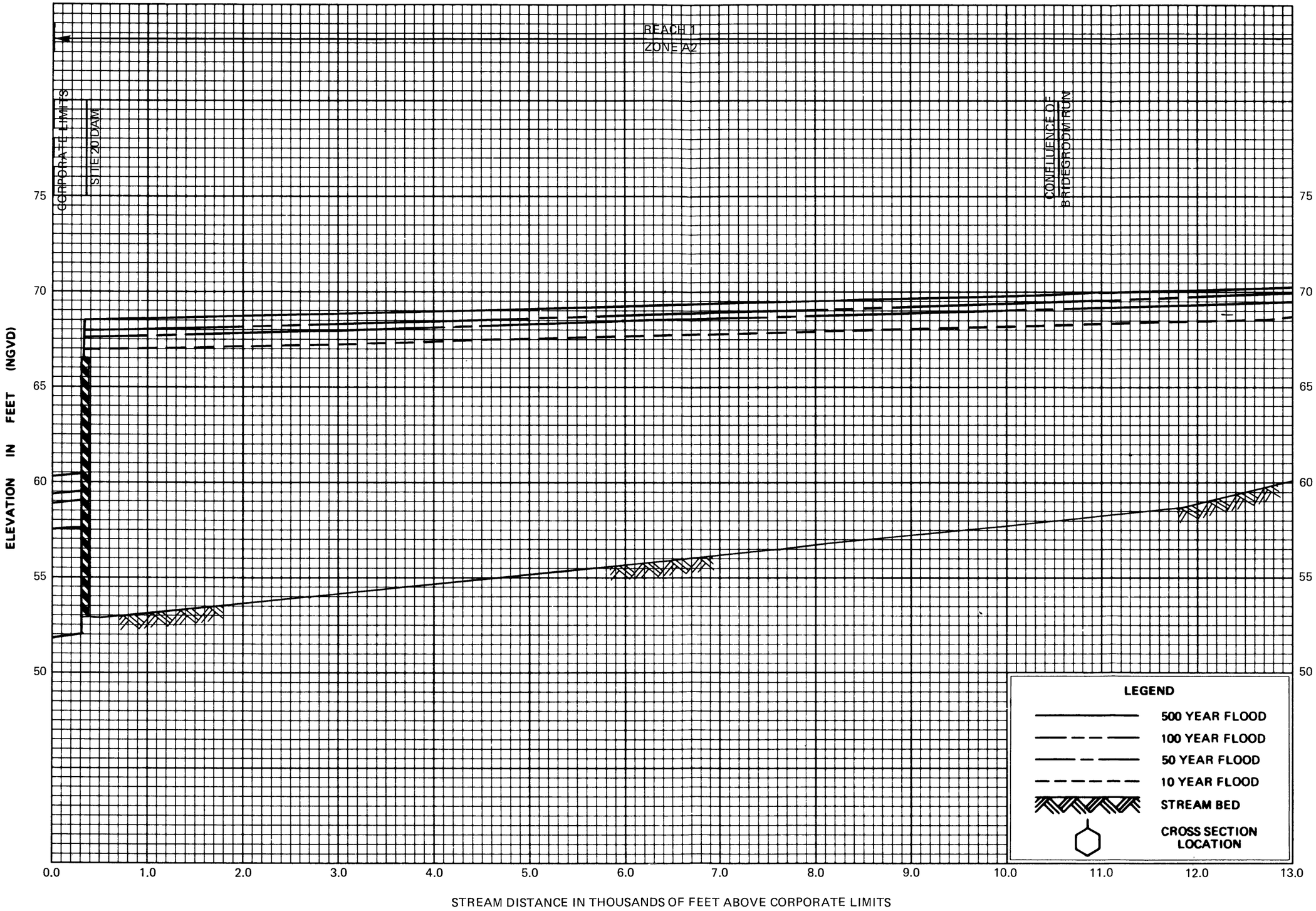
FLOOD PROFILES

STONY BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF WEST WINDSOR, NJ
(MERCER CO.)

12P



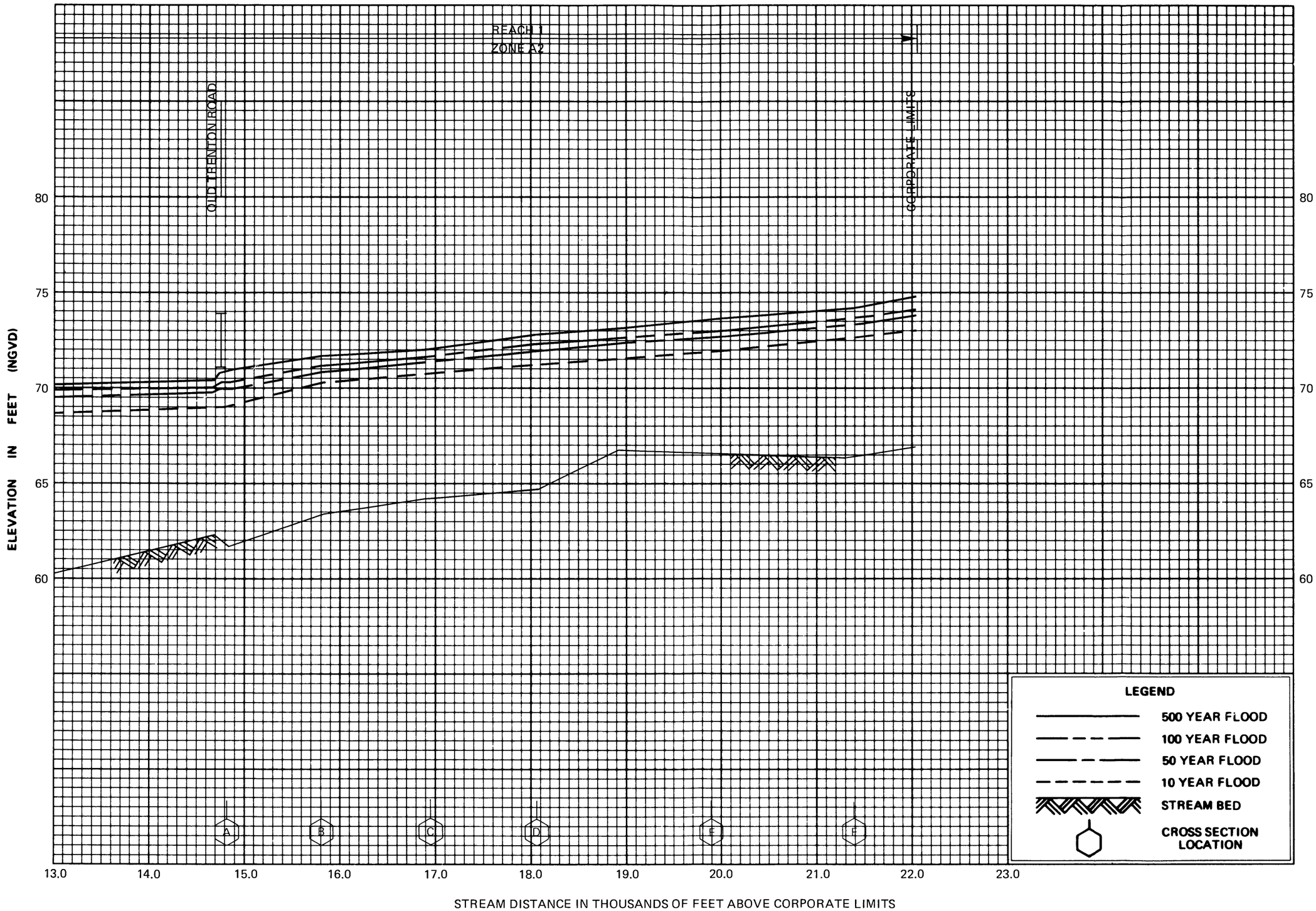
FLOOD PROFILES

ASSUNPINK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF WEST WINDSOR, NJ
(MERCER CO.)

13P



FLOOD PROFILES

ASSUNPINK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF WEST WINDSOR, NJ

(MERCER CO.)

14P

FLOOD PROFILES

BRIDEGROOM RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF WEST WINDSOR, NJ
(MERCER CO.)

15P

West Windsor Build Out

FEMA WSE Conversion

22 October 2014

INPUT	OUTPUT
State Plane, NAD83	State Plane, NAD83
2900 - New Jersey, U.S. Feet	2900 - New Jersey, U.S. Feet
Vertical - NGVD29 (Vertcon94), U.S. Feet	Vertical - NAVD88, U.S. Feet

West Windsor 100YR

1/2

Northing/Y:	541719.235	**Northing/Y:**	541719.235
Easting/X:	456227.35	**Easting/X:**	456227.350
Elevation/Z:	62	**Elevation/Z:**	60.921
Convergence:	-0 04 59.91021	**Convergence:**	-0 04 59.91021
Scale Factor:	0.999901473	**Scale Factor:**	0.999901473
Combined Factor:	0.999903703	**Combined Factor:**	0.999903754

Grid Shift (U.S. ft.): X/Easting = 0.0, Y/Northing = 0.0

West Windsor 500YR

2/2

Northing/Y:	541719.235	**Northing/Y:**	541719.235
Easting/X:	456227.35	**Easting/X:**	456227.350
Elevation/Z:	64.5	**Elevation/Z:**	63.421
Convergence:	-0 04 59.91021	**Convergence:**	-0 04 59.91021
Scale Factor:	0.999901473	**Scale Factor:**	0.999901473
Combined Factor:	0.999903583	**Combined Factor:**	0.999903635

Grid Shift (U.S. ft.): X/Easting = 0.0, Y/Northing = 0.0

Remark: