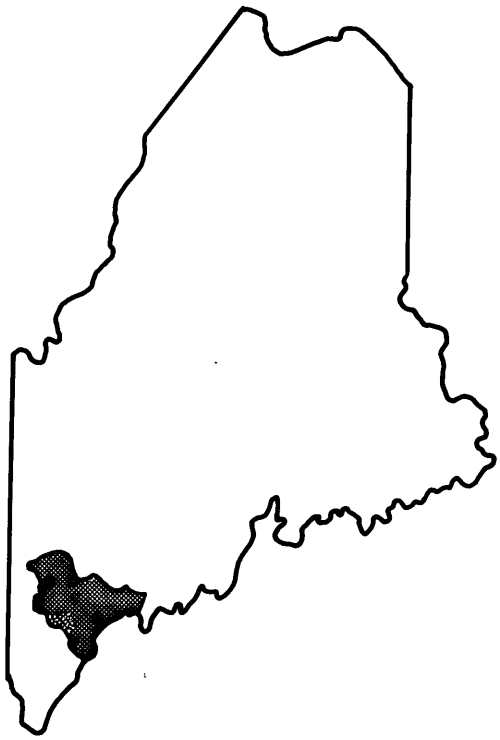
FLOOD INSURANCE STUDY

TOWN OF NAPLES, MAINE
CUMBERLAND COUNTY



OCTOBER 1, 1981

Federal Emergency Management Agency

COMMUNITY NUMBER - 230050

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1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Town of Naples, Cumberland County, Maine, 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 Naples 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 Soil Conservation Service for the Federal Emergency Management Agency, under Inter-Agency Agreement No. IAA-H-17-78, Project Order No. 5. This study was completed in November 1979.

1.3 Coordination

Identification of streams requiring detailed and approximate study was accomplished at an initial Consultation and Coordination Officer's (CCO) meeting in January 1978, attended by representatives of the FEMA, the Town of Naples, and the Soil Conservation Service (SCS - the study contractor).

On May 20, 1980, the results of the study were reviewed at a final CCO meeting attended by representatives of the SCS, the FEMA, and the Town of Naples.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Town of Naples, Cumberland County, Maine. The area of study is shown on the Vicinity Map (Figure 1).

The areas studied by detailed methods were the Songo River; the Crooked River, from the confluence with the Songo River to Molly Gut; Sebago Lake; the Bay of Naples (Brandy Pond), and Long Lake. 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 November 1984.

The areas studied by approximate methods were Cold Rain Pond, Holt Pond, Leavitt Brook, the Muddy River, Peabody Pond, Trickey Pond, the portions of the Crooked River not studied by detailed methods, and several unnamed areas throughout Naples. 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 Town of Naples is located in the northern portion of Cumberland County in southwestern Maine. The total land area contained within the corporate limits is 33.0 square miles. Naples is bordered by the Towns of Harrison and Otisfield to the north, the Town of Casco to the east, Sebago Lake to the south, the Town of Sebago to the southwest, and the Town of Bridgton to the northwest. Naples is situated approximately 25 miles southwest of Lewiston, Maine, and 25 miles north-northwest of Portland, Maine.

The population in the Town of Naples increased from 956 in 1970 to an estimated 1,539 in 1977 (Reference 1).

The Songo River, which flows south, forms the southeastern border of Naples and is the principal tributary of Sebago Lake. It has a length of 3.7 miles and a drainage area of 275 square miles (Reference 2).

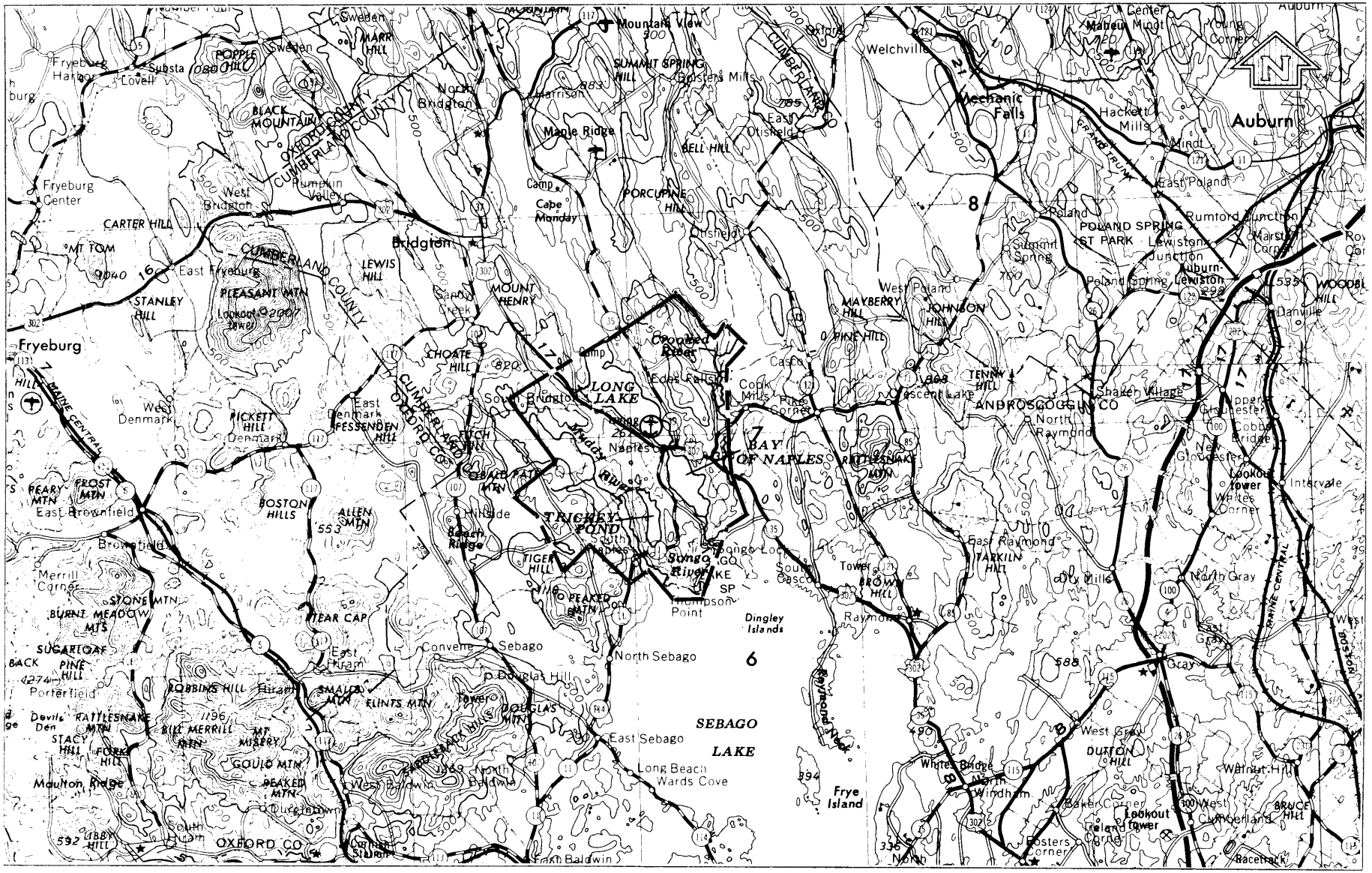


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF NAPLES, ME
(CUMBERLAND CO.)

APPROXIMATE SCALE

4 0 4 8 12 MILES

VICINITY MAP

The Crooked River, which flows south through northern Naples and forms the eastern border of southern Naples, is a principal tributary of the Songo River. It has a length of 42 miles and a drainage area of 152 square miles (Reference 3).

Sebago Lake, which borders Naples to the south, is the source of the Presumpscot River and is Maine's second largest lake. It has a surface area of 28,800 acres and a drainage area of 441 square miles (Reference 2) at its outlet in Windham.

Long Lake, a portion of which is located in north-central Naples, empties into the Bay of Naples. It has a surface area of 4,900 acres, 1,800 of which are in Naples, and a drainage area of 114 square miles.

The Bay of Naples, otherwise known as Brandy Pond, is located between the outlet of Long Lake and the head of the Songo River in Naples. It has a surface area of 760 acres and a drainage area of 119 square miles.

The majority of the land area of Naples is devoted to timber stands. Within the studied flood plains, development consists of single-family residences, businesses, seasonal homes, recreational development, a National Register Historic Site, a state park, roads, and bridges. The majority of development in Naples is located along U. S. Route 302, primarily in the Village of Naples. There is also substantial recreational development located around and adjacent to the lakes and ponds of Naples, and along the Crooked and Songo Rivers.

The Naples area receives an average annual precipitation of 45 inches, which includes the water equivalent of 90 inches of snow. Precipitation is rather evenly distributed throughout the year; however, snowmelt in the spring accounts for a large part of the runoff. The average annual temperature for the area is approximately 45.7 degrees Fahrenheit (°F), ranging from means of 20.4°F in January to 70.0°F in July (Reference 4).

2.3 Principal Flood Problems

Sebago Lake water-level records have been kept by the Portland Water District since 1905. These show the flood of record to have occurred in June 1917. This flood reached an elevation of approximately 267.7 feet and is estimated to have a frequency of approximately 70 years. The second largest flood recorded was in April 1953. It had an elevation of approximately 267.5 feet and has an estimated frequency of 30 years. Floods of lesser magnitude were recorded on Sebago Lake in 1920, 1928, 1936, 1945, 1954, 1960, and 1973.

Monthly storage records were kept for Long Lake and the Bay of Naples at Songo Lock from 1920 through 1960 (Reference 5). The records show major floods occurring in 1920, 1936, and 1953 and these floods having recurrence frequencies of approximately 70, 70, and 20 years, respectively.

The only known record of a flood discharge on the Crooked River was 8,300 cubic feet per second (cfs), measured in Norway, Maine, in March 1936 (Reference 6), which would have a frequency of approximately 30 years. Records of high-water marks and flood damages were kept at Scribner's Mills in Harrison, Maine, for many years. These show major floods having occurred on the Crooked River in 1896, 1936, 1942, and 1953.

Past history of floods in the area has indicated that most flooding occurs in the winter or early spring months as a result of heavy rainfall on snow-covered or frozen ground. Flooding in the summer months is most often associated with thunderstorms, although tropical hurricanes occasionally generate prolonged heavy rainfalls in the area.

Within the past 15 years, a substantial number of seasonal homes have been constructed on the flood plains of the Songo and Crooked Rivers. Many of these structures sustain damage from relatively frequent floods (Figure 2). Flooding on these rivers also results in damages to single-family residences, recreational property, roads, bridges, Sebago Lake State Park, and the Songo Lock, a National Register Historic Site.

Flooding on the Bay of Naples, Long Lake, and Sebago Lake results in damages to single-family dwellings, numerous seasonal homes, businesses, recreational property, roads, and Sebago Lake State Park (Figure 3).

2.4 Flood Protection Measures

There are no known existing or planned flood protection structures within the Town of Naples.

In 1971, the state of Maine enacted the "Mandatory Zoning and Subdivision Control Law" (Reference 7) which requires all municipal units of government to adopt zoning and subdivision control ordinances for shoreland areas. Shoreland areas are defined as land within 250 feet of the normal high-water mark of any pond, river, or saltwater body. If a municipality fails to adopt zoning and subdivision controls for any reason, the Maine Department of Environmental

Figure 2 - Crooked River; seasonal residences during the flood of April 1969. This flood is estimated to have a frequency of 5 years. (SCS photograph, 1969).

Figure 3 - Long Lake-Bay of Naples, damage in causeway area of Naples resulting from the flood of March 1936.

Protection and the Maine Land Use Regulation Commission shall adopt suitable ordinances for that municipality. The law was revised by the Maine Legislature in 1973 to give the municipalities until June 30, 1974, to adopt the ordinances. At that time, a moratorium was declared in those communities that had failed to develop ordinances on all shoreland areas as defined above. This law prohibits filling or earth-moving without a permit within 250 feet of the shoreline.

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 and peak elevation-frequency relationships for floods of the selected recurrence intervals for each flooding source studied in detail affecting the community.

Flood discharges on the Songo and Crooked Rivers were generated from the SCS TR-20 hydrologic evaluation model (Reference 8) which was developed for flood hazard analyses studies of the Crooked River in Casco, Naples, Harrison, and Otisfield (References 9 and 10). This model utilizes such variables as rainfall-frequency data, soil type, antecedent moisture condition, land use, time of concentration, and drainage area.

A summary of drainage area-peak discharge relationships 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
SONGO RIVER					
5,000 feet above Sebago Lake	292.0	6,300	10,000	11,500	15,200
CROOKED RIVER					
540 feet above confluence with the Songo River	151.5	6,100	9,500	11,000	14,800

For Sebago Lake, the Bay of Naples, and Long Lake hydrologic analyses were carried out to establish peak elevation-frequency for floods of the selected recurrence intervals.

Water-surface elevations for the selected recurrence intervals on Sebago Lake were furnished by the USGS. The USGS determined the water-surface elevations by using 40 years (1920-1960) of gaging station information from the Sebago Lake dam gage.

Water-surface elevations for the Bay of Naples, Long Lake, and the Songo River above Songo Lock were computed through the use of a log-Pearson Type III analysis (Reference 11) on 40 years of records, 1920-1960, from the Songo Lock gaging station.

A summary of peak elevation frequency relationships is shown in Table 2, "Summary of Elevations."

TABLE 2 - SUMMARY OF ELEVATIONS

FLOODING SOURCE AND LOCATION	PEAK ELEVATIONS (feet) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
BAY OF NAPLES	273.2	274.0	274.4	275.1
LONG LAKE	273.2	274.0	274.4	275.1
SEBAGO LAKE	267.3	267.6	267.7	268.0

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.

Water-surface elevations for the Songo and Crooked Rivers were computed through the use of the SCS WSP-2 computer program starting from critical depth at Sebago Lake (Reference 12).

Cross sections for the Crooked and Songo Rivers below the Crooked River confluence were obtained from aerial photographs (Reference 11). Those on the Songo River above the confluence of the Crooked River, and all below-water sections, bridges, dams, and culverts were obtained from field surveys.

Channel roughness factors (Manning's "n") used in the hydraulic computations were chosen using engineering judgment based on field observations of the streams and flood plain area. Roughness values for the main channel of the Songo River ranged from 0.045 to 0.057 with flood plain roughness values ranging from 0.070 to 0.110 for all floods. Roughness values for the main channel of the Crooked River ranged from 0.037 to 0.071 with flood plain roughness values ranging from 0.065 to 0.150 for all floods.

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).

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 the streams 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 and on Sebago Lake the boundaries were interpolated from stereo-plotted flood plain maps with a contour interval of 4 feet (Reference 12). The boundaries on the Bay of Naples and Long Lake were delineated by field surveys, stereoscoping aerial photographs (Reference 13), the use of topographic maps (Reference 14), and the Flood Hazard Boundary Map (Reference 15). 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 boundary of the 100-year flood was taken from the Flood Hazard Boundary Map. Both the topographic maps and aerial photographs referenced above and field-checks were utilized to verify the approximate flood boundaries.

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. 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 3).

For the Songo River the floodway was computed up until Songo Lock Road at which point all water-surface elevations remain static. For this reason, it was determined that a floodway was unnecessary upstream of this point.

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 floodways widths for both the Songo and Crooked Rivers extend beyond the corporate limits of Naples.

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 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 4.

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

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
Songo River								
A	5,000[1]	1216/814[3]	7,569	1.52	268.4	268.4	269.4	1.0
B	8,205[1]	433/345[3]	3,659	3.14	270.3	270.3	271.3	1.0
C	9,990[1]	1129/1027[3]	8,303	1.38	271.0	271.0	272.0	1.0
D	12,050[1]	505/429[3]	4,986	2.31	271.8	271.8	272.8	1.0
E	14,195[1]	170	2,264	0.55	272.4	272.4	273.4	1.0
Crooked River								
A	540[2]	448/355[3]	4,056	2.71	272.9	272.9	273.9	1.0
B	730[2]	516/77[3]	4,972	2.21	274.0	274.0	275.0	1.0
C	2,330[2]	732/280[3]	6,986	1.57	274.5	274.5	275.5	1.0
D	2,915[2]	664/79[3]	6,619	1.66	274.7	274.7	275.7	1.0
E	4,020[2]	564/463[3]	5,047	2.18	275.1	275.1	276.1	1.0
F	5,945[2]	288/56[3]	3,645	3.02	276.5	276.5	277.5	1.0
G	8,160[2]	744/123[3]	9,356	1.18	277.0	277.0	278.0	1.0
H	10,070[2]	726/131[3]	8,017	1.37	277.8	277.8	278.8	1.0
I	12,745[2]	811/639[3]	9,314	1.18	278.3	278.3	279.3	1.0
J	15,715[2]	775/108[3]	6,320	1.74	279.7	279.7	280.7	1.0
K	17,355[2]	457/95[3]	6,523	1.69	280.0	280.0	281.0	1.0
L	18,400[2]	920/433[3]	9,919	1.11	280.2	280.2	281.2	1.0
M	22,295[2]	905/331[3]	7,217	1.52	281.3	281.3	282.3	1.0

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

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF NAPLES, ME
(CUMBERLAND CO.)

FLOODWAY DATA

SONGO RIVER AND CROOKED RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
Crooked River (continued)								
N	22,835	150/75	2,178	5.05	281.3	281.3	282.3	1.0
O	23,320	136/68	2,086	5.27	281.6	281.6	282.6	1.0
P	24,645	517/97	5,435	2.02	282.2	282.2	283.2	1.0
Q	25,345	597/423	4,500	2.44	282.7	282.7	283.7	1.0
R	25,515	461/84	6,230	1.77	283.6	283.6	284.6	1.0
S	25,715	149/61	2,483	4.43	284.2	284.2	285.2	1.0
T	26,165	160/80	2,456	4.48	284.8	284.8	285.8	1.0
U	27,155	126/63	2,231	4.93	285.1	285.1	286.1	1.0
V	28,470	427/357	3,262	3.37	286.0	286.0	287.0	1.0
W	30,280	332/253	4,596	2.39	287.3	287.3	288.3	1.0
X	32,385	453/392	6,871	1.60	288.2	288.2	289.2	1.0
Y	35,030	442/357	5,030	2.19	288.9	288.9	289.9	1.0
Z	36,355	523/322	8,757	1.26	289.5	289.5	290.5	1.0
AA	37,090	287/178	3,851	2.86	289.6	289.6	290.6	1.0
AB	37,425	511/336	6,667	1.65	289.8	289.8	290.8	1.0
AC	37,985	671/599	9,403	1.17	289.8	289.8	290.8	1.0
AD	38,225	870/635	11,416	0.96	290.5	290.5	291.5	1.0
AE	38,835	774/59	9,811	1.12	290.5	290.5	291.5	1.0
AF	40,510	592/367	7,669	1.43	290.5	290.5	291.5	1.0

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

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF NAPLES, ME
(CUMBERLAND CO.)

FLOODWAY DATA

CROOKED RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
Crooked River (continued)								
AG	40,925	178	2,780	3.96	290.5	290.5	291.5	1.0
AH	41,535	884	10,063	1.09	290.8	290.8	291.8	1.0
AI	43,040	123	2,349	4.68	291.5	291.5	292.5	1.0
AJ	46,100	809	8,784	1.25	292.1	292.1	293.1	1.0
AK	48,845	175	2,805	3.92	294.4	294.4	295.4	1.0
AL	50,475	175	2,787	3.95	295.4	295.4	296.4	1.0
AM	51,565	357	3,966	2.77	296.1	296.1	297.1	1.0
AN	52,455	172	2,882	3.82	296.8	296.8	297.8	1.0
AO	52,655	251	2,814	3.91	301.3	301.3	302.3	1.0
AP	52,950	147	2,049	5.37	302.0	302.0	303.0	1.0
AQ	53,045	303	3,559	3.09	302.4	302.4	303.4	1.0
AR	53,135	246	3,231	3.40	303.0	303.0	304.0	1.0
AS	53,290	156	1,848	5.95	303.0	303.0	304.0	1.0
AT	53,840	115	1,312	8.39	304.5	304.5	305.5	1.0
AU	54,390	171	2,165	5.08	305.9	305.9	306.9	1.0
AV	54,830	139	1,763	6.24	306.2	306.2	307.2	1.0
AW	55,910	170	2,178	5.05	307.2	307.2	308.2	1.0
AX	56,710	345	4,227	2.60	307.9	307.9	308.9	1.0

[1] Feet above confluence with Songo River

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF NAPLES, ME
(CUMBERLAND CO.)

FLOODWAY DATA

CROOKED RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
Crooked River (continued)								
AY	58,070	1419	12,851	0.86	308.4	308.4	309.4	1.0
AZ	59,355	1714	15,713	0.70	308.4	308.4	309.4	1.0
BA	60,545	1379	12,771	0.86	308.4	308.4	309.4	1.0

[1]Feet above confluence with Songo River

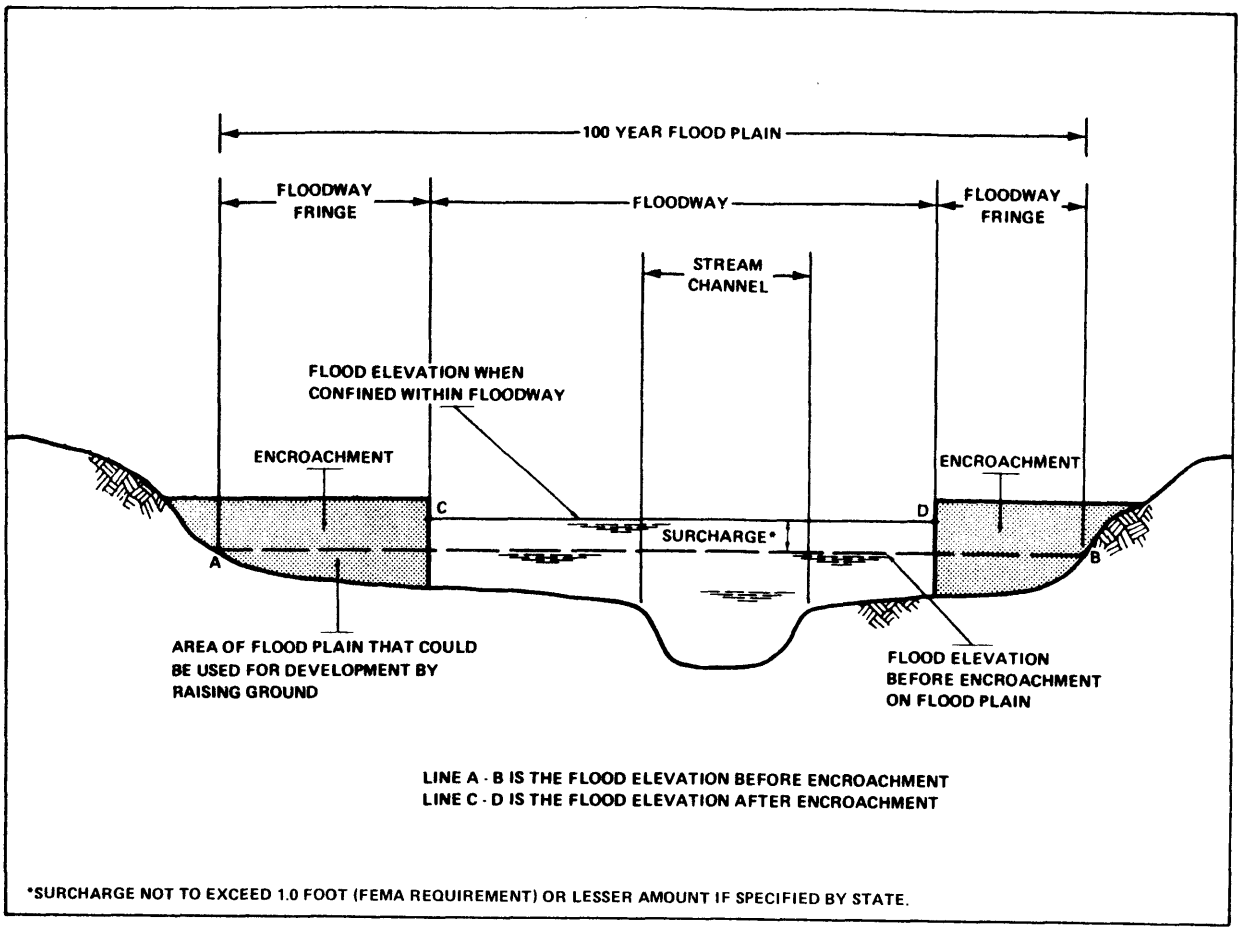
TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF NAPLES, ME
(CUMBERLAND CO.)

FLOODWAY DATA

CROOKED RIVER



FLOODWAY SCHEMATIC

Figure 4

insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHFs), and flood insurance zone designations for each flooding source affecting the Town of Naples.

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 Town of Naples are shown on the Flood Profiles (Exhibit 1) and are summarized in the Flood Insurance Zone Data Table (Table 4).

In lacustrine areas, reaches are limited to the distance for which the difference between the 10- and 100-year flood elevations does not vary more than 1.0 foot. Using these criteria, the Sebago Lake shoreline qualifies as one reach whose flooding source is Sebago Lake. The Bay of Naples shoreline qualifies as one reach whose flooding source is the Bay of Naples. The Long Lake shoreline qualifies as one reach whose flooding source is Long Lake.

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 Town of Naples 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, A4, 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.

FLOODING SOURCE	PANEL	ELEVATION DIFFERENCE BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Sebago Lake							
Reach 1	15, 21	-0.4	-0.1	+0.3	005	A1	268
Songo River							
Reach 1	18, 21	-0.9	-0.2	+0.5	010	A2	Varies
Reach 2	18	-1.9	-0.5	+1.0	020	A4	Varies
Reach 3	18	-1.1	-0.3	+0.6	010	A2	Varies
Crooked River							
Reach 1	06,08,16,18	-3.5	-0.9	+2.1	035	A7	Varies
Bay of Naples							
Reach 1	16, 18	-1.2	-0.4	+0.7	010	A2	274
Long Lake							
Reach 1	05,08,15,16	-1.2	-0.4	+0.7	010	A2	274

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF NAPLES, ME
(CUMBERLAND CO.)

FLOOD INSURANCE ZONE DATA

SEBAGO LAKE, SONGO RIVER, CROOKED RIVER, BAY OF NAPLES AND LONG LAKE

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.

Table 4, "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 Town of Naples.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the Town of Naples 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

In 1974, the SCS published a Flood Hazard Analyses for the Crooked River in the Towns of Casco and Naples (Reference 9). Information generated for this study was used in preparing the Flood Insurance Study for the Town of Naples; however, a revision in the gage datum on Sebago Lake has resulted in lower flood stages on Sebago Lake, the Songo River, and the lower portion of the Crooked River.

A Flood Hazard Analysis (Reference 10) was published by the SCS in 1975 for the Crooked River in the Towns of Harrison and Otisfield, which border Naples and Casco, respectively. Information in this study is in agreement with information appearing in the Flood Insurance Study for the Town of Naples.

Flood Insurance Studies are currently being prepared for the surrounding Towns of Bridgton, Casco, Harrison, Otisfield, and Waterford, Maine (References 16, 17, 18, 19, and 20). Information used in these studies is in agreement with information appearing in the Flood Insurance Study for the Town of Naples.

A Flood Hazard Boundary Map has been published by the FEMA (Reference 15). The differences between the Flood Hazard Boundary Map and this study are justified due to the more detailed nature of this Flood Insurance Study.

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 Insurance and Mitigation Division of the Federal Emergency Management Agency, Regional Director, Region I Office, J. W. McCormack Post Office and Courthouse Building, Room 462, Boston, Massachusetts 02109.

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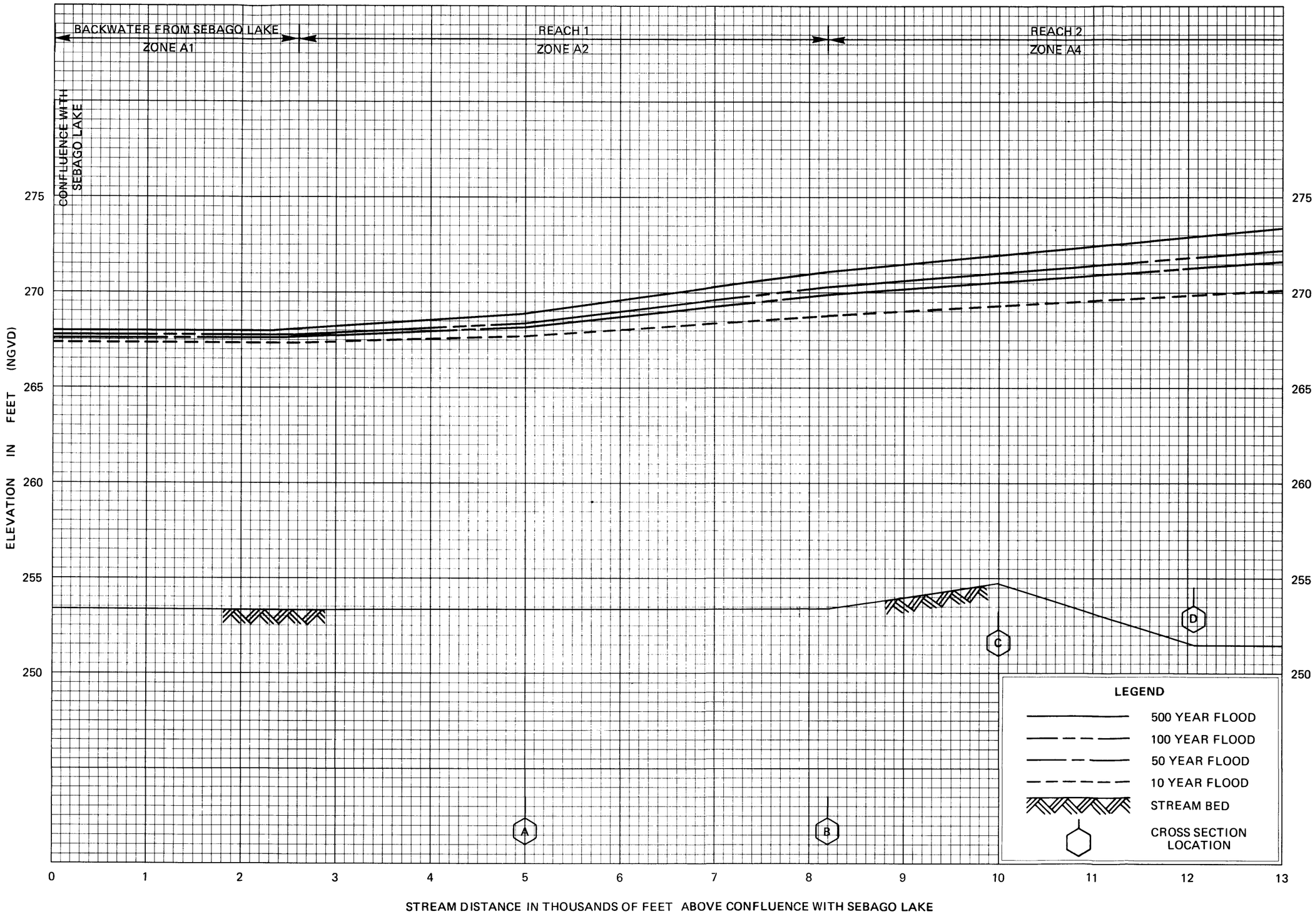


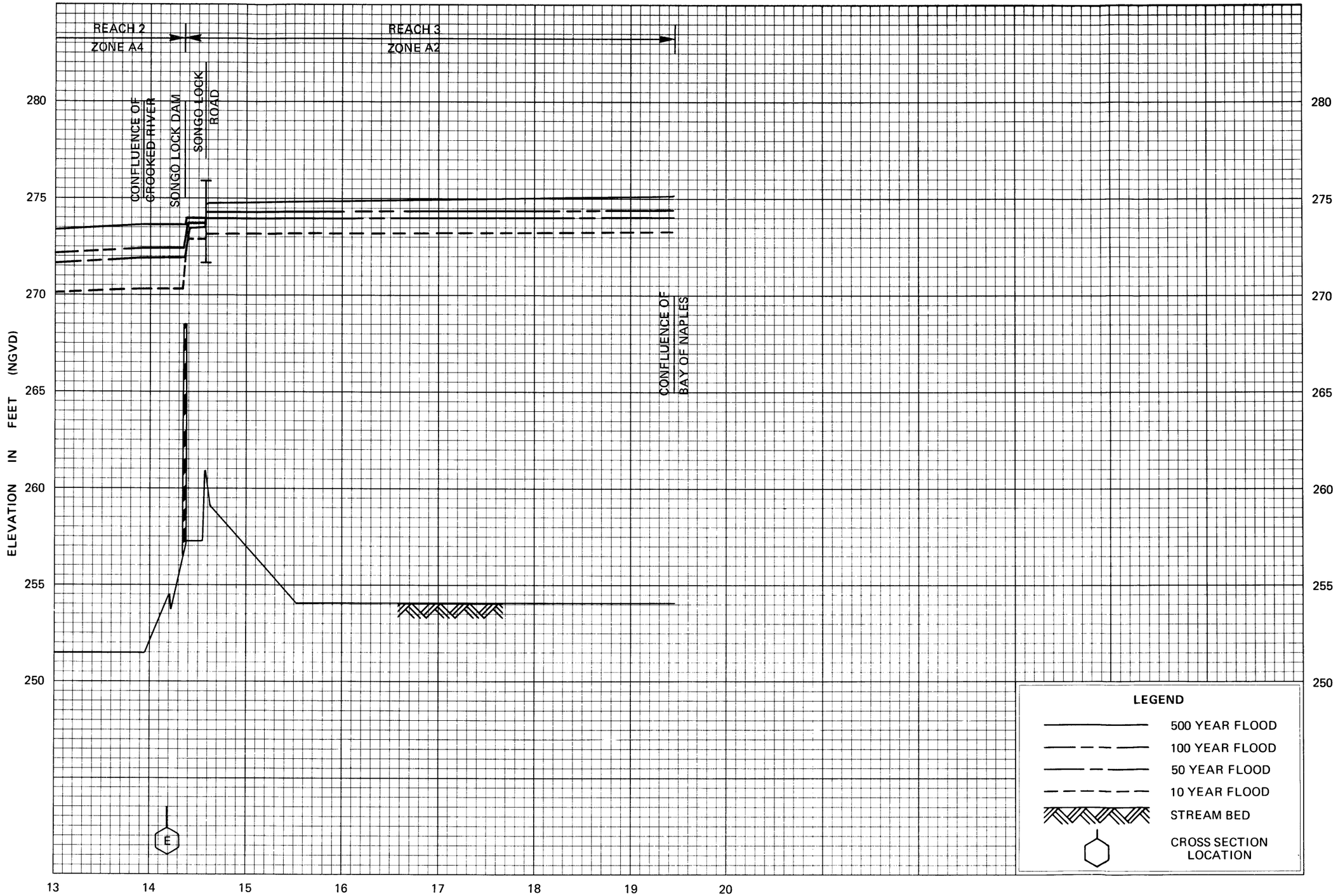
FLOOD PROFILES

SONGO RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF NAPLES, ME
(CUMBERLAND CO.)

01P



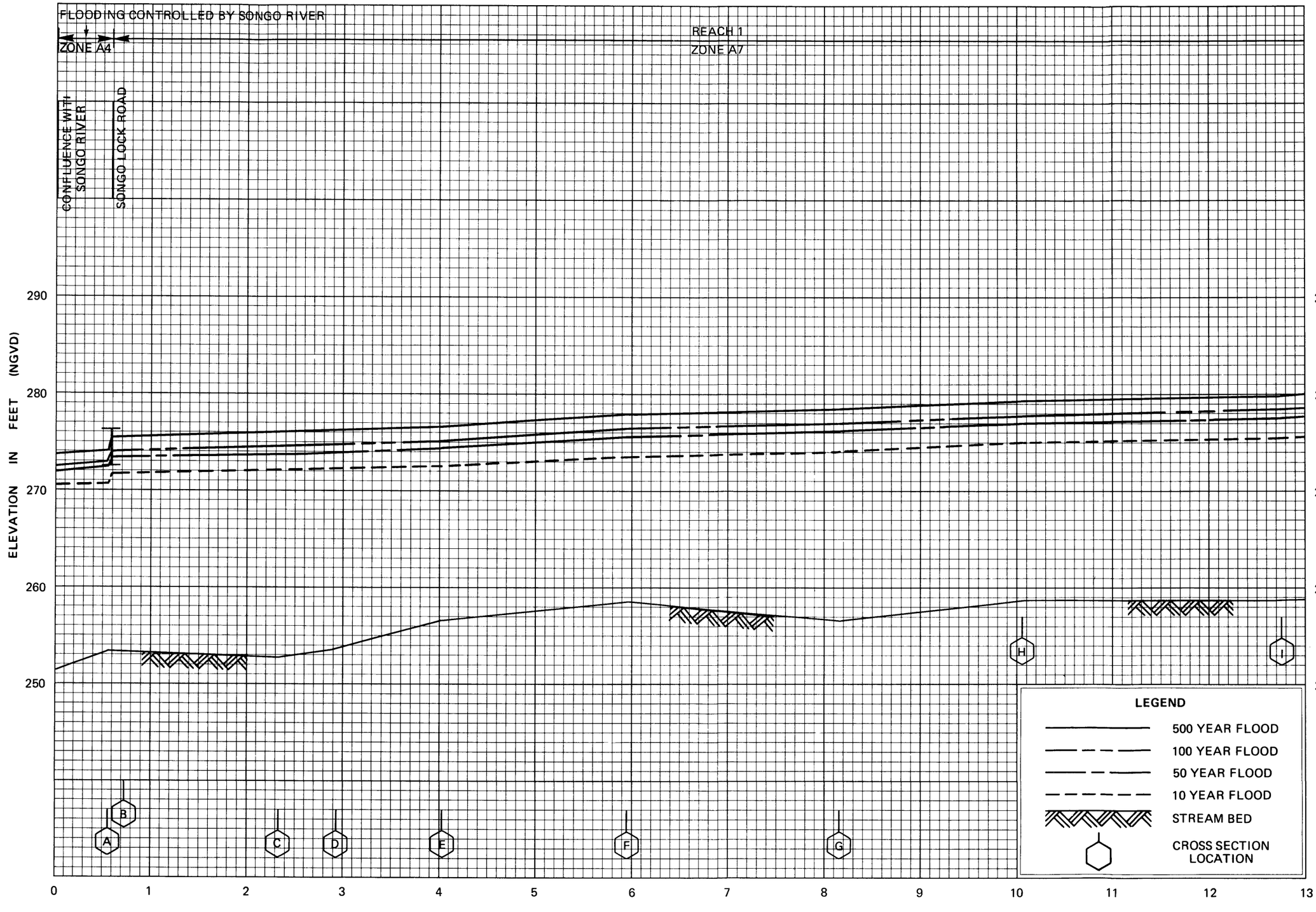
FLOOD PROFILES

SONGO RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF NAPLES, ME
(CUMBERLAND CO.)

02P



FLOOD PROFILES

CROOKED RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF NAPLES, ME
(CUMBERLAND CO.)

03P

REACH 1
ZONE A7

U.S. ROUTE 302
STATE ROUTE 35
ABANDONED ROAD

ELEVATION IN FEET (NGVD)

290
280
270
260
250

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

STREAM DISTANCE IN THOUSANDS OF FEET ABOVE CONFLUENCE WITH SONGO RIVER

J K L M N O P Q R S

LEGEND

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

FLOOD PROFILES

CROOKED RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF NAPLES, ME
(CUMBERLAND CO.)

04P

REACH 1
ZONE A7

STATE ROUTE 11

ELEVATION IN FEET (NGVD)

300
290
280
270
260

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

26 27 28 29 30 31 32 33 34 35 36 37 38 39

STREAM DISTANCE IN THOUSANDS OF FEET ABOVE CONFLUENCE WITH SONGO RIVER

LEGEND

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

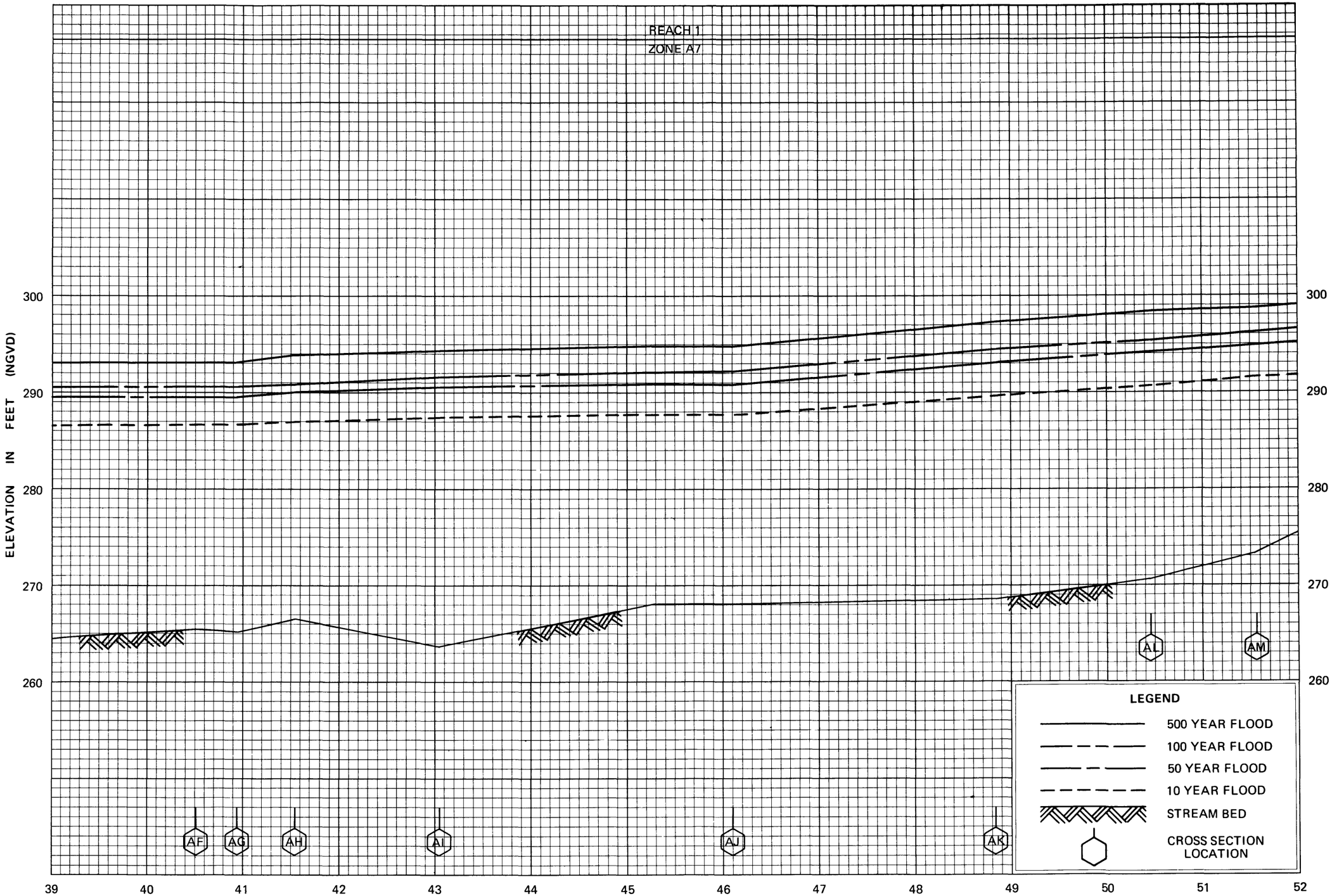
FLOOD PROFILES

CROOKED RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF NAPLES, ME
(CUMBERLAND CO.)

05P



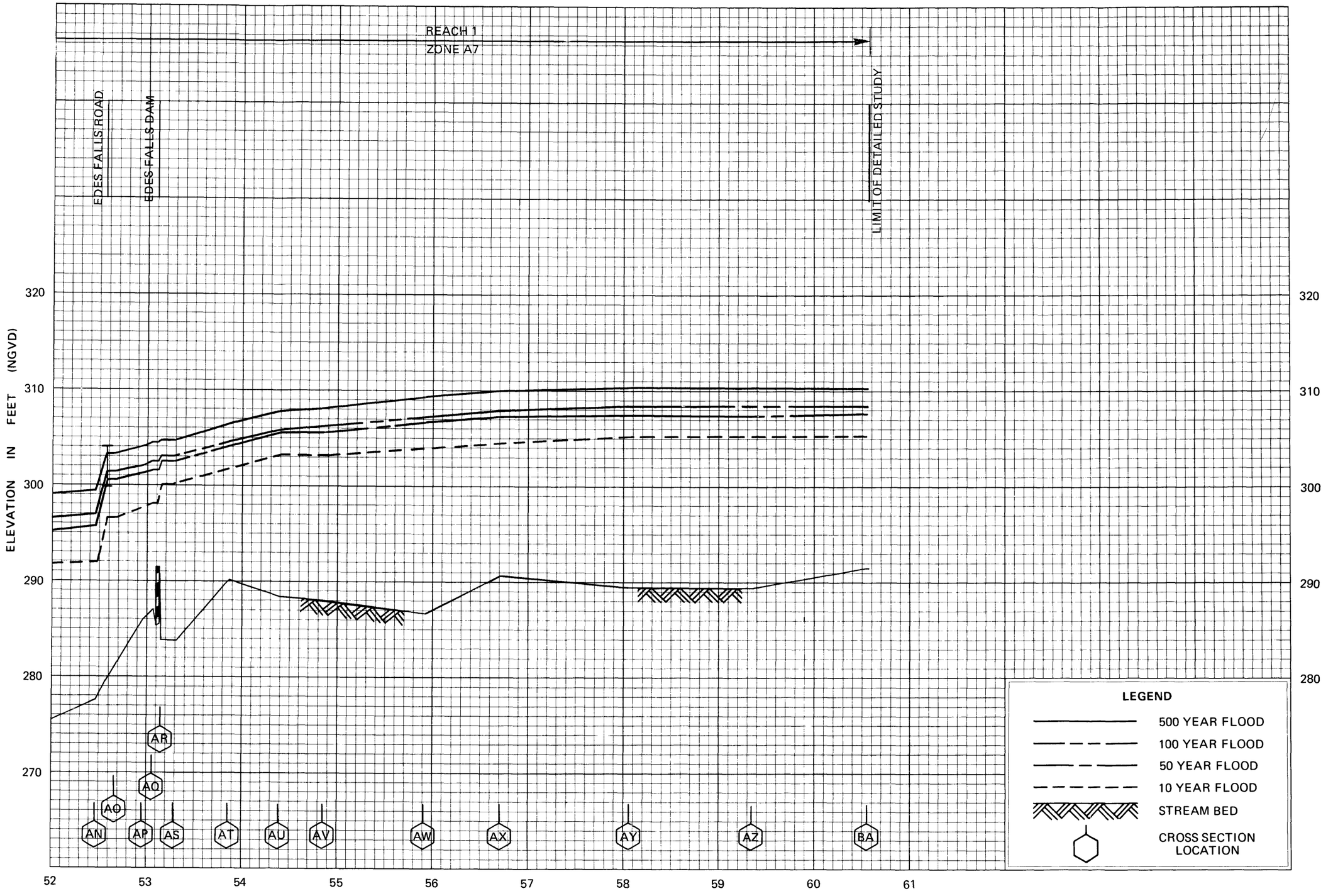
FLOOD PROFILES

CROOKED RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF NAPLES, ME
(CUMBERLAND CO.)

06P



FLOOD PROFILES

CROOKED RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF NAPLES, ME
(CUMBERLAND CO.)

07P