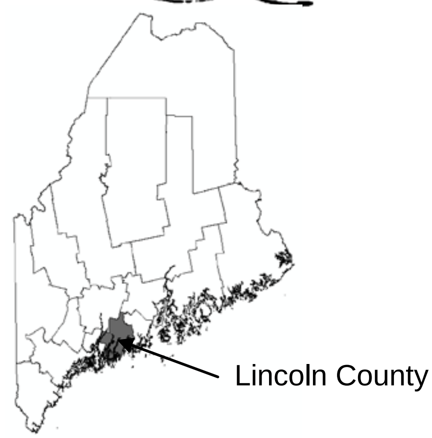
FLOOD INSURANCE STUDY

LINCOLN COUNTY, MAINE
(ALL JURISDICTIONS)



COMMUNITY NAME	COMMUNITY NUMBER
Alna, Town of	230083
Bar Island	230916
Boothbay, Town of	230212
Boothbay Harbor, Town of	230213
Bremen, Town of	230214
Bristol, Town of	230215
Damariscotta, Town of	230216
Dresden, Town of	230084
Edgecomb, Town of	230217
Haddock Island	230918
Hibberts Gore, Township of	230712
Hungry Island	230917
Indian Island	230919
Jefferson, Town of	230085
Jones Garden Island	230925
Killick Stone Island	230927
Louds Island	230915
Marsh Island	230921

COMMUNITY NAME	COMMUNITY NUMBER
Monhegan Plantation	230511
Newcastle, Town of	230218
Nobleboro, Town of	230219
Polins Ledges Island	230929
Ross Island	230922
Somerville, Town of	230512
South Bristol, Town of	230220
Southport, Town of	230221
Thief Island	230920
Thrumcap Island	230928
Waldoboro, Town of	230086
Webber Dry Ledge Island	230930
Western Egg Rock Island	230926
Westport, Town of	230222
Whitefield, Town of	230087
Wiscasset, Town of	230223
Wreck Island	230924
Wreck Island Ledge	230923

PRELIMINARY DATE: February 7, 2014

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
23015CV001A

NOTICE TO
FLOOD INSURANCE STUDY USERS

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

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

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

Old Zone(s)	New Zone
Al through A30	AE
Vl through V30	VE
B	X (Shaded)
C	X

Initial Countywide FIS Effective Date:

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Flood Insurance Rate Map

FLOOD INSURANCE STUDY
LINCOLN COUNTY, MAINE
(ALL JURISDICTIONS)

1.0 INTRODUCTION

1.1 Purpose of Study

This countywide Flood Insurance Study (FIS) report investigates the existence and severity of flood hazards in the geographic area of Lincoln County, Maine including the Towns of Alna, Boothbay Harbor, Boothbay, Breman, Bristol, Damariscotta, Dresden, Edgecomb, Jefferson, Newcastle, Nobleboro, S. Bristol, Somerville, Southport, Waldoboro, Westport, Whitefield, and Wiscasset; the Township of Hibberts Gore; and Bar Island, Haddock Island, Hungry Island, Indian Island, Jones Garden Island, Killick Stone Island, Louds Island, Marsh Island, Monhegan Plantation, Polins Ledges Island, Ross Island, Thief Island, Thrumcap Island, Webber Dry Ledge Island, Western Egg Rock Island, Wreck Island, Wreck Island Ledge (referred to collectively herein as Lincoln County).

This FIS aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood-risk data for various areas of the county that will establish actuarial flood insurance rates and to assist the county in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

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

The Digital Flood Insurance Rate Map (DFIRM) and FIS report for this countywide study have been produced in digital format. Flood hazard information was converted to meet the Federal Emergency Management Agency (FEMA) DFIRM database specifications and Geographic Information System (GIS) format requirements. The flood hazard information was created and is provided in a digital format so that it can be incorporated into a local GIS and be accessed more easily by the community.

1.2 Authority and Acknowledgments

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

This FIS was prepared to include all jurisdictions within Lincoln County into a countywide format. Information on the authority and acknowledgements for each of the previously printed FISs and Flood Insurance Rate Maps (FIRMs) for communities within Lincoln County was compiled, and is shown below.

Boothbay, Town of:	The hydrologic and hydraulic analyses for the June 3, 1986 (Reference 1) study were prepared by the U.S. Army Corps of Engineers (USACE), for FEMA, under Inter-Agency Agreement No. EMW-E-0941. This work was completed in March 1984.
Boothbay Harbor, Town of:	The hydrologic and hydraulic analyses for the June 3, 1986 (Reference 2) study were prepared by the USACE, for FEMA, under Inter-Agency Agreement No. EMW-E-0941. This work was completed in March 1984.
Bristol, Town of:	The hydrologic and hydraulic analyses for the June 17, 1986 (Reference 3) study were prepared by the USACE, New England Division, for FEMA, under Inter-Agency Agreement No. EMW-E-0941. This work was completed in July 1986.
Damariscotta, Town of:	The hydrologic and hydraulic analyses for the September 30, 1988 (Reference 4) study were prepared by the U.S. Geological Survey (USGS), for FEMA, under Inter-Agency Agreement No. EMW-85-E-1823, Project Order No. 11. This work was completed in June1987.
Dresden, Town of:	The hydrologic and hydraulic analyses for the May 19, 1987 study were prepared by the USGS, for FEMA, under Inter-Agency Agreement No. EMW-85-E-1823, Project Order No. 11. This work was completed in January1986. For the July 6, 1988 revision (Reference 5), the hydrologic and hydraulic analyses for the Kennebec River were prepared by the USGS, for FEMA, under Inter-Agency Agreement No. EMW-92-E-3848, Project Order No. 4. This work was completed in January1995.
Jefferson, Town of:	The hydrologic and hydraulic analyses for the October 18, 1988 (Reference 6) study were prepared by the USGS, for FEMA, under Inter-Agency Agreement No. EMW-85-E-1823, Project Order No. 11. This work was completed in June1987.
Nobleboro, Town of:	The hydrologic and hydraulic analyses for the November 15, 1989 (Reference 7) study were prepared by the USGS, for FEMA, under Inter-Agency Agreement No. EMW-85-E-2738, Project Order No. 4. This work was completed in July1988.

Somerville, Town of:	The hydrologic and hydraulic analyses for the April 3, 1987 (Reference 9) study were prepared by the USGS, for FEMA, under Inter-Agency Agreement No. EMW-87-E-2548, Project Order No. 1A. This work was completed in December 1989. For the August 19, 1991 revision (Reference 10), the hydrologic and hydraulic analyses for Long Pond, the Sheepscot River, and James Pond were prepared by the USGS, for FEMA, under Inter-Agency Agreement No. EMW-87-E-2548, Project Order No. 1A. This work was completed in December 1989.
South Bristol, Town of:	The hydrologic and hydraulic analyses for the July 16, 1990 (Reference 8) study were prepared by Stone & Webster Engineering Corporation (SWEC), for FEMA, under Inter-Agency Agreement No. EMW-86-C-2231, Project Order No. 4. This work was completed in October1988.
Southport, Town of:	The hydrologic and hydraulic analyses for the May 17, 1988 (Reference 11) study were prepared by the USACE, for FEMA, under Inter-Agency Agreement No. EMW-E-0941. This work was completed in July1986.
Waldoboro, Town of:	The hydrologic and hydraulic analyses for the October 3, 1984 (Reference 12) study were prepared by the Soil Conservation Service (NRCS, formerly SCS) during the course of the flood plain management Study for the Medomak River in the Town of Waldoboro. The NRCS study was completed in September 1982.
Wiscasset, Town of:	The hydrologic and hydraulic analyses for the April 16, 1991 (Reference 13) study were prepared by ENSR Corporation (formerly ERT), for FEMA, under Contract No. EMW-87-C-2446. This work was completed in November 1988.

There are no previous FIS reports or FIRMs published for the Township of Hibberts Gore, Hungry Island, Monhegan Plantation, Polins Ledges Island, Thrumcap Island, Webber Dry Ledge Island, and Wreck Island Ledge. There are no previous FIS reports published for the Towns of Alna, Bremen, Edgecomb, Newcastle, Westport, and Whitefield; as well as Bar Island, Haddock Island, Indian Island, Jones Garden Island, Killick Stone Island, Louds Island, Marsh Island, Ross Island, Thief Island, Western Egg Rock Island, and Wreck Island; therefore the previous authority and acknowledgment information for these communities are not included in this FIS. These communities may not appear in the Community Map History table (Section 6.0).

For this countywide FIS, the DFIRM database and mapping were prepared for FEMA by STARR, a joint venture between CDM Smith, Stantec, and Atkins under the Joint Venture Contract No. HSFEHQ-09-D-0370, Task Order Number HSFE01-11-J1-0007. This work was completed in September 2013.

The orthophotography base mapping was provided the Maine Office of Geographic Information Systems (MEGIS) and was produced from aerial photos collected over Maine in the spring of 2013. The projection used for the basemap was produced in Universal Transverse Mercator (UTM) zone 19, and the horizontal datum used is the North American Datum 1983 (NAD83), Geodetic Reference System (GRS) 80 Spheroid. Differences in the datum, spheroid, projection, or State Plane zones used in the production of FIRMs for adjacent counties may result in slight positional differences in map features at the county boundaries. These differences do not affect the accuracy of information shown on this FIRM.

1.3 Coordination

The purpose of an initial Consultation Coordination Officer's (CCO) meeting is to discuss the scope of the FIS. The initial and final meeting dates for the previous FIS reports for Lincoln County and its communities are listed in Table 1, "Initial and Final CCO Meetings."

Table 1 – Initial and Final CCO Meetings

COMMUNITY NAME	INITIAL MEETING	FINAL MEETING
Boothbay, Town of	June 14, 1982	January 28, 1985
Boothbay Harbor, Town of	June 14, 1982	January 28, 1985
Bristol, Town of	May 5, 1983	August 8, 1988
Damariscotta, Town of	December 1984	November 18, 1987
Dresden, Town of	January 1985 April 29, 1992	June 19, 1986 October 11, 1996
Jefferson, Town of	December 1984	November 18, 1987
Nobleboro, Town of	September 1987	December 7, 1988
S. Bristol, Town of	January 24, 1986	August 16, 1989
Somerville, Town of	April 1988 April 1989	1989 September 19, 1990
Southport, Town of	May 5, 1983	June 4, 1987
Waldoboro, Town of	*	May 17, 1984
Wiscasset, Town of	October 3, 1986	April 16, 1990

* Data Not Available

For this countywide study, the final CCO meeting was held on ______________, and attended by __________________. All problems raised at that meeting have been addressed.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS covers the geographic area of Lincoln County, Maine, including all communities listed in Section 1.1.

Tidal flooding including its wave action from the Atlantic Ocean, affecting the following streams listed in Table 2, "Areas Studied by Detailed Methods," were studied by detailed methods in the pre-countywide flood insurance studies. Limits of Detailed Study are indicated on the Flood Profiles (Exhibit 1) and on the FIRM (Exhibit 2).

For this countywide study, Damariscotta River, Kennebec River, Little Medomak Pond Outlet Stream, Medomak River and Sheepscot River were redelineated by STARR.

Table 2 – Areas Studied by Detailed Methods

Back River	Linekin Bay
Biscay Pond	Little Medomak Pond
Boothbay Harbor	Little Medomak Pond Outlet Stream
Chewonki Creek	Long Pond
Clary Lakes	Medomak Pond
Damariscotta Lake	Medomak River
Damariscotta River	Montsweag Bay
Duckpuddle Pond	Montsweag Brook
Dyer Long Pond	Muscongus Bay
Eastern Branch Johns River	Pemaquid Pond
James Pond	Salt Bay (a part of the Damariscotta River estuary)
Johns Bay	Sheepscot River
Kennebec River	

The areas studied by detailed methods were selected with priority given to all known flood hazards and areas of projected development or proposed construction through 1994. For this new study the areas were redelineated.

Table 3, "Areas Studied by Approximate Methods," lists the streams that were studied by approximate methods in the pre-countywide flood insurance studies. For this countywide study, all approximate study streams were re-studied by STARR.

Table 3 – Areas Studied by Approximate Methods

Adams Pond	French Pond	Pemaquid River
Alford Brook	Gardiner Pond	Pitcher Brook
Back Brook	Goose River	Powderhorn Island
Back Meadow Brook	Hastings Pond	Ram Islands
Benner Brook	Horn Pond	Ross Pond

Table 3 – Areas Studied by Approximate Methods (Continued)

Black Brook	Indiantown Island	Spectacle Island
Boyd Pond	Kerr Pond	The Tidal Flats
Brann Brook	Knickerbocker Lake	Three Corner Pond
Campbell Creek	Labrador Meadow	Tobias Pond
Cooks Pond	Levensaler Brook	Travel Brook
Cross River (portions of)	Little Dyer Pond	Travel Pond
Crummett Brook	Little Falls Brook	Tumbler Island
Davis Stream	Little Pond	Turner Pond
Deer Meadow Brook	Lovejoy Stream	Ward Brook
Deer Meadow Pond	Lower Pond	Waterman Brook
Demuth Brook	Meadow Brook (portions of)	West Branch Sheepscot River
Dodge Pond	Mill Pond	West Branch Stream
Dresden Bog	Muddy Pond	West Harbor Pond
Dyer River	Musquash Pond	Wiley Brook
Fish Hawk Island	Nequasset Brook	
Flood Pond	Oyster Creek	

The islands south of Paradise Point in Linekin Bay, the islands south of Ocean Point on Linekin Neck, a low-lying marsh area east of the South Bristol town office, a low-lying marsh area located in the northwest portion of the town, upstream of a large marsh area to the east in the Town of Bristol, a low-lying marsh area located next to the West Bristol cemetery, as well as several unnamed streams, tributaries, marshes, swamps, and ponding areas were also studied using approximate methods. Brand new A Zone analyses were completed for this countywide study.

Approximate analyses were used to study those areas having a low development potential or minimal flooding hazards and/or or those areas that did not have available scientific or technical data. The scope and methods of study were proposed to, and agreed upon, by FEMA and the communities.

No Letters of Map Revision (LOMRs) were incorporated as part of this study.

2.2 Community Description

Lincoln County is located in the south of Maine, and contains 456 square miles with 451 miles of coastline. The County is bordered on the north by Kennebec County; on the east by Knox County; on the northeast by Waldo County; on the west by Sagadahoc County; and to the south by the Atlantic Ocean. The County seat is the Town of Wiscasset. Major transportation routes that serve Lincoln County include U.S. Route 1 and State Routes 27, 32, 96, 129, 130, 213, and 215.

The climate for this area is a moderate coastal climate with moderately warm summers and cold winters. The proximity of the Atlantic Ocean provides a modifying factor in regard to temperature extremes. The average mean temperature ranges from 78 degrees Fahrenheit (ºF) in July to 13ºF in January. The highest recorded temperature was 101ºF in 1975. The lowest recorded temperature was -20ºF in 1981. Yearly precipitation averages approximately 4.0 inches, with the maximum monthly average occurring in November, with 5.1 inches and the minimum monthly average occurring in July, with 3.1 inches (Reference 14). The mean annual precipitation is fairly uniformly distributed throughout the year. Snowfall averages approximately 80 inches annually. Water from snowmelt is usually a significant source of stream flow during the months of March and April (Reference 15). Thunderstorm activity is somewhat suppressed by the effects of the cool ocean, while winter precipitation is increased by coastal storms (northeasters).

The 2010 population of Lincoln County was reported to be 34,457 (Reference 16). The population, especially near the shore, increases significantly in the summer due to the influx of summer residents. Many homes are occupied only during the summer months. Tourism, fishing, and boat building are the major industries. With the advent of the intensive summer community, comes an increase in the number of resort developments, hotels, restaurants, and other businesses that cater to the tourist trade. Sailing, yachting, windsurfing, fishing, water-skiing, and windjammer cruises are popular summer activities that accompany the tourism industry.

The topography of Lincoln County is some low-lying rolling hills, to moderately sloping, rising to an elevation of approximately 300 feet. The highest elevations are slightly in excess of 500 feet. Two major peninsulas, Spruce Point and Juniper Point, jut out into the ocean. Mean tidal range at the Town of Wiscasset is 8.6 feet North American Vertical Datum of 1988 (NAVD88).

There are some areas of tidal flats located along the coastal boundaries. The shoreline is marked by the presence of numerous coves, bays, ledges, harbors, and offshore islands. In several areas the shorelines are steep to cliffed.

Vegetation in the County consists mainly of softwood forest (with some hardwood), lawned areas, and meadows. Soil cover is generally shallow near the shore; it is deeper inland, with rock outcroppings common. Soils range from poorly drained heavy and shallow clays to well drained bedrock and sandy loam.

The Damariscotta River flows out of Damariscotta Lake. At the outlet of the lake, there is a 40-foot drop, to tide water, in a 400 foot distance. The river at this point is an estuary of the Atlantic Ocean and is referred to as “Salt Bay”. The estuary has a tide range of about 8.3 feet NAVD88 and an average width of 2,000 feet. Damariscotta Lake is extensively controlled by the power company at the outlet of the lake. They regulate the lake levels for multi-purpose use: power generation, alewife propagation, recreation and camping, and to help prevent flooding. Damariscotta Lake has the largest alewife, an anadromous fish, run in the state. Alewives are harvested commercially at the outlet. This lake is the largest body of fresh water in Lincoln County. It has a surface area of 4,625 acres, a maximum depth of 114 feet, and a drainage area of 56.8 square miles.

The Eastern River runs for 9.1 miles to its confluence at the Kennebec River. The entire length of the Eastern River in the Town of Dresden is tidal. The Eastern River drains 50 square miles; however, extreme flood events are caused by backwater from the Kennebec River. Near the mouth of the river at low tides, its banks are lined with tidal flats for approximately 2 miles.

The Kennebec River basin is located in west-central Maine and drains approximately one-fifth of the State. The Kennebec River originates at the outlet of Moosehead Lake and flows south for approximately 145 miles to Abagadasset Point in Merrymeeting Bay, where the Kennebec River is joined by the Androscoggin River and four smaller rivers before it flows for an additional 20.5 miles to the Atlantic Ocean.

The headwater lakes and streams that contribute to the Kennebec River flow through a mountainous region with peak elevations of up to 3,000 feet. The central portion of the Kennebec River Valley is characterized as an upland area of rounded hills having local relief of up to 1,000 feet. Below Waterville, the river valley widens, and the land elevations are generally less than 100 feet. Between Moosehead Lake and mean tide level at Augusta, the river falls 1,026 feet, an average gradient of 8.5 feet per mile. The Kennebec River runs 9.0 miles along the western boundary of Dresden. At Dresden, the Kennebec River is a wide, tranquilly flowing estuary with a tidal range of approximately 5 feet. The river has been dredged to a depth ranging from 10 to 20 feet at mean low water. This dredging was last done in 1938. The river channel depth ranges from approximately 24 feet at the mouth to approximately 6 feet at low tide at the Dresden Pittston corporate limits.

The Medomak River has a drainage area of 80 square miles at the downstream corporate limits of the Town of Waldoboro. The topography of the watershed is predominately hilly and rolling with several lakes and ponds scattered throughout the area. Land use within the watershed is approximately 75-percent forest land, 21-percent open land, 3-percent water areas, and 1-percent urban (Reference 17). There is substantial second-home recreational development around Medomak Pond; including several manufacturing firms, small businesses, and many residences. Due to its close proximity to coastal resort areas, development pressure is intensifying at an increasing rate (Reference 17).

The Sheepscot River originates in the northwestern portion of the Town of Montville and flows to the southwest and into Sheepscot Lake. The drainage area at the outlet of Sheepscot Lake is 45.9 square miles (Reference 18). Sheepscot River continues on into Long Pond.

The slope of the Sheepscot River from its headwaters to the inlet at Long Pond averages 15 feet per mile. The Sheepscot River continues to the southwest from the outlet of Long Pond to its confluence with the Atlantic Ocean. The Sheepscot River has a drainage area of 350 square miles at its confluence with the Atlantic Ocean (Reference 19).

Biscay Pond has a surface area of 253 acres and drains 28.1 square miles. The maximum depth of Biscay Pond is 61 feet.

Clary Lake, also known as Pleasant Pond, has a surface area of 682 acres, a maximum depth of 22 feet, and drains 9.56 square miles. In recent years due to the inflow of nutrients, the lake has experienced algae blooms. This has discouraged people from building along its shores.

Duckpuddle Pond has a surface area of approximately 293 acres and a maximum depth of approximately 23 feet.

Dyer Long Pond has a surface area of 392 acres, a maximum depth of 16 feet and a drainage area of 17.5 square miles. Alewives, use the pond for spawning. They enter the pond through a fish ladder in the small dam at the outlet.

James Pond has a surface area of 50 acres and a maximum depth of 18 feet. James Pond provides an excellent habitat for warm water fisheries (Reference 18). The drainage area at the outlet of the pond is 0.50 square mile (Reference 19). Water levels in the pond are often controlled by numerous beaver dams located in the marsh area just downstream from the outlet and along the Sheepscot River. During floods, pond elevations are controlled by the reach of the Sheepscot River downstream from the outlet of James Pond.

Long Pond has a surface area of 747 acres and a maximum depth of 16 feet. Long Pond is noted primarily for its warm water fisheries (Reference 20). The drainage area at the outlet of the pond is 65.4 square miles (Reference 19). Water levels in the pond are controlled by a ledge outcrop and the remains of an old dam located approximately 1.1 miles downstream from the outlet of the pond on the Sheepscot River. During floods, pond elevations are controlled by the reach of the Sheepscot River downstream from the outlet of James Pond.

McCurdy and Pemaquid Ponds have the same water-surface elevations during peaks above 76.3 feet NAVD88. They have a combined lake surface area of 1,720 acres, of which 1,515 acres is Pernaquid Pond. The maximum depth of Pemaquid Pond is 61 feet and the maximum depth of McCurdy Pond is 41 feet.

McCurdy Pond flows into Pemaquid Pond which in turn flows into Biscay Pond. The Pemaquid River flows out of Biscay Pond. There are fish ladders at Pemaquid Falls and at Bristol Mills to allow the alewifes to enter these ponds. The dam at Bristol controls the elevation of the water in Biscay, McCurdy, and Pemaquid Ponds.

At present, there is no power generated at Bristol Mills, where the control dam for Biscay and Pemaquid Ponds is located. The dam is operated to maintain high levels on the ponds during the summer months for recreational users. The dam has little effect on flood levels during times of high water, because it has no storage capacity.

2.3 Principal Flood Problems

Lincoln County is subject to coastal flooding caused by northeasters and hurricanes. Northeasters are the most frequent type of storm in the area. They can occur at any time of the year but are more prevalent in the winter months. Hurricanes, which are rarely experienced, occur in the late summer and early fall months.

Northeaster type storms represent low pressure systems that have developed off the southern Atlantic coast that travel northward, up the coast collecting moisture and gathering strength during travel. Northeaster storms may be hundreds of miles in diameter, and may travel slowly enough to produce heavy sustained onshore winds for as much as 48 hours. Due to the duration of the storm, northeasters often last through one or more tidal cycle. The combination of sustained onshore winds and high tide causes significant elevation of the overall water surface. This is known as storm surge. In Town of Wiscasset, the worst storm surge is caused by winds from the southeast quadrant. The actual direction of sustained winds at a given location from a northeaster storm depends on the location of the storm center and the associated counterclockwise wind circulation around the low pressure system, with respect to that location.

The majority of coastal storms cause damage only to low coastal roads, boats, beaches, and seawalls. Occasionally, a major storm accompanied by strong onshore winds and high tides results in surge that causes extensive property damage and erosion.

Inland flooding occurs most frequently in early spring when heavy rains on snow covered or frozen ground produce greater than normal runoff. It is at this time of year that ice breaks loose from stream banks, resulting in potential obstructions to bridge openings and other channel constrictions which can artificially raise flood levels. Flash floods occasionally occur from localized thunderstorms, but generally these events produce less runoff than that which is associated with spring flooding (Reference 17).

Data on major storms has been recorded by the Marine Resources Laboratory tidal gage at McKown Point in Boothbay Harbor. Table 4, "Major Storms in Boothbay Harbor," is a list of historical flood information from the gaging station.

Table 4 – Major Storms in Boothbay Harbor

Storm Type	Date	Stillwater Elevation (feet NAVD88*)
Northeaster	January 9, 1978	8.7**
Northeaster	February 7, 1978	8.4
Northeaster	November 30, 1963	8.0
Northeaster	March 16, 1976	7.8
Northeaster	November 20, 1972	7.8
Northeaster	February 19, 1972	7.8

* North American Vertical Datum of 1988 (NAVD88)

** Note: The January 9, 1978 storm produced slightly higher elevations in Boothbay Harbor than the February 7, 1978 storm, which is the reverse of information presented for the open ocean in the USACE Tidal Flood Profiles. This phenomena results from the interaction of each storm's unique characteristics with the particular bathymetry of a tidal inlet such as Boothbay Harbor (Reference 21).

In the Town of South Bristol, the storm of record in the area occurred on February 7, 1978. This storm produced a stillwater storm tide elevation of 9.5 feet at the National Ocean Service (NOS) tide gage at Rockland (Reference 22). The second highest elevation of record at the Rockland gage was 8.7 feet NAVD88 on January 9, 1978. Because an insufficient record exists at the Rockland gage to perform a frequency analysis, the expected return periods for the two storms are based on the storm elevations at the Portland NOS gage. Using the frequency analysis performed by the USACE at the Portland gage, the February and January 1978 storms had expected return periods of the 1- and 1.6-percent-annual-chance floods, respectively, at Portland. The USGS has published elevations of high water marks caused by the February 1978 storm in the nearby communities: 8.8 feet NAVD88 at West Waldoboro in Waldoboro, 8.57 feet NAVD88 at Newcastle, 11.27 feet NAVD88 at Five Islands in Georgetown, and 7.93 feet NAVD88 at Reid State Park in Georgetown (Reference 23).

Flooding of the Damariscotta River can be caused by ocean surges at times of very high tides and high winds. The Damariscotta River has recently been flooded by the February 1976 and the January and February 1978 floods. The February 1976 event was about 3.5 feet above mean high tide with a little less than 10-percent-annual-chance flood. The January 1978 event was greater than a 1-percent-annual-chance flood, and was nearly 6 feet above mean high tide. The February 1978 event was a little less than a 2-percent-annual-chance flood with high water about 4.5 feet above mean high tide. A maximum elevation of 81.1 feet NAVD88 was observed on Duckpuddle, McCurdy and Pemaquid Ponds during the flood of April 1987. This elevation was approximately equal to that of the 1-percent-annual-chance flood. An elevation of 55.5 feet NAVD88 was observed on Damariscotta Lake in April 1987; this elevation is approximately 1.6 feet below the 1-percent-annual-chance flood.

Flooding on the Eastern River is caused by backwater from the Kennebec River. Ice jams in the Kennebec River often compound flood problems.

The flood of March 1896 on the Kennebec River washed out part of the Gardiner-Randolph bridge. However, the most notable recorded floods on the Kennebec River occurred in March 1936 and April 1987. The 1987 flood had a peak discharge of 232,000 cubic feet per second (cfs) at the USGS gaging station in North Sidney (station No. 01049265) and a recurrence interval of over the 1-percent-annual-chance flood (Reference 24). Discharge data is not available at the gage for the 1936 flood. Both flood caused extensive damage within the river basin. Flood damage from the 1936 flood was exacerbated by the presence of ice jams on the lower part of the river which increased flood elevations upstream as far as Augusta (Reference 25). Historical peak elevation data indicates that the 1936 flood was higher than the 1987 flood for all of the Town of Dresden upstream of Swan Island (References 24 and 25). Several other floods resulting from ice jams have occurred on the Kennebec River, and the potential for ice jam flooding is an annual concern (References 26 and 7).

The most recent flood in the watershed occurred in March 1977 when more than four inches of rain fell on snow-covered ground and resulted in general high-water conditions throughout the area. The most serious flooding occurred at the U.S. Route 1 bridge over the Medomak River. Ice and floodwaters reportedly damaged the bridge deck, causing traffic to be re-routed.

Flooding also occurred on State Route 32 and at a trailer park where several trailers had to be evacuated. The picnic area immediately downstream of U.S. Route 1 was flooded to a depth of approximately 2 feet. Many small businesses in the area had water in their parking lots. Based on high-water marks in the study area, the recurrence of this flood was estimated to be approximated as the 4-percent-annual-chance flood. Other floods occurred in 1936, 1940, 1954, and 1973 (Reference 17).

The USGS has operated a streamflow monitoring station on the Sheepscot River downstream in the Town of North Whitefield since October 1938. The drainage area at the USGS gage is 145 square miles. Significant flood events at the USGS gage were noted in December 1973 and April 1987, with recurrence intervals of approximately 45 and 80 years, respectively (Reference 28). Local residents in the Town of Somerville noted that the 1987 flood was the highest in recent history. Long Pond was approximately 8 to 9 feet above the normal pool elevation during the 1987 flood, and flood waters were just below the low steel of the Coopers Mills Road bridge over the Sheepscot River, according to local residents.

2.4 Flood Protection Measures

Lincoln County communities have joined the Emergency Program of the National Flood Insurance Program. They incorporated a set of flood plain management regulations into its zoning laws to help minimize future flood damages and related hazards.

The coastal communities have also adopted the Minimum Shoreland Zoning Ordinance as required by the State of Maine Shoreland Zoning Act (Reference 29). This ordinance serves to protect the shorelines by restricting building to reduce flood damage and problems. The current ordinance requires that residential lots abutting a pond or tidal water have a minimum shore frontage of 100 feet, building be set back 100 feet from mean annual high-water marks, and the first floor elevation of all buildings and structures must be elevated to at least 3-feet above mean annual high-water marks and/or 1-foot above the 1-percent-annual-chance flood elevation. Additionally, the areas are designated as Resource Protection Districts and, therefore, no structures or development are allowed in these areas (except for municipal purposes in the Reservoir District) (Reference 30).

The natural stream flow of the Kennebec River is altered by several hydroelectric plants and storage reservoirs located upstream from Dresden. The structure that has the most pronounced effect on the Kennebec River is the dam at Solon, approximately 80 miles upstream from Dresden. It is a low-head dam that maintains a discharge of 3,600 cfs at Madison, 14 miles downstream. When inflow at the dam exceeds 4,000 cfs, it no longer controls river discharges. The major storage lakes within the Kennebec River basin and their capacities in billion cubic feet are as follows: Moosehead Lake, 23.7; Indian Pond, 3.2; Flagstaff Lake, 12.0; and Wyman Pond, 2.6. These reservoirs have a dampening influence on peak flows downstream.

The most downstream dam on the Kennebec River is Cushnoc Dam, at the head of the tidal effect in Augusta. This low-head dam is operated for power generation and to supply process water for mills. Storage from this dam has little effect on downstream flooding.

Large amounts of potential flood control exist in the upper part of the Kennebec River basin, particularly in Flagstaff, Moosehead, and Wyman Lakes. During the 1987 flood, the reservoir's in the basin above the USGS gaging station in Bingham (station No. 01046500; drainage area 2,715 square miles), which regulate 50 percent of the watershed above Augusta, contributed only approximately 25 percent of the peak flow at Augusta (Reference 31). Because these reservoirs are regulated primarily for power generation, the potential for major flooding exists at a time when they are at or near capacity and could offer little appreciable flood control. However, under normal operation the reservoirs are lowered before peak spring runoff.

The shorelands located within 250 feet, horizontal distance, of the normal high-water marks of the Kennebec and Eastern Rivers have been zoned to restrict development (Reference 29).

Since 1969, flooding has caused considerable damage along the banks of the Kennebec River, especially nearby in the City of Gardiner. During the past 40 years, the Coast

Guard has often been requested to break open the channel in the Kennebec River when the ice cover is thick and flood potential is high. These conditions are most likely to occur in the month of March.

Water levels in Damariscotta Lake are controlled by a dam at the outlet of the lake; the lake level is regulated for multipurpose usage; including power generation, recreation, and camping, flood control, and alewife propagation. A dam at Bristol controls the elevations of water in Biscay, Duckpuddle, and Pemaquid Ponds.

Eight bridges span the Medomak River and two bridges span Little Medomak Pond Outlet Stream within the study area. The only operational dam in the Town of Waldoboro is located approximately 50 feet downstream of Mill Street. It is presently owned by the town and used primarily to provide water for fire protection. The dam has a total head of approximately 8 feet. There are remains of several other dams in the town which at one time provided power for mills. In their present condition, however, they do not provide significant water impoundment (Reference 17).

Most of the physical flood and erosion protection measures along shorelines consist of wood sheet piling, stone seawall, and riprap.

3.0 ENGINEERING METHODS

For the flooding sources studied by detailed methods in the county, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent-annual-chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 1-percent-annual-chance (100-year) flood in any 50-year period is approximately 40 percent (4 in 10); for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for the flooding source studied in detail affecting the community.

Pre-countywide Analyses

In New England, flooding of low-lying coastal areas and erosion of coastal areas subject to wave attack caused primarily by storm surges and wind waves generated by extra-tropical coastal storms called northeasters, southeasters, or southwesters, depending on the principal direction from which the wind blows. Hurricanes also occasionally produce significant storm surge in New England, but they do not occur as frequently as northeasters. Northeasters can produce significant river flow flooding.

Coastal flood frequency information has been developed for the New England coastline by the USACE as shown in *Tidal Flood Profiles of the New England Coastline* (Reference 32). These profiles for floods of various frequencies were determined through a Pearson Type III analysis of NOS long-term tidal gage data in conjunction with information on high-water marks experienced between gage locations. These data were used for establishing tidal flood levels along the Atlantic Ocean. Stage frequencies were developed by routing ocean storm tide levels of the respective frequencies upstream, utilizing the principals of conservation of mass and momentum. Riverine flows for the Damariscotta and Sheepscot Rivers were considered to be insignificant. It was determined that the elevations for the Sheepscot River in the Town of Boothbay Harbor do not vary significantly from those for the Atlantic Ocean. The 0.2-percent-annual-chance stillwater elevation, in the Town of South Bristol, was based on extrapolated data.

A one-dimensional estuarine storm surge model developed by New England Coastal Engineers, Inc. for tidal rivers and inlets was used to calculate the 10-, 2-, 1-, and 0.2-percent-annual-chance surge elevations for the Back and Sheepscot Rivers. Tide and depth data and channel cross-section information were also obtained from this report (Reference 33). These results were also used for the FISs for the Towns of Georgetown and Woolwich (References 34 and 35).

The New England Coastal Engineers, Inc. computer model was used to simulate the tidal flooding along the Damariscotta River from the river mouth to the Salt Bay south of Nobleboro, Maine (Reference 33). The cross section data of the river for the computer model were obtained from National Oceanic and Atmospheric Administration (NOAA) maps (Reference 36). An astronomical tidal curve with storm surge, having a peak elevation of 9.9 feet and a tide period of 12.4 hours at the river mouth, was used as input. A value of 70 for the river bottom friction factor (Chezy Friction Coefficient) was assigned to the main conveyance flow section. A constant wind velocity of 50 mph out of the south was applied to the river surface. The computer modeling results showed that a gradual increase in tide height along the river toward the upstream end of the river was observed. The average water level in the upstream portion of the river is increased by approximately 1 foot above the river mouth level. Hence, an elevation of 11 feet was assigned for the 1-percent-annual-chance flood along the Damariscotta River shoreline upstream of Wentworth Point.

Because of the potential for ice-jam flooding along the Kennebec River, hydrologic analyses were done for both free-flow and ice-jam events. For free-flow events, discharges were determined using peak daily mean flow records from the Scott Paper Company Dam at Waterville. These records were published by the USGS from 1892 to 1935 at gage station No. 01048500. Flow records from 1936 to 1977 were obtained from Scott Paper Company (records past 1977 could not be located). A log-Pearson Type III analysis of these peak flows was done to compute preliminary flood discharges (Reference 37). Final free-flow discharges were computed by adjusting the preliminary discharges for the difference between daily mean and instantaneous peaks and the difference in drainage area between Waterville and Dresden.

The daily-mean to instantaneous peak adjustment was developed based on the relationship between daily-mean and peak flood discharges at the USGS gage on the

Kennebec River in North Sidney. The adjustment varied from 9.9 percent for the 10-percent-annual-chance flood to 17.8 percent for the 0.2-percent-annual-chance flood.

For ice-jam events, discharges were determined using the general method described above for free flow events. The difference between the two analyses is the peak daily discharges used in the log-Pearson Type III analysis. For the ice-jam hydrologic computations, peak daily discharges were tabulated for the ice-jam season only. The ice jam season was assumed to extend from December 20 to April 15. Peak daily discharges at Waterville during the ice-jam season were only available for the years 1892 to 1936.

The primary source of peak-flow data used to determine flood discharges for the Sheepscot River downstream from Long Pond was USGS stream gaging station No. 01038000, Sheepscot River at North Whitefield. The North Whitefield gage is located just upstream from the State Route 126 bridge and has a drainage area of 145 square miles. Records of flood peaks were available at this gage for the period 1939-1988. The 1-percent-annual-chance flood discharge at the gage was based on a log-Pearson Type III analysis of the annual peak flow data (Reference 37).

Peak discharges for the Sheepscot River, upstream from the USGS gage and downstream from Long Pond, as well as the Kennebec River were established by adjusting the 1-percent-annual-chance flood discharge computed at the gage using a drainage-area ratio technique documented in a USGS gage publication (Reference 38). The drainage-area ratio technique uses the following formula:

$$Q = Q_g\,(A/A_g)^b$$

where Q is the desired 1-percent-annual-chance discharge at the upstream site
Q_g is the 1-percent-annual-chance flood discharge at the USGS gage
A and A_g are drainage areas at the respective sites
The value of the exponent b that was used is 0.8

Use of the drainage-area ratio technique to transfer computed flood frequency estimates from gaged to ungaged sites on the same river is limited by the magnitude of the drainage area differences.

Drainage-area ratio transfer is usually limited to sites where the drainage areas differ by 40 to 50 percent. Drainage areas for the Sheepscot River upstream from Long Pond are less than 40 percent of those at the USGS gage; therefore a different technique to compute the 1-percent-annual-chance flood was used. To calculate the 1-percent-annual-chance flood, a report on the magnitude and frequency of floods in Maine was utilized (Reference 38). In that report, regression equations were used to relate flood-peak discharges to basin characteristics such as drainage area, average stream slope, and the storage area of lakes and ponds.

Flood flows for the 10-, 2-, 1-, and 0.2-percent-annual-chance floods of the Little Medomak Pond Outlet Stream and Medomak River were computed from an analysis of stream hydraulics, soil cover, land use, and rainfall data using the NCRS TR-20 hydrologic model (Reference 39). Flood hydrographs were reservoir routed the rough four ponds in the watershed. After an analysis of the 1-, 2-, 4-, 7-, and 10-day 1-percent-annual-chance storms, it was found that the 2-day storm produced the highest discharges in the study area and was used for the flood hazard evaluation.

In order to determine the 1-percent-annual-chance flood elevations of Biscay Pond, Clary Lake, Duckpuddle Pond, Dyer Long Pond, and Pemaquid Pond, a 1-percent-annual-chance discharge at the control dams at the outlets of these lakes were computed. The resultant discharge for the 1-percent-annual-chance flood was computed by the equations developed by R. A. Morrill, open-file report No. 75-292 (Reference 38). These equations relate flood flows to the following basin characteristics: drainage area, main channel slope, and storage area in the basin. The 1-percent-annual-chance flood discharge at Bristol Mills was determined to be 800 cfs. The 1-percent-annual-chance discharge was reduced by a drainage area ratio to the outlet of Pemaquid Pond and was determined to be 610 cfs. The 1-percent-annual-chance flood discharge at the outlet of Dyer Long Pond is 918 cfs. The 1-percent-annual-chance flood discharge at the outlet of Clary Lake is 510 cfs.

The principal source of hydrologic data for Damariscotta Lake was the Damariscotta Lake Association who furnished lake water-level records. The water-level readings were adjusted to NAVD88 values by running levels from a benchmark to the lake gage. The datum of the gage was found to be 45.59 feet NAVD88. The 1-percent-annual-chance flood elevation was determined by a log-Pearson Type III distribution of 10 annual maximum lake elevations for the period 1977- 1986, according to the procedures outlined in USGS Bulletin l7B (Reference 37); this analysis was carried out during the preparation of the FIS for the Town of Jefferson (Reference 6).

Flood elevations for Little Medomak Pond and Medomak Pond were established by the level pond reservoir routing procedure included in the NCRS TR-20 computer program (Reference 39).

The 1-percent-annual-chance flood elevation for Salt Bay was computed during the preparation of the FIS for the Town of Damariscotta (Reference 4). Additional data was obtained from the USACE (Reference 32).

Peak discharge-drainage area relationships for the 10-, 2-, 1-, and 0.2-percent-annual-chance floods for each stream studied by detailed methods are presented in Table 5, “Summary of Discharges”.

Table 5 – Summary of Discharges

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ. MILES)	PEAK DISCHARGES (cfs) 10%-ANNUAL-CHANCE	2%-ANNUAL-CHANCE	1%-ANNUAL-CHANCE	0.2%-ANNUAL-CHANCE
KENNEBEC RIVER					
At State Route 197 bridge	5,823	*	*	233,000	*
LITTLE MEDOMAK POND OUTLET STREAM					
At Storer Mountain Road	1.20	50	65	80	105
At Noyes Road	1.57	115	165	215	270
MEDOMAK RIVER					
At State Route 220	50.70	1,800	2,720	3,450	4,330
At Ellard Mank Road	55.78	1,920	3,890	3,660	4,590
At Wagner Bridge Road	63.86	2,110	3,150	3,980	4,980
At Cross Street	72.44	2,370	3,530	4,450	5,580
At Main Street	78.00	2,300	3,500	4,480	5,690
At Mill Street	77.69	2,310	3,520	4,490	5,700
At U.S. Route 1	75.76	2,400	3,610	4,560	5,730
SHEEPSCOT RIVER					
At Inlet to Long Pond	49.70	*	*	2,910	*
At Coopers Mills Dam	80.00	*	*	4,990	*
At USGS gage station No. 01038000 at North Whitefield	145.00	*	*	8,030	*

* Data Not Available

Stillwater Elevations for the 10-, 2-, 1-, and 0.2-percent-annual-chance floods for each stream and waterbody studied by detailed methods are presented in Table 6, “Summary of Stillwater Elevations”.

Table 6 – Summary of Stillwater Elevations

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ. MILES)	ELEVATION (feet NAVD88[1]) 10%-ANNUAL-CHANCE	2%-ANNUAL-CHANCE	1%-ANNUAL-CHANCE	0.2%-ANNUAL-CHANCE
BACK/SHEEPSCOT RIVERS					
At State Route 144	*	8.8	9.6	9.9	10.7
BISCAY POND	28.1	*	*	80.0	*
CLARY LAKE	9.56	*	*	152.9	*
DAMARISCOTTA LAKE	56.8	*	*	57.1	*
DAMARISCOTTA RIVER					
Damariscotta-Bristol corporate limits to head of Salt Bay	Ocean Estuary	*	*	9.2	*
East Boothbay	*	8.4	9.2	9.4	10.3
At Boothbay-Edgecomb corporate limits	*	8.6	9.4	9.6	10.5
Wentworth Point	*	8.6	9.4	9.8	10.8
Northern corporate limits of the Town of South Bristol	*	8.9	9.7	10.2	11.5
DUCKPUDDLE POND	*	*	*	80.5	*
DYER LONG POND	17.5	*	*	134.7	*
JAMES POND	*	*	*	199.1[2]	*
LITTLE MEDOMAK POND	*	133.5	135.2	136.3	137.7
LONG POND	*	*	*	186.7[2]	*

* Data Not Available
[1] North American Vertical Datum of 1988 (NAVD88)
[2] These elevations do not consider the effects of wave action

Table 6 – Summary of Stillwater Elevations (Continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ. MILES)	ELEVATION (feet NAVD88[1]) 10%-ANNUAL-CHANCE	2%-ANNUAL-CHANCE	1%-ANNUAL-CHANCE	0.2%-ANNUAL-CHANCE
MEDOMAK POND	*	228.8	229.4	229.8	230.3
PEMAQUID POND	22.6	*	*	80.5	*
SALT BAY	*	*	*	9.2	*
SHEEPSCOT RIVER					
At Boothbay-Edgecomb corporate limits	*	8.5	9.4	9.6	10.4
At confluence with Townsend Gut	*	8.3	9.1	9.4	10.0

* Data Not Available
[1] North American Vertical Datum of 1988 (NAVD88)

The analyses reported in this study reflect the stillwater elevations due to tidal and wind setup effects. The effects of wave action were also considered in the determination of flood hazard areas. Coastal structures that are located above stillwater flood elevations can still be severely damaged by wave runup, wave-induced erosion, and wave-borne debris. For example, during the northeasters of January and February 1978, considerable damage along the Maine coast was caused by wave activity, even though most of the damaged structures were above the high-water level. The extent of wave runup past stillwater levels depends greatly on the wave conditions and local topography.

Wave heights and corresponding wave crest elevations were determined using the National Academy of Sciences (NAS) methodology (Reference 40). The wave runup was determined using the methodology developed by Stone and Webster Engineering Corporation (SWEC) for FEMA (Reference 41).

Countywide Analyses

For this countywide FIS, new hydrologic analyses were performed for all approximate streams, by STARR.

In order to estimate the peak flows (Q_r) for ungaged and unregulated streams in rural drainage basins, the regression equations in Table 3 of *Water Resources Investigations Report (WRIR) 99-4008* were utilized for the 1-percent-annual-chance-flood event (Reference 42).

$$Q_{r100} = 5.629(A)^{0.711}\, 10^{-0.0326(W)}$$

The explanatory variables in the regression equation are drainage area (A) and the areal percentage of all types of wetlands in a basin (W).

Wetlands data for the study area was gathered from U.S. Fish and Wildlife Service GIS shapefiles made available through the National Wetlands Inventory database, http://www.fws.gov/wetlands/. This data set represents the extent, approximate location and type of wetlands, and deep water habitats in the Lincoln County drainage area. The wetland shapefile was converted to a raster file and used by ArcHydro to determine the percentage of wetlands within each drainage area.

Furthermore, Figure 3 in the USGS publication was implemented to verify that the explanatory variables A and W were within the range of values used to develop the regression equations. The lower limit of A is about 1-square mile. Although many basins were delineated with A less than 1-square mile, the regression equations were applied with no adjustments made on A. Therefore the accuracy of the equations applied on these watersheds is unknown. Similarly, the upper limit of the wetland variable, W, is 27%. In order to avoid dramatic reductions in flow from high wetland percentages in small watersheds and to be more conservative (estimate higher flows), the maximum value of W used in the application of this method was set to 27% even when computed wetland percentage is larger.

The regression peak flows were calculated for all study sites in the county.

In order to estimate the weighted peak flows (Q_{uf}) for ungaged sites on gaged, unregulated streams in rural drainage basin, a regression equation in Section 4 of WRIR 99-4008 (Equation 6) was utilized for the 1-percent-annual-chance flood event (Reference 42).

$$Q_{uf100} = (Q_r)(W_r) + (Q_u)(1\text{-}W_u)$$

The explanatory variables in this regression equation were the regression estimate of the peak flow at the ungaged site from Table 3 of WRIR 99-4008 (Q_r), a weighting factor (W_r), and the peak flow from the gaging stations with a drainage area adjustment (Q_u).

The weighted factor (W_r) is dictated by the drainage-basin area of the ungaged site (A_u) and the drainage-basin area of the gaging station (A_g).

For $A_u > A_g$, $W_r = (A_u)/(A_g) – 1$, and
For $A_u < A_g$, $W_r = (A_g)/(A_u) – 1$

The equation for the peak flow from the gaging station (Q_u) is

$$Q_{u=}\ Q_w\left(\frac{A_u}{A_g}\right)^b$$

Where:

- Q_u = the estimated discharge for the ungaged watershed,

- Q_w = weighted-average peakflow for a given recurrence interval for the gaging station,
- A_u = the area of the ungaged watershed,
- A_g = the area of the gaged watershed, and
- b = the coefficient of the simplified regression equation for the appropriate recurrence interval.

A coefficient (b) value of 0.748 was used for a recurrence interval of 100 years. For this study, this methodology was only applied to the Sheepscot River.

3.2 Hydraulic Analyses

Hydraulic analyses, considering storm characteristics and the shoreline and bathymetric characteristics of the flooding source studied, were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along the shoreline. Users should be aware that flood elevations shown on the FIRM represent rounded whole-foot elevations and may not exactly reflect the elevations shown on the Flood Profiles or in the Floodway Data tables in the FIS report. Flood elevations shown on the FIRM are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS in conjunction with the data shown on the FIRM.

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 FIRM (Exhibit 2). Unless specified otherwise, the hydraulic analyses for these studies were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations shown on the Flood Profiles and FIRM (Exhibits 1 and 2) are referenced to the NAVD88.

<u>Pre-countywide Analyses</u>

The water-surface elevations for the Damariscotta River were taken from the *Tidal Flood Profiles of the New England Coastline* (Reference 32). The flood marks of February 1976 and the January and February 1978 events were obtained by field surveys by the USGS and used to verify the results shown in this report.

Water-surface elevations of floods of the selected recurrence interval were computed using the Federal Highway Administration WSPRO step-backwater computer program (References 43 and 44). The starting water-surface elevation was taken from the FIS for Bowdoinham, Maine, which was performed in conjunction with the Town of Dresden FIS (Reference 45).

In the hydraulic analyses of the Kennebec River it was necessary to combine the probability of flooding due to free-flow events with the probability of flooding due to ice jams. This was done at each cross section using the equation:

$$P(s) = P(si) + P(sq) - P(si) * P(sq)$$

where $P(s)$ = probability of a given stage being equaled or exceeded from either an ice jam event or a free flow event

$P(si)$ = probability of that stage being equaled or exceeded from an ice jam event

$P(sq)$ = probability of that stage being equaled or exceeded from a free-flow event

Free-flow stage-frequency curves were developed at each cross section using the step-backwater model calibrated using profile and discharge information available from the April 1987 flood (Reference 24).

Flood discharges for the model were taken from the free-flow hydrologic computations (Section 3.1).

Ice-jam stage-frequency curves were developed at each cross section affected by ice jamming using the USACE HEC-2 step backwater computer program, calibrated using profile and discharge information available from the March 1936 flood (References 25 and 46). The 1936 flood was the worst ice affected flood to occur on the Kennebec River in recorded history. In the calibration run, an ice jam blocking 71 percent of the channel was simulated at the Richmond-Dresden bridge at the head of Swan Island. Upstream of the jam, ice thickness of three feet was assumed. Flood discharges for the model were taken from the ice-jam hydrologic computations (Section 3.1).

A necessary component in combining the probability of ice-jam floods with free-flow floods is the percentage of annual peak stages attributable to each type of flooding. Based on historic information, it was assumed that 34 percent of annual peak stages on the Kennebec River are caused by ice jams (References 26 and 27).

The combination of the stage-frequency curves for ice-jam and free-flow events resulted in a composite stage-frequency curve at each cross section within the community affected by ice jamming. Final flood elevations for each recurrence interval were obtained at each cross section from the curves.

The starting water-surface elevations for Biscay Ponds, Clary Lake, Duckpuddle Pond, Dyer Long Ponds, and Pemaquid Ponds were determined by a slope/area method. The slope of the stream was taken from computations of elevations and distances shown on the topographic map of the area (Reference 47). The control, (the Bristol Mills Dam), the approach, and bridge geometry, and downstream (exit) sections were surveyed and tied into NAVD88.

Starting water-surface elevations for Little Medomak Pond Outlet Stream were obtained from a known elevation on Little Medomak Pond.

Water-surface elevations of floods of the selected recurrence intervals were computed using the NRCS WSP-2 computer program (Reference 48). Starting water-surface elevations for the Medomak River were computed from tidal frequency data (Reference 32). Appropriate aerial photographs and USGS topographic maps were incorporated into the study (References 49 and 50).

The water-surface elevation for Biscay Ponds, Clary Lake, Duckpuddle Pond, Dyer Long Ponds and Pemaquid Ponds were taken from a profile developed using a step-backwater computer program model (Reference 43).

The culvert in the small valley section between Duckpuddle and Pemaquid Ponds does not constrict the overflow section, and the two ponds are at the same elevation during high-water periods. This was confirmed by differential leveling of the valley section between the ponds, by high-water data from the 1987 flood, and by information gathered from local residents.

The water-surface elevation for Damariscotta Lake was determined from the log-Pearson Type III frequency distribution of lake levels for the period 1977-86.

Flood elevations for James Pond are controlled by the Sheepscot River reach located at the outlet of the Pond. A step-backwater model was used to calculate the 1-percent-annual-chance flood elevations for James Pond and the reach of the Sheepscot River between Long Pond and James Pond (Reference 43). The starting water-surface elevations for the reach were determined to be the previously calculated 1-percent-annual-chance flood elevation for Long Pond. The 1-percent-annual-chance flood elevation for James Pond was determined to be 199.1 feet NAVD88.

Flood elevations on Long Pond are controlled by a ledge outcrop and the remains of an old dam located approximately 1.1 mile downstream from the outlet of the pond on the Sheepscot River. To determine the 1-percent-annual-chance flood elevation for Long Pond, a step-backwater model was used (Reference 43). The starting point for the model reach was selected to be the dam on the Sheepscot River downstream at Coopers Mills. The dam provided an appropriate location to compute a starting elevation for the reach and the upstream extent of the dam's influence on flood elevations needed to be determined. The starting water-surface elevation for the 1-percent-annual-chance flood at the Coopers Mills dam was determined by applying flow over broad-crested weir equations (Reference 51). The old dam located upstream from the Coopers Mills dam is no longer functional and flow past it can no longer be considered true weir flow. The old dam section was, therefore, treated as a composite cross-section in the step-backwater model (Reference 52). The 1-percent-annual-chance flood elevation for Long Pond was determined to be 186.7 feet NAVD88.

The water-surface elevation for Salt Bay was taken from USACE tidal profiles (Reference 32). The flood marks of February 1976, and January and February 1978, obtained by the USGS through field survey, were used to verify these elevations.

Cross sections and elevations and structural geometry of hydraulic structures for James Pond, Long Pond, and Sheepscot River were obtained from field surveys conducted by the study contractor during the 1989 field season. Upper-end extension of cross sections and storage volume calculations were based on information contained on USGS topographic maps (Reference 50).

No cross section data were obtained for the Damariscotta River or Salt Bay. The bottom elevations were taken from the latest nautical chart for the Damariscotta River (Reference 36).

Cross section data for the Kennebec River were obtained from USGS topographic maps at a scale of 1:24,000 with a contour interval of 10 feet (Reference 47). The below water portions of the cross sections were obtained from the nautical chart for the area (Reference 53). The USGS operated temporary water-stage recorders in the Cities of Gardiner and Augusta from April to December 1976. The data obtained indicates that there would be less than a 0.1 foot tide effect for a discharge of 148,000 cfs in Gardiner. This flow has a recurrence interval of 15 years, or an exceedence probability of 0.065. The 1-percent-annual-chance profile of the Kennebec River in Dresden is not affected by the tide.

Channel and overbank roughness factors (Manning's "n") used in the hydraulic computations were estimated by engineering judgment and based on field observation at each cross-section and adjusted with known high-water marks and stream gage rating curves where possible. Table 7, "Manning's "n" Values," shows the channel and overbank "n" values for the streams studied by detailed methods.

Table 7 – Manning's "n" Values

STREAM	CHANNEL	OVERBANK
Biscay Pond	0.030 – 0.040	0.045 – 0.090
Clary Lake Outlet Stream	0.033 – 0.040	0.055 – 0.070
Damariscotta River	0.030 – 0.040	0.045 – 0.090
Duckpuddle Pond	0.030 – 0.040	0.045 – 0.090
Dyer Long Pond Outlet Stream	0.030 – 0.035	0.055 – 0.075
James Pond	0.030 – 0.050	0.055 – 0.100
Kennebec River	0.020 – 0.027	0.055 – 0.075
Long Pond	0.030 – 0.050	0.055 – 0.100
Pemaquid Pond	0.030 – 0.040	0.045 – 0.090
Sheepscot River	0.030 – 0.050	0.055 – 0.100

Countywide Analyses

As part of this countywide FIS, new hydraulic analyses were performed for all approximate streams, by STARR. Damariscotta River, Kennebec River, Little Medomak Pond Outlet Stream, Medomak River and Sheepscot River were redelineated using new topography.

As part of this countywide FIS, the 1-percent-annual-chance flood elevations for flooding sources studied with approximate methods were determined using USGS Regression Equations (Reference 54) and the USACE Hydrologic Engineering Centers River Analysis System (HEC-RAS) computer program (Reference 55). The peak flood discharges from the regression equations were input into a HEC-RAS model that included cross sections extracted from Light Detection and Ranging (LiDAR) data. Because this cross section information was not supplemented with field survey data and the models did not include bridge and culvert information, the resulting floodplain boundaries are considered approximate.

The water surface elevations were computed using the USACE HEC-RAS computer program (Reference 56). The HEC-RAS model is based on cross section geometry generated using manual and semi-automated methods derived from GIS techniques and data.

Cross section elevations were extracted from a mosaic 20 foot Digital Elevation Model (DEM). The DEM was generated from LiDAR data, provided by Photo Science, Inc., collected in December 2010.

The HEC-RAS computer program allows the use of an "ineffective flow" boundaries within a modeled cross section to distinguish areas of ponding or backwater from areas of active flow that contribute to the conveyance of flooding along the floodplain. As part of the modeling process, preliminary water-surface elevations calculated using HEC-RAS were delineated on the DEM using GIS software. This process helped identify natural areas of ineffective flow, which were defined as ineffective flow areas in subsequent runs of the HEC-RAS model.

Manning's values used for the analysis were estimated based on the Maine Land Cover Dataset (Reference 57) in extended overbank areas of cross sections. Overbank values ranged from 0.020 – 0.180 and 0.045 was used for channel values.

3.3 Coastal Hydrologic Analyses

In 1988, the USACE developed coastal flood frequency curves for the New England coastline, from the Long Island Sound to the U.S.-Canada border in Maine (Reference 58). The data for this work was derived from high water marks collected after historical storm events and from tide gauge records maintained by the USACE and NOAA. A Pearson Type III distribution was fitted to the data, from which inferences about flood recurrence intervals were made. The statistics at the gauge locations were then extrapolated along the coastline based on considerations of tidal hydrodynamics and high water marks from historic storms. This document has historically been the primary source of stillwater elevations (SWELs) for FEMA coastal studies.

In 2012, STARR, under contract to FEMA published updated tidal flood frequency profiles (Reference 59). This revision incorporates approximately 20 additional years of tide gauge data collected since the 1988 USACE report. The 2012 report uses the more statistically robust regionalized L-moments distribution fitting approach (Reference 60). The 10-, 2-, 1-, and 0.2-percent-annual-chance SWELs for this study were obtained from the updated STARR flood frequency profiles. SWELs were linearly interpolated from the profile baseline to all transects. They were also used as the open coast boundary condition for a 2-dimensional hydraulic model, RMA2, which was used to route storm water levels to the sheltered coast.

3.4 Coastal Hydraulic Analyses

The coastal flood hazard analyses utilize an event-based approach, where the 1-percent-annual-chance flood is associated with a 1-percent-annual-chance meteorological event. This event may be a northeaster or a hurricane. A storm event is idealized as the joint occurrence of storm surge along with corresponding wind-generated wave conditions. The storm surge and wave conditions, appropriately transformed to the shoreline using hydraulic models, are used as inputs for the assessment of beachfront and inland flooding.

The severity of storm-induced coastal flooding depends on storm surge elevations, dune erosion or failure, coastal armoring structures, wave setup, wave runup and overtopping, and overland propagation of waves in low-lying areas inundated by storm surge. The analysis of nearshore and overland flooding was conducted along 84 representative transects, placed perpendicular to the mean shoreline. The placement of transects accounts for variations in topography, shoreline characteristics, land use, and incident hydraulic conditions.

SWELs with different recurrence intervals were derived from tidal profiles based on statistical analysis of tide gauge records in New England. This statistical analysis is presented in the STARR report: *Updated Tidal Profiles for the New England Coastline* (Reference 59). SWELs obtained from the tidal profiles were used directly to represent 1-percent-annual-chance water levels for open coast transects. However, because the water levels obtained from tide gauges at the open coast may not accurately represent water levels at the indented coasts of Maine, results extracted from RMA2, was used to select SWELs for the sheltered coasts (Reference 61). The STARR report: *Coastal Hydraulics and Hydrology, Cumberland, York, Sagadahoc, Lincoln, Knox, Waldo & Hancock Counties Maine* presents that the RMA2 model was forced with the tidal profile data at the offshore boundary and was used to route water levels to the sheltered coast (Reference 59).

Transect wave information was selected from two sources: a Steady State Spectral Wave Model (STWAVE) that simulated a 1-percent-annual-chance storm event and an Automated Coastal Engineering System (ACES) wave growth analysis. Wave information was then transformed to obtain the equivalent deepwater wave conditions. Wave setup was computed at each transect using the Direct Integration Method (DIM) as described in the FEMA's Guidelines and Specifications (G&S) (Reference 62). On low-lying transects inundated by storm surge, the propagation of waves overland was modeled using the Wave Height Analysis for FISs (WHAFIS 4.0) tool (Reference 63). On steep transects where wave runup, rather than storm surge inundation is the source of flooding, wave runup was computed using the RUNUP 2.0 tool (Reference 64), the Technical Advisory Committee for Water Retaining Structures (TAW) method, or the runup on vertical structures method, as described in the G&S, depending on the steepness of the nearshore slopes. Both WHAFIS 4.0 and RUNUP 2.0 are implemented in the Coastal Hazard Analysis Modeling Program (CHAMP) (Reference 65). No significant coastal armoring structures were encountered in the study area. No dune feature was encountered that necessitated dune erosion.

On transects with significant inland excursion of the 1-percent-annual-chance SWEL, WHAFIS 4.0 was used to model overland wave propagation. WHAFIS input includes, the 1-percent-annual-chance SWEL, significant wave height, peak wave period, wave setup, wind speed, a transect profile (entered as station-elevation pairs), and user specified cards at each station describing vegetation and land-use characteristics. WHAFIS uses this information to compute wave crest elevations, flood insurance risk zone designations, and flood zone boundary locations along each transect.

The original basis for the WHAFIS model was the 1977 NAS report: *Methodology for Calculating Wave Action Effects Associated with Storm Surges* (Reference 40). The NAS methodology accounts for varying fetch lengths, barriers to wave transmission, and the regeneration of waves over flooded land areas. Since the incorporation of the NAS methodology into the initial version of WHAFIS, periodic upgrades have been made to WHAFIS to incorporate advancements in wave physics. For example, Version 4.0 incorporates an option to input location specific wind speeds (Reference 66).

The wave action conservation equation used within the model governs both wave regeneration caused by wind and wave dissipation resulting from marsh plants. This equation is supplemented by the conservation of wave equation, which expresses the spatial variation of the wave period at the peak of the wave spectrum. The wave heights and period respond to changes in wind conditions, water depths, and obstructions as a wave propagates. These equations are solved as a function of distance along transects. Wave heights are calculated to the nearest 0.1 foot, and wave crest elevations are computed at whole-foot intervals. WHAFIS continues to propagate waves inland along the transect until the wave crest elevation is permanently less than 0.5 foot above the SWEL or until the coastal flooding meets another flood source (e.g., a riverine flood source).

To populate the WHAFIS database in CHAMP, transect station and elevation data were extracted from the terrain and bathymetry DEMs using a custom tool for ArcGIS developed by STARR. This data was supplemented with transect survey data when appropriate. Field reconnaissance notes, aerial photographs, and land use data layers were used to define WHAFIS carding along each transect. WHAFIS carding was developed using the WHAFIS Carding Guidance included in the reference materials for CHAMP software in accordance with the G&S.

Figure 1– Transect Schematic shows a typical cross-shore profile and illustrates the effects of energy dissipation and regeneration of waves along the transect. The figure illustrates the attenuating effect of obstructions such as buildings, vegetation, and topography on the wave crest envelope as waves propagate inland. Conversely, the wave crest elevations increase due to wave growth in open, unobstructed fetches.

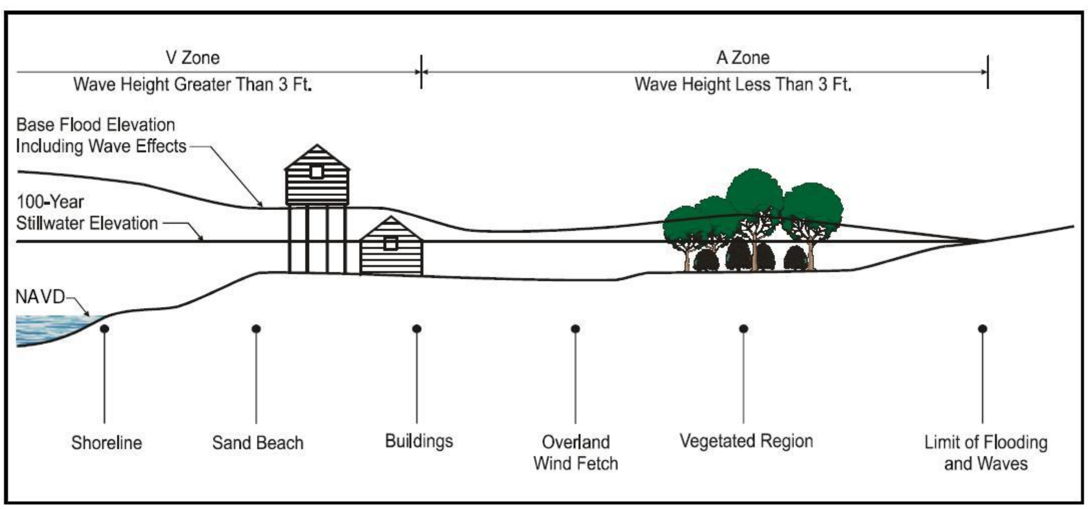

Figure 1 – Transect Schematic

Areas of coastline subject to wave attack are referred to as coastal high hazard zones. The USACE has established the 3-foot breaking wave as the criterion for identifying the limit of coastal high hazard zones. The 3-foot wave has been established as the minimum size wave capable of causing major damage to conventional wood frame and brick veneer structures. WHAFIS results indicate where the waves are greater than 3 feet (VE zones) and less than 3 feet (AE zones). Figure 1 illustrates the relationship between the local SWELs, the ground profile, and the location of the V/A zone boundary.

Wave runup is the uprush of water caused by waves breaking on the beach or against other barriers. The wave runup elevation is the vertical height above the SWEL attained by the uprushing water. Wave runup at a shore barrier can create flood hazards above and beyond those from stillwater inundation. The G&S recommends using the 2-percent wave runup value (the value exceeded by 2-percent of the runup events during the 1-percent-annual-chance storm). Wave runup is typically the dominant flood risk on unsubmerged steep slopes and vertical structures.

Wave runup was calculated for each transect using methods described in Section D.2.8 of the G&S. The TAW method was applied for sloped structures with a slope steeper than 1:8. The runup on vertical structures method produces the mean wave runup. For slopes milder than 1:8, the FEMA wave runup model RUNUP 2.0 was used. RUNUP 2.0 computes mean wave runup. The mean runup was scaled to the 2-percent runup depth using a factor of 2.2 as recommended in the G&S.

When wave runup overtops a barrier such as a partially eroded bluff or a structure, the floodwater percolates into the bed and/or runs along the back slope until it reaches another flooding source or a ponding area. Standardized procedures for the treatment of shallow water flooding and ponding were applied as described in the G&S, Section D.2.8.1.7.

As part of the countywide update, coastal analyses in the form of Primary Frontal Dune (PFD) delineation were performed for the open water flooding sources. All coastal analyses were performed in accordance with Appendix D "Guidance for Coastal Flooding Analyses and Mapping," (Reference 67) of the Guidelines and Specifications, as well as, the "Atlantic Ocean and Gulf of Mexico Coastal Guidelines Update", (Reference 68).

In accordance with 44 CFR Section 59.1 of the NFIP the effect of the PFD on coastal high hazard area (V Zone) mapping was evaluated. Identification of the PFD was based upon a FEMA approved numerical approach for analyzing the dune's dimensional characteristics. This approach utilized LiDAR data for the study areas (Reference 69) and assessed change in back slope to determine the landward toe of the PFD. Site visits were then performed to confirm the analysis. Identification of PFD outside areas with detailed topographic data was performed through field verification only. The PFD defined the landward limit of the V Zone along portions of the shoreline within each community.

Table 8, "Transect Descriptions," provides a listing of the transect locations and stillwater elevations, as well as the maximum wave crest/wave runup elevations.

Table 8 – Transect Descriptions

Transect	Description	ELEVATION (feet NAVD88[1]) 1%-Annual-Chance Stillwater Elevation	1%-Annual-Chance Maximum Runup[2]
1	The transect is located approximately 300 feet southwest of the intersection of Lincoln Avenue and Broadway, extending southwest towards the Sheepscot River.	9.1	16[4]
2	The transect is located approximately 300 feet north of the intersection of Paradise Lane and Paradise North, extending west towards the Sheepscot River.	9.1	10[4]
3	The transect is located approximately 600 feet southwest of the intersection of Beach Road and Lighthouse Lane, extending southwest towards the Sheepscot Bay.	9.1	21[4]
4	The transect is located approximately 100 feet east of the intersection of Beach Road and Lighthouse Lane, extending southwest towards the Sheepscot Bay.	9.0	17[3]
5	The transect is located approximately 600 feet south of the intersection of Hendricks Hill Road and Pratts Island Road, extending southwest towards the Sheepscot Bay.	9.0	15[4]
6	The transect is located approximately 600 feet southwest of the intersection of South Beach Road and Pratts Island Road, extending southwest towards the Sheepscot Bay.	9.0	25[4]
7	The transect is located approximately 600 feet northwest of the intersection of Christmas Cove Road and Rand Road, extending southwest towards the Sheepscot Bay.	9.0	18[4]
8	The transect is located approximately 300 feet northwest of the intersection of Mollys Point Road and Poore Road, extending southwest towards the Sheepscot Bay.	9.0	21[4]
9	The transect is located approximately 850 feet southwest of the intersection of Hendricks Hill Road and Richardson Road, extending southwest towards the Sheepscot Bay.	9.0	16[4]
10	The transect is located approximately 900 feet southwest of the intersection of Hendricks Hill Road and Moores Point, extending south towards the Atlantic Ocean.	9.0	25[4]
11	The transect is located approximately 350 feet south of the intersection of Hendricks Hill Road and Spruce Drive, extending southwest towards the Atlantic Ocean.	9.7	20[4]
12	The transect is located on Cape Island, extending south towards the Atlantic Ocean.	9.7	21[3]

[1] North American Vertical Datum of 1988 (NAVD88)
[2] Due to map scale limitations, the maximum wave elevation is not shown on the FIRM
[3] Maximum wave height elevation
[4] Maximum wave runup elevation

Table 8 – Transect Descriptions (Continued)

Transect	Description	ELEVATION (feet NAVD88[1]) 1%-Annual-Chance Stillwater Elevation	1%-Annual-Chance Maximum Runup[2]
13	The transect is located approximately 250 feet southwest of the intersection of Hendricks Hill Road and Gray Road, extending southeast towards the Atlantic Ocean.	9.7	19[4]
14	The transect is located approximately 1,100 feet southwest of the intersection of Cape Newagen Road and Town Landing Road, extending northeast towards Sheepscot Bay.	9.7	13[4]
15	The transect is located approximately 500 feet south of the intersection of Cape Newagen Road and Horn Cove Road, extending southeast towards Sheepscot Bay.	9.7	22[4]
16	The transect is located approximately 200 feet northwest of the intersection of Cape Newagen Road and Labrador Lane, extending northeast towards Sheepscot Bay.	9.7	14[4]
17	The transect is located approximately 600 feet northwest of the intersection of Capital Island Road and Pound Road, extending southeast towards Sheepscot Bay.	9.7	25[4]
18	The transect is located approximately 500 feet southwest of the intersection of Capital Island Road and Tennis Court, extending east towards Sheepscot Bay.	9.7	20[4]
19	The transect is located on Burnt Island, extending south towards Sheepscot Bay.	9.7	17[4]
20	The transect is located approximately 800 feet southeast of the intersection of Cape Newagen Road and Pine Cliff Road, extending northeast towards Sheepscot Bay.	9.7	15[4]
21	The transect is located approximately 1,000 feet south of the intersection of McKown Point Road and Juniper Point Road, extending southeast towards the Sheepscot Bay.	9.7	18[4]
22	The transect is located approximately 300 feet southeast of the intersection of McKown Point Road and West Road, extending southeast towards Boothbay Harbor.	9.7	24[4]
23	The transect is located approximately 400 feet southwest of the intersection of Western Avenue and Lakeview Road, extending south towards Boothbay Harbor.	9.7	13[4]
24	The transect is located approximately 600 feet north of the intersection of West Street and Mill Cove Crest Road, extending southwest towards Boothbay Harbor.	9.7	13[4]

[1] North American Vertical Datum of 1988 (NAVD88)
[2] Due to map scale limitations, the maximum wave elevation is not shown on the FIRM
[3] Maximum wave height elevation
[4] Maximum wave runup elevation

Table 8 – Transect Descriptions (Continued)

		ELEVATION (feet NAVD88[1])	
Transect	**Description**	**1%-Annual-Chance Stillwater Elevation**	**1%-Annual-Chance Maximum Runup[2]**
25	The transect is located approximately 250 feet west of the intersection of Sea Street and Commercial Street, extending south towards Boothbay Harbor.	9.7	16[4]
26	The transect is located approximately 300 feet south of the intersection of McKown Street and Commercial Street, extending southeast towards Boothbay Harbor.	9.7	11[4]
27	The transect is located approximately 100 feet east of the intersection of Union Street and School Street, extending southwest towards Boothbay Harbor.	9.7	12[4]
28	The transect is located approximately 100 feet south of the intersection of Bay Street and Harbor Heights Road, extending southwest towards Boothbay Harbor.	9.7	11[4]
29	The transect is located approximately 800 feet southwest of the intersection of Atlantic Avenue and Roads End Road, extending northeast towards Boothbay Harbor.	9.7	12[4]
30	The transect is located approximately at the intersection of Grandview Avenue and Breakwater Road, extending southwest towards Boothbay Harbor.	9.7	12[4]
31	The transect is located approximately 100 feet north of the intersection of Grandview Avenue and Linekin Road, extending southeast towards Sheepscot Bay.	9.7	14[4]
32	The transect is located approximately 1,300 feet north of the intersection of Grandview Avenue and Linekin Road, extending southeast towards the Atlantic Ocean.	9.7	20[4]
33	The transect is located approximately 1,000 feet southeast of the intersection of Crest Avenue and Blowhorn Road, extending southeast towards the Atlantic Ocean.	9.7	14[4]
34	The transect is located approximately 800 feet northeast of the intersection of Crest Avenue and Lobster Cove Road, extending southeast towards the Atlantic Ocean.	9.7	13[4]
35	The transect is located approximately 1,300 feet southwest of the intersection of Wall Point Road and Harris Point Road, extending south towards the Atlantic Ocean.	9.7	13[4]
36	The transect is located approximately 600 feet southeast of the intersection of Wall Point Road and Harris Point Road, extending south towards the Atlantic Ocean.	9.7	13[4]

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[2] Due to map scale limitations, the maximum wave elevation is not shown on the FIRM
[3] Maximum wave height elevation
[4] Maximum wave runup elevation

Table 8 – Transect Descriptions (Continued)

Transect	Description	ELEVATION (feet NAVD88[1]) 1%-Annual-Chance Stillwater Elevation	1%-Annual-Chance Maximum Runup[2]
37	The transect is located approximately 100 feet east of the intersection of Bayville Road and Roberts Circle, extending south towards Sheepscot Bay.	9.7	12[4]
38	The transect is located approximately 1,100 feet south of the intersection of Ocean Point Road and Presley Drive, extending southwest towards Sheepscot Bay.	9.7	11[4]
39	The transect is located approximately 400 feet northwest of the intersection of Murray Hill Road and Pothole Road, extending southwest towards Sheepscot Bay.	9.7	12[4]
40	The transect is located approximately 1,800 feet northwest of the intersection of Rock Lobster Road and Ocean Point Road, extending southwest towards Sheepscot Bay.	9.7	12[4]
41	The transect is located approximately 500 feet southwest of the intersection of Rock Lobster Road and Ocean Point Road, extending southwest towards Sheepscot Bay.	9.7	14[4]
42	The transect is located approximately 500 feet northwest of the intersection of Ocean Point Road and King Phillips Trail, extending northeast towards Sheepscot Bay.	9.7	14[4]
43	The transect is located approximately at the intersection of Ocean Point Road and Kimball Lane, extending southwest towards the Atlantic Ocean.	9.7	13[4]
44	The transect is located approximately 500 feet southwest of the intersection of Rock Ocean Point Road and Royall Road, extending northwest towards the Atlantic Ocean.	9.7	14[4]
45	The transect is located approximately 500 feet west of the intersection of Van Horn Road and Wall Street, extending west towards the Atlantic Ocean.	9.7	13[4]
46	The transect is located on Squirrel island, extending northeast towards the Atlantic Ocean.	9.7	16[4]
47	The transect is located on Squirrel island, extending southeast towards the Atlantic Ocean.	9.7	27[4]
48	The transect is located approximately at the intersection of Shore Road and F Street, extending southwest towards the Atlantic Ocean.	9.7	16[4]

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[2] Due to map scale limitations, the maximum wave elevation is not shown on the FIRM
[3] Maximum wave height elevation
[4] Maximum wave runup elevation

Table 8 – Transect Descriptions (Continued)

Transect	Description	ELEVATION (feet NAVD88[1]) 1%-Annual-Chance Stillwater Elevation	1%-Annual-Chance Maximum Runup[2]
49	The transect is located approximately 200 feet southwest of the intersection of Middle Road and High Street, extending southwest towards the Atlantic Ocean.	9.7	14[4]
50	The transect is located approximately 700 feet southwest of the intersection of Shore Road and Seascape Drive, extending southeast towards the Atlantic Ocean.	9.7	19[3]
51	The transect is located approximately 500 feet northeast of the intersection of Decker Reef Road and Royall Road, extending southeast towards the Atlantic Ocean.	9.7	27[4]
52	The transect is located approximately 300 feet north of the intersection of Wigwam Trail and Samoset Trail, extending southeast towards the Atlantic Ocean.	9.7	20[4]
53	The transect is located approximately 1,300 feet south of the intersection of Sea Surf Road and Farnham Point Road, extending east towards the Damariscotta River.	9.7	14[4]
54	The transect is located approximately 500 feet east of the intersection of School Street and Ocean Point Road, extending northeast towards the Damariscotta River.	9.1	11[4]
55	The transect is located approximately 600 feet northeast of the intersection of Sandy Cove Road and Gall Rock Road, extending southeast towards the Damariscotta River.	9.1	11[4]
56	The transect is located approximately 1,400 feet southwest of the intersection of Jones Point Road and Jones Cove Lane, extending southeast towards the Damariscotta River.	9.1	12[4]
57	The transect is located approximately 600 feet north of the intersection of West Side Road and Route 129, extending west towards the Damariscotta River.	9.7	11[4]
58	The transect is located approximately 100 feet northeast of the intersection of West Side Road and Ledge Hill Road, extending northwest towards the Damariscotta River.	9.7	11[4]
59	The transect is located approximately 300 feet west of the intersection of Old Sled Road and Captain Smith Way, extending south towards the Atlantic Ocean.	9.7	18[4]
60	The transect is located approximately 200 feet south of the intersection of Route 129 and Spring Street, extending east towards the Atlantic Ocean.	9.7	19[4]

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[2] Due to map scale limitations, the maximum wave elevation is not shown on the FIRM
[3] Maximum wave height elevation
[4] Maximum wave runup elevation

Table 8 – Transect Descriptions (Continued)

Transect	Description	ELEVATION (feet NAVD88[1]) 1%-Annual-Chance Stillwater Elevation	1%-Annual-Chance Maximum Runup[2]
61	The transect is located approximately 1,500 feet southeast of the intersection of Sand Cove Road and Shipley Road, extending southeast towards Johns Bay.	9.8	25[4]
62	The transect is located approximately 1,500 feet southeast of the intersection of Route 129 and John Gay Road, extending southeast towards the Johns Bay.	9.8	19[4]
63	The transect is located approximately 1,000 feet south of the intersection of McFarland Cove Road and Point Priscilla Road, extending southeast towards Johns Bay.	9.8	21[4]
64	The transect is located approximately 3,700 feet southwest of the intersection of Route 129 and Holmes Road, extending northeast towards the Damariscotta River.	9.2	11[4]
65	The transect is located approximately 200 feet northwest of the intersection of Pemaquid Harbor Road and Sunset Drive Loop, extending southwest towards Johns Bay.	9.8	18[3]
66	The transect is located approximately 100 feet northwest of the intersection of Old Fort Road and Huddle Road, extending east towards Johns Bay.	9.8	16[4]
67	The transect is located approximately 300 feet east of the intersection of Snowball Hill Road and Pemaquid Trail, extending southwest towards Johns Bay.	9.8	18[3]
68	The transect is located approximately 900 feet north of the intersection of Pemaquid Trail and Nahanda Road, extending southwest towards Johns Bay.	9.8	16[4]
69	The transect is located approximately 500 feet southeast of the intersection of Pemaquid Trail and Tispaquin Trail, extending southwest towards Johns Bay.	9.8	16[4]
70	The transect is located approximately 200 feet southwest of the intersection of Curtis Road and Johns Bay Lane, extending west towards Johns Bay.	9.8	15[4]
71	The transect is located approximately 200 feet southwest of the intersection of West Strand Road and Ridgeway Street, extending southwest towards the Atlantic Ocean.	9.8	26[4]
72	The transect is located approximately 300 feet northeast of the intersection of Bristol Road and Clover Road, extending southeast towards the Atlantic Ocean.	9.8	27[4]

[1] North American Vertical Datum of 1988 (NAVD88)
[2] Due to map scale limitations, the maximum wave elevation is not shown on the FIRM
[3] Maximum wave height elevation
[4] Maximum wave runup elevation

Table 8 – Transect Descriptions (Continued)

Transect	Description	ELEVATION (feet NAVD88[1]) 1%-Annual-Chance Stillwater Elevation	1%-Annual-Chance Maximum Runup[2]
73	The transect is located approximately 1,600 feet southeast of the intersection of Bristol Road and Pumpkin Cove Road, extending southeast towards Muscongus Bay.	9.8	37[4]
74	The transect is located approximately 800 feet southwest of the intersection of McFarland Shore Road and Old Mill Road, extending southeast towards Muscongus Bay.	9.8	27[4]
75	The transect is located approximately at the intersection of Dans Cottage Road and Gull Rock Road, extending southeast towards Muscongus Bay.	9.8	29[4]
76	The transect is located approximately at the intersection of Route 32 and Danforth Road, extending southeast towards Muscongus Bay.	9.8	23[4]
77	The transect is located approximately 200 feet northeast of the intersection of Route 32 and Spring Hill Loop, extending southeast towards Muscongus Bay.	9.8	28[4]
78	The transect is located approximately at the intersection of Long Cove Point Road and Island View Road, extending south towards Muscongus Bay.	9.8	21[4]
79	The transect is located approximately 1,900 feet northeast of the intersection of Long Cove Point Road and Martha Beck Drive, extending southeast towards Muscongus Bay.	9.8	37[4]
80	The transect is located approximately 1,000 feet northeast of the intersection of Browns Cove Road and Luces Spring Drive, extending southeast towards Muscongus Bay.	9.8	31[4]
81	The transect is located approximately 900 feet southeast of the intersection of Morrison Road and Reny Road, extending southeast towards Muscongus Bay.	9.8	19[4]
82	The transect is located on Louds Island, extending south towards Muscongus Bay.	9.8	19[4]
83	The transect is located on Marsh Island, extending south towards Muscongus Bay.	9.8	26[4]
84	The transect is located approximately 200 feet southeast of the intersection of Horns Hill Road and Staley Lane, extending southwest towards the Atlantic Ocean.	9.8	20[4]

[1] North American Vertical Datum of 1988 (NAVD88)
[2] Due to map scale limitations, the maximum wave elevation is not shown on the FIRM
[3] Maximum wave height elevation
[4] Maximum wave runup elevation

Figure 2, “Transect Location Map,” illustrates the location of the transects for the community.

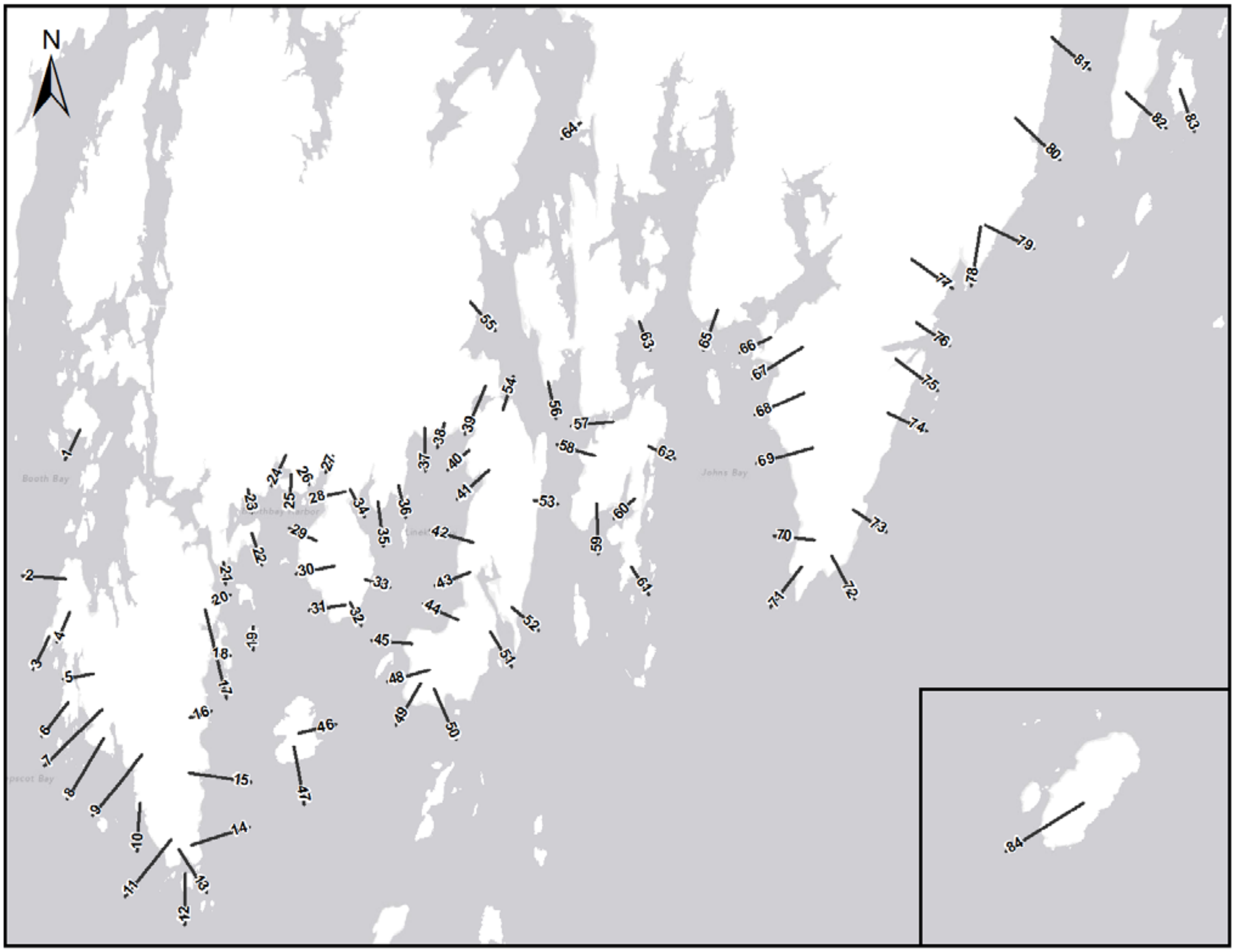

Figure 2 – Transect Location Map

Table 9, “Transect Data,” includes the flooding source and a summary of the stillwater elevations, flood hazard zone designations, and base flood elevations (BFEs) at each transect.

Table 9 – Transect Data

Flooding Source	STILLWATER ELEVATION (feet NAVD88*) 10%-Annual-Chance	2%-Annual-Chance	1%-Annual-Chance	0.2%-Annual-Chance	1%-Annual-Chance Stillwater + Wave Setup	Zone	Base Flood Elevation[1]
Sheepscot River							
Transect 1	8.1	8.9	9.1	9.8	9.9	VE	16
Transect 2	8.1	8.9	9.1	9.8	9.3	VE	10
Sheepscot Bay							
Transect 3	8.1	8.9	9.1	9.8	11.6	VE	21
Transect 4	8.1	8.9	9.0	9.8	10.9	AE	12
						VE	16-17
Transect 5	7.9	8.8	9.0	9.7	9.6	VE	15
Transect 6	7.9	8.8	9.0	9.7	11.8	VE	25
Transect 7	7.9	8.8	9.0	9.7	11.0	VE	18
Transect 8	7.9	8.8	9.0	9.7	12.5	VE	21
Transect 9	7.9	8.8	9.0	9.7	11.9	VE	16
Atlantic Ocean							
Transect 10	7.9	8.8	9.0	9.7	13.6	VE	25
Transect 11	8.2	9.2	9.7	11.1	13.6	VE	20
Transect 12	8.2	9.2	9.7	11.1	13.6	AE	15
						VE	17-21
Transect 13	8.2	9.2	9.7	11.1	12.3	AE	19
						VE	19
Sheepscot Bay (Continued)							
Transect 14	8.2	9.2	9.7	11.1	10.3	VE	13
Transect 15	8.2	9.2	9.7	11.1	11.3	VE	22
Transect 16	8.2	9.2	9.7	11.1	10.4	AE	14
						VE	14
Transect 17	8.2	9.2	9.7	11.1	11.3	VE	25
Transect 18	8.2	9.2	9.7	11.1	10.9	VE	20
Transect 19	8.2	9.2	9.7	11.1	11.8	AE	17
						VE	17
Transect 20	8.2	9.2	9.7	11.1	10.6	VE	15
Transect 21	8.2	9.2	9.7	11.1	11.6	VE	18
Boothbay Harbor							
Transect 22	8.2	9.2	9.7	11.1	10.9	VE	24

[1]Due to map scale limitations, BFEs shown on the FIRM represent average elevations for the depicted zones
* North American Vertical Datum of 1988 (NAVD88)

Table 9 – Transect Data (Continued)

Flooding Source	STILLWATER ELEVATION (feet NAVD88*) 10%-Annual-Chance	2%-Annual-Chance	1%-Annual-Chance	0.2%-Annual-Chance	1%-Annual-Chance Stillwater + Wave Setup	Zone	Base Flood Elevation[1]
Boothbay Harbor (Continued)							
Transect 23	8.2	9.2	9.7	11.1	10.3	VE	13
Transect 24	8.2	9.2	9.7	11.1	10.1	VE	13
Transect 25	8.2	9.2	9.7	11.1	10.3	VE	16
Transect 26	8.2	9.2	9.7	11.1	9.9	AE	11
Transect 27	8.2	9.2	9.7	11.1	10.0	AE	12
						VE	12
Transect 28	8.2	9.2	9.7	11.1	9.9	VE	11
Transect 29	8.2	9.2	9.7	11.1	10.0	VE	12
Transect 30	8.2	9.2	9.7	11.1	10.0	VE	12
Sheepscot Bay (Continued)							
Transect 31	8.2	9.2	9.7	11.1	10.4	VE	14
Atlantic Ocean (Continued)							
Transect 32	8.2	9.2	9.7	11.1	10.9	VE	20
Transect 33	8.2	9.2	9.7	11.1	10.1	VE	14
Transect 34	8.2	9.2	9.7	11.1	10.2	AE	13
						VE	13
Transect 35	8.2	9.2	9.7	11.1	10.2	AE	13
						VE	13
Transect 36	8.2	9.2	9.7	11.1	10.2	VE	13
Sheepscot Bay (Continued)							
Transect 37	8.2	9.2	9.7	11.1	10.1	VE	12
Transect 38	8.2	9.2	9.7	11.1	10.1	VE	11
Transect 39	8.2	9.2	9.7	11.1	10.0	AE	11-12
Transect 40	8.2	9.2	9.7	11.1	10.0	VE	12
Transect 41	8.2	9.2	9.7	11.1	10.1	VE	14
Transect 42	8.2	9.2	9.7	11.1	10.3	VE	14
Atlantic Ocean (Continued)							
Transect 43	8.2	9.2	9.7	11.1	10.3	VE	13
Transect 44	8.2	9.2	9.7	11.1	10.2	VE	14
Transect 45	8.2	9.2	9.7	11.1	10.3	VE	13
Transect 46	8.2	9.2	9.7	11.1	10.8	VE	16
Transect 47	8.2	9.2	9.7	11.1	12.3	VE	27

[1]Due to map scale limitations, BFEs shown on the FIRM represent average elevations for the depicted zones
* North American Vertical Datum of 1988 (NAVD88)

Table 9 – Transect Data (Continued)

STILLWATER ELEVATION (feet NAVD88*)

Flooding Source	10%-Annual-Chance	2%-Annual-Chance	1%-Annual-Chance	0.2%-Annual-Chance	1%-Annual-Chance Stillwater + Wave Setup	Zone	Base Flood Elevation[1]
Atlantic Ocean (Continued)							
Transect 48	8.2	9.2	9.7	11.1	10.3	AE	12
						VE	16
Transect 49	8.2	9.2	9.7	11.1	10.2	AE	14
						VE	14
Transect 50	8.2	9.2	9.7	11.1	12.2	AE	15
						VE	15-19
Transect 51	8.2	9.2	9.7	11.1	13.5	AE	27
						VE	27
Transect 52	8.2	9.2	9.7	11.1	13.0	VE	20
Darmariscotta River (Continued)							
Transect 53	8.2	9.2	9.7	11.1	10.4	VE	14
Transect 54	8.1	8.9	9.1	10.0	9.3	AE	11
						VE	11
Transect 55	8.1	8.9	9.1	10.0	9.5	VE	11
Transect 56	8.1	8.9	9.1	10.0	9.5	VE	12
Transect 57	8.2	9.2	9.7	11.1	10.0	VE	11
Transect 58	8.2	9.2	9.7	11.1	9.9	VE	11
Atlantic Ocean (Continued)							
Transect 59	8.2	9.2	9.7	11.1	11.5	AE	18
						VE	18
Transect 60	8.2	9.2	9.7	11.1	11.5	AE	19
						VE	19
Johns Bay							
Transect 61	8.2	9.2	9.8	11.1	14.3	AE	25
						VE	25
Transect 62	8.2	9.2	9.8	11.1	12.6	VE	18-19
Transect 63	8.2	9.2	9.8	11.1	13.3	VE	21
Darmariscotta River (Continued)							
Transect 64	8.2	9.0	9.2	10.1	9.5	AE	11

[1]Due to map scale limitations, BFEs shown on the FIRM represent average elevations for the depicted zones
* North American Vertical Datum of 1988 (NAVD88)

Table 9 – Transect Data (Continued)

STILLWATER ELEVATION (feet NAVD88*)

Flooding Source	10%-Annual-Chance	2%-Annual-Chance	1%-Annual-Chance	0.2%-Annual-Chance	1%-Annual-Chance Stillwater + Wave Setup	Zone	Base Flood Elevation[1]
Johns Bay (Continued)							
Transect 65	8.2	9.3	9.8	11.1	12.1	AE	13
						VE	18
Transect 66	8.2	9.3	9.8	11.1	10.4	AE	16
						VE	16
Transect 67	8.2	9.3	9.8	11.1	11.6	AE	13
						VE	18
Transect 68	8.2	9.3	9.8	11.1	11.2	VE	16
Transect 69	8.2	9.3	9.8	11.1	11.5	AE	16
						VE	16
Transect 70	8.2	9.3	9.8	11.1	10.7	VE	15
Atlantic Ocean (Continued)							
Transect 71	8.2	9.3	9.8	11.1	14.1	VE	26
Transect 72	8.2	9.3	9.8	11.2	14.9	VE	27
Muscongus Bay (Continued)							
Transect 73	8.2	9.3	9.8	11.2	15.7	VE	37
Transect 74	8.2	9.3	9.8	11.2	14.6	VE	27
Transect 75	8.2	9.3	9.8	11.2	14.5	AE	29
						VE	29
Transect 76	8.2	9.3	9.8	11.2	14.1	VE	23
Transect 77	8.2	9.3	9.8	11.2	14.0	VE	28
Transect 78	8.2	9.3	9.8	11.2	13.6	VE	21
Transect 79	8.2	9.3	9.8	11.2	13.2	AE	37
						VE	37
Transect 80	8.2	9.3	9.8	11.2	12.9	VE	31
Transect 81	8.3	9.3	9.8	11.2	11.0	VE	19
Transect 82	8.3	9.3	9.8	11.2	12.1	AE	19
						VE	19
Transect 83	8.3	9.3	9.8	11.2	12.8	AE	26
						VE	26
Atlantic Ocean (Continued)							
Transect 84	8.3	9.3	9.8	11.2	12.0	AE	20

[1]Due to map scale limitations, BFEs shown on the FIRM represent average elevations for the depicted zones
* North American Vertical Datum of 1988 (NAVD88)

3.5 Vertical Datum

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

For this countywide FIS, all flood elevations shown in the FIS report and on the FIRM are referenced to NAVD88. Structure and ground elevations in the community must, therefore, be referenced to NAVD88. It is important to note that adjacent communities may be referenced to NGVD29. This may result in differences in BFEs across corporate limits between the communities.

Flood elevations shown in this FIS report and on the FIRM are referenced to the NAVD88. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. Some of the data used in this study were taken from the prior effective FIS reports and FIRMs and adjusted to NAVD88. The datum conversion factor from NGVD29 to NAVD88 in Lincoln County is **-0.693 feet**. The locations used to establish the conversion factor were USGS 7.5-minute topographic quadrangle corners that fell within the County, as well as those that were within 2.5 miles outside the County. The benchmarks are referenced to NAVD88.

The data points used to determine the conversion are listed in Table 10, "Vertical Datum Conversion Values."

Table 10 – Vertical Datum Conversion Values

USGS 7.5-minute Quadrangle Name	Corner	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Conversion from NGVD29 to NAVD88 (feet)
Boothbay Harbor	SE	43.750	-69.625	-0.715
Bristol	SE	43.875	-69.500	-0.686
Damariscotta	SE	44.000	-69.500	-0.676
East Pittston	SE	44.125	-69.625	-0.689
Gardiner	SE	44.125	-69.750	-0.682
Jefferson	SE	44.125	-69.375	-0.686
Louds Island	SE	43.875	-69.375	-0.699
New Harbor	SE	43.750	-69.375	-0.722
North Whitefield	SE	44.125	-69.500	-0.699
Richmond	SE	44.000	-69.750	-0.663
Togus Pone	SE	44.250	-69.625	-0.692
Waldoboro West	SE	44.000	-69.375	-0.686
Weeks Mills	SE	44.250	-69.500	-0.689

Table 10 – Vertical Datum Conversion Values (Continued)

USGS 7.5-minute Quadrangle Name	Corner	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Conversion from NGVD29 to NAVD88 (feet)
Westport	SE	43.875	-69.625	-0.705
Wiscasset	SE	44.000	-69.625	-0.699
			AVERAGE	**-0.693 feet**

The BFEs are shown on the FIRM represent whole-foot rounded values. For example, a BFE of 102.4 will appear as 102 on the FIRM and 102.6 will appear as 103. Therefore, users that wish to convert the elevations in this FIS to NGVD29 should apply the conversion factor to elevations shown on the Flood Profiles and supporting data tables in this FIS report, which are shown at a minimum to the nearest 0.1 foot.

NAVD88 = NGVD29 – 0.693

For additional information regarding conversion between the NGVD29 and NAVD88, visit the National Geodetic Survey website at http://www.ngs.noaa.gov, or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey, SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

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

All qualifying benchmarks within a given jurisdiction that are catalogued by the NGS and entered into the National Spatial Reference System (NSRS) as First or Second Order Vertical and have a vertical stability classification of A, B or C are shown and labeled on the FIRM with their 6-character NSRS Permanent Identifier.

Benchmarks catalogued by the NGS and entered into the NSRS vary widely in vertical stability classification. NSRS vertical stability classifications are as follows:

- Stability A: Monuments of the most reliable nature, expected to hold position/elevation (e.g. mounted in bedrock)
- Stability B: Monuments which generally hold their position/elevation (e.g. concrete bridge abutment)
- Stability C: Monuments which may be affected by surface ground movements (e.g. concrete monument below frost line)

- Stability D: Mark of questionable or unknown vertical stability (e.g. concrete monument above frost line, or steel witness post)

In addition to NSRS benchmarks, the FIRM may also show vertical control monuments established by a local jurisdiction; these monuments will be shown on the FIRM with the appropriate designations. Local monuments will only be placed on the FIRM if the community has requested that they be included, and if the monuments meet the aforementioned NSRS inclusion criteria.

To obtain current elevation, description, and/or location information for benchmarks shown on the FIRM for this jurisdiction, please contact the Information Services Branch of the NGS at (301) 713-3242, or visit their Web site at www.ngs.noaa.gov.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each FIS provides 1-percent-annual-chance (100-year) flood elevations and delineations of the 1- and 0.2-percent-annual-chance (500-year) floodplain boundaries and 1-percent-annual-chance floodway to assist communities in developing floodplain management measures. This information is presented on the FIRM and in many components of the FIS report, including Flood Profiles and Floodway Data Table. Users should reference the data presented in the FIS report as well as additional information that may be available at the local map repository before making flood elevation and/or floodplain boundary determinations.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent-annual-chance flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent-annual-chance flood is employed to indicate additional areas of flood risk in the community. For each stream studied by detailed methods, the 1- and 0.2-percent-annual-chance floodplain boundaries have been delineated using the flood elevations determined at each cross section. The boundaries were interpolated between cross sections using a mosaic 20 foot DEM. The DEM was generated from LiDAR data, provided by MEGIS and was produced from aerial photos collected over Maine in the spring of 2003, 2004, and 2005.

For the tidal areas with wave action, the flood boundaries were delineated using the elevations determined at each transect; between transects, the boundaries were interpolated using engineering judgment, land-cover data, and the topographic maps. The 1-percent-annual-chance floodplain was divided into whole-foot elevation zones based on the average wave envelope elevation in that zone. Where the map scale did not permit these zones to be delineated at one-foot intervals, larger increments were used.

For the streams and ponding areas studied by approximate methods, only the 1-percent-annual-chance floodplain boundary is shown on the FIRM (Exhibit 2). The boundary of the 1-percent-annual-chance floodplain was delineated using digital terrain models developed from a mosaic 20 foot DEM. The DEM was generated from LiDAR data, provided by MEGIS and was produced from aerial photos collected over Maine in the spring of 2003, 2004, and 2005. Ponding area boundaries were also redefined when the DEM didn’t match orthophotos.

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

4.2 Floodways

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

The floodways presented in this FIS report and on the FIRM were computed for certain stream segments on the basis of equal-conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations have been tabulated for selected cross sections (Table 11, Floodway Data). The computed floodways are shown on the FIRM. In cases where the floodway and 1-percent-annual-chance floodplain boundaries are either close together or collinear, only the floodway boundary has been shown.

Encroachment into areas subject to inundation by floodwaters having hazardous velocities aggravates the risk of flood damage and heightens potentials flood hazards by further increasing velocities. A listing of stream velocities at selected cross sections is provided in Table 11, “Floodway Data”. To reduce the risk of property damage in areas where the stream velocities are high, the community may wish to restrict development in areas outside the floodway.

Near the mouths of streams studied in detail, floodway computations are made without regard to flood elevations on the receiving water body. Therefore, “Without Floodway” elevations presented in Table 11 for certain downstream cross sections of Little Medomak Pond Outlet Stream are lower than the regulatory flood elevations in that area, which must take into account the 1-percent-annual-chance flooding due to back water from other sources. The floodways are recommended to local agencies as minimum standards that can be adopted or that can be used as a basis for additional studies.

The area between the floodway and 1-percent-annual-chance floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the WSEL of the 1-percent-annual-chance flood more than 1 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 3, “Floodway Schematic”.

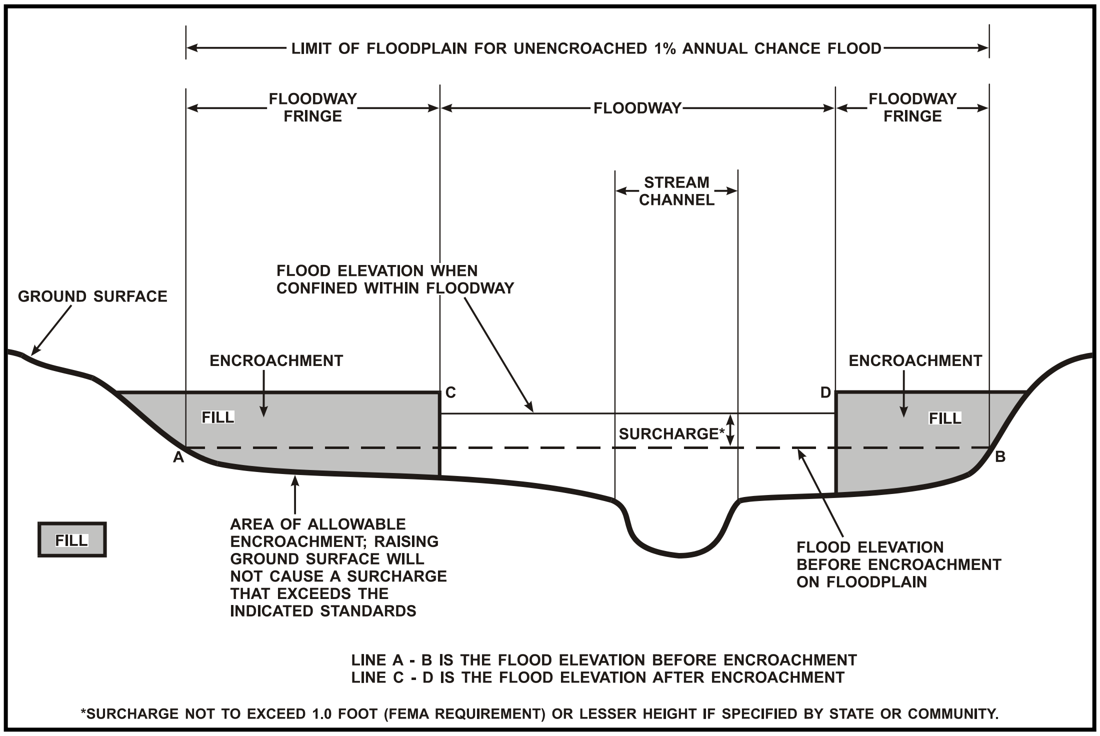

Figure 3 – Floodway Schematic

No floodways were computed for Damariscotta and Sheepscot Rivers.

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)[2]	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD88)	WITHOUT FLOODWAY (FEET NAVD88)[3]	WITH FLOODWAY (FEET NAVD88)	INCREASE (FEET)
KENNEBEC RIVER								
A	29,640	2,004/890	38,561	4.51	10.3	10.3	11.1	0.8
B	36,890	4,551/3,510	71,565	2.43	10.9	10.9	11.6	0.7
C	40,090	2,572/1,280	41,450	4.20	11.0	11.0	11.7	0.7
D	42,190	2,002/1,190	35,857	4.85	11.2	11.2	11.8	0.6
E	47,090	972/490	22,742	7.65	11.4	11.4	12.0	0.6
F	50,290	970/590	21,649	8.04	11.9	11.9	12.4	0.5
G	52,470	1,352/510	34,297	6.79	16.1	12.6	13.1	0.5
H	54,490	1,236/540	27,041	8.62	16.3	12.9	13.4	0.5
I	56,090	1,226/530	28,527	8.17	17.6	13.5	14.0	0.5
J	58,590	1,080/620	31,002	7.52	18.0	14.2	14.6	0.4
K	60,470	1,432/660	36,915	6.31	18.3	14.7	15.2	0.5
L	63,130	1,652/840	41,415	5.63	18.6	15.2	15.6	0.4
M	65,120	1,372/550	35,352	6.59	18.7	15.3	15.7	0.4
N	66,860	1,151/640	34,064	6.84	18.8	15.6	15.9	0.3
O	68,460	1,085/450	31,278	7.45	18.9	15.8	16.1	0.3
P	71,460	1,169/600	28,338	8.22	19.0	16.1	16.4	0.3
Q	72,740	1,422/330	38,178	6.10	19.4	16.9	17.2	0.3

[1] Feet above Abagadasset Point

[2] Width/width within County

[3] Elevation computed considering ice-jam effects

TABLE 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

LINCOLN COUNTY, ME

(ALL JURISDICTIONS)

FLOODWAY DATA

KENNEBEC RIVER

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD88)	WITHOUT FLOODWAY (FEET NAVD88)	WITH FLOODWAY (FEET NAVD88)	INCREASE (FEET)
LITTLE MEDOMAK POND OUTLET STREAM								
A	700[1]	530	3,078	0.1	136.3	136.0[3]	137.0	1.0
B	5,180[1]	37	162	0.5	229.8	229.8	230.8	1.0
C	5,250[1]	28	82	1.0	229.8	229.8	230.8	1.0
MEDOMAK RIVER								
A	-702[2]	609	8,261	0.5	9.9	9.9	10.9	1.0
B	-602[2]	111	2,241	2.0	9.9	9.9	10.9	1.0
C	-102[2]	232	2,753	1.6	9.9	9.9	10.9	1.0
D	448[2]	117	713	6.3	13.9	13.9	14.9	1.0
E	2,048[2]	67	613	7.3	18.3	18.3	19.3	1.0
F	2,248[2]	122	1,381	3.3	23.9	23.9	24.9	1.0
G	2,998[2]	58	350	13.0	40.9	40.9	41.9	1.0
H	3,248[2]	98	764	5.9	44.2	44.2	45.2	1.0
I	3,743[2]	80	749	6.1	47.0	47.0	48.0	1.0
J	4,338[2]	148	1,468	3.1	47.8	47.8	48.8	1.0
K	11,303[2]	171	1,551	2.9	52.8	52.8	53.8	1.0
L	15,248[2]	146	1,139	3.9	60.2	60.2	61.2	1.0
M	15,498[2]	191	756	5.9	63.5	63.5	64.5	1.0
N	15,923[2]	132	1,049	4.2	65.2	65.2	66.2	1.0

[1] Feet above confluence with Medomak Pond

[2] Feet above Main Street (Old U.S. Route 1)

[3] Elevation computed without consideration of backwater from Medomak Pond

TABLE 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

LINCOLN COUNTY, ME

(ALL JURISDICTIONS)

FLOODWAY DATA

LITTLE MEDOMAK POND OUTLET STREAM – MEDOMAK RIVER

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD88)	WITHOUT FLOODWAY (FEET NAVD88)	WITH FLOODWAY (FEET NAVD88)	INCREASE (FEET)
MEDOMAK RIVER (Continued)								
O	24,098	134	1,564	2.7	75.0	75.0	76.0	1.0
P	26,548	124	1,116	3.6	82.7	82.7	83.7	1.0
Q	29,478	85	559	7.1	90.8	90.8	91.8	1.0
R	31,498	108	968	4.1	94.5	94.5	95.5	1.0
S	33,973	189	1,754	2.2	95.8	95.8	96.8	1.0
T	38,173	60	513	7.4	99.3	99.3	100.3	1.0
U	39,523	180	1,807	2.1	101.9	101.9	102.9	1.0
V	39,568	154	1,062	3.6	101.9	101.9	102.9	1.0
W	41,318	130	1,036	3.6	104.4	104.4	105.4	1.0
X	42,118	88	762	4.9	106.8	106.8	107.8	1.0
Y	46,693	113	1,442	2.5	108.9	108.9	109.9	1.0
Z	48,198	133	709	5.2	120.6	120.6	121.6	1.0
AA	48,773	327	1,127	3.1	128.0	128.0	129.0	1.0
AB	52,128	115	1,140	3.0	134.0	134.0	135.0	1.0
AC	54,788	158	1,672	2.0	136.2	136.2	137.2	1.0

[1] Feet above Main Street (Old U.S. Route 1)

TABLE 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

LINCOLN COUNTY, ME

(ALL JURISDICTIONS)

FLOODWAY DATA

MEDOMAK RIVER

4.3 Base Flood Elevations

Areas within the community have BFEs established in AE and VE Zones. These are the elevations of the 1-percent-annual-chance (base flood) relative to NAVD88. In coastal areas affected by wave action, BFEs are generally at their maximum at the open shoreline. These elevations generally decrease in a landward direction at a rate dependent on the presence of obstructions capable of dissipating the wave energy. Where possible, changes in BFEs have been shown in 1-foot increments on the FIRM. However, where the scale did not permit, 2- or 3-foot increments were sometimes used. BFEs shown in the wave action areas represent the average elevation within the zone. Current program regulations generally require that all new construction be elevated such that the first floor, including basement, is elevated to or above the BFE in AE and VE Zones.

4.4 Velocity Zones

The USACE has established the 3-foot wave height as the criterion for identifying coastal high hazard zones (Reference 70). This was based on a study of wave action effects on structures. This criterion has been adopted by FEMA for the determination of VE zones. Because of the additional hazards associated with high-energy waves, the NFIP regulations require much more stringent floodplain management measures in these areas, such as elevating structures on piles or piers. In addition, insurance rates in VE zones are higher than those in AE zones.

The location of the VE zone is determined by the 3-foot wave as discussed previously. The detailed analysis of wave heights performed in this study allowed a much more accurate location of the VE zone to be established. The VE zone generally extends inland to the point where the 1-percent-annual-chance stillwater flood depth is insufficient to support a 3-foot wave.

5.0 <u>INSURANCE APPLICATIONS</u>

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

Zone A

Zone A is the flood insurance risk zone that corresponds to the 1-percent-annual-chance floodplains that are determined in the FIS by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no BFE or base flood depths are shown within this zone.

Zone AE

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

Zone AH

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

Zone AO

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

Zone AR

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

Zone A99

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

Zone V

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

Zone VE

Zone VE is the flood insurance risk zone that corresponds to the 1-percent-annual-chance coastal floodplains that have additional hazards associated with storm waves. Whole-foot BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

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

Zone X (Future Base Flood)

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

Zone D

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

6.0 FLOOD INSURANCE RATE MAP

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

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

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

The countywide FIRM presents flooding information for the entire geographic area of Lincoln County. Previously, FIRMs were prepared for each incorporated community and the unincorporated areas of the County identified as flood-prone. This countywide FIRM also includes flood-hazard information that was presented separately on Flood Boundary and Floodway Maps, where applicable. Historical data relating to the maps prepared for each community are presented in Table 12, “Community Map History.”

COMMUNITY NAME	INITIAL NFIP MAP DATE	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	INITIAL FIRM DATE	FIRM REVISIONS DATE
Alna, Town of	January 3, 1975	None	March 1, 2005	
Bar Island	February 21, 1975	August 27, 1976	June 19, 1989	January 4, 2002
Boothbay, Town of	February 7, 1975	March 7, 1980	June 3, 1986	
Boothbay Harbor, Town of	February 14, 1975	August 16, 1977	June 17,1986	
Bremen, Town of	January 31, 1976	October 8, 1976	February 4, 1987	
Bristol, Town of	February 21, 1975	August 27, 1976	June 19, 1989	January 4, 2002
Damariscotta, Town of	February 14, 1975	August 27, 1976	September 30, 1988	
Dresden, Town of	September 20, 1974	December 3, 1976	May 19, 1987	July 6, 1998
Edgecomb, Town of	January 3, 1975	July 18, 1978	October 1, 2002	
Haddock Island	February 21, 1975	August 27, 1976	June 19, 1989	January 4, 2002
Indian Island	February 21, 1975	August 27, 1976	June 19, 1989	January 4, 2002
Jefferson, Town of	October 25, 1974	July 9, 1976	October 18, 1988	
Jones Garden Island	February 21, 1975	August 27, 1976	June 19, 1989	January 4, 2002
Killick Stone Island	February 21, 1975	August 27, 1976	June 19, 1989	January 4, 2002
Louds Island	February 21, 1975	August 27, 1976	June 19, 1989	January 4, 2002

TABLE 12

FEDERAL EMERGENCY MANAGEMENT AGENCY

LINCOLN COUNTY, ME
(ALL JURISDICTIONS)

COMMUNITY MAP HISTORY

COMMUNITY NAME	INITIAL NFIP MAP DATE	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	INITIAL FIRM DATE	FIRM REVISIONS DATE
Marsh Island	February 21, 1975	August 27, 1976	June 19, 1989	January 4, 2002
Newcastle, Town of	May 17, 1977	None	April 1, 2003	
Nobleboro, Town of	February 14, 1975	April 30, 1976	November 15, 1989	
Ross Island	February 21, 1975	August 27, 1976	June 19, 1989	January 4, 2002
S. Bristol, Town of	April 11, 1975	December 7, 1979	July 16, 1990	
Somerville, Town of	April 25, 1975	None	April 3, 1987	August 19, 1991
Southport, Town of	January 17, 1975	August 6, 1976	May 17, 1988	
Thief Island	February 21, 1975	August 27, 1976	June 19, 1989	January 4, 2002
Waldoboro, Town of	November 1, 1974	December 24, 1976	April 3, 1985	
Western Egg Rock Island	February 21, 1975	August 27, 1976	June 19, 1989	January 4, 2002
Westport, Town of	January 3, 1975	None	September 1, 2013	
Whitefield, Town of	July 26, 1974	None	February 18, 1977	
Wiscasset, Town of	May 24, 1977	None	April 16, 1991	
Wreck Island	February 21, 1975	August 27, 1976	June 19, 1989	January 4, 2002

TABLE 12

FEDERAL EMERGENCY MANAGEMENT AGENCY

LINCOLN COUNTY, ME
(ALL JURISDICTIONS)

COMMUNITY MAP HISTORY

7.0 OTHER STUDIES

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

Countywide FIS reports for the adjacent Maine Counties of Know, Sagadahoc, and Waldo are currently underway.

The countywide FIS report for Kennebec County, Maine (2011) has already gone effective (Reference 71).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting FEMA Region I, 99 High Street, 6th Floor, Boston, MA 02110.

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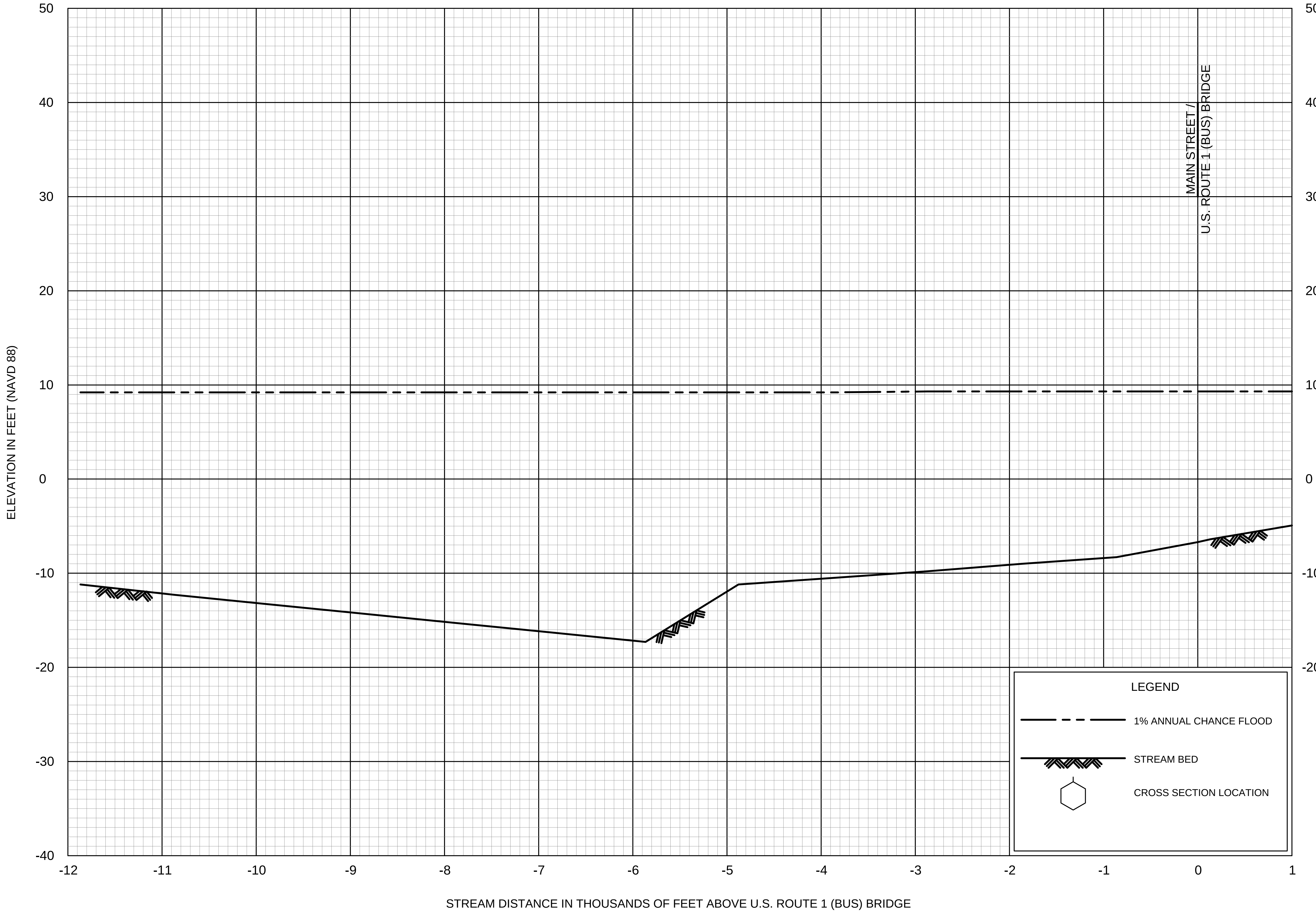


FLOOD PROFILES

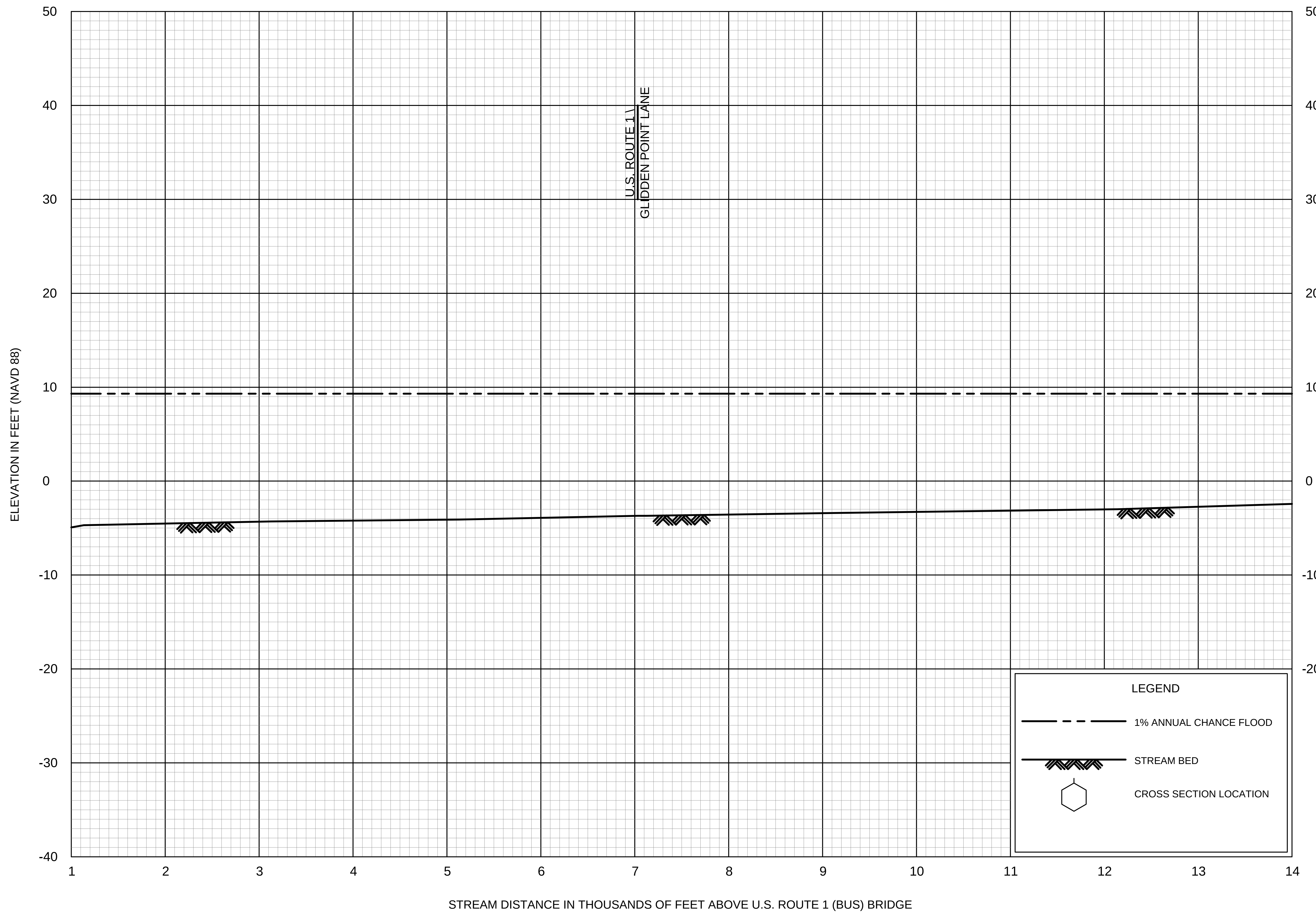
DAMARISCOTTA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

LINCOLN COUNTY, ME

(ALL JURISDICTIONS)

01P



FLOOD PROFILES

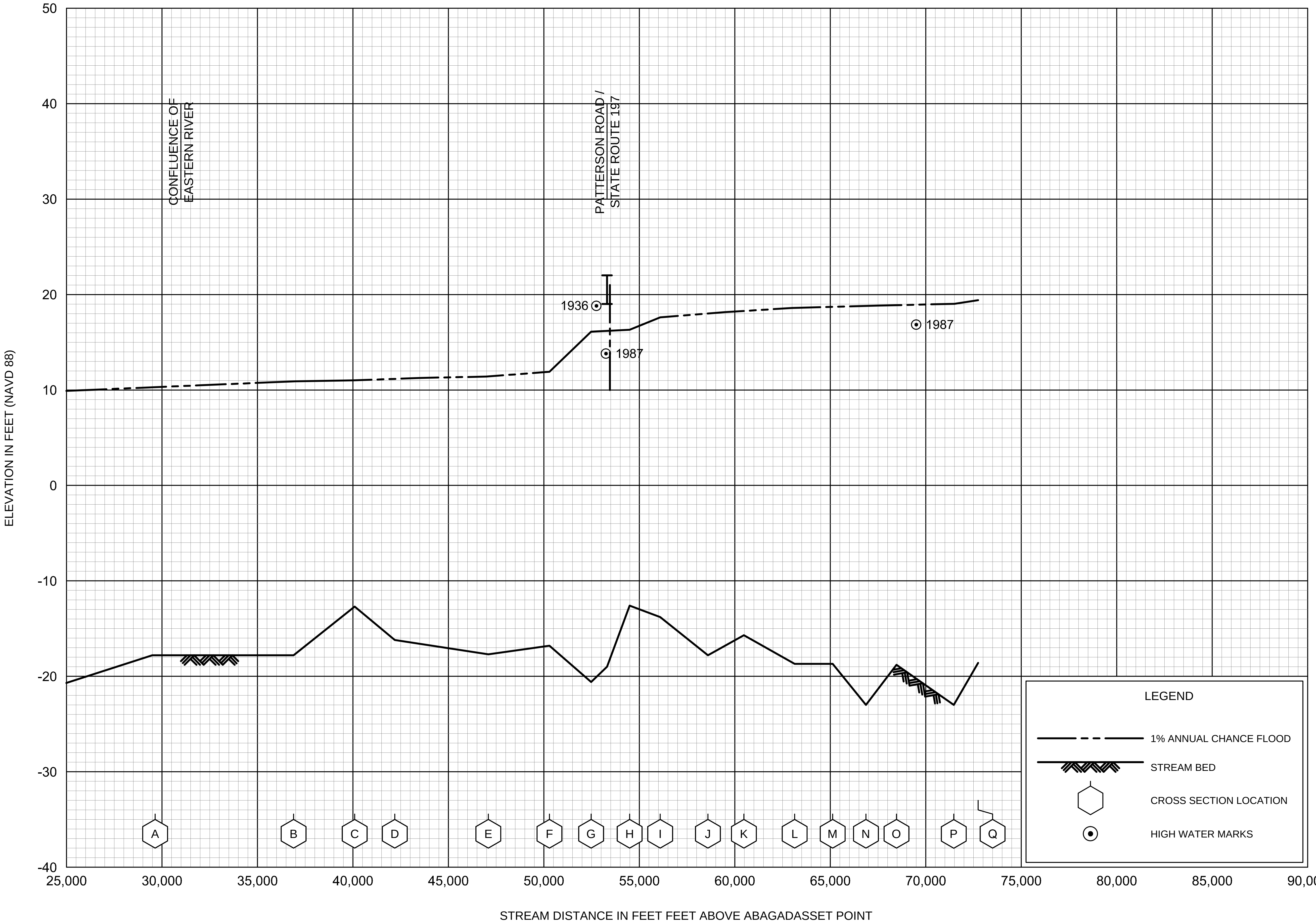
DAMARISCOTTA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

LINCOLN COUNTY, ME

(ALL JURISDICTIONS)

02P



FLOOD PROFILES

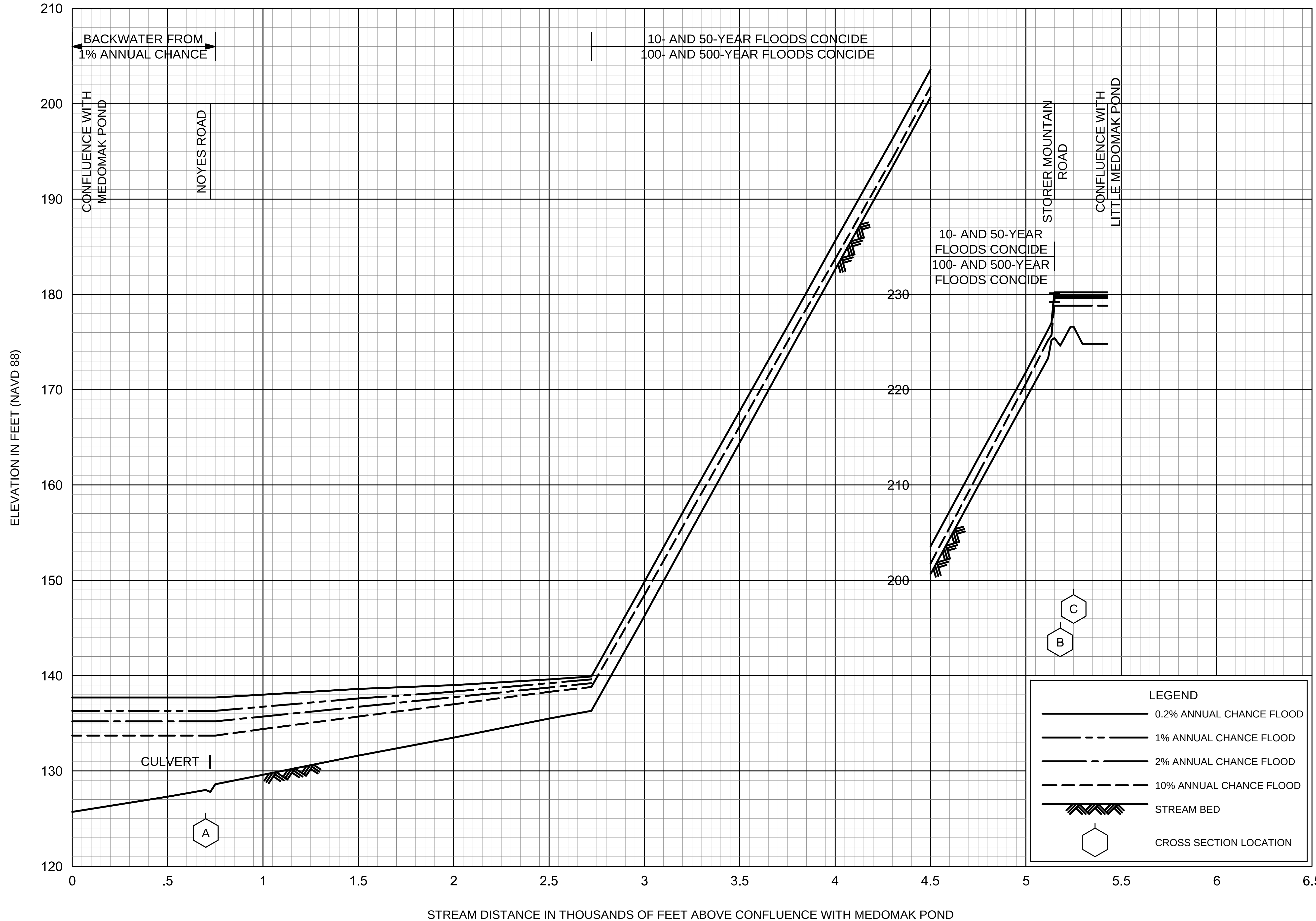
KENNEBEC RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

LINCOLN COUNTY, ME

(ALL JURISDICTIONS)

03P



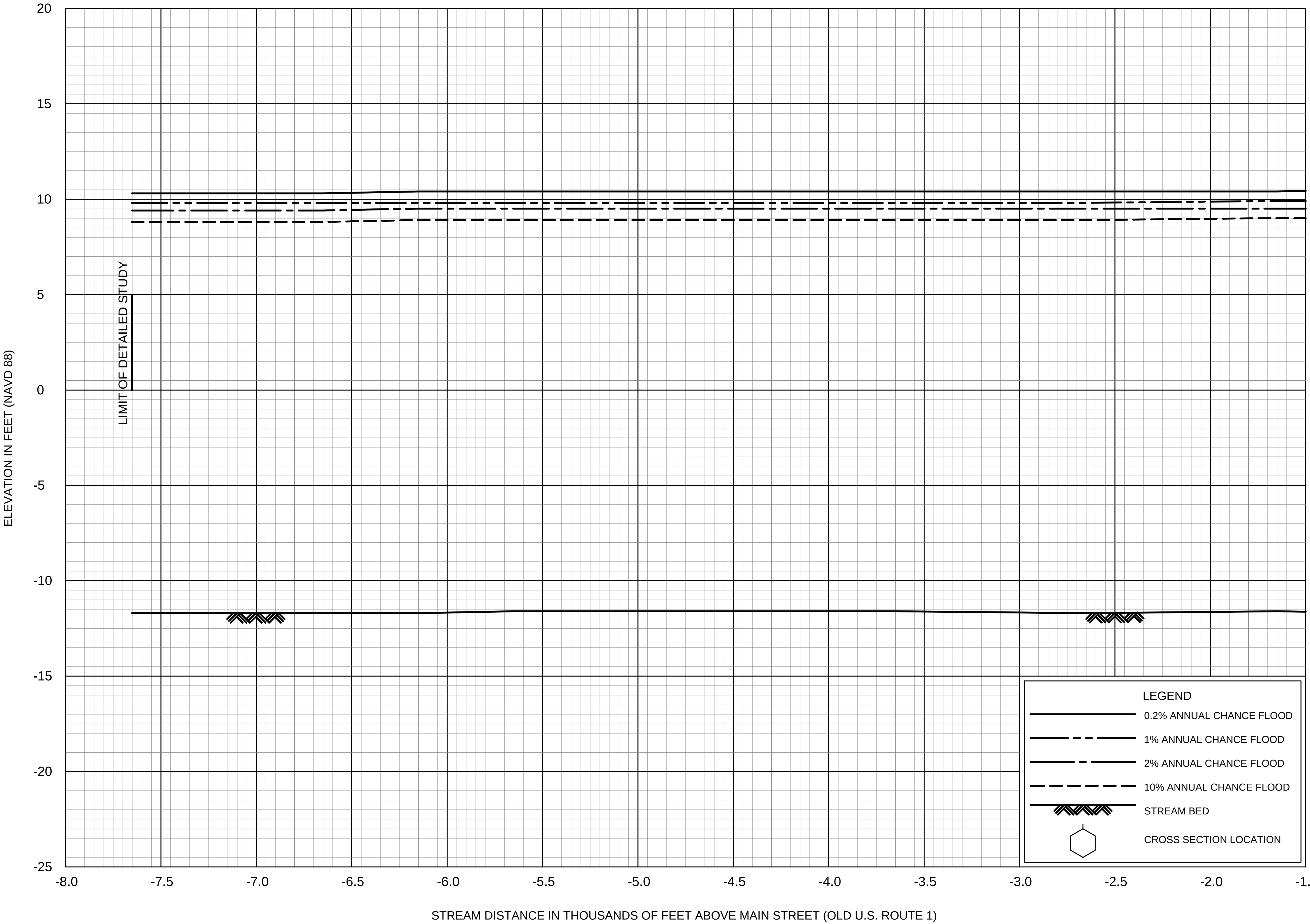
FLOOD PROFILES

LITTLE MEDOMAK POND OUTLET STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

LINCOLN COUNTY, ME
(ALL JURISDICTIONS)

04P



FLOOD PROFILES

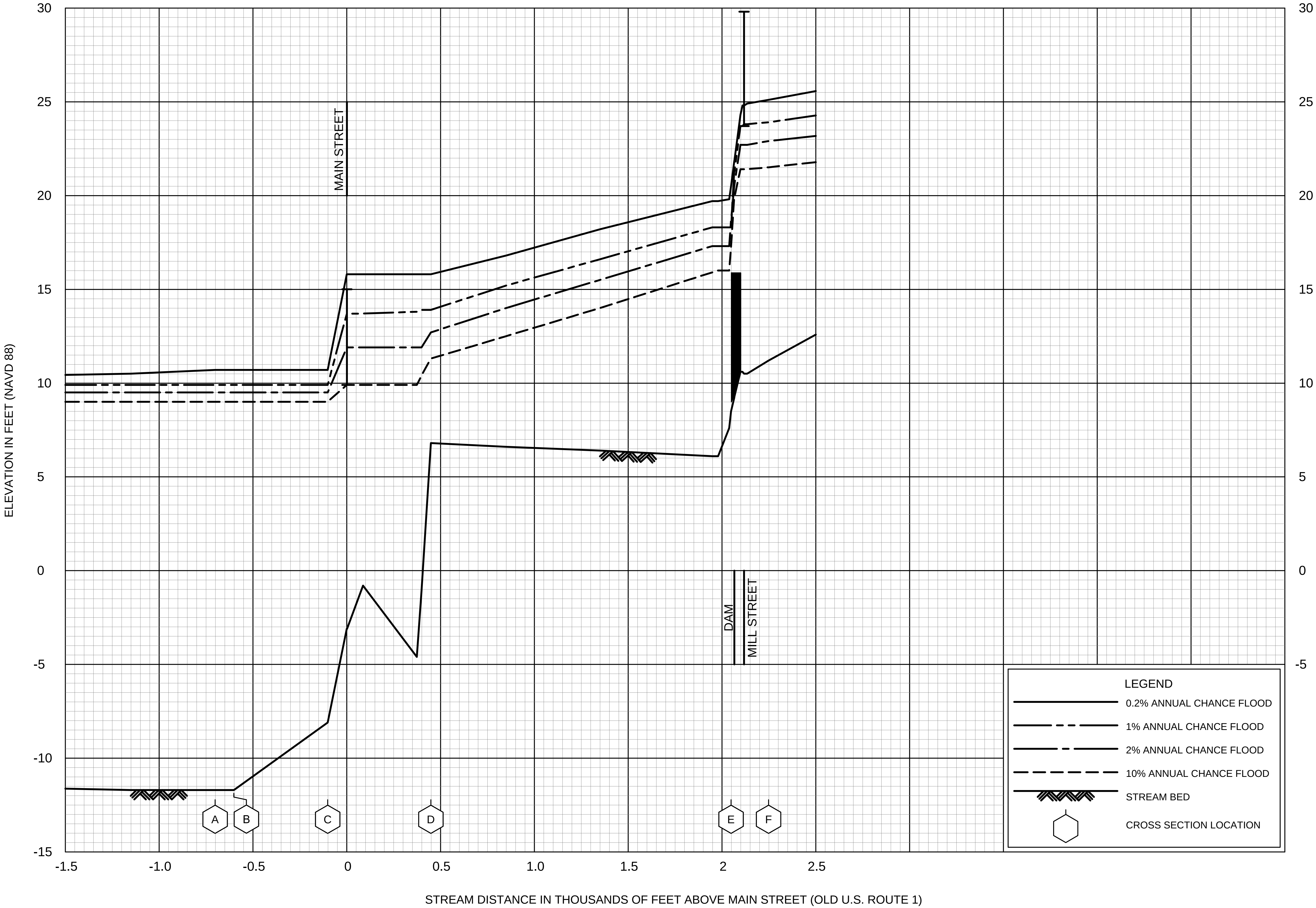
MEDOMAK RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

LINCOLN COUNTY, ME

(ALL JURISDICTIONS)

05P



FLOOD PROFILES

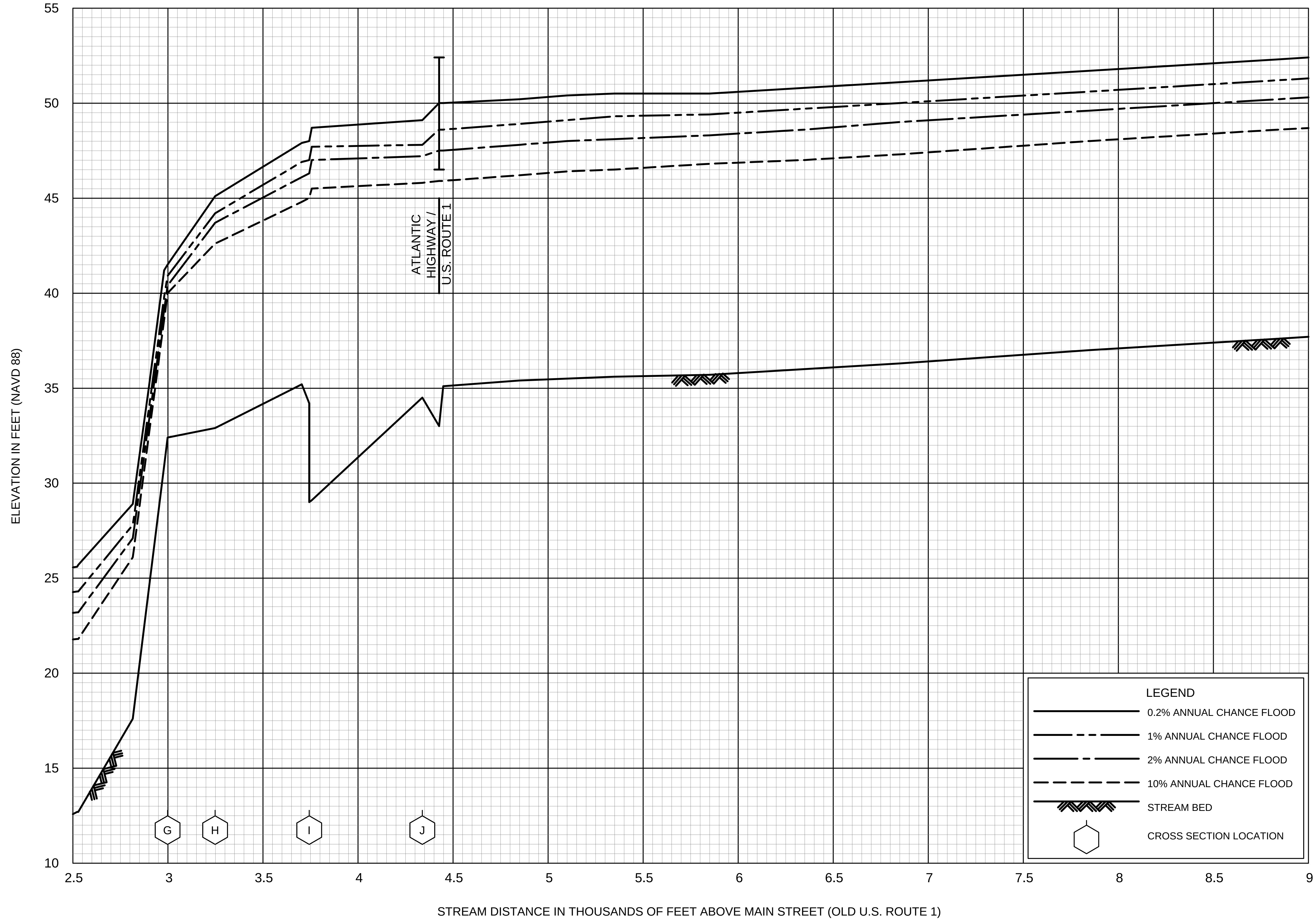
MEDOMAK RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

LINCOLN COUNTY, ME

(ALL JURISDICTIONS)

06P



FLOOD PROFILES

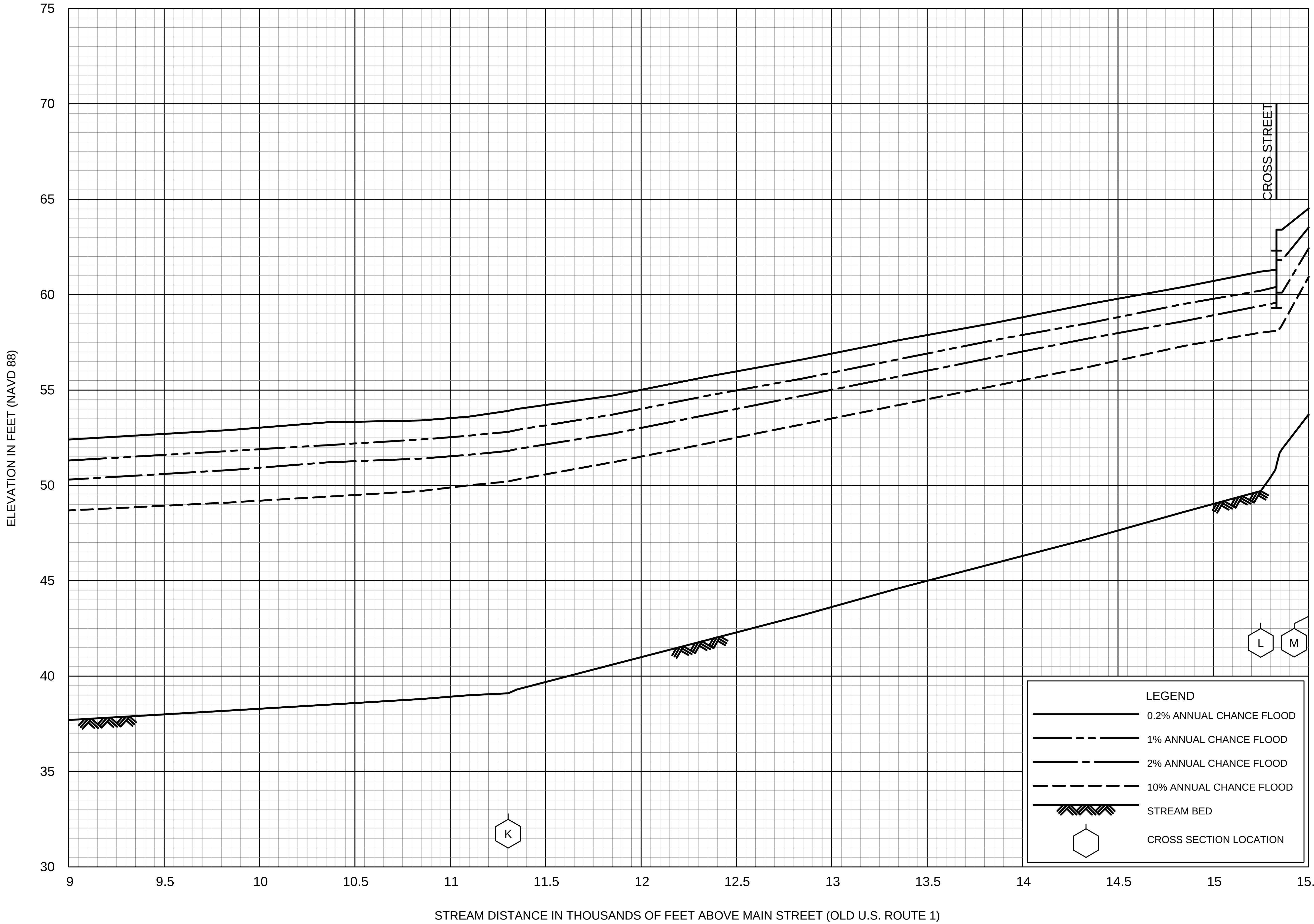
MEDOMAK RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

LINCOLN COUNTY, ME

(ALL JURISDICTIONS)

07P



FLOOD PROFILES

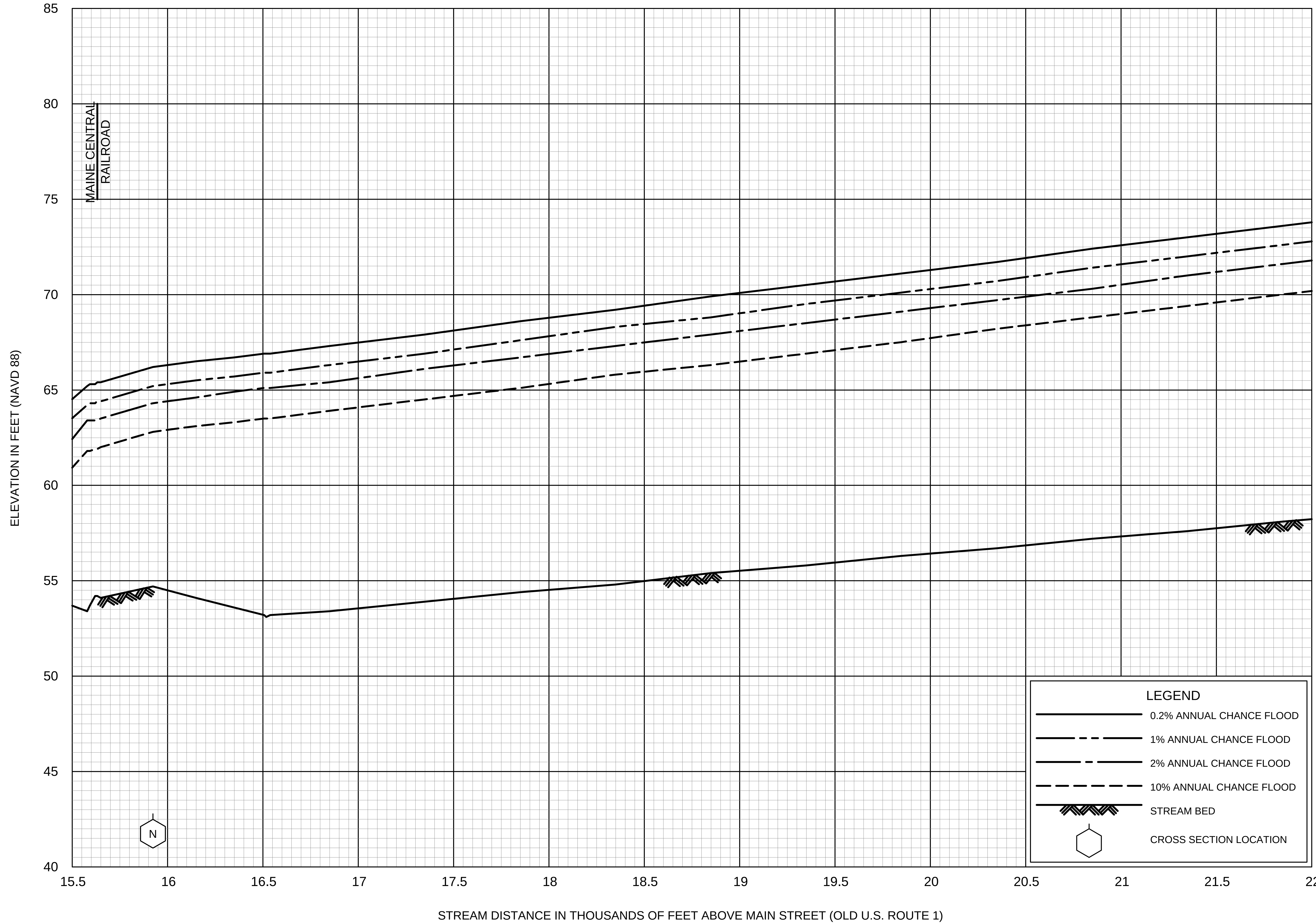
MEDOMAK RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

LINCOLN COUNTY, ME

(ALL JURISDICTIONS)

08P



FLOOD PROFILES

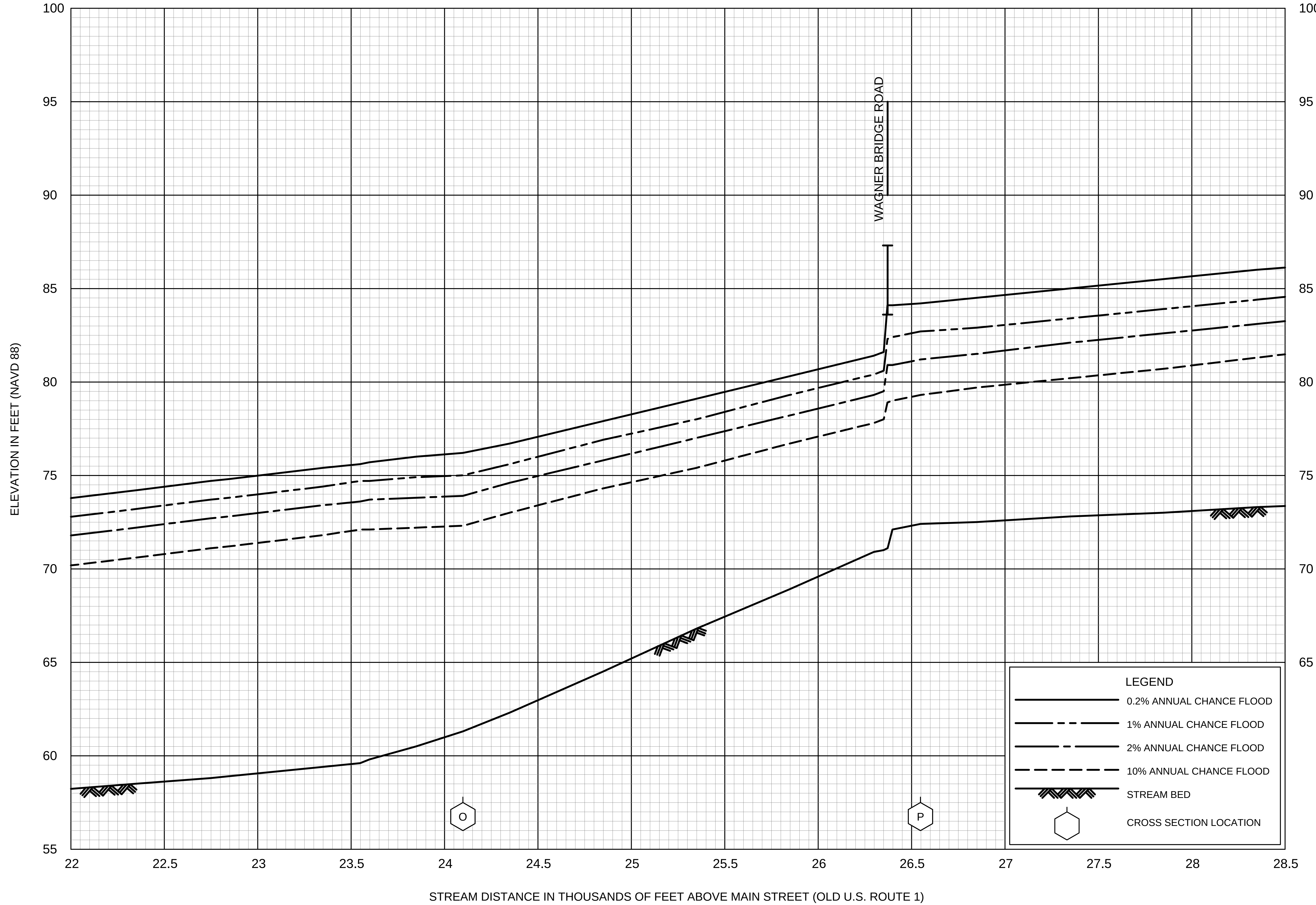
MEDOMAK RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

LINCOLN COUNTY, ME

(ALL JURISDICTIONS)

09P



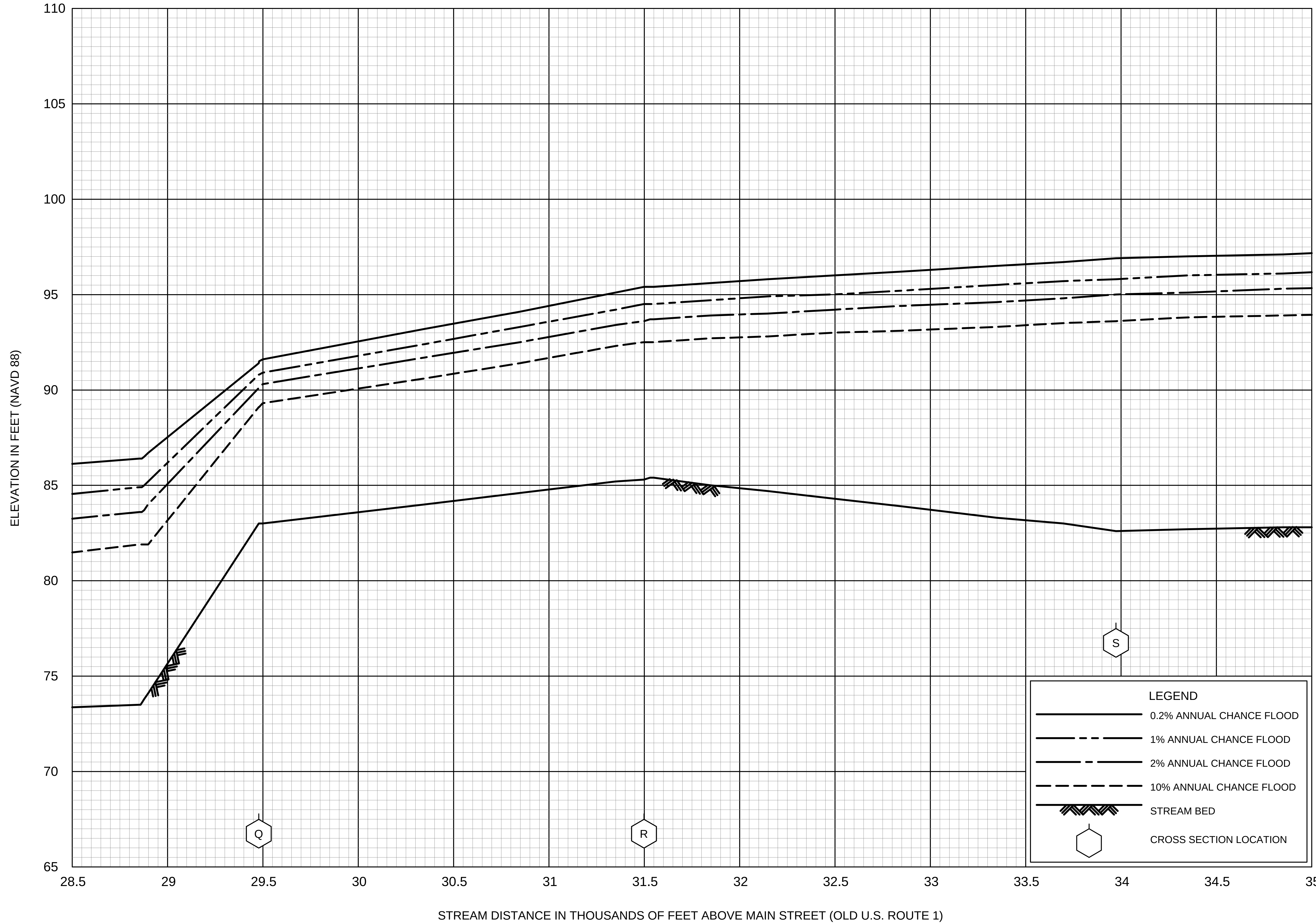
FLOOD PROFILES

MEDOMAK RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

LINCOLN COUNTY, ME

(ALL JURISDICTIONS)



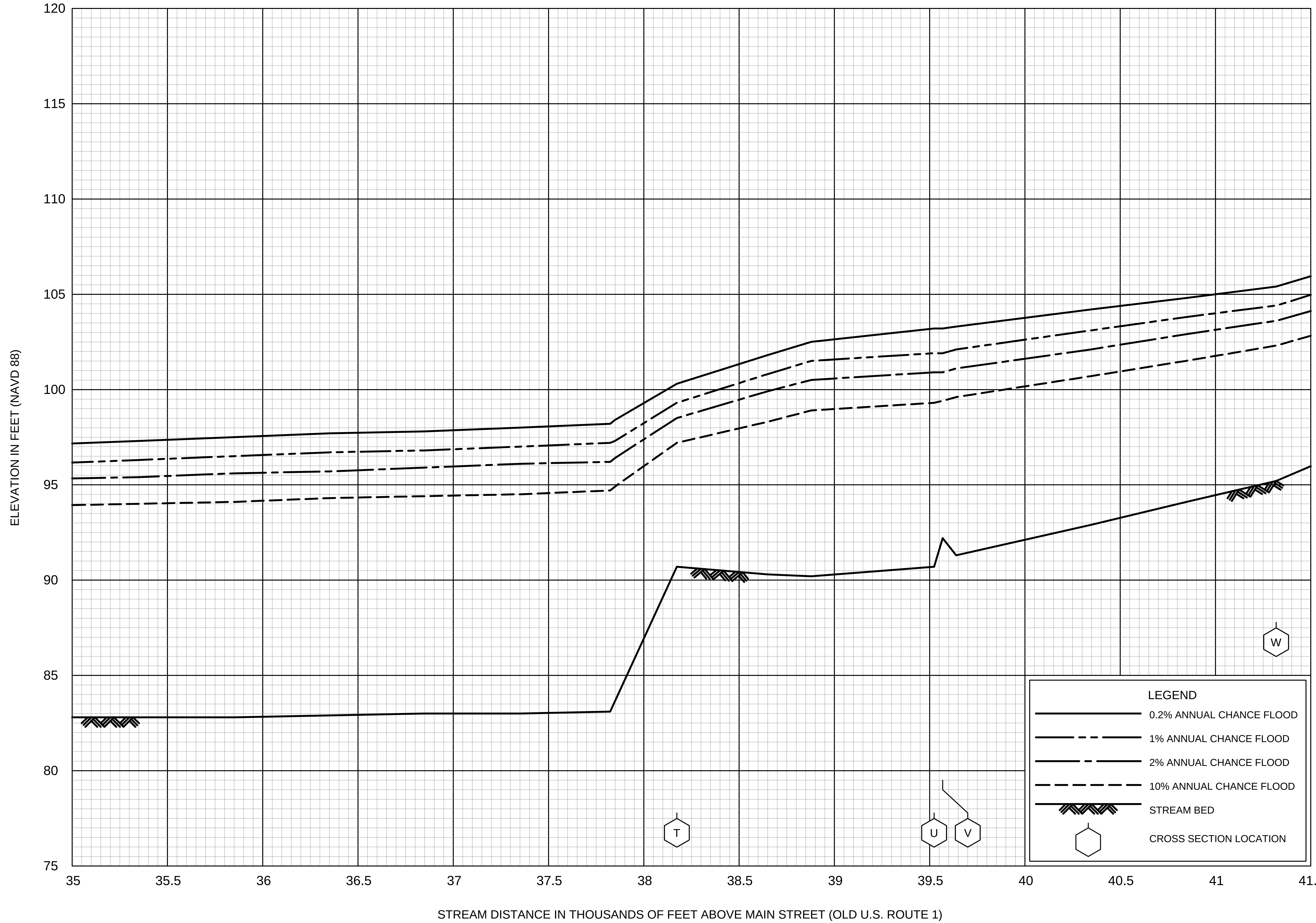
FLOOD PROFILES

MEDOMAK RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

LINCOLN COUNTY, ME

(ALL JURISDICTIONS)



FLOOD PROFILES

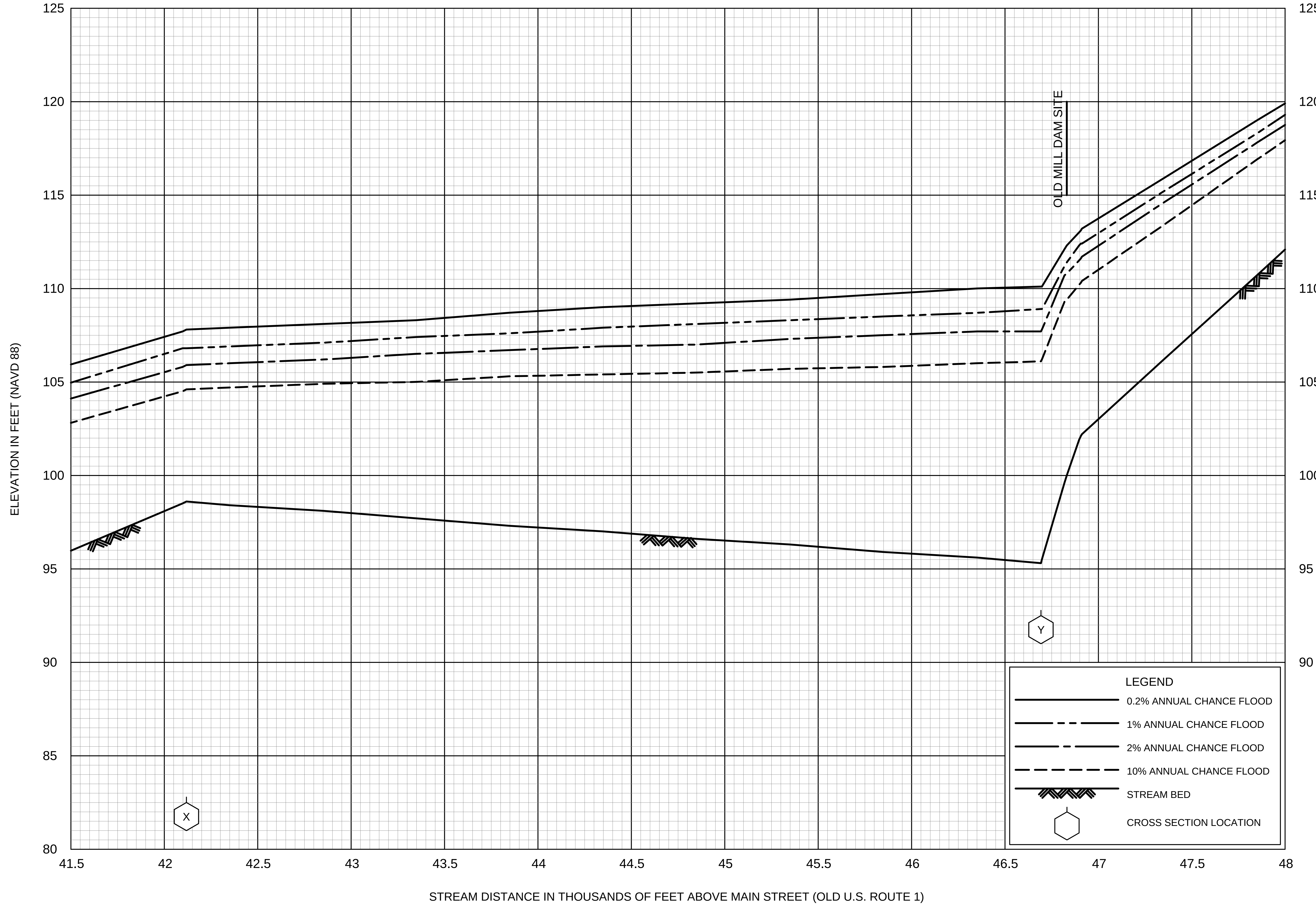
MEDOMAK RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

LINCOLN COUNTY, ME

(ALL JURISDICTIONS)

12P



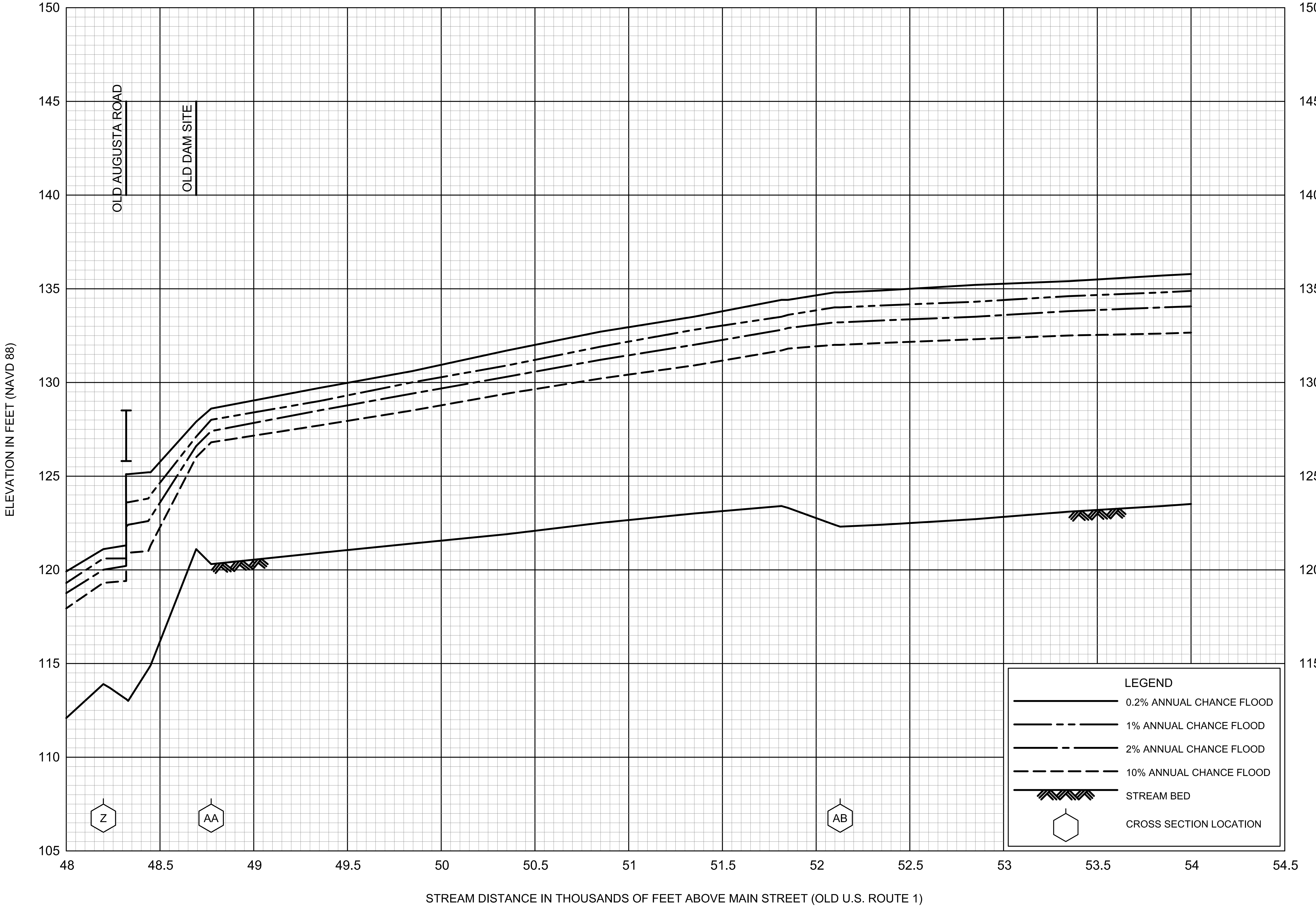
FLOOD PROFILES

MEDOMAK RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

LINCOLN COUNTY, ME

(ALL JURISDICTIONS)



FLOOD PROFILES

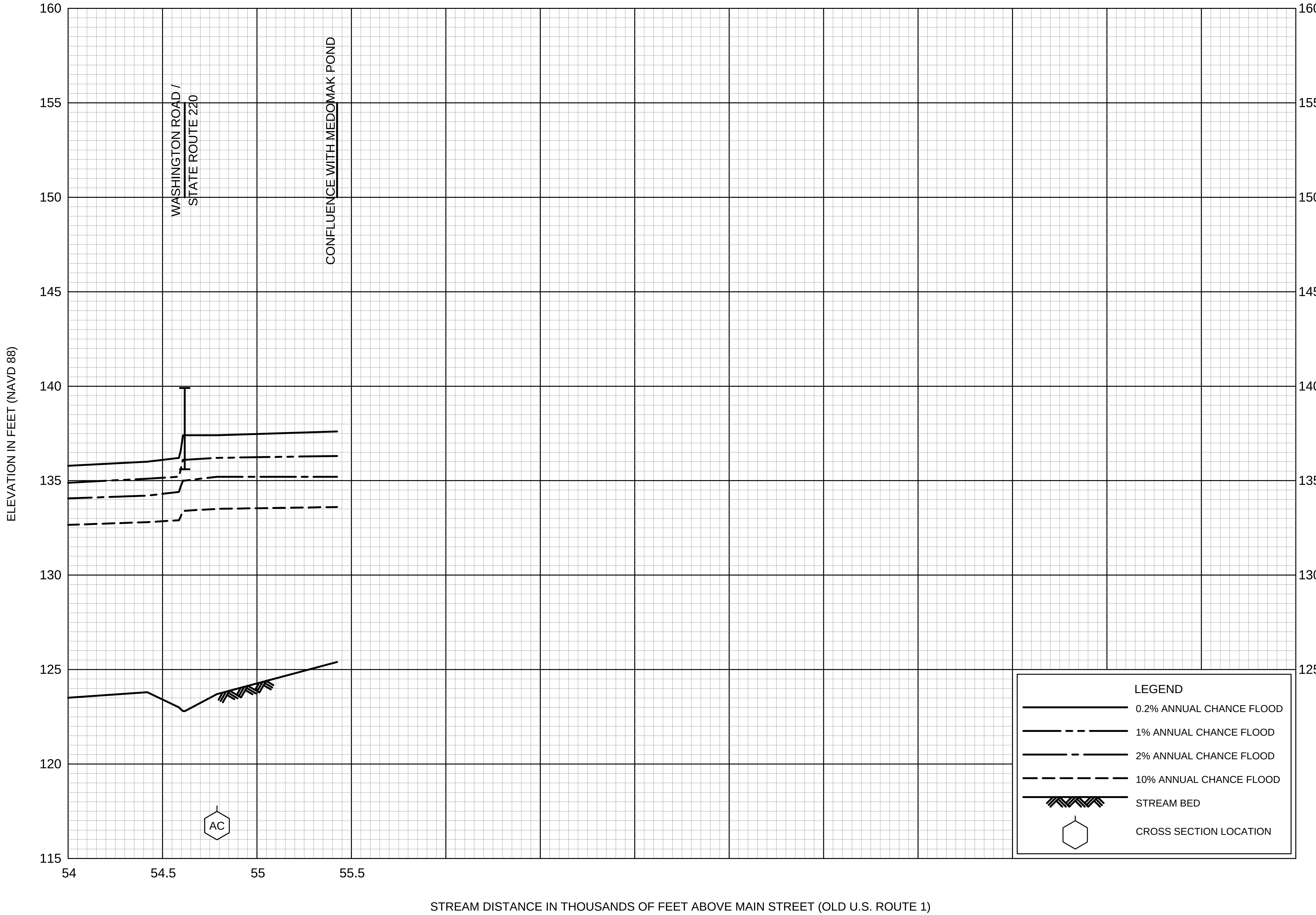
MEDOMAK RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

LINCOLN COUNTY, ME

(ALL JURISDICTIONS)

14P



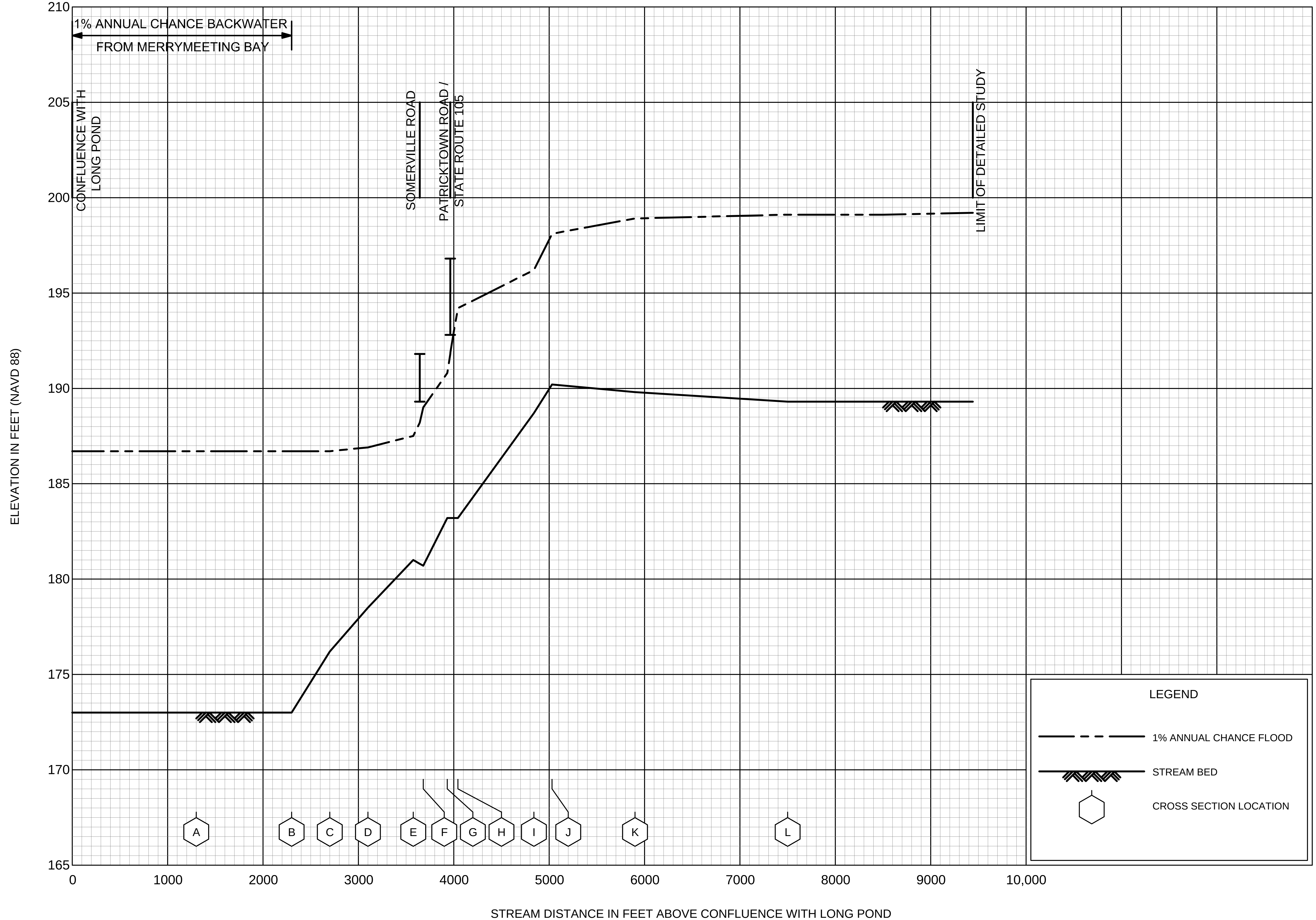
FLOOD PROFILES

MEDOMAK RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

LINCOLN COUNTY, ME

(ALL JURISDICTIONS)



FLOOD PROFILES

SHEEPSCOT RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

LINCOLN COUNTY, ME

(ALL JURISDICTIONS)