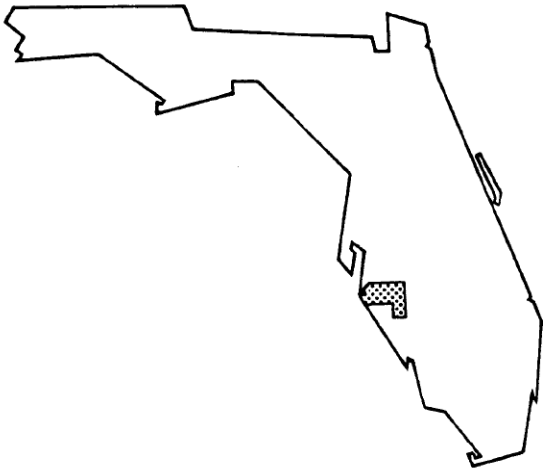
FLOOD INSURANCE STUDY

MANATEE COUNTY, FLORIDA
AND INCORPORATED AREAS



COMMUNITY NAME	COMMUNITY NUMBER
ANNA MARIA, CITY OF	125087
BRADENTON, CITY OF	120155
BRADENTON BEACH, CITY OF	125091
HOLMES BEACH, CITY OF	125114
LONGBOAT KEY, TOWN OF	125126
MANATEE COUNTY, UNINCORPORATED AREAS	120153
PALMETTO, CITY OF	120159

Effective: March 17, 2014

Federal Emergency Management Agency

Flood Insurance Study Number
12081CV000A

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) 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 the FIS 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 panels for the community contain information that was previously shown separately on the corresponding Flood Boundary and Floodway Map panels (e.g. floodway boundaries, cross sections). In addition, former flood hazard zone designations have been changed as shown:

Old Zone	New Zone
A1 through A30	AE
B	X
C	X

Initial Countywide FIS Effective Date: March 17, 2014

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EXHIBITS

FLOOD INSURANCE STUDY
MANATEE COUNTY, FLORIDA AND INCORPORATED AREAS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study (FIS) investigates the existence and severity of flood hazards in, or revises and updates previous FISs/Flood Insurance Rate Maps (FIRMs) for the geographic area of Manatee County, Florida, including: the Town of Longboat Key (portion within Manatee County only); the Cities of Anna Maria, Bradenton, Bradenton Beach, Holmes Beach, Palmetto and the unincorporated areas of Manatee County (hereinafter referred to collectively as Manatee County). The portion of the Town of Longboat Key within Sarasota County is not included in this FIS.

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 community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promoted 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, as amended.

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

1.2 Authority and Acknowledgments

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

This FIS was prepared to combine the incorporated communities within Manatee County into a countywide format. Information on the authority and acknowledgments for each jurisdiction included in this countywide FIS, as compiled from their previously printed FIS reports (References 1 through 7), is shown below.

Anna Maria, City of:	The hydrologic and hydraulic analyses for this study were performed by Tetra Tech, Inc., for the Federal Emergency Management Agency, under Contract No. H-4510. This work, which was completed in April 1979, covered all significant flooding sources affecting the City of Anna Maria. (Reference 8).
Bradenton, City of:	The hydrologic and hydraulic analyses for this study were performed by Tetra Tech, Inc., for the Federal Emergency Management Agency, under Contract No. H-4510. This work, which was completed in March 1979, covered all significant flooding sources affecting the

unincorporated areas of the City of Bradenton, Florida. (Reference 9).

Bradenton Beach, City of:

The hydrologic and hydraulic analyses for this study were performed by Tetra Tech, Inc., for the Federal Emergency Management Agency, under Contract No. H-4510. This work, which was completed in April 1979, covered all significant flooding sources affecting the City of Bradenton Beach. (Reference 8).

Holmes Beach, City of:

The hydrologic and hydraulic analyses for this study were performed by Tetra Tech, Inc., for the Federal Emergency Management Agency, under Contract No. H-4510. This work, which was completed in April 1979, covered all significant flooding sources affecting the City of Holmes Beach (Reference 8).

Longboat Key, Town of:

The hydrologic and hydraulic analyses for this study were performed by Tetra Tech, Inc., for the Federal Emergency Management Agency, under Contract No. H-4059. This work, which was completed in July 1978, covered all significant flooding sources affecting the Town of Longboat Key. (Reference 10).

Manatee County (Unincorporated Areas):

The original hydrologic and hydraulic analyses for this study were performed by Tetra Tech, Inc., for the Federal Emergency Management Agency, under Contract No. H-4510. This work, which was completed in March 1979, covered all significant flooding sources affecting the unincorporated areas of Manatee County, Florida. (Reference 9).

Updated hydrologic and hydraulic analyses mentioned in Section 9 - Revisions Description of the July 15, 1992 FIS report were performed by Engineering Methods & Application, Inc., under Contract No. EMW-89-C-2823 for the Federal Emergency Management Agency (FEMA). (Reference 11).

The 1992 study revision included the overflow of Cabbage Slough; Wade Canal; Frye Canal; Cooper Creek; Frog Creek, upstream of U.S. Route 41; Buffalo Canal; Gamble Creek, upstream of Golf Course Drive; Braden River, upstream of Interstate 75; Braden River West Channel; Wolf Slough; Mill Creek, upstream of

confluence of unnamed tributary; Rattlesnake Slough; Gap Creek; Williams Creek; Cypress Strand; Gates Creek; East Fork Cooper Creek; Myakka River, upstream of State Road 70; and South Fork Little Manatee River.

The updated hydrologic and hydraulic analyses for Cedar Hammock Drainage Canal mentioned in the July 15, 1992 FIS report Section 9 - Revisions Description were taken from a COE reconnaissance report (Reference 12).

Palmetto, City of: The hydrologic and hydraulic analyses for this study were performed by Tetra Tech, Inc., for the Federal Emergency Management Agency, under Contract No. H-4510. This work, which was completed in April 1979, covered all significant flooding sources affecting the City of Palmetto (Reference 8).

For this countywide revision, the conversion to the Digital Flood Insurance Rate Map (DFIRM) format is based upon updated orthophotography and also involved: the redelineation of coastal floodplain areas based upon updated Light Detection and Ranging (LiDAR)-derived topographic data (94 miles), the incorporation of several new community-supplied detailed studies (92 miles), the addition of new approximate Zone A areas based on SWFWMD wetland and waterbody land use codes and National Wetland Inventory (NWI) delineations (36 miles), new approximate Zone A delineations on riverine reaches (76 miles), the incorporation of effective Letters of Map Revisions (LOMRs) (9 miles), and the transition from the National Geodetic Vertical Datum of 1929 (NGVD 29) to the North American Vertical Datum of 1988 (NAVD 88). The study was prepared by the BakerAECOM, for FEMA, under Contract No. HSFEHQ-09-0368, Task Order No. HSFE04-09-0066. This work was completed in September 2011 (Reference 13). Table 4 lists the scope of this revision in more detail.

The Wares Creek / Cedar Hammock Creek hydrologic and hydraulic analyses were prepared by the U.S. Department of the Army, Army Corps of Engineers, Jacksonville District, in October 2007, and submitted to FEMA during the Flood Insurance Study project scoping phase (Reference 14).

The Frog Creek/Buffalo Canal watershed was restudied using ICPR V3 by the Southwest Florida Water Management District (SWFWMD) contractor Jones Edmunds & Associates, Inc. in October 2007, and submitted to FEMA during the Flood Insurance Study project scoping phase (Reference 15).

Base map information shown on the FIRM panels was base map orthophotography obtained from Southwest Florida Water Management District (SWFWMD) from one−foot resolution digital orthoimagery flown in 2008 and 2009 (Reference 16). Vector base map data was provided by Manatee County and SWFWMD. Vector information was compiled in 2003−2009 by Manatee County GIS department (Reference 17). Elevation data for the current study and redelineation efforts was provided in the form of LiDAR terrain data. (Reference 18). The projection used in the preparation of this map is Florida State Plane west zone (FIPSZONE 0902), North American Datum of 1983 (NAD 83), GRS80 spheroid.

1.3 Coordination

Consultation Coordination Officer's (CCO) meetings may be held for each jurisdiction in this countywide FIS. An initial CCO meeting is held typically with representatives of FEMA, the community, and the study contractor to explain the nature and purpose of a FIS and to identify the steams to be studied by detailed methods. A final CCO meeting is held typically with representatives of FEMA, the community, and the study contractor to review the results of the study.

An initial time and cost estimation meeting was held on February 16, 1977. Representatives of the study contractor, the county, and the Federal Emergency Management Agency agreed on the scope and methods of study. Information describing hydrologic conditions, drainage patterns, and other flood-related data, as well as information on topography, roads, bench marks, and demography was sought from the Manatee County Planning and Engineering Departments; the State of Florida, Department of Community Affairs; the State of Florida, Department of Transportation; the Manatee Chamber of Commerce; the Manatee County Utility System; the National Oceanic and Atmospheric Administration; the Seaboard Coast Line Railroad; the U.S. Soil Conservation Service; the Southwest Florida Water Management District; the Tampa Bay Regional Planning Council; the U.S. Army Corps of Engineers, Jacksonville District; and the U.S. Geological Survey.

On August 21, 1979, an intermediate meeting was held and attended by representatives of the study contractor, the county, and the Federal Emergency Management Agency.

TABLE 1 – PRE-COUNTYWIDE CCO MEETINGS

Community	Initial CCO Date	Intermediate CCO Date	Final CCO Date
Anna Maria, City of	*	*	June 29, 1982
Bradenton, City of	*	*	February 23, 1983
Bradenton Beach, City of	*	*	*
Holmes Beach, City of	*	*	June 29, 1982
Longboat Key, Town of	*	*	June 7, 1979
Manatee County (Unincorporated Areas)	February 16, 1977	August 21, 1979	*
Palmetto, City of	*	*	*

*Data Not Available

The initial meeting was held on November 2, 2009 with FEMA, **S**outhwest Florida Water Management District, BakerAECOM, Manatee County and the Cities of Anna Maria, Bradenton Beach, Bradenton Beach, Holmes Beach, Palmetto and the Town of Longboat Key to explain the

nature and purpose of the countywide Manatee County FIS and to identify the streams to be studied and restudied, the DFIRM format and the conversion to the NAVD 88 datum.

The results of the study were reviewed at the final meeting held on June 11, 2012, and attended by representatives of FEMA, Southwest Florida Water Management District, BakerAECOM, Manatee County and the Cities of Anna Maria, Bradenton Beach, Bradenton Beach, Holmes Beach, Palmetto and the Town of Longboat Key All issues and/or concerns raised at that meeting have been addressed.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS covers the geographic area of Manatee County, Florida.

The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction. All or portions of the flooding sources listed in Table 2, "Flooding Sources Studied by Detailed Methods," were studied by detailed methods. Limits of detailed study are indicated on the Flood Profiles (Exhibit 1) and on the FIRM (Exhibit 2). Study analysis includes the effects of hurricane surge in the areas affected. Some areas affected by flooding due to rainfall ponding and shallow sheetflow were also studied in detail.

Flooding within the Myakka River State Park was not studied with the exception of an approximate study along Mossy Island Slough in the northern portion of the park acquired after the 1992 effective FIS.

TABLE 2 – FLOODING SOURCES STUDIED BY DETAILED METHODS

STREAM NAME	STUDY REACH
Bowlees Creek	From US Route 41 to a point 2200 feet upstream of 52st Avenue East
Braden River	From Tampa Bay to State Road 70
Braden River West Channel	From mouth at Braden River to State Road 70
Buffalo Canal	Entire reach
Cedar Hammock Drainage Canal	From the confluence with Manatee River to 20th Street W
Cooper Creek	From mouth at Braden River to University Parkway
Curiosity Creek	From 2100 feet upstream of county boundary to 350 feet upstream of FPL maintenance road, 5000 feet upstream of county boundary
Curiosity Creek Tributary	From confluence with Curiosity Creek to approximately 6280 feet upstream of confluence
Cypress Strand	From mouth at Manatee River to
East Ditch	From confluence with Manatee River to the headwaters

TABLE 2 – FLOODING SOURCES STUDIED BY DETAILED METHODS (continued)

STREAM NAME	STUDY REACH
East Fork Cooper Creek	From mouth at Cooper Creek to approximately 3000 feet upstream of Lakewood Ranch Boulevard
Frog Creek	Entire reach
Frye Canal	From mouth at Gamble Creek to just upstream of re-convergence with Gamble Creek
Gamble Creek	From mouth at Manatee River to 1800 feet upstream of re-convergence with Frye Canal
Gap Creek	From mouth at Braden River to Saunders Road
Gates Creek	From mouth at Manatee River to State Road 64
Gulf of Mexico	Entire reach within county
Little Manatee River	Entire reach within county
Manatee River	From Tampa Bay at Interstate 75 to the Manatee County Utility System Dam
Manatee River Lake Reach	From mouth at Manatee River to Rive Isle Run
Manatee River Wetland Reach	From mouth at Manatee River to Rive Isle Run
Mill Creek	From mouth at Manatee River to Trail Road
Myakka River	From county boundary to State Road 64
Rattlesnake Slough	From mouth at Braden River to approximately 380 feet upstream of North Lockwood Ridge Road
Rattlesnake Slough Diversion Channel	From confluence with Rattlesnake Slough to divergence from Rattlesnake Slough
Sarasota Bay	Entire length within the county
South Fork Little Manatee River	From county boundary to Bunker Hill Road
Tampa Bay	Entire length within the county
Trunk Ditch	Confluence with Manatee River to State Road 64
Williams Creek	From mouth at Braden River to Trail Road
Wolf Slough	From mouth at Braden River to 13,100 feet upstream of Braden River

Approximate analyses were used to study those areas having a low development potential or minimal flood hazard.

The flooding sources and their tributaries studied by approximate methods are listed in Table 3, "Flooding Sources Studied by Approximate Methods."

TABLE 3 – FLOODING SOURCES STUDIED BY APPROXIMATE METHODS

Baker Branch
Big Slough Canal
Bowlees Creek
Braden River
Braden River West Channel
Bud Slough
Cedar Creek
Clay Gully
Coker Creek
Curiosity Creek
Curiosity Creek Tributary
Cypress Strand
Deer Prairie Slough
East Ditch Tributary1
East Fork Cooper Creek
East Fork Manatee River
East Fork Manatee River Tributary 1
Elder Branch
Fisher Branch
Fort Crawford Creek
Gamble Creek
Gamble Creek Tributary 1
Gamble Creek Tributary 4
Gamble Creek Tributary 5
Gamble Creek Tributary 6
Gamble Creek Tributary 7
Gap Creek
Gap West Tributary
Gates Creek
Gates Creek Tributary 1
Gates Creek Tributary 2
Gilley Creek
Gilley Creek Tributary 1
Gilley Creek Tributary 2
Gilley Creek Tributary 3
Gilley Creek Tributary 4
Gilley Creek Tributary 5
Gilley Creek Tributary 6
Goddard Creek
Graveyard Creek
Harvey Prong
Keen Branch
Little Fort Crawford Creek
Long Branch
Long Creek
Manatee River
Maple Creek
Mill Creek
Mill Creek Tributary 1
Mossy Island Slough
Mud Slough
Myakka River
North Fork Manatee River
North Fork Manatee River Tributary 1
North Fork Manatee River Tributary 3
North Fork Manatee River Tributary 4
North Fork Manatee River Tributary 5
North Fork Manatee River Tributary 6
North Fork Manatee Tributary 2
Ogleby Creek
Owen Branch
Owen Creek
Pearce Canal
Rattlesnake Slough
Rye Branch
Sand Branch
South Fork Little Manatee River
Tatum Gully
Tyre Creek
Tyre Creek Tributary1
Water Hole Creek
West Fork Horse Creek
Wildcat Slough
Williams Creek
Wingate Creek
Youngs Creek

Table 4 details the scope of revision for this FIS.

TABLE 4 – SCOPE OF REVISION

Flooding Source(s)	Study Type	Mileage
Gulf of Mexico, Tampa Bay, Sarasota Bay and other coastal study reaches	Coastal Redelineation	94 miles
Multiple ponding areas	New Approximate Study (Zone A) delineation for wetland areas not previously mapped, using Southwest Florida Water Management District (SWFWMD) Land Use / Land Cover methodology and data, compared against the US Fish and Wildlife Service NWI mapping.	36 miles[2]
Multiple riverine stream reaches	New Approximate Study (Zone A) delineations	76 miles
Wares Creek / Cedar Hammock	New Detailed Study incorporation – leveraged models supplied by Manatee County	5 miles
Frog Creek/Buffalo Canal Watershed	New Detailed Study incorporation – leveraged ICPR models supplied by Southwest Florida Water Management District (SWFWMD)	87 miles
Multiple flooding sources	Incorporation of effective Letters of Map Revision (LOMRs)	9 miles
All unmentioned non-coastal detailed study reaches	Digital conversion of all Zone AE areas not being replaced by the above-mentioned studies	285 miles

The following coastal special flood hazard areas were redelineated on updated topographic data (Reference 18): Gulf of Mexico, Tampa Bay, Sarasota Bay, and the coastal portions of Manatee River (Reference 13).

Multiple approximate zone ponding areas shown on the SWFWMD Land Use / Land Cover data, as compared against the US Fish and Wildlife Service NWI mapping, have been added to the FIRM panels as approximate (Zone A) special flood hazard areas (Reference 14).

New approximate studies were also performed on various riverine stream reaches, including non-detailed study portions of the following flooding sources: Big Slough Canal, Bowlees Creek, Bud Slough, Curiosity Creek, Curiosity Creek, Curiosity Creek, Curiosity Creek Tributary, Deer Prairie Slough, East Fork Manatee River, Gap West Tributary, Gates Creek, Gilley Creek, Fisher Branch, Keen Branch, Long Branch, Manatee River, Mill Creek, North Fork Manatee River, South Fork Little Manatee River, Tributary to Cypress Strand, Tributary to Gates Creek, Tributary to Gilley Creek, Tributary to Gilley Creek, Tributary to Gilley Creek, Tributary to Gilley Creek, Tributary to Mill Creek, Tributary to Mill Creek, Tributary to North Fork Manatee River, Tributary to North Fork Manatee River, Tributary to North Fork Manatee River, Wares Creek, Webb Branch, Wildcat Slough, Wildcat Slough, and Williams Creek.

Several new detailed studies were added to this FIS, replacing previous study results.

Manatee County provided a flood study on the Wares Creek / Cedar Hammock reach prepared by Jones, Edmunds and Associates (Reference 14), and Southwest Florida Water Management District (SWFWMD) provided a new study prepared by the US Army Corps of Engineers on the Frog Creek/Buffalo Canal Watershed (Reference 12). These studies were incorporated by BakerAECOM into this countywide FIS (Reference 13).

Table 4 presents Letters of Map Change (LOMCs) incorporated into this countywide study. LOMRs were incorporated on Curiosity Creek, Curiosity Creek Tributary, East Ditch, East Fork Cooper Creek, Manatee River Lake Reach, Manatee River Wetland Reach, Rattlesnake Slough Diversion Channel, Sarasota Bay, and Trunk Ditch.

No other new hydrologic or hydraulic analysis was performed for this revision. The flooding sources not replaced by new detailed or approximate studies or redelineated on updated topography were digitized directly from the effective Flood Insurance Rate Maps after being georeferenced to updated orthophotography. (Reference 13).

TABLE 5 – LETTERS OF MAP CHANGE

Community	**Case Number**	**Project Identifier**	**Effective Date**
Manatee County	98-04-281P	Hawks Harbor Property / Sarasota Bay	December 9, 1998
Manatee County	99-04-295P	Long Bar Point / Sarasota Bay	July 5, 2000
Manatee County	00-04-355P	Scott Avenue / Sarasota Bay	April 4, 2001
Manatee County	01-04-545P	Villages of Palm Air / Rattlesnake Slough	January 4, 2002
Manatee County	03-04-135P	Berth 12 Port Manatee / Tampa Bay	February 20, 2003
Manatee County	03-04-265P	46th and 100th Streets West / Sarasota Bay	June 24, 2003

Manatee County	04-04-357P	River Place Subdivision / Braden River	May 8, 2005
Manatee County	05-04-0296P	Heritage Harbor Phase I / East and Trunk Ditches	June 22, 2006
Manatee County	05-04-A393P	Lakewood Ranch Boulevard Improvements / East Fork Cooper Creek	April 28, 2006
Manatee County	06-04-C664P	Buckeye 928 Property / Curiosity Creek & Trib.	April 27, 2007
Manatee County	07-04-4406P	River Isle Phase III / Manatee River, Lake Reach, Wetland Reach	March 13, 2008

2.2 Community Description

Manatee County occupies an area of approximately 785 square miles in west-central Florida. The study area is bordered on the north by Hillsborough and Pinellas Counties, on the east by Hardee and DeSoto Counties, on the south by Sarasota County, and on the west by the Gulf of Mexico. Bradenton, the county seat and largest city, is approximately 230 miles northwest of the City of Miami, approximately 240 miles southwest of the City of Jacksonville, and approximately 270 miles southeast of the City of Tallahassee.

The cities of Anna Maria, Bradenton Beach, and Holmes Beach area located on Anna Maria Key, a sandy barrier island across Tampa and Sarasota Bays to the west of the mainland portion of Manatee County. The City of Longboat Key is on Longboat Key, to the south of Anna Maria Key. The City of Palmetto is situated on the mainland between Terra Ceia Bay and the tidal portion of Manatee River. The City of Bradenton is also on the mainland on the Manatee River across from the City of Palmetto.

The previous FIS report listed the 1970 population of Manatee County at 97,115 (Reference 19). The U.S. Bureau of the Census recorded the 2010 population of Manatee County at 322,833 (Reference 20), which represents an increase of approximately 332% percent over the 1970 level.

Most developed land in the area is primarily agricultural, cropland, pasture, and citrus grove. Urban, residential, and recreational areas are generally in the western portion of the county. Most commercial development extends along the gulf coast and U.S. Highway 41. Major industrial development is along U.S. Highway 301 and the Seaboard Coast Line Railroad, which runs north-south through the western portion of the county. Leading industries in the area manufacture citrus products, fiberglass boats, mobile homes, truck trailers, precision machine equipment, plastics, and military and aerospace hardware. Port Manatee, at the entrance to Tampa Bay in the northern part of the county, serves shippers from throughout the central area of the state.

Most of the flood plain in the unincorporated areas is undeveloped or agricultural land. Approximately 90 percent of the soil in Manatee County consists of poorly drained sandy soils with organic pan. Flood plains in the incorporated areas are mostly developed or coastal marsh.

Manatee County is in the subtropical climatic zone, which is characterized by mild, dry winters and warm, wet summers. The wet season extends from June through September and coincides

with the hurricane season. During this 4-month period, the study area receives nearly two-thirds of its annual precipitation. In the City of Bradenton, which is in the western portion of the study area, the average annual precipitation is approximately 54 inches and the average annual temperature is approximately 72°F.

The subtropical climate permits the growth of many varieties of vegetation. Hardwoods are found in the central and eastern parts of the county, and scattered slash pines are found in the low inland wetlands. A few cypress swamps exist in the north-central and eastern areas; marsh prairie dominates the extreme southeastern part; and grazing land exists in nearly all areas of the county. vegetables (especially tomatoes), flowers, and citrus crops are grown mostly in the western one-third of the county, where the Gulf of Mexico provides some protection from frost. Tidal marsh along the Manatee and Braden Rivers supports a growth of salt-loving weeds and grasses. In coastal back-bay areas, mangroves, consisting of shore-fringing stands of red, black, and white varieties, offer protection from erosion and flooding. On the Gulf of Mexico side of the study area, the coastal region contains a well-established primary dune which offers natural shoreline protection.

Manatee County is characterized by gently sloping terrain with level or nearly level areas in the flood plains, and higher, gently rolling areas in the central and northeastern portions of the county. All streams drain into the Gulf of Mexico, Tampa Bay, and Sarasota Bay on the western side of the county. Numerous intermittent, shallow ponds dot the county, especially in the central and eastern portions.

The elevation in the study area ranges from sea level along the gulf coast to approximately 150 feet in the northeastern tip of the county. A chain of low islands (Anna Maria Key and part of Longboat Key) forms a barrier to the mainland. The major streams within the county are the Manatee, Braden, Little Manatee, and Myakka Rivers. Along with their numerous tributaries, these streams provide a fairly extensive drainage system.

Manatee River, which flows from northeastern Manatee County into Tampa Bay at Bradenton and palmetto, is approximately 45 miles long and drains approximately 330 square miles, including the 80 square miles of the Braden River watershed. Braden River, a tributary of Manatee River, is approximately 19 miles long.

Gamble Creek has a drainage area of approximately 52 square miles and flows southerly into Manatee River downstream from Lake Manatee.

Mill Creek has a drainage area of 14 square miles and flows northerly into Manatee River near the confluence point with Gamble Creek.

Bowlees Creek flows southwesterly into Sarasota Bay in the southwestern portion of the county and has a drainage area of approximately 8 square miles.

Frog Creek flows westerly into Tampa Bay in the northwestern portion of the county and has a drainage area of approximately 18 square miles.

Little Manatee River, which is approximately 40 miles long, flows westerly from southeastern Hillsborough County and empties into Tampa Bay near Port Tampa. It drains an area of approximately 75 square miles in northern Manatee County. Its largest tributary, South Fork Little Manatee River, drains an area of approximately 40 square miles in Manatee County.

Myakka River, in the southern part of Manatee County, flows generally southerly into Charlotte Harbor and drains an area of approximately 235 square miles within Manatee County.

In addition, there is a network of canals and ditches to drain some of the low, flat areas.

2.3 Principal Flood Problems

Flooding in Manatee County results primarily from tidal surge and associated wave action (caused by hurricanes and tropical storms in the coastal areas of the county and from overflow of the streams (caused by rainfall runoff) in other areas.

Not all storms that pass close to the study area produce extremely high tides. Storms that produce extreme conditions in one area may not necessarily produce critical conditions in other parts of the study area. However, with the condition of high winds directed onshore, the tides produced can inundate the low coastal islands and flood the coastal areas behind them for some distance inland. Wave action that accompanies wind-generated tides can cause flooding, erosion, and structural damage, particularly on the offshore islands. Manatee River is a broad estuary, and, under certain conditions, tides generated at its mouth in Tampa Bay can intrude far upstream. Rainfall, which usually accompanies hurricanes, can aggravate the tidal flood situation. Because of the flatness of the terrain, many inland areas are characterized by shallow flooding during heavy rain falls.

Myakka River is a coastal stream that drains approximately 174 square miles of predominantly rural land in Manatee County. Urban and agricultural developments are increasing along its flood plain. Low-lying areas near the Myakka River main stem are subject to frequent and severe flooding. Flood-prone area identification is therefore essential to ensure orderly basin development.

Storms passing Florida in the vicinity of Manatee County have produced severe floods as well as structural damage. A brief description of several significant tropical storms provides historic information to which coastal and riverine flood hazards and the projected flood depths can be compared (References 21, 22, 23, 24, and 25).

October 21-31, 1921

This storm originated in the western Caribbean Sea and entered Florida north of the City of Tarpon Springs. Flooding conditions were prolonged because of the slow forward movement of the storm. At Anna Maria Key and Cortez, the tide covered the area, and water was 4 to 5 feet deep. High tides caused substantial property damage and agricultural losses in Manatee County.

September 11-22, 1926

This storm, one of the most destructive storms of this century in Florida, originated in the Atlantic Ocean near the Cape Verde Islands and approached the coast of Florida on September 17. Wave action caused erosion along the Manatee County coast and severe flooding in the Bradenton area. Damage was estimated at $100 million statewide, including $3 million in the Bradenton, Sarasota, and Fort Myers areas.

October 13-21, 1944

The hurricane originated in the western Caribbean Sea south of the Cayman Islands. It entered the west coast of Florida near Sarasota and followed a northeasterly course. This large hurricane caused extremely high tides south of Tampa and abnormally low tides from Tampa northward.

September 7, 1950

This small, but severe, hurricane originated over the western Caribbean Sea, passed northward over Aruba and the Gulf of Mexico, then moved north-northwestward parallel to the Florida coastline. Tides were estimated to have been between 6 and 8 feet along the central gulf coast. Much of Anna Maria Island was flooded. The shoreline receded 15 to 20 feet in some areas, cutting through the beach road on the island in several places.

September 10-11, 1960 – Hurricane Donna

Although precipitation from Hurricane Donna averaged 5 to 7 inches, a pre-storm rainfall of approximately 10 inches in the previous 3 weeks had saturated the ground; consequently, considerable flooding resulted. Storm tides generated by this storm also caused substantial damage to the Manatee County coastal areas.

October 18, 1968

This storm originated in the Caribbean Sea and entered the Florida Straits. Tides of up to 5 feet above normal produced considerable damage, beach erosion and the lowering of beach profiles throughout in Sarasota County and the Manatee County portion of the City of Longboat Key.

June 19, 1972 – Hurricane Agnes

Hurricane Agnes originated on the northeastern tip of the Yucatan Peninsula and traveled westward. The storm was of large diameter, and, although the center of this storm passed approximately ISO miles west of the Florida peninsula, it produced a high, damaging tidal surge. Tides were approximately 3 to 4 feet above normal; coastal areas experienced erosion from wave action and tidal damage to homes, seawalls, revetments, and roads. Damage in Manatee County from this storm was estimated at $2 million.

2.4 Flood Protection Measures

There are no structural flood protection measures in the county. Manatee Utility System Dam was designated for water supply, but its associated reservoir, Lake Manatee, is drawn down to provide flood control storage when prolonged heavy rainfall is anticipated (Reference #). The spillway crest of this dam was found to be higher than the 100-year flood but not as high as the 500-year flood. No extensive community flood protection project exists in the tidal areas; however, flood protection of structures is done on an individual basis and includes such measures as elevation of dwellings, conservation of mangrove swamps and dunes, and construction of seawalls.

Manatee County has adopted flood plain management regulations in accordance with the regular phase of the National Flood Insurance Program.

Refer to Section 3.2 of this report for detailed information about flood hazards behind levees.

3.0 ENGINEERING METHODS

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

3.1 Hydrologic Analyses

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

In addition to rainfall flooding, major consideration was given to coastal flooding associated with hurricane-induced storm surge. The analysis of storm surge included its propagation inland, incorporating the effects of natural and manmade flow paths.

Pre-countywide Analyses

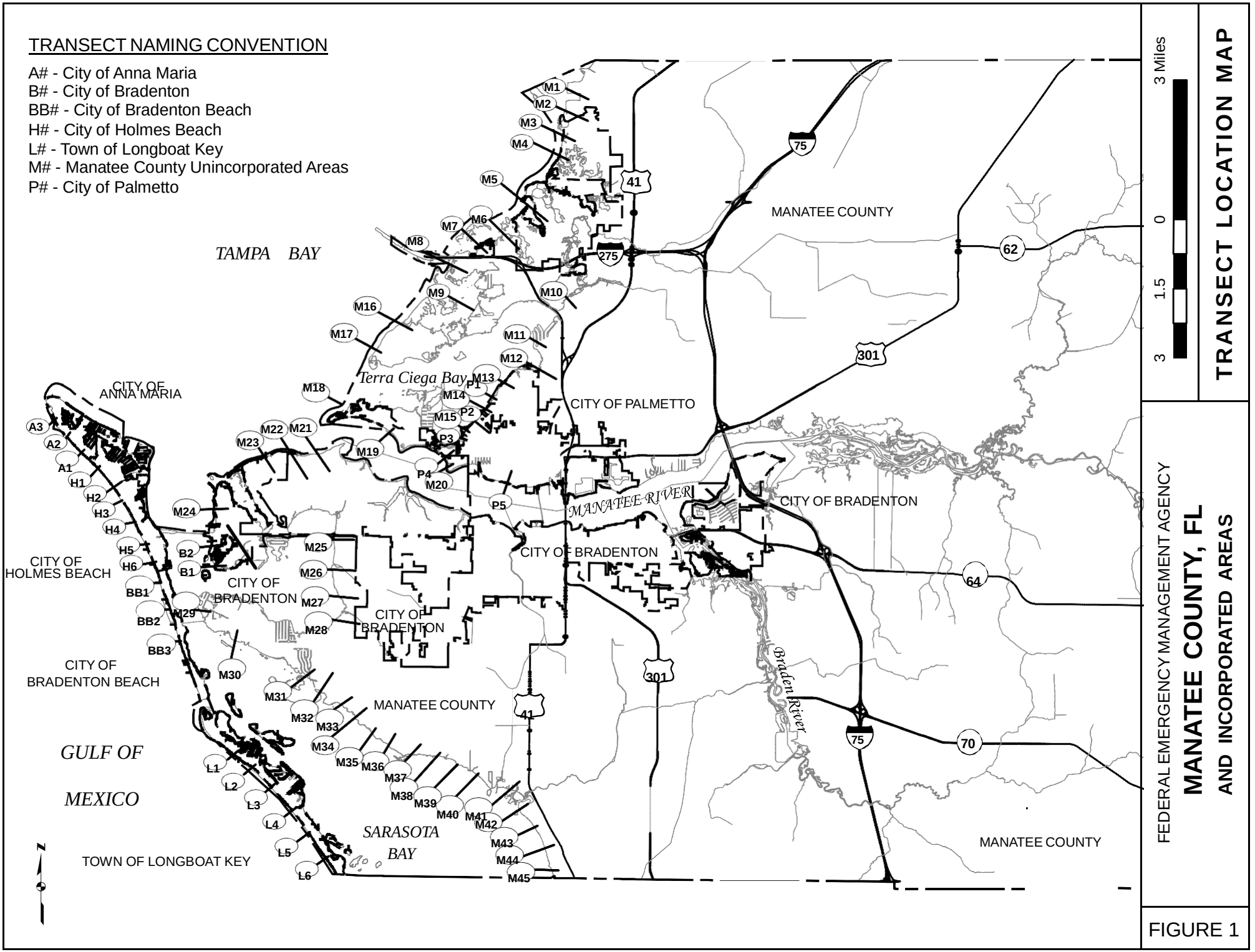
The determination of coastal inundation caused by passage of a hurricane storm surge was approached by the joint probability method (Reference 26). The storm populations were described by probability distributions of five parameters that influence surge heights. These parameters were: central pressure depression (which measures the intensity of the storm), radius to maximum winds, forward speed of the storm, shoreline crossing point, and crossing angle. These characteristics were described statistically based on an analysis of observed storms in the vicinity of Manatee County. The primary sources of data for this were the National Climatic Center (Reference 27): Cry (Reference 28): Ho, Schwerdt, and Goodyear (Reference 29): the National Hurricane Research Project (Reference 30): and the Monthly Weather Review (Reference 31). Digitized storm information for all storms from 1886 through 1977 was used to correlate statistics (Reference 32). A summary of the parameters for surge elevation used for the Manatee County and Incorporated Areas study is presented in Table 6.

For areas subject to flooding directly from the Gulf of Mexico, Tampa and Sarasota Bays, the Federal Emergency Management Agency standard coastal surge model was used to simulate the coastal surge generated by any chosen storm (that is, any combination of the five storm parameters defined previously). By performing such simulations for a large number of storms, each of known total probability, the frequency distribution of surge height can be established as a function of coastal location. These distributions incorporate the large scale surge behavior, but do not include an analysis of the added effects associated with much finer scale wave phenomena, such as wave height, setup, or runup. The astronomic tide for the region is then statistically combined with the computed storm surge to yield recurrence intervals of total water level

(Reference 33). The standard coastal surge model utilizes a grid pattern approximating the geographical features of the study area and the adjoining areas. Surges were computed utilizing grids of 5 nautical miles, 1 nautical mile, and 2000 feet, depending on the resolution required.

Underwater depths and land heights for the model grid systems were obtained from National Oceanic and Atmospheric Administration Nautical Charts (Reference 34) and U.S. Geological Survey topographic maps (Reference 35).

Wave heights were added to stillwater storm-surge elevations using methodology recommended by the National Academy of Sciences (Reference 36). This methodology considers maximum conditions associated with the 100-year flood, and uses transects that are oriented perpendicular to the average mean sea level shoreline to deduce wave crest elevations. The transects used in this study are located on the map presented in Figure 1, and were chosen based on topography, vegetation, and cultural development.


TRANSECT NAMING CONVENTION
A# - City of Anna Maria
B# - City of Bradenton
BB# - City of Bradenton Beach
H# - City of Holmes Beach
L# - Town of Longboat Key
M# - Manatee County Unincorporated Areas
P# - City of Palmetto
TAMPA BAY
Terra Ciega Bay
CITY OF ANNA MARIA
CITY OF HOLMES BEACH
CITY OF BRADENTON BEACH
TOWN OF LONGBOAT KEY
CITY OF BRADENTON
CITY OF PALMETTO
MANATEE COUNTY
MANATEE RIVER
Braden River
GULF OF MEXICO
SARASOTA BAY
N
3 Miles
3
1.5
0
TRANSECT LOCATION MAP
FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS
FIGURE 1

As waves propagate inland, the effects of obstructions (such as buildings, vegetation, dunes, and manmade barriers) were calculated using procedures outlined in the User's Manual for Wave Height Analysis (Reference 37). On each- traverse, along available fetch lengths, the regeneration of waves by winds associated with major storms was also considered. Calculations along the transects were continued inland until the waves were substantially dissipated, or until flooding from another source with an equal water-surface elevation was reached. Figure 2 shows a 1% annual chance flood hazard elevation profile of a sample transect.

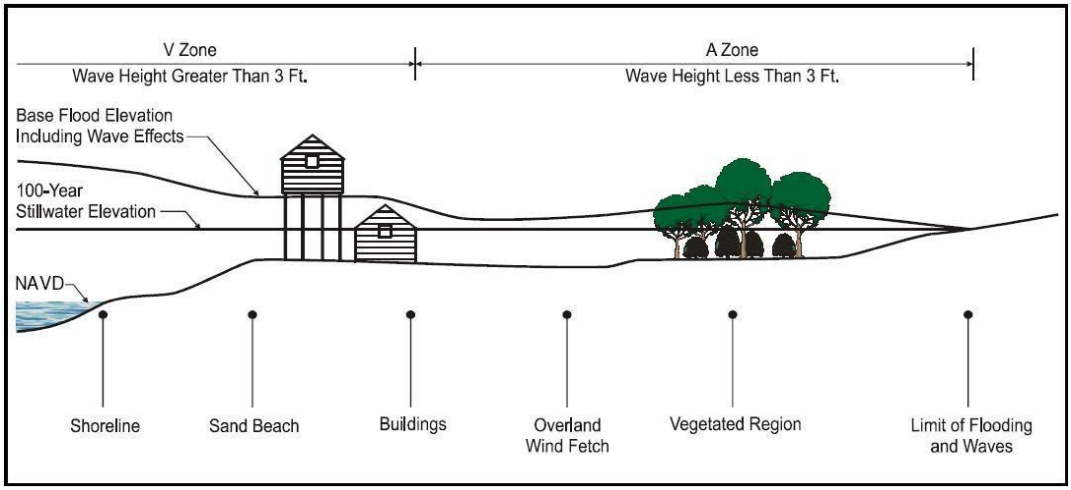


Figure 2 – Typical Transect Schematic

Data for the wave height calculations were obtained from U.S. Geological Survey topographic maps (Reference 35) and aerial photographs (Reference 38). The results of this study are considered accurate until local topography, vegetation, or cultural development undergo any major changes.

Areas exist within Manatee County where greater flood hazards may be expected than are presently indicated on the revised Flood Insurance Rate Map due to potential wave action. These areas include, but may not be limited to, the western sides of Sarasota Bay, Palma Sola Bay, Tampa Bay, Terra Ceia Bay, and the numerous small bays along the east side of Tampa Bay; and the following areas of Manatee River; portions of the southern shoreline downstream of McNeil Point, the entire southern shoreline between McNeil Point and Green Bridge (in Bradenton and Palmetto), and all areas upstream of Green Bridge. Due to limitations of the data and engineering methodology, including knowledge of wave generation and propagation mechanisms and wind-surge correlations in time, the magnitude and extent of wave hazard cannot be accurately determined at present and these areas have been omitted from rigorous analysis. As further refinements to existing study methods become available, the Flood Insurance Rate Map will be revised accordingly.

Surge levels in the Manatee and Braden Rivers were computed with the aid of a one-dimensional unsteady branch flow model (Reference 39). The wide flood plain and channel irregularities of the Manatee and Braden River basins provide substantial storage and frictional resistance and attenuate the surge propagation.

Flood magnitudes and frequencies for areas affected by riverine flooding were estimated by analyzing synthetic time series that were generated from precipitation data via rainfall-runoff simulation models. These models were calibrated with existing stream gage data from the Manatee and Braden River basins. Twenty-two years of data were obtained from U.S. Geological Survey Gage No. 02300000, located on Manatee River near Bradenton.

Land use, soil types, and hydraulic structures were used to modify basin parameters that were developed for the Manatee River Basin and were then transposed to other basins, which include Braden River, Gamble Creek, and Mill Creek. The resulting annual peak time series was then fitted to the log-Pearson Type III distribution following the guidelines contained in U.S. Water Resources Council Bulletin 17 (Reference 40). Discharges for the 10- and 100-year floods on Manatee River were taken from Floodplain Study for the Lower Manatee River, Manatee County, Florida (Reference 41).

A relationship between peak flood discharge and drainage area was developed for the Manatee River basin and adopted for use on Bowlees Creek by making an adjustment to include the effects of urbanization (Reference 42). Because urbanization has a greater impact on small floods, the 10-year peak discharge for Bowlees Creek was found to be larger than the corresponding discharge for Mill Creek, even though the Mill Creek drainage area is greater. Discharges for Frog Creek were determined using a regional regression analysis adopted from a U.S. Geological Survey study (Reference 43). The significant parameters were channel length, drainage area, slope, and storage. Discharges for Little Manatee River were taken from a study by the Southwest Florida Water Management District (Reference 44).

Rainfall-runoff simulation models were developed to generate hydrographs of selected frequencies for inflow into Lake Manatee. These hydrographs were then routed through the reservoir by the Storage Indication Method. The starting water-surface elevation in the reservoir was 40 feet for the 10-, 50-, 100-, and 500-year floods. The 500-year flood results are essentially identical to the Standard Project Flood estimated by the U.S. Army Corps of Engineers (Reference 45).

Flood-frequency relations for natural conditions of the Myakka River were based on weighted flood-frequency distributions determined for one long-term streamflow station near Sarasota (drainage area = 235 square miles), one short-term streamflow station near Myakka City (drainage area = 125 square miles), and two ungaged sites. One ungaged site is at state Road 780, in Sarasota County, and is the outlet station for the drainage in Manatee County (drainage area = 174 square miles). The other ungaged site is at Blackburn Bridge in Sarasota County (drainage area = 270 square miles).

One estimate of the flood-frequency distribution for each of the four sites was determined using results of an areal flood-frequency analysis of long-term streamflow records for 20 stations in west-central Florida.

Areal flood-frequency relations were developed in a multiple linear regression analysis of flood-peak discharges for selected recurrence intervals (from log-Pearson Type III distributions) and selected basin parameters. Basin parameters used include drainage area, stream length and slope, and percentage of the basin area that is lakes and swamps. The average standard error of estimate for areal flood-frequency relations is 25.8 percent and the average multiple correlation coefficient is 0.98. Flood-frequency distributions were obtained for the two gaged and two ungaged sites on Myakka River using the determined regression coefficients and measured basin parameter values.

A log-Pearson Type III distribution was used as a second estimate of flood frequency for the long-term station, Myakka River near Sarasota. A log-Pearson Type III flood-frequency distribution for the short-term station, Myakka River at Myakka City, was determined by correlation with a nearby long-term station (No. 02300000) on Manatee River. This correlation procedure is described by the U.S. Water Resources Council (Reference 40) as a two-station comparison.

Regression flood-frequency distributions were weighted with log-Pearson Type III distributions to obtain weighted flood-frequency distributions for the gaged sites. The weighting procedure used is referred to as weighting of independent estimates by the U.S. Water Resources Council (Reference 40).

Weighted flood-frequency distributions for the ungaged sites were based on weighted distributions at the gaged sites. Ratios of regression distribution discharges to log-Pearson Type III discharges for the Sarasota and Myakka City stations were plotted versus drainage area on logarithmic paper. Ratios corresponding to the drainage areas of the ungaged sites were determined from the plot. Regression distributions for the ungaged sites were then multiplied by respective ratios to obtain weighted distributions.

Recurrence-interval discharges from weighted distributions for all four sites were plotted to form the flood-frequency relations for natural conditions (Reference 46).

Peak discharge-drainage area relationships for Manatee River, Braden River, Gamble Creek, Mill Creek, Bowlees Creek, Frog Creek, Little Manatee River, and Myakka River are shown in Table 6 Summary of Discharges.

For the 1992 FIS, drainage basin areas, slopes, and, lake areas were determined using topographic maps (Reference 47); aerial photography (Reference 48); and stereo aerial photography (Reference 49). Discharges were determined using USGS regional regression equations with modifications for urbanization (References 50 and 51). The 1992 revision incorporated revised flooding caused by the overflow of Cabbage Slough; Wade Canal; Frye Canal; Cooper Creek; Frog Creek, upstream of U.S. Route 41; Buffalo Canal; Gamble Creek, upstream of Golf Course Drive; Braden River, upstream of Interstate 75; Braden River West Channel; Wolf Slough; Mill Creek, upstream of confluence of unnamed tributary; Rattlesnake Slough; Gap Creek; Williams Creek; Cypress Strand; Gates Creek; East Fork Cooper Creek; Myakka River, upstream of State Road 70; South Fork Little Manatee River; and Cedar Hammock Drainage Canal.

Flood levels resulting from coastal flooding (surge and waves) and from rainfall were determined independently of each other and combined statistically. The computed elevations for the Gulf of Mexico, Tampa Bay, Sarasota Bay, and Lake Manatee are shown in Table 7 Summary of Elevations.

For each community within Manatee County that had a previously printed FIS report, the unrevised hydrologic analyses described in those reports have been compiled and are summarized below by city or town.

Table 6 – Parameter Values for Surge Elevation

			Central Pressure Depression (mb)						
Probabilities	85	75	65	55	45	35	25	15	5
Entering	0.02	0.02	0.03	0.04	0.05	0.09	0.25	0.25	0.25
Exiting	0.04	0.04	0.05	0.07	0.09	0.11	0.2	0.2	0.2
Parallel	0.06	0.06	0.08	0.11	0.13	0.13	0.14	0.15	0.14

Storm Radius (nm)			15		30
Probability			0.55		0.45
Forward Speed (knots)			8	14	20
Probabilities:	Entering		0.26	0.46	0.28
	Exiting		0.55	0.41	0.04
	Parallel		0.62	0.34	0.04

Direction of Storm Path	Entering		Alongshore	Exiting	
Degrees from North	66	21	-24	-69	-114
Probability	0.30	0.26	0.22	0.7	0.05

Frequency 4.08 x 10-3 storms / nm / year

A summary of the drainage area-peak discharge relationships for the streams studied by detailed methods is shown in Table 7, "Summary of Discharges."

Stillwater flood elevations for the 10, 50, 100, and 500 year storm events are shown in Table 8, Summary of Stillwater Elevations.

TABLE 7 – Summary of Discharges

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (Cubic Feet per Second) 10-Year	50-Year	100-Year	500-Year
BOWLEES CREEK					
At Mouth	8.1	2,390	4,030	4,770	6,700
BRADEN RIVER					
At Interstate 75	45.6	3,034	4,928	5,980	8,556
Just upstream of Confluence of Cooper Creek	31.1	2,794	4,539	5,499	7,863
Just upstream of Confluence of Braden Road West Channel	11.5	1,610	2,632	3,176	4,528
At State Road 70	8.3	1,245	2,043	2,464	3,517
BRADEN RIVER WEST CHANNEL					
At State Road 70	3.2	577	959	1,155	1,670
BUFFALO CANAL					
Just upstream of confluence with Cedar Drain	*	608	671	689	*
CABBAGE SLOUGH					
At I-275	*	613	667	664	*
CEDAR DRAIN					
Upstream of Buffalo Creek	*	475	566	575	*
CEDAR HAMMOCK					
At 26th Street West	N/A	N/A	N/A	2,388	N/A
At footbridge near 9th Street	N/A	N/A	N/A	2,096	N/A
Just upstream of Cortez Road	N/A	N/A	N/A	863	N/A
COOPER CREEK					
Just upstream of Confluence of East Fork Cooper Creek	10.8	670	1,120	1,355	1,976
At University Parkway	803	535	898	1,088	1,598
CURIOSITY CREEK					
Approximately 250 feet downstream of I-75	5.74	*	*	845	*
CYPRESS STRAND					
At mouth	3.7	527	877	1,056	1,522
At Landfill Road	1.6	257	434	522	760

*Not Computed

TABLE 7 – Summary of Discharges (Continued)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (Cubic Feet per Second) 10-Year	50-Year	100-Year	500-Year
EAST DITCH					
Confluence with Manatee River	4.3	*	*	776	*
EAST FORK COOPER CREEK					
At mouth	3.9	568	1,007	1,222	1,813
About 2,000 feet east of west line of Section 32, T35S, R19E	2.4	405	725	882	1,320
FROG CREEK					
At US 41	*	1,806	2,301	2,388	*
FRYE CANAL					
At mouth	6.7	1,473[2]	2,209[2]	2,597[2]	3,538[2]
At State Road 675	5.1	1,266[2]	1,873[2]	2,192[2]	2,966[2]
At upstream confluence of Gamble Creek	0.0	325[2]	325[2]	330[2]	330[2]
GAMBLE CREEK					
At Golf Course Road	46.1	4,355	7,018	8,502	12,038
Just upstream of confluence of Frye Canal	39.4	3,415[3]	5,702[3]	6,979[3]	10,034[3]
Just upstream of divergence of Frye Canal	21.4	2,620	4,249	5,134	7,259
GAP CREEK					
At mouth	9.8	1,028	1,685	2,039	2,963
At Saunders Road	5.5	665	1,105	1,335	1,950
GATES CREEK					
At Mouth	3.6	618	1,025	1,235	1,742
About 1400 feet south of north line Section 29, T34S, R19E	2.0	440	733	880	1,246
At State Road 64	0.7	248	416	498	704
LITTLE MANATEE RIVER					
Near Wimauma	149	7,930	14,800	18,500	32,000
MANATEE RIVER					
Downstream of Manatee Utility Dam	123	11,669	12,300	15,500	25,000
MANATEE RIVER LAKE REACH					
At Confluence with Manatee River	--[1]	1,673	2,413	2,785	4,055

* Not Computed
[1] Flow affected by upstream overflows, diversions, or obstructions; drainage area does not apply
[2] discharges affected by flow from Gamble Creek
[3] discharges affected by flow from Frye Canal

TABLE 7 – Summary of Discharges (Continued)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (Cubic Feet per Second) 10-Year	50-Year	100-Year	500-Year
MANATEE RIVER WETLAND REACH					
Downstream of Island Estates Drive	--[1]	1,386	2,286	2,730	4,194
MILL CREEK					
Just upstream of confluence of unnamed tributary	10.4	1,419	2,323	2,803	3,993
At State Road 64	8.8	1,327	2,175	2,624	3,744
At Trail Road	0.7	246	404	483	684
MYAKKA RIVER					
At State Road 70	115.4	2,900	8,629	10,348	14,733
At State Road 780 (Sarasota Co.)	34.8	2,567	4,387	5,270	7,751
At State Road 64	11.2	1,157	2,017	2,437	3,566
RATTLESNAKE SLOUGH					
At mouth	4.2	539	891	1,075	1,548
At projection of Lockwood Road	0.9	268	450	539	775
SOUTH FORK LITTLE MANATEE RIVER					
600 feet west of east line of Section 12 T33S, R20E	34.8	2,346	4,028	4,851	7,048
At Taylor Grade Road	24.7	1,846	3,190	3,848	5,622
At upstream crossing of Bunker Hill Road	9.4	723	1,387	1,744	2,745
TRIBUTARY TO CURIOSITY CREEK					
At Buckeye Road	4.21	*	*	2,290	*
TRUNK DITCH					
Confluence with Tributary D to the Manatee River	3.2	*	*	574	*
WADE CANAL					
At Mouth	*	272	333	338	*
WILLIAMS CREEK					
At mouth	3.2	478	798	960	1,381
At power lines Section 15, T35S, R18E	2.4	406	680	819	1,184
WOLF SLOUGH					
At mouth	3.6	560	929	1,117	1,588
At north line of Section 15, T35S, R19E	0.3	129	219	260	372

* Not Computed

[1] Flow affected by upstream overflows, diversions, or obstructions; drainage area does not apply.

TABLE 8: Summary of Stillwater Elevations

Flooding Source and Location	Stillwater Flood Elevation (Feet NAVD) 10-Year	50-Year	100-Year	500-Year
Tampa Bay – Unincorporated Manatee County				
At Piney Point	3.8	6.7	8.0	10.6
At Paradise Island	3.7	6.8	8.1	10.7
At 6th Avenue West and 40th Street West	4.0	6.8	8.3	11.0
At Meade Point	3.6	6.6	8.0	10.7
At Emerson Point	3.6	6.6	8.0	10.6
At Gus Point	3.8	6.5	8.0	10.6
At 28th Street and C Avenue	3.5	6.7	8.2	10.9
At Prices Key	3.5	7.0	8.6	11.6
Sarasota Bay – Unincorporated Manatee County				
At Cortez Road and 119th Street West	3.5	7.5	9.1	12.1
At Coconut Terrace and Royal Palm Dr.	4.3	8.3	9.9	12.9
At Cow Point	4.0	8.3	9.9	13.1
At 24th Avenue W. and Palma Sola Blvd.	4.8	9.2	10.8	14.0
At south end of 83rd Street Northwest	4.0	9.4	10.9	14.2
At Sarasota Bay	5.0	8.6	10.3	13.4
At Florida Boulevard and 26th Street	5.0	9.6	11.4	14.6
Lake Manatee – Unincorporated Manatee County				
At Manatee Utility System Dam	40.6	42.9	44.2	50.0
Gulf of Mexico – Unincorporated Manatee County				
At Passage Key National Wildlife Refuge	3.8	6.8	8.2	10.8
Gulf of Mexico – City of Anna Maria				
At Anna Maria	3.9	6.9	8.3	10.9
Gulf of Mexico – City of Bradenton Beach				
Intersection of 26th St. N. and Avenue C	3.4	6.7	8.1	10.9
Intersection of 17th St. N. and Gulf Dr. N.	3.5	7.0	8.6	11.6
Intersection of 13 Street S. and Gulf Dr. S.	3.4	7.3	8.9	12.0
Gulf of Mexico – City of Bradenton				
Braden River 0.8 mile upstream from State Highway	3.0	5.4	6.5	9.2
Manatee River 0.6 mile upstream from Confluence with Braden	3.1	5.4	6.5	9.0
At State Highway 683	3.2	5.7	6.9	9.8
Palma Sola Bay At State Highway 64, 1.7 Miles west of Flamingo Road	3.8	7.0	8.4	11.0

TABLE 8: Summary of Stillwater Elevations (Continued)

Flooding Source and Location	Stillwater Flood Elevation (Feet NAVD) 10-Year	50-Year	100-Year	500-Year
At State Highway 64, 1.5 Miles west of Flamingo Road	3.7	6.9	8.4	11.1
At State Highway 64, 0.5 Miles west of Flamingo Road	3.9	7.0	9.3	12.5
At Intersection of State Highway 64 and Flamingo Road	4.8	8.5	10.2	13.4
At State Highway 64, 1.0 mile east of Flamingo Road	4.8	9.2	10.7	13.8
Gulf of Mexico – City of Holmes Beach				
Northern Holmes Beach	3.8	6.8	8.2	10.8
Southern Holmes Beach	3.4	6.6	8.2	11.2
Gulf of Mexico – City of Palmetto				
At Terra Ceia Bay	3.9	6.8	8.1	10.8
At State Route 683	3.2	5.7	6.9	9.8
Gulf of Mexico – Town of Longboat Key				
At Lyons Lane	3.7	7.8	9.3	12.3
Sarasota Bay at Bishops Point	4.4	8.3	9.9	12.8

Countywide Analyses

New detailed hydrologic analyses were performed as part of this countywide update.

Frog Creek / Buffalo Canal Watershed Study

A watershed-wide hydrologic model was initiated by the Southwest Florida Water Management District (SWFWMD) and Manatee County, and developed by Jones Edmunds and Associates, Inc. (Reference 14) using Interconnected Channel and Pond Routing Model (ICPR) software (Reference 54). The computer model was used to simulate the hydrologic response of the study area and to route stormwater through constructed facilities and natural topographic features for the standard storm events. The model schematic was created using ESRI's ArcGIS geographic information system software (Reference 55), ESRI's Arc Hydro tools (Reference 56), proprietary GIS-based tools developed by Jones Edmunds, and manual methods.

The Buffalo Canal/Frog Creek Watershed Management Plan was prepared by SWFWMD (Reference 57). The plan incorporates digital topographic information, watershed evaluation, and watershed management plan elements from the SWFWMD Guidelines and Specifications (G&S) (Reference 58). This plan formed the basis for the new study.

ICPR was preferred by the SWFWMD for the Watershed Management Plan because of its ability to accurately model ponding areas, its familiarity and use by the local engineering community, ease of use, and approval for use in FEMA flood insurance studies. Also, the recently added

percolation and Green and Ampt runoff integration make the model an all encompassing package for this modeling effort. Instabilities in the models were reviewed and addressed in several ways to insure that peak flood stage results are reasonable.

See Table 9 for a listing of the ICPR model nodes and flood stage elevations.

Wares Creek (Cedar Hammock) Watershed Study

The U.S. Army Corps of Engineers Jacksonville District produced a new hydrologic study for Wares Creek (Cedar Hammock) (Reference 15). The Drainage Basin Runoff Model (DABRO) software (Reference 59) was used to compute hydrographs and discharges based on Soil Conservation Service (SCS) unit hydrograph methods.

Updated and New Approximate Studies

Updated approximate hydrologic analyses have been performed by BakerAECOM on all previously effective approximate stream reaches as part of this countywide update, using regional regression equations (Reference 13). Peak discharges for thirty-four (34) individual streams totaling approximately 81.8 linear miles were developed using the methodology outlined in the USGS report entitled Estimating the Magnitude and Frequency of Floods for Streams in West-Central Florida (Reference 60).

New approximate Zone A delineations have been added for areas not previously studied by either detailed or approximate methods, using the current Southwest Florida Water Management District (SWFWMD) Land Use/Land Cover (LULC) feature class as Zone A polygons (Reference 13). The SWFWMD procedure was prepared to ensure that all flood prone areas are identified on any new FIRMs that are produced for counties within the SWFWMD jurisdiction. The SWFWMD methodology used was adapted from the Northwest Florida Water Management District methodology for using wetland delineations to supplement existing Zone A floodplain boundaries (Reference 61). No hydrologic analyses were performed as part of the addition of these ponding areas.

TABLE 9 – Buffalo Canal / Frog Creek Study - ICPR Node Location Elevations

Node ID	Flood Stage in Feet (NAVD) 1% Annual Chance / 24 Hour Storm Duration
NA0860	13.78
NA1200	20.31
NA1330	6.79
NA1340	17.70
NA1560	14.86
NA1570	16.65
NA1580	19.32
NA1585	26.79
NA1586	24.74
NA1587	20.88
NA1588	15.00
NA1590	14.17
NA1600	15.19
NA1610	15.62
NA1620	15.88
NA1630	16.12
NA1740	11.74
NA1750	21.14
NA1800	26.72
NA1880	16.89
NA1885	16.76
NA1910	17.34
NA1920	16.05
NA1930	17.40
NA2070	15.21
NA2150	19.86
NA2160	11.58
NA2170	19.61
NA2180	13.46
NA2190	10.55
NA2200	10.72
NA2210	12.90
NA2215	16.40
NA2220	12.65
NA2230	19.03
NA2250	10.21
NA2270	20.51
NA2280	14.78
NA2340	9.71
NA2350	7.36
NA2360	9.06
NA2370	11.21
NA2410	4.71
NA2420	10.19
NA2430	12.15

TABLE 9 – Buffalo Canal / Frog Creek Study - ICPR Node Location Elevations

Node ID	Flood Stage in Feet (NAVD) 1% Annual Chance / 24 Hour Storm Duration
NA2435	12.75
NA2440	7.26
NA2450	4.61
NA2460	6.59
NA2470	5.98
NA2480	5.78
NA2490	6.05
NA2500	3.74
NA2510	6.98
NA2580	5.26
NA2590	4.13
NA2600	4.02
NA2610	3.54
NA2620	2.24
NA2630	0.72
NA2650	1.84
NA2655	3.32
NA2660	3.73
NA2670	1.91
NA2680	1.92
NA2690	2.04
NA2700	2.35
NA2710	2.35
NA2790	3.33
NA2800	0.66
NA2810	2.96
NA2820	11.70
NA2830	11.91
NA2930	11.47
NA2940	16.12
NA2950	17.37
NA2960	15.57
NA2970	15.80
NA2980	16.05
NA3140	0.50
NA3150	0.50
NA3160	2.02
NA3170	2.02
NA3210	19.63
NA3310	18.15
NA3370	12.07
NA3380	9.89
NA3390	11.53
NA3460	31.21
NA3610	19.40

TABLE 9 – Buffalo Canal / Frog Creek Study - ICPR Node Location Elevations

Node ID	Flood Stage in Feet (NAVD) 1% Annual Chance / 24 Hour Storm Duration
NA3940	8.64
NA4265	14.43
NA4270	12.56
NA5430	0.50
NA5440	8.16
NA5450	0.50
NA5460	3.84
NA5470	3.51
NA5480	5.39
NA5490	0.50
NA5500	4.13
NA5510	4.50
NA5520	9.50
NA5530	10.74
NA5540	7.07
NA5550	9.43
NA5580	5.78
NA5590	5.78
NA5600	12.43
NA5790	14.12
NA5800	14.12
NA5810	17.16
NA5970	13.56
NA5980	14.50
NA5985	15.37
NA6090	19.35
NA6120	16.13
NA6180	14.82
NA6190	18.92
NA6200	17.60
NA6205	18.14
NA6210	11.61
NA6220	21.73
NA6250	13.41
NA6270	16.38
NA6280	11.58
NA6290	12.19
NA6300	15.18
NA6710	16.86
NA6860	13.39
NA6870	7.20
NA6960	13.07
NA6965	17.38
NA6970	11.75
NA6975	11.81

TABLE 9 – Buffalo Canal / Frog Creek Study - ICPR Node Location Elevations

Node ID	Flood Stage in Feet (NAVD) 1% Annual Chance / 24 Hour Storm Duration
NA6980	11.08
NA6990	14.70
NA7030	15.08
NA7040	15.61
NA7410	20.29
NA7420	19.04
NA7440	17.63
NA7450	20.17
NA7460	20.17
NA7470	19.45
NA7480	19.44
NA7520	17.51
NA7570	7.50
NA7590	12.17
NA7600	13.50
NA7610	0.50
NA7620	3.67
NA7630	11.78
NA7640	23.03
NA7650	16.13
NA7720	17.56
NA8100	1.85
NA8830	16.73
NA9010	17.73
NA9020	17.63
NA9030	4.50
NA9100	0.50
NA9140	2.94
NA9150	18.20
NA9155	21.36
NA9170	18.06
NA9175	17.52
NB0650	23.73
NB0840	22.59
NB0880	31.13
NB0890	25.46
NB0900	25.27
NB0910	24.47
NB0920	23.79
NB0923	24.93
NB0926	25.63
NB0930	23.75
NB0940	31.54
NB0950	25.30
NB0960	26.11

TABLE 9 – Buffalo Canal / Frog Creek Study - ICPR Node Location Elevations

Node ID	Flood Stage in Feet (NAVD) 1% Annual Chance / 24 Hour Storm Duration
NB0970	31.64
NB0980	33.29
NB0990	32.61
NB1000	29.00
NB1010	32.25
NB1020	25.75
NB1210	27.58
NB1220	35.00
NB1230	33.05
NB1240	29.40
NB1260	23.88
NB1270	23.51
NB1280	23.33
NB1290	22.78
NB1300	23.51
NB1310	29.51
NB1320	22.66
NB1350	22.44
NB1360	29.35
NB1370	22.63
NB1380	22.43
NB1400	22.41
NB1760	19.28
NB1770	23.34
NB1780	22.35
NB1790	22.32
NB1820	22.12
NB1890	27.53
NB1950	20.65
NB1960	15.68
NB1970	17.94
NB1980	24.02
NB1990	30.81
NB2000	26.05
NB2010	30.34
NB2020	26.64
NB2030	26.80
NB2040	23.28
NB2050	20.84
NB2060	20.15
NB2110	25.38
NB2235	20.90
NB2236	20.89
NB2237	21.12
NB2240	19.75

TABLE 9 – Buffalo Canal / Frog Creek Study - ICPR Node Location Elevations

Node ID	Flood Stage in Feet (NAVD) 1% Annual Chance / 24 Hour Storm Duration
NB2260	10.09
NB2290	22.61
NB2300	12.03
NB2310	13.74
NB2320	14.76
NB2330	11.26
NB2530	33.46
NB2560	12.10
NB2570	14.69
NB2720	24.88
NB2730	24.08
NB2735	24.45
NB3040	22.25
NB3070	26.86
NB3180	22.12
NB3260	21.55
NB3320	30.44
NB3400	12.11
NB3490	22.41
NB3500	31.22
NB3510	31.14
NB3690	30.52
NB4060	17.96
NB4070	26.67
NB4080	20.09
NB4180	23.51
NB4400	26.55
NB5570	29.81
NB5610	18.33
NB5700	23.67
NB5720	24.73
NB5730	24.51
NB5740	27.00
NB5750	25.51
NB5760	28.10
NB5770	23.93
NB5780	22.48
NB5820	27.86
NB5830	30.76
NB5840	30.76
NB5850	30.16
NB5860	25.54
NB5870	24.70
NB5880	27.20
NB5890	25.79

TABLE 9 – Buffalo Canal / Frog Creek Study - ICPR Node Location Elevations

Node ID	Flood Stage in Feet (NAVD) 1% Annual Chance / 24 Hour Storm Duration
NB5900	22.42
NB5910	22.41
NB5920	31.54
NB5930	28.30
NB5940	31.72
NB5950	28.50
NB5960	23.18
NB6310	30.47
NB6315	30.92
NB6320	18.35
NB6330	20.65
NB6340	18.61
NB6350	22.04
NB6360	22.03
NB6370	22.03
NB6380	21.07
NB6390	21.01
NB6400	25.70
NB6410	17.27
NB6420	30.80
NB6430	31.70
NB6440	30.92
NB6450	30.13
NB6630	22.38
NB6640	22.34
NB6650	27.38
NB6720	23.12
NB6730	24.73
NB6740	27.24
NB6820	23.57
NB6830	29.90
NB6840	27.51
NB6850	28.62
NB6880	30.22
NB6900	25.96
NB6910	23.44
NB6920	24.88
NB7290	22.41
NB7295	22.86
NB7300	24.87
NB7380	22.43
NB7390	22.53
NB7400	22.52
NB7405	24.03
NB7490	25.96

TABLE 9 – Buffalo Canal / Frog Creek Study - ICPR Node Location Elevations

Node ID	Flood Stage in Feet (NAVD) 1% Annual Chance / 24 Hour Storm Duration
NB7580	22.68
NB7680	22.47
NB7700	25.38
NB7710	23.91
NB7810	18.78
NB7880	24.35
NB7885	23.33
NB8040	23.46
NB8090	22.24
NB8120	27.78
NB8150	25.53
NB8160	27.53
NB8170	31.13
NB8200	24.10
NB8210	22.07
NB8220	28.37
NB8230	24.13
NB8240	23.78
NB8310	21.13
NB8380	20.91
NB8500	24.33
NB8510	24.18
NB8520	25.60
NB8530	24.88
NB8540	24.14
NB8550	24.12
NB8560	24.04
NB8570	23.90
NB8580	25.97
NB8590	24.94
NB8600	24.33
NB8610	24.34
NB8620	26.47
NB8860	25.90
NB8870	25.77
NB8880	24.50
NB8890	23.04
NB9000	22.05
NB9120	31.63
NB9145	24.44
NC0350	31.06
NC0580	28.52
NC0790	29.27
NC0800	27.99
NC0810	28.03

TABLE 9 – Buffalo Canal / Frog Creek Study - ICPR Node Location Elevations

Node ID	Flood Stage in Feet (NAVD) 1% Annual Chance / 24 Hour Storm Duration
NC1060	17.82
NC1410	28.55
NC1415	29.53
NC1430	28.63
NC1440	29.55
NC1450	29.94
NC1455	29.37
NC1460	28.11
NC1470	29.75
NC1475	29.93
NC1480	30.35
NC1490	30.58
NC1500	30.68
NC1510	27.57
NC1520	27.04
NC1530	27.84
NC1540	25.50
NC1550	26.74
NC1670	31.02
NC1675	31.59
NC1690	31.14
NC1700	28.31
NC1705	26.95
NC1710	16.86
NC2990	22.00
NC3000	16.84
NC3090	30.47
NC3100	29.23
NC3190	31.64
NC3270	32.67
NC3280	31.02
NC3290	32.91
NC3850	29.88
NC3950	29.70
NC4090	27.73
NC4290	28.43
NC4310	27.83
NC4350	31.06
NC4360	28.14
NC4410	26.18
NC4420	32.22
NC4470	27.93
NC4480	26.74
NC4720	22.90
NC4730	27.97

TABLE 9 – Buffalo Canal / Frog Creek Study - ICPR Node Location Elevations

Node ID	Flood Stage in Feet (NAVD) 1% Annual Chance / 24 Hour Storm Duration
NC4740	28.02
NC4750	27.51
NC4760	27.48
NC4770	27.49
NC4774	28.28
NC4775	28.14
NC4780	28.14
NC4790	28.16
NC4800	27.27
NC4810	27.86
NC5050	27.99
NC5060	27.99
NC5070	28.10
NC5080	24.80
NC5090	28.95
NC5100	29.18
NC5110	28.60
NC5120	29.43
NC5130	28.04
NC5135	28.06
NC5140	30.88
NC5150	28.09
NC5160	28.09
NC5170	27.88
NC5180	29.31
NC5200	28.94
NC5210	27.02
NC5220	32.68
NC5270	30.60
NC5280	16.72
NC5285	21.79
NC5300	29.10
NC5310	26.09
NC5320	26.08
NC5330	28.25
NC5335	29.39
NC5336	28.44
NC5340	27.83
NC5345	27.84
NC5350	26.90
NC5640	28.21
NC5645	28.31
NC5650	28.16
NC5660	28.17
NC6460	28.41

TABLE 9 – Buffalo Canal / Frog Creek Study - ICPR Node Location Elevations

Node ID	Flood Stage in Feet (NAVD) 1% Annual Chance / 24 Hour Storm Duration
NC6470	28.15
NC6475	28.18
NC6750	32.47
NC7000	29.22
NC7010	29.02
NC7050	26.33
NC7060	31.36
NC7100	27.71
NC7120	27.99
NC7160	27.99
NC7240	27.76
NC7250	24.30
NC7260	27.98
NC7270	27.99
NC7500	20.04
NC7505	19.01
NC7540	28.14
NC7550	31.28
NC8260	29.81
NC8270	28.60
NC8280	29.16
NC8300	31.15
NC8640	28.80
NC8650	29.37
NC8800	28.39
NC9080	26.80
NC9135	26.80
NC9180	30.48
ND0010	39.65
ND0020	39.01
ND0030	38.64
ND0040	34.35
ND0050	34.43
ND0060	38.20
ND0300	29.46
ND0310	35.77
ND0360	28.25
ND0370	28.78
ND0380	27.25
ND0390	26.91
ND0400	25.76
ND0410	24.67
ND0420	24.23
ND0430	27.82
ND0440	22.78

TABLE 9 – Buffalo Canal / Frog Creek Study - ICPR Node Location Elevations

Node ID	Flood Stage in Feet (NAVD) 1% Annual Chance / 24 Hour Storm Duration
ND0450	22.98
ND0455	24.35
ND0460	34.39
ND0470	33.22
ND0480	26.81
ND0530	24.76
ND0540	24.80
ND0550	24.00
ND0555	24.80
ND0560	20.73
ND0570	20.77
ND0590	39.62
ND0600	27.92
ND0610	20.07
ND0620	20.27
ND0630	24.98
ND0640	24.97
ND0660	27.33
ND0670	25.86
ND0680	40.95
ND0720	20.31
ND0730	20.31
ND0740	20.36
ND0750	20.37
ND0770	25.17
ND0774	25.82
ND0775	26.14
ND0780	24.81
ND0830	20.37
ND0870	19.14
ND1030	20.37
ND1040	20.37
ND1070	23.42
ND1080	22.91
ND1090	20.16
ND1100	20.37
ND1110	20.17
ND1130	20.32
ND1140	20.34
ND1150	20.35
ND1160	20.32
ND1170	20.32
ND1180	19.53
ND1190	20.31
ND1250	24.97

TABLE 9 – Buffalo Canal / Frog Creek Study - ICPR Node Location Elevations

Node ID	Flood Stage in Feet (NAVD) 1% Annual Chance / 24 Hour Storm Duration
ND1640	16.34
ND1650	16.49
ND1660	16.26
ND1680	20.93
ND1720	22.67
ND1730	22.44
ND1810	20.34
ND1830	22.44
ND1840	24.22
ND1850	22.46
ND1860	18.94
ND1865	19.04
ND1870	22.28
ND1940	20.31
ND2080	26.01
ND2090	24.59
ND2100	19.83
ND2115	20.25
ND2120	21.17
ND2130	20.34
ND2380	20.24
ND2520	21.74
ND2540	35.79
ND2550	34.69
ND2740	17.36
ND2750	17.99
ND2760	16.82
ND2900	26.30
ND2910	30.86
ND3010	20.33
ND3020	21.42
ND3030	38.67
ND3080	23.53
ND3110	25.41
ND3120	23.06
ND3130	19.94
ND3200	20.00
ND3220	20.35
ND3230	23.46
ND3240	29.27
ND3300	22.07
ND3330	22.85
ND3340	16.70
ND3350	17.77
ND3360	17.51

TABLE 9 – Buffalo Canal / Frog Creek Study - ICPR Node Location Elevations

Node ID	Flood Stage in Feet (NAVD) 1% Annual Chance / 24 Hour Storm Duration
ND3410	37.89
ND3420	36.73
ND3430	32.73
ND3440	35.28
ND3450	31.20
ND3470	33.18
ND3480	20.27
ND3530	39.75
ND3540	38.06
ND3550	30.61
ND3560	27.45
ND3570	36.50
ND3580	29.89
ND3590	19.55
ND3620	23.38
ND3670	27.90
ND3680	27.83
ND3700	30.59
ND3710	34.63
ND3720	34.95
ND3730	34.35
ND3740	23.77
ND3750	20.37
ND3760	37.95
ND3770	23.22
ND3780	23.75
ND3790	21.18
ND3800	23.21
ND3810	20.37
ND3820	20.37
ND3830	27.81
ND3860	20.88
ND3870	21.00
ND3880	21.19
ND3890	20.37
ND3900	20.80
ND3910	21.20
ND3920	20.37
ND3960	17.81
ND3970	20.37
ND3980	21.20
ND3990	21.20
ND4000	21.27
ND4010	25.90
ND4020	23.78

TABLE 9 – Buffalo Canal / Frog Creek Study - ICPR Node Location Elevations

Node ID	Flood Stage in Feet (NAVD) 1% Annual Chance / 24 Hour Storm Duration
ND4030	30.07
ND4050	31.88
ND4130	21.00
ND4140	20.90
ND4150	25.04
ND4160	22.94
ND4170	20.45
ND4220	22.64
ND4260	26.67
ND4370	22.01
ND4380	17.90
ND4390	21.89
ND4460	19.26
ND4490	26.67
ND4500	20.34
ND4510	20.32
ND4520	20.29
ND4530	20.29
ND4540	20.28
ND4550	20.29
ND4560	20.28
ND4570	20.22
ND4580	20.22
ND4590	20.08
ND4600	20.28
ND4610	20.28
ND4620	19.68
ND4640	21.40
ND4650	22.80
ND4660	19.80
ND4900	20.08
ND5000	27.20
ND5230	31.15
ND5240	30.27
ND5245	29.93
ND5250	26.43
ND5260	30.91
ND5290	16.71
ND5360	16.81
ND5370	17.01
ND5380	16.79
ND5390	22.94
ND5400	20.26
ND5410	19.55
ND5420	19.68

TABLE 9 – Buffalo Canal / Frog Creek Study - ICPR Node Location Elevations

Node ID	Flood Stage in Feet (NAVD) 1% Annual Chance / 24 Hour Storm Duration
ND5620	23.71
ND5630	23.71
ND5680	24.15
ND5690	25.87
ND6070	16.55
ND6080	16.47
ND6100	16.26
ND6110	16.26
ND6130	17.96
ND6140	17.60
ND6150	17.09
ND6155	22.68
ND6160	16.69
ND6170	16.64
ND6560	18.14
ND6570	30.31
ND6575	35.02
ND6580	34.54
ND6590	19.31
ND6600	20.28
ND6605	20.45
ND6610	18.94
ND6620	19.48
ND6660	17.71
ND6670	17.69
ND6680	20.25
ND6690	26.23
ND6760	17.78
ND6770	19.98
ND6780	24.46
ND6790	23.13
ND6800	34.56
ND6890	39.97
ND6930	32.91
ND6940	31.71
ND6950	31.21
ND7280	19.28
ND7310	25.81
ND7330	20.51
ND7340	22.14
ND7345	22.46
ND7350	22.43
ND7360	22.15
ND7370	22.43
ND7430	21.03

TABLE 9 – Buffalo Canal / Frog Creek Study - ICPR Node Location Elevations

Node ID	Flood Stage in Feet (NAVD) 1% Annual Chance / 24 Hour Storm Duration
ND7435	21.04
ND7690	23.71
ND7750	26.10
ND7760	28.27
ND7780	39.68
ND7790	39.65
ND7800	38.50
ND7820	22.00
ND7830	20.72
ND7840	20.34
ND7850	20.34
ND7860	17.54
ND7865	17.64
ND7870	17.69
ND7890	27.04
ND7900	26.81
ND7910	21.47
ND7920	22.48
ND8020	32.62
ND8030	36.40
ND8110	34.60
ND8250	20.37
ND8290	20.43
ND8320	20.32
ND8330	20.50
ND8340	20.31
ND8350	35.25
ND8360	34.55
ND8390	25.96
ND8400	20.37
ND8410	20.37
ND8420	20.37
ND8430	22.61
ND8440	20.33
ND8450	23.56
ND8460	25.18
ND8470	22.60
ND8480	20.31
ND8720	20.36
ND8730	23.18
ND8740	23.16
ND8750	20.27
ND8760	20.26
ND8780	30.87
ND8790	32.51

TABLE 9 – Buffalo Canal / Frog Creek Study - ICPR Node Location Elevations

Node ID	Flood Stage in Feet (NAVD) 1% Annual Chance / 24 Hour Storm Duration
ND8795	32.42
ND9070	22.14
ND9105	23.11
ND9110	22.91
ND9115	23.94
ND9130	20.61
ND9160	25.83
ND9165	25.77
NE0070	36.75
NE0080	35.13
NE0090	34.92
NE0100	35.96
NE0110	35.71
NE0120	36.33
NE0125	36.28
NE0130	35.79
NE0135	35.70
NE0140	39.52
NE0150	39.58
NE0160	38.65
NE0170	26.87
NE0180	25.55
NE0190	25.28
NE0200	25.27
NE0210	25.03
NE0220	25.05
NE0230	25.20
NE0240	25.27
NE0245	26.23
NE0250	33.76
NE0260	32.53
NE0270	33.93
NE0280	34.15
NE0290	34.09
NE0295	36.64
NE0320	39.99
NE0325	39.10
NE0326	42.64
NE0330	33.21
NE0340	32.66
NE0490	35.19
NE0500	25.96
NE0510	25.03
NE0520	26.67
NE0690	24.77

TABLE 9 – Buffalo Canal / Frog Creek Study - ICPR Node Location Elevations

Node ID	Flood Stage in Feet (NAVD) 1% Annual Chance / 24 Hour Storm Duration
NE0700	22.35
NE0710	32.68
NE0760	35.87
NE0763	35.22
NE0766	35.58
NE0820	21.59
NE0850	38.20
NE1050	25.34
NE1120	20.55
NE1390	42.20
NE1900	40.49
NE2140	36.63
NE2400	35.16
NE2770	26.55
NE2780	26.75
NE2840	26.83
NE2850	25.19
NE2860	32.03
NE2870	27.77
NE2875	27.96
NE2880	20.86
NE2890	27.74
NE2920	34.85
NE3050	32.38
NE3060	32.65
NE3065	33.11
NE3250	22.15
NE3520	24.61
NE3600	35.47
NE3605	35.48
NE3630	40.50
NE3640	35.89
NE3645	41.23
NE3650	35.68
NE3660	35.36
NE3840	30.78
NE4040	26.89
NE4100	37.51
NE4110	35.14
NE4120	41.34
NE4190	41.54
NE4200	39.44
NE4210	38.64
NE4230	27.50
NE4240	29.33

TABLE 9 – Buffalo Canal / Frog Creek Study - ICPR Node Location Elevations

Node ID	Flood Stage in Feet (NAVD) 1% Annual Chance / 24 Hour Storm Duration
NE4250	29.24
NE4280	28.44
NE4300	28.67
NE4320	27.92
NE4330	30.28
NE4340	31.10
NE4430	25.31
NE4440	39.55
NE4445	36.33
NE4450	26.80
NE4630	35.31
NE4670	37.50
NE4680	36.00
NE4690	33.85
NE4700	32.67
NE4710	29.14
NE4820	24.83
NE4830	24.95
NE4840	24.42
NE4850	23.54
NE4860	27.70
NE4865	27.93
NE4870	21.83
NE4880	23.06
NE4890	23.15
NE4910	25.54
NE4920	22.78
NE4930	20.87
NE4940	26.35
NE4950	25.58
NE4960	28.46
NE4970	30.75
NE4980	33.37
NE4990	33.83
NE5010	28.67
NE5020	30.54
NE5025	31.78
NE5026	30.92
NE5030	25.27
NE5033	25.30
NE5036	25.45
NE5040	28.83
NE5670	33.70
NE5675	35.18
NE5990	35.69

TABLE 9 – Buffalo Canal / Frog Creek Study - ICPR Node Location Elevations

Node ID	Flood Stage in Feet (NAVD) 1% Annual Chance / 24 Hour Storm Duration
NE6000	36.34
NE6020	33.81
NE6030	35.19
NE6035	35.19
NE6040	35.19
NE6045	35.19
NE6050	35.36
NE6060	35.05
NE6480	40.27
NE6490	41.31
NE6500	35.64
NE6510	41.68
NE6520	41.58
NE6530	40.80
NE6540	39.59
NE6550	42.46
NE6700	28.47
NE6705	35.59
NE6706	31.90
NE6810	36.92
NE7020	39.09
NE7065	29.09
NE7066	27.91
NE7070	27.68
NE7075	27.71
NE7076	27.25
NE7080	27.87
NE7090	28.66
NE7110	28.49
NE7130	27.20
NE7135	27.21
NE7136	27.20
NE7140	24.90
NE7145	28.35
NE7150	28.00
NE7155	30.41
NE7156	29.59
NE7170	29.07
NE7190	28.67
NE7200	28.56
NE7210	28.70
NE7220	24.90
NE7230	26.10
NE7320	25.91
NE7530	21.18

TABLE 9 – Buffalo Canal / Frog Creek Study - ICPR Node Location Elevations

Node ID	Flood Stage in Feet (NAVD) 1% Annual Chance / 24 Hour Storm Duration
NE7560	32.66
NE7565	33.13
NE7660	35.39
NE7665	35.81
NE7730	25.68
NE7740	25.60
NE7770	35.27
NE7930	25.25
NE7950	25.25
NE7960	28.85
NE7965	28.89
NE7970	36.58
NE7980	37.40
NE7990	37.46
NE8000	37.47
NE8010	37.47
NE8065	25.76
NE8066	26.64
NE8067	25.44
NE8068	26.49
NE8069	26.02
NE8070	25.29
NE8080	25.26
NE8130	24.88
NE8140	23.06
NE8180	25.63
NE8190	32.65
NE8490	25.27
NE8630	35.13
NE8660	34.74
NE8670	34.85
NE8680	34.85
NE8690	34.94
NE8700	36.753
NE8710	37.392
NE8770	27.716
NE8775	27.485
NE8776	27.211
NE8810	26.124
NE8820	26.878
NE9060	29.206
NE9065	27.544
NE9090	41.8
NE9095	38.8
NE9125	36.324

TABLE 9 – Buffalo Canal / Frog Creek Study - ICPR Node Location Elevations

Node ID	Flood Stage in Feet (NAVD) 1% Annual Chance / 24 Hour Storm Duration
NE9185	33.133
NE9190	31.5

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals. 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. For construction and/or floodplain management purposes, users are encouraged to use the flood elevation data presented in this FIS in conjunction with the data shown on the FIRM.

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

For each incorporated community in Manatee County that had a previously printed FIS report, the hydraulic analyses described in those reports have been compiled and are summarized below.

Pre-countywide Analyses

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

Water-surface profiles for all detailed study streams (except Myakka River and the 10- and 100-year floods on Manatee River) were developed using the HEC-2 step-backwater computer model (References 62 and 63). The Myakka River profiles were developed using the U.S. Geological Survey E-431 step-backwater computer program (Reference 64).

The 10- and 100-year flood elevations for Manatee River were determined by a hydrodynamic simulation model as part of the flood plain study provided by the county (Reference 41). Profiles for all other detailed studies were determined for the 10-, 50-, 100-, and 500-year floods. Channel cross section data for the hydraulic analysis on the lower reaches of the Manatee and Braden Rivers were obtained from Nautical Chart No. 11425 (Reference 34). Upstream channel cross section data for the Manatee and Braden Rivers were determined by field survey. Overbank cross section data were obtained from topographic maps (Reference 18). Bridge geometry for all streams, and cross section data for Gamble, Mill, Bowlees, and Frog Creeks, and Myakka River, were obtained by field survey. The cross section data for Little Manatee River were obtained from the Southwest Florida Water Management District (Reference 65).

Hydraulic analyses of the shoreline characteristics of the flooding sources studied in detail were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each of the shorelines.

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

Roughness coefficients (Manning's "n") were determined from aerial photographs (Reference 33) and then further refined by calibrating the HEC-2 model against high-water marks. Manning's "n" values ranged from 0.020 to 0.080 for the channel and from 0.080 to 0.250 for the overbanks. Roughness coefficients for the Myakka and Manatee Rivers and were estimated for each subarea of each channel cross section. Coefficients were varied with depth and represent average roughness across the subarea. Aerial photographs, streamflow records, and field survey data were used in estimating coefficients.

Starting water-surface elevations were determined from normal depth calculations for Gamble and Mill Creeks and from mean high tide for all other streams.

The baseline used for horizontal control on portions of Braden River was obtained by field survey.

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

Floods resulting from overland rainfall flow were determined, an estimate of rainfall excess was made, and the areas where runoff would accumulate were determined. This type of flooding, where the depth is less than 1 foot, is classified as shaded Zone X.

Water-surface elevations for areas of approximate study were determined using engineering judgment and normal depth calculations.

The hydraulic analyses for this study 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.

1992 Effective FIS Revisions to Hydraulic Analyses

For the 1992 effective FIS study revisions, elevation and structural geometry data for bridges, culverts, and dams were obtained from field surveys. Most cross sections were obtained from field surveys. Other cross sections for portions of the Braden River, cabbage Slough, and Buffalo canal were provided by the SWFWMD (Reference 52).

Revised roughness coefficients (Manning's "n") used in the 1992 hydraulic computations were selected on the basis of field observations, aerial photos, and photographs of the streams and flood plain areas. Channel "n" values ranged from 0.02 to 0.07, and overbank "n" values ranged from 0.05 to 0.15.

Revised water-surface elevations of streams of the selected recurrence intervals were computed using the HEC-2 step-backwater computer program (Reference 67). Starting water-surface elevations for most streams were normal depth or mean high tide, whichever was greater. For stream reaches which were extensions of previously determined profiles, the starting water-surface elevations were set equal to the elevations determined for the existing profiles.

For each stream studied in detail in the 1992 revision, the 100- and 500-year flood plain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1: 24000 with a contour interval of 5 feet and aerial photography at a scale of 1: 2400 with a contour interval of 1 foot (References 47 and 48).

Countywide Analyses

New detailed hydraulic analyses have been performed as part of this study.

Frog Creek / Buffalo Canal Watershed

A watershed-wide hydraulic model was initiated by the Southwest Florida Water Management District (SWFWMD) and Manatee County, and developed by Jones Edmunds and Associates, Inc. (Reference 14) using Interconnected Channel and Pond Routing Model (ICPR) software (Reference 54). The computer model was used to simulate the hydrologic response of the study area and to route stormwater through constructed facilities and natural topographic features for the standard storm events. The model schematic was created using ESRI's ArcGIS geographic information system software (Reference 55), ESRI's Arc Hydro tools (Reference 56), proprietary GIS-based tools developed by Jones Edmunds, and manual methods.

The Buffalo Canal/Frog Creek Watershed Management Plan was prepared by SWFWMD (Reference 57). The plan incorporates digital topographic information, watershed evaluation, and watershed management plan elements from the SWFWMD Guidelines and Specifications (G&S) (Reference 58). This plan formed the basis for the new study.

ICPR was preferred by the SWFWMD for the Watershed Management Plan because of its ability to accurately model ponding areas, its familiarity and use by the local engineering community, ease of use, and approval for use in FEMA flood insurance studies. Also, the recently added percolation and Green and Ampt runoff integration make the model an all encompassing package for this modeling effort. Instabilities in the models were reviewed and addressed in several ways to insure that peak flood stage results are reasonable.

See Table 9 for a listing of the ICPR model nodes and flood stage elevations.

Wares Creek (Cedar Hammock) Watershed Study

The U.S. Army Corps of Engineers Jacksonville District produced a new hydraulic study for Wares Creek (Cedar Hammock) (Reference 15). For the Wares Creek (Cedar Hammock) watershed, hydraulic profiles were computed with the HEC-2 program.

Updated and New Approximate Studies

Updated approximate hydraulic analyses have been performed by BakerAECOM (Reference 13) on all previously effective approximate stream reaches as part of this countywide update. Thirty-four (34) individual streams totaling approximately 81.8 linear miles were modeled using HEC-RAS (Reference 68) via automated methods with non-surveyed GIS-based terrain data.

For this study, new approximate Zone A delineations have been added for areas not previously studied by either detailed or approximate methods, using the current Southwest Florida Water Management District (SWFWMD) Land Use/Land Cover (LULC) feature class as Zone A

polygons. The SWFWMD methodology used was adapted from the Northwest Florida Water Management District methodology for using wetland delineations to supplement existing Zone A floodplain boundaries (Reference 61). No hydraulic analyses were performed as part of the addition of these special flood hazard areas.

Benchmarks

For FIRM panels dated July 16, 2004, or later, qualifying bench marks within a given jurisdiction are cataloged by the National Geodetic Survey (NGS) and entered into the National Spatial Reference System (NSRS). First or Second Order Vertical bench marks that have a vertical stability classification of A, B, or C are shown and labeled on the FIRM with their 6-character NSRS Permanent Identifier.

Bench marks cataloged 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 well (e.g., mounted in bedrock)

Stability B: Monuments which generally hold their position/elevation well (e.g., concrete bridge abutments)

Stability C: Monuments which may be affected by surface ground movements (e.g., concrete mounted 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 bench marks, the FIRM may also show vertical control monument 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 bench marks 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, www.ngs.noaa.gov.

It is important to note that temporary vertical monuments are often established during the preparation of a flood hazard analysis for the purposes of establishing local vertical control. Although these monuments are not shown on the digital FIRM, they may be found in the Technical Support Data Notebook associated with this FIS and FIRM. Interested individuals may contact FEMA to access this data.

3.3 Vertical Datum

All FISs and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum in use for newly created or revised FISs and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD 29). With the finalization

of the North American Vertical Datum of 1988 (NAVD 88), many FIS reports and FIRMs are being prepared using NAVD 88 as the referenced vertical datum.

For this countywide FIS, all flood elevations shown in the FIS report and on the FIRM are referenced to NAVD 88. Structure and ground elevations in the community must, therefore, be referenced to NAVD 88. It is important to note that adjacent communities may be referenced to NGVD 29. This may result in differences in base flood elevations across corporate limits between the communities.

As noted above, the elevations shown in the FIS report and on the FIRM for Manatee County are referenced to NAVD 88. Ground, structure, and flood elevations may be compared and/or referenced to NGVD 29 by applying a standard conversion factor. The conversion factor from NGVD 29 to NAVD 88 for Manatee County is -0.98 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 bench marks are referenced to NAVD 88.

The BFEs shown on the FIRM represent whole-foot rounded values. For example, a BFE of 12.4 will appear as 12 on the FIRM and 12.6 will appear as 13. Therefore, users that wish to convert the elevations in this FIS to NGVD 29 should apply the conversion factor (+0.98 foot) 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.

NGVD – 0.98’ = NAVD

For more information on NAVD 88, see Converting the National Flood Insurance Program to the North American Vertical Datum of 1988, FEMA Publication FIA-20/June 1992, 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
(301) 713-3242
http://www.ngs.noaa.gov/

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

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

4.1 Floodplain Boundaries

In order to provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For the streams studied in detail, the 1- and 0.2-percent-annual-chance floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps and verified using photogrammetrically-derived contours from aerial photography (References 35, 38, 47, 48, 69, 70, 71, 72, 73, and 74). The 1- and 0.2-percent-annual-chance floodplain boundaries for coastal areas were delineated using the same reference materials. For information regarding scale and sources of these maps, see Table 10, "Sources of Original Topographic Data."

TABLE 10 – SOURCES OF ORIGINAL TOPOGRAPHIC DATA

LOCATION	SCALE	CONTOUR INTERVAL (Feet)	REFERENCE #'s
Anna Maria, City of	1:24,000	5	35, 72, 73
	1:7,200, 1:10,800	*	38
Bradenton, City of	1:24,000	5	35
Bradenton Beach, City of	1:24,000	5	35
	1:7,200, 1:10,800	*	38
Holmes Beach, City of	1:24,000	5	35
	1:8,400	1	38
Longboat Key, Town of	1:24,000	5	35
	1:2,400	1	74
	1:7,200, 1:10,800, 1:21,600	*	38
Manatee County	1:24,000	5	35, 47
(Unincorporated Areas)	1:2,400	1	38, 48, 69, 70
	1:12,000	2	71
Palmetto, City of	1:24,000	5	35
	1:7,200, 1:10,800	*	38

*Data Not Available.

The 1- and 0.2-percent-annual-chance floodplain boundaries are shown on the Flood Insurance Rate Map. On this map, the 1-percent-annual-chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A and AE), 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.

For this countywide revision, the redelineation of effective coastal floodplains, and the development of new detailed and approximate Zone A floodplains are based upon updated LiDAR-derived topographic data provided by Southwest Florida Water Management District (Reference 18). This revision also includes the transition from the National Geodetic Vertical Datum of 1929 (NGVD 29) to the North American Vertical Datum of 1988 (NAVD 88).

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 National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 1-percent-annual-chance floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 1-percent-annual-chance flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced.

The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this study were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. For purposes of computation only, rainfall flooding was considered.

At some cross sections on the Manatee and Braden Rivers, where full flood plain encroachment does not cause a rise in water surface equal to the specified allowable surcharge, the limits of the floodway coincide with the top of the bank of the stream. The results of these computations are tabulated at selected cross sections for each stream segment for which a floodway is computed (Table 11).

In the July 1992 FIS, floodway computations for Cabbage Slough; Wade Canal; Frye Canal; Cooper Creek; Frog Creek, upstream of U.S. Route 41; Buffalo Canal; Gamble Creek, upstream of Golf Course Drive; the Braden River, upstream of Interstate 75; Braden River West Channel; Wolf Slough; Mill Creek, upstream of confluence of unnamed tributary; Rattlesnake Slough; Gap Creek; Williams Creek; Cypress Strand; Gates Creek; East Fork Cooper Creek; the Myakka River, upstream of State Road 70; and South Fork Little Manatee River were revised or added. Many of these have been updated as part of this revision.

Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections (see Table 10, Floodway Data). The computed floodways are shown on the Flood

Insurance Rate Map (Exhibit 2). In cases where the floodway and 1-percent-annual-chance floodplain boundaries are either close together or collinear, only the floodway boundary is shown.

The area between the floodway and 1-percent-annual-chance floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing 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".

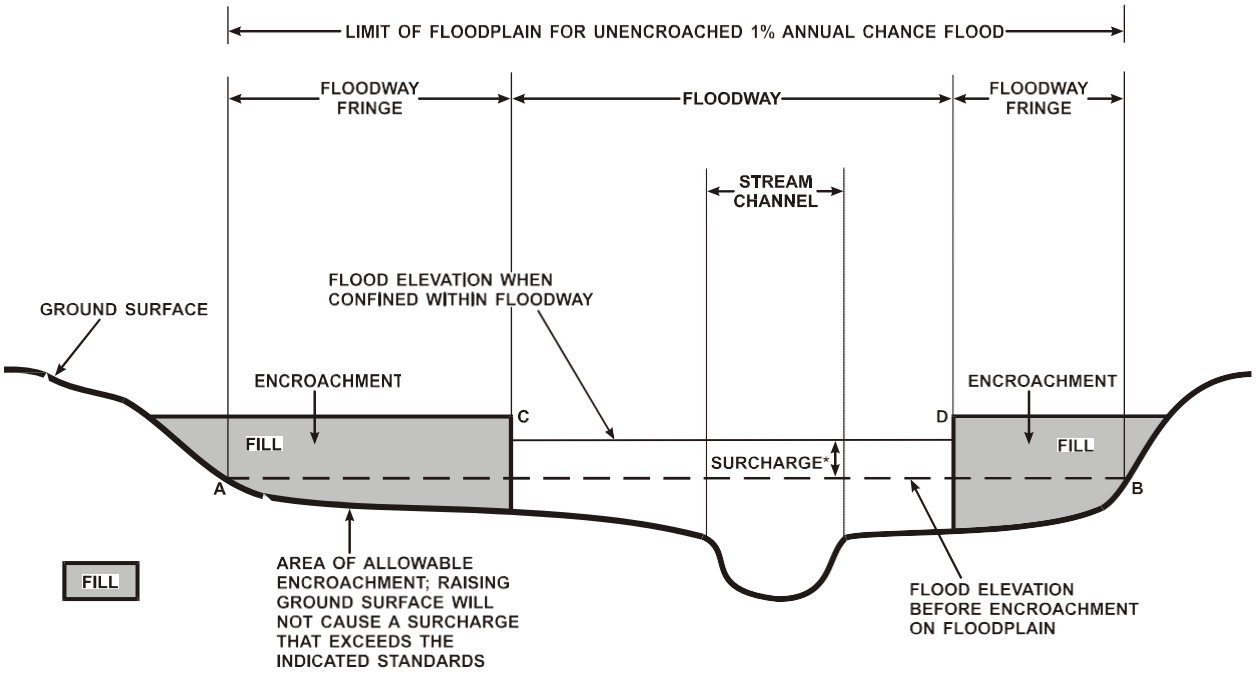


FIGURE 3 – FLOODWAY SCHEMATIC

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
BOWLEES CREEK								
A	1,700	93	551	8.7	11.4	2.4 [2]	2.5	0.1
B	4,270	50	625	7.6	11.5	6.9 [2]	7.9	1.0
C	5,960	494	3,446	1.4	11.5	8.9 [2]	9.9	1.0
D	7,432	265	1,615	2.6	11.9	10.8 [2]	11.6	0.8
E	7,952	261	1,447	2.9	12.1	11.2 [2]	11.9	0.7
F	9,084	474	2,172	1.9	13.0	12.0 [2]	12.7	0.7
G	9,794	614	2,961	1.4	13.6	13.6	14.3	0.7
H	10,794	355	1,773	2.4	13.9	13.9	14.5	0.6
I	13,070	420	3,091	1.1	15.6	15.2	16.3	0.7
J	14,810	846	3,991	0.9	17.2	17.2	17.9	0.7
K	16,686	1,168	6,832	0.4	17.6	17.6	18.3	0.7
L	19,186	1,004	6,451	0.5	17.7	17.7	18.4	0.7
M	20,682	777	1,873	1.4	19.4	19.4	20.0	0.6
N	21,690	144	954	2.8	23.8	23.8	24.8	1.0
O	23,600	405	1,925	1.4	29.9	29.9	30.8	0.9
P	24,100	466	1,675	1.3	30.2	30.2	31.0	0.8
Q	25,425	290	855	2.5	31.3	31.3	31.9	0.6
R	26,200	596	2,043	1.1	32.2	32.2	32.7	0.5

1 FEET ABOVE MOUTH

2 ELEVATIONS WITHOUT CONSIDERING STORM SURGE EFFECT FROM SARASOTA BAY

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
BRADEN RIVER								
E	18,190	700	4,524	3.4	6.6	4.8 [2]	5.1	0.3
F	20,090	939	8,118	1.9	6.8	5.4 [2]	5.8	0.4
G	22,790	359	6,449	2.5	7.3	5.9 [2]	6.4	0.5
H	24,319	390	4,327	3.6	7.5	6.3 [2]	7.2	0.9
I	26,019	770	9,549	1.6	7.8	6.5 [2]	7.4	0.9
J	27,622	N/A	N/A	N/A	7.9	N/A	N/A	N/A
K	30,570	N/A	N/A	N/A	13.6	14	14	N/A
L	32,170	N/A	N/A	N/A	13.9	14	15	N/A
M	34,670	732	6,794	1.9	9.2	9.2	10.2	1.0
N	37,770	286	2,541	5.0	10.6	10.6	11.2	0.6
O	40,770	501	4,992	2.5	12.4	12.4	13.3	0.9
P	43,805	331	3,703	1.6	13.3	13.3	14.3	1.0
Q	45,105	295	3,909	1.5	13.4	13.4	14.4	1.0
R	47,615	170	2,144	2.6	13.6	13.6	14.6	1.0
S	51,215	182	2,086	2.6	14.1	14.1	15.1	1.0
T	54,569	212	1,958	2.8	15.4	15.4	16.3	0.9
U	57,019	180	1,536	3.1	16.3	16.3	17.1	0.8
V	58,719	120	1,200	4.0	16.8	16.8	17.5	0.7
W	59,419	149	1,440	3.4	17.2	17.2	17.8	0.6
X	60,319	158	1,385	3.5	17.7	17.7	18.3	0.6
Y	61,419	174	1,398	3.5	18.5	18.5	19.0	0.5
Z	62,521	194	1,112	4.3	19.5	19.5	19.9	0.4
AA	63,466	229	1,425	3.4	21.3	21.3	21.5	0.2
AB	64,866	185	1,183	4.1	23.0	23.0	23.5	0.5
AC	66,106	302	1,853	2.6	24.7	24.7	25.3	0.6
AD	66,815	315	1,963	2.2	25.2	25.2	25.8	0.6

1 FEET ABOVE STATE ROAD 64

2 ELEVATIONS WITHOUT CONSIDERING STORM SURGE EFFECT FROM TAMPA BAY

TABLE 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

MANATEE COUNTY, FL

AND INCORPORATED AREAS

FLOODWAY DATA

BRADEN RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
BRADEN RIVER								
AE	67,878	319	1,918	2.3	25.7	25.7	26.3	0.6
AF	68,980	309	1,463	3.0	26.5	26.5	27.1	0.6
AG	69,925	332	1,576	2.8	27.5	27.5	28.1	0.6
AH	70,975	417	2,578	1.7	28.8	28.8	29.7	0.9
AI	71,959	400	2,376	1.9	29.6	29.6	30.5	0.9
AJ	72,864	437	2,813	1.6	30.4	30.4	31.3	0.9
AK	74,048	473	2,645	1.7	13.6	13.6	14.3	0.9
AL	74,993	460	2,722	1.6	13.9	13.9	14.5	1.0
AM	76,056	357	2,674	1.2	33.2	33.2	34.0	0.8
AN	77,001	377	2,744	1.2	33.5	33.5	34.3	0.8
AO	78,198	554	3,901	0.8	33.8	33.8	34.6	0.8
AP	79,143	565	3,759	0.8	33.9	33.9	34.9	1.0
AQ	79,930	571	3,593	0.9	34.1	34.1	35.1	1.0
AR	81,150	1136 [3]	3,386	0.9	34.4	34.4	35.4	1.0
AS	82,901	43	442	5.6	36.2	36.2	37.2	1.0
BRADEN RIVER WEST CHANNEL								
A	1130 [2]	1136 [3]	3,386	0.9	34.4	34.4	35.4	1.0

1 FEET ABOVE STATE ROAD 64

2 FEET ABOVE MOUTH

3 COMBINED FLOODWAY WIDTH OF BRADEN RIVER AND BRADEN RIVER WEST CHANNEL

TABLE 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

MANATEE COUNTY, FL

AND INCORPORATED AREAS

FLOODWAY DATA

BRADEN RIVER -BRADEN RIVER WEST CHANNEL

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
COOPER CREEK								
A	3,535	44	491	2.8	13.5	10.0 [2]	11.0	1.0
B	6,928	91	399	3.4	15.6	15.6	15.7	0.1
C	8,559	146	761	1.8	18.4	18.4	19.3	0.9
D	10,759	141	759	1.4	20.1	20.1	21.1	1.0
CYPRESS STRAND								
A	5,892	42	290	3.6	6.9	6.9	7.8	0.9
B	9,562	77	497	2.1	13.6	13.6	14.3	0.7
C	13,003	57	330	2.7	13.9	13.9	14.5	0.4
D	17,553	133	169	4.3	17.9	17.9	18.3	0.4
E	19,288	106	278	1.9	22.2	22.2	23.1	0.9
F	21,108	32	102	5.1	24.7	24.7	24.8	0.1
G	22,193	194	524	1.0	28.0	28.0	29.0	1.0
H	22,558	140	388	1.3	28.1	28.1	29.1	1.0
EAST FORK COOPER CREEK								
A	1,290	36	227	5.4	13.5	9.6 [2]	10.6	1.0
B	4,020	1,022	2,165	0.6	18.2	18.2	19.1	0.9
C	5,706	300	1,128	0.8	19.5	19.5	19.9	0.4
D	6,320	105	328	2.7	20.0	20.0	20.5	0.5
FRYE CANAL								
A	2,655	37	338	7.7	17.4	17.0 [3]	17.4	0.4
B	6,557	27	341	6.4	21.6	21.6	22.6	1.0
C	10,357	32	286	1.2	25.6	25.6	26.1	0.5
D	14,557	33	212	1.6	25.9	25.9	26.3	0.4

1 FEET ABOVE MOUTH

2 ELEVATIONS WITHOUT CONSIDERING BACKWATER FROM BRADEN RIVER

3 ELEVATIONS WITHOUT CONSIDERING BACKWATER FROM GAMBLE CREEK

TABLE 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

MANATEE COUNTY, FL
AND INCORPORATED AREAS

FLOODWAY DATA

COOPER CREEK - CYPRESS STRAND - EAST FORK COOPER CREEK - FRYE CANAL

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
GAMBLE CREEK								
A	6,000	2,774	23,441	0.6	11.6	9.8 [2]	10.8	1.0
B	9,750	2,200	15,979	0.8	12.0	10.0 [2]	11.0	1.0
C	11,000	1,777	17,734	0.8	12.0	10.1 [2]	11.1	1.0
D	14,250	3,021	23,687	0.6	12.0	10.3 [2]	11.3	1.0
E	18,000	3,507	10,920	1.2	12.0	10.9 [2]	11.9	1.0
F	21,212	2,168	5,585	2.4	12.0	11.9 [2]	12.9	1.0
G	25,512	1,057	9,135	1.5	13.6	13.6	14.3	1.0
H	27,412	591	4,106	3.2	13.9	13.9	14.5	0.9
I	28,571	715	5,142	1.7	17.2	17.2	18.1	0.9
J	32,981	844	6,296	1.1	18.8	18.8	19.6	0.8
K	37,251	1,734	6,567	1.1	19.3	19.3	20.2	0.9
L	39,963	2,877	20,431	0.3	19.5	19.5	20.5	1.0
M	46,043	1,051	4,501	1.2	20.1	20.1	21.0	0.9
N	53,043	1,183	4,791	1.0	23.1	23.1	24.0	0.9
O	60,043	1,383	5,788	0.9	27.0	27.0	28.0	1.0
GAP CREEK								
A	3,645	186	1,222	1.7	7.8	7.8	8.8	1.0
B	6,822	94	781	2.6	10.5	10.5	11.4	0.9
C	9,063	64	579	3.5	12.6	12.6	13.5	0.9
D	10,893	175	522	3.9	13.6	13.6	14.6	1.0
E	13,518	53	462	2.9	15.7	15.7	16.4	0.7
F	16,654	105	712	1.9	16.7	16.7	17.4	0.7

1 FEET ABOVE MOUTH

2 ELEVATIONS WITHOUT CONSIDERING OVERFLOW EFFECT FROM MANATEE RIVER

TABLE 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

MANATEE COUNTY, FL

AND INCORPORATED AREAS

FLOODWAY DATA

GAMBLE CREEK - GAP CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
GATES CREEK								
A	1,017	56	380	3.3	10.0	4.0 [2]	4.8	0.8
B	6,460	56	281	3.1	15.4	15.4	15.9	0.5
C	10,545	43	261	3.4	21.4	21.4	22.4	1.0
D	11,121	110	178	2.8	22.0	22.0	22.9	0.9
E	12,722	22	105	4.8	24.7	24.7	25.6	0.9
LITTLE MANATEE					13.6	13.6	14.3	
RIVER					13.9	13.9	14.5	
A	92,408	988	11,068	1.5	27.9	27.9	28.7	0.8
B	94,358	981	9,811	1.7	28.6	28.6	29.4	0.8
C	96,958	735	7,955	2.0	29.7	29.7	30.5	0.8
D	100,598	1,206	13,454	1.2	30.9	30.9	31.8	0.9
E	102,468	1,573	18,047	0.9	31.4	31.4	32.3	0.9

1 FEET ABOVE MOUTH

2 ELEVATIONS WITHOUT CONSIDERING BACKWATER EFFECT FROM MANATEE RIVER

TABLE 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

MANATEE COUNTY, FL

AND INCORPORATED AREAS

FLOODWAY DATA

GATES CREEK - LITTLE MANATEE RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
MANATEE RIVER								
B	48,575	3,000	20,756	0.0	6.4	2.6	2.6 [2]	0.0
C	54,575	3,560	26,589	1.3	6.0	3.7	3.8 [2]	0.1
D	60,375	3,200	21,921	1.5	6.3	5.1	5.7 [2]	0.6
E	64,675	2,800	20,617	1.6	6.7	6.3	7.1 [2]	0.8
F	71,675	2,016	18,094	1.4	8.8	8.0	8.8 [2]	0.8
G	77,475	2,250	24,302	1.3	10.5	9.8	10.5	0.7
H	81,475	2,800	35,150	0.5	13.6	13.6	14.3	0.6
I	84,075	1,900	18,827	0.9	13.9	13.9	14.5	0.3
J	86,775	1,700	18,138	1.0	13.9	13.9	14.1	0.2
K	88,975	1,300	15,022	1.2	15.2	15.2	15.4	0.2
L	91,075	1,000	13,543	1.3	16.6	16.6	16.9	0.3
M	93,875	700	5,525	3.1	18.4	18.4	18.7	0.3
N	96,175	1,400	5,029	3.4	20.9	20.9	21.1	0.2
O	98,575	2,100	10,612	1.5	22.4	22.4	22.6	0.2
P	100,975	2,000	3,870	4.1	23.8	23.8	23.9	0.1
Q	103,975	2,200	6,700	2.4	27.0	27.0	27.1	0.1

1 FEET ABOVE MOUTH

2 ELEVATIONS WITHOUT CONSIDERING STORM SURGE EFFECT FROM TAMPA BAY

TABLE 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

MANATEE COUNTY, FL

AND INCORPORATED AREAS

FLOODWAY DATA

MANATEE RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY [2] (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
MANATEE RIVER LAKE REACH								
A	168 [3]	205	2,191	1.2	7.5	6.8	7.8	1.0
B	1,441 [3]	349	4,879	0.5	7.9	7.1	8.0	0.9
C	2,890 [3]	77	1,084	2.4	8.3	7.2	8.2	1.0
D	3,536 [3]	150	2,037	2.2	8.5	7.3	8.3	1.0
E	4,505 [3]	186	2,739	1.6	8.8	7.7	8.7	1.0
F	5,748 [3]	57	656	6.7	9.2	8.2	9.0	0.8
MANATEE RIVER WETLAND REACH								
A	67,716 [1]	1,558	11,769	0.4	7.6	6.9	7.8	0.9
B	68,534 [1]	1,638	11,751	0.4	7.9	7.1	8.0	0.9
C	69,863 [1]	410	3,250	0.9	8.4	7.4	8.3	0.9
D	71,467 [1]	1,116	10,294	0.3	8.9	7.9	8.7	0.8
E	72,625 [1]	283	2,485	1.2	9.3	8.3	9.0	0.7

1 FEET ABOVE MOUTH OF MANATEE RIVER

2 ELEVATIONS WITHOUT CONSIDERING STORM SURGE EFFECT FROM TAMPA BAY

3 FEET ABOVE MOUTH OF MANATEE RIVER LAKE REACH

TABLE 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

MANATEE COUNTY, FL
AND INCORPORATED AREAS

FLOODWAY DATA

MANATEE RIVER WETLAND REACH - MANATEE RIVER LAKE REACH

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
MILL CREEK								
A	1,150	1,094	10,121	0.5	11.1	9.7 [2]	10.6	1.0
B	2,360	675	6,308	0.8	11.1	9.8 [2]	10.8	1.0
C	3,120	674	5,625	0.9	11.1	9.8 [2]	10.8	1.0
D	4,700	376	2,889	1.8	11.1	10.1 [2]	11.1	1.0
E	5,900	325	2,959	1.8	11.1	10.4 [2]	11.4	1.0
F	8,000	500	4,141	1.3	11.1	10.8 [2]	11.8	1.0
G	9,460	281	2,610	2.0	13.6	13.6	14.3	1.0
H	10,700	351	3,177	1.6	13.9	13.9	14.5	1.0
I	12,860	210	2,129	2.5	12.7	12.7	13.7	1.0
J	13,500	170	884	3.2	12.7	12.7	13.7	1.0
K	17,730	100	506	5.5	19.7	19.7	20.0	0.3
L	19,813	69	520	5.0	24.1	24.1	24.9	0.8
M	22,913	513	2,588	1.0	27.5	27.5	28.5	1.0
N	27,873	652	3,993	0.7	29.5	29.5	30.5	1.0
O	31,566	209	853	0.6	32.0	32.0	33.0	1.0

1 FEET ABOVE MOUTH

2 ELEVATIONS WITHOUT CONSIDERING BACKWATER EFFECT FROM MANATEE RIVER

TABLE 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

MANATEE COUNTY, FL

AND INCORPORATED AREAS

FLOODWAY DATA

MILL CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
MYAKKA RIVER								
AC	65,920	656	402	1.6	41.1	41.1	42.1	1.0
AD	66,740	676	6,282	1.6	41.4	41.4	42.3	0.9
AE	72,190	1,388	11,305	0.9	43.5	43.5	44.4	0.9
AF	76,742	1,219	12,922	0.8	45.0	45.0	45.9	0.9
AG	80,142	2,666	25,642	0.4	45.3	45.3	46.2	0.9
AH	95,692	1,270	10,332	0.5	45.8	45.8	46.8	1.0
AI	101,116	574	4,031	1.3	13.6	13.6	14.3	0.8
AJ	103,616	506	3,018	1.7	13.9	13.9	14.5	0.8
AK	108,441	684	3,705	0.7	54.3	54.3	55.3	1.0
AL	109,546	235	937	2.6	55.3	55.3	56.2	0.9
AM	111,771	230	1,178	2.1	59.5	59.5	60.4	0.9
AN	114,601	153	900	2.7	65.5	65.5	66.2	0.7
AO	119,401	279	1,697	1.4	72.6	72,6	73.6	1.0
RATTLESNAKE SLOUGH								
A	3,060 [1]	238	1,196	0.9	10.0	10.0	11.0	1.0
B	5,072 [1]	152	454	3.9	11.5	11.5	12.0	0.5
C	7,597 [1]	316	1,190	2.8	13.3	13.3	13.6	0.3
D	9,177 [1]	394	1,454	0.4	13.6	13.6	14.1	0.5

[1] FEET ABOVE MOUTH

TABLE 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

MANATEE COUNTY, FL
AND INCORPORATED AREAS

FLOODWAY DATA

MYAKKA RIVER - RATTLESNAKE SLOUGH - RATTLESNAKE SLOUGH DIVERSION CHANNEL

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
RATTLESNAKE SLOUGH DIVERSION CHANNEL								
A	1,190 [2]	200	892	0.2	12.2	12.2	12.3	0.1
SOUTH FORK LITTLE MANATEE RIVER								
A	10,022	314	2,321	2.2	45.7	45.7	46.7	1.0
B	17,045	707	4,417	1.2	53.6	53.6	54.6	1.0
C	21,145	374	2,413	2.1	58.3	58.3	59.3	1.0
D	27,190	547	4,295	1.1	63.5	63.5	64.5	1.0
E	32,755	365	2,709	1.8	13.6	13.6	14.3	0.9
F	33,030	246	1,815	2.7	13.9	13.9	14.5	1.0
G	37,030	458	4,350	1.1	74.5	74.5	75.5	1.0
H	42,180	505	3,776	1.0	76.8	76.8	77.8	1.0
I	46,955	176	1,299	3.0	81.1	81.1	82.1	1.0
J	51,690	314	3,139	0.8	84.2	84.2	85.2	1.0
K	55,782	245	2,089	1.2	87.4	87.4	88.3	0.9
L	58,070	384	1,935	1.2	88.3	88.3	89.2	0.9
M	58,320	424	2,722	0.9	88.5	88.5	89.5	1.0
N	62,755	148	782	2.2	93.9	93.9	94.9	1.0

1 FEET ABOVE MOUTH

2 FEET FROM CONFLUENCE WITH RATTLESNAKE SLOUGH

TABLE 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

MANATEE COUNTY, FL

AND INCORPORATED AREAS

FLOODWAY DATA

SOUTH FORK LITTLE MANATEE RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
WILLIAMS CREEK								
A	2,847	41	238	4.0	7.0	6.7 [2]	7.3	0.6
B	5,577	32	174	5.1	13.4	13.4	13.9	0.5
C	6,577	35	168	5.3	16.6	16.6	17.6	1.0
D	7,839	32	183	4.9	19.9	19.9	20.8	0.9
E	10,310	135	599	1.4	25.0	25.0	26.0	1.0
WOLF SLOUGH								
A	4,271	63	599	1.9	13.9	13.9	14.5	0.5
B	8,688	150	428	2.6	29.6	29.6	30.6	1.0
C	11,953	104	192	5.0	33.6	33.6	33.6	0.0
D	12,273	58	237	1.1	34.1	34.1	34.9	0.8
E	13,073	30	105	2.5	34.2	34.2	35.2	1.0

1 FEET ABOVE MOUTH

2 ELEVATIONS WITHOUT CONSIDERING BACKWATER EFFECT FROM BRADEN RIVER

TABLE 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

MANATEE COUNTY, FL
AND INCORPORATED AREAS

FLOODWAY DATA

WILLIAMS CREEK - WOLF SLOUGH

5.0 INSURANCE APPLICATION

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

Zone A

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

Zone AE

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

Zone AH

Zone AH is the flood insurance rate 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 base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance rate 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 depths derived from the detailed hydraulic analyses are show within this zone.

Zone A99

Zone A99 is the flood insurance rate 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 base flood elevations or depths are shown within this zone.

Zone V

Zone V is the flood insurance 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 base flood elevations are shown within this zone.

Zone VE

Zone VE is the flood insurance rate zone that corresponds to the 1-percent-annual-chance floodplains that have additional hazards associated with storm waves. Whole-foot base flood

elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to the 0.2-percent-annual-chance floodplain, areas within the 0.2-percent-annual-chance floodplain, and to 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 base flood elevations or depths are shown within this zone.

Zone D

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

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 1-percent-annual-chance floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations 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-percent-annual-chance and 0.2-percent-annual-chance floodplains. Floodways and the locations of selected cross sections used in the hydraulic analyses and floodway computations are shown where applicable.

The countywide FIRM presents flooding information for the entire geographic area of Manatee County. Previously, FIRMs were prepared for each incorporated community and the unincorporated areas of the County identified as flood-prone (References 1 through 7). This countywide FIRM also includes flood-hazard information that was presented separately on Flood Boundary and Floodway Maps (FBFMs), where applicable. Historical data relating to the maps prepared for each community are presented in Table 11, "Community Map History."

COMMUNTY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Anna Maria, City of	July 1, 1970	None	June 11, 1971	July 1, 1974 May 23, 1975 February 20, 1976 February 1, 1984
Bradenton, City of	March 1, 1974	October 24, 1975	June 1, 1981	November 16, 1983
Bradenton Beach, City of	July 1, 1970	None	June 11, 1971	July 1, 1974 February 20, 1976 February 15, 1984 May 18, 1992
Holmes Beach, City of	June 11, 1971	None	June 11, 1971	July 1, 1974 October 3, 1975 February 20, 1976 February 1, 1984
Longboat Key, Town of	April 20, 1970	None	April 20, 1970	July 1, 1974 February 20, 1976 August 15, 1983 October 1, 1983 May 18, 1992
Manatee County (Unincorporated Areas)	June 26, 1971	None	June 26, 1971	July 1, 1974 February 20, 1976 March 15, 1984 July 15, 1992 February 5, 1994
Palmetto, City of	July 19, 1974	February 20, 1976	September 2, 1981	November 16, 1983

TABLE 12

FEDERAL EMERGENCY MANAGEMENT AGENCY

MANATEE COUNTY, FL

AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

7.0 OTHER STUDIES

Information pertaining to revised and unrevised flood hazards for each jurisdiction within Manatee County, Florida, has been compiled into this FIS. Therefore, this FIS supersedes all previously printed FIS reports, and FIRMs for all of the incorporated and unincorporated jurisdictions within Manatee County, Florida (References 1, 2, 3, 4, 5, 6, and 7).

Flood Insurance Studies have previously been published for the adjacent jurisdictions of DeSoto, Hardee, Hillsborough, Polk, and Sarasota County, Florida; (References 75, 76, 77 and 78).

A previous Flood Insurance Study for Manatee, Sarasota, and Charlotte Counties, Florida, was prepared in 1973 (Reference 79). Other flood related studies that concentrate on portions of the study area include a hydrobiological report that covers Little Manatee River (Reference 65); a Water Resources Investigation by the U.S. Geological Survey on the Myakka River basin (Reference 80); a U.S. Army Corps of Engineers, Jacksonville District, survey report (Reference 81); and a Special Flood Hazard Information report (Reference #) on the Manatee and Braden Rivers and their 100-year hurricane surge elevations for Tampa Bay prepared in 1974 (Reference 82); and a report from the University of South Florida prepared in 1972 (Reference 23) which presents the results of computer simulations of a number of hurricanes which have affected the Tampa Bay region in the past.

The stillwater flood levels presented in this study are lower than those of the National Oceanic and Atmospheric Administration on the open coast (Reference 38), especially at the entrance to Tampa Bay. This difference is accounted for by differences in hydrodynamic modeling techniques. Whereas the National Oceanic and Atmospheric Administration assumed the existence of a straight shoreline not explicitly including the geometry of Tampa Bay, this study adopted a detailed two-dimensional model in which the bay was treated as an integral part. Within Sarasota Bay, between Cortez and Sarasota, the results of the stillwater analysis of this study are closer to the National Oceanic and Atmospheric Administration open coast stillwater values (Reference 79).

The U.S. Army Corps of Engineers 1974 study (Reference 82) predicted a 100-year stillwater flood level that is higher than the stillwater results of this study. This difference is the result of differences in the hydrodynamic model and in the statistical analysis.

The report from the University of South Florida (Reference 23) did not establish water levels for specified return intervals but concentrated on four historical storms. The results for the 100-year surge level presented herein are in close agreement with the minimum building levels suggested in the University of South Florida study in the area of Longboat Key and regions just north of Sarasota.

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

8.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting Federal Insurance and Mitigation Division, FEMA Region IV, Koger Center – Rutgers Building, 3003 Chamblee Tucker Road, Atlanta, GA 30341.

9.0 BIBLIOGRAPHY AND REFERENCES

1. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Study, City of Anna Maria, Manatee County, Florida, Washington, D.C., August 1, 1983.

2. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Study, City of Bradenton, Manatee County, Florida, Washington, D.C., May 16, 1983.

3. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Study, City of Bradenton Beach, Manatee County, Florida, Washington, D.C., August 15, 1983.

4. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Study, City of Holmes Beach, Manatee County, Florida, Washington, D.C., August 1, 1983.

5. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Study, Town of Longboat Key, Manatee and Sarasota Counties, Florida, Washington, D.C., February 15, 1983.

6. Federal Emergency Management Agency, Flood Insurance Study, Manatee County, Florida Unincorporated Areas, Washington, D.C., July 15, 1992.

7. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Study, City of Palmetto, Manatee County, Florida, Washington, D.C., May 16, 1983.

8. Tetra Tech, Inc., Cities of Anna Maria, Brandenton Beach, Holmes Beach, and Palmetto Flood Insurance Study for Federal Emergency Management Agency, under Contract No. H-4510, April 1979.

9. Tetra Tech, Inc., City of Bradenton and Manatee County Unincorporated Areas Flood Insurance Study for Federal Emergency Management Agency, under Contract No. H-4510, March 1979.

10. Tetra Tech, Inc., Longboat Key Flood Insurance Study for Federal Emergency Management Agency, under Contract No. H-4059, July 1978.

11. Engineering Methods & Application, Inc., Manatee County Flood Study for the Federal Emergency Management Agency, Contract No. EMW-89-C-2823, May 4, 1992.

12. U.S. Army Corp of Engineers, Jacksonville District, Cedar Hammock, Manatee County, Florida, Reconnaissance Report, March 1990.

13. BakerAECOM, Flood Insurance Study for Manatee County Florida, Alexandria Virginia, September 2011.

14. Jones Edmunds & Associates, Inc., Watershed Evaluation Report Buffalo Canal / Frog Creek Watershed Management Plan, Gainesville, Florida, October 2007.

15. Department of the Army, Army Corps of Engineers, Jacksonville, Cedar Hammock (Wares Creek) Manatee County, Florida Section 205 Reconnaissance Report, March 1990.

16. Southwest Florida Water Management District and PhotoScience Inc., 2009 Digital Orthophotos - Manatee County, Brooksville Florida, 2009.

17. Manatee County Department of Information Technology, Office of Geographic Informations Systems, Vector GIS Base Layers, compiled between 2003 and 2009.

18. Southwest Florida Water Management District, 2007 Southwest Florida Water Management District (SWFWMD) LiDAR: Hillsborough/Little Manatee Districts, Charleston, SC, 2008.

19. U.S. Department of Commerce, Bureau of the Census, Final Report PC(l) - All, 1970 Census of Population, Number of Inhabitants, Florida, 1971.

20. US Census Bureau, 2010 Census, 2010 Census Demographic Profile, Online Linkage: http://www.census.gov/popfinder/, Washington DC, October 01, 2011.

21. University of Florida, Coastal Engineering Laboratory, Storm Tides in Florida as Related to Coastal Topography, Engineering Progress at the University of Florida, vol. XVI, no. 1, Bulletin Series 109, P. Bruun, T. Chiu, F. Gerritsen, and W.H. Morgan, January 1962.

22. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service, Technical Memorandum NWS Hydro-20, Storm Tide Frequency Analysis for the Gulf Coast of Florida From Cape San Blas to St. Petersburg Beach, F.P. Ho and R.J. Tracey, April 1975.

23. University of South Florida, Hurricanes, Melvin W. Anderson and Bernard E. Ross, December 1972.

24. U.S. Department of the Army, Corps of Engineers, Jacksonville District, Survey Report, Analysis of Hurricane Problems in Coastal Areas of Florida, September 29, 1961.

25. U.S. Department of the Army, Corps of Engineers, Jacksonville District, Appraisal Report, Hurricanes Affecting the Florida Coast, July 1956.

26. U.S. Department of Commerce, Environmental Science Services Administration, Technical Memorandum WBTM, Hydro 11, Joint Probability Method of Tide Frequency Analysis, V.A. Myers, April 1970.

27. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Climatic Center, Tropical Cyclone Deck 993, 1975.

28. U.S. Department of Commerce, Weather Bureau, Technical Paper 55, Tropical Cyclones of the North Atlantic Ocean 1871-1963, G.W. Cry, 1965.

29. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service, Technical Report NWS 15, Some Climatological Characteristics of Hurricanes and Tropical Storms, Gulf and East Coasts of the U.S., F.P. Ho, R.W. Schwerdt, and H.V. Goodyear, May 1975.

30. U.S. Department of Commerce, National Hurricane Research Project, Report No. 5, Survey of Meteorological Factors Pertinent to Reduction of Loss of Life and Property in Hurricane Situations, March 1957.

31. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service, Monthly Weather Review, Abstracts of Previous Year Hurricane Season 1964 to 1977.

32. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service, Tape of Digitized Storm Information From 1886 Through 1977, Asheville, North Carolina, December 1978.

33. Tetra Tech, Inc., Coastal Flooding Handbook, Parts I and II, May 1977.

34. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Survey, Nautical Charts, 1:960,000: Chart 11408 (September 1977); Chart 11409 (February 1977); Chart 11401; Chart 11412 (April 1977); Chart 11413; Chart 11414; Chart 11424 (February 1976); Chart 11425; Chart 11426 (July 1977).

35. U.S. Department of the Interior, Geological Survey, 7.5-Minute Series Topographic Maps, Scale 1:24,000, Contour Interval 5 feet: Cockroach Bay, Florida (1956), Photorevised (1969 and 1972); Ruskin, Florida (1956), Photorevised (1969); Wimauma, Florida (1956), Photorevised (1969); Fort Lonesome, Florida (1952), Photorevised (1972); Duette NE, Florida (1956), Photorevised (1972); Egmont Key, Florida (1964), Photorevised (1969); Anna Maria, Florida (1964), Photorevised (1969); Palmetto, Florida (1964), Photorevised (1969); Parrish, Florida (1973); Rye, Florida (1972); Keentown, Florida (1956), Photorevised (1972); Duette, Florida (1956), Photorevised (1972); Bradenton Beach, Florida (1964), Photorevised (1969); Bradenton, Florida (1964), Photorevised (1969); Lorraine, Florida (1973); Verna, Florida (1973); Myakka City, Florida (1956), Photorevised (1972); Myakka Head, Florida (1956); Sarasota, Florida (1973); Bee Ridge, Florida (1973); Old Myakka, Florida (1973); Myakka City NW, Florida (1956); Edgeville, Florida (1956); Murdock NW, Florida (1956), Photorevised (1972); Murdock NE, Florida (1956).

36. National Academy of Sciences, Methodology for Calculating Wave Action Effects Associated with Storm Surges, 1977.

37. Federal Emergency Management Agency, Users Manual for Wave Height Analysis, Revised April 1981.

38. Real Estate Data, Inc., Real Estate Atlas of Manatee County, Florida, Scales 1:7,200, 1:8,400, 1:10,800, 1:21,600, 1976 and 1979.

39. M.D. Teubner and B.J. Noye, Numerical Simulation of Fluid Motion, Edited by John Noye, North Holland Press, 1978.

40. U.S. Water Resources Council, Bulletin 17, Guidelines for Determining Flood Flow Frequency, March 1976 (Revised June 1977).

41. Reynolds, Smith and Hill, Inc., Floodplain Study for the Lower Manatee River, Manatee County, Florida, March 1982.

42. U.S. Department of the Interior, Geological Survey, Water Resources Investigations 23-74, An Approach to Estimating Flood Frequency for Urban Areas in Oklahoma, V.B. Sauer, July 1974.

43. U.S. Department of the Interior, Geological Survey, Flood Profiles for Cypress Creek, West Central Florida, W.R. Murphy, 1978.

44. Southwest Florida Water Management District, Report on the Hydrobiologic Assessment of the A1afia and Little Manatee Rivers, 1974.

45. U.S. Department of the Army, U.S. Army Corps of Engineers, Jacksonville District, Phase I, Inspection Report, National Dam Safety Program, Lake Manatee Dam, Manatee County, Florida, Inventory FL 280, February 1978.

46. U.S. Department of the Interior, Geological Survey, Magnitude and Frequency of Flooding on the Myakka River, Southwest Florida, Tallahassee, Florida, 1978.

47. U.S. Geological Survey, 7.5-Minute Series Topographic Maps, Scale 1:24000, Contour Interval 5 Feet: Bradenton, Florida, 1964, Photorevised 1969; Lorraine, Florida, 1973; Palmetto, Florida, 1964, Photorevised 1969; Parrish, Florida, 1973; Rye, Florida, 1972.

48. Southwest Florida Water Management District, Aerial Photography, scale 1”24000, Contour Interval 1 Foot: Braden River Basin, July 1978, South Fork Little Manatee River, December 1987; Upper Braden River Basin, November 1985; Parrish, September 1986; Lake Manatee, April 1982; Palmetto/Lower Manatee River Basin, April 1980.

49. Florida Department of Transportation, Stereo Aerial Photography, Scale 1:24000, Contour Interval 1 Foot: April 1987.

50. U.S. Geological Survey, Techniques for Estimating Magnitude and Frequency of Floods on Natural-Flow Streams in Florida, Water-Resource Investigations 82-4012, 1982.

51. _____, Flood Characteristics of Urban Watersheds in the United States, Water-Supply Paper 2207, 1984.

52. Southwest Florida Water Management District, Floodplain Information on the Braden River, Manasota Basin Board, Brooksville, Florida, September 1983.

53. U.S. Department of the Army, U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water Surface Profiles, Computer Program 723-X6-L202A, Davis, California, September 1988.

54. Streamline Technologies, Interconnected Channel and Pond Routing Model (ICPR), Version 3.10, Service Pack 4, Winter Springs, Florida, 2007.

55. Environmental Systems Research Institute (ESRI), ArcGIS, version 9.3, June 26, 2008.

56. Environmental Systems Research Institute (ESRI), Arc Hydro, 2002.

57. Southwest Florida Water Management District, Watershed Management Plan Buffalo Canal / Frog Creek, Project L007, October 2010.

58. Southwest Florida Water Management District, Southwest Florida Water Management District's Watershed Management Program Guidelines and Specifications, 2002.

59. Golding, B.C., DABRO-Drainage Basin Runoff Model-A Computer Program. Hieldebran Software, Orlando, Florida, 1986.

60. U.S. Geological Survey, Scientific Investigations Report (SIR) 2005-5080 Estimating the Magnitude and Frequency of Floods for Streams in West-Central Florida, 2001, published 2005.

61. Northwest Florida Water Management District, Use of Wetland Designations as Supplement to Existing Zone A Floodplain Boundaries, Online Linkage: http://nwfwmdfloodmaps.com/pdf/3-Use_of_wetland_designations.pdf, undated.

62. U.S. Department of the Army, Corps of Engineers, Hydrologic Engineering Center, Applications of the HEC-2 Bridge Routines, Davis, California, June 1974.

63. U.S. Department of the Army, Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water-Surface Profiles, Users Manual, Davis, California, November 1976.

64. U.S. Department of the Interior, Geological Survey, Computer Program E-431, Computer Applications for Step-Backwater and Floodway Analyses, 1976.

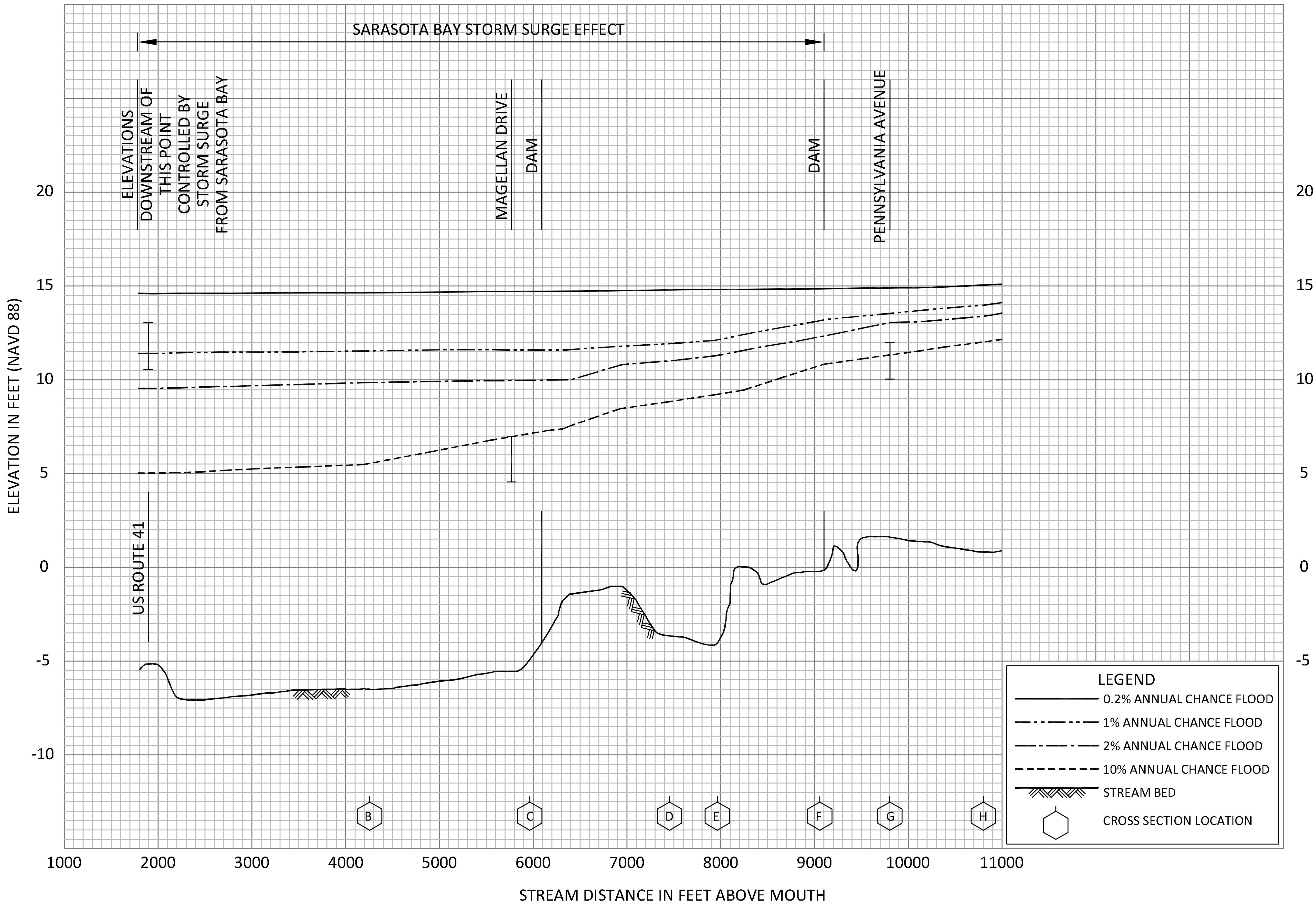
65. Southwest Florida Water Management District, Report on the Hydro-biologic Assessment of the Alafia and Little Manatee Rivers, 1974.

66. Southwest Florida Water Management District, Floodplain Information on the Braden River, Manasota Basin Board, Brooksville, Florida, September 1983.

67. U.S. Army Corp of Engineers, Hydrologic Engineering Center, HEC-2 Water Surface Profiles, Computer Program 723-X6-L202A, Davis, California, September 1988.

68. U.S. Army Corp of Engineers, Hydrologic Engineering Center, HEC-RAS River Analysis System Software, Version 4.1, Davis California, January 2010.

69. Southwest Florida Water Management District, Aerial Photography with Contours, Scale 1:2,400, Contour Interval 1 foot: Pa1metto Lower Manatee-Manasota Basin, Manatee County, Florida, May 1980.



FLOOD PROFILES

BOWLEES CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MANATEE COUNTY, FL AND INCORPORATED AREAS

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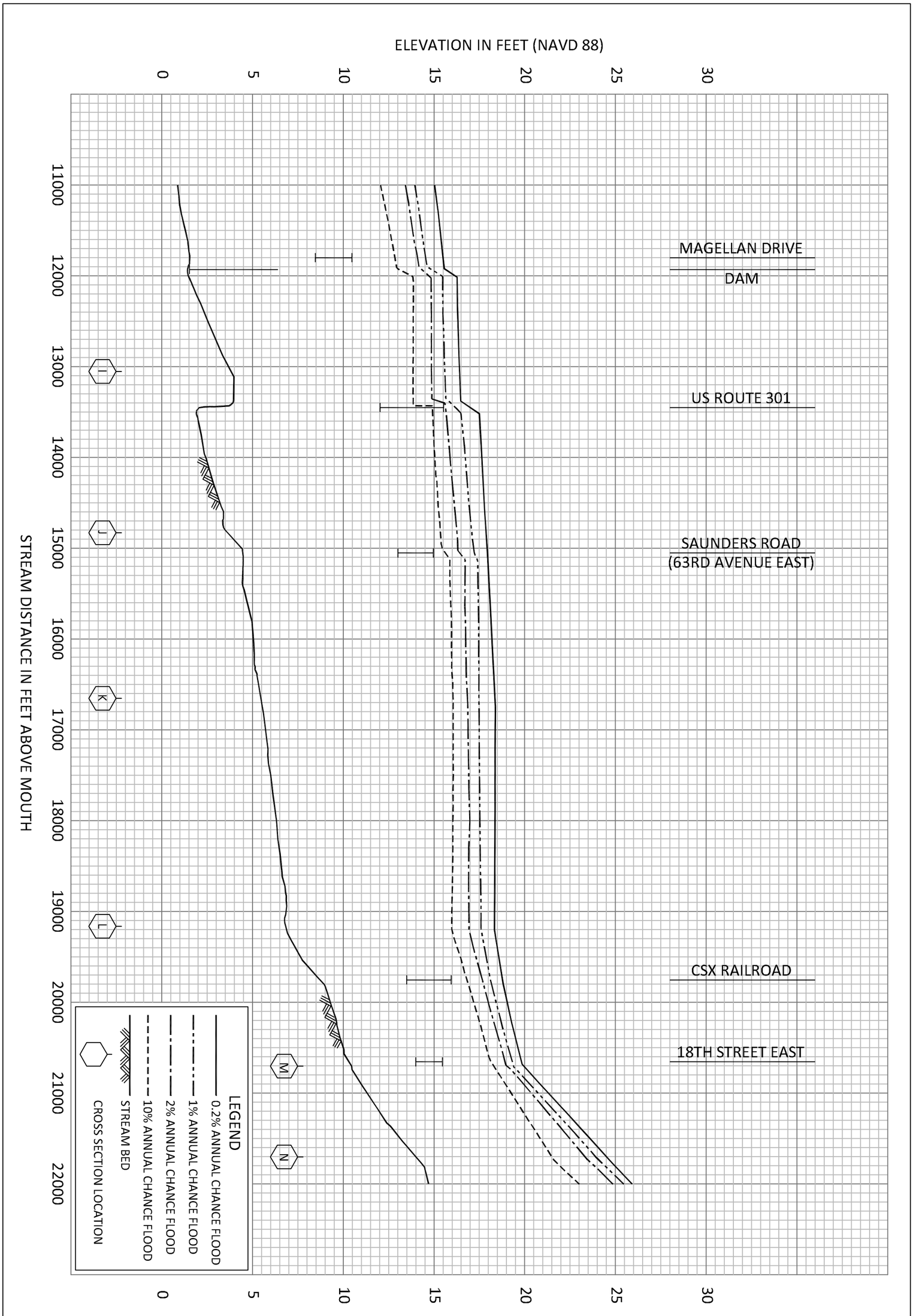

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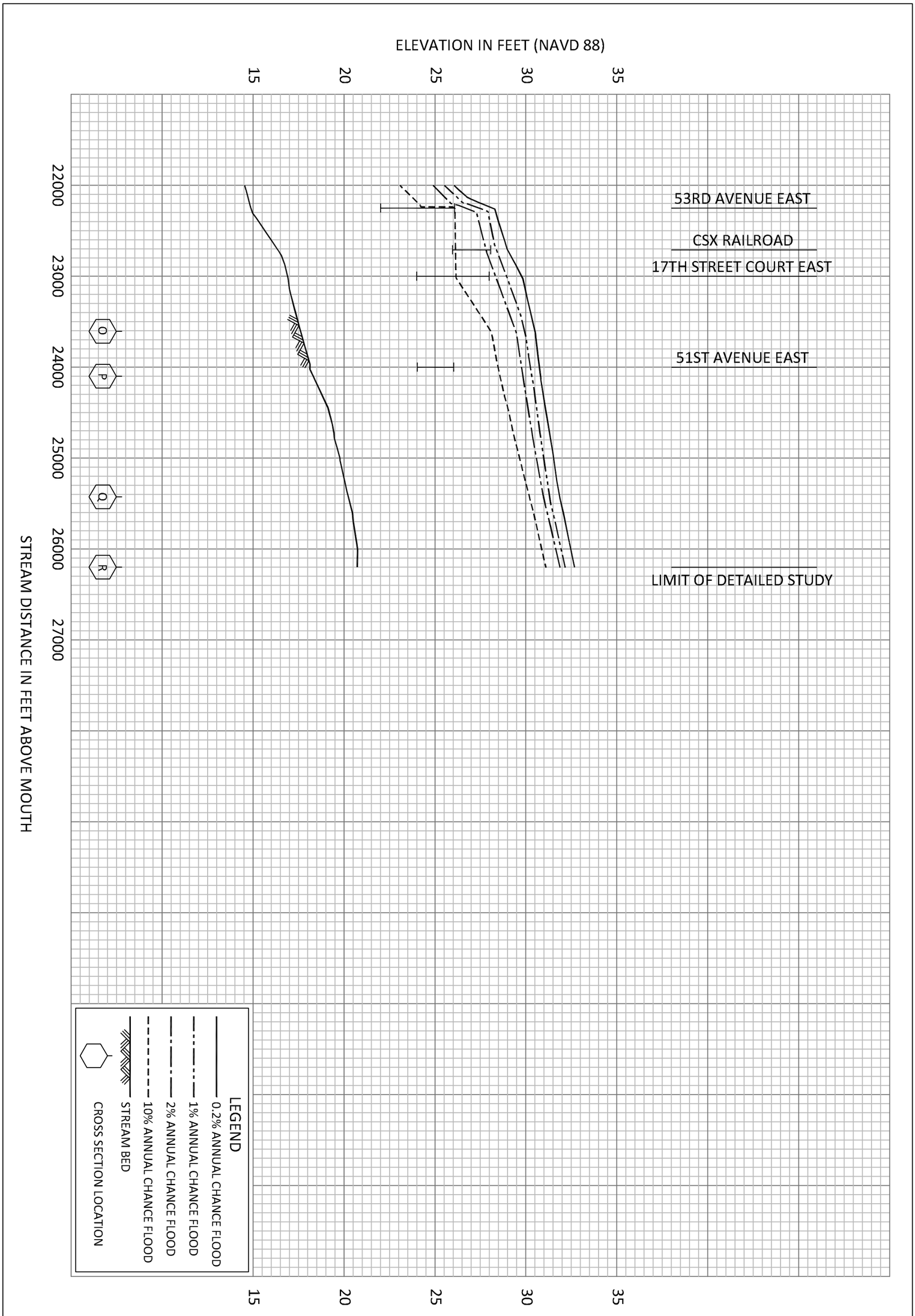
FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS

FLOOD PROFILES

BOWLEES CREEK



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FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS

FLOOD PROFILES

BOWLEES CREEK

TAMPA BAY STORM SURGE EFFECT

CONFLUENCE OF WILLIAMS CREEK

CONFLUENCE OF GAP CREEK

STATE ROAD 70

CITY OF BRADENTON DAM

CONFLUENCE OF RATTLESNAKE SLOUGH

ELEVATION IN FEET (NAVD 88)

20 15 10 5 0 -5 -10 -15 -20

14000 16000 18000 20000 22000 24000 26000 28000 30000 32000 34000 36000 38000 40000

STREAM DISTANCE IN FEET ABOVE STATE ROAD 64

E F G H I J K L M N

LEGEND

0.2% ANNUAL CHANCE FLOOD

1% ANNUAL CHANCE FLOOD

2% ANNUAL CHANCE FLOOD

10% ANNUAL CHANCE FLOOD

STREAM BED

CROSS SECTION LOCATION

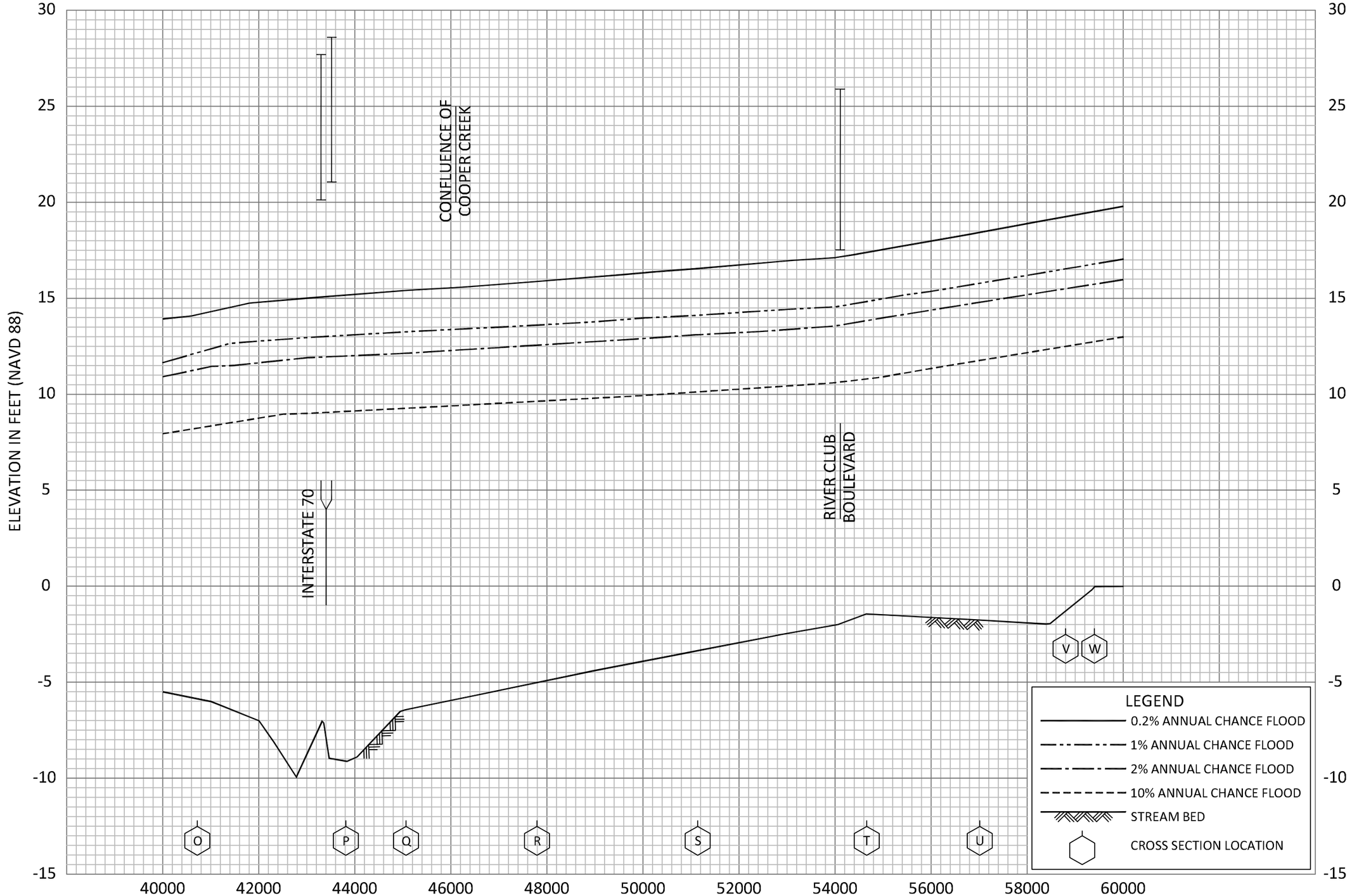
FLOOD PROFILES

BRADEN RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS

FLOOD PROFILES

BRADEN RIVER



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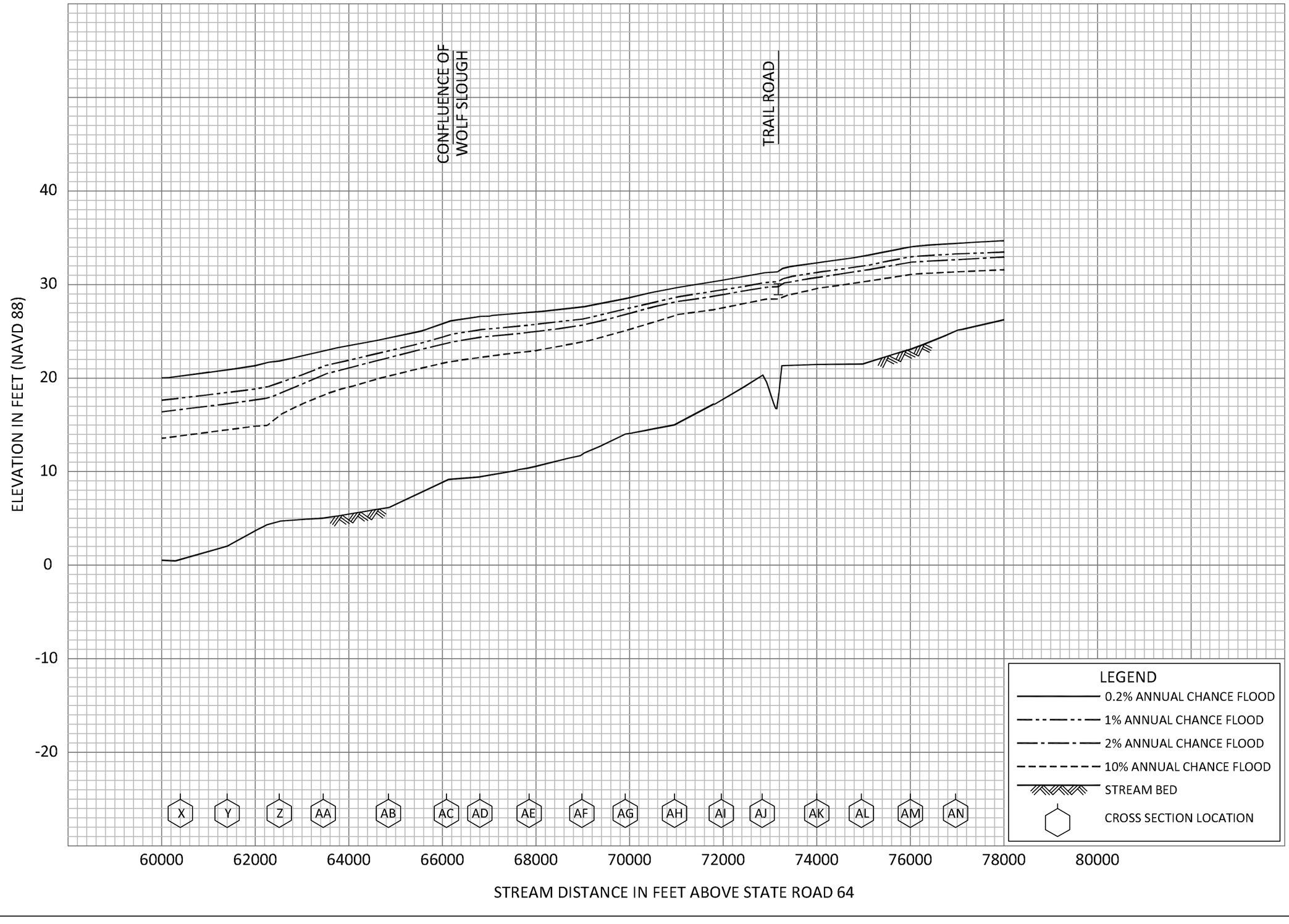
MANATEE COUNTY, FL
AND INCORPORATED AREAS

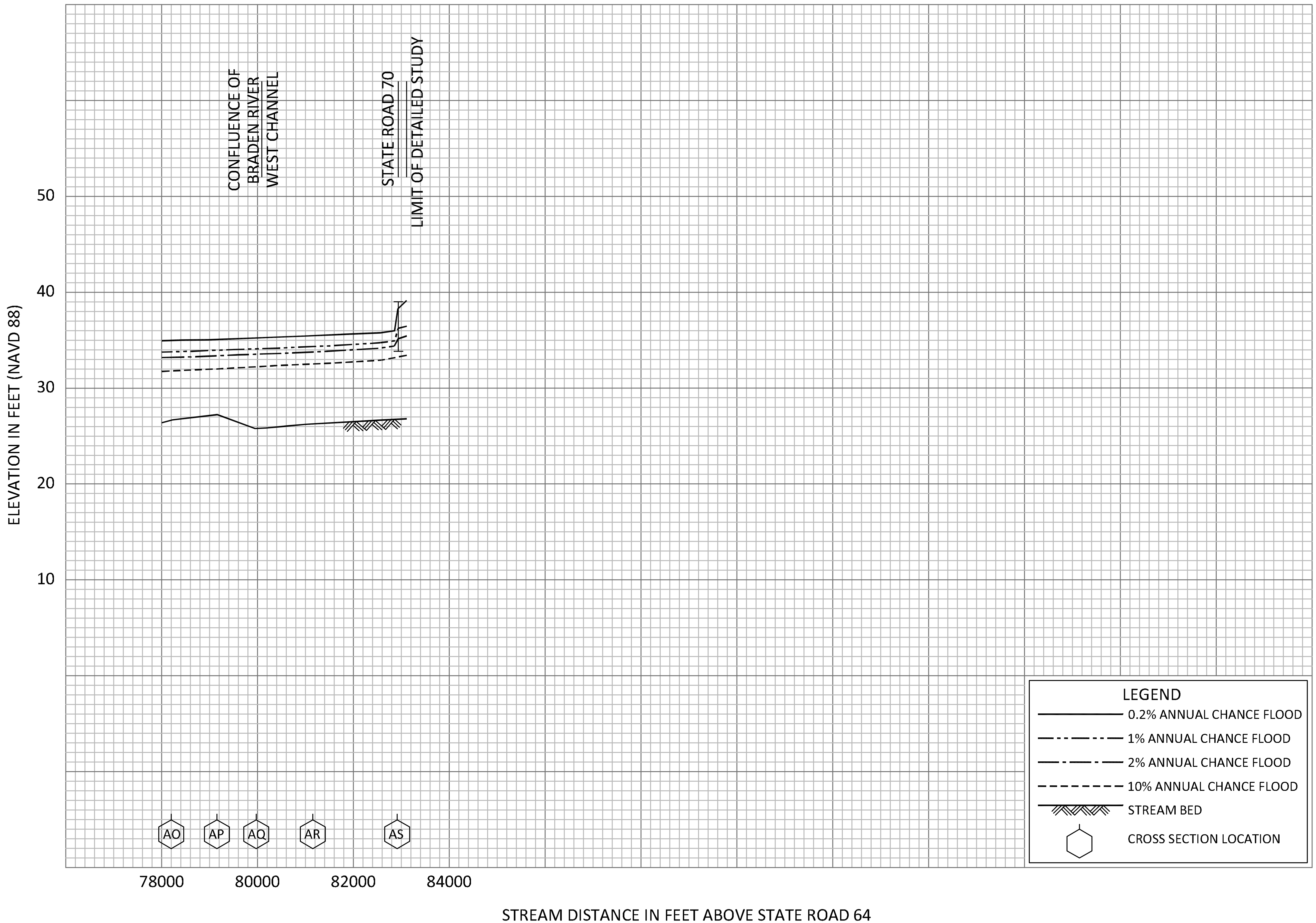


FLOOD PROFILES

BRADEN RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS

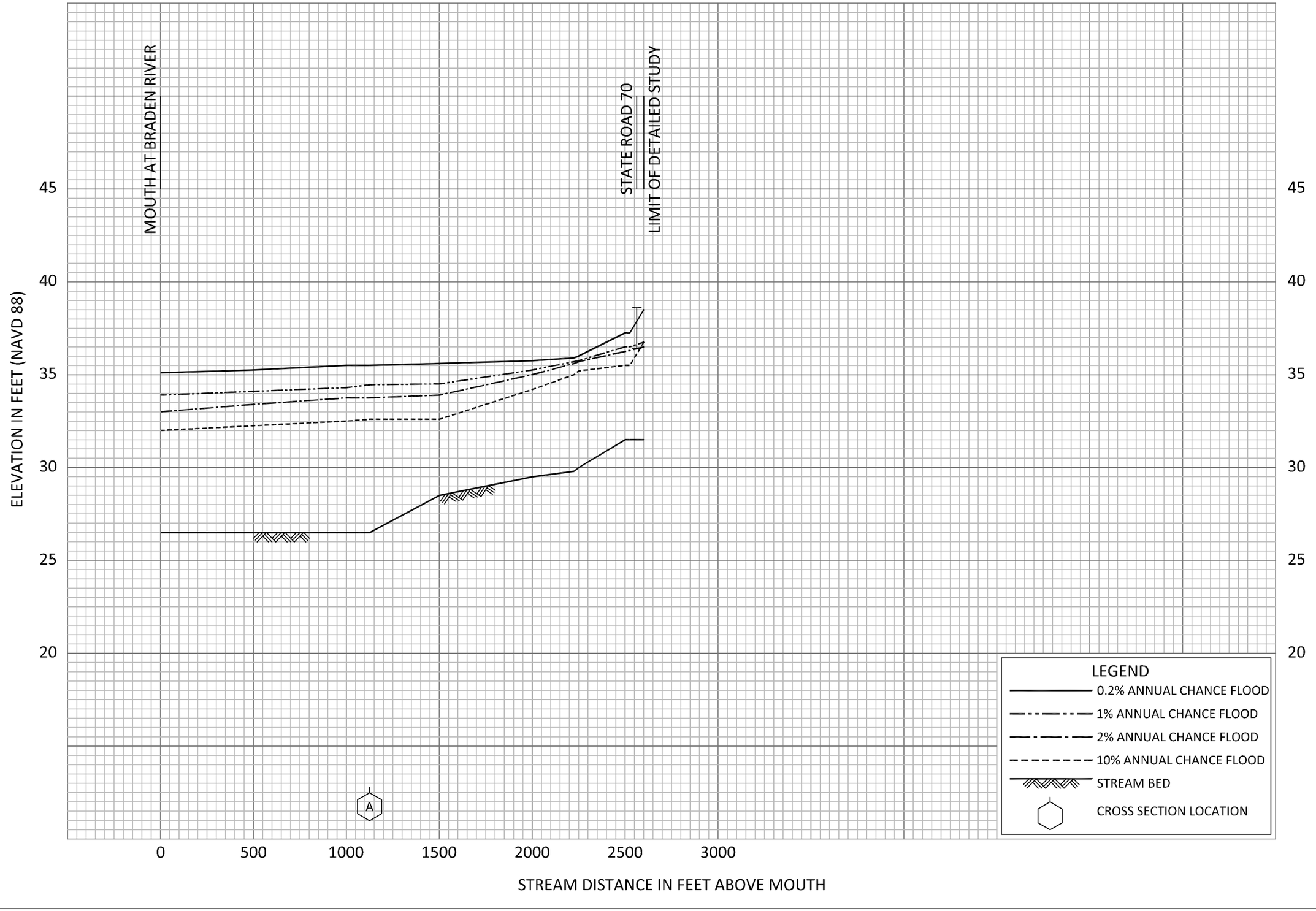
06P



FLOOD PROFILES

BRADEN RIVER

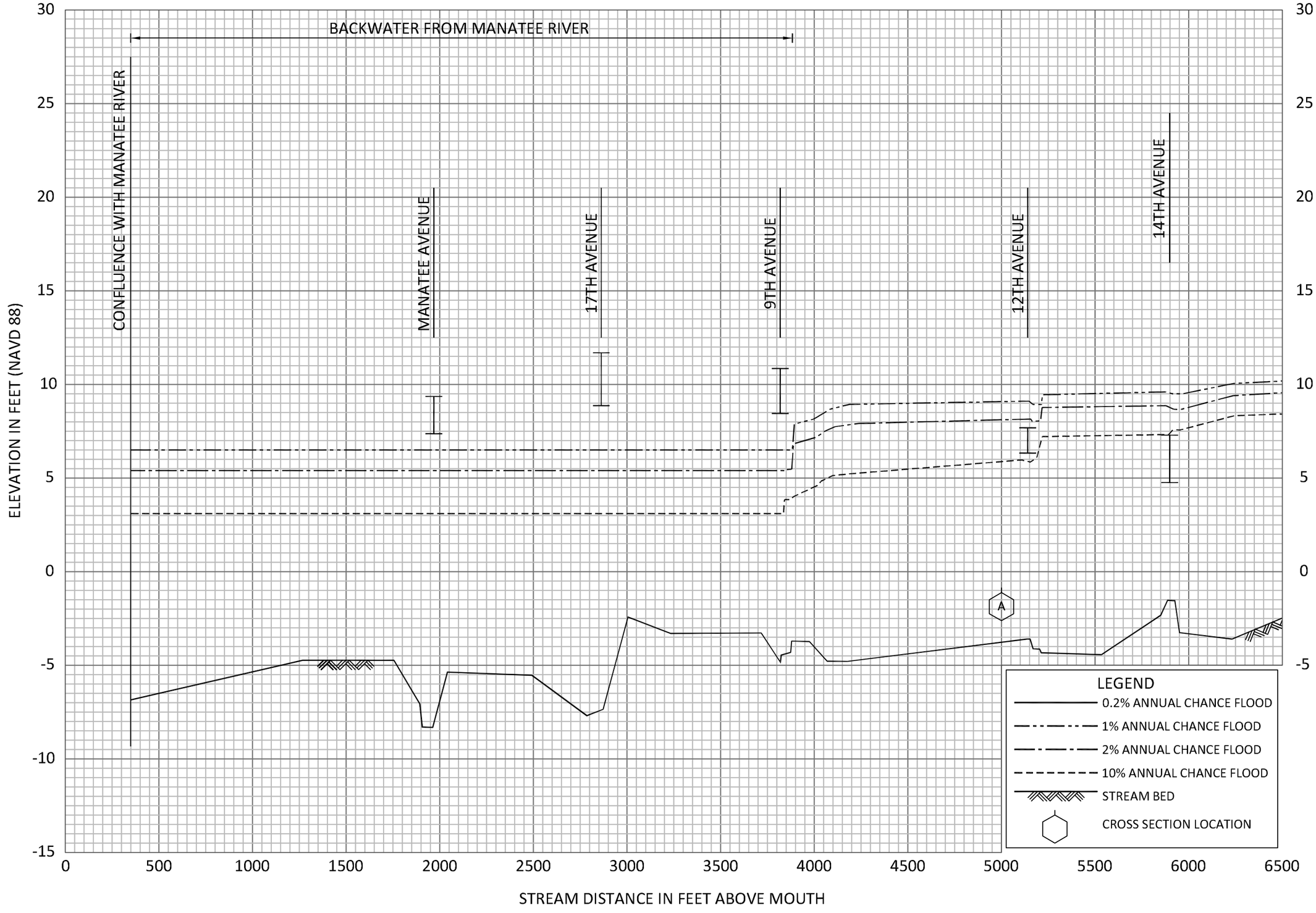
FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS



FLOOD PROFILES

BRADEN RIVER WEST CHANNEL

FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS

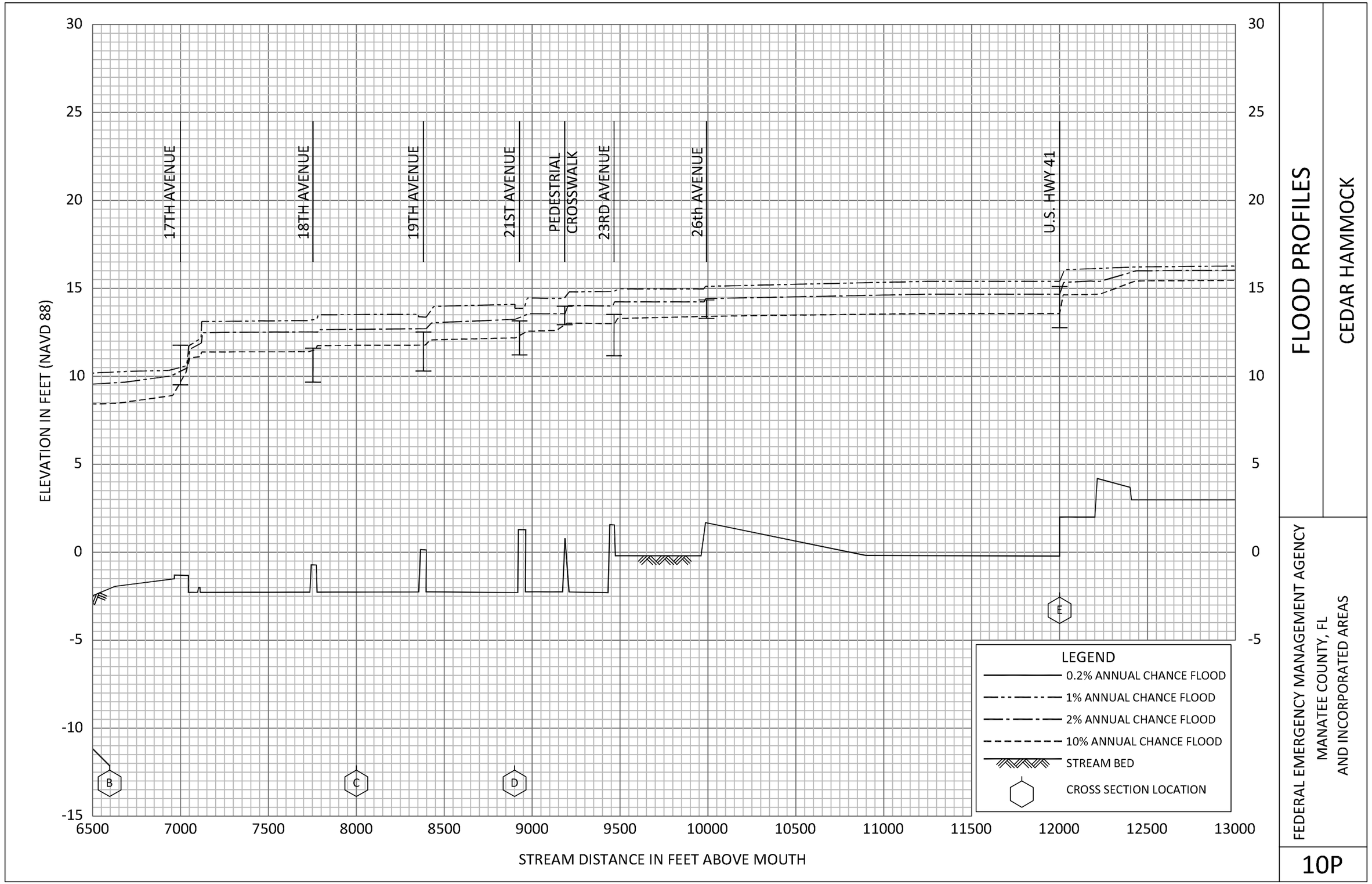


FLOOD PROFILES

CEDAR HAMMOCK

FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS

09P



FLOOD PROFILES

CEDAR HAMMOCK

FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS

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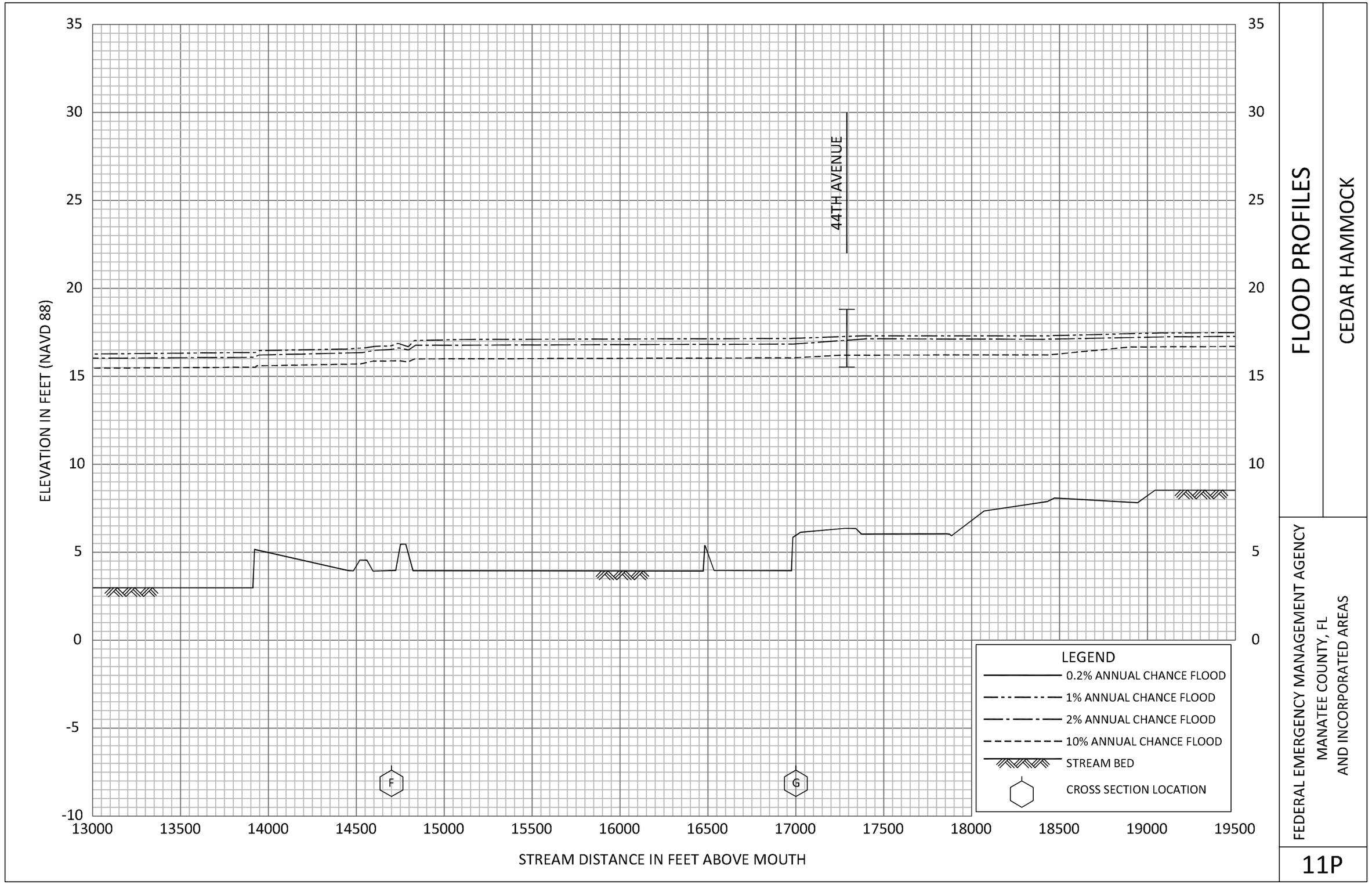
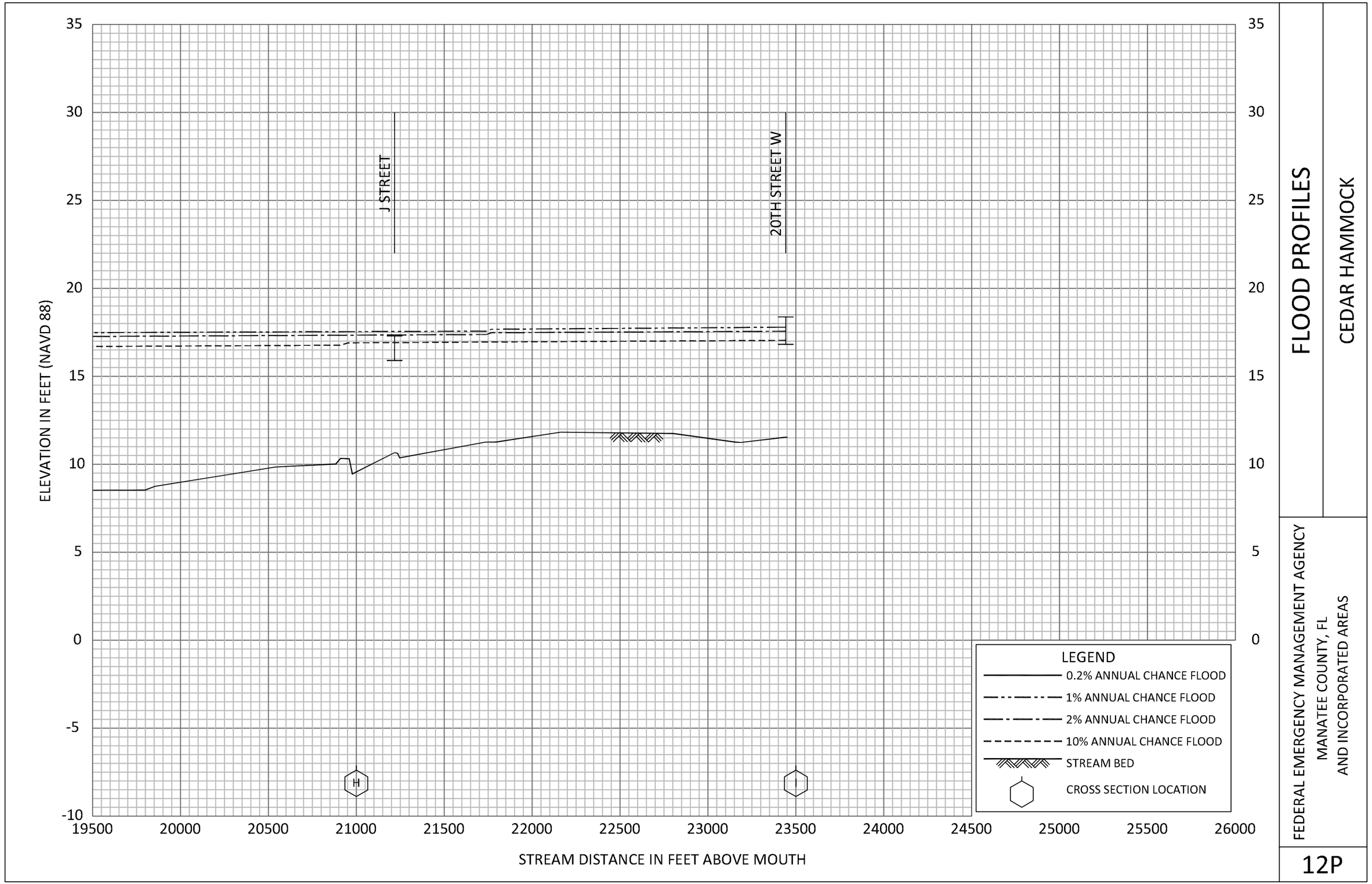


FLOOD PROFILES

CEDAR HAMMOCK

FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS



FLOOD PROFILES

CEDAR HAMMOCK

FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS

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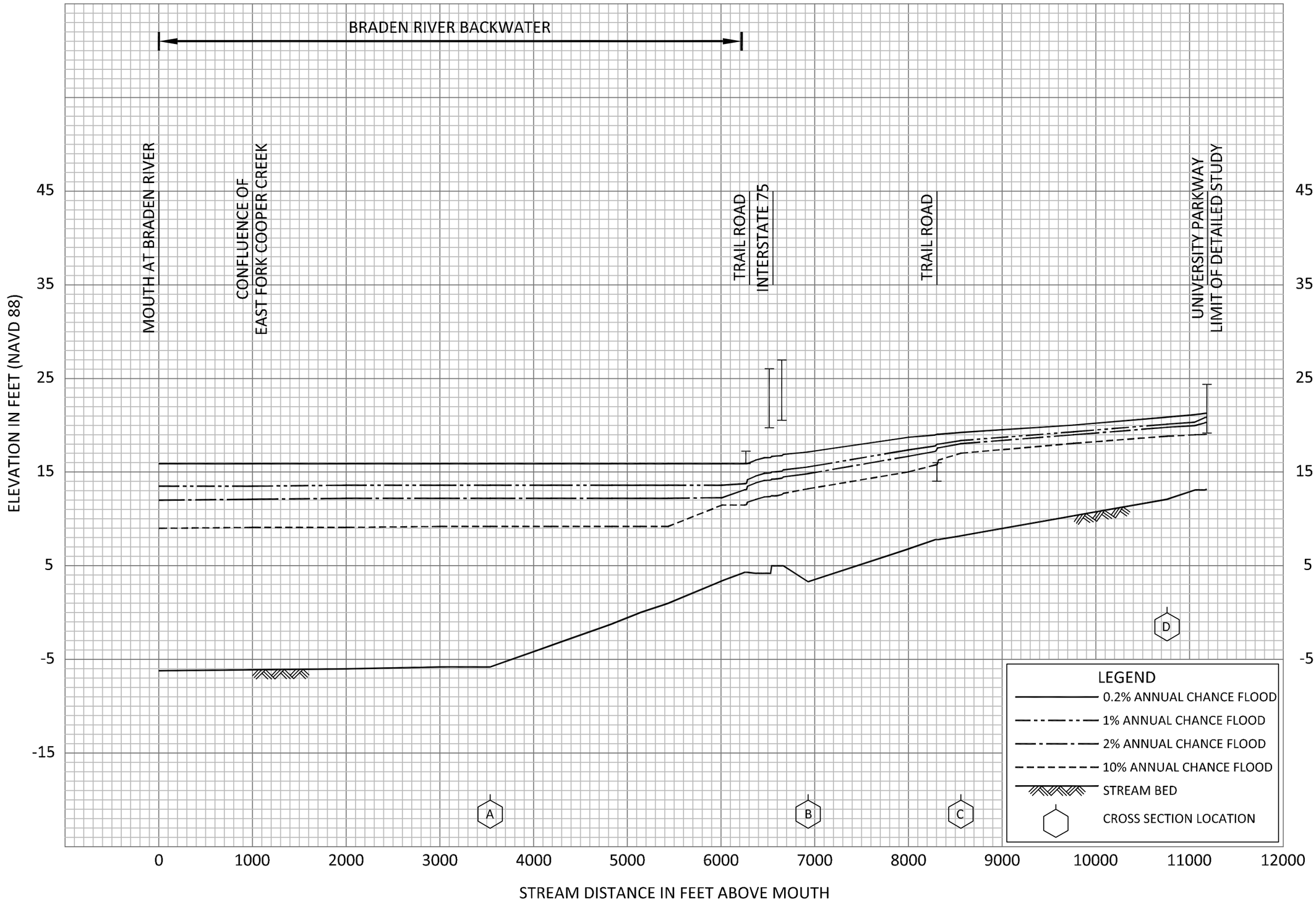
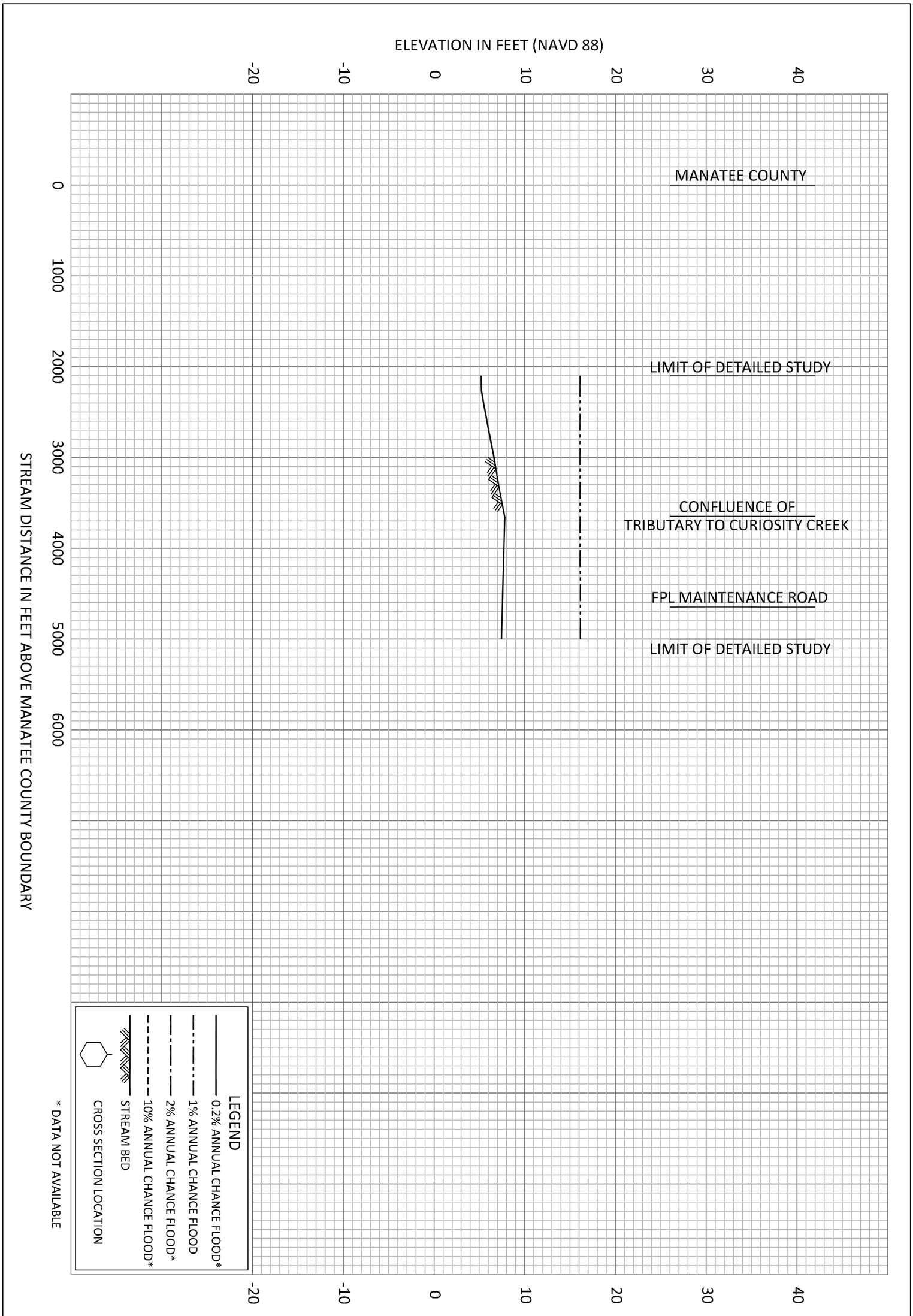


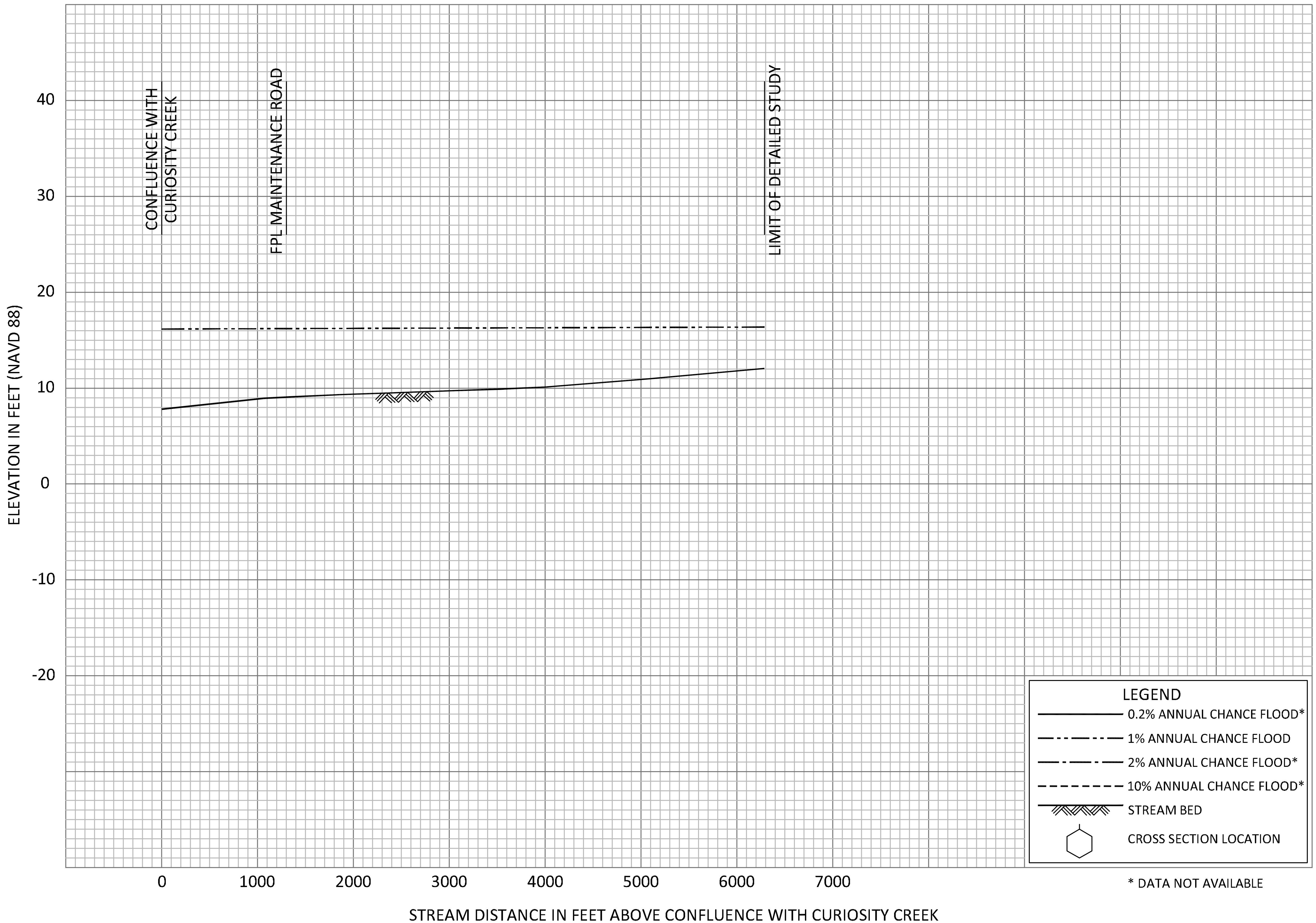
FLOOD PROFILES

COOPER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS



14P	FEDERAL EMERGENCY MANAGEMENT AGENCY MANATEE COUNTY, FL AND INCORPORATED AREAS	FLOOD PROFILES CURIOSITY CREEK

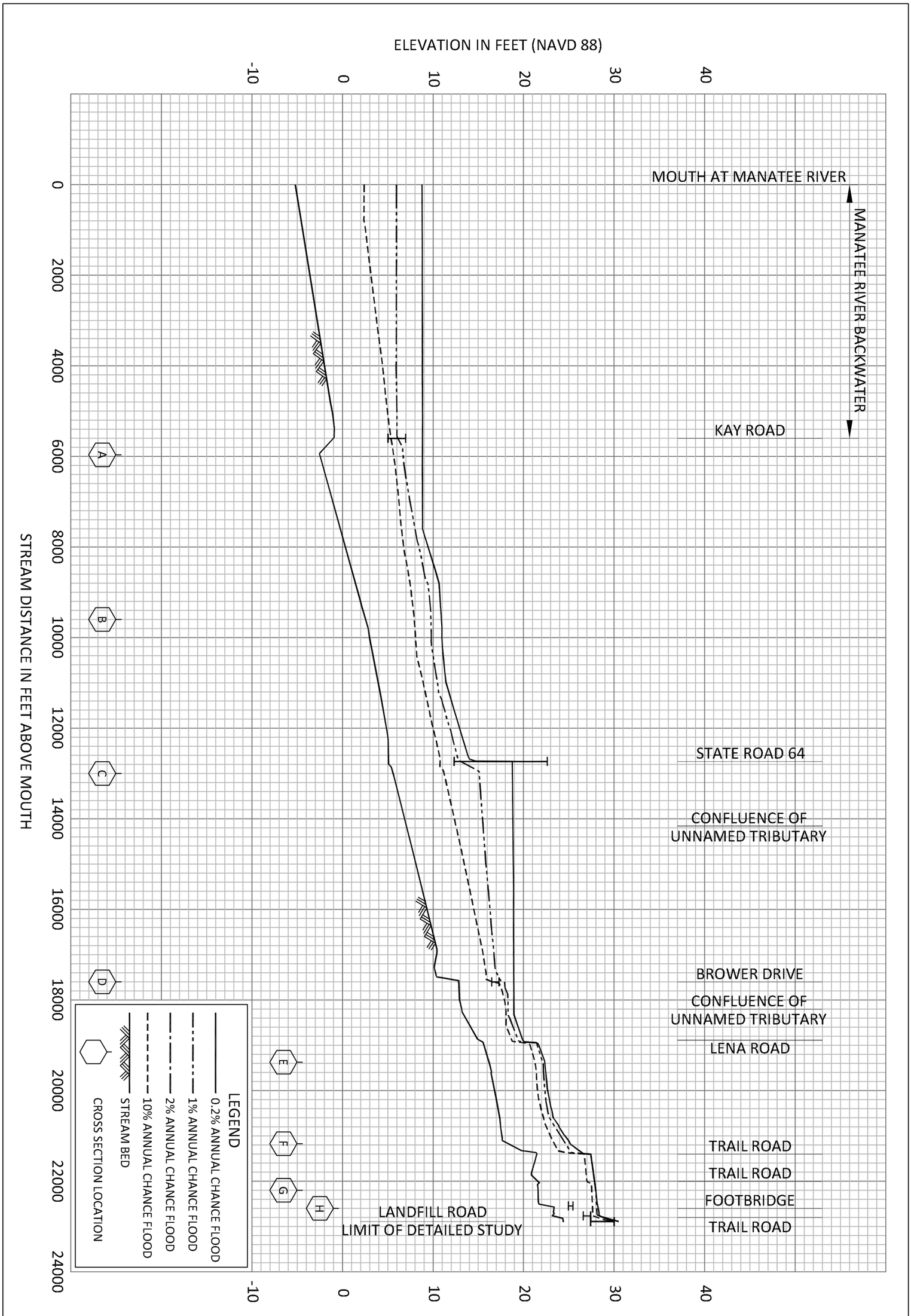


FLOOD PROFILES

TRIBUTARY TO CURIOSITY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MANATEE COUNTY, FL
AND INCORPORATED AREAS



16P

FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS

FLOOD PROFILES

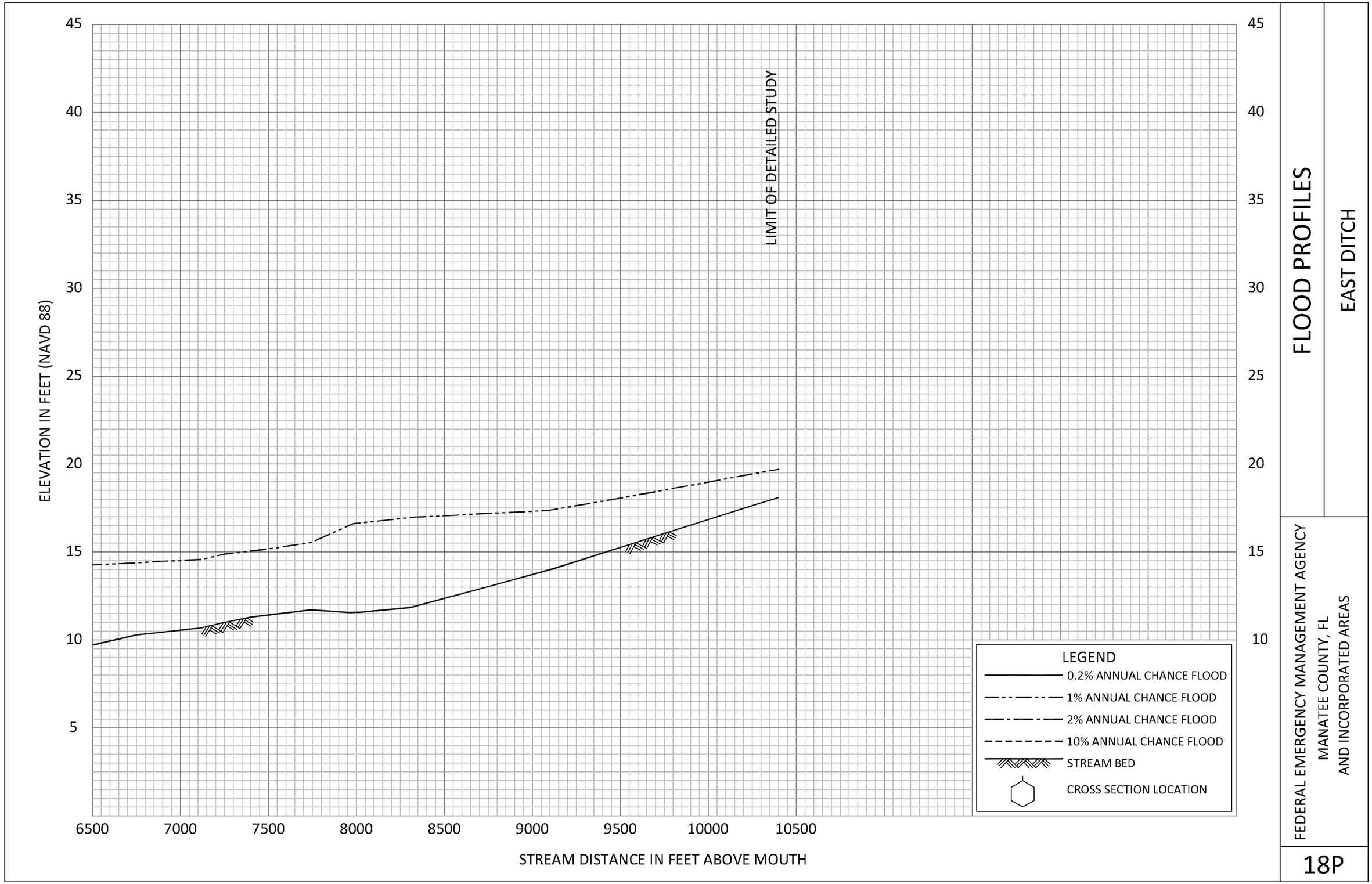
CYPRESS STRAND

FLOOD PROFILES

EAST DITCH

FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS

17P

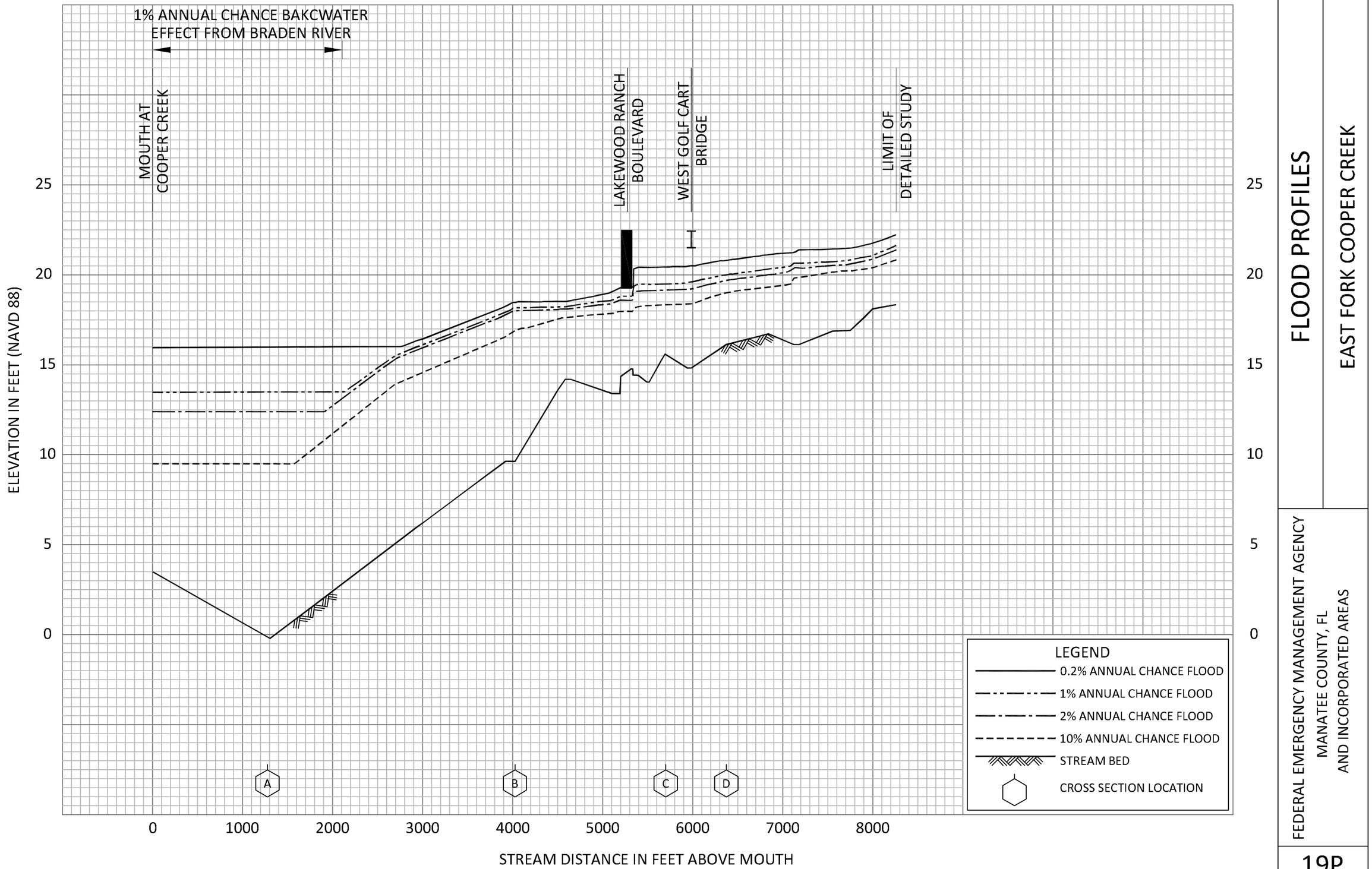


FLOOD PROFILES

EAST DITCH

FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS

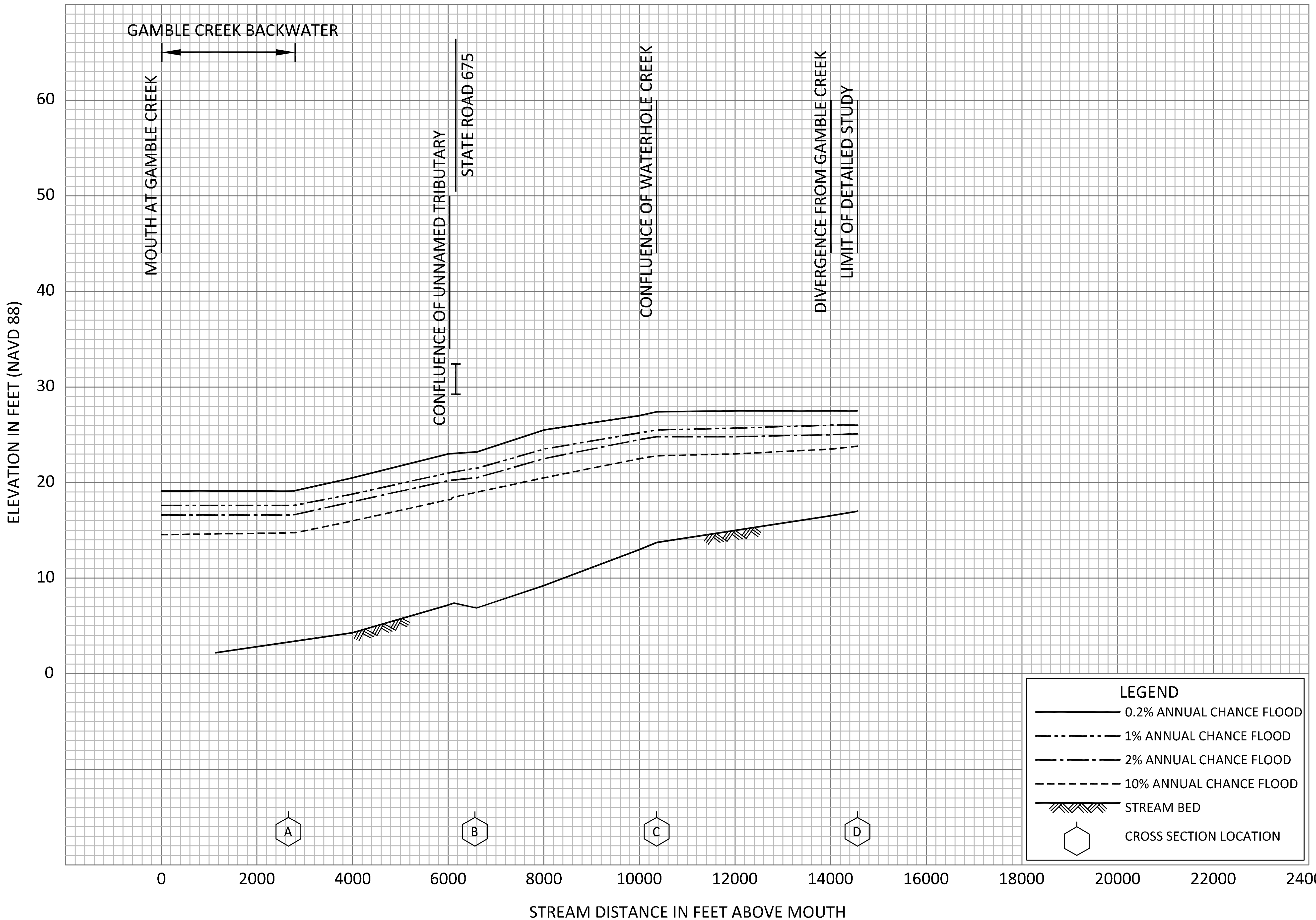
18P



FLOOD PROFILES

EAST FORK COOPER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS

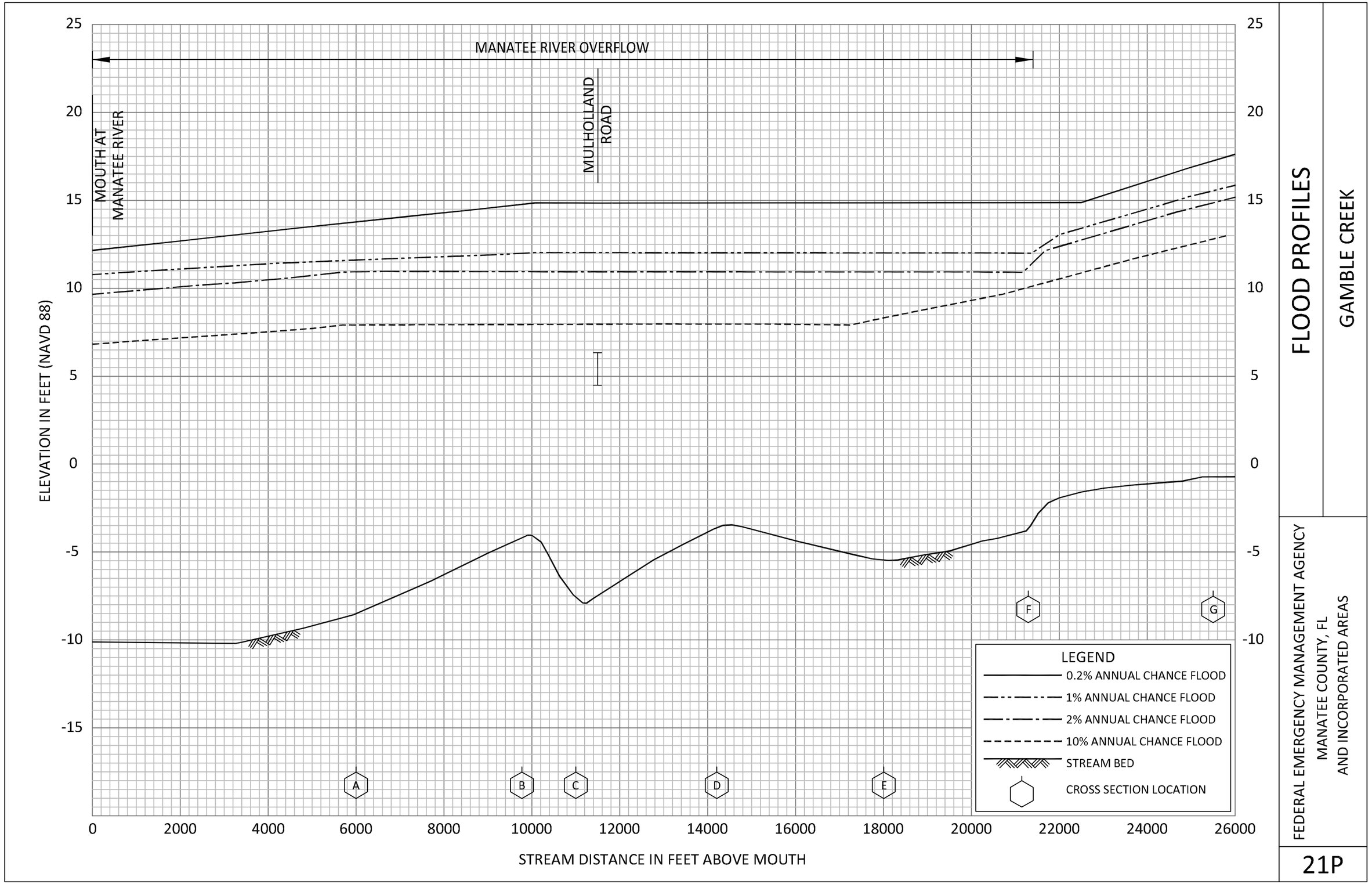


FLOOD PROFILES

FRYE CANAL

FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS

20P



FLOOD PROFILES

GAMBLE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS

GOLF COURSE ROAD

CONFLUENCE OF FRYE CANAL

JIM DAVIS ROAD

STATE ROAD 675

ELEVATION IN FEET (NAVD 88)

40
30
20
10
0
-10

26000 28000 30000 32000 34000 36000 38000 40000 42000 44000 46000 48000 50000

STREAM DISTANCE IN FEET ABOVE MOUTH

H I J K L M

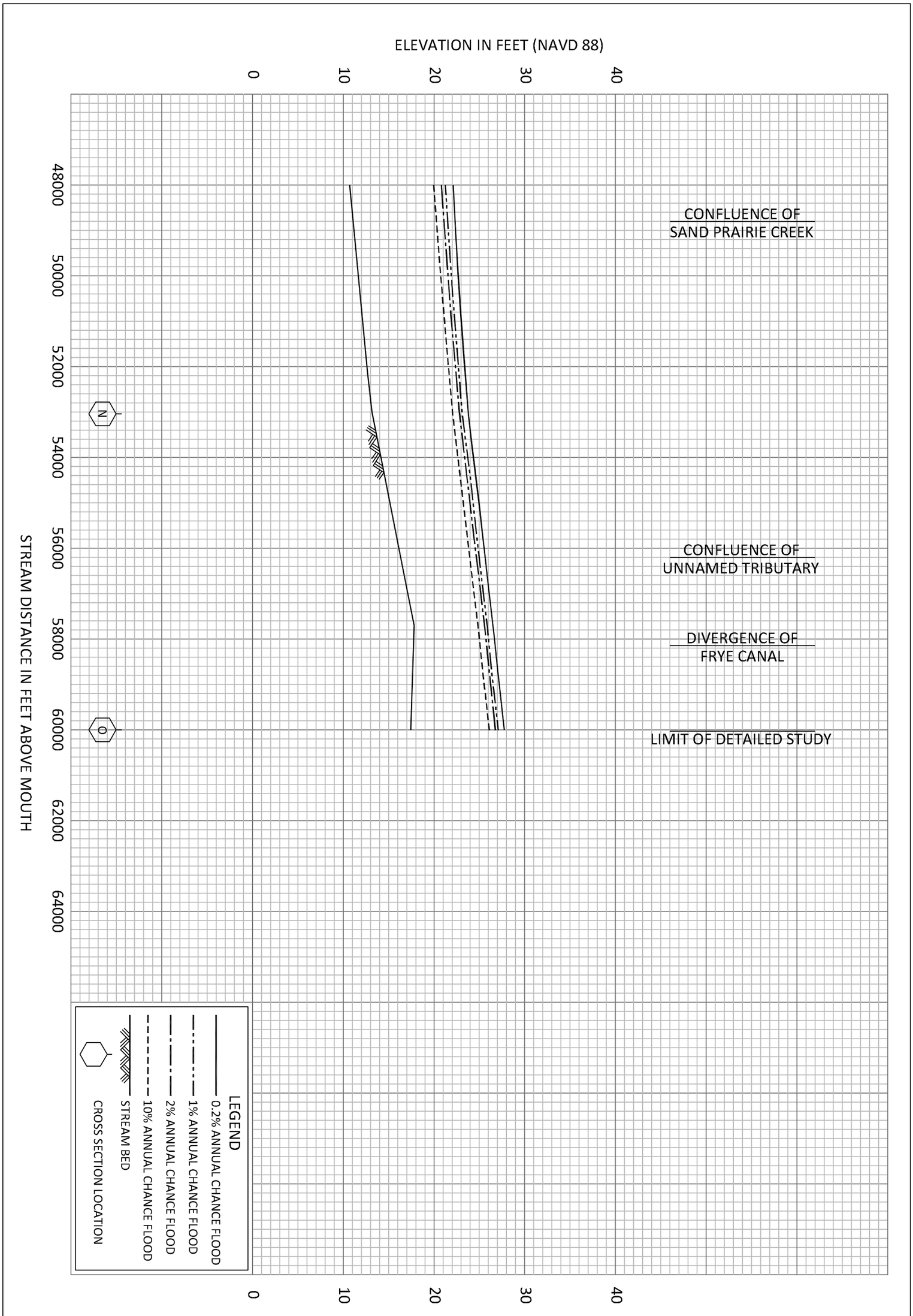
LEGEND

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

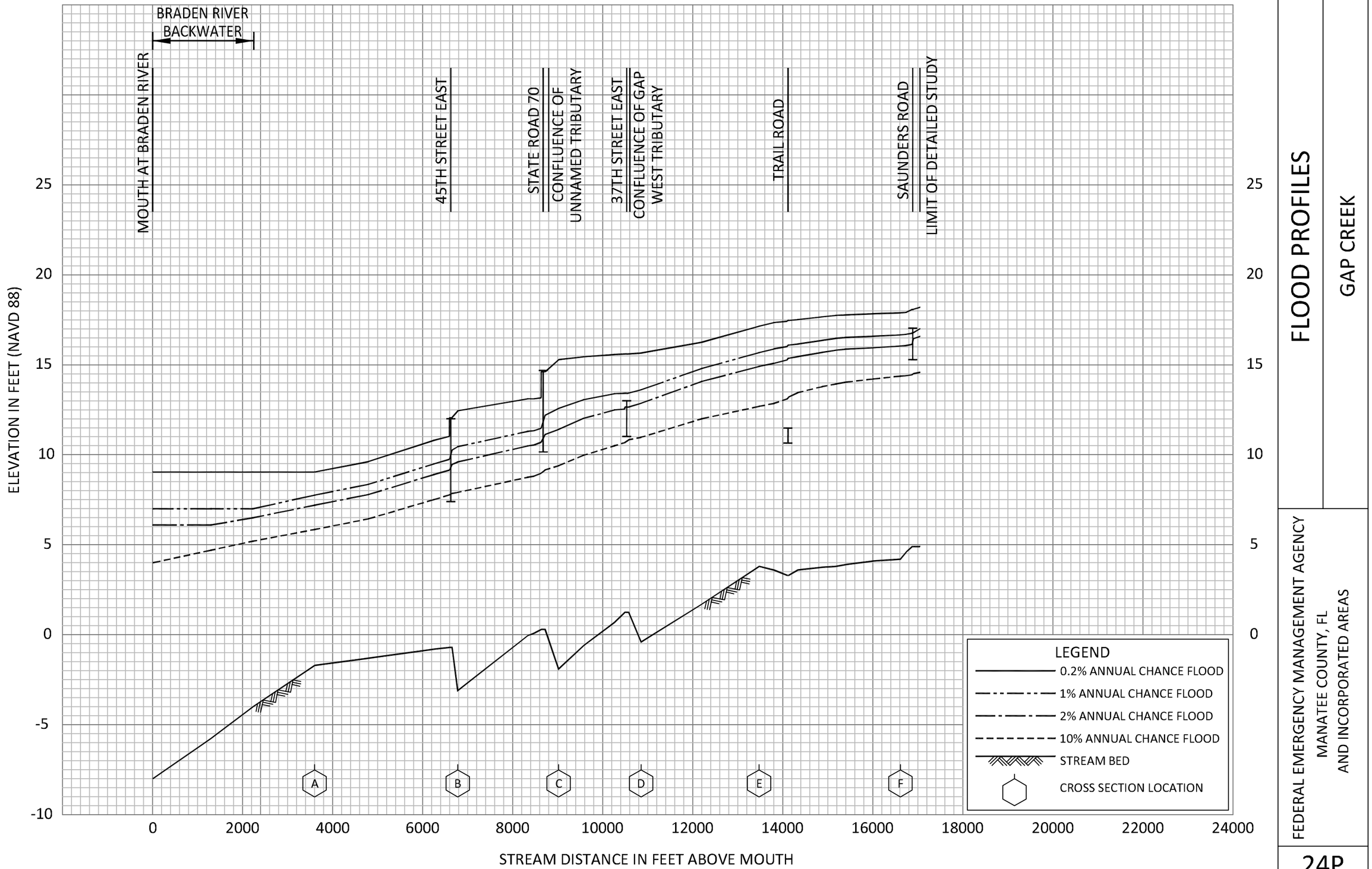
FLOOD PROFILES

GAMBLE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS



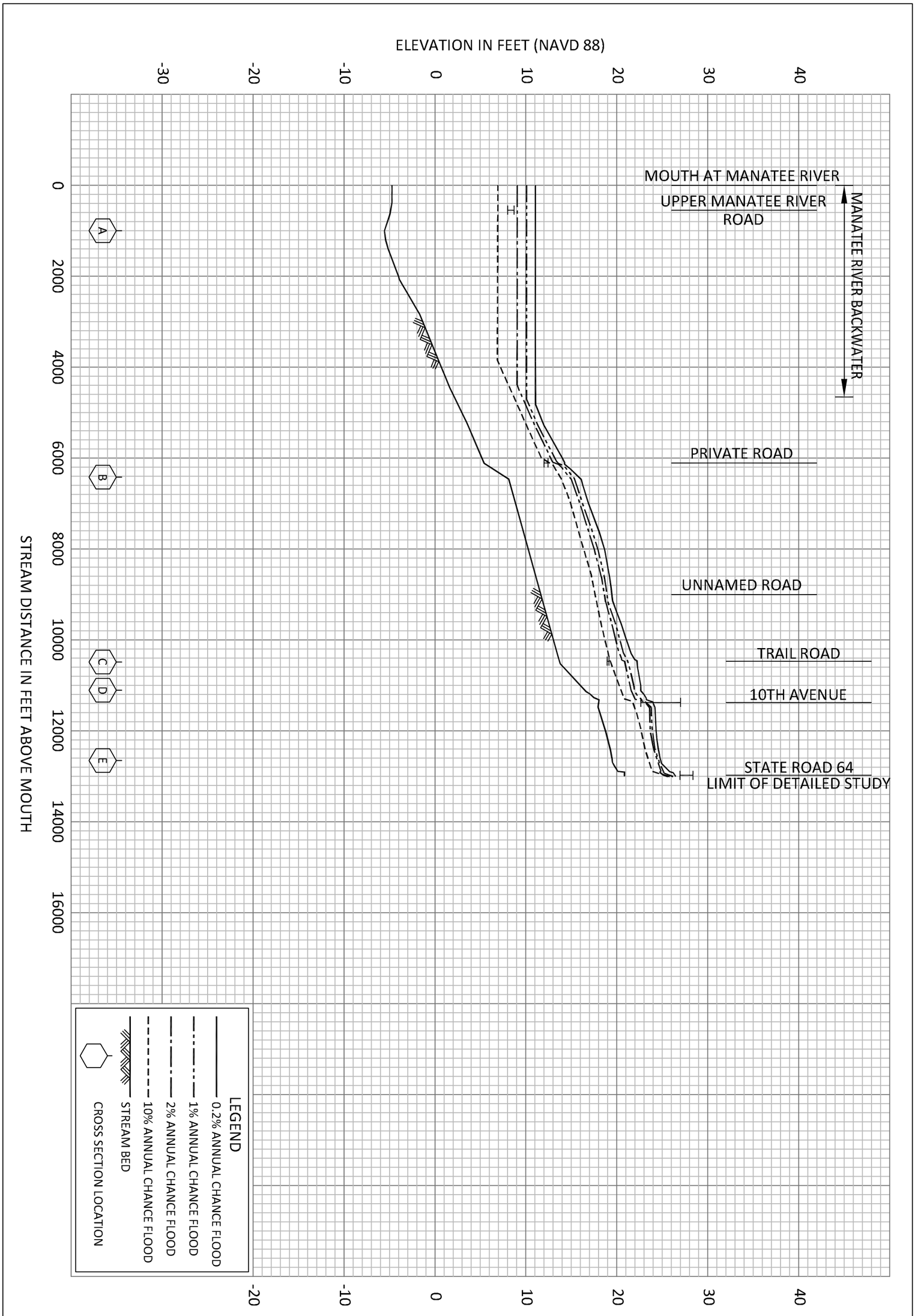
23P	FEDERAL EMERGENCY MANAGEMENT AGENCY MANATEE COUNTY, FL AND INCORPORATED AREAS	FLOOD PROFILES GAMBLE CREEK



FLOOD PROFILES

GAP CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS

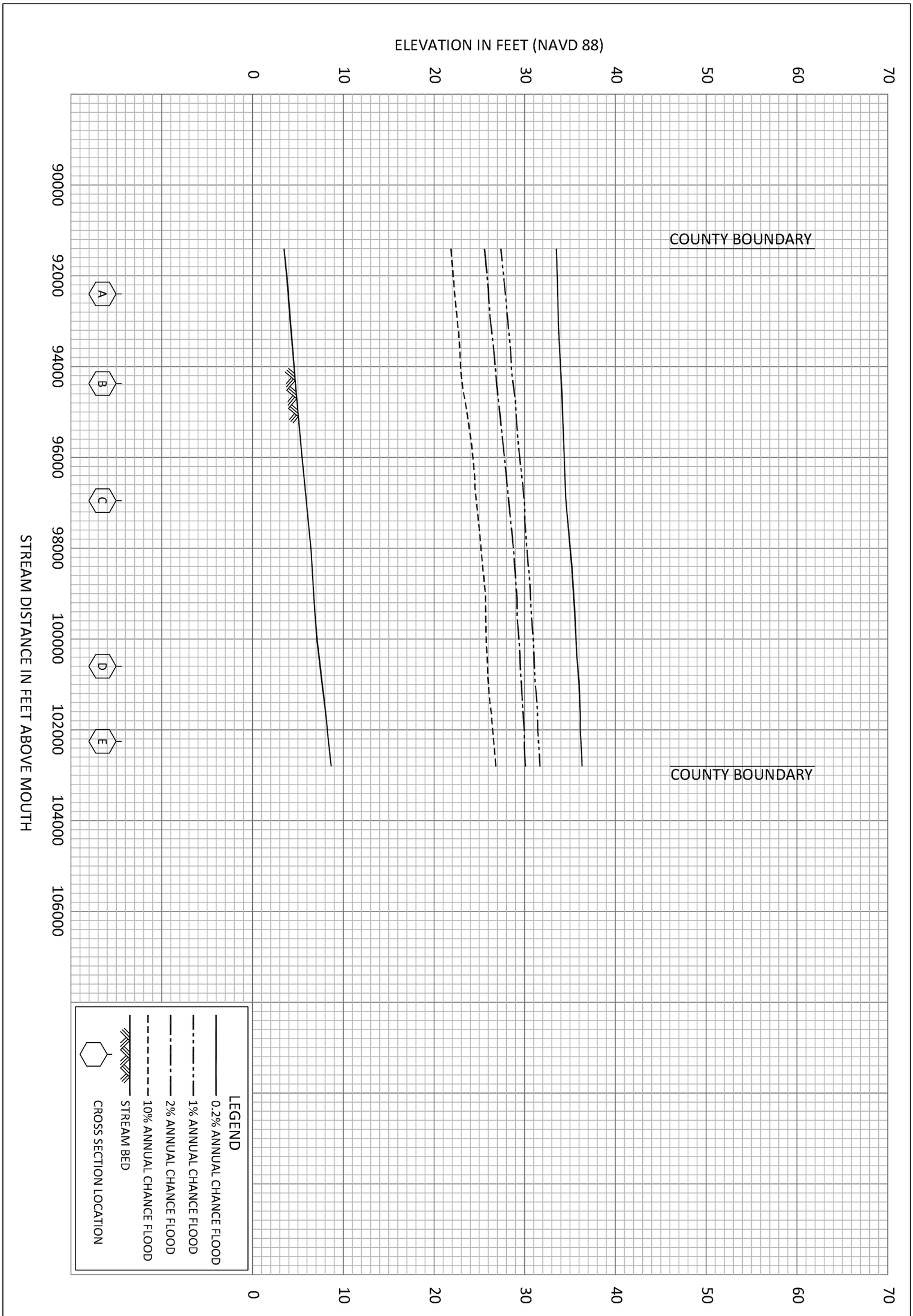


25P

FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS

FLOOD PROFILES

GATES CREEK

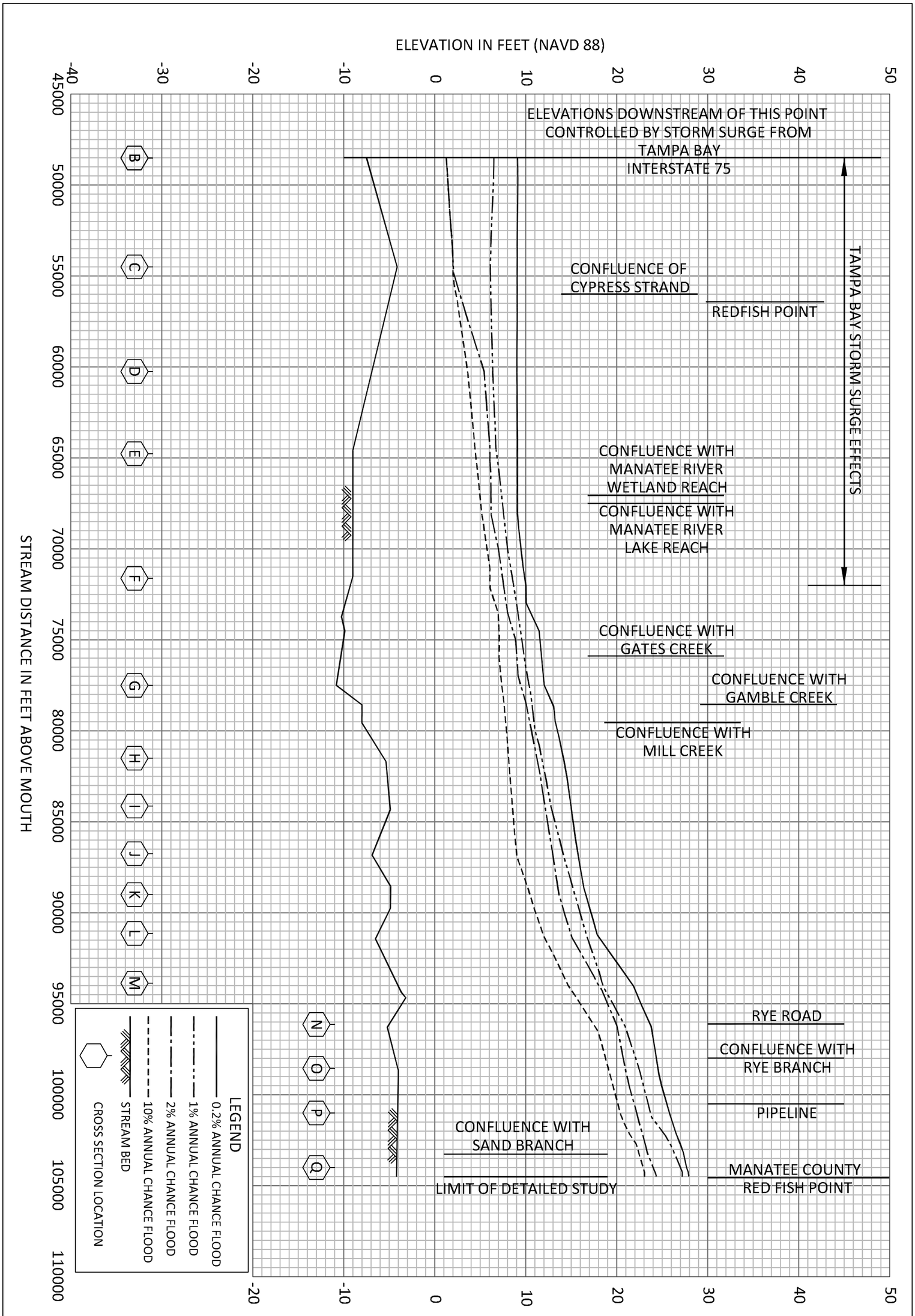


26P

FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS

FLOOD PROFILES

LITTLE MANATEE RIVER



27P

FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS

FLOOD PROFILES

MANATEE RIVER

TAMPA BAY STORM SURGE EFFECT

CONFLUENCE WITH MANATEE RIVER

RIVE $HORES TRAIL

ISLAND ESTATES DRIVE

RIVE ISLE RUN

ELEVATION IN FEET (NAVD 88)

25
20
15
10
5
0
-5
-10
-15

0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000 5500 6000 6500

STREAM DISTANCE IN FEET ABOVE MOUTH

A B C D E F

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

FLOOD PROFILES

MANATEE RIVER LAKE REACH

FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS

TAMPA BAY STORM SURGE EFFECT

CONFLUENCE WITH MANATEE RIVER

RIVE ISLE RUN

ISLAND ESTATES DRIVE

ELEVATION IN FEET (NAVD 88)

25
20
15
10
5
0
-5
-10
-15

67000 67500 68000 68500 69000 69500 70000 70500 71000 71500 72000 72500 73000

STREAM DISTANCE IN FEET ABOVE MOUTH OF MANATEE RIVER

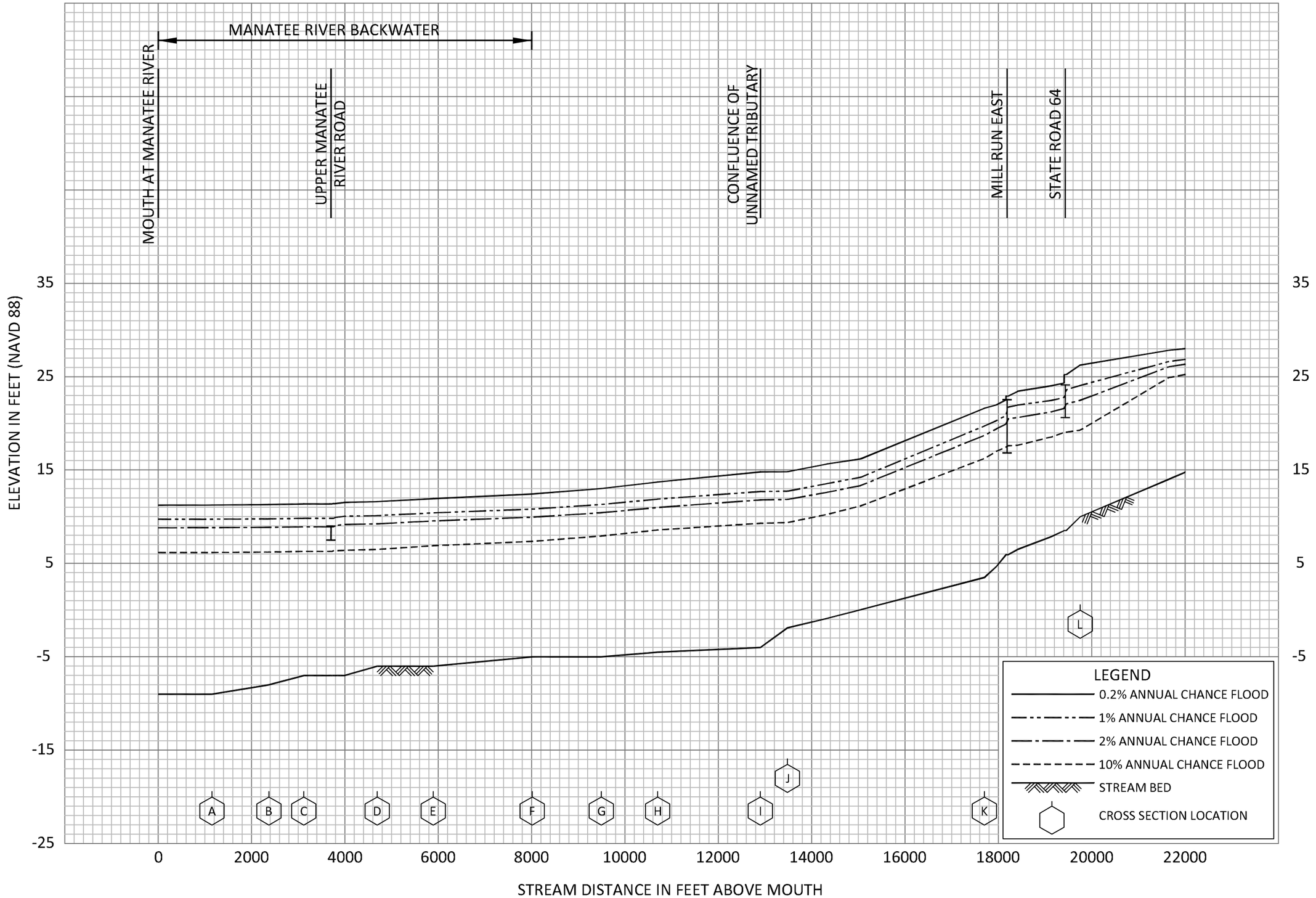
A B C D E

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

FLOOD PROFILES

MANATEE RIVER WETLAND REACH

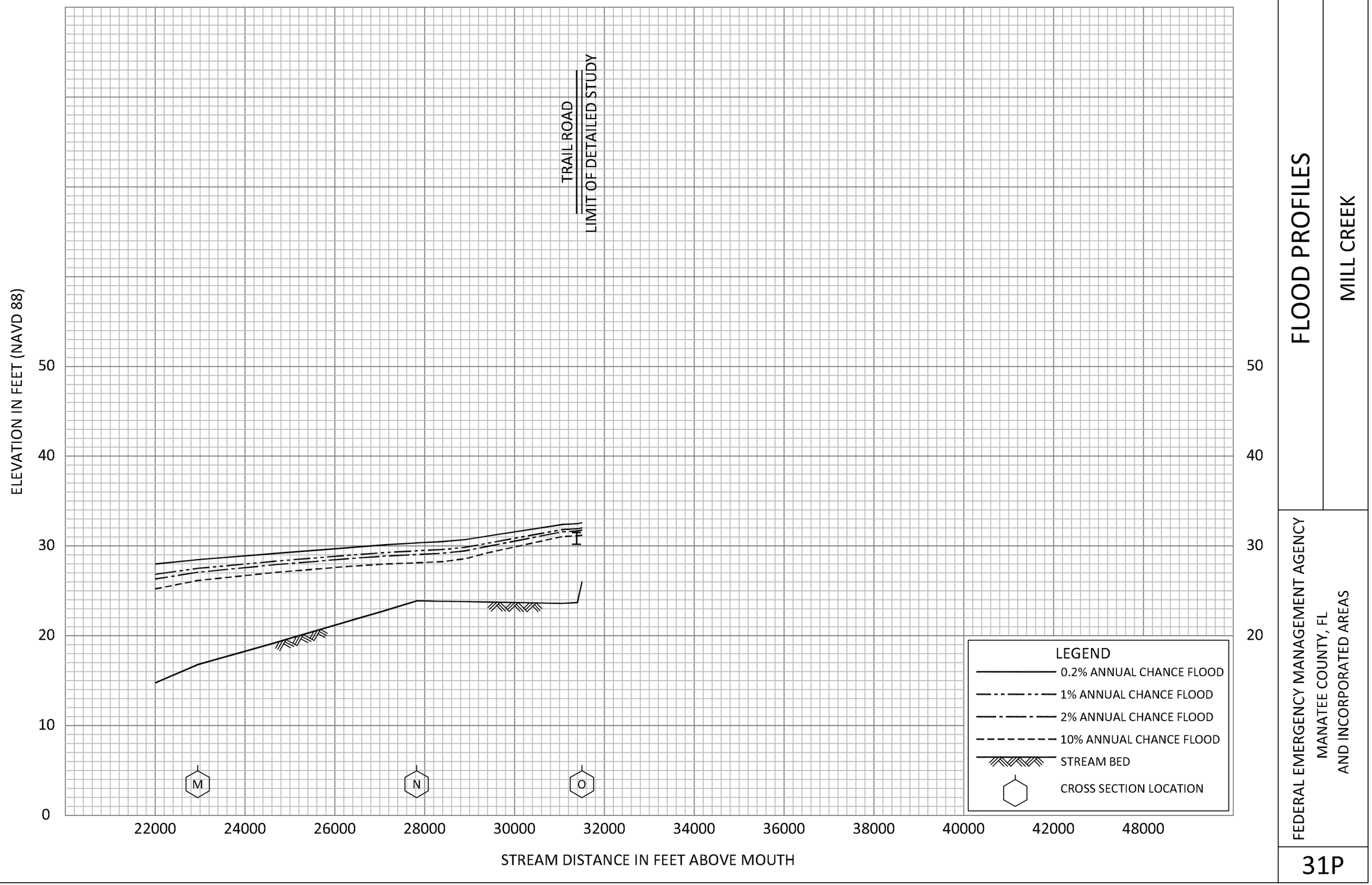
FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS



FLOOD PROFILES

MILL CREEK

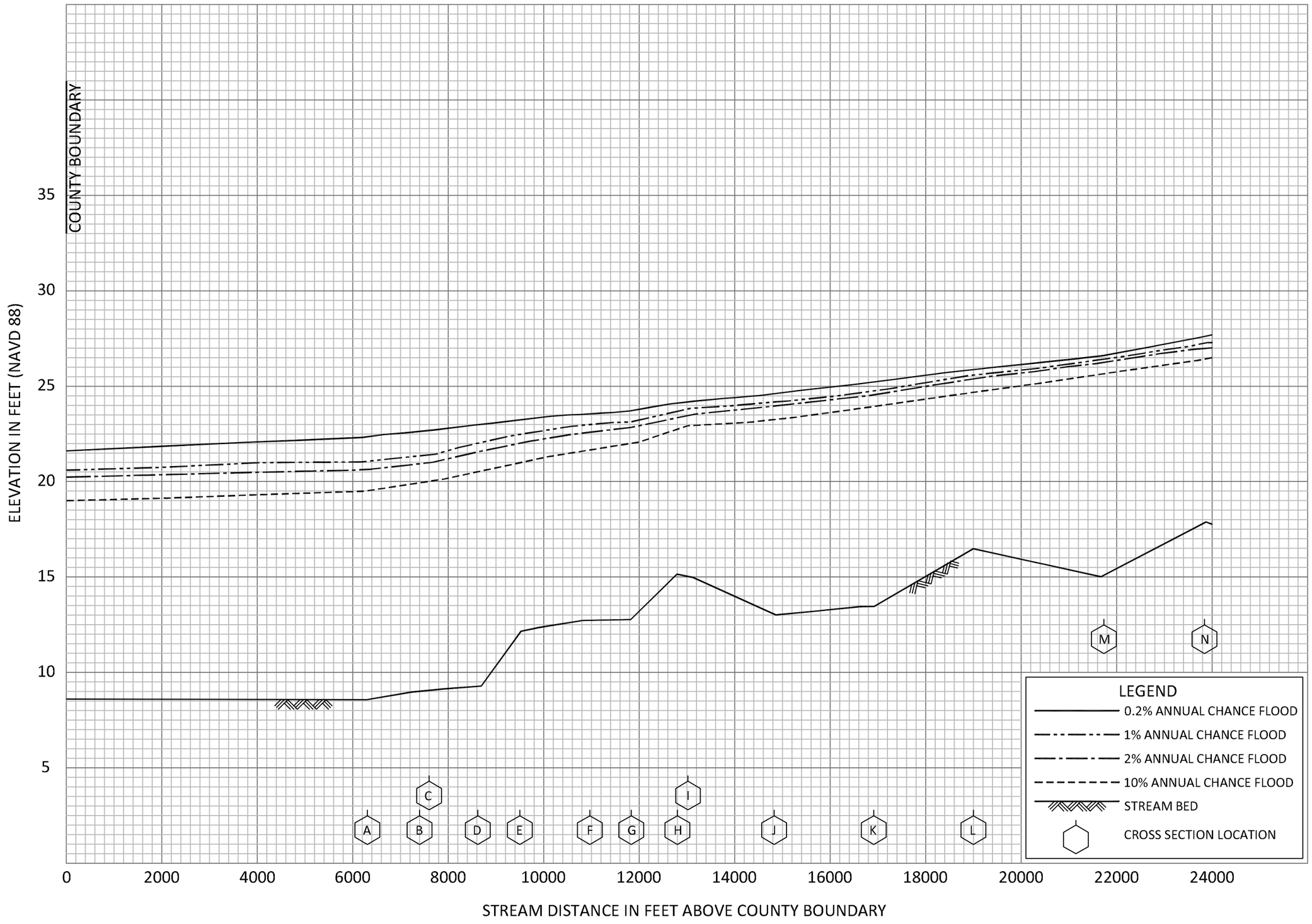
FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS



FLOOD PROFILES

MILL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS



FLOOD PROFILES

MYAKKA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS

ELEVATION IN FEET (NAVD 88)

45
40
35
30
25
20
15
10
5

24000 26000 28000 30000 32000 34000 36000 38000 40000 42000 44000 46000 48000

STREAM DISTANCE IN FEET ABOVE COUNTY BOUNDARY

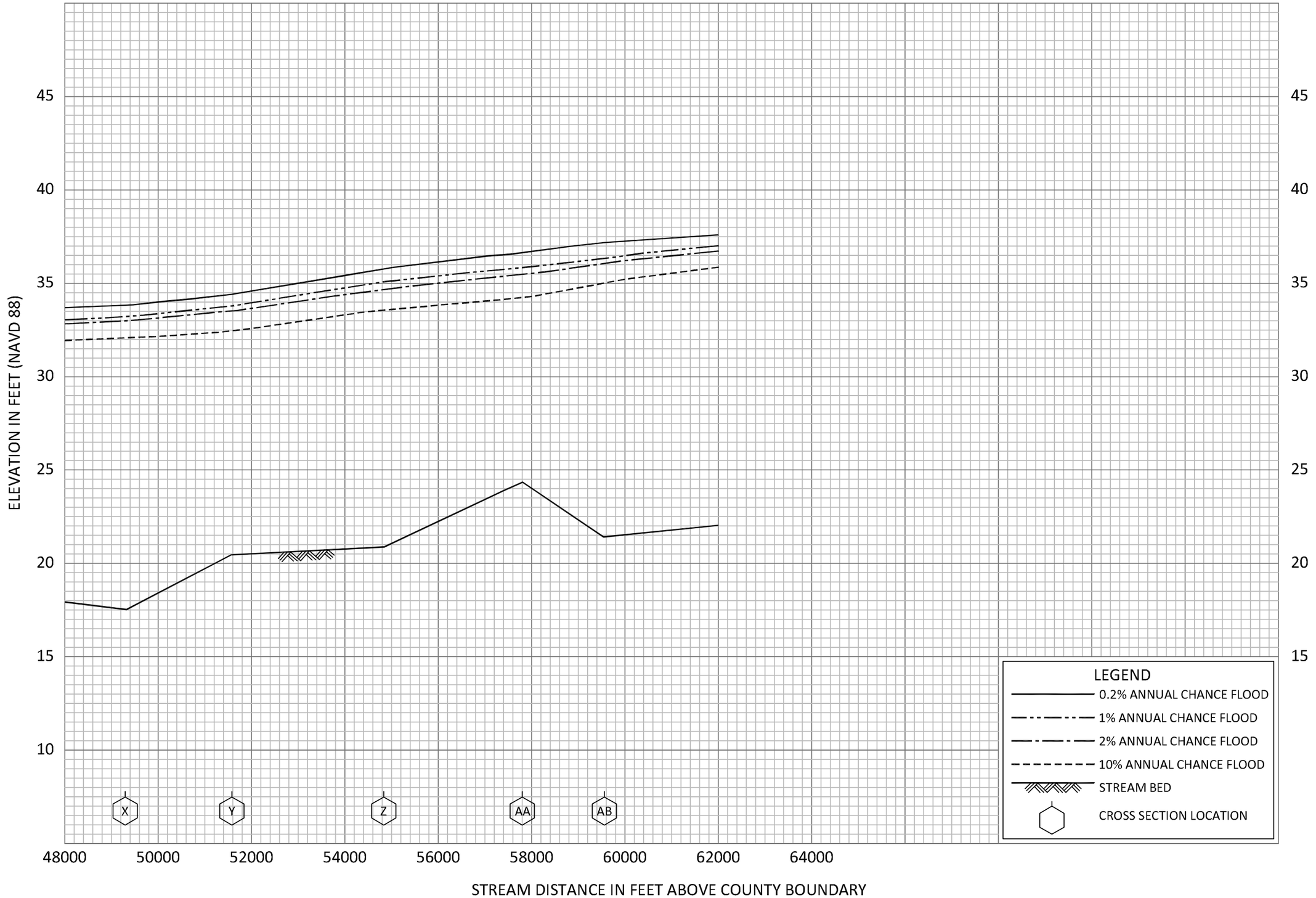
O P Q R S T U V W

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

FLOOD PROFILES

MYAKKA RIVER

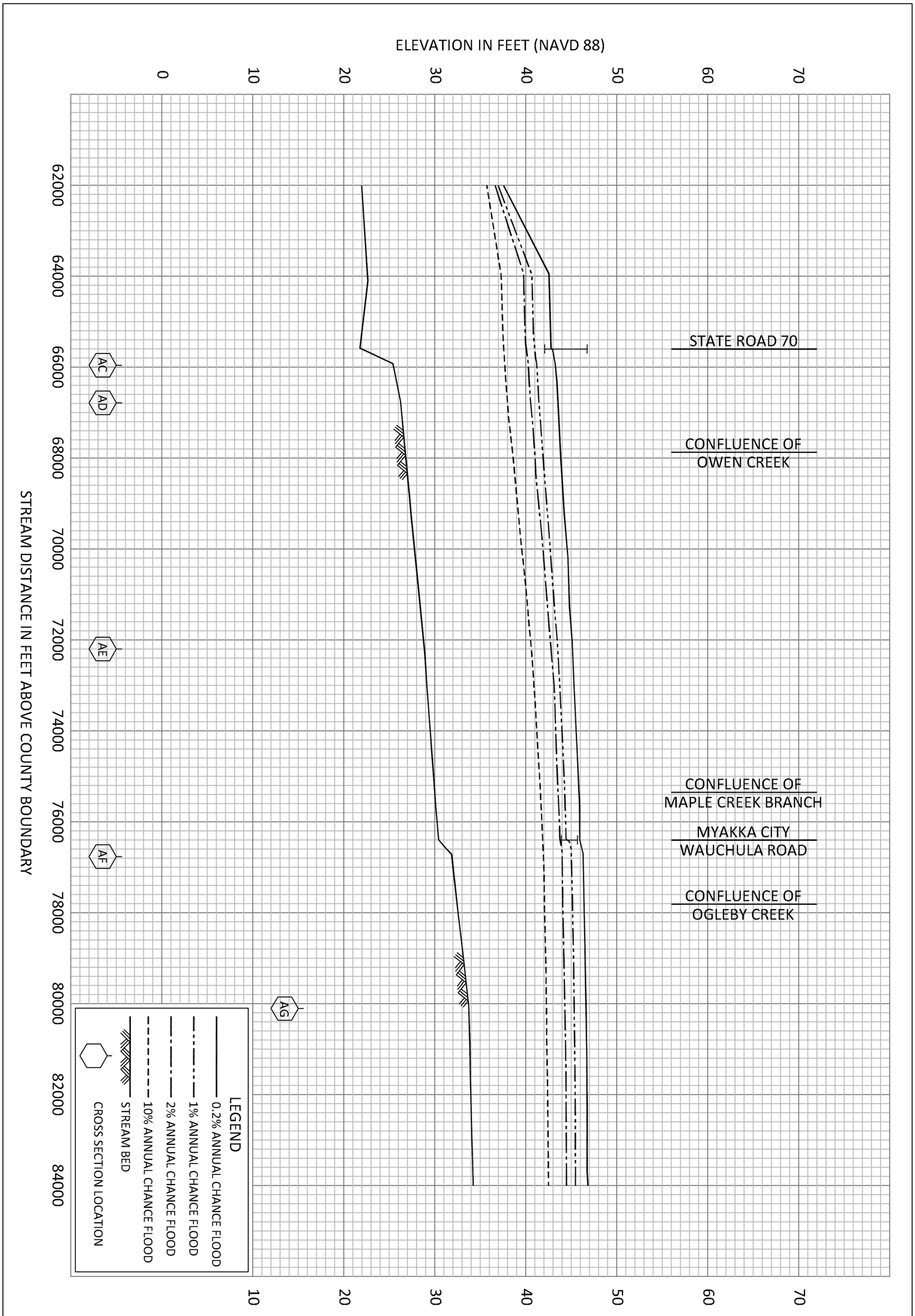
FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS



FLOOD PROFILES

MYAKKA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS

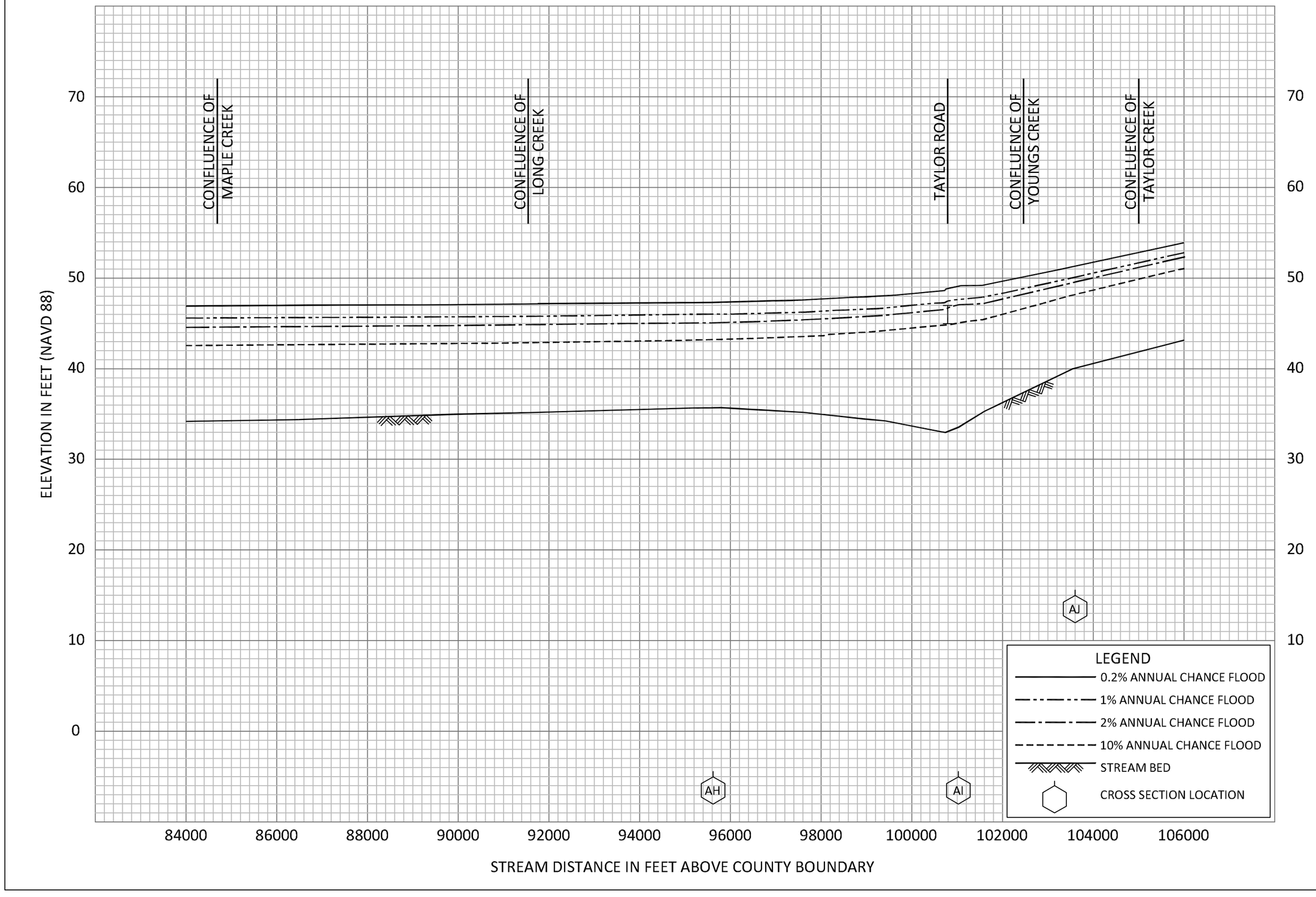


35P

FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS

FLOOD PROFILES

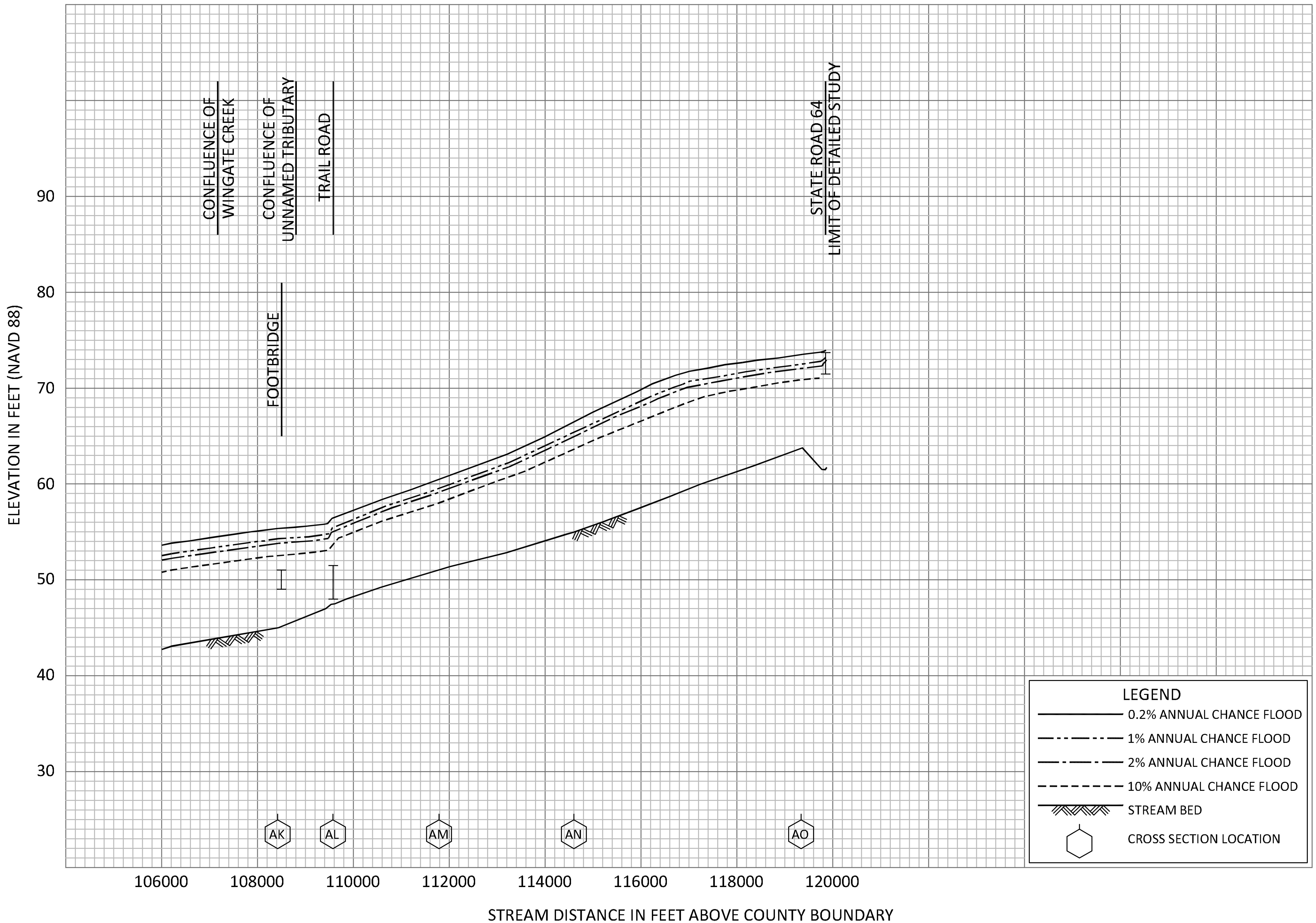
MYAKKA RIVER



FLOOD PROFILES

MYAKKA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS

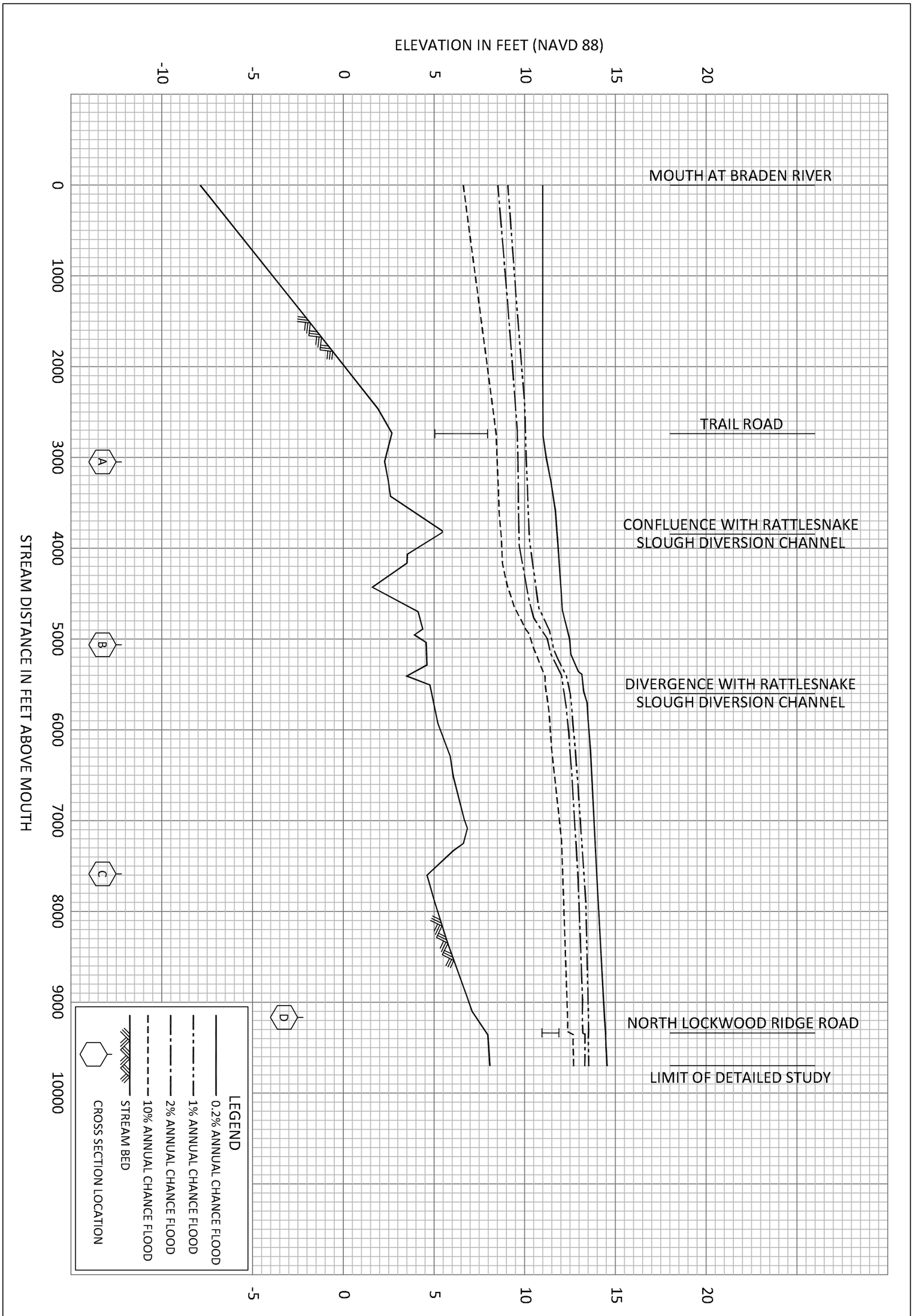


FLOOD PROFILES

MYAKKA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MANATEE COUNTY, FL
AND INCORPORATED AREAS

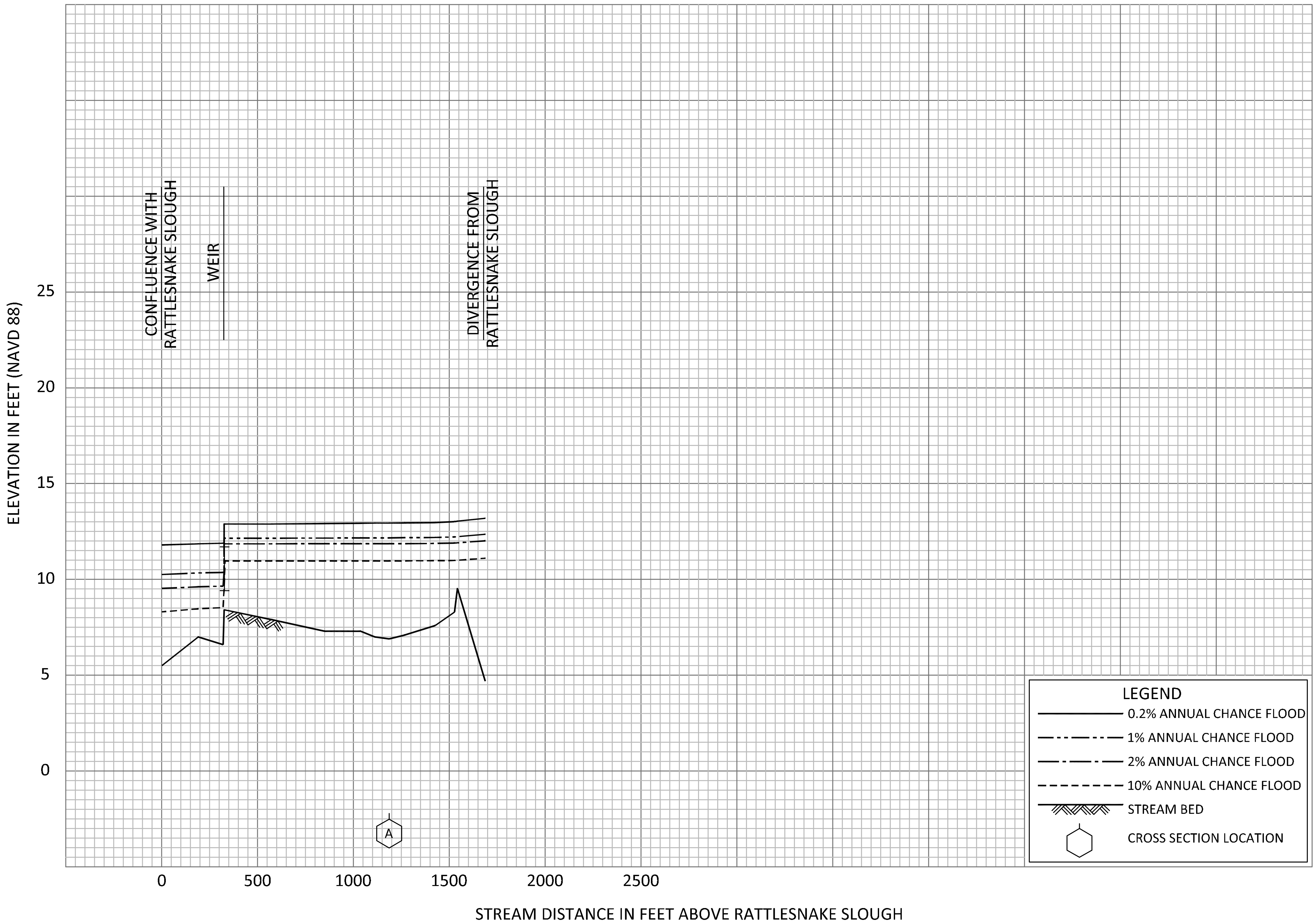


38P

FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS

FLOOD PROFILES

RATTLESNAKE SLOUGH

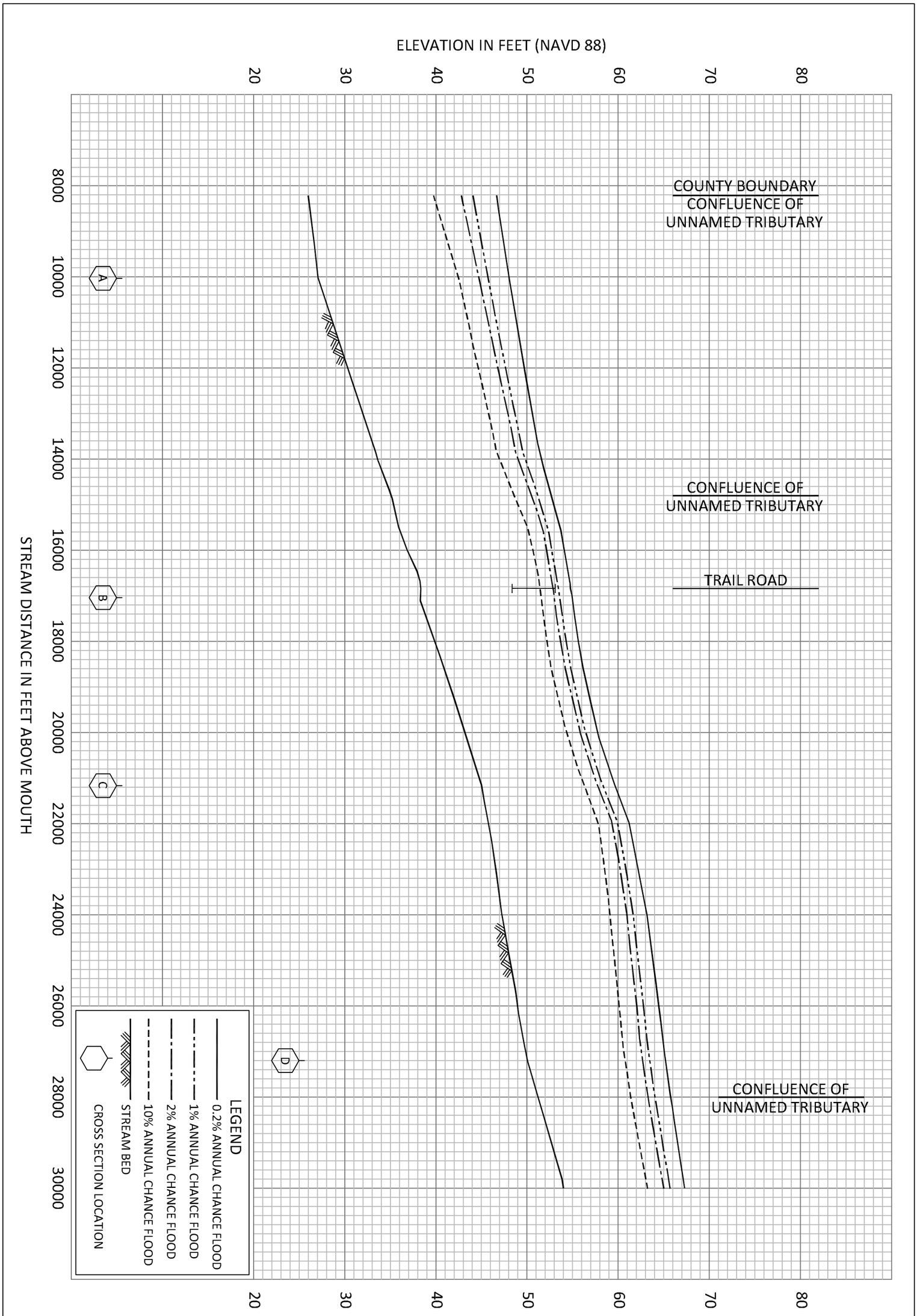


FLOOD PROFILES

RATTLESNAKE SLOUGH DIVERSION CHANNEL

FEDERAL EMERGENCY MANAGEMENT AGENCY

MANATEE COUNTY, FL
AND INCORPORATED AREAS

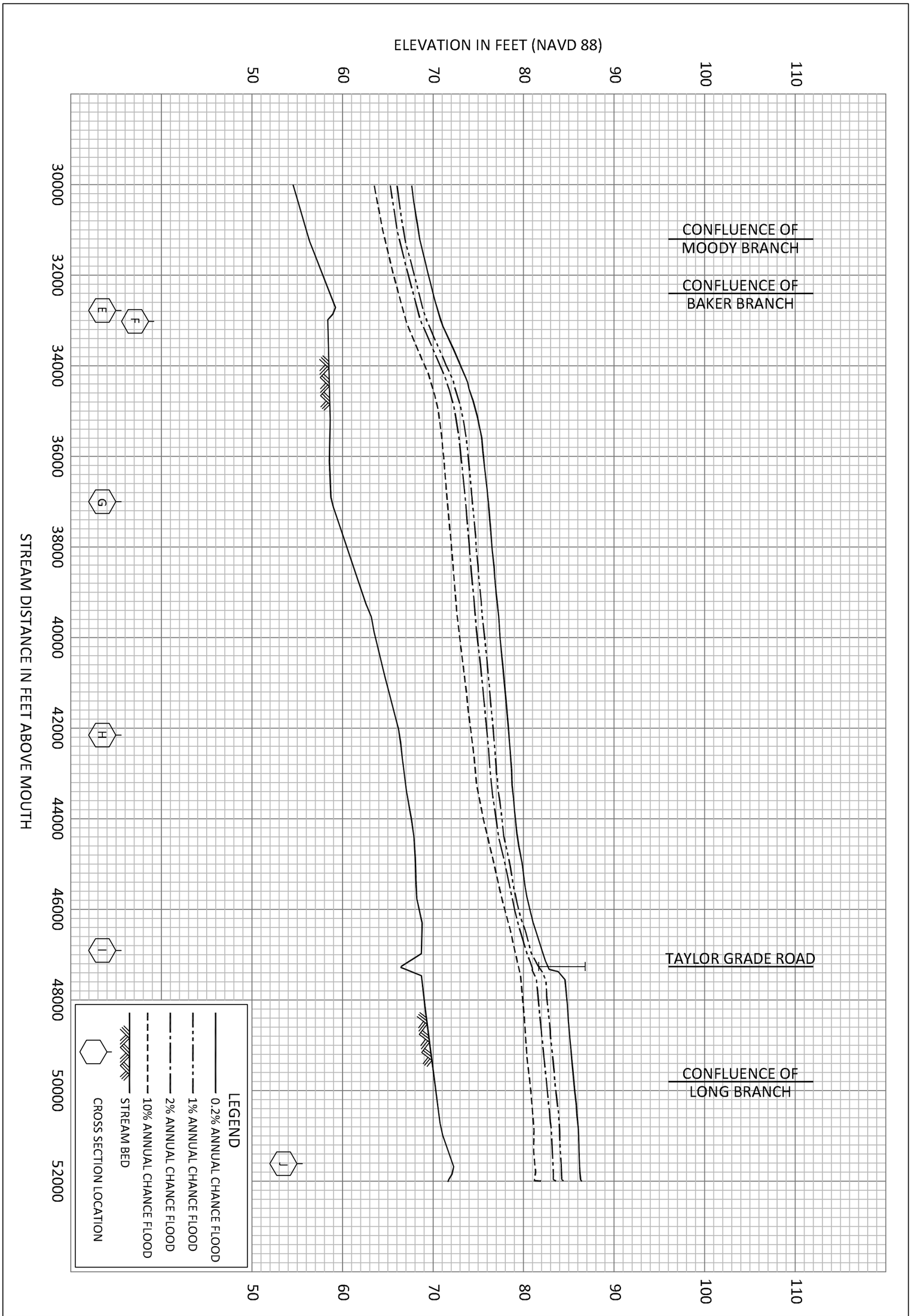


40P

FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS

FLOOD PROFILES

SOUTH FORK LITTLE MANATEE RIVER

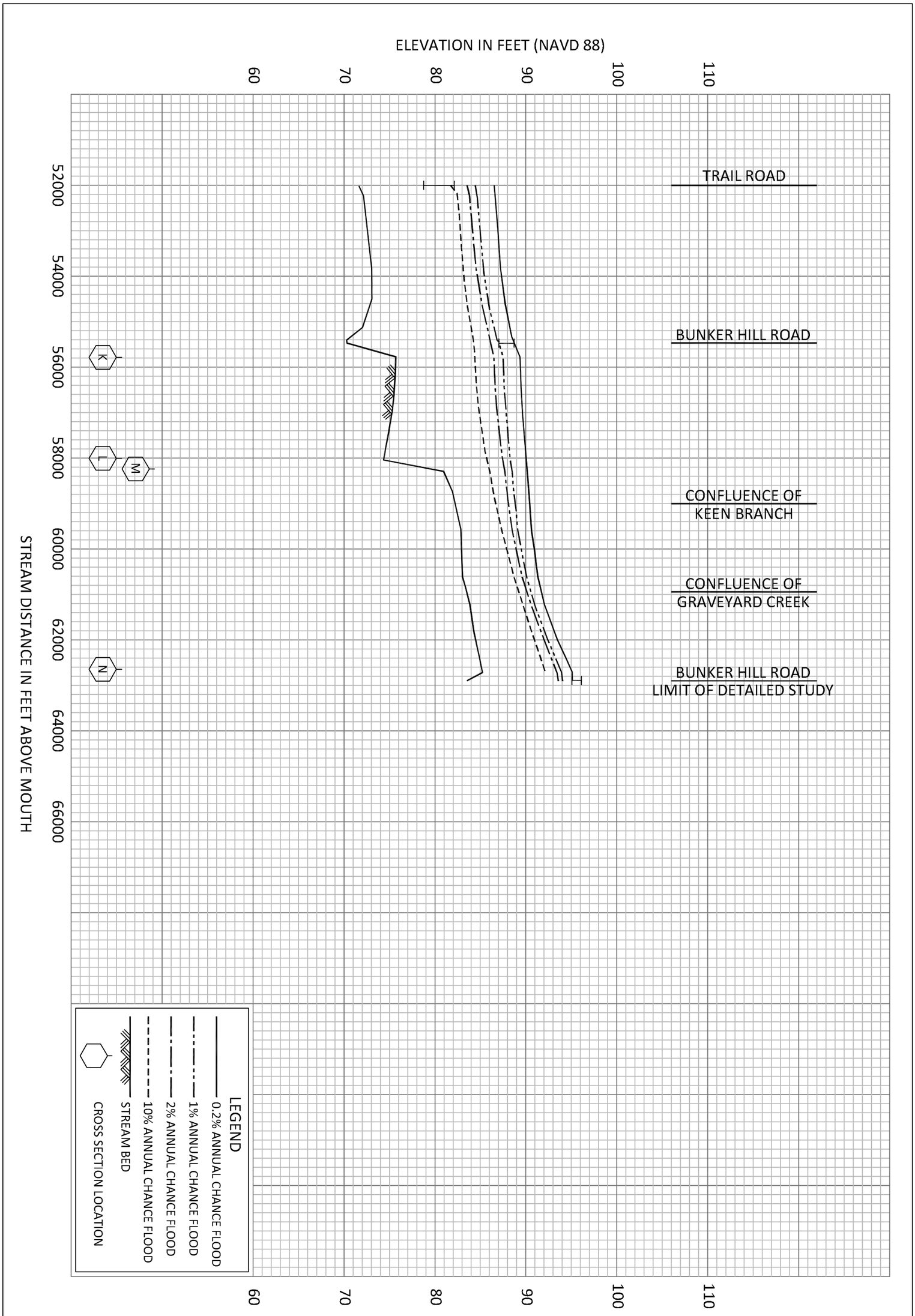


41P

FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS

FLOOD PROFILES

SOUTH FORK LITTLE MANATEE RIVER

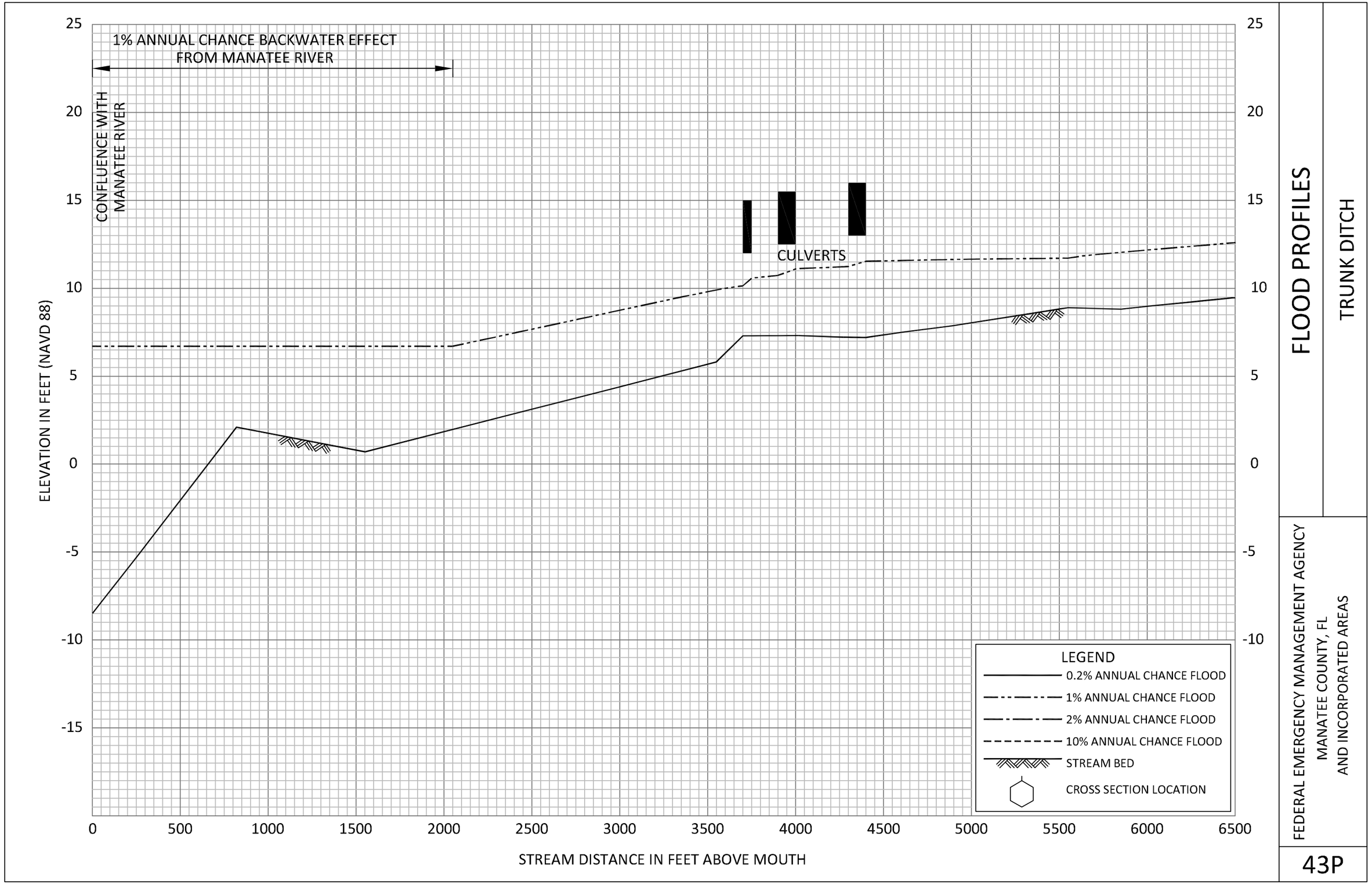


42P

FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS

FLOOD PROFILES

SOUTH FORK LITTLE MANATEE RIVER



FLOOD PROFILES

TRUNK DITCH

FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS

ELEVATION IN FEET (NAVD 88)

45
40
35
30
25
20
15
10
5

LIMIT OF DETAILED STUDY

CULVERT

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

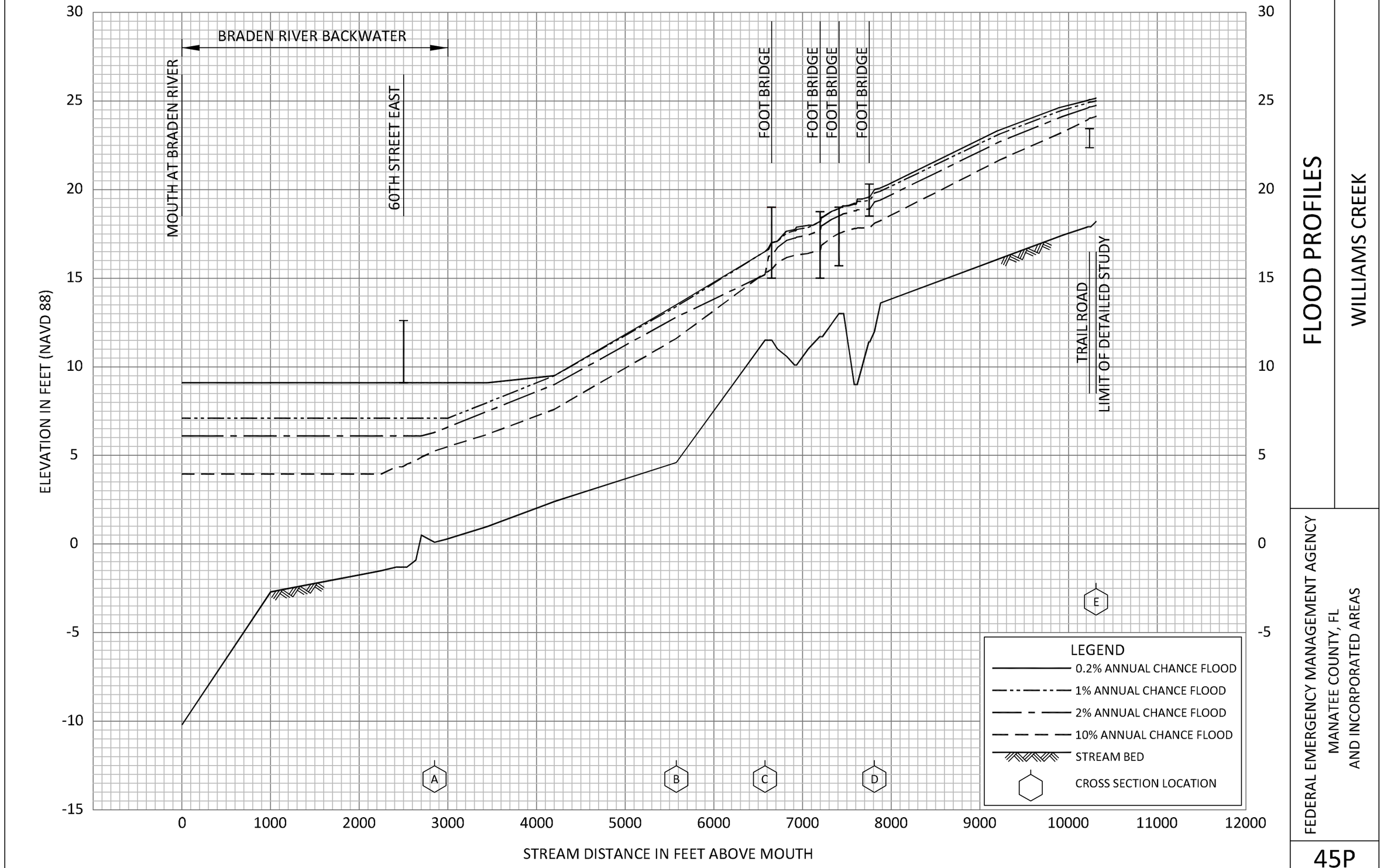
6500 7000 7500 8000 8500 9000 9500 10000 10500 11000 11500 12000

STREAM DISTANCE IN FEET ABOVE MOUTH

FLOOD PROFILES

TRUNK DITCH

FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS

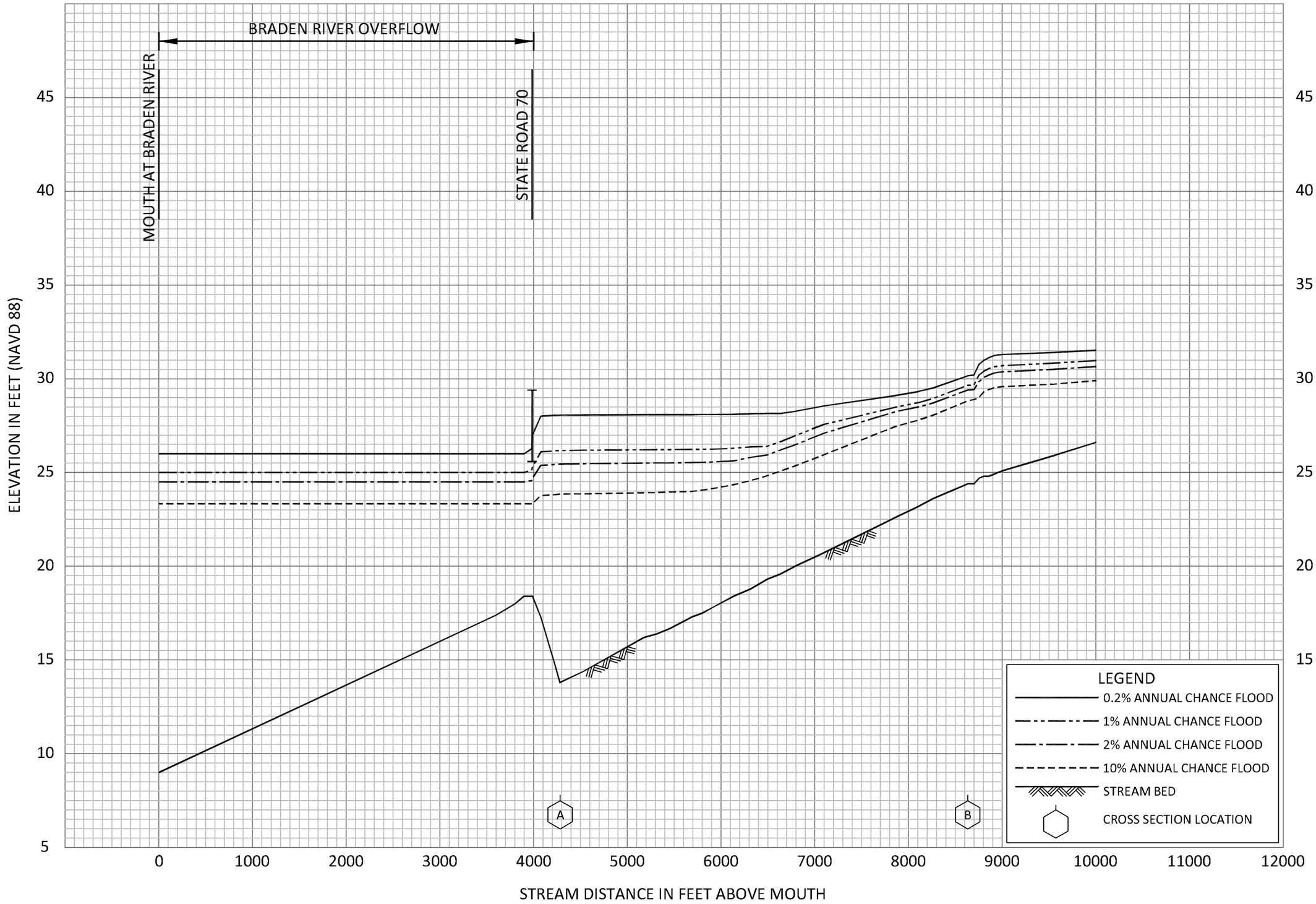


FLOOD PROFILES

WILLIAMS CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS

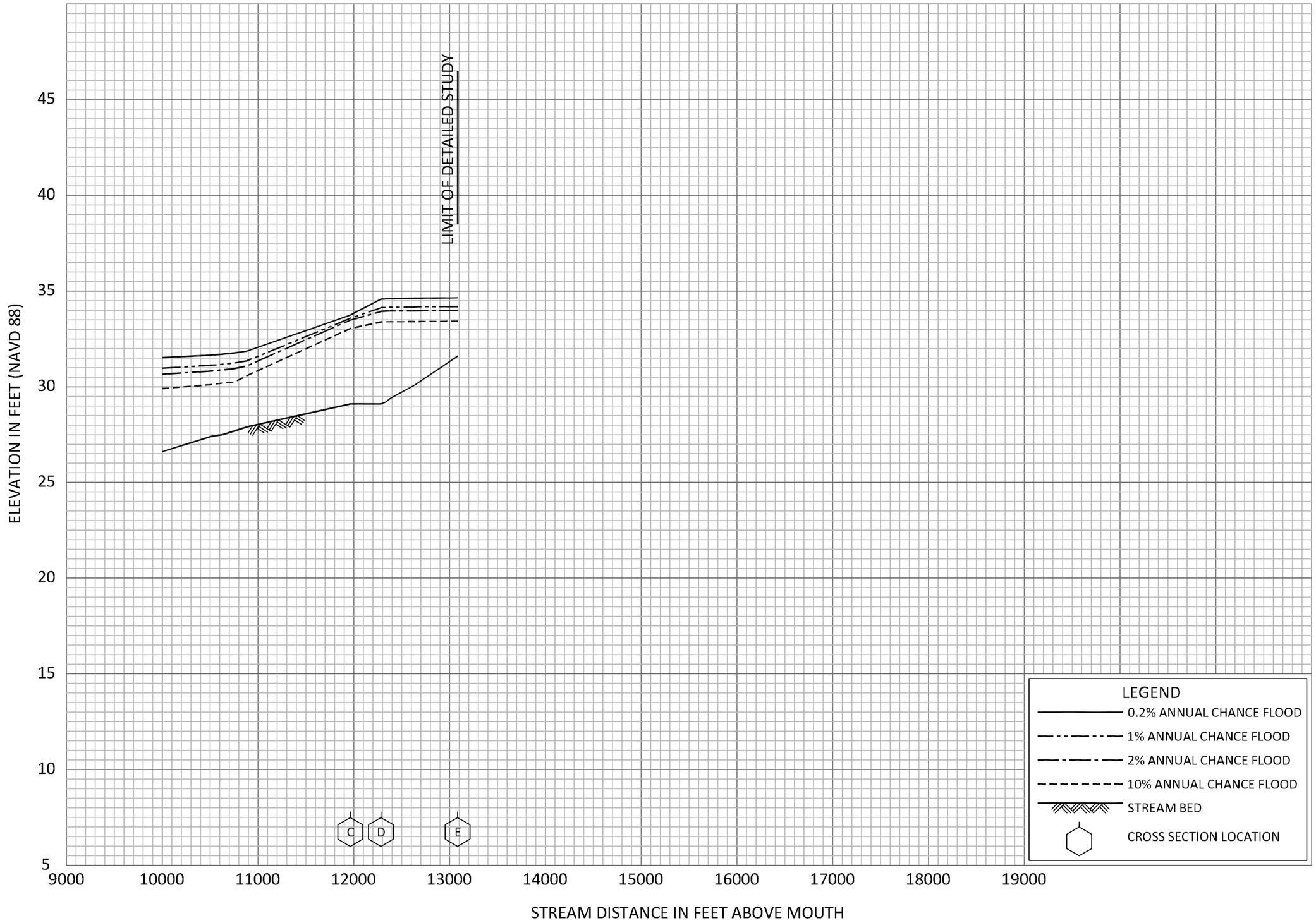
45P



FLOOD PROFILES

WOLF SLOUGH

FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS



FLOOD PROFILES

WOLF SLOUGH

FEDERAL EMERGENCY MANAGEMENT AGENCY
MANATEE COUNTY, FL
AND INCORPORATED AREAS

47P