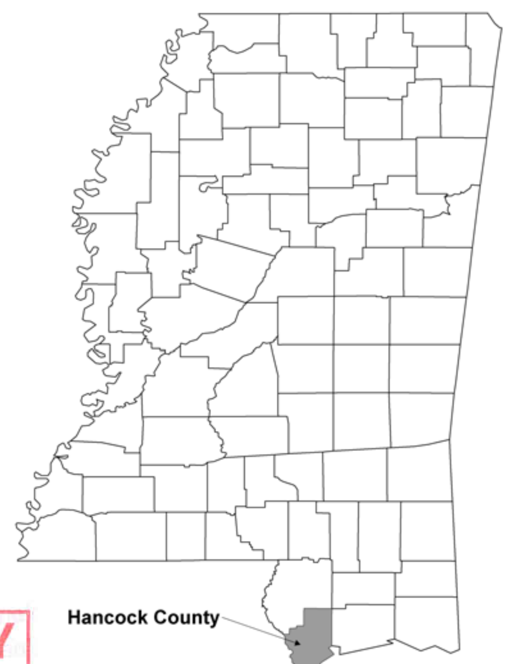
FLOOD INSURANCE STUDY

HANCOCK COUNTY, MISSISSIPPI
AND INCORPORATED AREAS

VOLUME 1 OF 2



COMMUNITY NAME	COMMUNITY NUMBER
BAY ST. LOUIS, CITY OF	285251
HANCOCK COUNTY (UNINCORPORATED AREAS)	285254
WAVELAND, CITY OF	285262

PRELIMINARY
NOV 15 2007

Federal Emergency Management Agency
FLOOD INSURANCE STUDY NUMBER
28045CV001A

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) 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 repository. It is advisable to contact the community repository for any additional data.

Part or all of this FIS may be revised and republished at any time. In addition, part of this FIS may be revised by the Letter of Map Revision process, which does not involve republication or redistribution of the FIS. It is, therefore, the responsibility of the user to consult with community officials and to check the community repository to obtain the most current FIS components.

Initial Countywide FIS Effective Date:

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FLOOD INSURANCE STUDY
HANCOCK COUNTY, MISSISSIPPI AND INCORPORATED AREAS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study (FIS) revises and supersedes the FIS reports and/or Flood Insurance Rate Maps (FIRMs) in the geographic area of Hancock County, Mississippi, including the City of Bay St. Louis, City of Waveland and unincorporated areas of Hancock County (hereinafter referred to collectively as Hancock County), and 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. This information will also be used by Hancock County to update existing floodplain regulations as part of the Regular Phase of the National Flood Insurance Program (NFIP), and by local and regional planners to further promote sound land use and floodplain development. Minimum floodplain management requirements for participation in the NFIP are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

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

1.2 Authority and Acknowledgments

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

This FIS was prepared to include the unincorporated areas of, and incorporated communities within, Hancock County in a countywide format. Information on the authority and acknowledgements for each jurisdiction included in this countywide FIS, as compiled from their previous printed FIS reports, is shown below.

Bay St. Louis, City of:	The hydrologic and hydraulic analyses for the May 16, 1983 FIS were performed by Gee & Jenson Engineers, Architects, Planners, Inc., for the Federal Emergency Management Agency (FEMA), under contract No. EMW-C-0159. This study was completed in March 1982.
Hancock County (Unincorporated Areas):	For the September 18, 1987 FIS, the coastal hydrologic and hydraulic analysis for the Mississippi Sound and St. Louis Bay and riverine analyses for the lower reaches of Bayou Coco, the Jourdan River, Rotten Bayou/Bayou LaSalle and Bayou LaTerre were performed by Gee & Jenson Engineers-Architects-Planners, Inc. (the study contractor) for FEMA under Contract No. EMW-C-

0159. The coastal and riverine studies were completed in February 1985.

Hydrologic and hydraulic data for mapping and determination of floodways in the upper reaches of the streams listed above as well as for Anner Creek, Bayou Bacon, Catahoula Creek, Crane Creek, Hickory Creek, Necaise Creek, Orphan Creek, the Pearl River, Shiloh Creek, White Cypress Creek and the Wolf River were taken from the FIS prepared by the U.S. Department of Agriculture, Soil Conservation Service (SCS) in 1971 and a second FIS for the Unincorporated Areas of Hancock County (References 1 and 2).

Waveland, City of: The hydrologic and hydraulic analyses for the May 16, 1983 FIS were performed by Gee & Jenson Engineers, Architects, Planners, Inc., the study contractor, for FEMA, under Contract No. EMW-C-0159. This study was completed in March 1982.

The hydrologic and hydraulic analyses for this countywide FIS were performed by the State of Mississippi for FEMA, under Contract No. EMA-2004-CA-5028. This study was completed in ______________.

Base map information shown on the FIRM was provided in digital format by the State of Mississippi. This information was photogrammetrically compiled at a scale of 1:12,000 from aerial photography dated September 2004.

The digital FIRM was produced using the State Plane Coordinate System, Mississippi East, FIPSZONE 2301. The horizontal datum was the North American Datum of 1983, GRS 80 spheroid. Distance units were measured in U.S. feet.

1.3 Coordination

An initial Consultation Coordination Officer's (CCO) meeting is held with representatives from FEMA, the community, and the study contractor to explain the nature and purpose of a FIS, and to identify the streams to be studied by detailed methods. A final CCO meeting is held with representatives from FEMA, the community, and the study contractor to review the results of the study.

The dates of the initial and final CCO meetings held for the communities within the boundaries of Hancock County are shown in Table 1, “CCO Meeting Dates.”

TABLE 1. CCO MEETING DATES

Community Name	Initial CCO Date	Final CCO Date
Bay St. Louis, City of	June 20, 1979	November 18, 1982
Hancock County (Unincorporated Areas)	June 20, 1979	September 15, 1986
Waveland, City of	June 20, 1979	November 19, 1982

For this FIS study, an initial Pre-Scoping Meeting was held on April 4, 2004. A Project Scoping Meeting was held on July 14, 2004, followed by a Post-Scoping Meeting on August 27, 2004. Attendees for these meetings included representatives from the Mississippi Department of Environmental Quality, Mississippi Emergency Management Agency, FEMA National Service Provider, Hancock County and the incorporated communities within Hancock County, and Mississippi Geographic Information, LLC, the State study contractor. Coordination with county officials and Federal, State, and regional agencies produced a variety of information pertaining to floodplain regulations, available community maps, flood history, and other hydrologic data. All problems raised in the meetings have been addressed.

2.0 AREA STUDIED

2.1 Scope of Study

The May 16, 1983 study covered the incorporated area of the City of Bay St. Louis, Hancock County, Mississippi. In the meeting of the FEMA representatives with the community, the entire coastal area of Bay St. Louis was delineated for detailed study. The study analysis includes coastline flooding due to hurricane-induced storm surge. Both the open coast surge and its inland propagation were studied; in addition, the added effects of wave heights were also considered.

The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through March 1987.

The May 16, 1983 study covered the incorporated area of the City of Waveland, Hancock County, Mississippi. In the meeting of the FEMA representatives with the community, the entire coastal area of Waveland was delineated for detailed study. The study analysis includes coastline flooding due to hurricane-induced storm surge. Both the open coast surge and its inland propagation were studied; in addition, the added effects of wave heights were also considered.

The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through March 1987.

The September 18, 1987 study covered the unincorporated areas of Hancock County, Mississippi. The incorporated areas within the county were excluded from this study.

Portions of the flooding caused by overflow of the Bayou Coco, the Jourdan River, Rotten Bayou/Bayou LaSalle and Bayou LaTerre were studied in detail.

Portions of Anner Creek, Bayou Bacon, Catahoula Creek, Crane Creek, Hickory Creek, Necaise Creek, Orphan Creek, Shiloh Creek, White Cypress Creek and the Wolf River were also studied in detail.

A detailed coastal flooding analysis of the entire coastline of Hancock County, where the flooding source is the Mississippi Sound, was included in a previous study (Reference 2). This study also included a statistical analysis of the Pearl River that has been incorporated into this report.

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

Portions of the above streams that were not studied by detailed methods were studied using approximate methods.

The areas studied were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through February 1990. The scope and methods of study were proposed to and agreed upon by FEMA and Hancock County.

This FIS report covers the geographic area of Hancock County, Mississippi, including the incorporated communities listed in Section 1.1.

For this FIS study, no new detailed studies were performed.

Limited detailed analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon, by FEMA and the State of Mississippi. For this FIS study, the following table lists the streams which were restudied and/or newly studied by Limited detailed methods:

TABLE 2. STREAMS STUDIED BY LIMITED DETAILED METHODS

Stream	Limits of Revision/New Limited Detailed Study
Bayou Coco	From a point approximately 400 ft upstream of Old Joe Moran Road to Cuevas Road.
Bayou Coco Tributary 1	From the confluence with Bayou Coco to a point approximately 6,500 ft upstream of the confluence with Bayou Coco.
Bayou Talla	From State Highway 43 to Kiln Picayune Road
Bayou Talla Tributary 3	From the confluence with Bayou Talla to a point approximately 2,300 ft upstream of the confluence with Bayou Talla.

TABLE 2. STREAMS STUDIED BY LIMITED DETAILED METHODS - continued

Stream	Limits of Revision/New Limited Detailed Study
Catahoula Creek	From the confluence with Jourdan River to a point approximately 6,850 ft upstream of the confluence with Hickory Creek, and, From the confluence with Hickory Creek to a point approximately 3,100 ft downstream of Mitchell Road.
Dead Tiger Creek	From the confluence with Catahoula Creek to Flat Top Road.
Hickory Creek	From the confluence with Catahoula Creek to a point approximately 400 ft downstream of the confluence with Crane Pond Branch.
Hickory Creek Tributary 1	From the confluence with Hickory Creek to a point approximately 7,500 ft upstream of the confluence with Hickory Creek.
Jourdan River	From a point approximately 6,000 ft upstream of State Highway 43 to the confluence with Bayou Bacon.
Stall Branch	From the confluence with Dead Tiger Creek to B and B Hunting Club Road.

Also, floodplain boundaries of streams that have been previously studied by detailed methods were redelineated based on up-to-date topographic information.

Numerous flooding sources in the county were studied by approximate methods, and are the basis of the revised Zone A mappings included on the FIRMs.

This countywide FIS reflects a vertical datum conversion from the National Geodetic Vertical Datum of 1929 (NGVD29) to the North American Vertical Datum of 1988 (NAVD88).

2.2 Community Description

Located on the Mississippi Sound in southwest Mississippi, Hancock County encompasses an area of approximately 485 square miles. The county is bounded on the west by St. Tammany Parish, Louisiana, on the south by the Mississippi Sound, on the north by Pearl River County and on the east by Harrison County and St. Louis Bay. The nearest large metropolitan area is the City of New Orleans, Louisiana, located about 30 miles west of Hancock County. Other nearby cities include Mobile, Alabama, located about 75 miles east of the county, and Jackson, Mississippi, located about 120 miles north of the county. The major roads in the county are Interstate Highway 10, U.S. Highway 90 and State Roads 603 and 607. Rail service is provided by the Louisville & Nashville Railroad, which runs east-west along the southern portion of the county. The

2006 population estimate was 40,421, a 5.9 percent decrease over the 2000 population (Reference 3).

Named for John Hancock, Hancock County was established in 1812 in the Mississippi Territory and formally dedicated by the state in 1817. The eastern portion of the county was relinquished to create Harrison County in 1841. Later, the northern portion was extracted to form Pearl River County.

NASA's National Science Technological Laboratory, located south of the City of Picayune, has provided an economic lift for the county in addition to its tourist, agricultural and industrial enterprises.

The topography away from the coastline has good relief with well-defined rises, depressions and confined floodplains. The coastal ridge in the City of Bay St. Louis is approximately 20 feet NGVD29 near U.S. Highway 90 and drops to nearly sea level in the marsh areas near Lake Shore and Bayou Caddie. This marshy lowland extends westward to the East Pearl River.

The Pearl River is the largest river in the county. It flows south, forming the western boundary of the county and extends approximately 400 miles from its source in Neshoba County to Lake Borgne. Its drainage basin encompasses approximately 8,760 square miles.

The climate in Hancock County is mild with mean annual temperatures in the upper 60s. Average winter temperatures range from 53 degrees Fahrenheit to 60 degrees Fahrenheit with mean summer temperatures ranging from 75 degrees Fahrenheit to 82 degrees Fahrenheit. Rainfall averages approximately 62 inches annually with the majority of the accumulation in July through September. Winds in the area are generally southeasterly or southwesterly. Wind speeds usually remain under 10 mph, but increase during storms. Thunderstorms occur between 70 and 80 days a year, many of which are accompanied by severe winds (Reference 4).

A majority of the residential and commercial development is centered around Bay St. Louis, the City of Waveland and Pearlington. The Diamondhead area north of Bay St. Louis is a particularly large development area. Agricultural and forestry interests are confined to the rural northern portions of the county. Residential construction in the Pearlington area is chiefly limited to the floodplain of the East Pearl River. The NASA Mississippi Test Facility includes approximately 150,000 acres within its buffer zone area. Private ownership is permitted within this area; however, construction is restricted.

2.3 Principal Flood Problems

Bay St. Louis is located on the Gulf Coast and St. Louis Bay and primarily subject to flooding as a result of hurricane storm surge. During periods of severe rainfall some flooding occurs as a result of ponding in low-lying areas and areas with inadequate drainage.

Coastal areas are subject to flooding and wave action resulting from hurricanes and tropical storms. Grand bayou and its tributaries are also sources of flooding during periods of heavy rainfall. Other low-lying, poorly drained areas in the community are subjected to ponding during heavy rainfall.

The coastal areas of Hancock County are subject to flooding and wave action as a result of hurricane storm surge and the associated intense rainfall. Riverine and general flooding occurs during heavy rainfall from frontal systems passing through or becoming stationary over the area.

Flooding of the low marshy floodplain of the Pearl River occurs frequently, generally as a result of heavy rainfall or spring runoff from its upper reaches. Recent heavy flooding occurred in April 1979 and April 1980. The flood stage in the lower reaches of the river in April 1980 was estimated by the U.S. Geological Survey (USGS) and the U.S. Army Corps of Engineers (USACE) to be of a magnitude that would occur on the average of once in 67 years (67-year recurrence interval).

Historical descriptions of past hurricanes and related damage are numerous for this area. During the 1800's, storms caused significant damage to the Gulf Coast (Reference 5). Some of the more significant storms that have occurred in this century are as follows:

<u>1909 (September 10 - September 21)</u>

Landfalling in Louisiana, the storm caused tides of 8 to 12 feet along the Mississippi coast. Three hundred and fifty lives were reported lost as a result of the storm (Reference 6).

<u>1915 (September 22 – October 1)</u>

This hurricane made landfall near the Town of Grand Isle, Louisiana, on September 29. Although the storm center passed well west of the Mississippi Coast, a pressure of 28.02 inches of mercury was recorded at Biloxi. High-water elevations ranged from 11.8 feet at Bay St. Louis to 9.0 feet at Gulfport and Biloxi, Mississippi. Two hundred and seventy five lives were reportedly lost in the United States because of the storm (Reference 6).

<u>1947 (September 4 – September 21)</u>

This hurricane entered the Gulf of Mexico after passing over Florida. Continuing across the gulf the hurricane made landfall in southeastern Louisiana on September 19.

High-water marks surveyed after the storm showed elevation ranging from 8 feet at Pascagoula to 15 feet at Bay St. Louis. Portions of the 28-mile seawall were breached during the storm.. Fifty-one people were left dead in its wake with damages estimated at $100 million (Reference 6).

<u>1965 Hurricane Betsy (August 27 – September 12)</u>

Entering the Gulf of Mexico on September 8, Hurricane Betsy proceeded on a northwesterly track, making landfall west of Grande Isle on the evening of the ninth. Betsy left many sections of U.S. Highway 90 along the shoreline damaged as a result of wave action and surge. High-water elevations surveyed after the storm were about 12 feet in the vicinity of Waveland, Bay St. Louis and Pass Christian. The tide gage at Biloxi recorded a peak surge of 8.6 feet (approximately a 4-percent-annual-chance recurrence interval) (References 7 and 8).

1969 Hurricane Camille (August 14 – August 22)

Camille reached hurricane strength on the morning of August 15 with estimated wind speeds of 90 mph near the center of the storm. Its location was 75 miles off the extreme southwestern tip of Cuba. The storm continued to develop rapidly while traveling on a north-northwest track.

Camille was located 155 miles southeast of New Orleans at 1PM CDT on Sunday, August 17, and was tracking to the north-northwest at 12 to 15 mph. Maximum wind speeds were estimated at 160 mph with National Weather Bureau predictions of 190 mph for the same afternoon. The center of Camille passed east of the mouth of the Mississippi River and then made landfall at Waveland and Bay St. Louis at 10:30PM CDT, August 17. The eye was estimated to be 10 to 12 miles in diameter and a central pressure of 26.85 inches of mercury was recorded in Bay St. Louis.

In Waveland, high-water marks up to 19.4 feet NGVD29 were surveyed after the storm. Estimated wind speeds were 140 mph with gusts estimated at 175 mph. Camille ranked five on the Saffir/Simpson Hurricane Scale of 1 to 5, and was the most intense storm to ever hit the United States mainland (Reference 9).

1985 Hurricane Elena (August 28 – September 4)

Elena, named on August 28 over central Cuba, strengthened into a hurricane on August 29 in the open waters of the southeast Gulf of Mexico. A decrease in forward speed and a turn to the east-northeast threatened the Florida panhandle. Elena eventually made an anticyclonic loop off Cedar Key, Florida and began accelerating towards the west-northwest. The storm reached a central pressure of 951 mb on September 1 about 100 mi south of Apalachicola, Florida. Elena weakened after that and made landfall near Biloxi, Mississippi with a central pressure of 959 mb. The highest tides and the storm surge reached about 8 ft in Biloxi and Gulfport, and 10 ft in the Pascagoula area. Several commercial structures were damaged by high winds, estimated at 60 to 105 mph in Gulfport and 90 to 115 mph in Pascagoula. During the period Elena threatened Gulf Coast areas, nearly a million people were evacuated, which may account for the fact that there were no deaths in the area of landfall. Four deaths were attributed to Elena by falling trees, automobile accidents, and heart attacks. The overall economic loss was estimated at over $1.25 billion.

1997 Hurricane Danny (July 16–26)

Danny became a tropical cyclone on July 16 off the southwestern coast of Louisiana. Danny continued to strengthen and became a hurricane early on July 18, but moved slowly and became nearly stationary at times. It finally made landfall just northwest of the Mississippi River Delta near Empire and Buras, Louisiana on July 18. Danny was back in the Gulf of Mexico later the same day and strengthened to Category 1 with 75 mph winds and a minimum central pressure of 984 mb. Danny moved east, then north-northeast near the mouth of Mobile Bay and passed over Dauphin Island before finally making landfall near Mullet Point, Alabama on July 19. The Mississippi coast experienced large amounts of rainfall and estimated winds of about 75 mph near the Mississippi-Alabama state line as Danny traveled toward landfall. Danny was responsible for five deaths in the region. The total reported damages were between $60 and $100 million.

1998 Hurricane Georges (September 15 – October 1)

Georges was named on September 15 while still a tropical storm. It continued to strengthen and reached category 4 status by September 19. Near-surface wind estimates indicated maximum winds of a strong Category 4 hurricane on September 20 about 300 mi east of Guadeloupe in the Lesser Antilles. After making several landfalls along its path from the eastern Atlantic Ocean to the Caribbean Sea, Georges intensified again and made landfall on September 25 in Key West, Florida with a minimum central pressure of 981 mb and maximum winds of 105 mph. The storm shifted eastward and made landfall again, near Biloxi, Mississippi, on the morning of September 28 with a sustained 1-min wind speed of 150 mph and a minimum central pressure of 964 mb. High water marks were taken on the U.S. mainland. Along the Mississippi coast, the range of stillwater marks was 6.9 to 12.1 ft. Similarly, the debris line heights ranged from 5.6 to 12.5 ft in Mississippi. A total of 602 deaths were attributed to Georges making it the 19th-deadliest storm in the Atlantic basin during the twentieth century to date. Most of the deaths were in the Dominican Republic and Haiti, due to flash flooding and subsequent mud slides. One death occurred in the United States—a freshwater drowning in Mobile, Alabama. Insured property damage estimates totaled $2.96 billion in the United States including Puerto Rico and the U.S. Virgin Islands. Based on the insured losses, the total estimated damage from Georges is $5.9 billion, of which $2.31 billion was outside the continental United States.

2005 Hurricane Katrina (August 23-30)

Katrina developed over the central Bahamas on the evening of August 23. The storm strengthened and reached hurricane status on the evening of August 25, less than 2 hours before it made landfall as a Category 1 storm near the border of Miami-Dade County and Broward County. Katrina continued moving west-southwest and entered the Gulf of Mexico early on August 26. The storm intensified to a Category 3 hurricane by noon on August 27 over 275 mi southeast of the mouth of the Mississippi River. Over the next day, Katrina doubled in size and turned toward the northwest. Katrina strengthened to a Category 5 in less than 12 hours and reached 160 mph winds by noon on August 28. Although Katrina did not make landfall near Buras, Louisiana until around noon on August 29 as a strong Category 3 storm (according to best estimates), the storm was large enough that hurricane force winds were reaching the coast as early as August 28.

Since most of the tide gauges failed along the coast and buildings were completely destroyed, it was difficult to determine the storm surge from Katrina. Post-storm assessments by FEMA estimate that the storm surge was 24 to 28 ft along the Mississippi coast across a swath about 20 miles wide, centered roughly on St. Louis Bay. For the eastern half of the Mississippi coast (roughly from Gulfport to Pascagoula), the storm surge was estimated to be 17 to 22 ft reaching up to 6 mi inland and up to 12 mi inland along bays and rivers. Compared to the 1969 storm (Hurricane Camille) that traveled along nearly the same path, Katrina was a weaker storm, but caused as much or more damage due to its large size. The radius of maximum winds was 25-30 n. mi. and hurricane force winds extended at least 75 n mi to the east from the center of the storm. Also, Katrina generated substantial wave setup along the northern Gulf coast while it was still a Category 4 and 5 before it made landfall.

Katrina was a powerful and deadly hurricane that ranks as one of the costliest and one of the five deadliest hurricanes to ever strike the United States. A total of 1,833 fatalities from Louisiana, Mississippi, Florida, Georgia and Alabama are directly and indirectly related to Katrina. Early estimates of the total damages place the losses at over $81 billion.

2.4 Flood Protection Measures

Following the storms of 1909 and 1915 which damaged much of the coastal highway, a protective seawall was constructed to prevent future damage. Elevations along the seawall in Waveland average between 4 and 5 feet NGVD29. Elevations along the seawall in Bay St. Louis average 8 feet NGVD29 from the southern corporate limit to U.S. Highway 90, dropping to 6 feet north of U.S. Highway 90 and again dropping west of Cowand Point to about 4 feet NGVD29.

The seawall has been effective in minimizing wave damage during minimal strength hurricanes. In addition, a man-made beach was placed seaward of the seawall to further attenuate storm damage. The beach has been replenished after each major storm since 1947.

A storm drainage system consisting of natural and man-made ditches handles storm runoff for the less intense rainfall events.

3.0 ENGINEERING METHODS

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

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for each flooding source studied by detailed methods affecting the community.

Pre-Countywide FIS Analyses

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

Analyses were also carried out to establish the peak elevation-frequency relationships for each coastal flooding source studied in detail.

The flows of the required frequencies for the Jourdan River, Bayou Coco, Bayou LaTerre and Rotten Bayou/Bayou LaSalle were based on a method presented in "Flood Frequency of Mississippi Streams" (Reference 10). This report outlined methods of determining the 10- and 1-percent-annual-chance discharges. These values were then graphically extrapolated on log-probability paper to determine the 0.2-percent-annual-chance discharges. Hydrological statistical analysis procedures were utilized to obtain stage-frequency relationships for the Pearl River.

The peak discharges for the streams studied in detail by the SCS were obtained from the USGS publication, "Floods in Mississippi, Magnitude and Frequency" (Reference 11), where applicable. Although the methodologies for the previous and present studies differ, the results are reasonably comparable.

This Countywide Analyses

Peak discharges for the streams studied by Limited detailed methods were calculated based on USGS regional regression equations (Reference 12).

For the discharges calculated based on regional regression equations, the rural regression values were updated to reflect urbanization as necessary.

A summary of the drainage area-peak discharge relationships for all the streams is shown in Table 3, "Summary of Discharges."

TABLE 3. SUMMARY OF DISCHARGES

Detailed Studied Streams

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. mi.)	PEAK DISCHARGES (cfs)			
		10-percent	2-percent	1-percent	0.2-percent
ANNER CREEK					
Approximately 1.3 miles upstream of mouth	*	*	*	1,102	*
BAYOU BACON					
Approximately 0.5 mile downstream of Dossett Road	*	2,633	*	4,730	6,885
Approximately 1.2 miles upstream of Dossett Road	*	2,339	*	4,300	6,106
Approximately 0.6 mile upstream of State Highway 603	*	1,898	*	3,540	5,005
BAYOU COCO					
At Kiln-deLisle Road	3.0	1,050	*	1,970	2,720
At Joe Moran Road	2.1	900	*	1,700	2,320

* Data not available

TABLE 3. SUMMARY OF DISCHARGES - continued

Detailed Studied Streams - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. mi.)	PEAK DISCHARGES (cfs) 10-percent	2-percent	1-percent	0.2-percent
BAYOU LA TERRE					
At mouth	24.9	3,815	*	7,705	10,600
At Firetower Road	15.3	3,272	*	6,453	8,100
Approximately 3 miles upstream of Firetower Road	*	3,099	*	5,673	8,174
CATAHOULA CREEK					
Approximately 1.4 miles upstream of State Highway 43	29.5	3,519	*	6,348	9,108
Approximately 3.2 miles upstream of State Highway 43	27.9	3,663	*	6,660	9,546
Approximately 0.5 mile upstream of Caesar-Necaise Road	23.7	3,780	*	6,880	9,828
Approximately 2.8 miles upstream of Caesar-Necaise Road	17.4	3,375	*	4,900	8,820
CRANE CREEK					
Approximately 0.7 mile upstream of Crane Creek Road	*	*	*	7,800	*
HICKORY CREEK					
Approximately 1.5 miles downstream of State Highway 43	61.9	7,600	*	13,585	19,475
Just downstream of the confluence of White Cypress Creek	59.0	8,346	*	14,980	21,293
Approximately 3.4 miles upstream of the confluence with White Cypress Creek	35.5	6,095	*	10,918	15,794
Approximately 1 mile upstream of the confluence of Necaise Creek	25.9	5,640	*	10,320	14,640
Approximately 1 mile downstream of the northern county boundary	9.6	3,518	*	6,499	9,246
JOURDAN RIVER					
At mouth	390.9	22,394	*	42,302	53,000
At Interstate 10	289.7	18,449	*	34,710	48,800
Just upstream of confluence with Rotten Bayou	219.8	16,594	*	30,921	42,100
Just upstream of confluence with Bayou Talla	210.9	15,935	*	29,668	40,300

* Data not available

TABLE 3. SUMMARY OF DISCHARGES - continued

Detailed Studied Streams - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. mi.)	PEAK DISCHARGES (cfs) 10-percent	2-percent	1-percent	0.2-percent
NECAISE CREEK					
Approximately 1 mile upstream of mouth	4.7	*	*	4,128	*
ORPHAN CREEK					
Approximately 700 feet upstream of State Highway 43	*	*	*	4,870	*
Approximately 4,000 feet upstream of State Highway 603	*	*	*	3,050	*
ROTTEN BAYOU/BAYOU LA SALLE					
At mouth	57.5	8,128	*	16,863	21,850
Just upstream of confluence of Bayou La Terre	30.9	5,442	*	10,964	14,300
Just upstream of confluence of Mill Creek	18.8	4,143	*	8,117	10,700
Approximately 1.8 miles upstream of Kiln-deLisle Road	*	3,315	*	6,068	8,232
Approximately 3.7 miles upstream of Kiln-deLisle Road	*	1,135	*	2,116	3,032
SHILOH CREEK					
Approximately 1.2 miles upstream of mouth	5.1	2,106	*	3,920	5,616
Approximately 3 miles upstream of mouth	2.6	1,915	*	3,595	5,103
WHITE CYPRESS CREEK					
Approximately 1,600 feet downstream of confluence of Shiloh Creek	15.3	4,968	*	9,072	12,960
Approximately1 mile upstream of confluence with Shiloh Creek	5.5	2,204	*	4,070	5,800
Just downstream of State Highway 603	3.7	2,400	*	4,480	6,400
WOLF RIVER					
Approximately 3.3 miles upstream of confluence of Crane Creek	*	12,464	*	22,116	31,388

* Data not available

TABLE 3. SUMMARY OF DISCHARGES - continued

Limited Detailed Studied Streams

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. mi.)	PEAK DISCHARGES (cfs) 10-percent	2-percent	1-percent	0.2-percent
BAYOU COCO TRIBUTARY 1					
Approximately 200 ft upstream of confluence with Bayou Coco	0.5	*	*	497	*
BAYOU TALLA					
At State Highway 43	5.0	*	*	3,574	*
Approximately 50 ft upstream of confluence with Bayou Talla Tributary 3	4.4	*	*	2,305	*
Approximately 150 ft upsteram of confluence with Bayou Talla Tributary 3	2.9	*	*	1,755	*
BAYOU TALLA TRIBUTARY 3					
Approximately 250 ft upstream of confluence with Bayou Talla	0.7	*	*	639	*
DEAD TIGER CREEK					
Just upstream of confluence with Wolf Branch	15.2	*	*	4,126	*
Just upstream of confluence with Stall Branch	8.7	*	*	2,740	*
HICKORY CREEK TRIBUTARY 1					
Just upstream of confluence with Hickory Creek	0.6	*	*	603	*
STALL BRANCH					
Just upstream of confluence with Dead Tiger Creek	4.6	*	*	2,186	*
Approximately 6,750 ft downstream of B and B Hunting Club Road	2.1	*	*	1,368	*
Approximately 1,350 ft downstream of B and B Hunting Club Road	1.1	*	*	930	*

* Data not available

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 Flood Insurance Rate Map (FIRM) represent rounded whole-foot elevations and may not exactly reflect the elevations shown on the Flood Profiles or in the Floodway Data table in the FIS report. Flood elevations shown on the FIRM are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS report in conjunction with the data shown on the FIRM.

Pre-Countywide FIS Analyses

Analyses of the hydraulic characteristics of flooding from the riverine sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Cross sections for the water-surface elevation analyses of the Jourdan River, Bayou Coco, Bayou LaTerre and Rotten Bayou/Bayou LaSalle were obtained by the field measurements. Bridges and culverts were field checked to obtain elevation data and structural geometry.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles. For stream segments for which a floodway was computed (Section 4.2), selected cross-section locations are also shown on the FIRM (Exhibit 3).

Roughness factors (Manning’s “n”) used in hydraulic computations were chosen based on field observations of the stream and floodplain area. The roughness coefficients for the main channel of the Jourdan River ranged from 0.03 to 0.035 with floodplain roughness values ranging from 0.065 to 0.10 for all floods.

The roughness coefficient for the main channel of Bayou Coco, Bayou LaTerre and Rotten Bayou/Bayou LaSalle ranged from 0.03 to 0.05 with floodplain roughness values ranging from 0.08 to 0.12 for all floods.

Water-surface elevations of floods of the selected recurrence intervals of the streams studied in detail were computed through use of the USACE HEC-2 step-backwater computer program (Reference 13). The starting water-surface elevations for all sources were calculated using the slope-area method, except the 10-percent-annual-chance frequency flood of the Jourdan River. Since the starting water-surface elevation of the Jourdan River for the 10-percent-annual-chance frequency flood was lower than the mean tide elevation of 0.3 NGVD29, the known starting water-surface elevation of 0.3 was used.

Historical data were used to establish water-surface elevations for the Pearl River. Water-surface elevations for the other streams previously studied (Reference 1) were computed by establishing rating curves for each cross section. The profiles created from these elevations were redrafted and merged with the profiles of streams re-studied for this study.

Flood Profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals. In cases where the 2- and 1-percent-annual-chance flood elevations are close together, due to limitations of the profile scale, only the 1-percent-annual-chance flood profile has been drawn.

The hydraulic analyses for the riverine study are based only on the effects of 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.

This Countywide Analyses

Cross section geometries were obtained from a combination of terrain data and field surveys. Bridges and culverts located within the limited detailed study limits were field surveyed to obtain elevation data and structural geometry.

Downstream boundary conditions for the hydraulics models were set to normal depth using a starting slope calculated from values taken from topographic data, or where applicable, derived from the water-surface elevations of existing effective flood elevations or recalculated flood elevations. Water-surface profiles were computed through the use of USACE HEC-RAS version 3.1.2 computer program (Reference 14). The model was run for the 1-percent-annual-chance storm for the limited detail and approximate studies.

Manning’s n values used in the hydraulic computations for both channel and overbank areas were based on recent digital orthophotography and field investigations.

Table 4, “Summary of Roughness Coefficients,” shows the ranges of the channel and overbank roughness factors used in the computations for all of the streams studied by Limited detailed methods.

TABLE 4. SUMMARY OF ROUGHNESS COEFFICIENTS

Limited Detailed Studied Streams

FLOODING SOURCE	CHANNEL “N”	OVERBANK “N”
Bayou Coco	0.050	0.150
Bayou Coco Tributary 1	0.050	0.150
Bayou Talla	0.030 – 0.40	0.120
Bayou Talla Tributary 3	0.040	0.120
Catahoula Creek	0.050	0.150
Dead Tiger Creek	0.040 – 0.050	0.120 – 0.150

TABLE 4. SUMMARY OF ROUGHNESS COEFFICIENTS – continued

Limited Detailed Studied Streams		
FLOODING SOURCE	CHANNEL "N"	OVERBANK "N"
Hickory Creek	0.030	0.120
Hickory Creek Tributary 1	0.050	0.150
Jourdan River	0.030 – 0.050	0.120 – 0.150
Stall Branch	0.040	0.120

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 FIRM (Exhibit 3).

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the Flood Profiles (Exhibit 1) are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to NAVD88.

Coastal Analysis

The hydraulic characteristics of flooding from the sources studied were analyzed 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 in the coastal data tables and flood profiles in the FIS report.

Storm Surge Analysis and Modeling

For areas subject to tidal inundation, the 10-, 2-, 1-, and 0.2-percent-annual-chance stillwater elevations and delineations were taken directly from a detailed storm surge study documented in the Technical Study Data Notebook (TSDN) for this new Mississippi coastal flood hazard study.

The Advanced Circulation model for Coastal Ocean Hydrodynamics (ADCIRC) (References 15 & 16), developed by the USACE, was selected to develop the stillwater elevations or storm surge levels for coastal Mississippi. ADCIRC uses an unstructured grid and is a finite-element long wave model. ADCIRC has the capability to simulate tidal circulation and storm surge propagation over large areas and is able to provide highly detailed resolution along the shorelines and areas of interest along the open coast and inland bays. It solves three dimensional equations of motion, including tidal potential, Coriolis, and nonlinear terms of the governing equations. The model is formulated from the depth averaged shallow water equations for conservation of mass and momentum which results in the generalized wave continuity equation.

The coastal wave model Simulating Waves Nearshore (SWAN) (Reference 17) is used to calculate the nearshore wave fields required for the addition of wave setup effects. This numerical model is a third-generation (phase-averaged) wave model for the simulation of waves in waters of extreme, intermediate, and finite depths. Model characteristics include the capping of the atmospheric drag coefficient, dynamic adjustment of bathymetry for changing water levels, and specification of the required save points. Three nested grids are used to obtain sufficient nearshore resolution to represent the radiation stress gradients required as ADCIRC inputs. Radiation stress fields output from the SWAN inner grids are used by ADCIRC to estimate the contribution of breaking waves (wave setup effects) to the total storm surge water level.

In order to model storm surge and wave fields using ADCIRC and SWAN, wind and pressure fields are required for input. A model called the Planetary Boundary Layer model (PBL), developed by V.J. Cardone (Reference 18), uses the parameters from a hurricane or storm to simulate the event and develop wind and pressure fields. The PBL model simulates hurricane induced wind and pressure fields by applying the vertically integrated equations of motion. Oceanweather Inc. provided support to run the PBL model and provide wind and pressure fields for each of the selected storms events.

The Joint Probability Method (JPM) was used to develop the stillwater frequency curves for the 10-, 2-, 1-, and 0.2-percent-annual-chance stillwater elevations. The original JPM application, while not called JPM, was developed by Larry Russell (Reference 19). The JPM approach is a simulation methodology that relies on the development of statistical distributions of key hurricane input variables such as central pressure, radius to maximum wind speed, maximum wind speed, translation speed, track heading, etc., and sampling from these distributions to develop model hurricanes. The resulting simulation results in a family of modeled storms that preserve the relationships between the various input model components, but provides a means to model the effects and probabilities of storms that historically have not occurred. The JPM approach was modified for this coastal study based on updated statistical methods developed by FEMA and the USACE for Mississippi and Louisiana. Further details on the JPM approach are included in the Technical Support Data Notebook (TSDN).

An existing ADCIRC grid mesh developed by the USACE was refined along the shoreline of Mississippi and surrounding areas using bathymetric and topographic data from various sources. Bathymetric data consisted of ETOPO5 and Digital Nautical Charts databases in the offshore regions, and was supplemented with NOAA hydrographic surveys. In the nearshore regions, bathymetric data came from the Northern Gulf Littoral Initiative, Naval Oceanographic Office multi-beam and single-beam bathymetry, NOAA bathymetric surveys, and NOAA charts. The topographic portion of the ADCIRC mesh was populated with topographic light detection and ranging (LIDAR) from several sources. For areas inland of the debris line from Hurricane Katrina, pre-Katrina LIDAR collected by EarthData International was used. For areas seaward of the debris line from Hurricane Katrina, post-Katrina LIDAR collected by Woolpert Inc. was used. For the offshore barrier islands, topographic data was taken from LIDAR collected by the USACE. For rivers, channel bottom elevations were taken from riverine profiles from effective FISs. All bathymetric and topographic data were brought to the NAVD88 datum for input to ADCIRC and SWAN. Further details about the terrain data and how it was processed can be found in the TSDN for this study.

The completed ADCIRC grid mesh resulted in a finite element model coded with over 900,000 grid nodes. The NOAA high definition vector shoreline was used to define the change between water and land elements. The grid includes other features, such as islands, roads, bridges, open waters, bays, and rivers. Field reconnaissance detailed the significant drainage and road features, and documentation of coastal structures in the form of seawalls, bulkheads, harbors, and casinos along the beachfront areas. The National Land Cover Dataset was used to define Manning's n values for bottom roughness coefficients input at each node in the mesh. A directional surface wind roughness value was also applied. Further details about the ADCIRC mesh creation and grid development process can be found in the TSDN.

Predicted tidal cycles were used to calibrate the ADCIRC model and refine the grid. Tidal boundary conditions were obtained from the EastCoast2001 tidal database, a digital tidal constituent database. Six tidal constituents were used (K1, O1, M2, S2, N2, and K2). The simulated water-surface elevation time series was compared to measured tides from tide gauge stations for over a 30-day period. Model validation, which tests the model hydraulics and ability to reproduce events, was performed against Hurricanes Katrina (2005), Betsy (1965), and Camille (1969). Simulated water levels for each event were compared to observed water levels from NOAA tidal gauges, as well as available high water marks. Hurricanes Georges and Katrina were used to validate the SWAN model. Modeled wave heights were compared to available historic wave data from NOAA wave buoys.

The SWAN model, used to calculate the wave setup component, used the same topographic and bathymetry data as the ADCIRC grid. The model is forced with wind and pressure fields and deepwater waves calculated by the WAM model from Oceanweather Inc. Results from the SWAN model, run on a low resolution grid, are input to a low resolution ADCIRC grid. Then the water level and wave effects results from ADCIRC are input to a high resolution SWAN grid to obtain the final radiation stress input for a high resolution ADCIRC grid. This process is repeated for the production run of each of the hundreds of synthetic hurricane simulations. The final radiation stress files are also modified to decrease the magnitude of wave radiation stress in vegetated areas before being input to ADCIRC.

Statistical Analysis

Due to the excessive number of simulations required for the traditional JPM method, the Joint Probability Method-Optimum Sampling (JPM-OS) was utilized to determine the stillwater elevations associated with tropical events. JPM-OS is a modification of the JPM method developed cooperatively by FEMA and the USACE for Mississippi and Louisiana coastal flood studies that were being performed simultaneously, and is intended to minimize the number of synthetic storms that are needed as input to the ADCIRC model. The methodology entails sampling from a distribution of model storm parameters (e.g., central pressure, radius to maximum wind speed, maximum wind speed, translation speed, and track heading) whose statistical properties are consistent with historical storms impacting the region, but whose detailed tracks differ. The methodology inherently assumes that the hurricane climatology over the past 60 to 65 years (back to 1940) is representative of the past and future hurricanes likely to occur along the Mississippi coast.

Production runs were carried out with SWAN and ADCIRC on a set of hypothetical storm tracks and storm parameters in order to obtain the maximum water levels for input to the statistical analysis. The hypothetical (synthetic) population of storms was divided into two groups, one for hurricanes of Saffir-Simpson scale Category 3 and 4 strength or "greater storms" and another set for hurricanes of Category 2 strength or "lesser storms." The parameters for each group of the greater storms and lesser storms are provided in Table 5, "Parameter Values for Surge Elevations." A total of 228 individual storms with different tracks and various combinations of the storm parameters were chosen for the production run set of synthetic hurricane simulations. Each storm was run for at least 3 days of simulation and did not include tidal forcing. Wind and pressure fields obtained from the PBL model and wave radiation stress from the SWAN model were input to the ADCIRC model for each production storm. All stillwater results for this study include the effects of wave setup; stillwater without wave effects was not simulated with ADCIRC. Stations for maximum water-surface output were selected on a 500-meter grid with additional stations along drainage features. This resulted in a total of 4,205 stations where the JPM-OS method was applied to obtain return periods of the stillwater elevation. Further details about the production run process can be found in the TSDN.

Stillwater Elevations

The results of the ADCIRC model, as described above, provided stillwater elevations, including wave setup effects that are statistically analyzed to produce probability curves. The JPM-OS is applied to obtain the return periods associated with tropical storm events. The approach involves assigning statistical weights to each of the simulated storms and generating the flood hazard curves using these statistical weights. The statistical weights are chosen so that the effective probability distributions associated with the selected greater and lesser storm populations reproduce the modeled statistical distributions derived from all historical storms.

Stillwater elevations for each of the respective coastal counties of Mississippi (Hancock, Harrison, and Jackson Counties), obtained using the ADCIRC and JPM-OS models, are provided for JPM and ADCIRC grid node locations for the 10-, 2-, 1-, or 0.2-percent-annual-chance return period stillwater elevations in the "Summary of Stillwater Elevations" table in the Appendix to this FIS. The location of these JPM and ADCIRC grid node stations for each set of return period elevations are listed by their geographic (longitude, latitude) coordinates for reference. A detailed accounting of the statistical analysis and final return period elevations are included in the TSDN.

Wave Height Analysis

Areas of coastline subject to significant wave attack are referred to as coastal high hazard zones. The USACE has established the 3-foot breaking wave as the criterion for identifying the limit of coastal high hazard zones (Reference 20). The 3-foot wave has been established as the minimum size wave capable of causing major damage to conventional wood frame and brick veneer structures.

TABLE 5. PARAMETER VALUES FOR SURGE ELEVATIONS (Greater Storms)												
	Holland's B		Radius of the scale pressure profile (Nmi)		Sea level pressure (mb)		Forward Speed	Storm Direction	Pre-Filling	Post-Filling		Annual Rate
Track:	Offshore	Landfall	Offshore	Landfall	Offshore	Landfall	(m/s)	(Degree)	Model	Model	Prob.	(#Storm/Km/year)
1	1.27	1.00	18.61	24.20	933.70	946.31	6.047	-38.91	R	V	1.33E-01	1.32E-03
2	1.27	1.00	39.82	51.80	937.80	955.83	6.047	-13.49	R	V	1.20E-01	2.55E-03
3	1.27	1.00	22.93	29.80	946.30	963.28	6.047	-38.92	R	V	1.33E-01	1.63E-03
4	1.27	1.00	10.83	14.40	950.80	955.83	6.047	-13.49	R	V	1.20E-01	6.94E-04
5	1.27	1.00	20.77	27.00	941.10	955.83	6.047	56.66	R	V	1.08E-01	1.19E-03
6	1.27	1.00	14.70	19.10	911.30	920.05	5.943	-12.81	R	V	3.42E-02	2.68E-04
7	1.27	1.00	30.80	40.00	916.40	934.41	6.014	-12.82	R	V	5.34E-02	8.77E-04
8	1.27	1.00	16.56	21.50	923.80	934.41	4.349	47.33	R	V	4.20E-02	3.71E-04
9	1.27	1.00	8.90	8.90	934.40	934.41	6.014	-12.82	R	V	5.34E-02	2.54E-04
10	1.27	1.00	16.56	21.50	923.80	934.41	14.540	-12.86	R	V	3.49E-02	3.08E-04
11	1.27	1.00	17.98	23.40	931.00	942.98	5.943	-12.82	R	V	3.42E-02	3.28E-04
12	1.27	1.00	16.56	21.50	923.80	934.41	4.346	-71.04	R	V	4.20E-02	3.71E-04
13	1.27	1.00	11.66	15.20	878.60	884.30	5.943	-12.81	R	V	1.06E-02	6.58E-05
14	1.27	1.00	25.30	32.90	891.30	909.30	6.014	-12.82	R	V	1.65E-02	2.23E-04
15	1.27	1.00	13.60	17.70	901.70	909.30	4.349	47.33	R	V	1.30E-02	9.44E-05
16	1.27	1.00	7.31	7.30	909.30	909.30	6.014	-12.82	R	V	1.65E-02	6.44E-05
17	1.27	1.00	13.60	17.70	901.70	909.30	14.540	-12.86	R	V	1.08E-02	7.83E-05
18	1.27	1.00	14.53	18.90	910.00	918.53	5.943	-12.82	R	V	1.06E-02	8.20E-05
19	1.27	1.00	13.60	17.70	901.70	909.30	4.346	-71.04	R	V	1.30E-02	9.43E-05

TABLE 5. PARAMETER VALUES FOR SURGE ELEVATIONS (Lesser Storms)												
	Holland's B		Radius of the scale pressure profile (Nmi)		Sea level pressure (mb)		Forward Speed	Storm Direction	Pre-	Post-		
Track:	Offshore	Landfall	Offshore	Landfall	Offshore	Landfall	(m/s)	(Degree)	Filling Model	Filling Model	Prob.	Annual Rate (#Storm/Km/year)
1	1.27	1.00	41.59	54.10	948.60	966.62	5.42	8.76	R	V	7.29E-02	1.80E-03
2	1.27	1.00	53.63	69.70	957.20	975.25	3.00	23.55	R	V	6.45E-02	2.05E-03
3	1.27	1.00	21.64	28.10	953.10	968.72	3.40	63.87	R	V	7.18E-02	9.23E-04
4	1.27	1.00	12.72	16.50	965.60	972.29	4.93	-9.32	R	V	9.11E-02	6.88E-04
5	1.27	1.00	44.24	57.50	963.20	981.22	4.88	-11.27	R	V	6.85E-02	1.80E-03
6	1.27	1.00	17.19	22.40	969.70	980.89	6.10	31.22	R	V	4.98E-02	5.08E-04
7	1.27	1.00	24.32	31.60	960.30	978.33	6.94	-71.07	R	V	7.55E-02	1.09E-03
8	1.27	1.00	16.94	22.00	954.50	965.47	4.38	-31.63	R	V	5.07E-02	5.10E-04
9	1.27	1.00	27.82	36.20	952.90	970.91	3.71	-59.19	R	V	1.18E-01	1.95E-03
10	1.27	1.00	24.31	31.60	960.30	978.33	2.46	-5.25	R	V	7.55E-02	1.09E-03
11	1.27	1.00	21.64	28.10	953.10	968.72	10.50	-13.83	R	V	7.18E-02	9.23E-04
12	1.27	1.00	53.63	69.70	957.20	975.25	7.89	-45.75	R	V	6.45E-02	2.05E-03
13	1.27	1.00	29.79	38.70	958.00	975.96	6.64	46.64	R	V	1.26E-01	2.22E-03

Figure 1 shows a profile for a typical transect illustrating the effects of energy dissipation and regeneration on a wave as it moves inland. This figure shows the wave crest elevations being decreased by obstructions, such as buildings, vegetation, and rising ground elevations, and being increased by open, unobstructed wind fetches. Figure 1 also illustrates the relationship between the local stillwater elevation, the ground profile, and the location of the V/A boundary. This inland limit of the coastal high hazard area is delineated to ensure that adequate insurance rates apply and appropriate construction standards are imposed, should local agencies permit building in this coastal high hazard area.

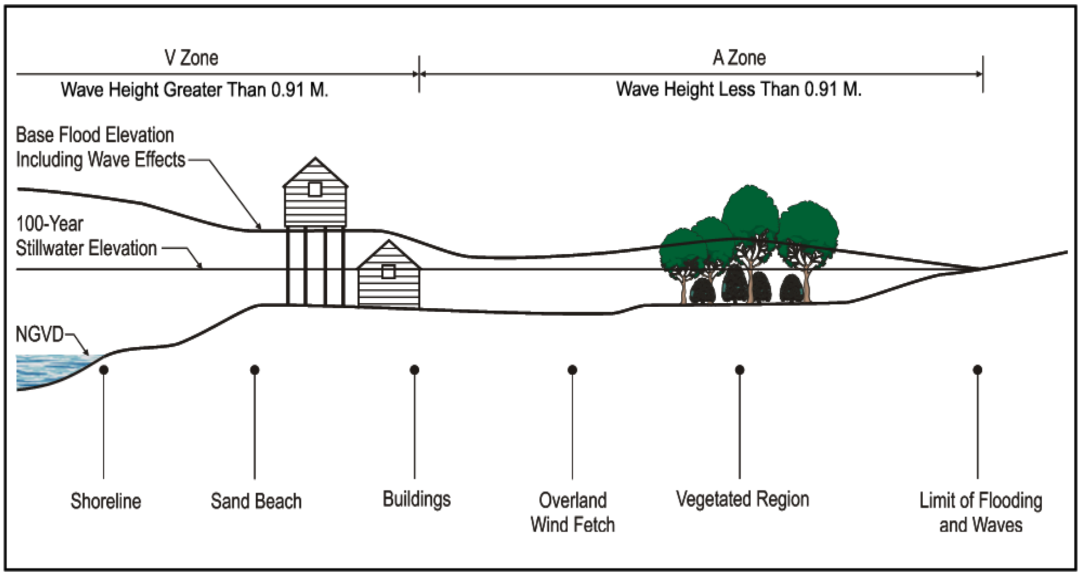


FIGURE 1. TRANSECT SCHEMATIC

Offshore wave characteristics representing a 1- and 0.2-percent-annual-chance flood event were determined using the SWAN 2-D wave model previously used for the wave setup modeling. The results from SWAN modeling for the storm surge study were used to apply a statistical analysis on the wave heights. Mean wave characteristics were determined as specified in the FEMA guidance for V-Zone mapping:

$$H_{bar} = (h_s)(0.625)$$
$$T_{bar} = (T_s)(0.85)$$

Wave H_{bar} is the average wave height of all waves, H_s is the significant wave height or the average over the highest one third of waves, T_{bar} is the average wave period, and T_s is the significant wave associated with the significant wave height.

The wave transects for this study were located considering the physical and cultural characteristics of the land so that they would closely represent conditions in their locality. Transects were spaced close together in areas of complex topography and dense development. In areas having more uniform characteristics, the transects were spaced at larger intervals. Transects are also located in areas where unique flooding existed and in areas where computer wave heights varied significantly between adjacent transects. Transects are shown on the respective FIRM panels for incorporated areas and unincorporated areas of Harrison, Hancock, and Jackson Counties.

The transect profiles were obtained using bathymetric and topographic data from various sources. Bathymetric data consisted of the Northern Gulf Littoral Initiative (NGLI), which reflects data gathered by multiple Federal and State agencies, universities, and private contractors. The NGLI data were augmented, where necessary, by NOAA navigation charts. The topographic data sources included pre-Hurricane Katrina LIDAR data, which were collected between 2003 and 2005 by the State of Mississippi and the NOAA, and were merged with post-Katrina (September-October 2005) LIDAR data collected along the coast by the USACE. All bathymetric and topographic data were brought to the NAVD88.

Post-Katrina aerial imagery was also utilized. This imagery, dated September 15, 2005, originated from the U.S. Department of Agriculture and was used to define features such as buildings, forested vegetation, and mash grass for input to the wave height models. Detailed information about the features, such as building types and density and vegetation types was gathered during a ground field reconnaissance performed along each transect.

Standard erosion methods defined by FEMA are typically applied to new coastal studies. However, since post-Katrina topographic LIDAR is being used for the transect profiles, it was assumed that the topographic data already represented eroded conditions (post-Katrina) that match that of a 1-percent-annual-chance event. Thus, no storm-induced erosion analysis was performed for this study. Primary frontal dune mapping was only applied along a segment of the coast in Jackson County, but was not applied anywhere else along the coast of Mississippi due to post-Katrina erosion impacts.

Wave height calculation used in this study follows the methodology described in the Appendix D of the 2003 FEMA Guidelines and Specifications for Flood Hazard Mapping Partners (Reference 21). WHAFIS 4.0 was used to calculate overland wave height propagation and establish base flood elevations. In addition to the 1-percent-annual-chance event, the 0.2-percent-annual-chance event was also modeled with WHAFIS 4.0. The 0.2-percent wave height results are not included on the FIRMs but are provided as wave transect profiles in this FIS.

Stillwater elevations were applied to each ground station along a transect and input to WHAFIS. The stillwater elevations were obtained from the storm surge study at each station where return periods were calculated and values were interpolated between stations to the transects locations. Wave setup was not calculated separately because wave setup was included in the base stillwater elevations from the storm surge analysis.

Wave runup was calculated at selected transects where the slope was steeper than 1 on 10. FEMA (2005) “Procedure Memorandum No. 37” (Reference 22) now recommends the use of the 2-percent wave runup for determining base flood elevations. The 2-percent wave runup was determined using the Technical Advisory Committee for Water Retaining Structures (TAW) method (Reference 23). For wave runup at the crest of a slope that transitions to a plateau or downslope, runup values were determined using the “Methodology for wave runup on a hypothetical slope” as described in Appendix D of the 2003 FEMA Guidelines and Specifications for Flood Hazard Mapping Partners (Reference 21).

Along each transect, wave envelopes were computed considering the combined effects of changes in ground elevation, vegetation, and physical features. Between transects, elevations were interpolated using topographic maps, land-use and land-cover data, and engineering judgment to determine the aerial extent of flooding. The results of the calculations are accurate until local topography, vegetation, or cultural developments within the community undergo major changes. The transect data for Hancock County is presented in Table 6, "Coastal Data Table," where the flood hazard zone and base flood elevations for each transect flooding source is provided. This table also describes the location of each transect and provides the 10-, 2-, 1-, and 0.2-percent-annual-chance stillwater elevations at the start of the transect and the range found along the length of the transect.

3.3 Vertical Datum

All FIS reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum in use for newly created or revised FIS reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD29). With the finalization of the North American Vertical Datum of 1988 (NAVD88), many FIS reports and FIRMs are being prepared using NAVD88 as the referenced vertical datum.

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

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 abutment)
>
> Stability C: Monuments which may be affected by surface ground movements (e.g., concrete monuments below frost line)
>
> Stability D: Mark of questionable or unknown vertical stability (e.g., concrete monument above frost line, or steel witness post)

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

TABLE 6. COASTAL DATA TABLE

Community Name	Transect	Description	Latitude & Longitude at Start of Transect	Starting Stillwater Elevations (feet NAVD 88) Range of Stillwater Elevations (feet NAVD88)				Zone Designation and BFE (feet NAVD 88)
				10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance	
Unincorporated Hancock County	1	Lake Borgone extended from Pearl River Island in Louisiana	(30.1726, -89.5698)	5.0 3.5-5.0	14.7 11.5-14.7	17.3 14.5-17.3	21.2 17.4-21.2	VE 18-25 AE 14-18
Unincorporated Hancock County	2	Lake Borgone extended from Pearl River Island in Louisiana	(30.1781, -89.5614)	5.0 2.8-5.0	14.8 8.9-14.8	17.1 10.6-17.1	21.1 13.9-21.1	VE 18-25 AE 11-18
Unincorporated Hancock County	3	Lake Borgone extended from Pearl River Island in Louisiana	(30.1822, -89.5480)	5.0 3.9-5.0	14.7 12.6-15.1	17.1 14.2-17.5	21.2 18.2-21.9	VE 20-25 AE 14-20
Unincorporated Hancock County	4	Lake Borgone extended from eastern edge of Pearl River Island in Louisiana	(30.1857, -89.5310)	5.1 3.2-5.1	14.7 8.8-15.3	17.1 10.4-17.7	21.3 14.3-21.9	VE 19-25 AE 11-19
Unincorporated Hancock County	5	Lake Borgone just east of the state line	(30.1833, -89.5191)	5.1 4.1-5.1	14.7 12.2-15.4	17.1 14.7-18.0	21.3 16.1-22.2	VE 20-25 AE 15-20

TABLE 6. COASTAL DATA TABLE (Cont.)

Community Name	Transect	Description	Latitude & Longitude at Start of Transect	Starting Stillwater Elevations (feet NAVD 88) Range of Stillwater Elevations (feet NAVD88)				Zone Designation and BFE (feet NAVD 88)
				10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance	
Unincorporated Hancock County	6	Lake Borgone east of the state line	(30.1825, -89.5017)	5.2 4.5-5.2	14.7 13.5-15.4	17.1 13.2-17.8	21.3 15.5-22.5	VE 20-25 AE 13-20
Unincorporated Hancock County	7	Lake Borgone east of the state line	(30.1869, -89.4907)	5.2 5.0-5.2	14.8 10.8-15.4	17.2 11.9-18.0	21.4 14.8-22.4	VE 20-25 AE 12-20
Unincorporated Hancock County	8	Lake Borgone east of the state line	(30.1927, -89.4782)	5.3 4.9-5.3	14.8 10.5-15.6	17.3 11.6-18.4	21.6 15.7-22.6	VE 20-25 AE 12-20
Unincorporated Hancock County	9	Gulf of Mexico/Mississippi Sound east of the state line	(30.1839, -89.4497)	5.4 5.3-5.4	14.6 13.2-15.8	17.1 15.6-18.4	21.4 16.6-23.0	VE 20-25 AE 16-20
Unincorporated Hancock County	10	Gulf of Mexico/Mississippi Sound east of the state line	(30.2055, -89.4463)	5.5 5.4-5.5	15.0 10.8-15.8	17.6 13.6-18.4	22.1 16.5-22.8	VE 20-26 AE 13-20

TABLE 6. COASTAL DATA TABLE (Cont.)

Community Name	Transect	Description	Latitude & Longitude at Start of Transect	Starting Stillwater Elevations (feet NAVD 88) Range of Stillwater Elevations (feet NAVD88)				Zone Designation and BFE (feet NAVD 88)
				10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance	
Unincorporated Hancock County	11	Gulf of Mexico/Mississippi Sound east of the state line	(30.2148, -89.4359)	5.5 5.0-5.5	15.1 10.3-15.8	17.6 13.6-18.4	22.2 15.2-23.0	VE 21-26 AE 12-21
Unincorporated Hancock County	12	Gulf of Mexico/Mississippi Sound at S Beach Blvd	(30.2417, -89.4248)	5.6 5.2-5.6	15.4 15.4-15.6	18.2 18.2-18.3	22.9 22.8-22.9	VE 24-27
Unincorporated Hancock County	13	Gulf of Mexico /Mississippi Sound at Lakeshore Road	(30.2465, -89.4242)	5.6 4.5-5.7	15.5 10.6-16.0	18.2 13.6-18.4	23.0 15.9-23.2	VE 21-27 AE 12-21
Unincorporated Hancock County	14	Gulf of Mexico /Mississippi Sound at south of Point Set Ave	(30.2525, -89.4207)	5.6 5.6-5.7	15.5 12.5-15.8	18.3 13.6-18.4	23.1 19.8-23.2	VE 21-27 AE 16-20
Unincorporated Hancock County	15	Gulf of Mexico/Mississippi Sound at Bordage Street	(30.2562, -89.4154)	5.6 4.3-5.7	15.5 10.5-15.9	18.3 13.6-18.4	23.2 16.1-23.3	VE 21-27 AE 16-20

TABLE 6. COASTAL DATA TABLE (Cont.)

Community Name	Transect	Description	Latitude & Longitude at Start of Transect	Starting Stillwater Elevations (feet NAVD 88) Range of Stillwater Elevations (feet NAVD88)				Zone Designation and BFE (feet NAVD 88)
				10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance	
Waveland, City of Hancock County	16	Gulf of Mexico/Mississippi Sound at the SW corner of Buccaneer State Park	(30.2589, -89.4082)	5.6 5.6-5.7	15.5 13.3-15.6	18.3 15.9-18.6	23.1 20.4-23.2	VE 21-27 AE 16-21
Waveland, City of Hancock County	17	Gulf of Mexico/Mississippi Sound at the center of Buccaneer State Park	(30.2612, -89.4008)	5.6 4.4-5.7	15.5 11.6-15.7	18.2 14.4-18.6	23.0 18.0-23.4	VE 21-27 AE 17-21
Waveland, City of Hancock County	18	Gulf of Mexico/Mississippi Sound at NE corner of Buccaneer State Park	(30.2635, -89.3933)	5.6 5.6-5.6	15.4 13.6-15.7	18.0 16.2-18.4	23.0 20.5-23.4	VE 20-26 AE 16-20
Waveland, City of Hancock County	19	Gulf of Mexico /Mississippi Sound at Sears Ave	(30.2667, -89.3863)	5.6 4.6-5.6	15.4 11.8-15.6	18.1 15.2-18.2	23.1 18.0-23.7	VE 20-26 AE 16-20
Waveland, City of Hancock County	20	Gulf of Mexico/Mississippi Sound at Waveland Ave	(30.2704, -89.3797)	5.7 4.6-5.7	15.4 13.7-15.6	18.2 16.1-18.2	23.1 20.6-23.7	VE 20-26 AE 16-20

TABLE 6. COASTAL DATA TABLE (Cont.)

Community Name	Transect	Description	Latitude & Longitude at Start of Transect	Starting Stillwater Elevations (feet NAVD 88) Range of Stillwater Elevations (feet NAVD88)				Zone Designation and BFE (feet NAVD 88)
				10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance	
Waveland, City of Hancock County	21	Gulf of Mexico/Mississippi Sound at Farrar Street	(30.2756, -89.3746)	5.7 4.1-5.7	15.4 11.7-15.6	18.0 14.6-18.3	23.1 17.9-23.5	VE 19-26 AE 15-20
Waveland, City of Hancock County	22	Gulf of Mexico/Mississippi Sound at St. Joseph St	(30.2809, -89.3696)	5.7 4.5-5.7	15.5 14.1-15.6	18.3 16.9-18.5	23.5 21.4-23.6	VE 21-27 AE 17-21
Waveland, City of Hancock County	23	Gulf of Mexico/Mississippi Sound at Mollere Street	(30.2853, -89.3641)	5.7 4.4-5.7	15.4 12.2-15.5	18.3 15.7-18.5	23.2 18.1-23.6	VE 21-27 AE 16-21
Waveland, City of Hancock County	24	Gulf of Mexico/Mississippi Sound at east of Nicholson Ave	(30.2892, -89.3573)	5.7 5.7-5.7	15.4 15.4-15.5	18.1 15.7-18.5	23.2 23.0-23.5	VE 20-26 AE 18-20
Waveland, City of Hancock County	25	Gulf of Mexico/Mississippi Sound at Acadian Bay Ln	(30.2915, -89.3498)	5.7 4.6-5.7	15.4 13.4-15.6	18.2 16.5-18.7	23.3 20.6-23.8	VE 21-27 AE 17-21

TABLE 6. COASTAL DATA TABLE (Cont.)

Community Name	Transect	Description	Latitude & Longitude at Start of Transect	Starting Stillwater Elevations (feet NAVD 88) Range of Stillwater Elevations (feet NAVD88)				Zone Designation and BFE (feet NAVD 88)
				10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance	
Bay St. Louis, City of Hancock County	26	Gulf of Mexico/Mississippi Sound at Bay Oaks Dr	(30.2944, -89.3426)	5.7 5.7-5.7	15.3 15.3-15.3	18.1 18.1-18.1	23.1 22.8-23.1	VE 20-26 AE 18-20
Bay St. Louis, City of Hancock County	27	Gulf of Mexico/Mississippi Sound at south of St. Charles St	(30.2982, -89.3360)	5.7 5.3-5.7	15.3 15.0-15.4	18.1 17.6-18.1	23.1 21.4-23.1	VE 20-26 AE 18-20
Bay St. Louis, City of Hancock County	28	Gulf of Mexico/Mississippi Sound at Sycamore St	(30.3028, -89.3302)	5.6 5.6-5.6	15.2 15.2-15.2	18.0 18.0-18.0	23.1 22.8-23.1	VE 20-26 AE 18-20
Bay St. Louis, City of Hancock County	29	Gulf of Mexico/Mississippi Sound at north of Union St	(30.3084, -89.3258)	5.6 4.4-5.6	15.2 13.8-15.4	17.9 16.6-18.0	23.1 21.0-23.1	VE 20-26 AE 17-20
Bay St. Louis, City of Hancock County	30	Gulf of Mexico/Mississippi Sound at Ulman Street	(30.3138, -89.3232)	5.6 5.1-5.6	15.1 15.1-16.1	17.8 17.7-17.9	22.8 22.7-22.9	VE 20-26 AE 18-20

TABLE 6. COASTAL DATA TABLE (Cont.)

Community Name	Transect	Description	Latitude & Longitude at Start of Transect	Starting Stillwater Elevations (feet NAVD 88) Range of Stillwater Elevations (feet NAVD88)				Zone Designation and BFE (feet NAVD 88)
				10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance	
Bay St. Louis, City of Hancock County	31	St. Louis Bay/Gulf of Mexico between Hwy 90 and Felicity Street	(30.3229, -89.3250)	5.6 5.6-5.6	15.0 15.0-15.7	17.8 17.6–17.8	22.7 22.0-22.7	VE 20-24 AE 18-20
Bay St. Louis, City of Hancock County	32	St. Louis Bay/Gulf of Mexico north of Burnett Street	(30.3358, -89.3325)	5.1 4.9-5.5	14.8 14.8-15.5	17.9 17.4-18.1	22.9 21.9-22.9	VE 21-25 AE 18-20
Bay St. Louis, City of Hancock County	33	St. Louis Bay/Gulf of Mexico at wetland area north of Wolf Street	(30.3461, -89.3661)	4.9 4.9-5.5	14.7 14.7-15.2	17.9 17.3-17.9	22.6 21.9-22.6	VE 22-25 (AE N/A)
Unincorporated Hancock County	34	St. Louis Bay/Gulf of Mexico at south of Diamond Head Development	(30.3520, -89.3664)	5.6 5.0-5.6	15.5 12.7-15.5	18.2 15.9-18.2	23.1 20.3-23.1	VE 19-25 AE 19-16
Unincorporated Hancock County	35	St. Louis Bay/Gulf of Mexico at south of Diamond Head Development	(30.3588, -89.3624)	5.6 4.4-5.6	15.6 14.1-15.7	18.3 16.7-18.5	23.3 21.1- 23.4	VE 20-25 AE 17-20

TABLE 6. COASTAL DATA TABLE (Cont.)

Community Name	Transect	Description	Latitude & Longitude at Start of Transect	Starting Stillwater Elevations (feet NAVD 88) Range of Stillwater Elevations (feet NAVD88)				Zone Designation and BFE (feet NAVD 88)
				10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance	
Unincorporated Hancock County	36	St. Louis Bay/Gulf of Mexico at south of Diamond Head Development	(30.3626, -89.3589)	5.6 4.7-5.6	15.6 14.2-16.1	18.4 17.1-18.6	23.4 21.6-23.6	VE 21-26 AE 17-21
Unincorporated Hancock County	37	St. Louis Bay/Gulf of Mexico at the wetland south of I-10	(30.3681, -89.3540)	5.6 4.9-5.6	15.7 14.1-15.9	18.5 17.1-18.6	23.5 21.1-23.5	VE 20-26 AE 17-20
Unincorporated Hancock County	38	St. Louis Bay/Gulf of Mexico just west of the county boundary	(30.3708, -89.3486)	5.6 5.6-5.6	15.7 15.7-16.0	18.5 18.5-18.8	23.6 23.6-24.0	VE 21-26 AE 19-21

The elevations shown in the FIS report and on the FIRM for Hancock County are referenced to NAVD88. Ground, structure, and flood elevations may be compared and/or referenced to NGVD29 by applying a conversion factor. To convert elevations from NAVD88 to NGVD29, add -0.05 feet to the NGVD29 elevation. The -0.05 feet value is an average for the entire County. The BFEs shown on the FIRM represent whole-foot rounded values. For example, a BFE of 12.4 feet will appear as 12 feet on the FIRM, and 12.6 feet as 13 feet. Users who wish to convert the elevations in this FIS report to NGVD29 should apply the stated conversion factor to elevations shown on the Flood Profiles and supporting data tables in the FIS report, which are shown at a minimum to the nearest 0.1 foot.

To obtain current elevation, description, and/or location information for bench marks shown on the FIRM for this jurisdiction, or for information regarding conversion between the NGVD29 and NAVD88, see the FEMA publication entitled *Converting the National Flood Insurance Program to the North American Vertical Datum of* 1988 (FEMA, June 1992), or contact the Vertical Network Branch, National Geodetic Survey, Coast and Geodetic Survey, National Oceanic and Atmospheric Administration, Rockville, Maryland 20910 (Internet address http://www.ngs.noaa.gov).

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

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each FIS provides 1-percent-annual-chance 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 Table. Users should reference the data presented in the FIS report as well as additional information that may be available at the local map repository before making flood elevation and/or floodplain boundary determinations.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent-annual-chance flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent-annual-chance flood is employed to indicate additional areas of flood risk in the community. For each stream studied by detailed methods, the 1- and 0.2-percent-annual-chance floodplain boundaries have been delineated using the flood elevations determined at each cross section.

For this study, LIDAR data from Earthdata International was used to delineate floodplain boundaries. The 1- and 0.2-percent-annual-chance floodplain boundaries are shown on the FIRM (Exhibit 3). On this map, the 1-percent-annual-chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AE, AH, AO, and VE), and the 0.2-percent-annual-chance floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 1- and 0.2-percent-annual-chance floodplain boundaries are close together, only the 1-percent-annual-chance floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by Limited detailed and approximate methods, only the 1-percent-annual-chance floodplain boundary is shown on the FIRM (Exhibit 3).

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 1-percent-annual-chance floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 1-percent-annual-chance flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 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 floodway presented in this FIS report and on the FIRM was computed for certain stream segments on the basis of equal-conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations have been tabulated for selected cross sections of detailed study streams (Table 7). In cases where the floodway and 1-percent-annual-chance floodplain boundaries are either close together or collinear, only the floodway boundary is shown.

Near the mouths of streams studied in detail, floodway computations are made without regard to flood elevations on the receiving water body. Therefore, “Without Floodway” elevations presented in Table 7, “Floodway Data,” for certain downstream cross sections are lower than the regulatory flood elevations in that area, which must take into account the 1-percent-annual-chance flooding due to backwater from other sources.

A floodway is not appropriate in areas such as those that may be inundated by flood waters from lakes and shallow flooding areas. Floodways were not determined for the Pearl River since this study was based on a statistical analysis from gage and historical high-water mark data.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Anner Creek								
A	12,050[2]	225	1,711	1.5	120.6	120.6	121.6	1.0
Bayou Bacon								
A	21,350[1]	500	2,321	2.0	52.7	52.7	53.7	1.0
B	30,450[1]	592	4,230	1.0	66.4	66.4	67.4	1.0
C	49,300[1]	390	1,841	1.9	100.3	100.3	101.3	1.0
Bayou Coco								
A	4,800[3]	92	454	4.3	*	6.5[4]	7.1	0.6
B	6,057[3]	121	529	3.7	*	8.8[4]	9.2	0.4
C	7,457[3]	129	878	2.2	*	13.8[4]	14.8	1.0
D	7,871[3]	125	673	2.9	*	14.3[4]	15.2	0.9
E	8,086[3]	135	789	2.5	*	14.9[4]	15.8	0.9
F	9,686[3]	225	703	2.8	18.8	18.5[4]	18.8	0.3
G	10,486[3]	43	188	9.0	21.8	21.8	21.8	0.0

[1] Feet above confluence with Hickory Creek
[2] Feet above confluence with Orphan Creek
[3] Feet above confluence with Jourdan River
[4] Elevation computed without consideration of storm surge effects from St. Louis Bay
* BFE determined by coastal storm surge flooding

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

FLOODWAY DATA

ANNER CREEK – BAYOU BACON – BAYOU COCO

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Bayou La Salle								
G	36,156[1]	119	1,655	4.9	17.3	11.4[4]	12.2	0.8
H	36,916[1]	85	928	8.7	17.3	11.5[4]	12.3	0.8
I	39,416[1]	207	2,264	3.6	19.0	18.2[4]	19.2	1.0
J	45,500[1]	363	2,837	2.1	34.4	34.4	35.4	1.0
K	55,350[1]	210	1,048	2.0	62.3	62.3	63.3	1.0
Bayou La Terre								
A	1,910[2]	376	2,905	2.7	*	10.0[4]	11.0	1.0
B	3,235[2]	248	2,126	3.6	*	11.0[4]	11.7	0.7
C	7,910[2]	127	1,196	6.4	17.8	16.4[4]	17.4	1.0
D	11,710[2]	416	3,058	2.5	20.8	20.6[4]	21.6	1.0
E	19,160[2]	363	3,104	2.1	25.7	25.7	26.5	0.8
F	35,550[2]	116	1,420	4.0	48.4	48.4	49.4	1.0
Catahoula Creek								
J	24,800[3]	500	3,171	1.1	76.5	76.5	77.5	1.0
K	34,400[3]	485	2,931	1.5	85.1	85.1	86.1	1.0
L	49,400[3]	675	5,437	0.5	111.4	111.4	112.4	1.0
M	61,650[3]	657	4,165	1.5	129.5	129.5	130.5	1.0

[1] Feet above confluence with Jourdan River
[2] Feet above confluence with Rotten Bayou
[3] Feet above confluence with Hickory Creek
[4] Elevation computed without consideration of storm surge effects from St. Louis Bay
* BFE determined by coastal storm surge flooding

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY
HANCOCK COUNTY, MS
AND INCORPORATED AREAS

FLOODWAY DATA

BAYOU LA SALLE - BAYOU LA TERRE – CATHOULA CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Crane Creek								
A	20,450[1]	312	1,711	4.6	112.8	112.8	113.8	1.0
Hickory Creek								
C	13,850[2]	400	3,437	3.9	52.4	52.4	53.4	1.0
D	29,350[2]	300	2,509	5.6	61.0	61.0	62.0	1.0
E	48,150[2]	750	7,149	1.5	82.1	82.1	83.1	1.0
F	76,200[2]	372	2,411	1.7	115.0	115.0	116.0	1.0
G	86,100[2]	419	2,691	1.2	125.7	125.7	126.7	1.0
Jourdan River								
A	10,370[3]	6,373	24,701	1.7	*	2.7[4]	3.6	0.9
B	16,570[3]	5,713	28,080	1.2	*	3.1[4]	3.9	0.8
C	24,170[3]	1,243	14,405	2.4	*	3.8[4]	4.5	0.7
D	33,870[3]	1,171	10,299	3.0	*	5.3[4]	5.9	0.6
E	46,470[3]	347	6,430	4.8	*	7.4[4]	8.2	0.8
F	53,670[3]	246	4,795	6.2	*	8.9[4]	9.8	0.9
G	58,146[3]	1,735	15,222	1.9	*	10.5[4]	11.4	0.9

[1] Feet above confluence with Wolf River
[2] Feet above confluence with Catahoula Creek
[3] Feet above confluence with St. Louis Bay
[4] Elevation computed without consideration of storm surge effects from St. Louis Bay
* BFE determined by coastal storm surge flooding

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY
HANCOCK COUNTY, MS
AND INCORPORATED AREAS

FLOODWAY DATA

CRANE CREEK – HICKORY CREEK – JOURDAN RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Necaise Creek								
A	5,250[1]	250	2,437	1.7	114.3	114.3	115.3	1.0
Orphan Creek								
A	11,850[2]	976	13,216	0.4	46.2	46.2	47.2	1.0
B	34,850[2]	129	474	6.4	79.1	79.1	80.1	1.0
Rotten Bayou								
A	5,800[3]	2,100	11,939	2.2	*	6.1[5]	6.9	0.8
B	10,470[3]	560	4,361	3.8	*	7.1[5]	7.7	0.6
C	18,770[3]	1,256	10,338	1.0	*	8.7[5]	9.4	0.7
D	23,430[3]	398	4,744	2.3	17.3	9.0[5]	9.8	0.8
E	31,340[3]	138	1,956	4.1	17.3	9.7[5]	10.5	0.8
F	35,790[3]	115	1,568	5.1	17.3	10.8[5]	11.8	1.0
Shiloh Creek								
A	6,750[4]	450	1,690	3.0	96.1	96.1	97.1	1.0
B	16,050[4]	250	668	1.7	114.4	114.4	115.4	1.0

[1] Feet above confluence with Hickory Creek
[2] Feet above confluence with Bayou Bacon
[3] Feet above confluence with Jourdan River
[4] Feet above confluence with White Cypress Creek
[5] Elevation computed without consideration of storm surge effects from St. Louis Bay
* BFE determined by coastal storm surge flooding

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

FLOODWAY DATA

NECAISE CREEK – ORPHAN CREEK – ROTTEN BAYOU – SHILOH CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
White Cypress Creek								
A	13,900	350	3,061	2.3	79.6	79.6	80.6	1.0
B	20,500	447	2,410	1.7	90.0	90.0	91.0	1.0
C	30,300	500	3,172	1.8	105.8	105.8	106.8	1.0

[1] Feet above confluence with Hickory Creek

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY
HANCOCK COUNTY, MS
AND INCORPORATED AREAS

FLOODWAY DATA

WHITE CYPRESS CREEK

Encroachment into areas subject to inundation by floodwaters having hazardous velocities aggravates the risk of flood damage, and heightens potential flood hazards by further increasing velocities. For detailed study streams, a listing of stream velocities at selected cross sections is provided in Table 7. In order to reduce the risk of property damage in areas where the stream velocities are high, the county may wish to restrict development in areas outside the floodway.

The area between the floodway and 1-percent-annual-chance floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 1-percent-annual-chance flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.

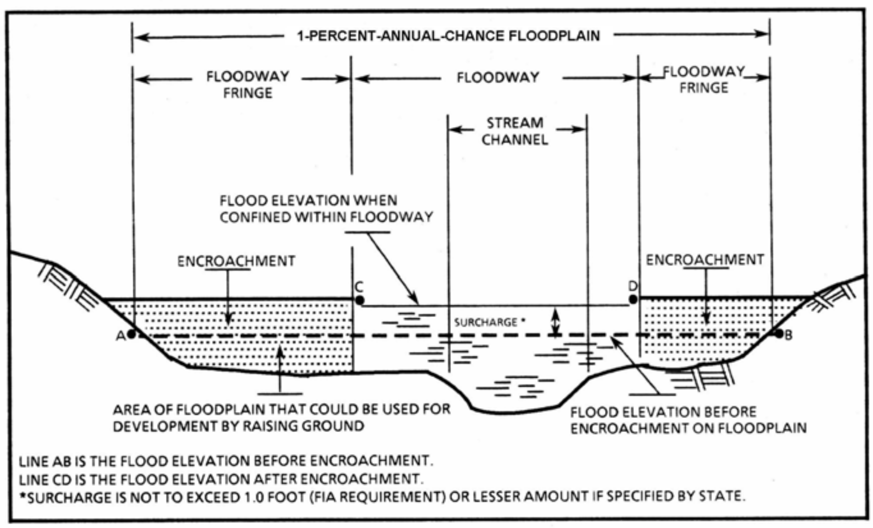


FIGURE 2. FLOODWAY SCHEMATIC

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

Zone AE

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

Zone AH

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

Zone AO

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

Zone V

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

Zone VE

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

Zone X

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

Zone D

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

6.0 FLOOD INSURANCE RATE MAP

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

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

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

The countywide FIRM presents flooding information for the entire geographic area of Jackson County. Previously, FIRMs were prepared for each incorporated community and the unincorporated areas of the County identified as flood-prone. This countywide FIRM also includes flood-hazard information that was presented separately on Flood Boundary and Floodway Maps (FBFMs), where applicable. Historical data relating to the maps prepared for each community up to and including this countywide FIS are presented in Table 8, "Community Map History."

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Bay St. Louis, City of	July 1, 1970	None	September 11, 1970	July 1, 1974 October 31, 1975 November 16, 1983
Hancock County (Unincorporated Areas)	September 9, 1970	None	September 9, 1970	April 3, 1978 November 16, 1983 September 18, 1987 August 18, 1992
Waveland, City of	June 27, 1970	None	September 11, 1970	July 1, 1974 April 16, 1976 November 16, 1983

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS
AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

7.0 OTHER STUDIES

This is a multi-volume FIS. Each volume may be revised separately, in which case it supersedes the previously printed volume. Users should refer to the Table of Contents in Volume 1 for the current effective date of each volume; volumes bearing these dates contain the most up-to-date flood hazard data.

An FIS has been prepared for the City of Bay St. Louis, the City of Waveland, and the unincorporated areas of Hancock County.

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

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the 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. U.S. Department of Housing and Urban Development, Federal Insurance Administration, by U.S. Department of Agriculture, Soil Conservation Service, Type 10 Flood Insurance Study, Hancock County, Unincorporated Areas, Mississippi, June 1971.

2. Federal Emergency Management Agency, Flood Insurance Study, Hancock County, Unincorporated Areas, Mississippi, May 1983.

3. U.S. Census Bureau, Population Estimates, 2000 Census of Population and Housing, Washington, D.C., January 1997.

4. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Environmental Data Service, National Climatic Center, Climate of Mississippi, 1977.

5. American Meteorological Society, Early American Hurricanes 1492 - 1870, Ludlum, David M. 1963.

6. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service, Memorable Hurricanes of the United States Since 1873, April 1971.

7. U.S. Army Corps of Engineers, Mobile District, Hurricane Betsy 8-11 September 1965, October 1967.

8. U.S. Army Corps of Engineers, New Orleans District, Hurricane Betsy 8-11 September 1965 After Action Report, July 1966.

9. U.S. Army Corps of Engineers, Mobile District, After Action Report Supplement No. 1 Hurricane Camille 17-18 August 1969, June 1971.

10. U.S. Geological Survey, Flood Frequency of Mississippi Streams, B.E. Colson and J.W. Hudson, prepared for the Mississippi State Highway Department, 1976.

11. U.S. Geological Survey, Floods in Mississippi, Magnitude and Frequency, K.V. Wilson and L.L. Trotter, Jr., prepared in cooperation with the Mississippi State Highway Department, 1961.

12. U.S. Department of the Interior, Geological Survey, Flood Characteristics of Mississippi Streams, Water-Resources Investigations Report 91-4037, Jackson, Mississippi, 1991.

13. U.S. Army Corps of Engineers, Hydrologic Engineering Center, Generalized Computer Program HEC-2, Water-Surface Profiles, Users Manual, April 1984.

14. U.S. Army Corps f Engineers, Hydrologic Engineering Center, HEC-RAS River Analysis System, User's Manual, version 3.1, Davis, California, November 2002.

15. Luettich, R.A., Westerink, J. J., and Scheffner, N. W. (1992), ADCIRC: An Advanced Three-Dimensional Circulation Mdeol for Shelves, Coasts, and Estuaries, Report 1: Theory and Methodology of ADCIRC-2DDI and ADCIRC-3DL, Technical Report DRP-92-6, U. S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.

16. Luettich, R. A., and Westerink, J. J. (2004), Formulation and Numerical Implementation of the 2D/2D ADCIRC Finite Element Model version 44.XX (http://www.marine.unc.edu/C_CATS/ascirc).

17. Booij, N., R. C. Ris, and L. H. Holtuijsen (1998). A Third-Generation Wave Model for Coastal Regions, Part I: Model Description and Validation. Journal of Geophysical Research. 104/C4, p.7649.

18. Cardone, V. J., Greenwood, C. V., and Greenwood, J. A., (1992). "Unified Program for the Specification of Hurricane Boundary Layer Winds Over Surfaces of Specified Roughness," Contract Report CERC-92-1, U. S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

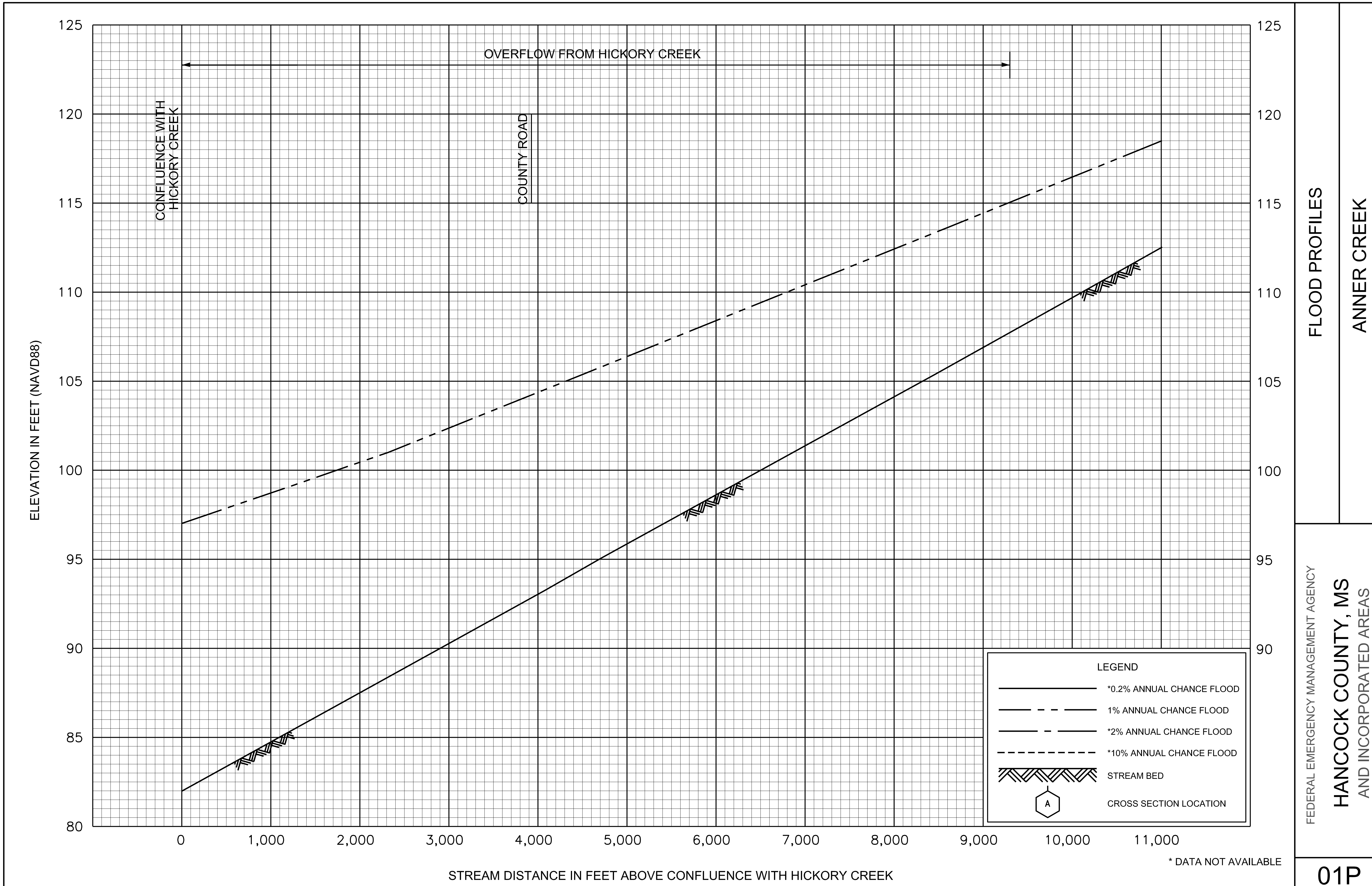
19. Russell, L. R.. (1968). Probability Distribution for Texas Gulf Coast Hurricane Effects of Engineering Interest. Ph.D. Thesis, Stanford University.

20. U. S. Army Corps of Engineers. (1975). Guidelines for Identifying Coastal High Hazard Zones. Galveston District Corps of Engineers. June.

21. Federal Emergency Management Agency. (2003). *Guidelines and Specifications for Flood Hazard Mapping Partners, Appendix D: Guidance for Coastal Flooding Analyses and Mapping*. Washington, D. C.

22. Federal Emergency Management Agency. (August 1, 2005). Procedure Memorandum no. 37 – Protocol for Atlantic and Gulf Coast Coastal Flood Insurance Studies in FY05. Washington, D. C.

23. Van der Meer, J. W. 2002. *Wave Run-up and Overtopping at Dikes*. Technical Report, Technical Advisory Committee for Water Retaining Structures (TAW), Delft, The Netherlands.



OVERFLOW FROM HICKORY CREEK
CONFLUENCE WITH HICKORY CREEK
COUNTY ROAD
ELEVATION IN FEET (NAVD88)
125
120
115
110
105
100
95
90
85
80
0
1,000
2,000
3,000
4,000
5,000
6,000
7,000
8,000
9,000
10,000
11,000
STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH HICKORY CREEK
LEGEND
*0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
*2% ANNUAL CHANCE FLOOD
*10% ANNUAL CHANCE FLOOD
STREAM BED
A
CROSS SECTION LOCATION
* DATA NOT AVAILABLE
FLOOD PROFILES
ANNER CREEK
FEDERAL EMERGENCY MANAGEMENT AGENCY
HANCOCK COUNTY, MS
AND INCORPORATED AREAS
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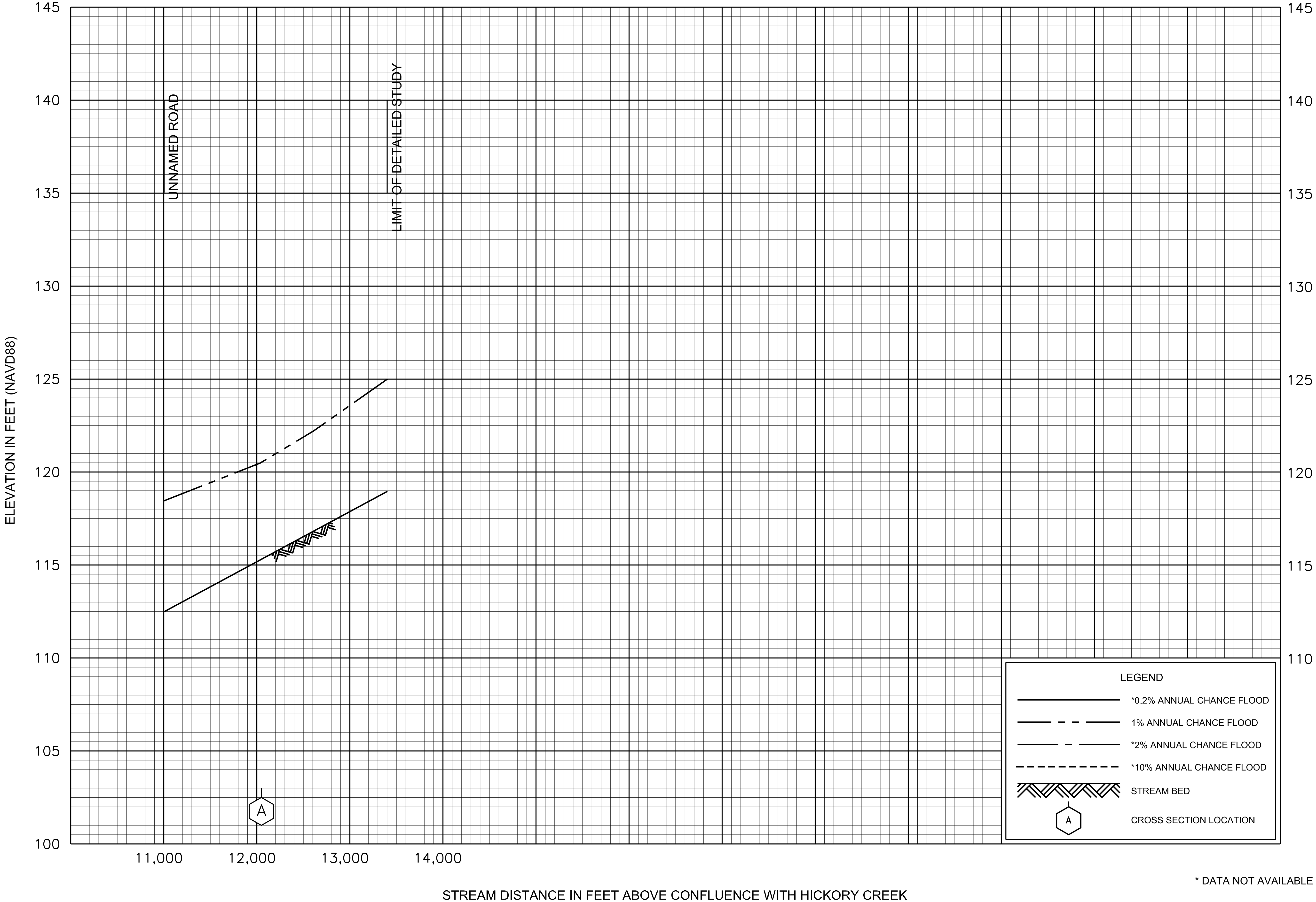


FLOOD PROFILES

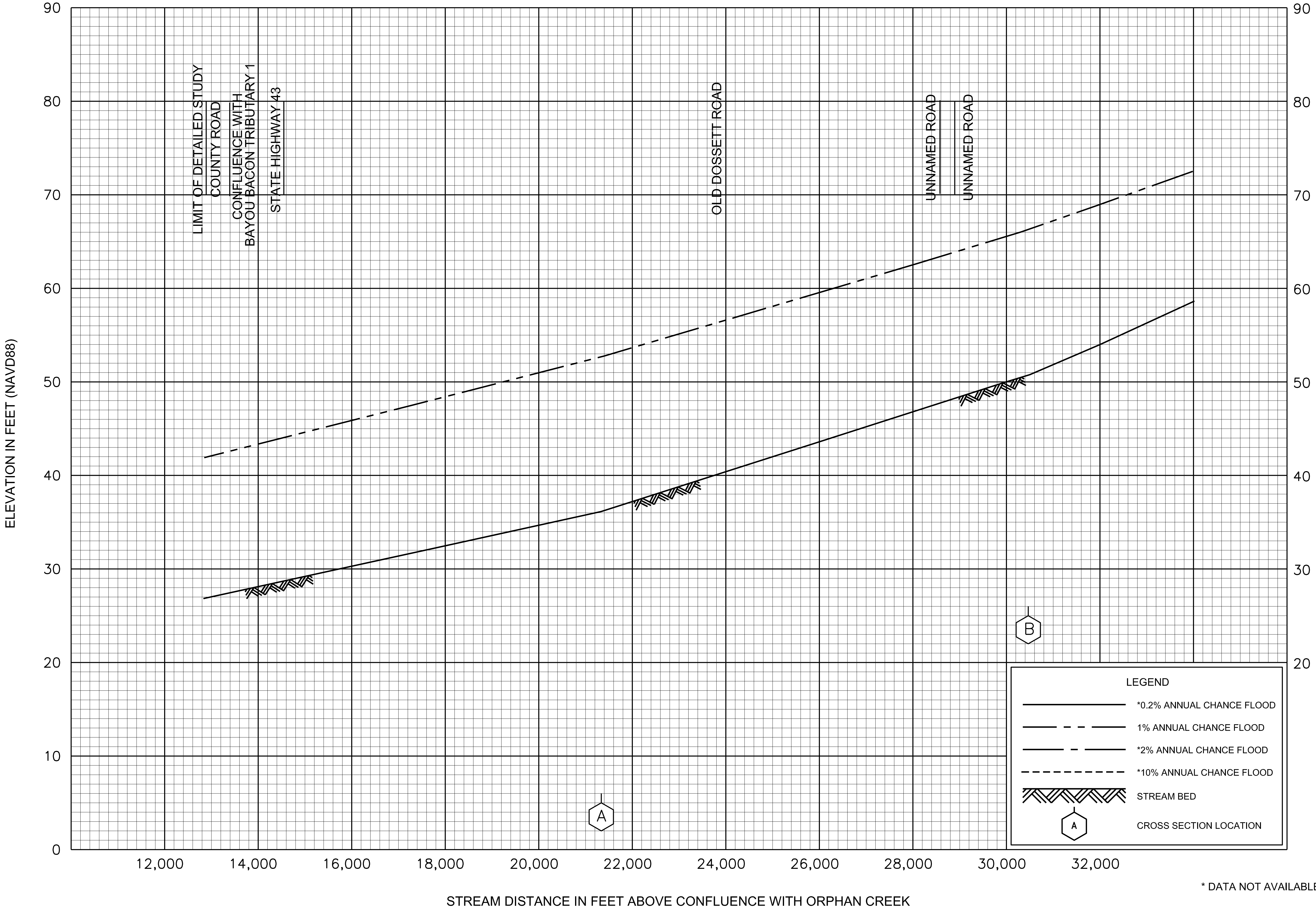
ANNER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

02P



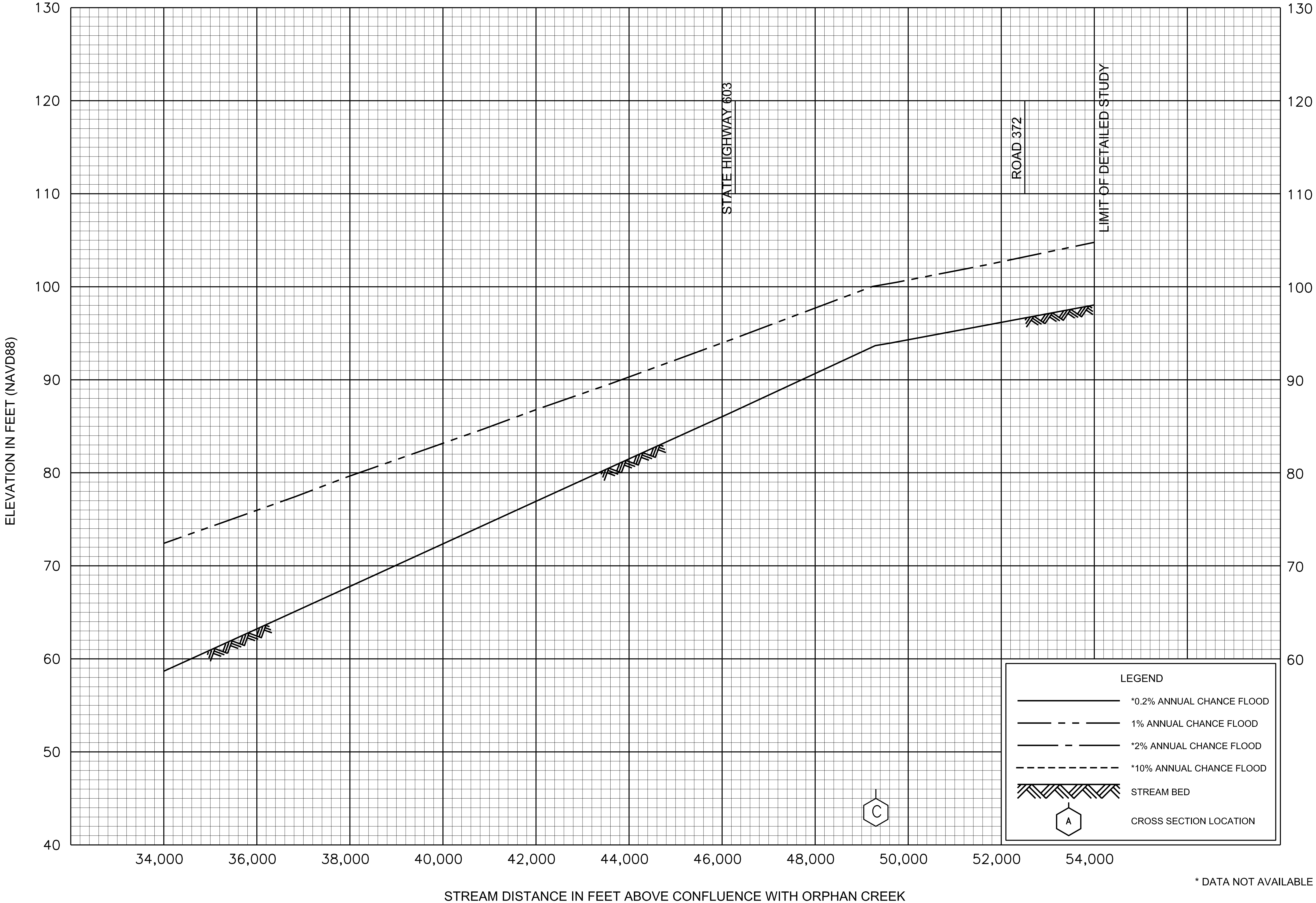
FLOOD PROFILES

BAYOU BACON

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS
AND INCORPORATED AREAS

03P



FLOOD PROFILES

BAYOU BACON

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

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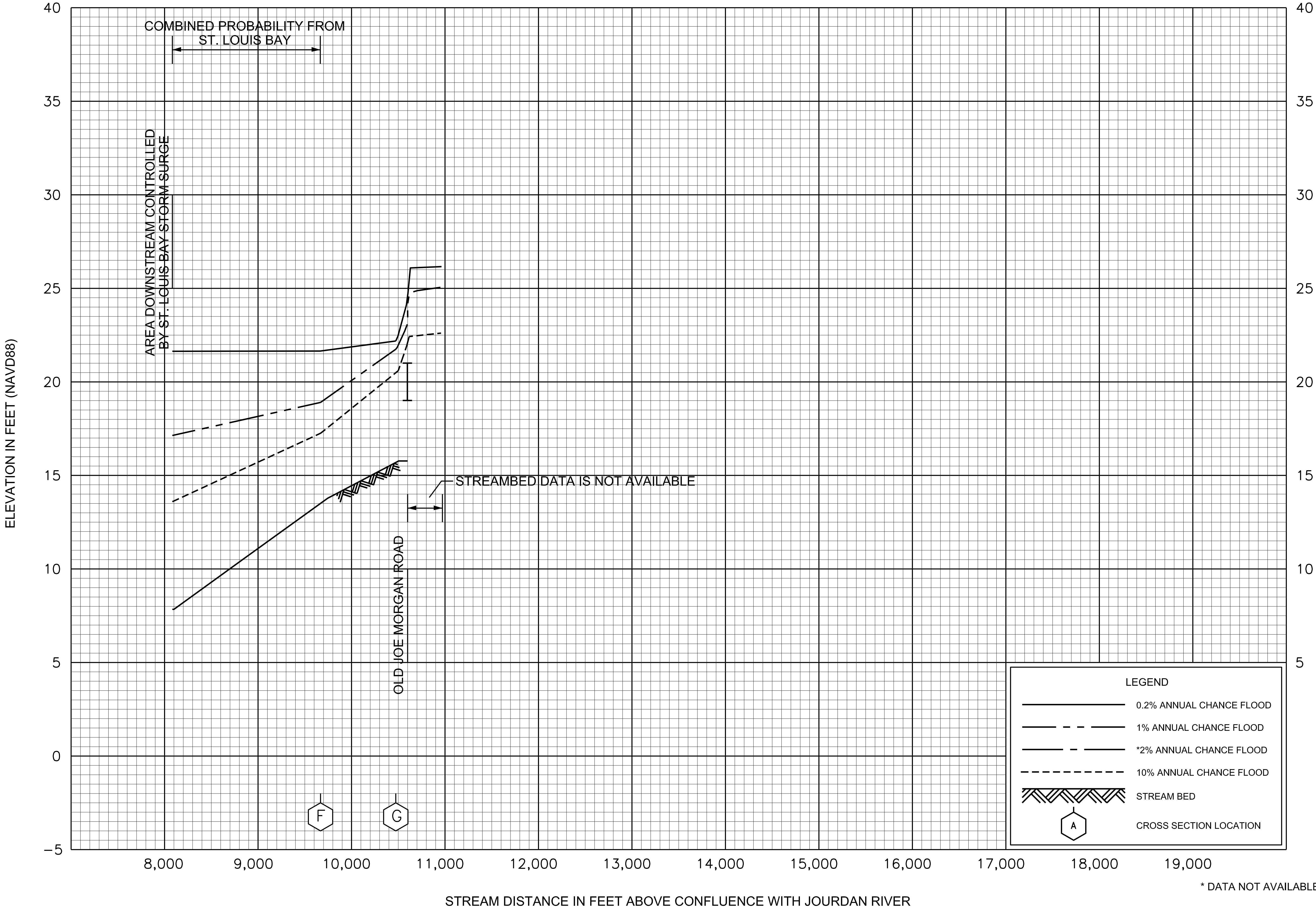

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FLOOD PROFILES

BAYOU COCO

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS
AND INCORPORATED AREAS

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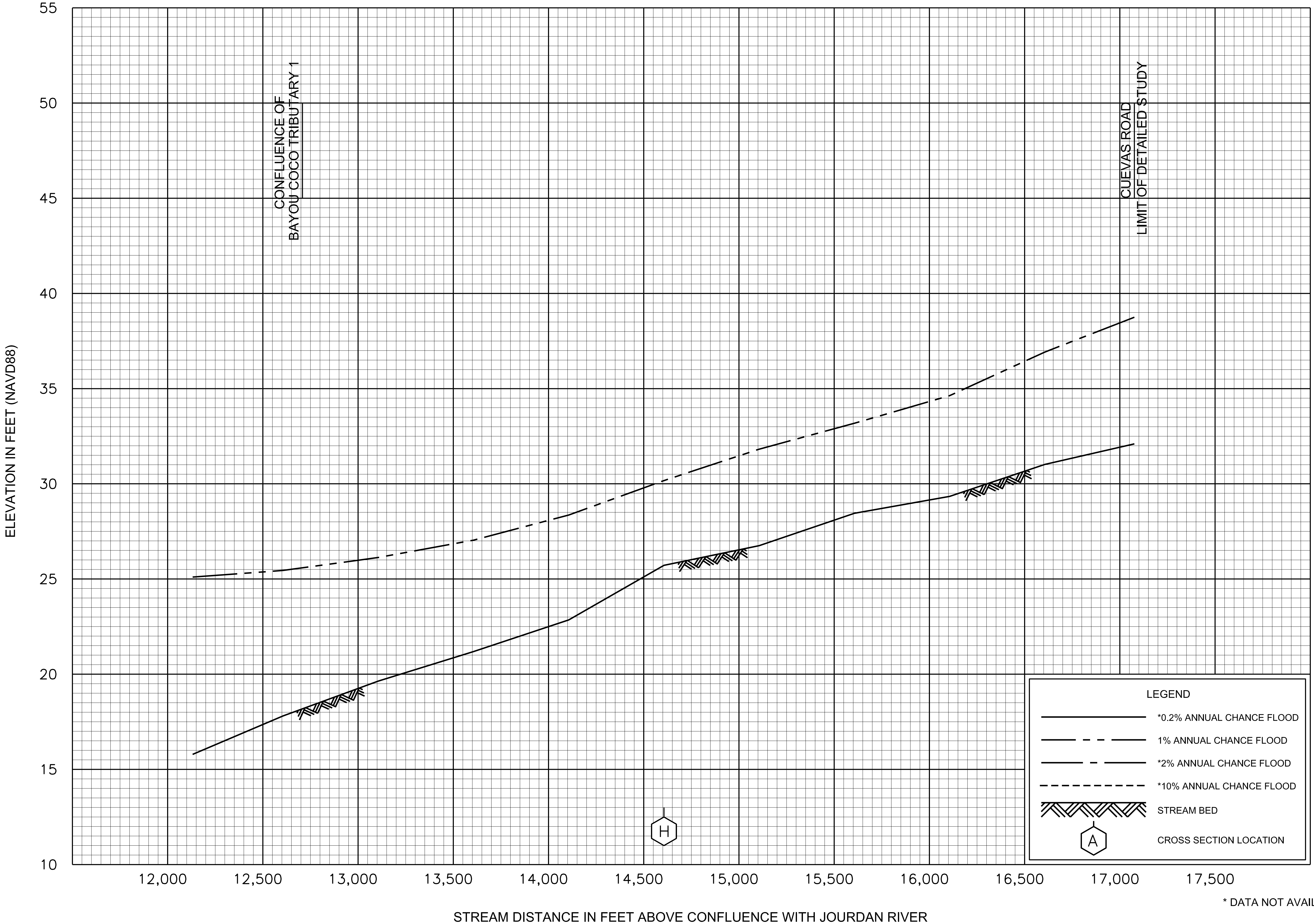

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FLOOD PROFILES

BAYOU COCO

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS
AND INCORPORATED AREAS

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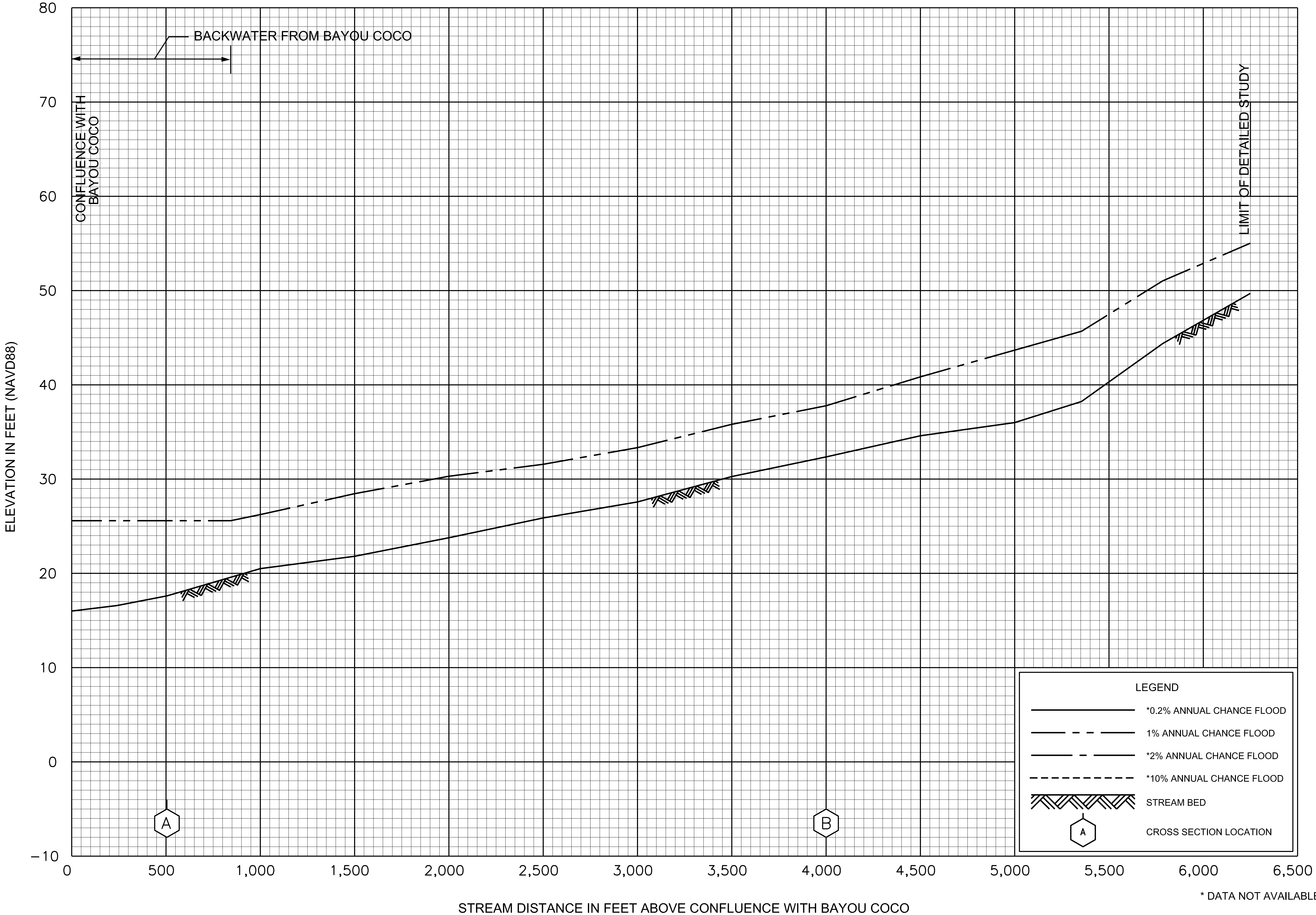
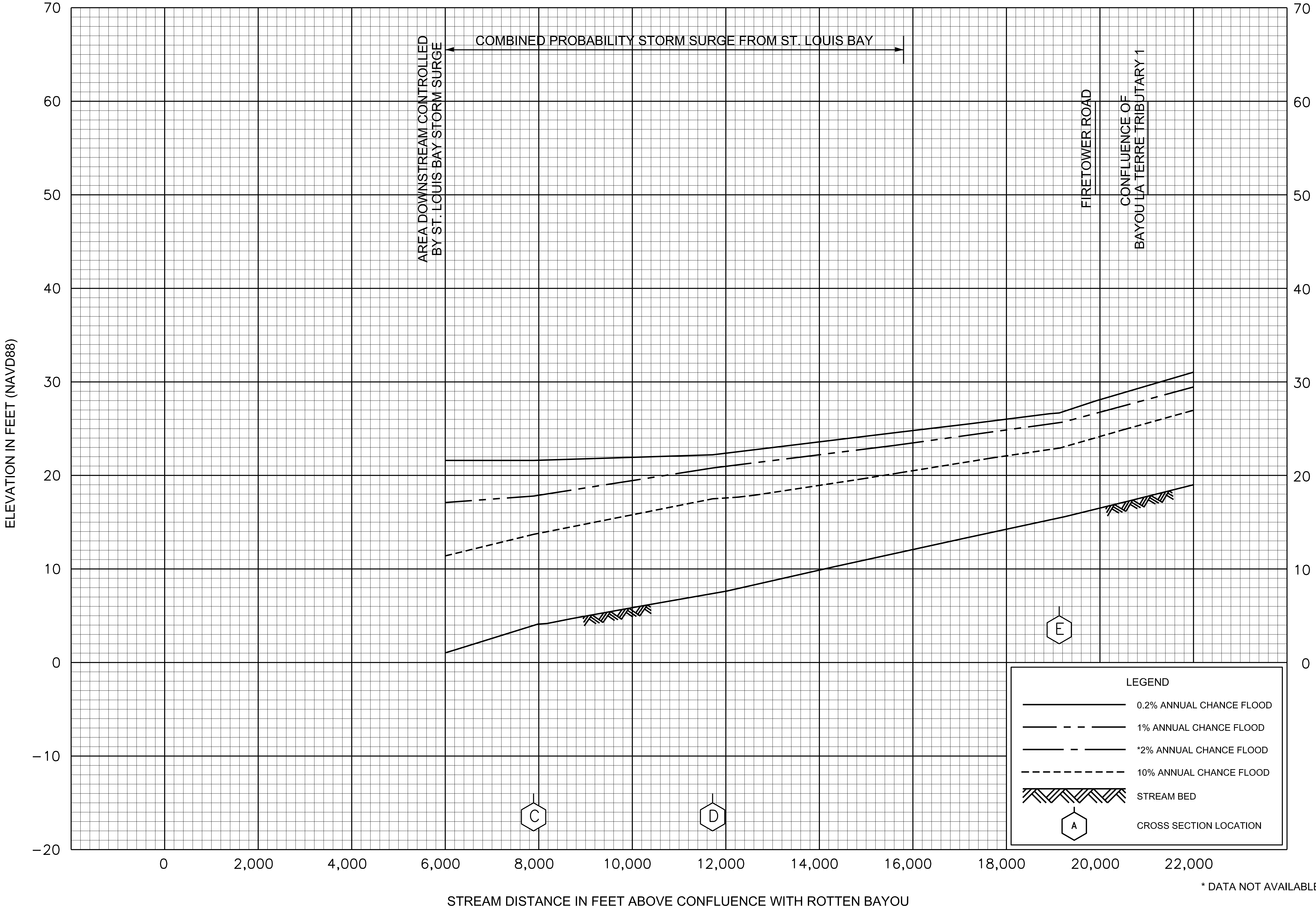


FLOOD PROFILES

BAYOU COCO TRIBUTARY 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS
AND INCORPORATED AREAS



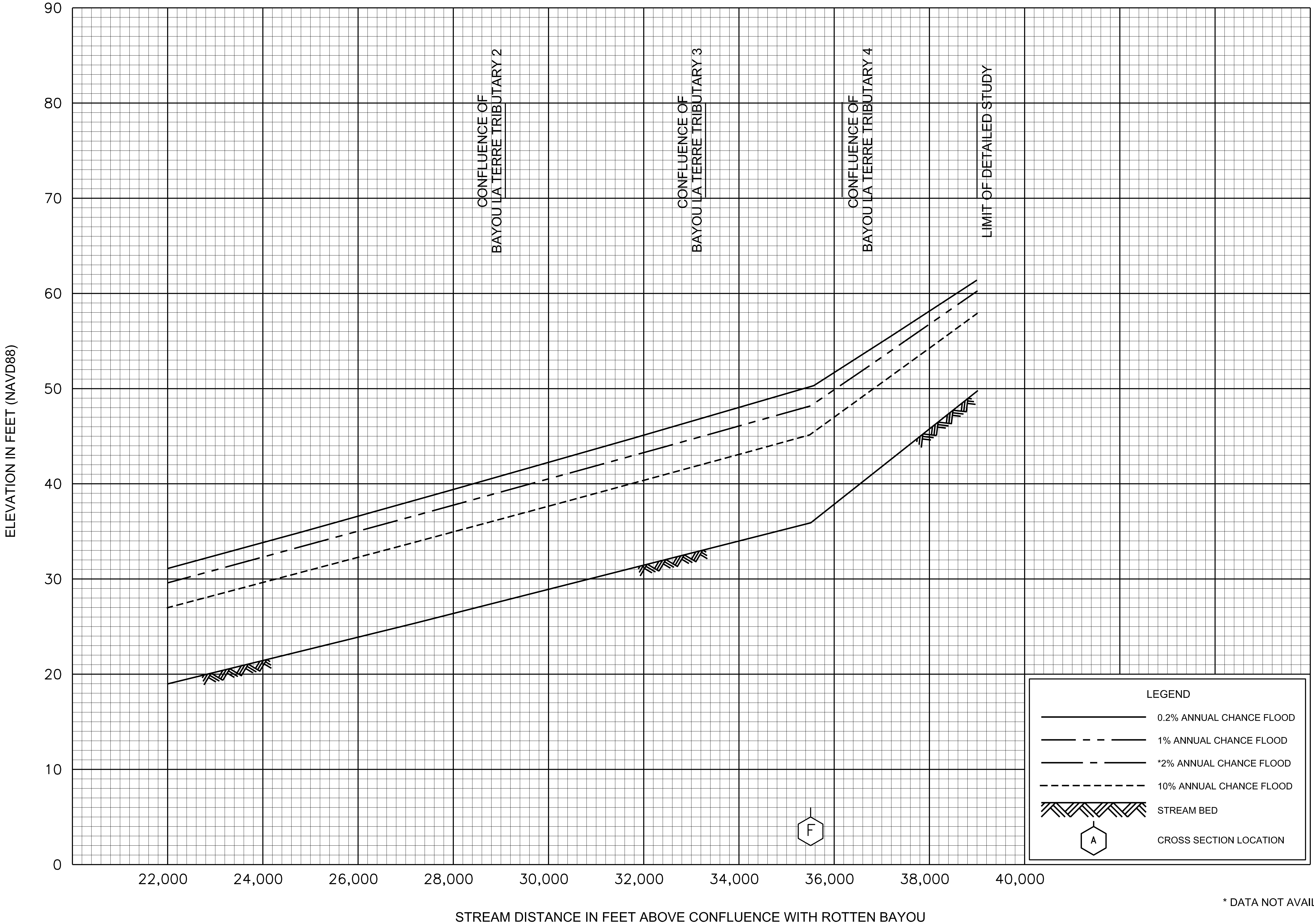
FLOOD PROFILES

BAYOU LA TERRE

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



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FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

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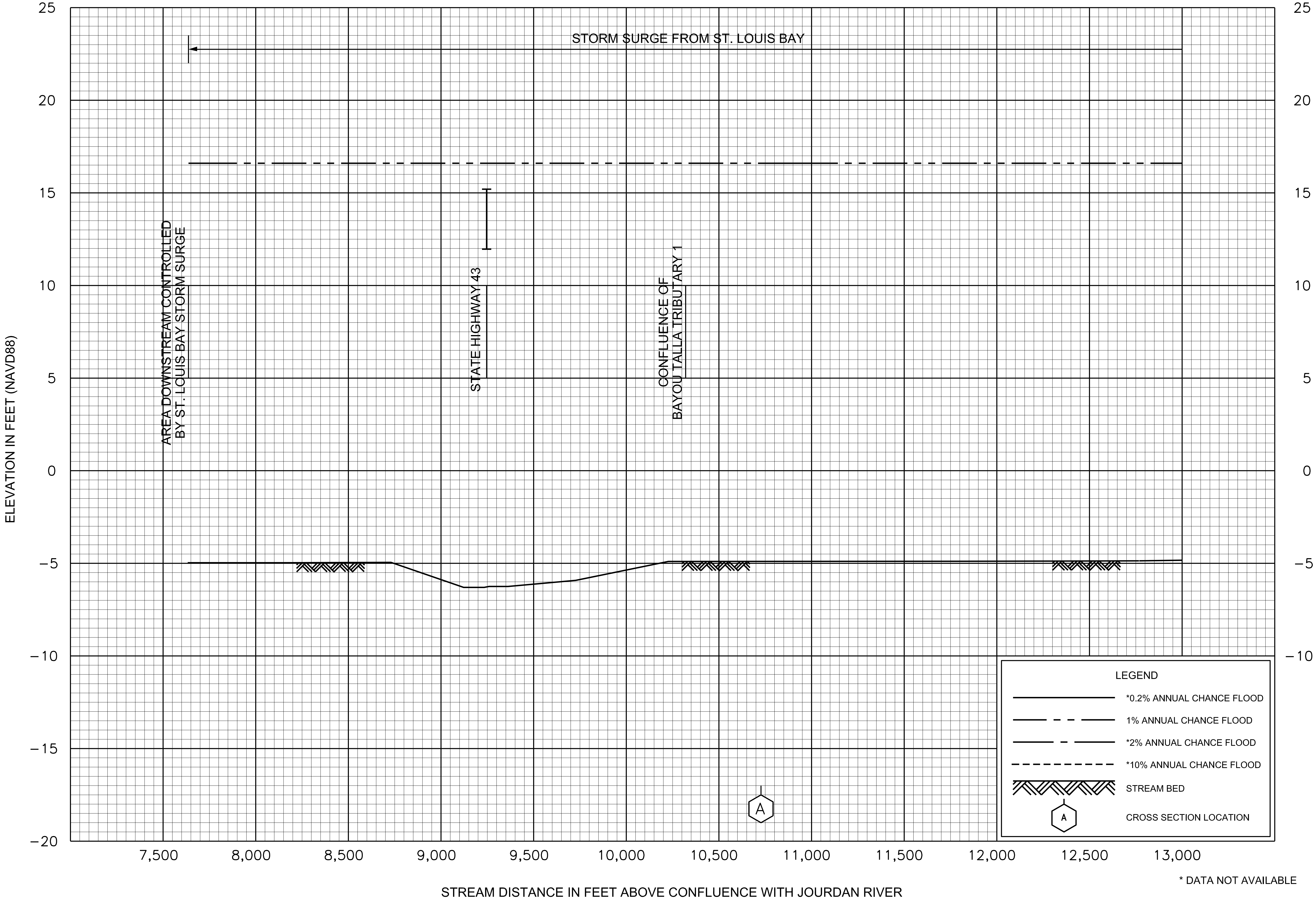

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FLOOD PROFILES

BAYOU TALLA

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS
AND INCORPORATED AREAS

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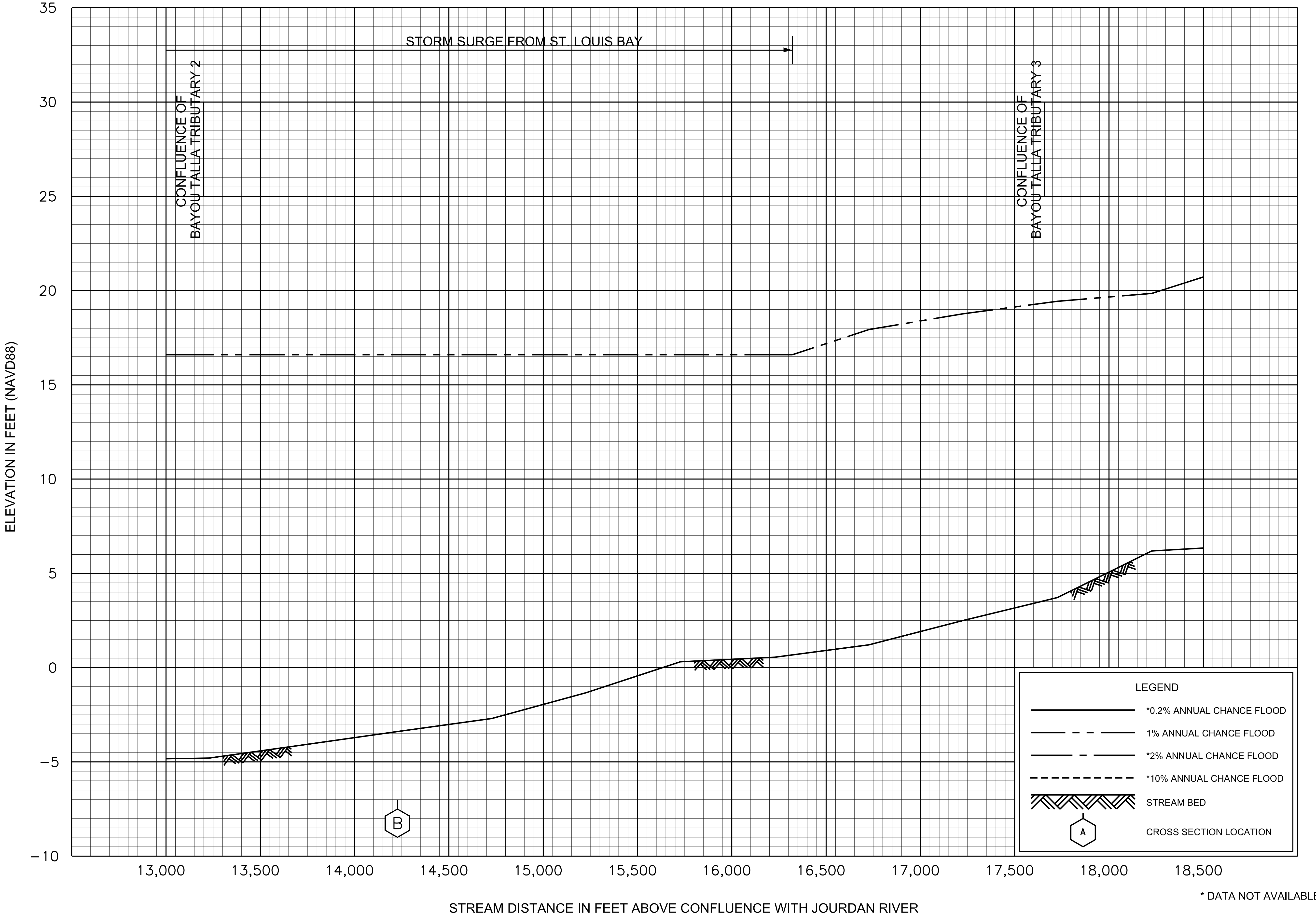

FLOOD PROFILES

BAYOU TALLA

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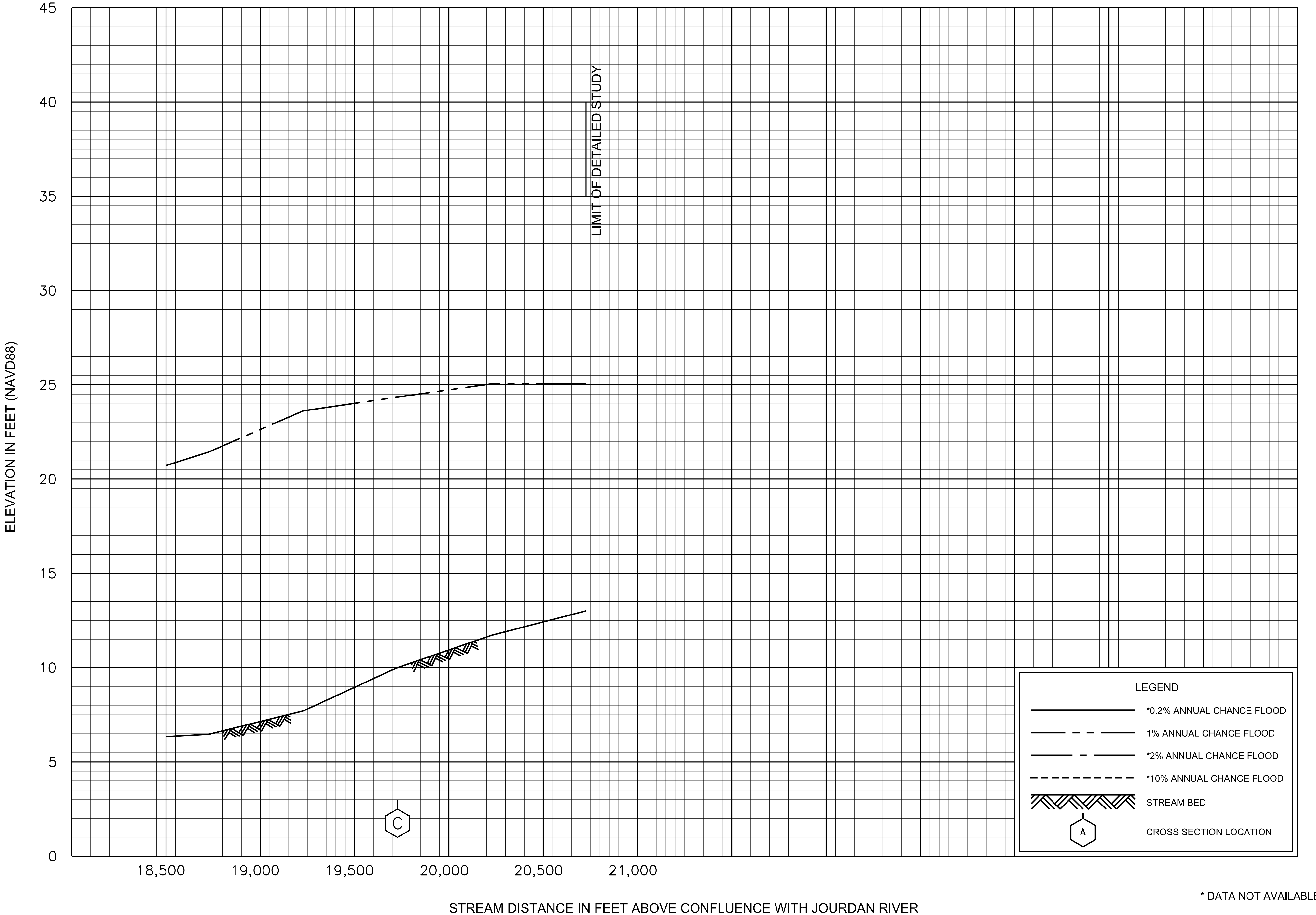
AND INCORPORATED AREAS

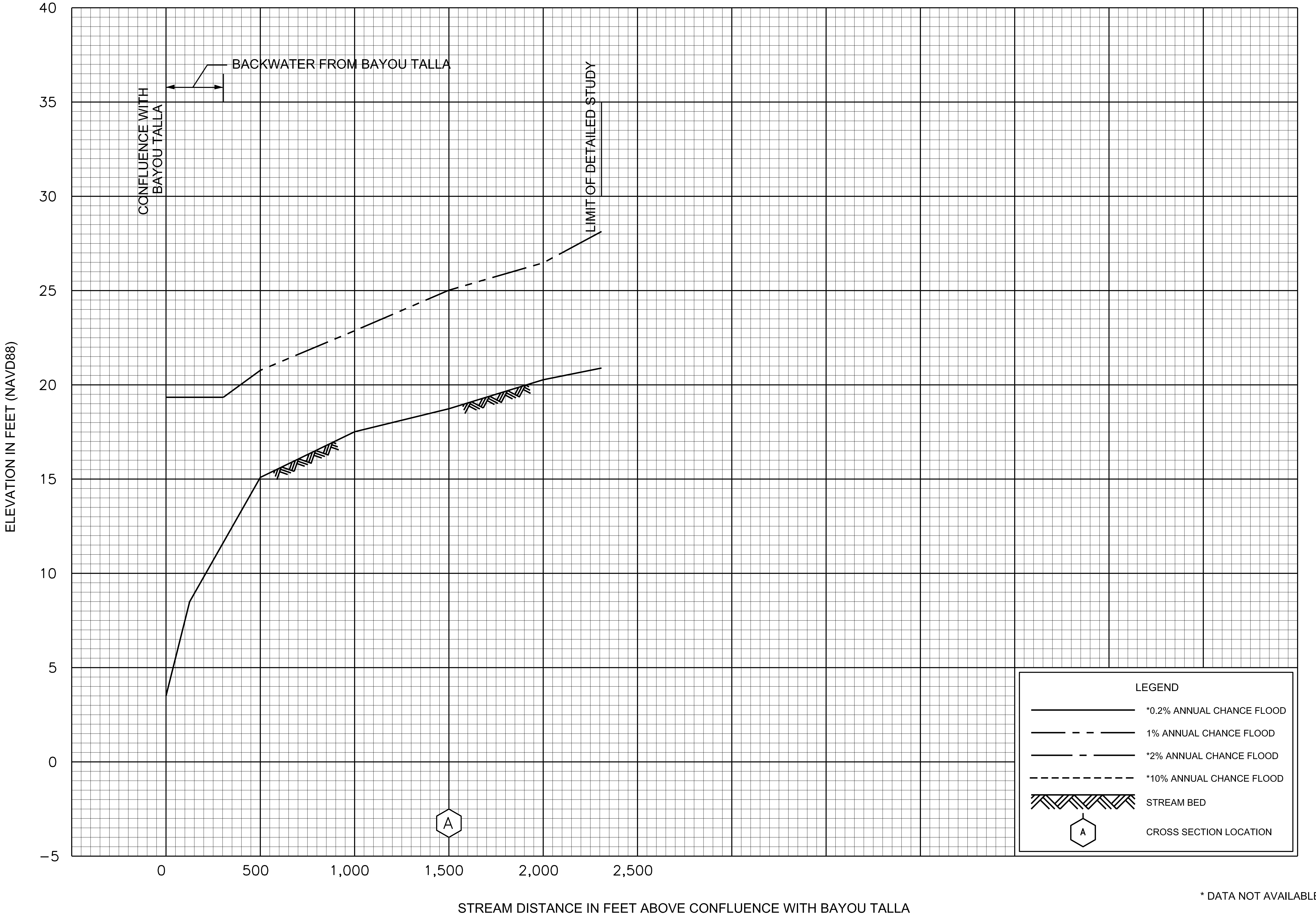


FLOOD PROFILES

BAYOU TALLA

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS AND INCORPORATED AREAS



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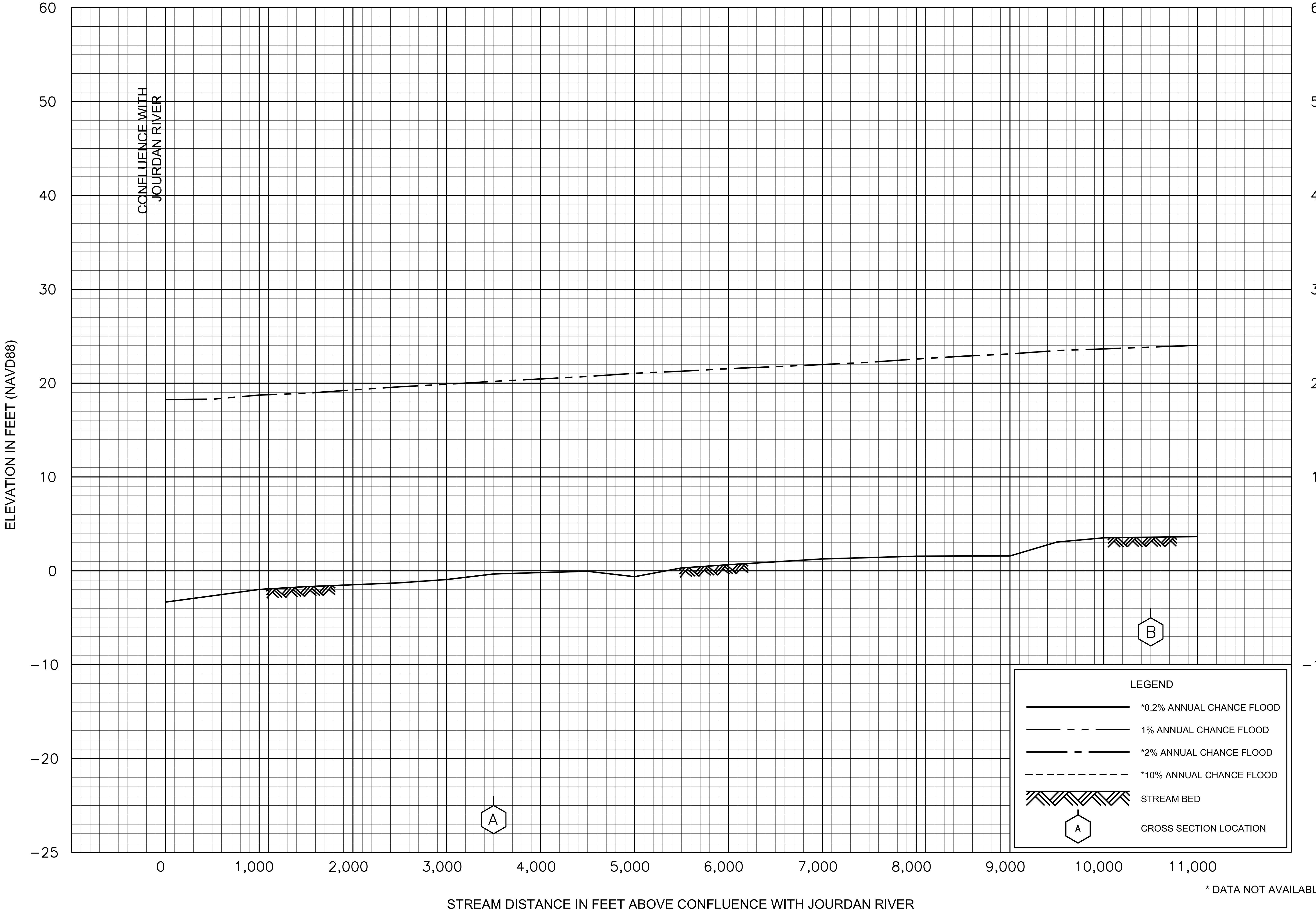
FLOOD PROFILES

BAYOU TALLA TRIBUTARY 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



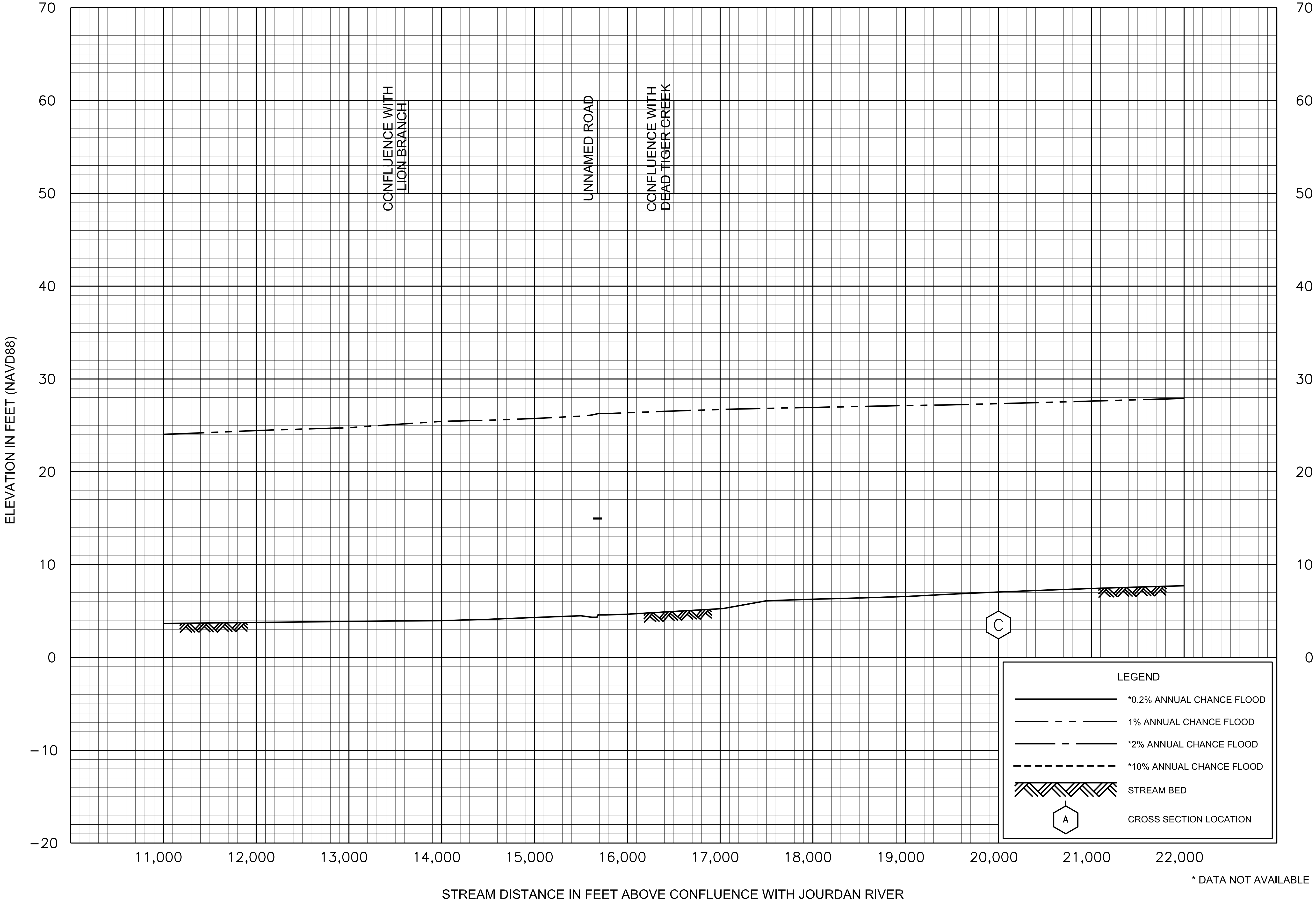
FLOOD PROFILES

CATAHOULA CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



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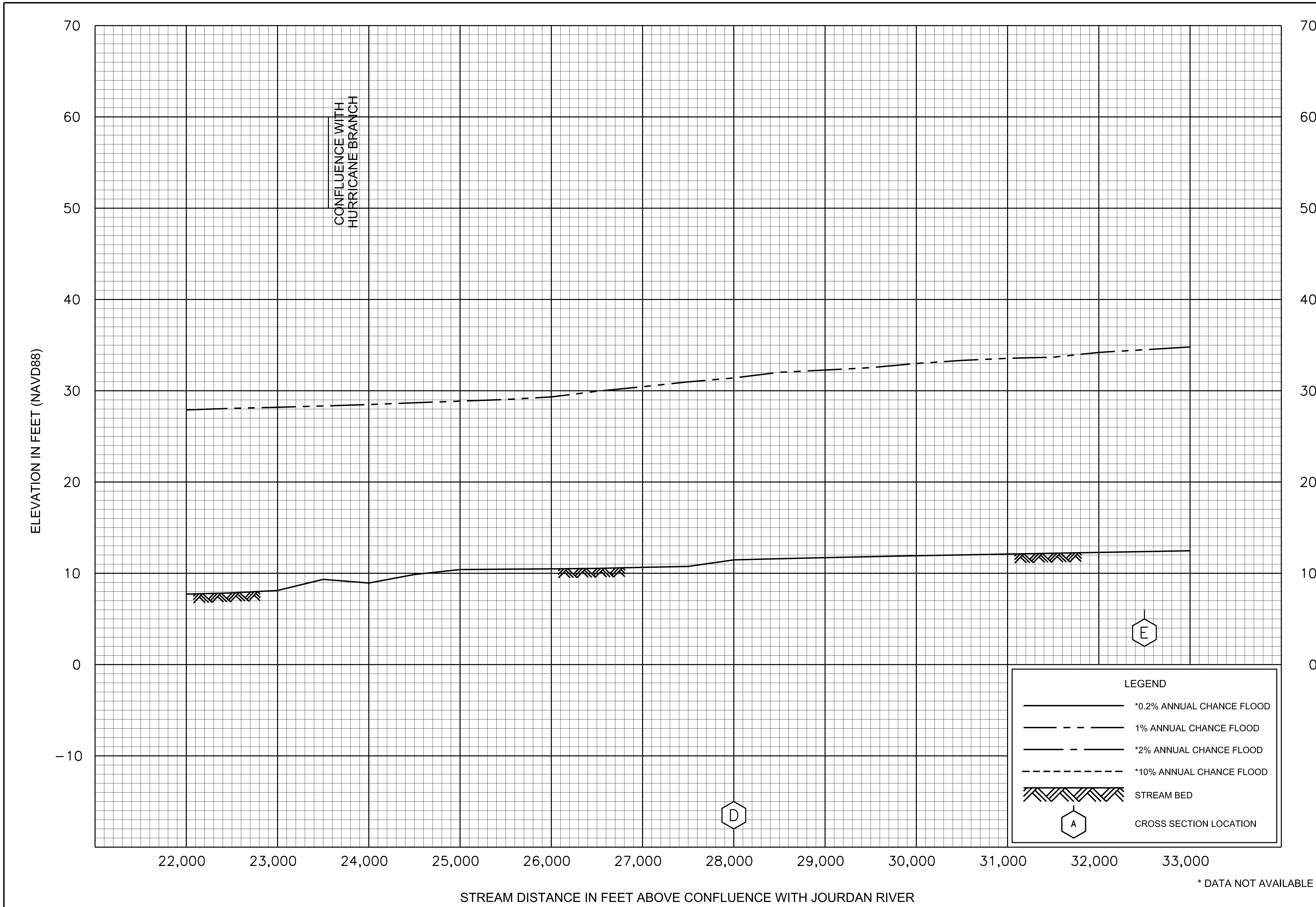
FLOOD PROFILES

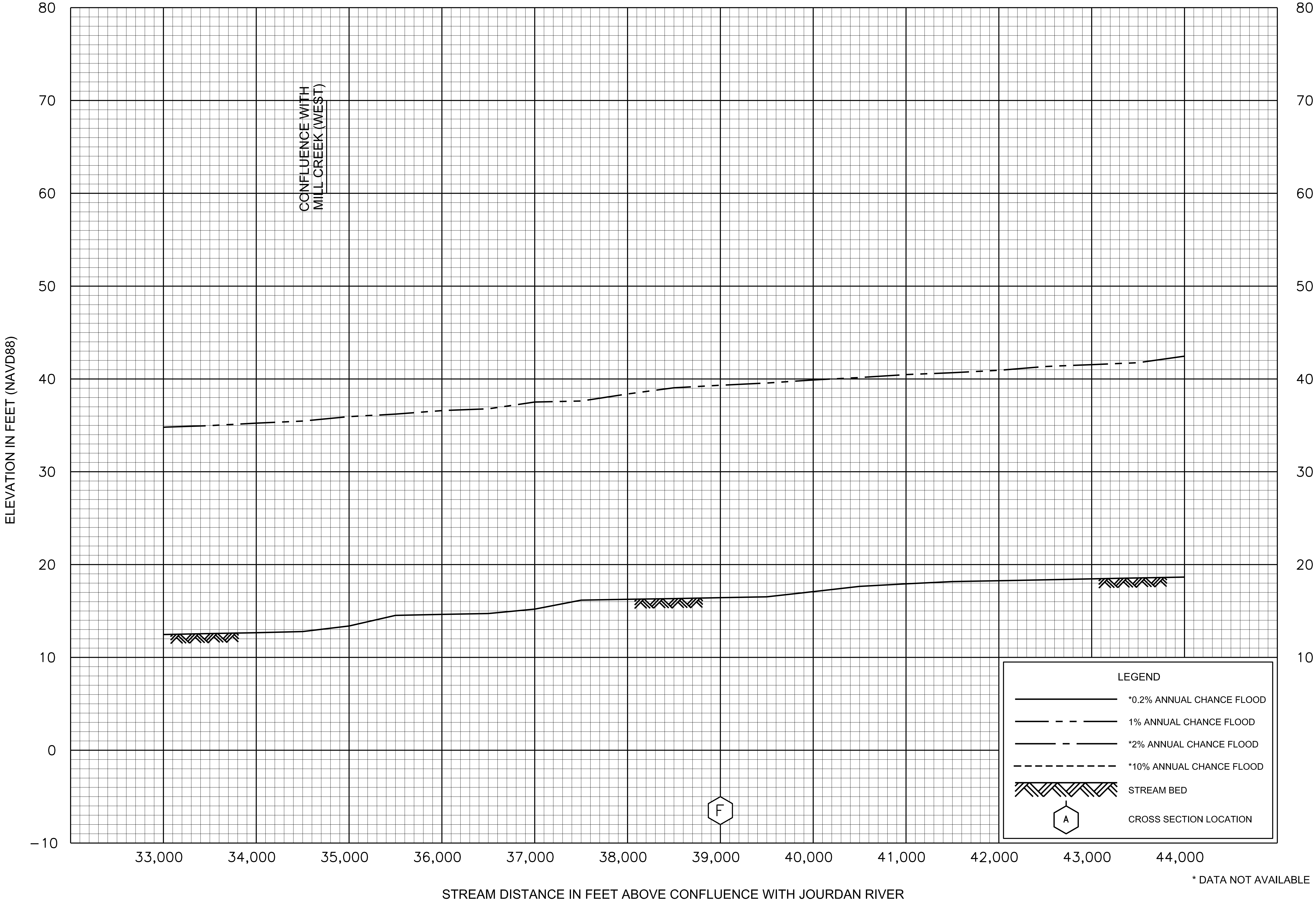
CATAHOULA CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS
AND INCORPORATED AREAS



CONFLUENCE WITH HURRICANE BRANCH
ELEVATION IN FEET (NAVD88)
70
60
50
40
30
20
10
0
−10
22,000
23,000
24,000
25,000
26,000
27,000
28,000
29,000
30,000
31,000
32,000
33,000
STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH JOURDAN RIVER
D
E
LEGEND
*0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
*2% ANNUAL CHANCE FLOOD
*10% ANNUAL CHANCE FLOOD
STREAM BED
A
CROSS SECTION LOCATION
* DATA NOT AVAILABLE
FLOOD PROFILES
CATAHOULA CREEK
FEDERAL EMERGENCY MANAGEMENT AGENCY
HANCOCK COUNTY, MS
AND INCORPORATED AREAS



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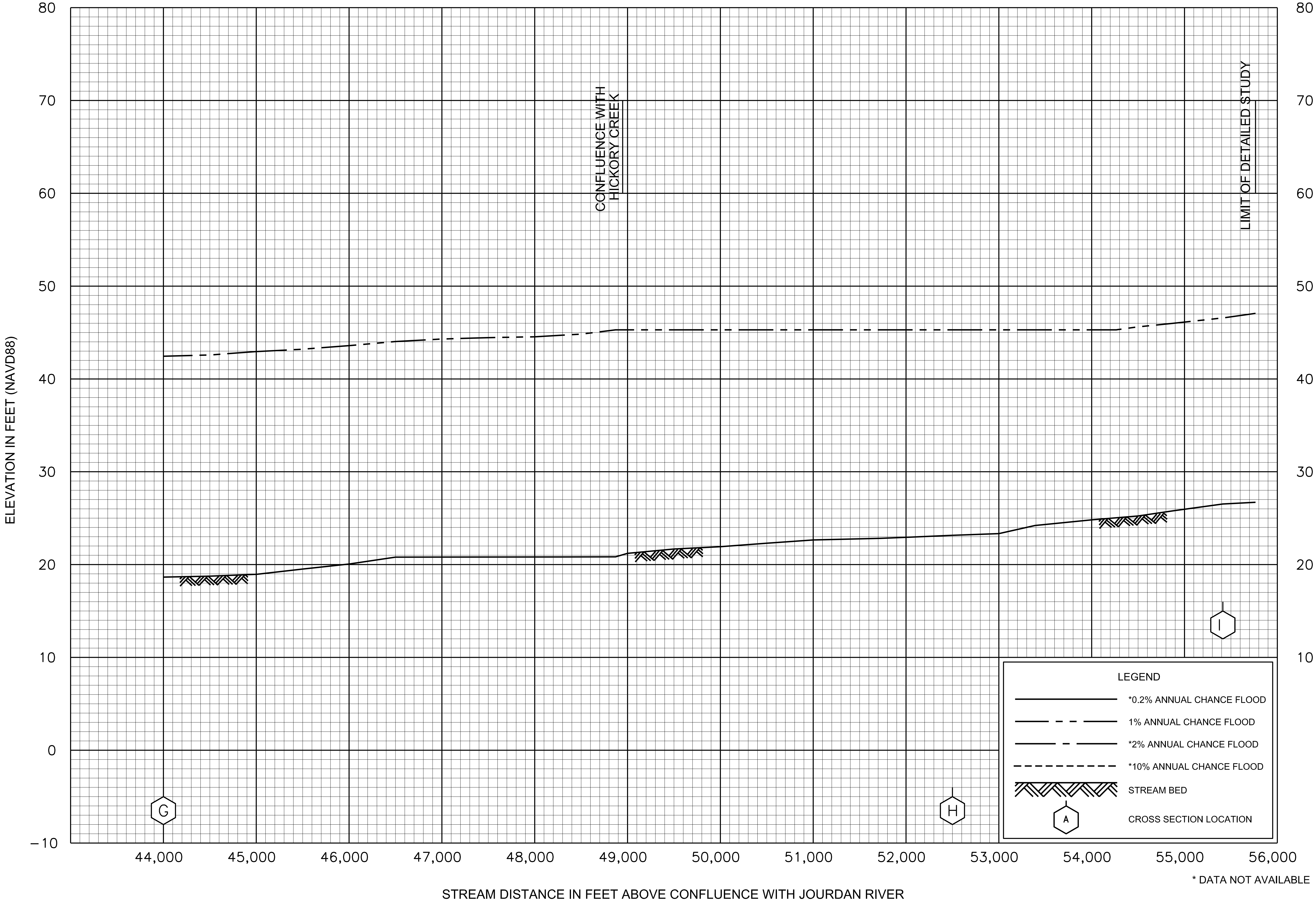
FLOOD PROFILES

CATAHOULA CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS
AND INCORPORATED AREAS



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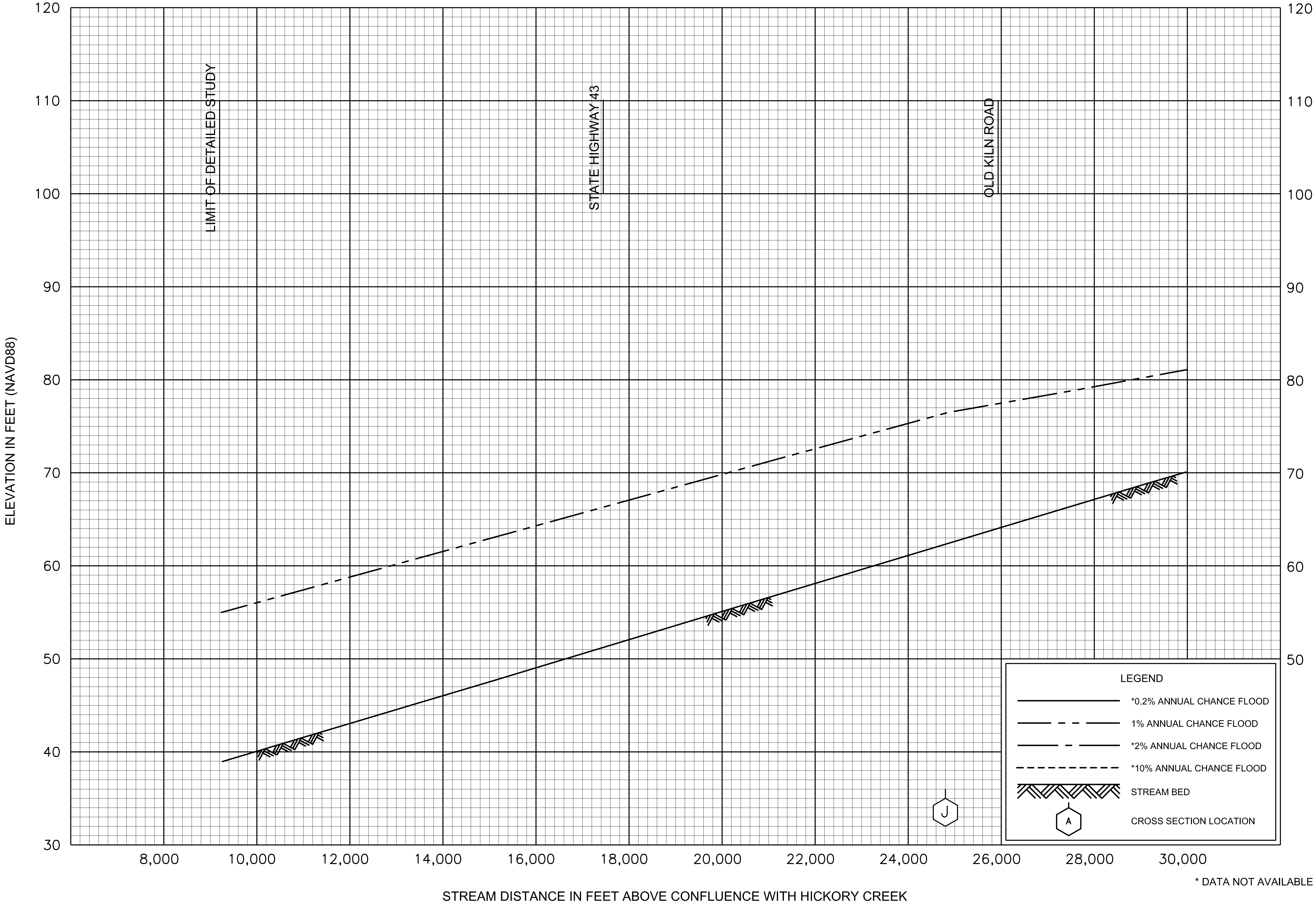
FLOOD PROFILES

CATAHOULA CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS
AND INCORPORATED AREAS



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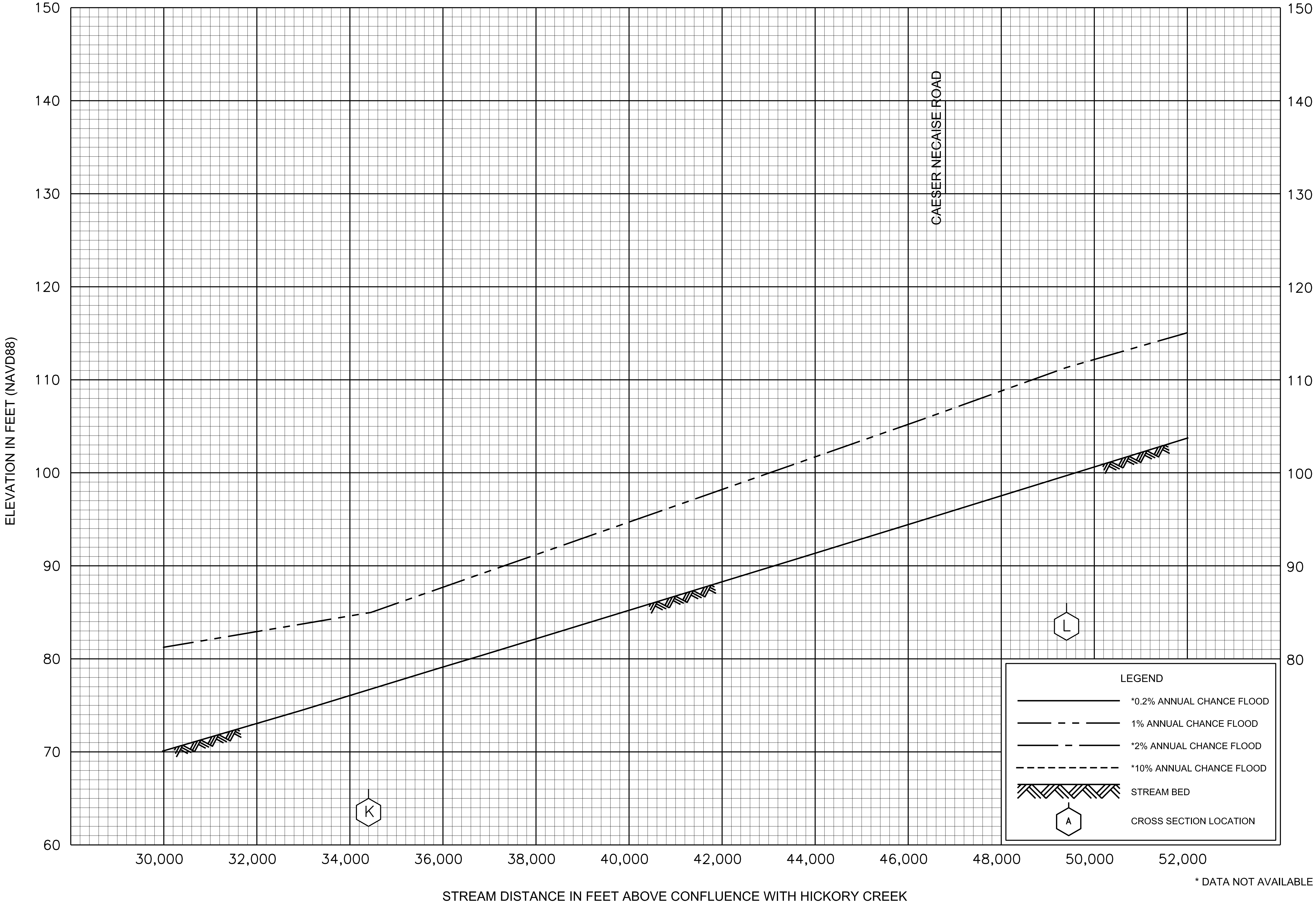
FLOOD PROFILES

CATAHOULA CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS
AND INCORPORATED AREAS



FLOOD PROFILES

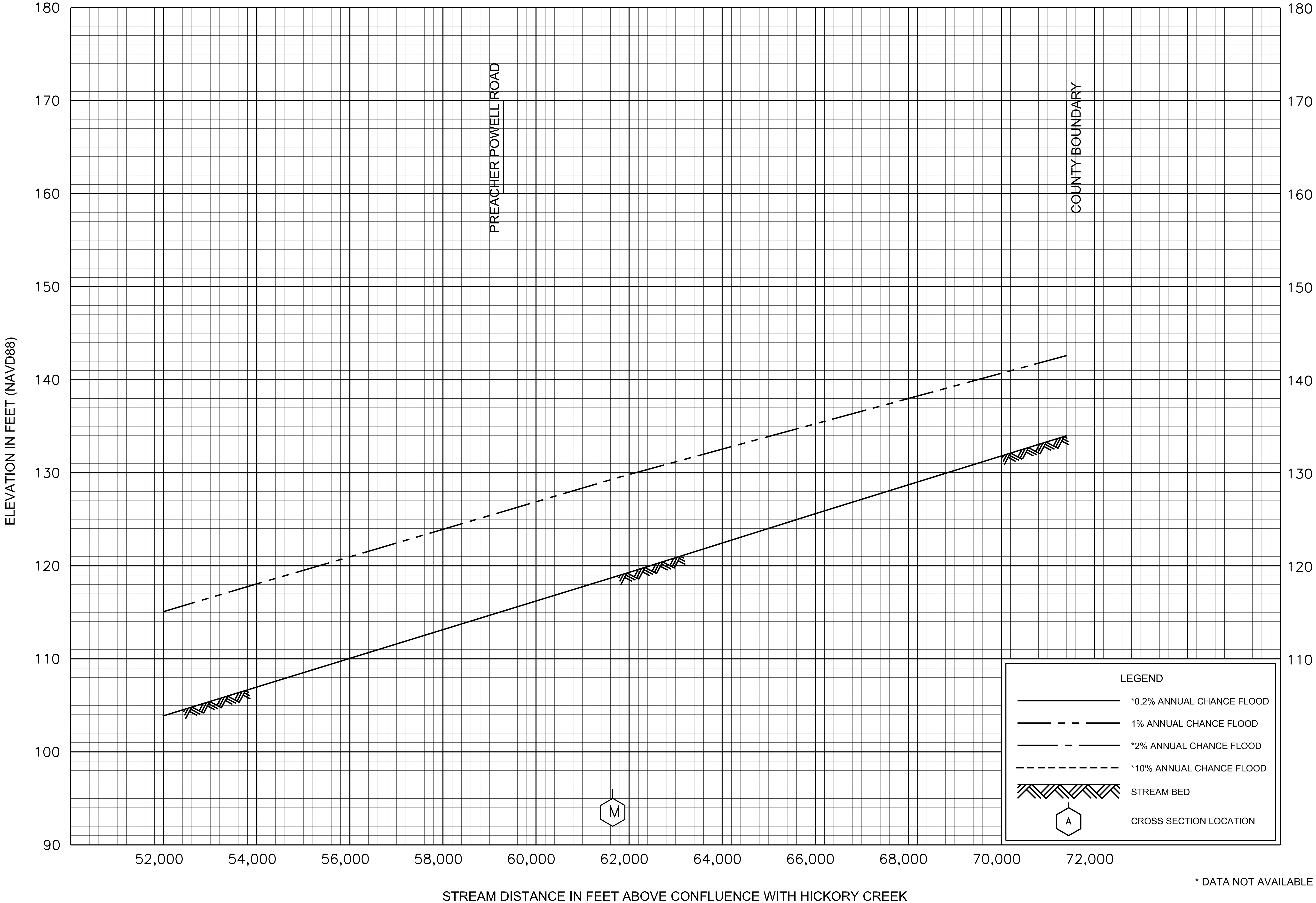
CATAHOULA CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

20P



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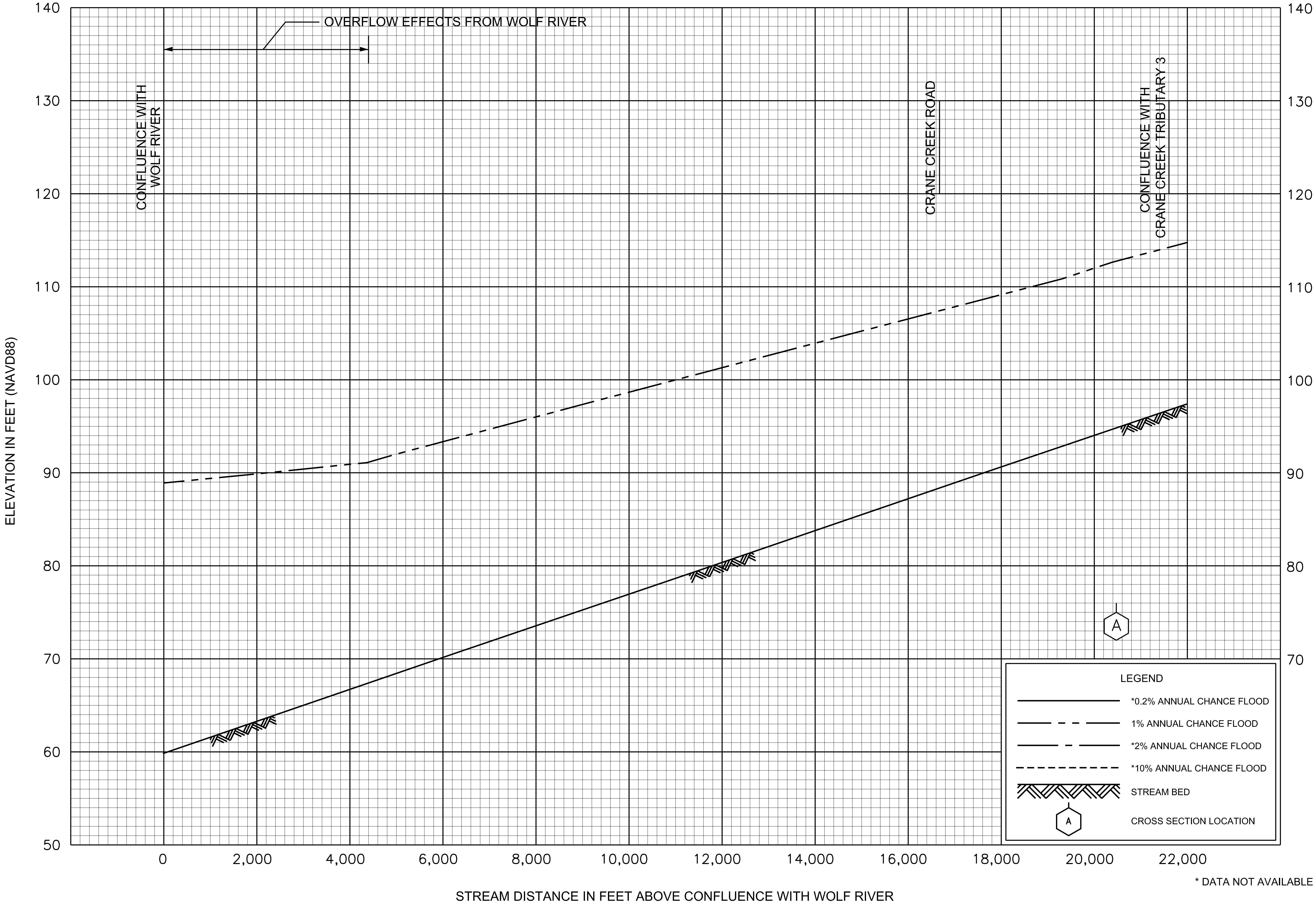
FLOOD PROFILES

CATAHOULA CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



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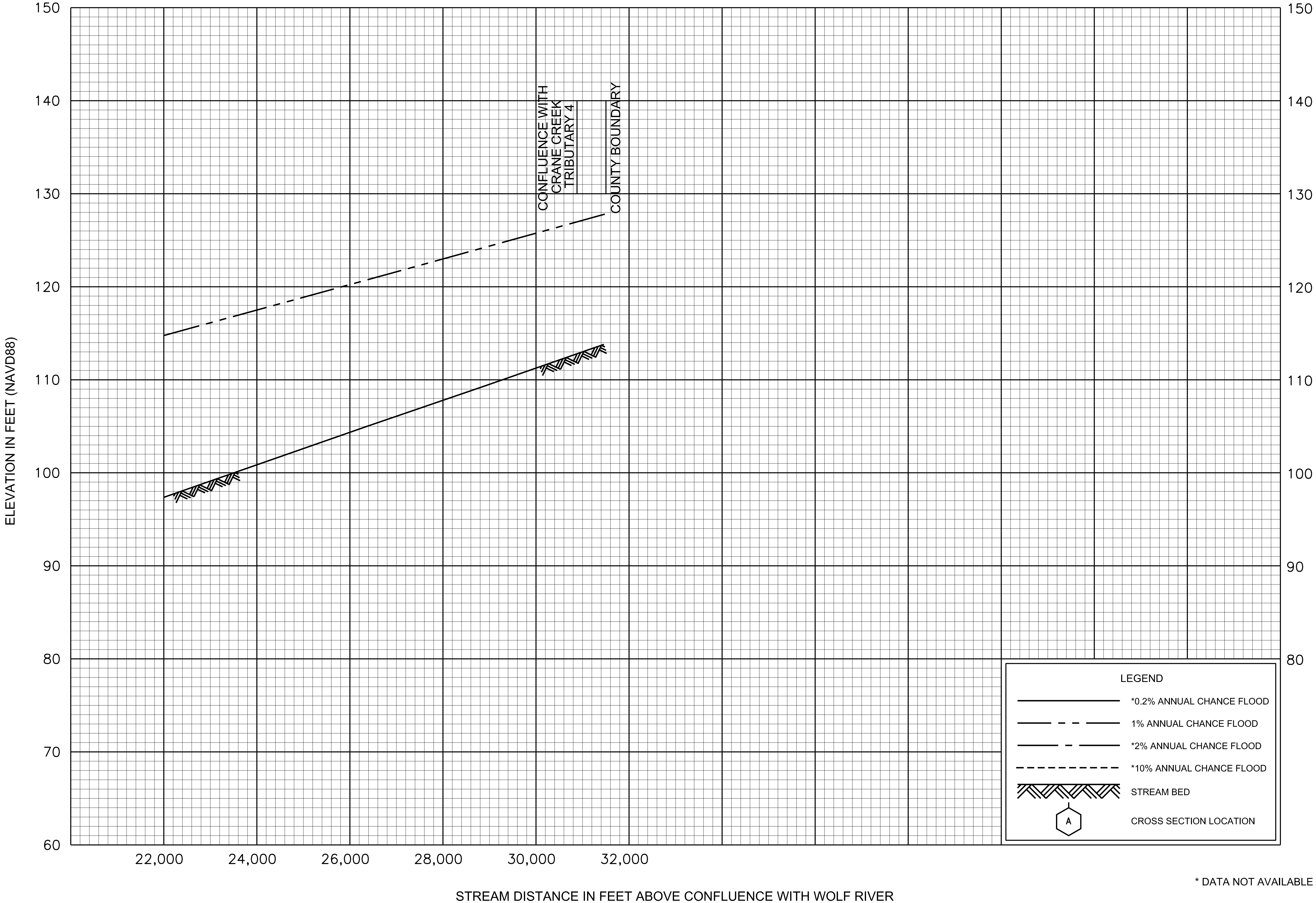
FLOOD PROFILES

CRANE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS
AND INCORPORATED AREAS

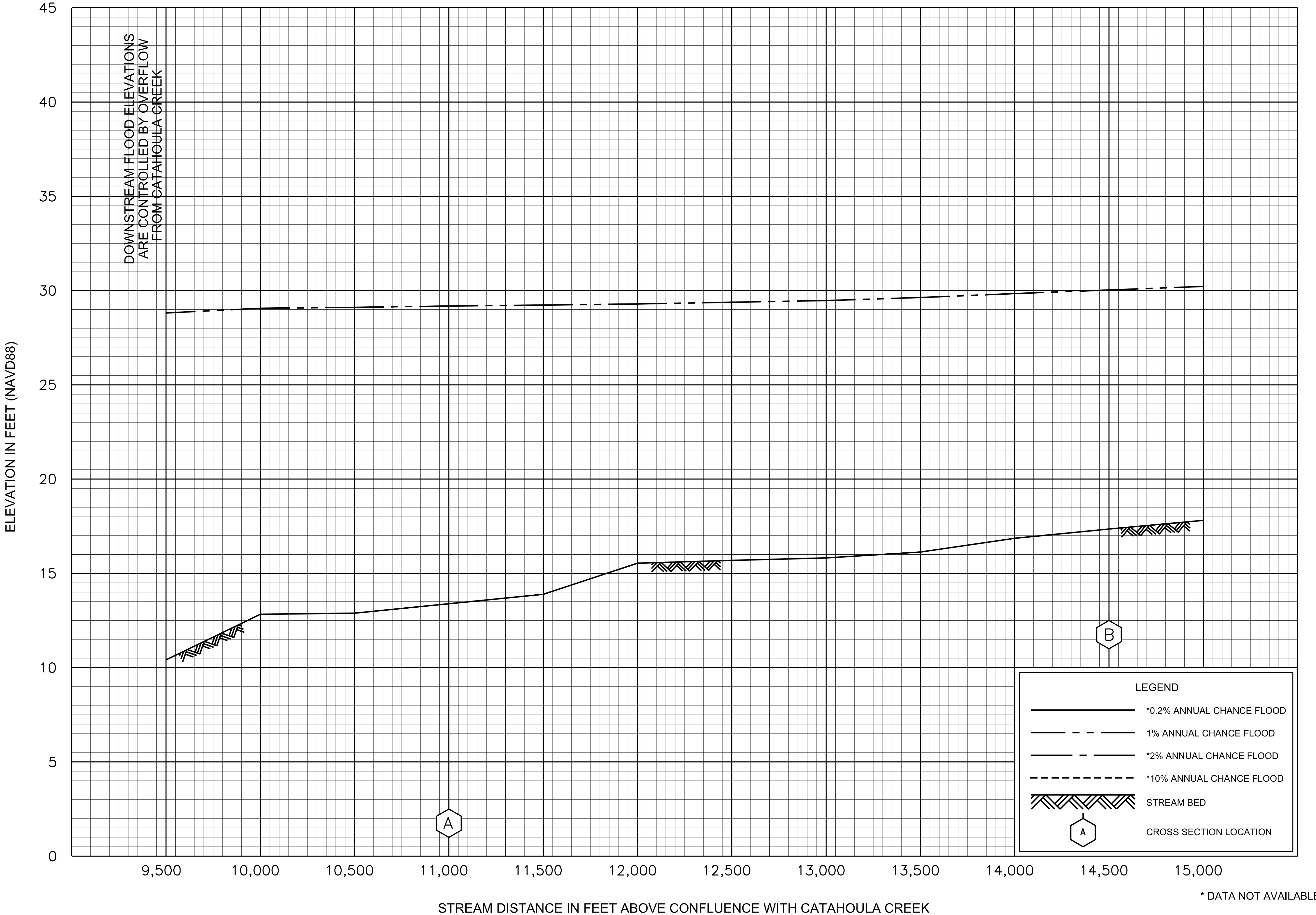


FLOOD PROFILES

CRANE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS
AND INCORPORATED AREAS



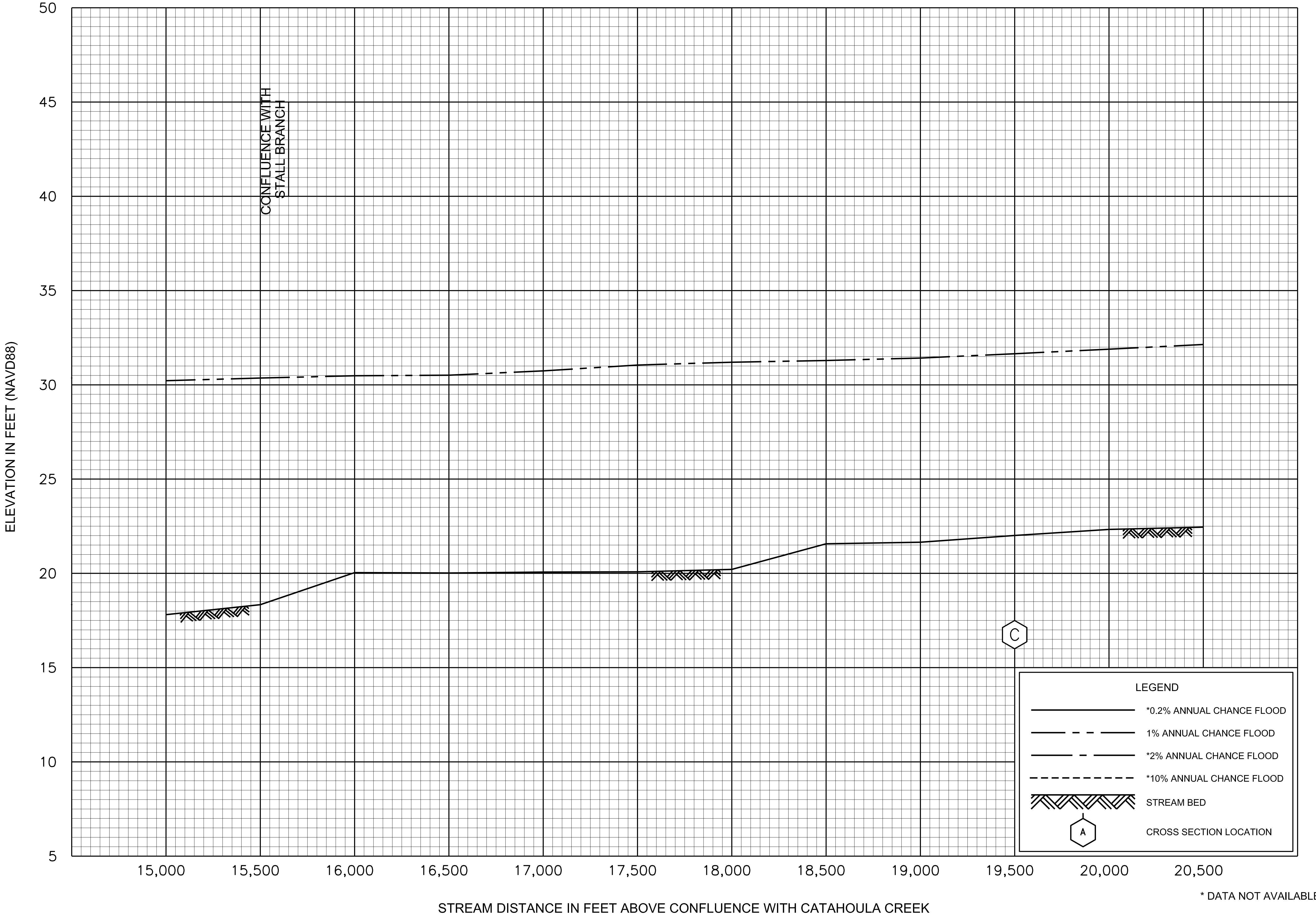
FLOOD PROFILES

DEAD TIGER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



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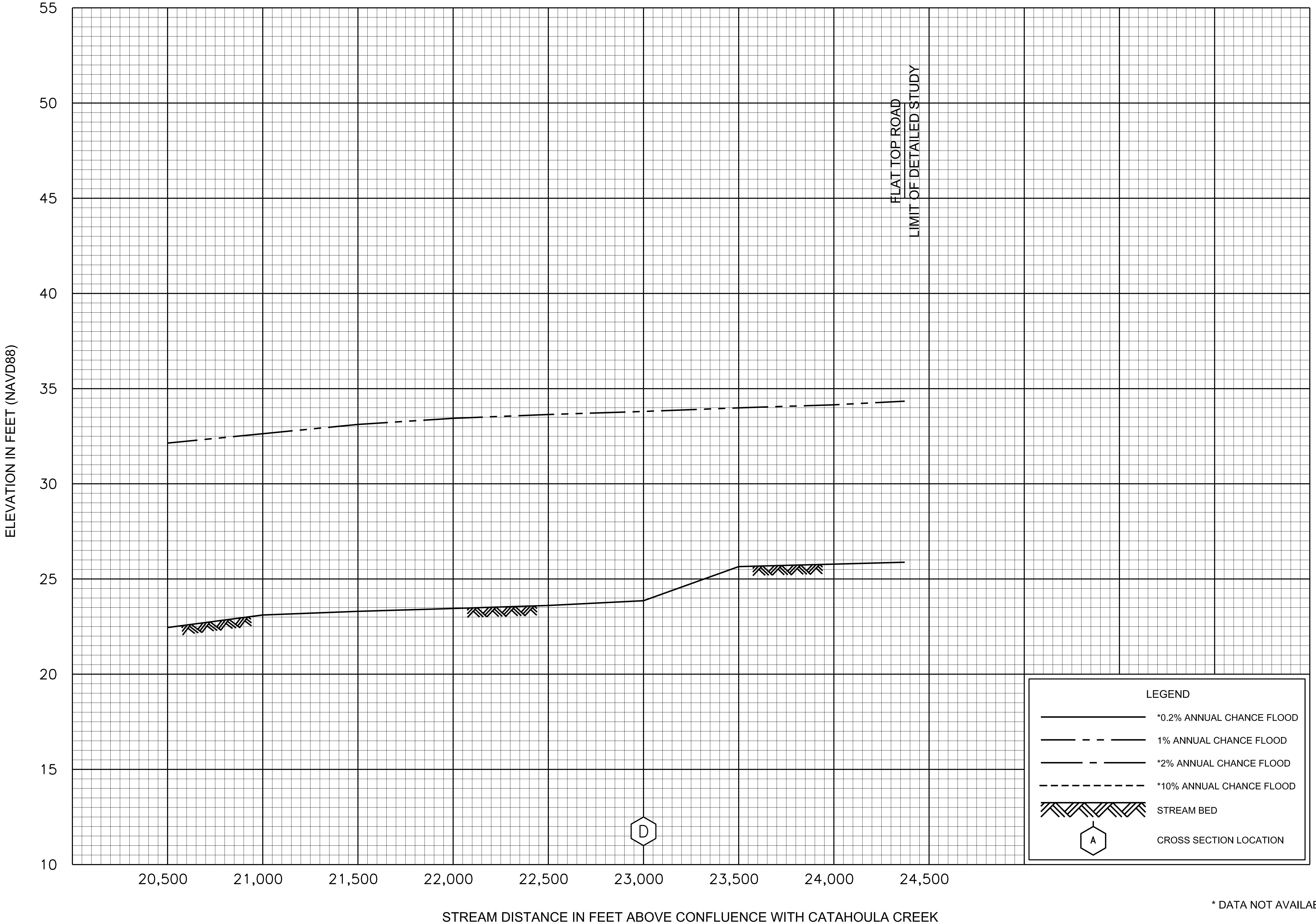
FLOOD PROFILES

DEAD TIGER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS
AND INCORPORATED AREAS



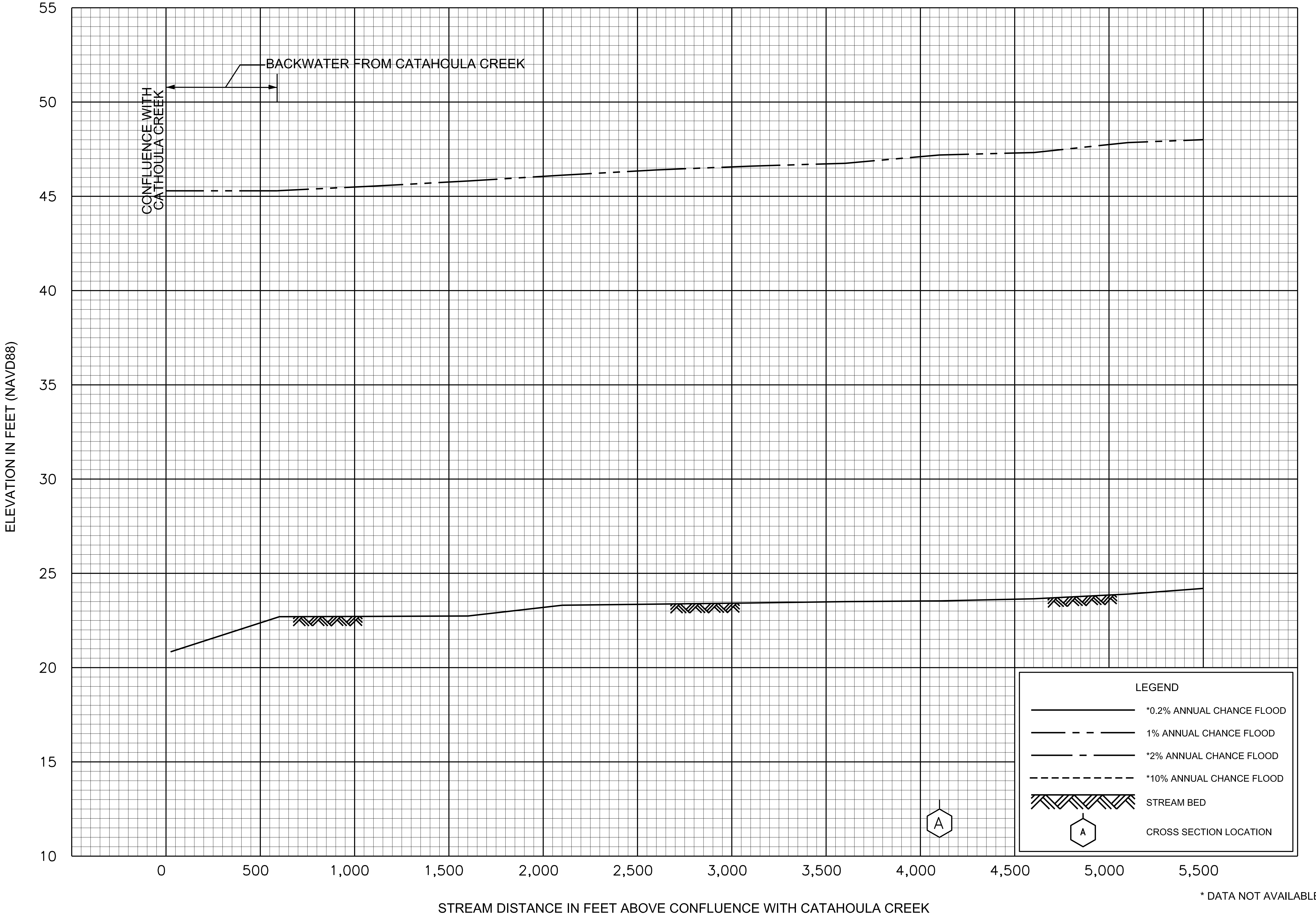
* DATA NOT AVAILABLE

FLOOD PROFILES

DEAD TIGER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS
AND INCORPORATED AREAS



* DATA NOT AVAILABLE

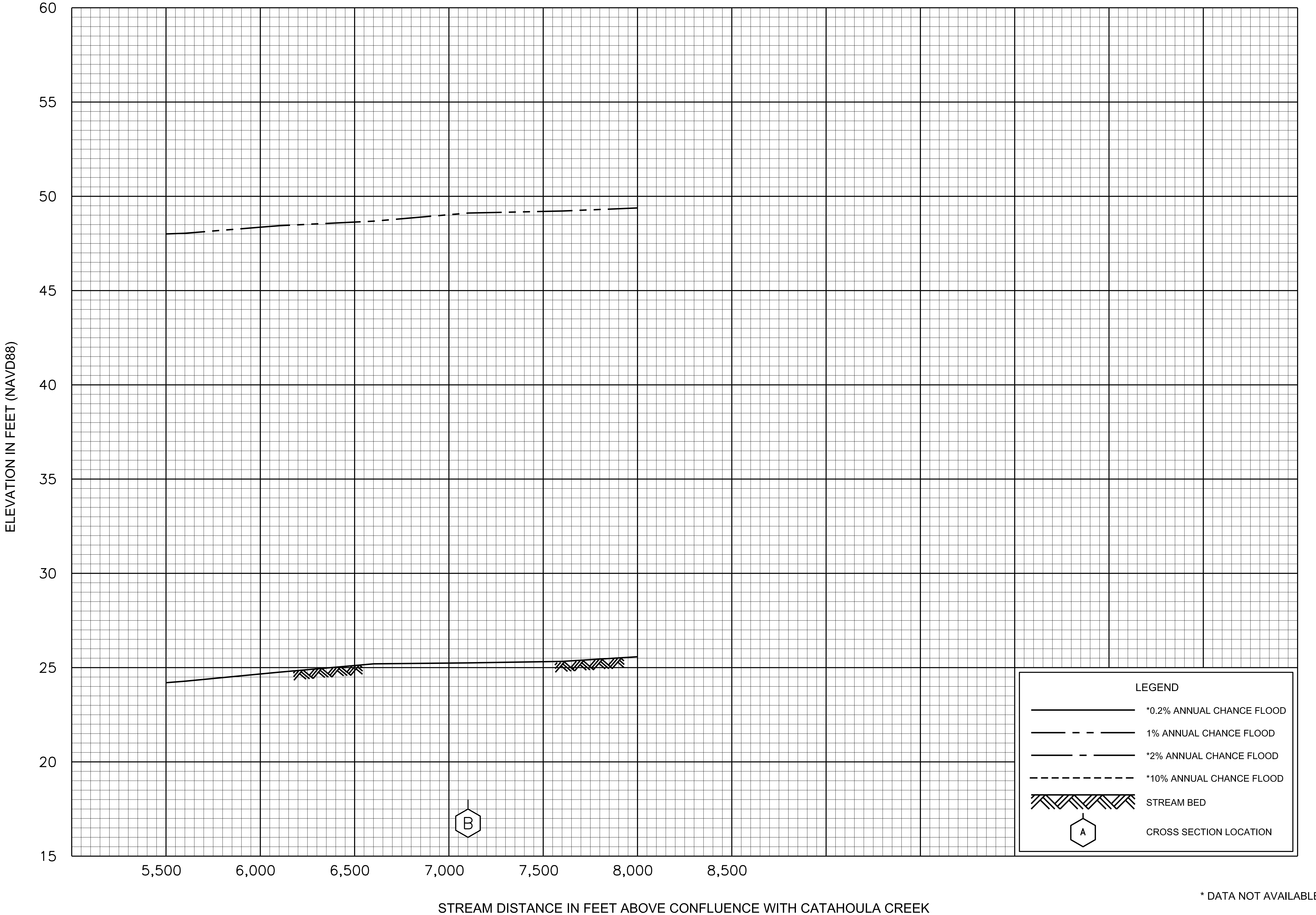
FLOOD PROFILES

HICKORY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



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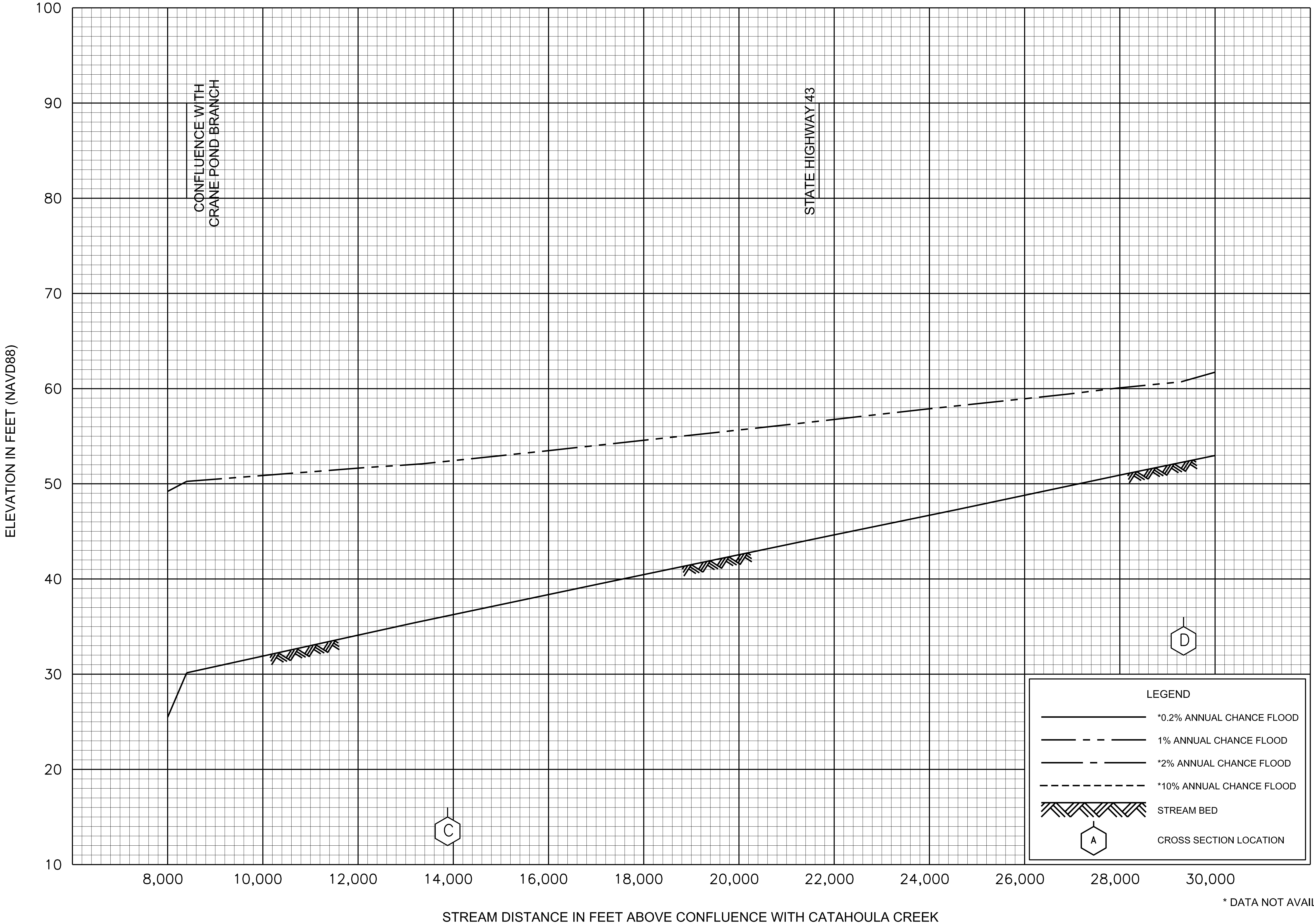
FLOOD PROFILES

HICKORY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



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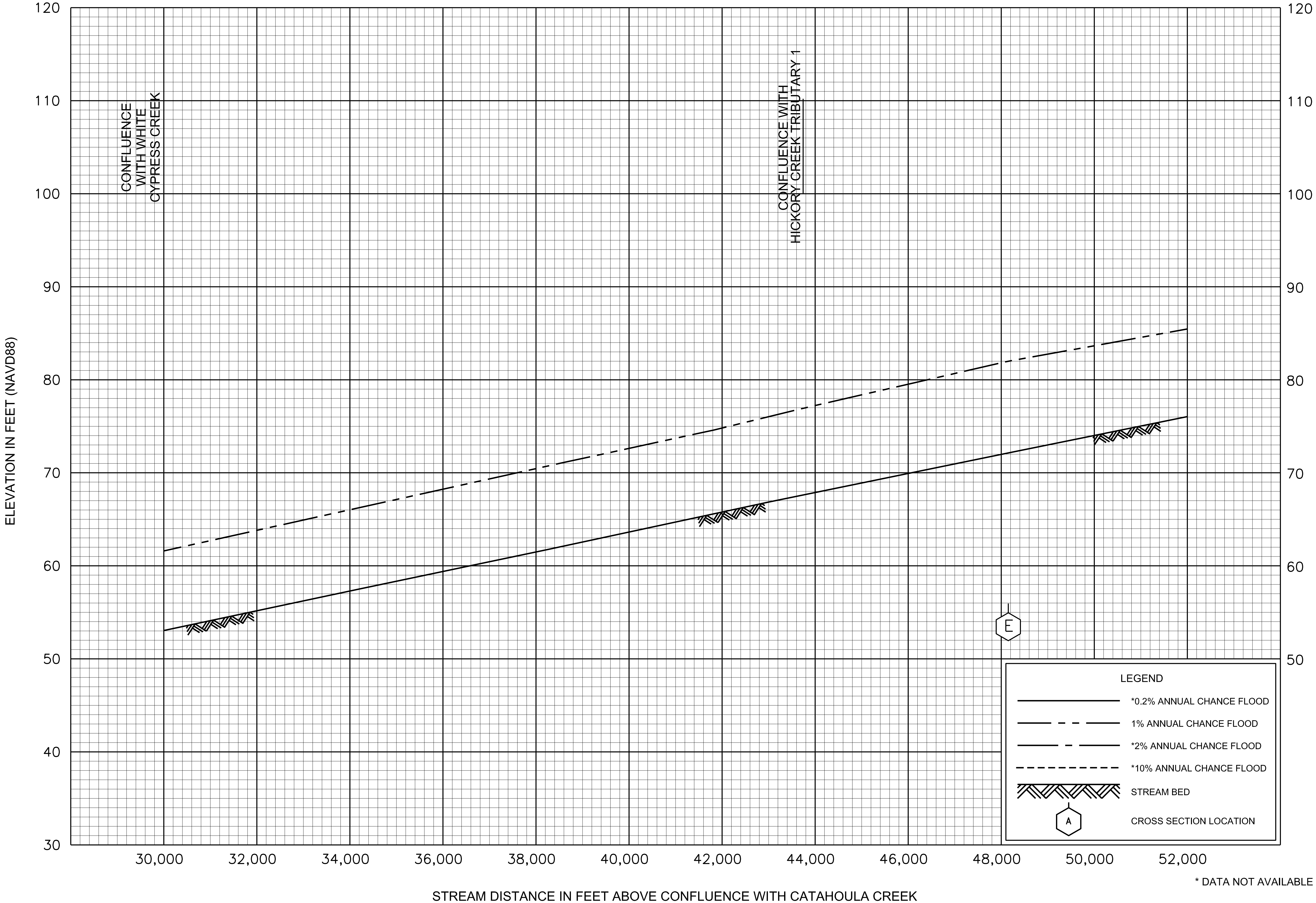
FLOOD PROFILES

HICKORY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS
AND INCORPORATED AREAS

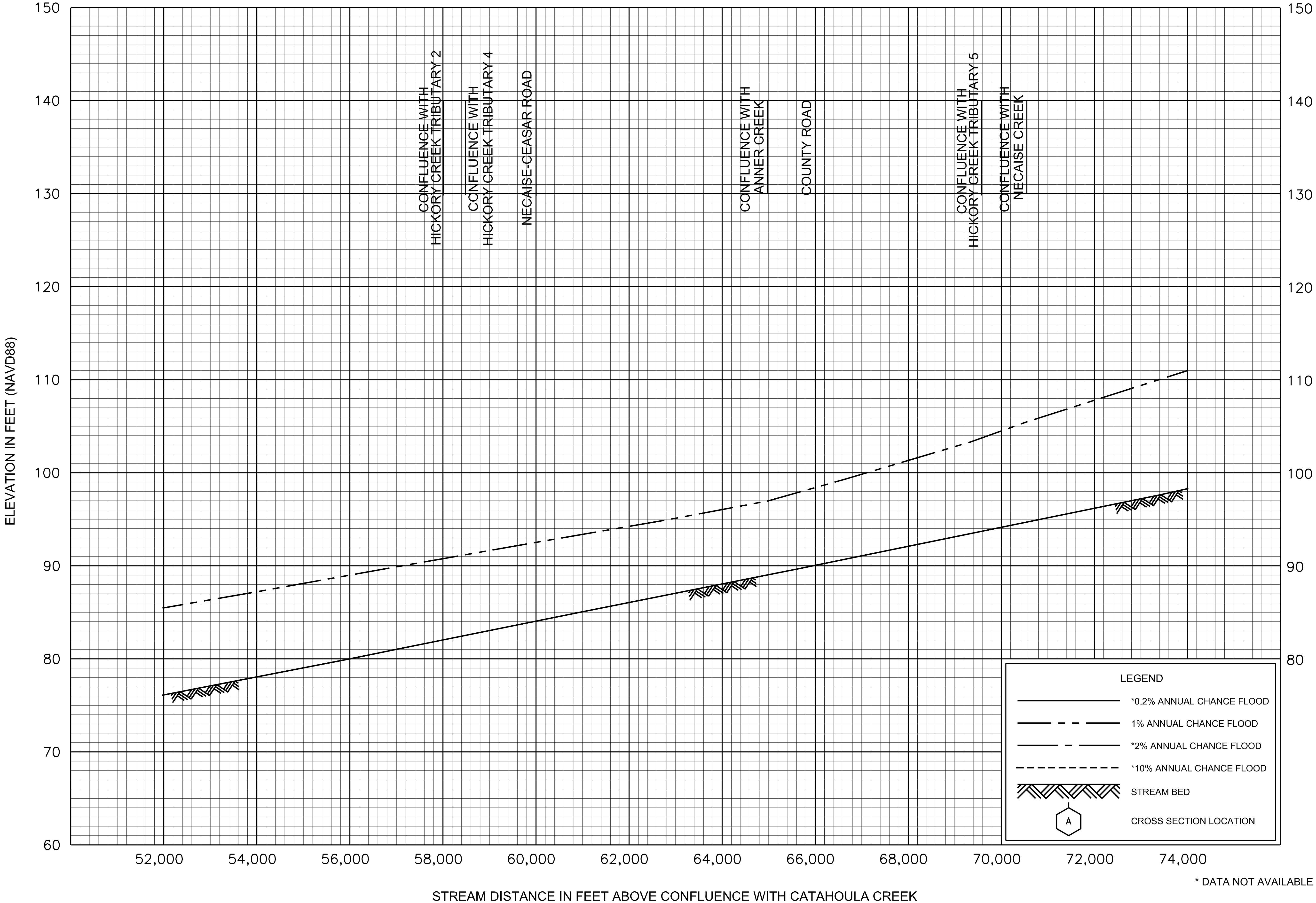


FLOOD PROFILES

HICKORY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS
AND INCORPORATED AREAS



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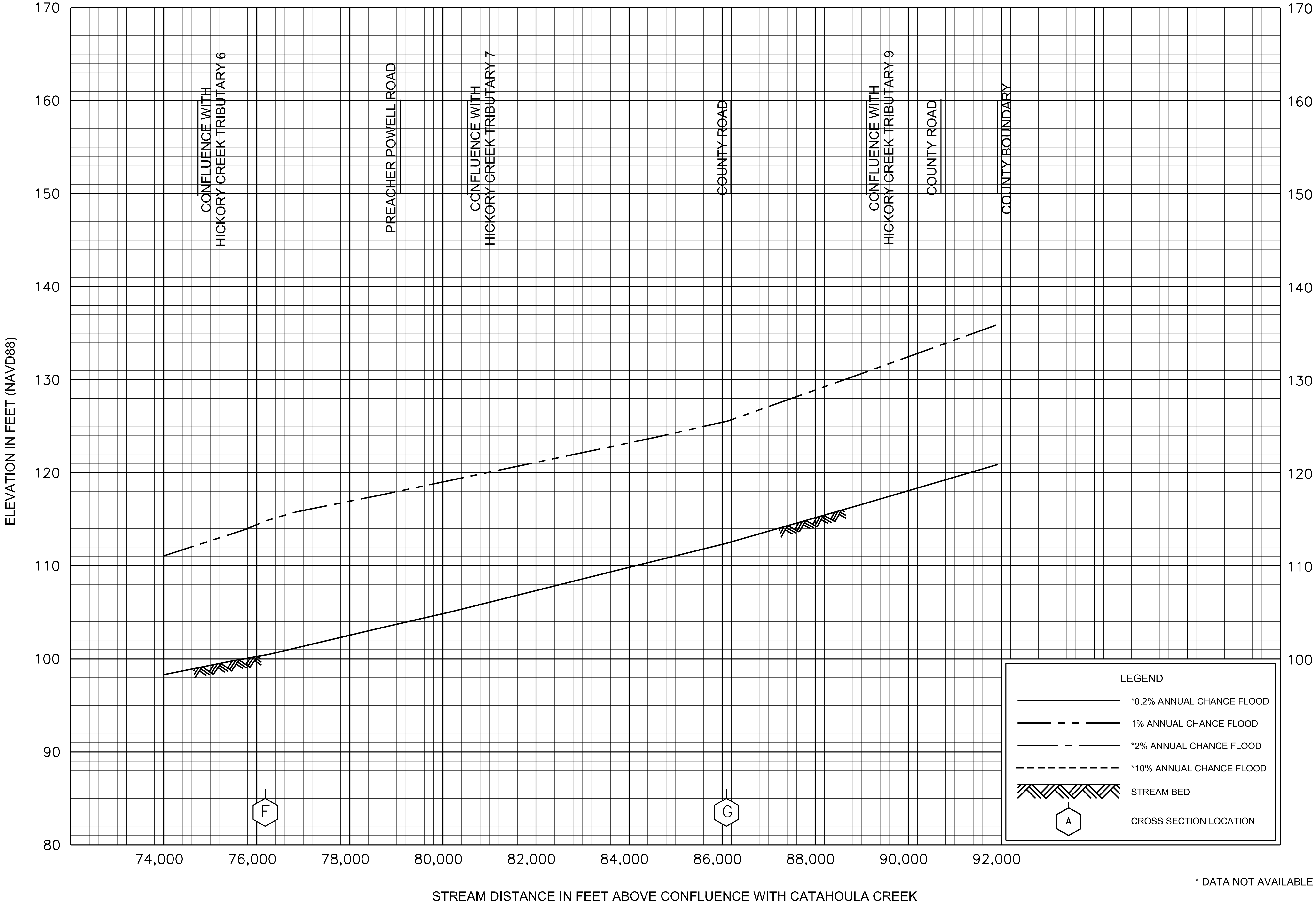
FLOOD PROFILES

HICKORY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS
AND INCORPORATED AREAS

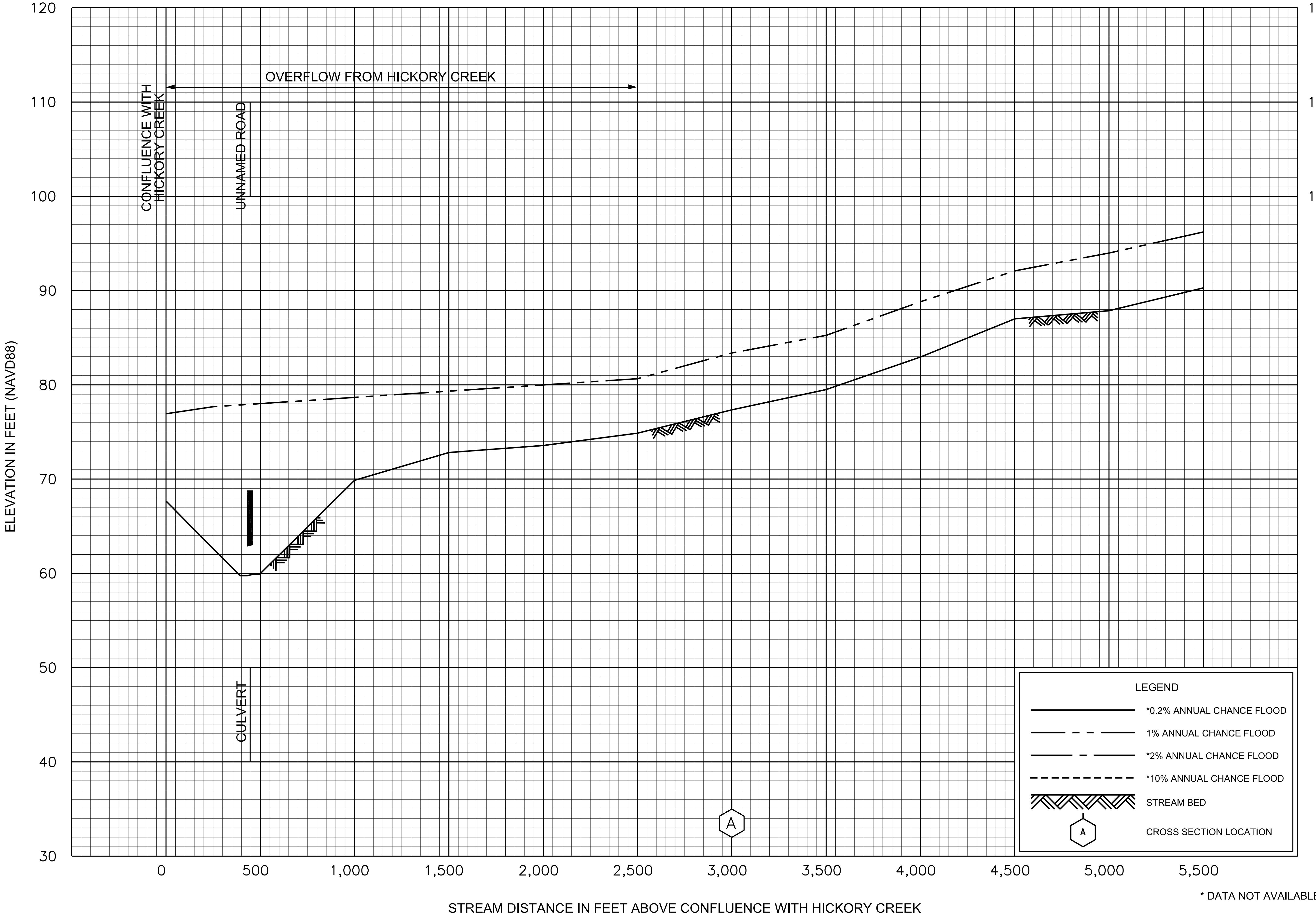


FLOOD PROFILES

HICKORY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS AND INCORPORATED AREAS

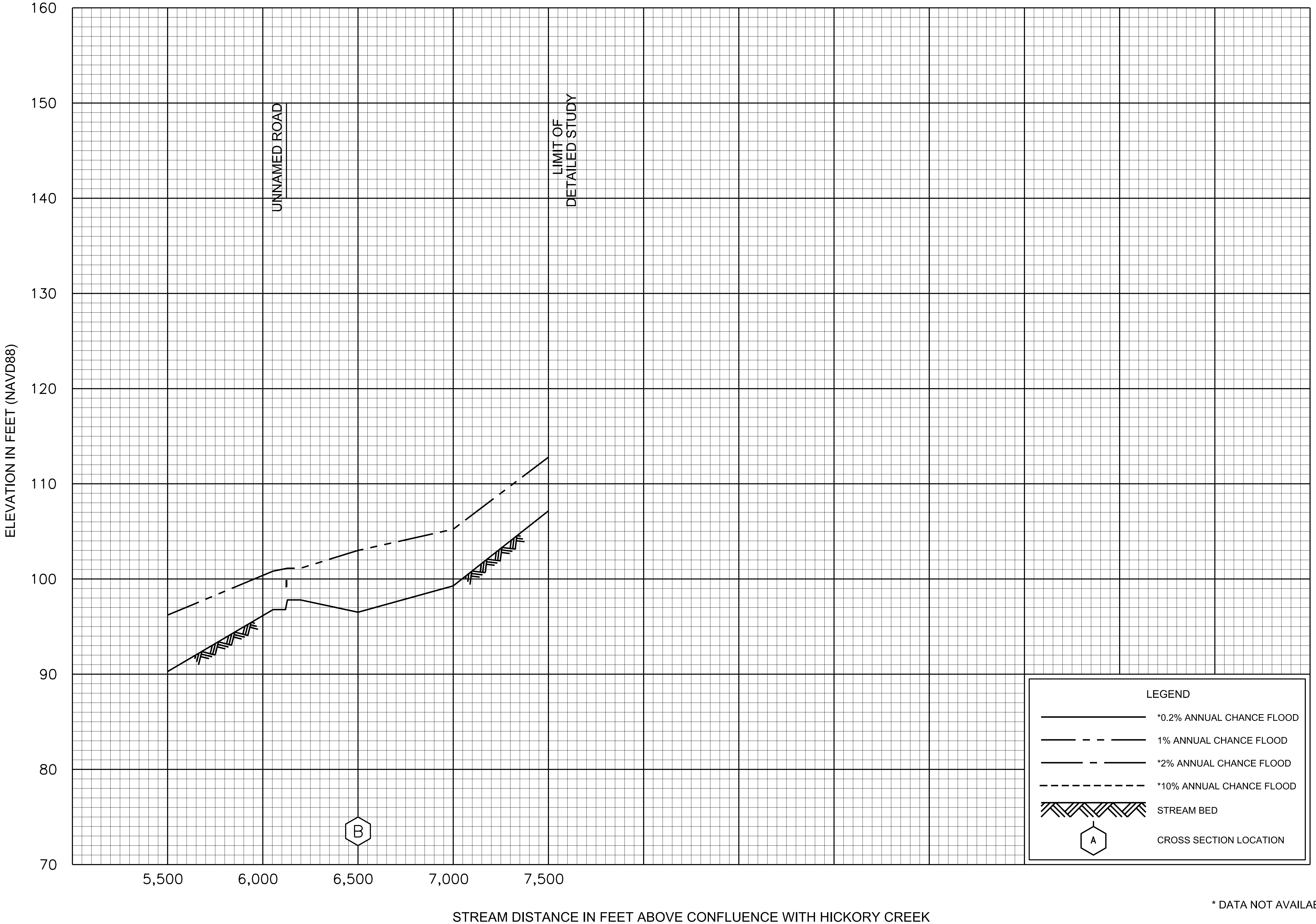


FLOOD PROFILES

HICKORY CREEK TRIBUTARY 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS
AND INCORPORATED AREAS



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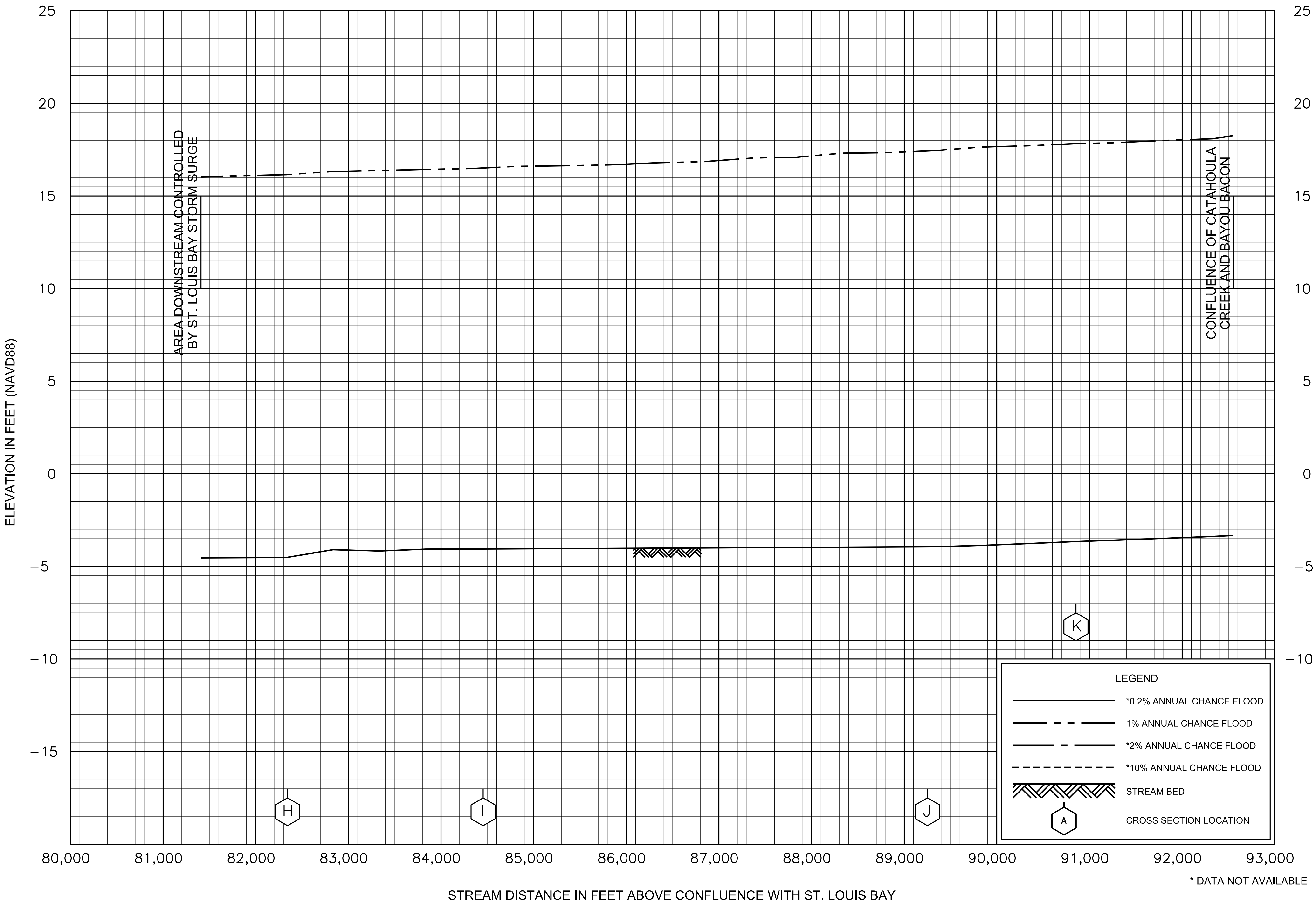
FLOOD PROFILES

HICKORY CREEK TRIBUTARY 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS
AND INCORPORATED AREAS

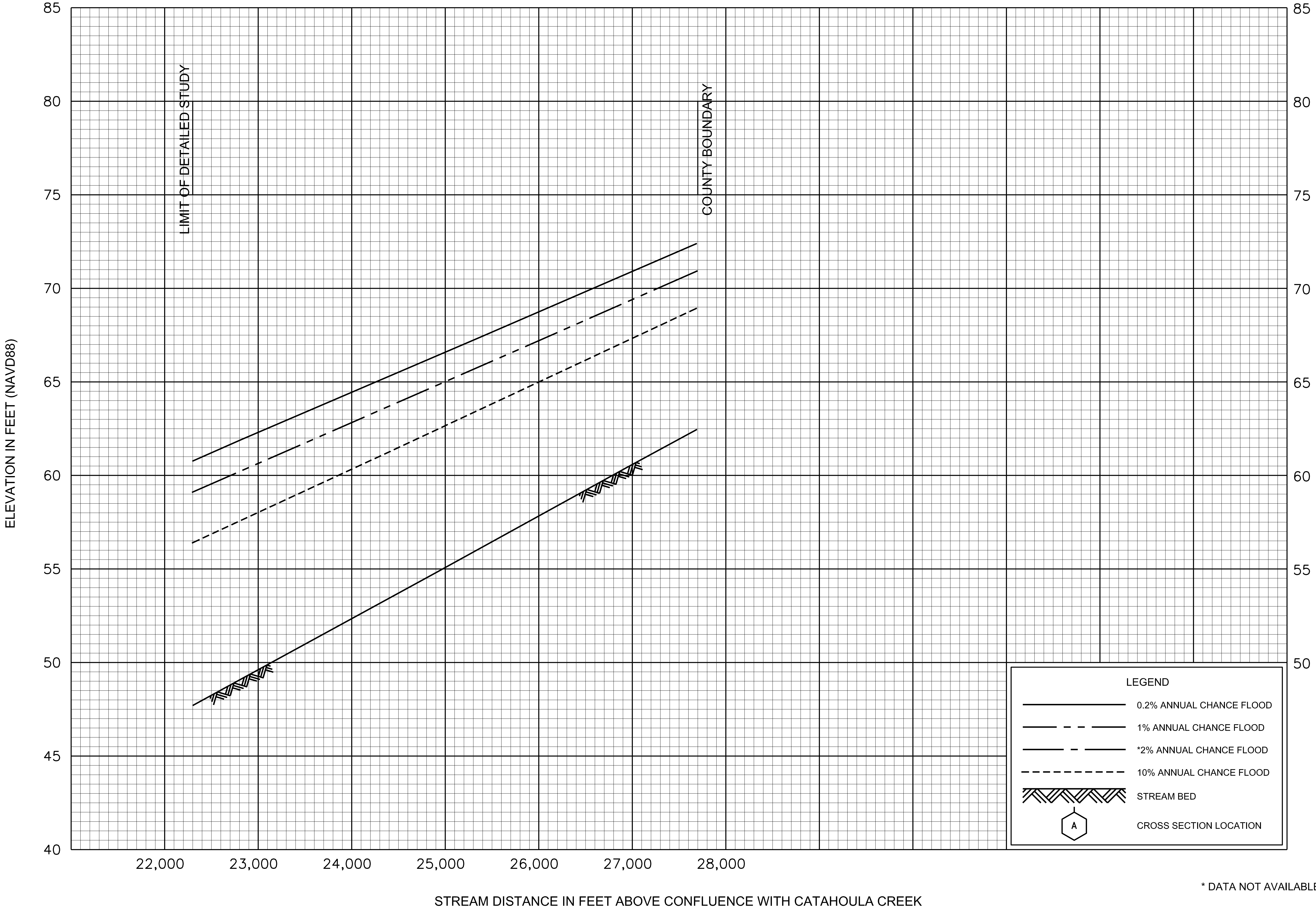


FLOOD PROFILES

JOURDAN RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS
AND INCORPORATED AREAS



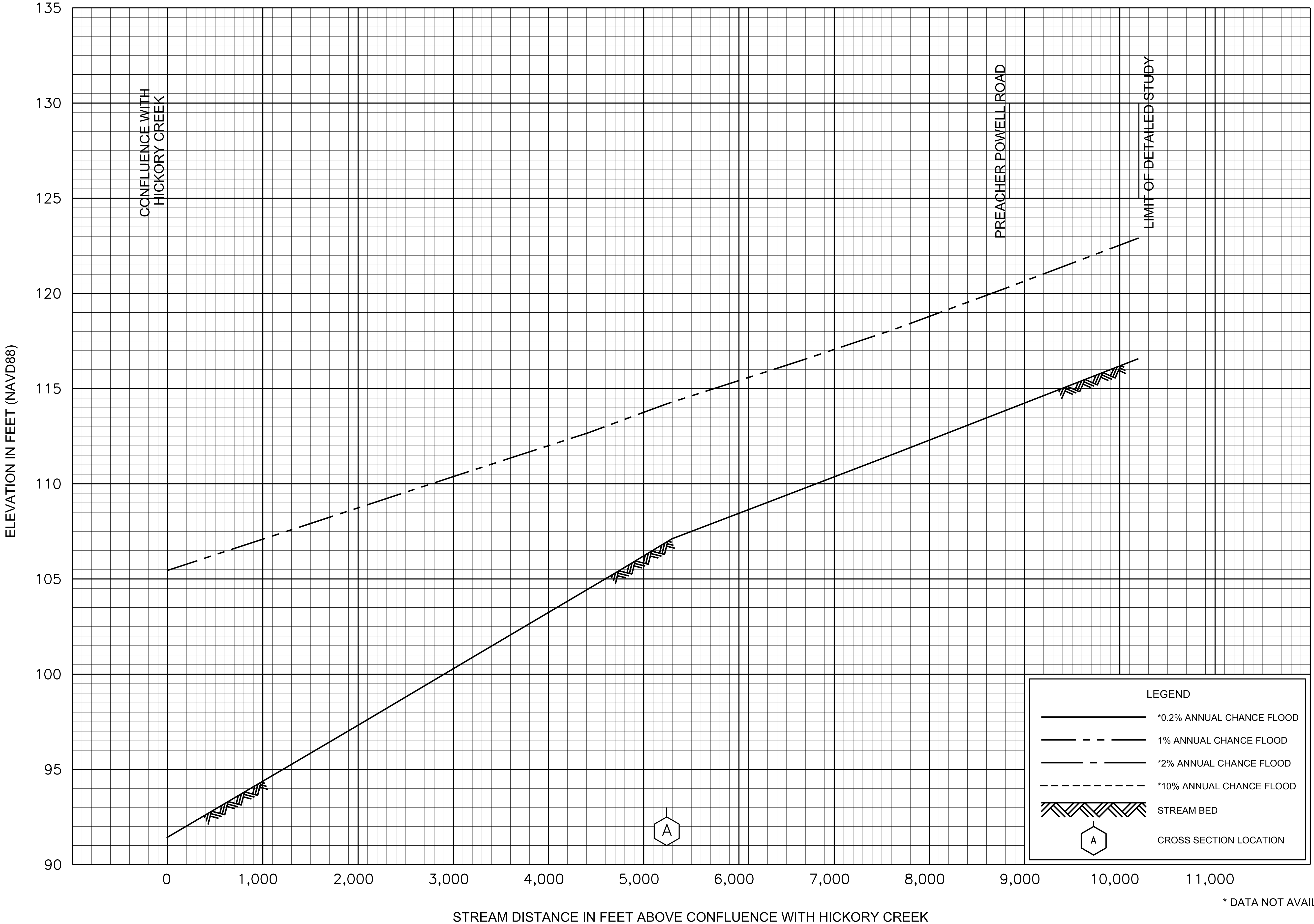
FLOOD PROFILES

MILL CREEK (WEST)

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



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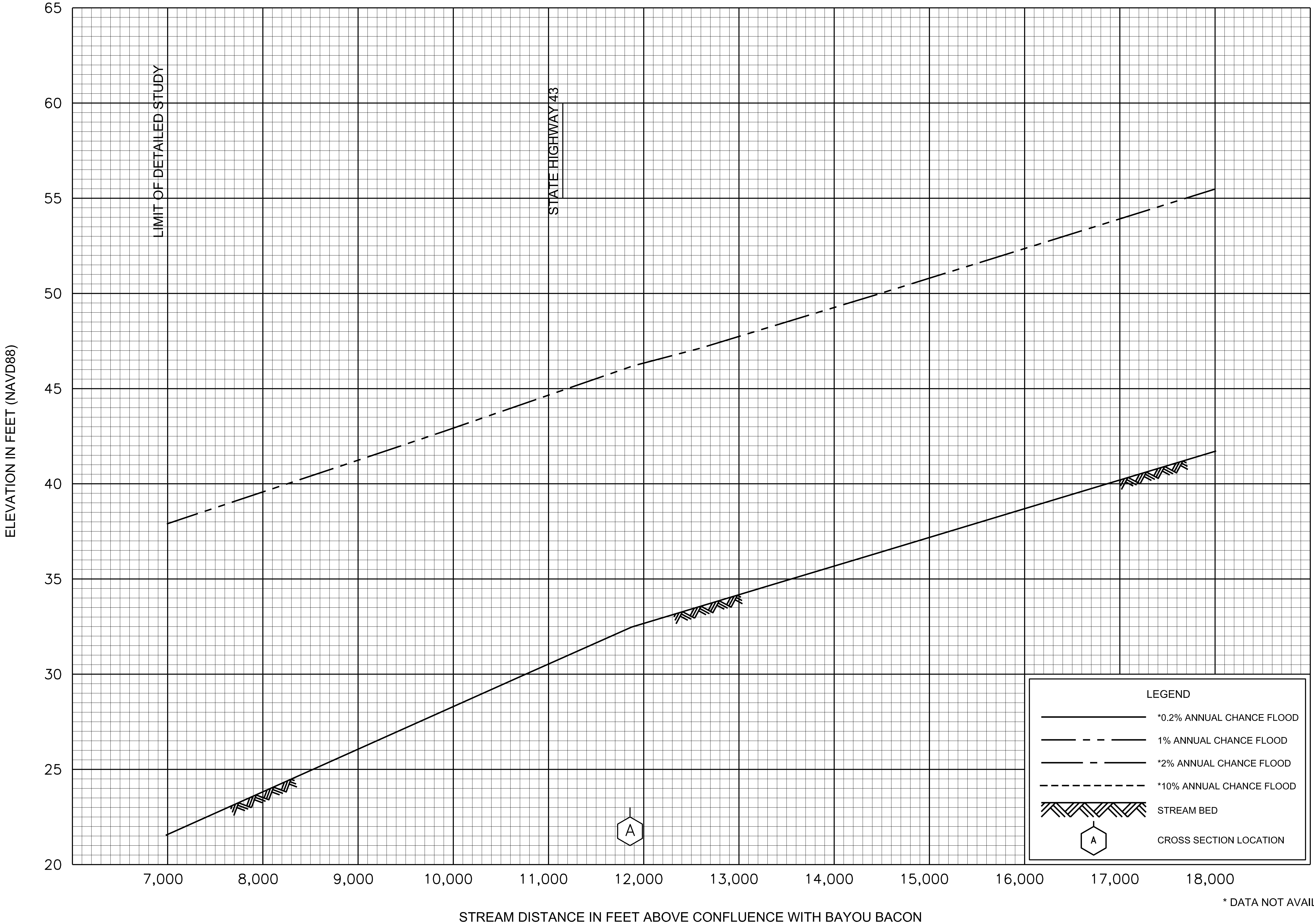
FLOOD PROFILES

NECAISE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



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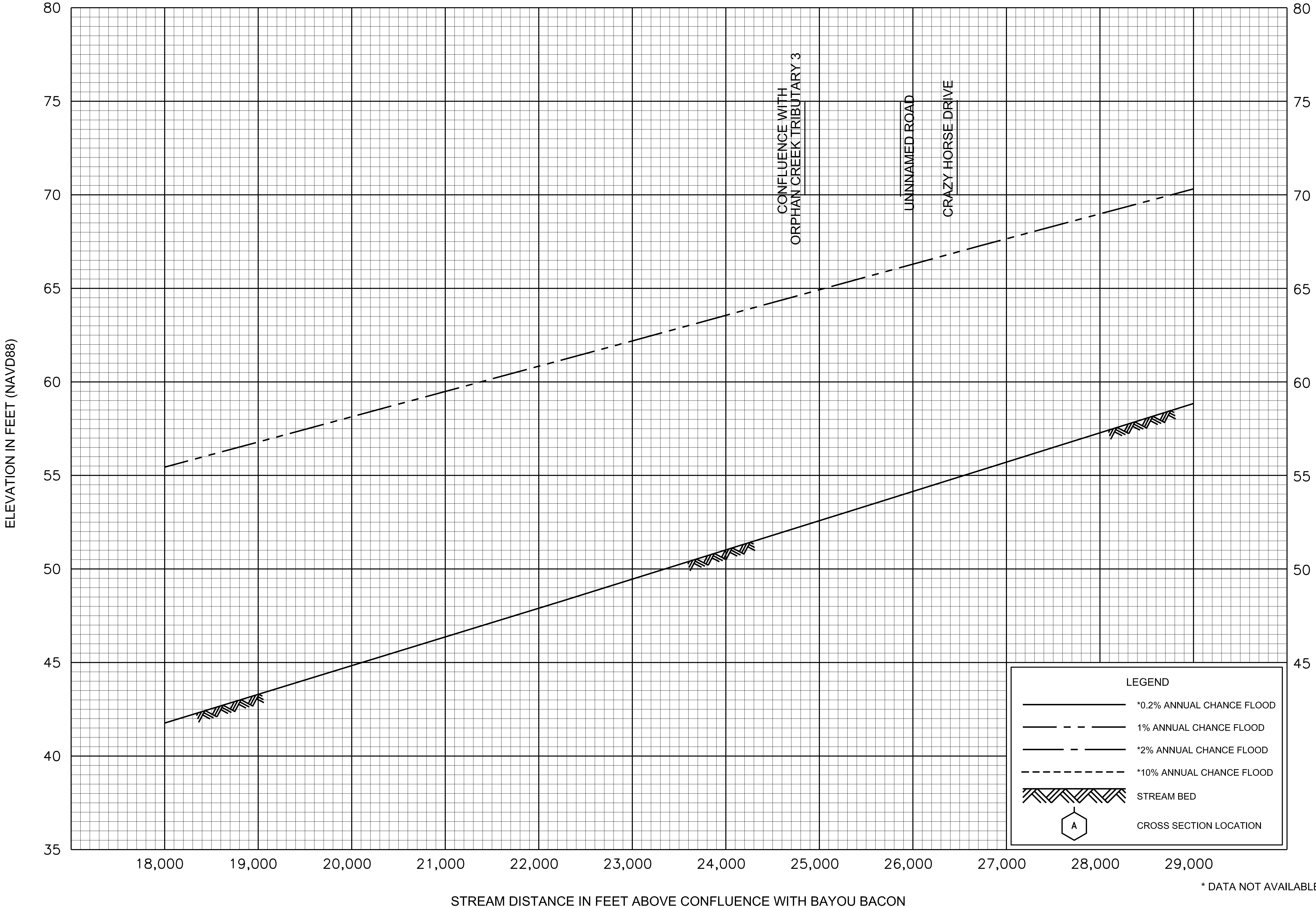
FLOOD PROFILES

ORPHAN CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



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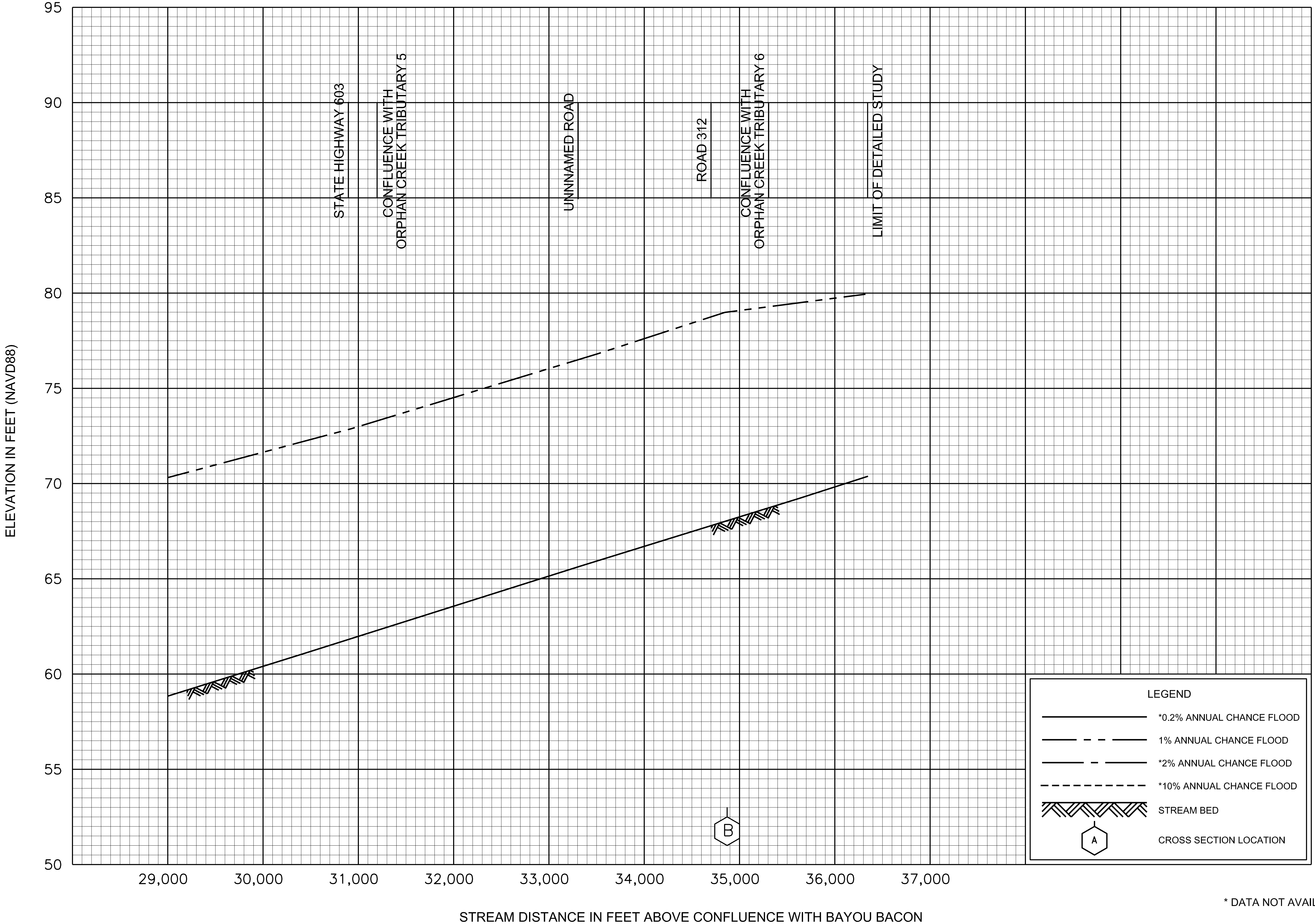
FLOOD PROFILES

ORPHAN CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS
AND INCORPORATED AREAS



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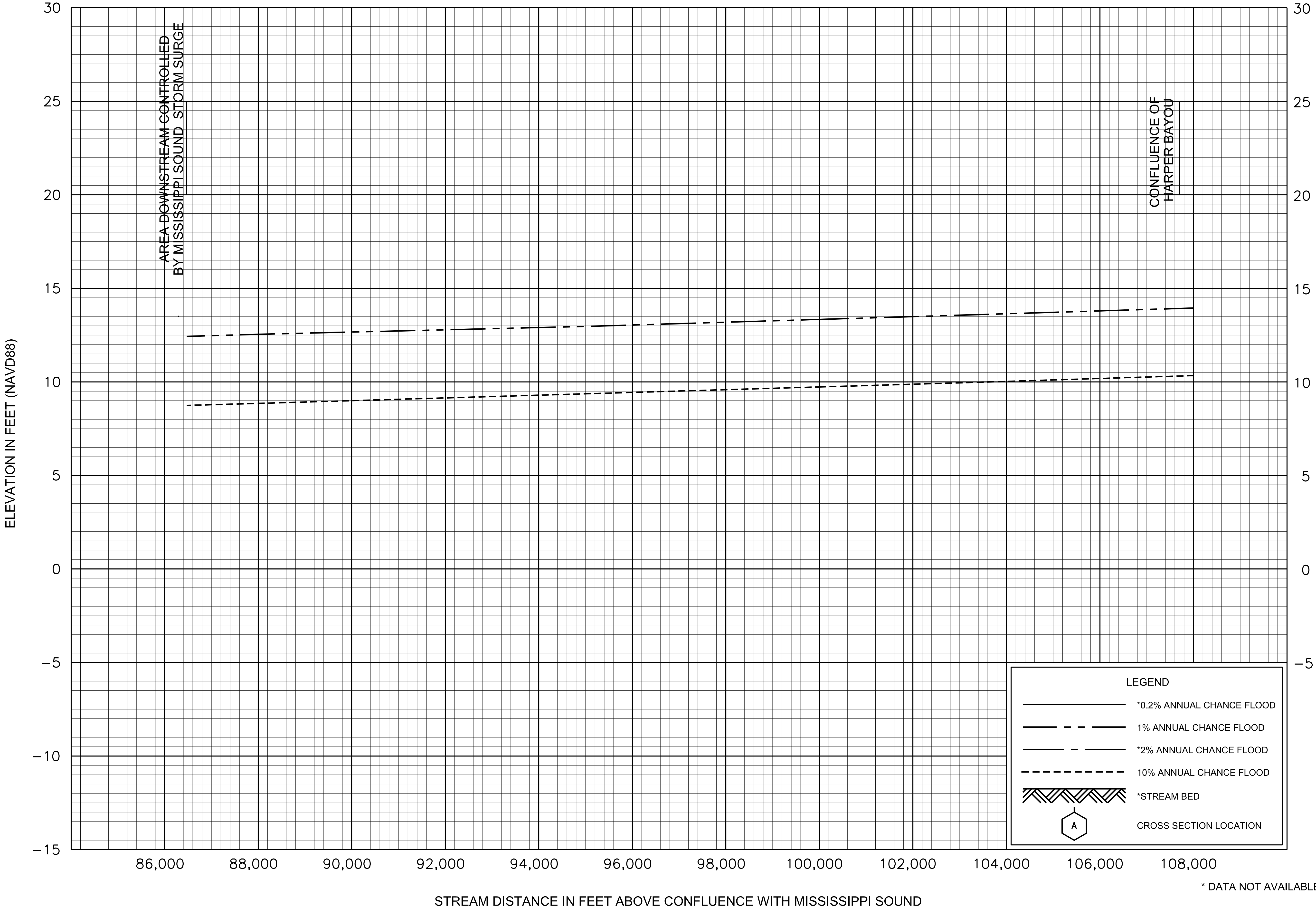
FLOOD PROFILES

ORPHAN CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS
AND INCORPORATED AREAS



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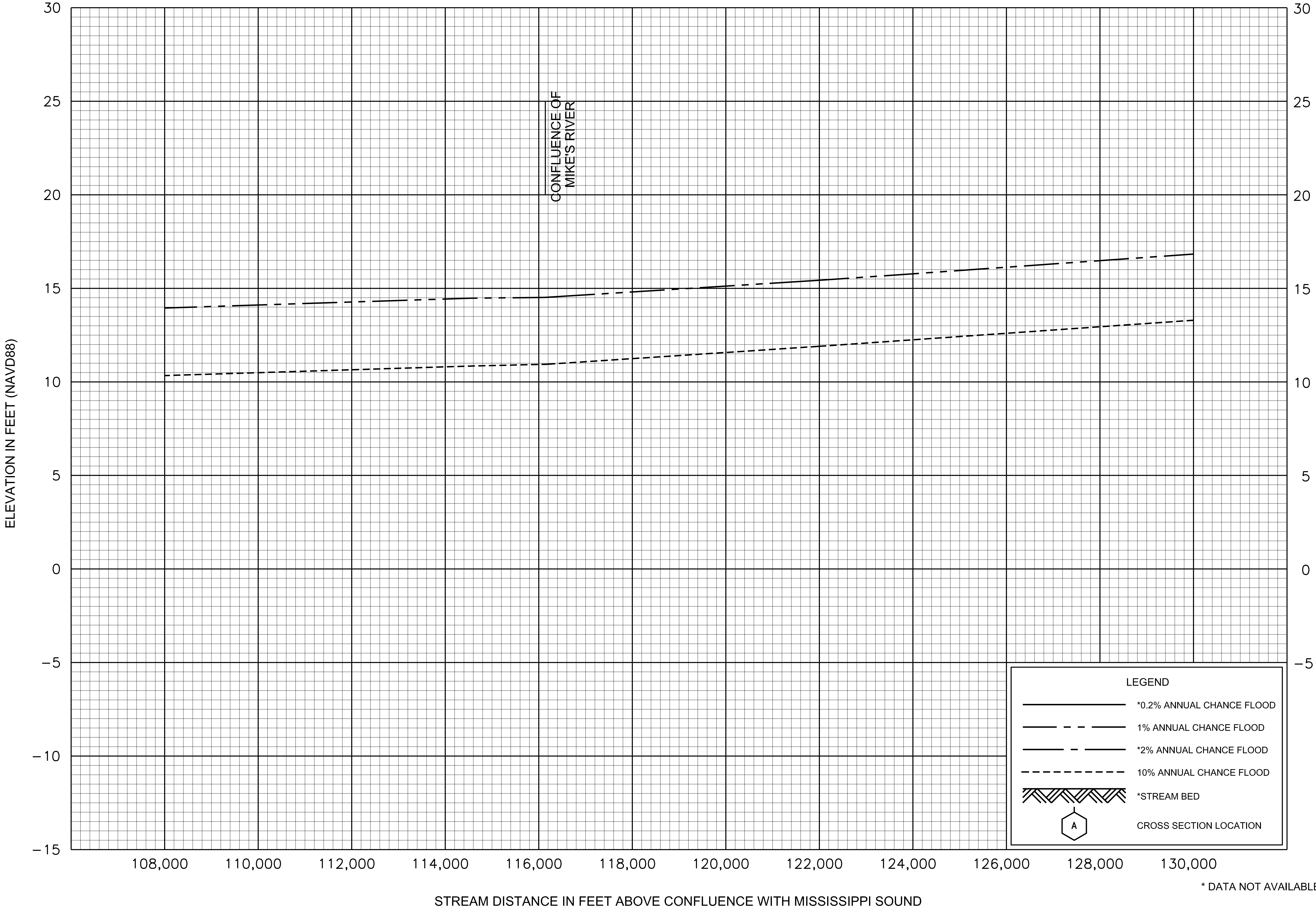
FLOOD PROFILES

PEARL RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



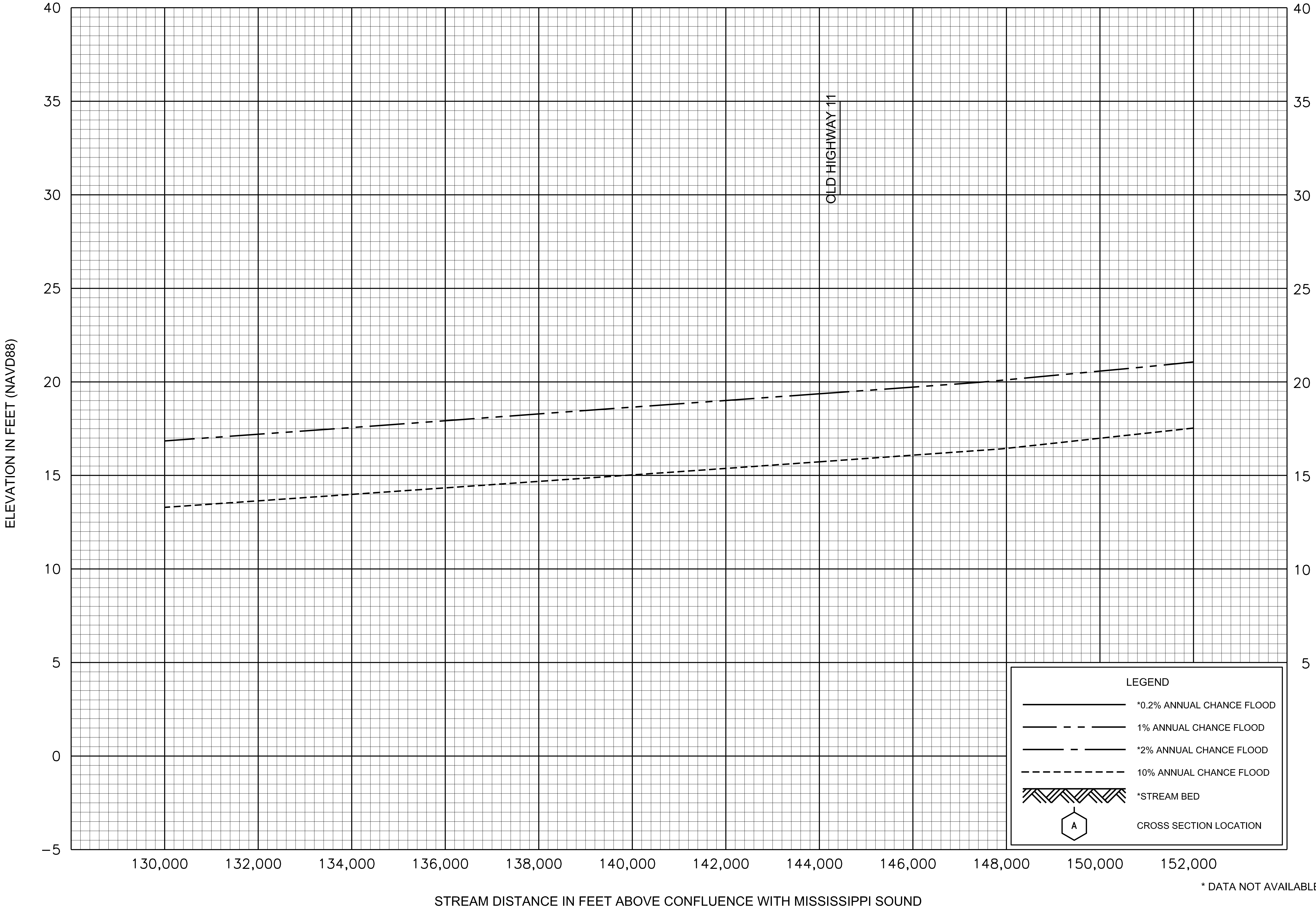
FLOOD PROFILES

PEARL RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



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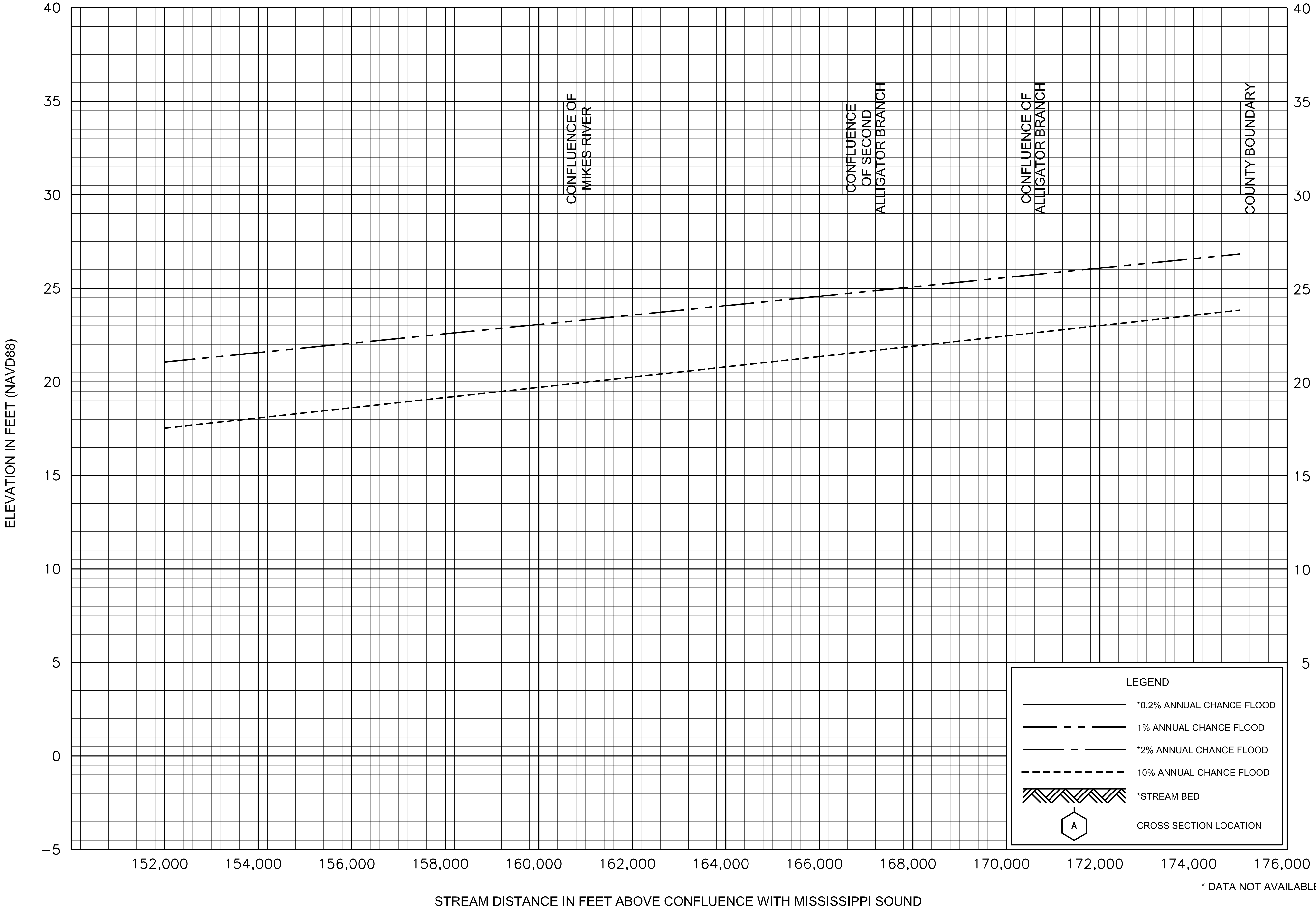
FLOOD PROFILES

PEARL RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



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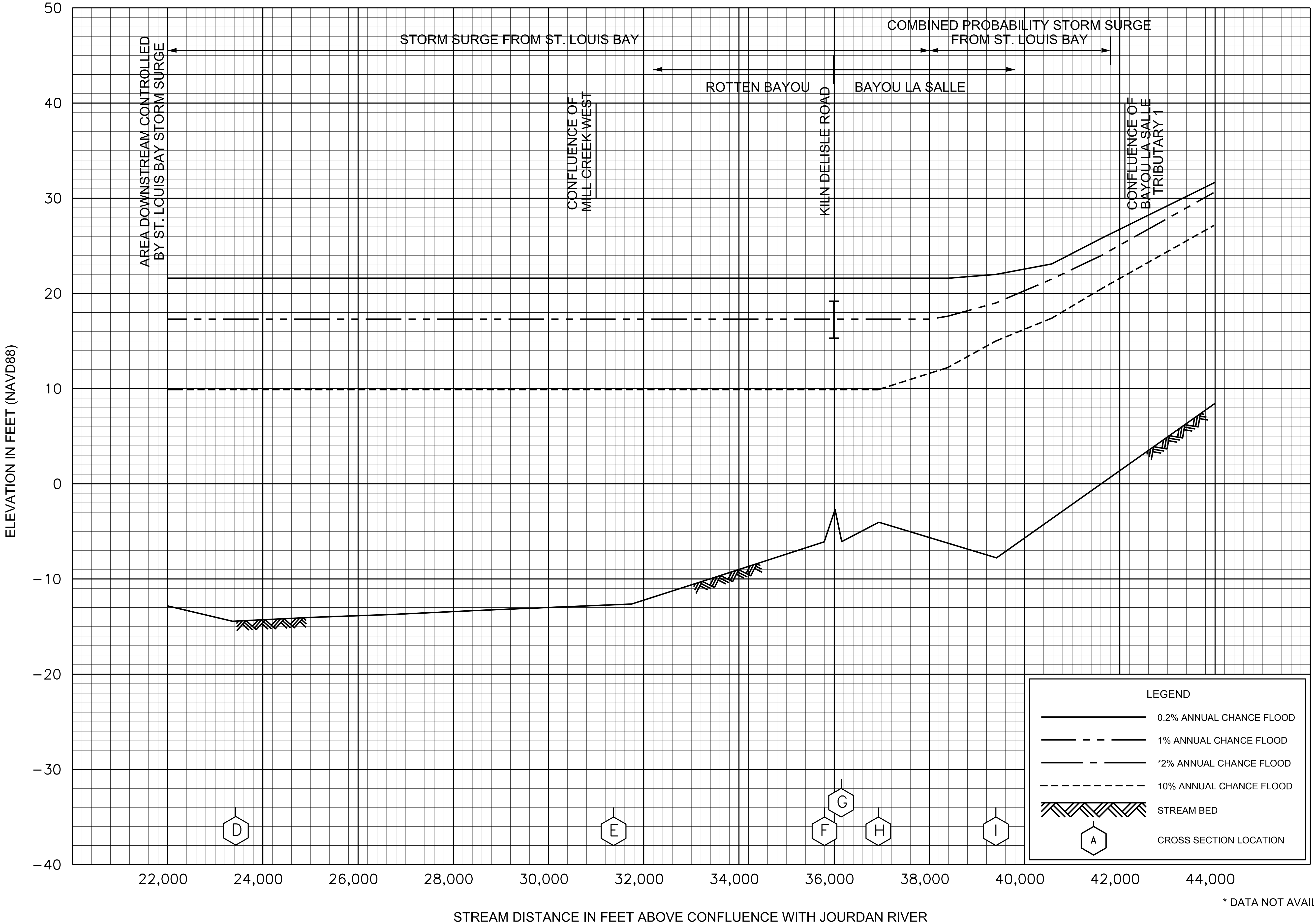
FLOOD PROFILES

PEARL RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS
AND INCORPORATED AREAS



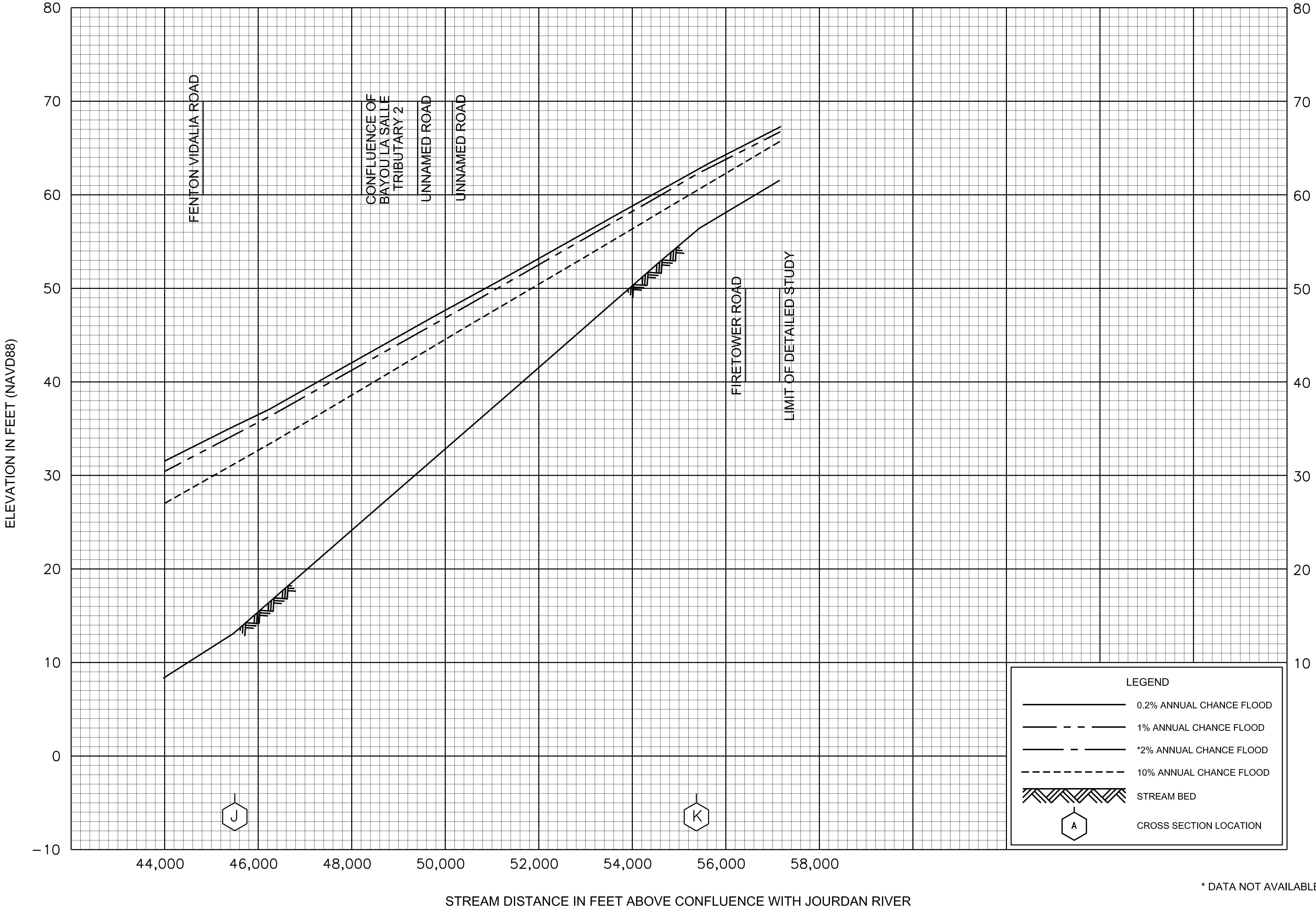
* DATA NOT AVAILABLE

FLOOD PROFILES

ROTTEN BAYOU - BAYOU LA SALLE

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS
AND INCORPORATED AREAS



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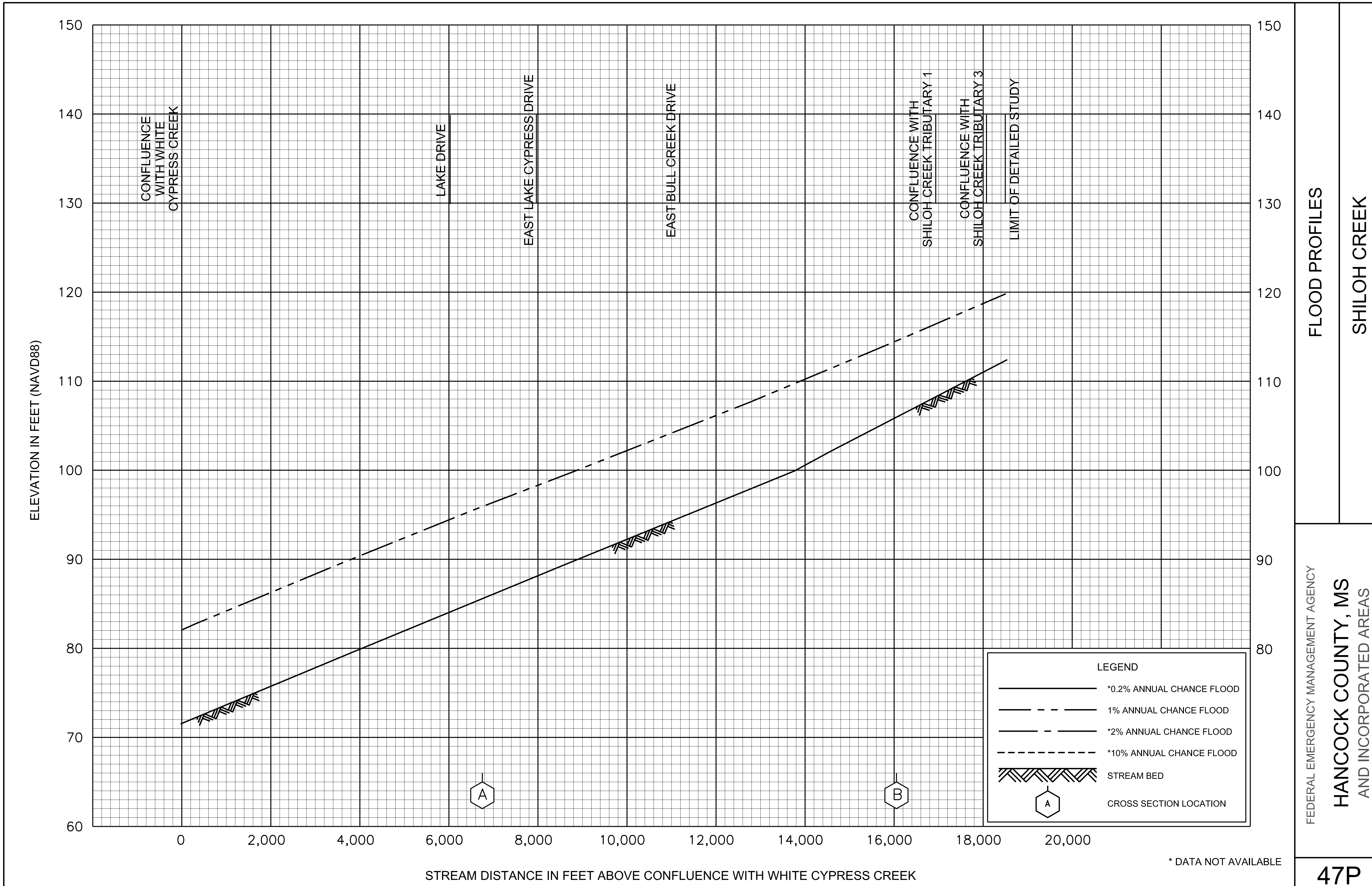
FLOOD PROFILES

BAYOU LA SALLE

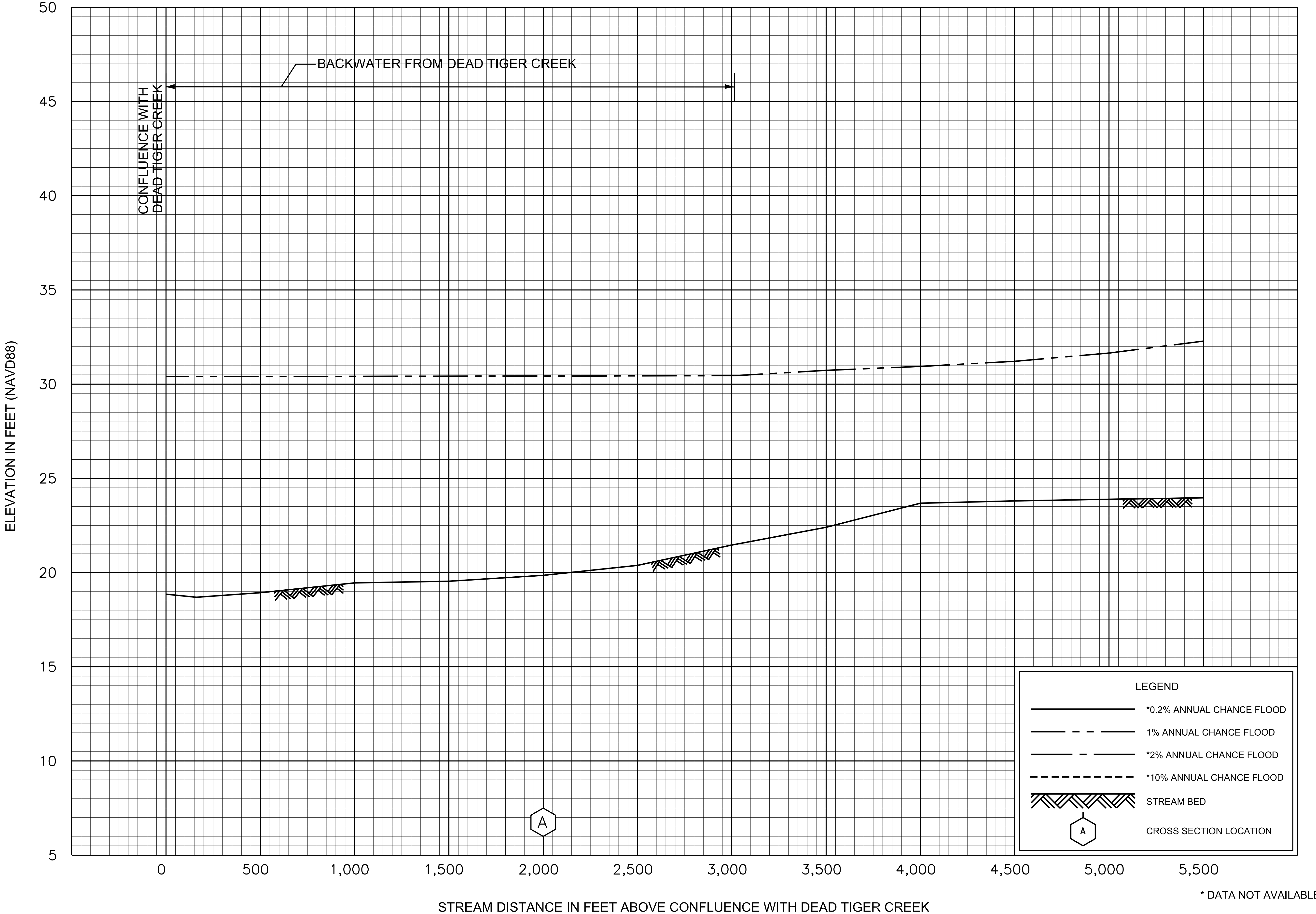
FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



FLOOD PROFILES
SHILOH CREEK
FEDERAL EMERGENCY MANAGEMENT AGENCY
HANCOCK COUNTY, MS
AND INCORPORATED AREAS
47P
ELEVATION IN FEET (NAVD88)
STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH WHITE CYPRESS CREEK
150
140
130
120
110
100
90
80
70
60
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
16,000
18,000
20,000
CONFLUENCE WITH WHITE CYPRESS CREEK
LAKE DRIVE
EAST LAKE CYPRESS DRIVE
EAST BULL CREEK DRIVE
CONFLUENCE WITH SHILOH CREEK TRIBUTARY 1
CONFLUENCE WITH SHILOH CREEK TRIBUTARY 3
LIMIT OF DETAILED STUDY
A
B
LEGEND
*0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
*2% ANNUAL CHANCE FLOOD
*10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION
* DATA NOT AVAILABLE



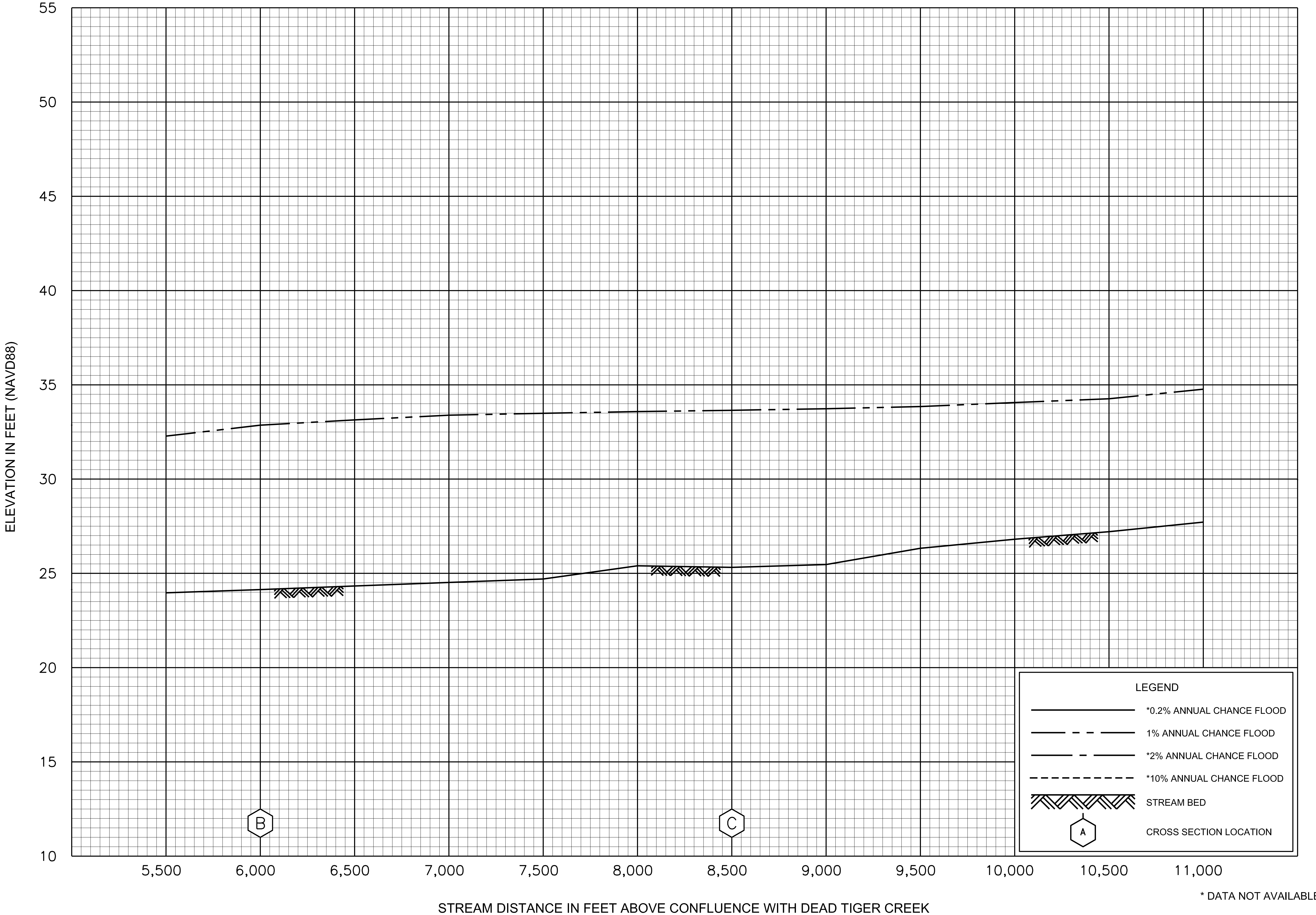
* DATA NOT AVAILABLE

FLOOD PROFILES

STALL BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS
AND INCORPORATED AREAS



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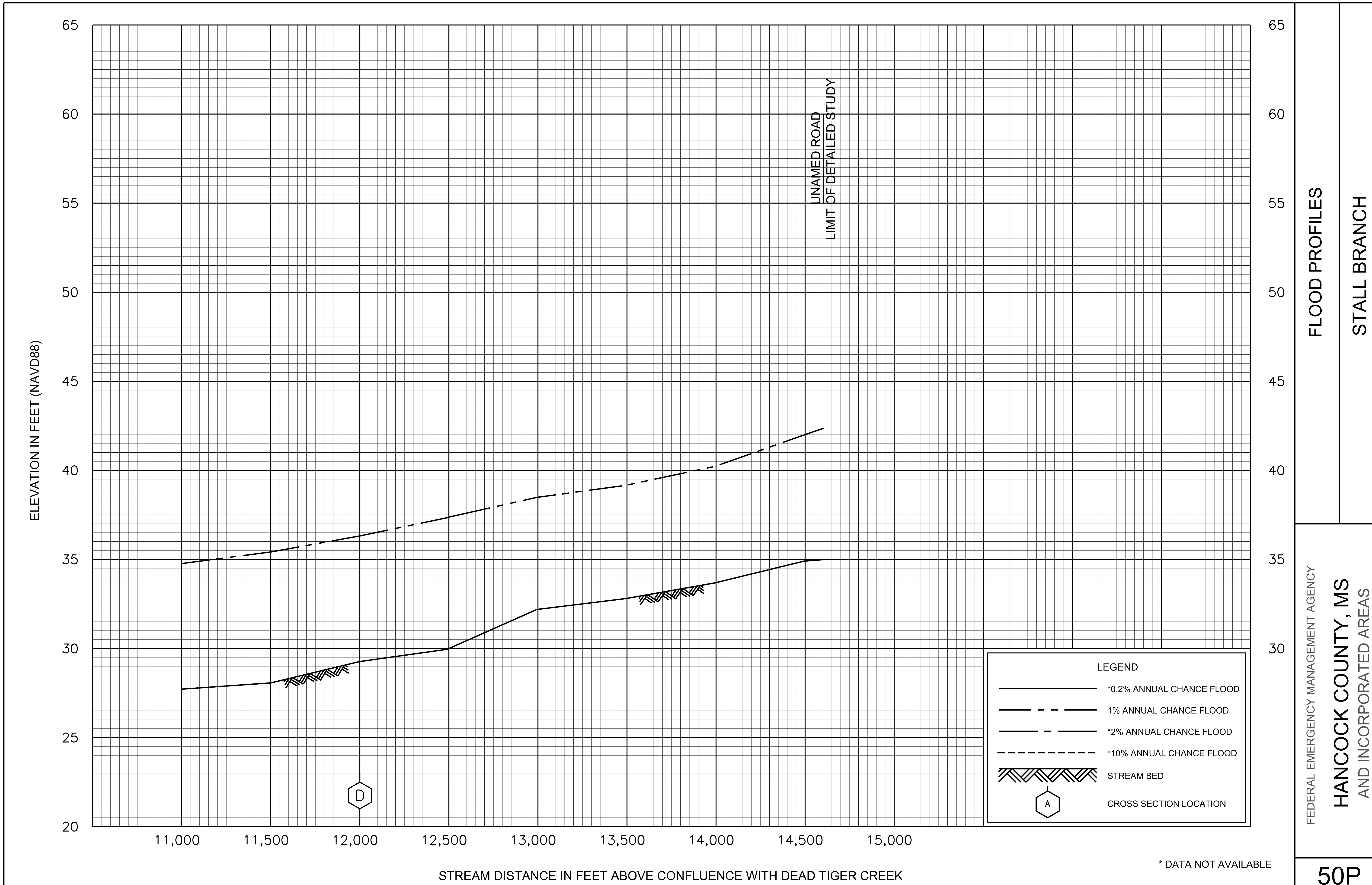
FLOOD PROFILES

STALL BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS
AND INCORPORATED AREAS



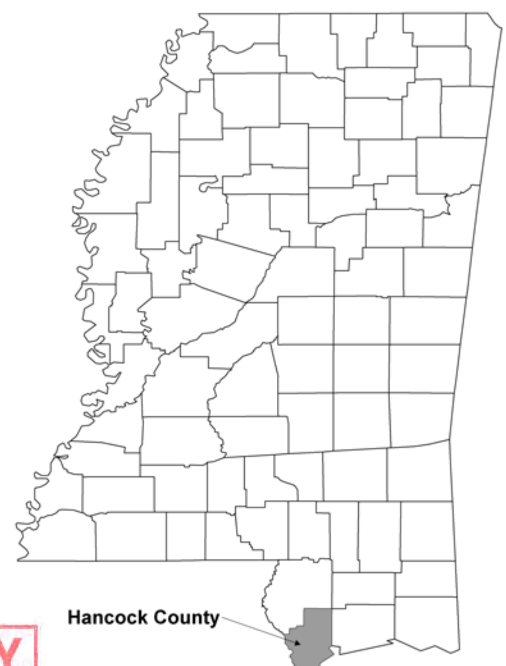
ELEVATION IN FEET (NAVD88)
65
60
55
50
45
40
35
30
25
20
11,000
11,500
12,000
12,500
13,000
13,500
14,000
14,500
15,000
STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH DEAD TIGER CREEK
UNAMED ROAD
LIMIT OF DETAILED STUDY
D
LEGEND
*0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
*2% ANNUAL CHANCE FLOOD
*10% ANNUAL CHANCE FLOOD
STREAM BED
A
CROSS SECTION LOCATION
* DATA NOT AVAILABLE
FLOOD PROFILES
STALL BRANCH
FEDERAL EMERGENCY MANAGEMENT AGENCY
HANCOCK COUNTY, MS
AND INCORPORATED AREAS

FLOOD INSURANCE STUDY

HANCOCK COUNTY, MISSISSIPPI

AND INCORPORATED AREAS

VOLUME 2 OF 2



COMMUNITY NAME	COMMUNITY NUMBER
BAY ST. LOUIS, CITY OF	285251
HANCOCK COUNTY (UNINCORPORATED AREAS)	285254
WAVELAND, CITY OF	285262

PRELIMINARY

NOV 15 2007

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER

28045CV002A

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) 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 repository. It is advisable to contact the community repository for any additional data.

Part or all of this FIS may be revised and republished at any time. In addition, part of this FIS may be revised by the Letter of Map Revision process, which does not involve republication or redistribution of the FIS. It is, therefore, the responsibility of the user to consult with community officials and to check the community repository to obtain the most current FIS components.

Initial Countywide FIS Effective Date:

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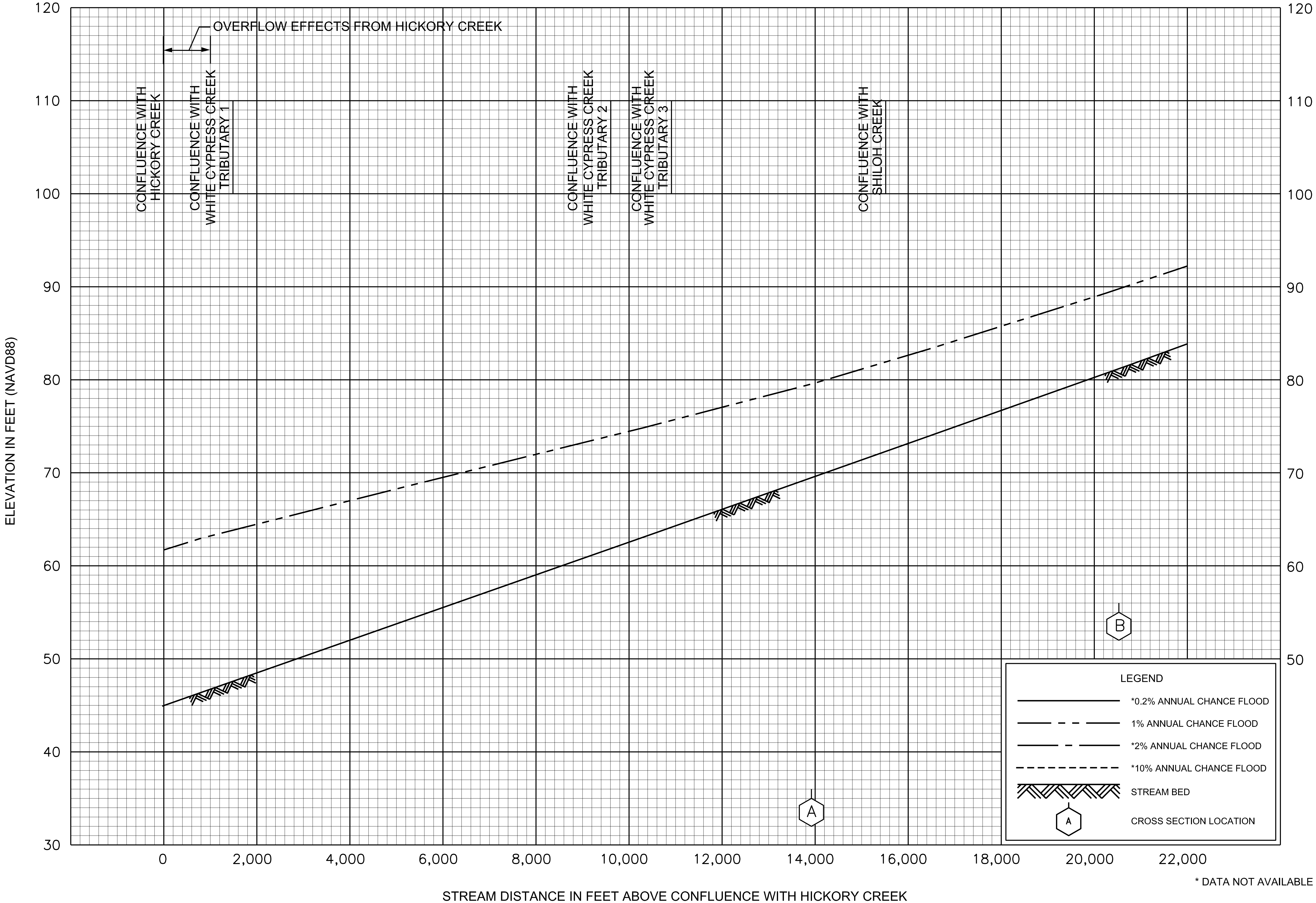
EXHIBITS – continued



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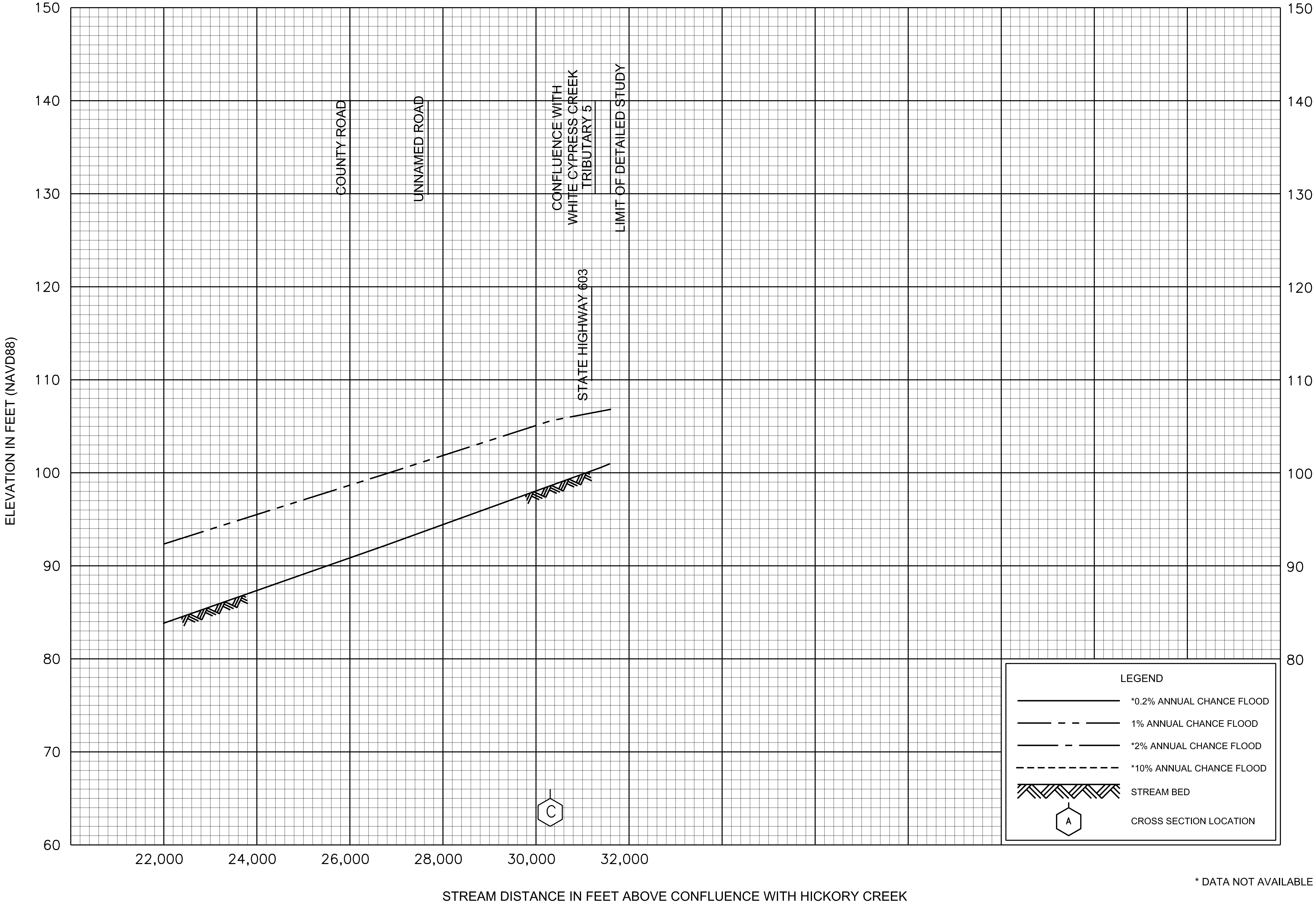
FLOOD PROFILES

WHITE CYPRESS CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



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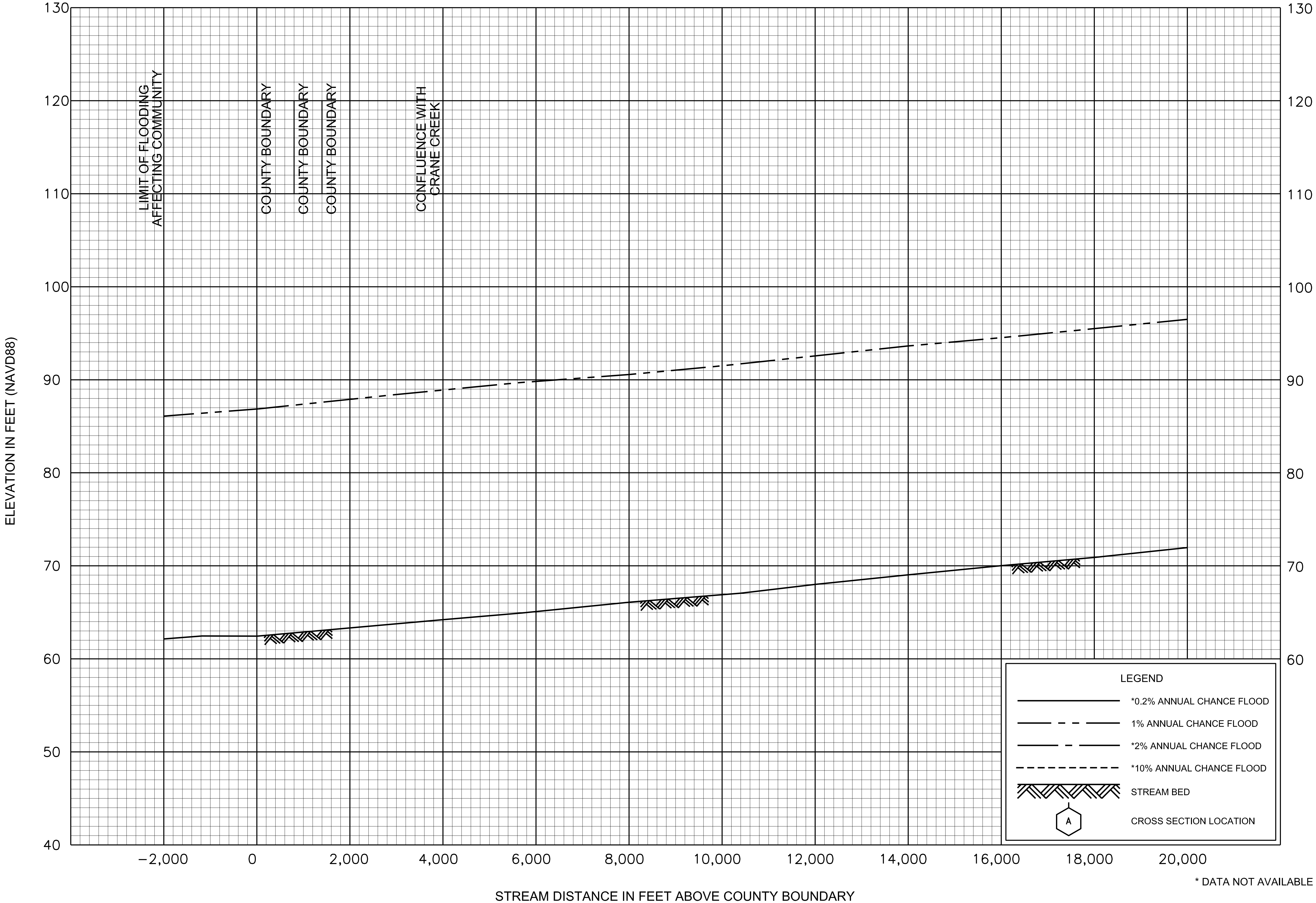
FLOOD PROFILES

WHITE CYPRESS CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



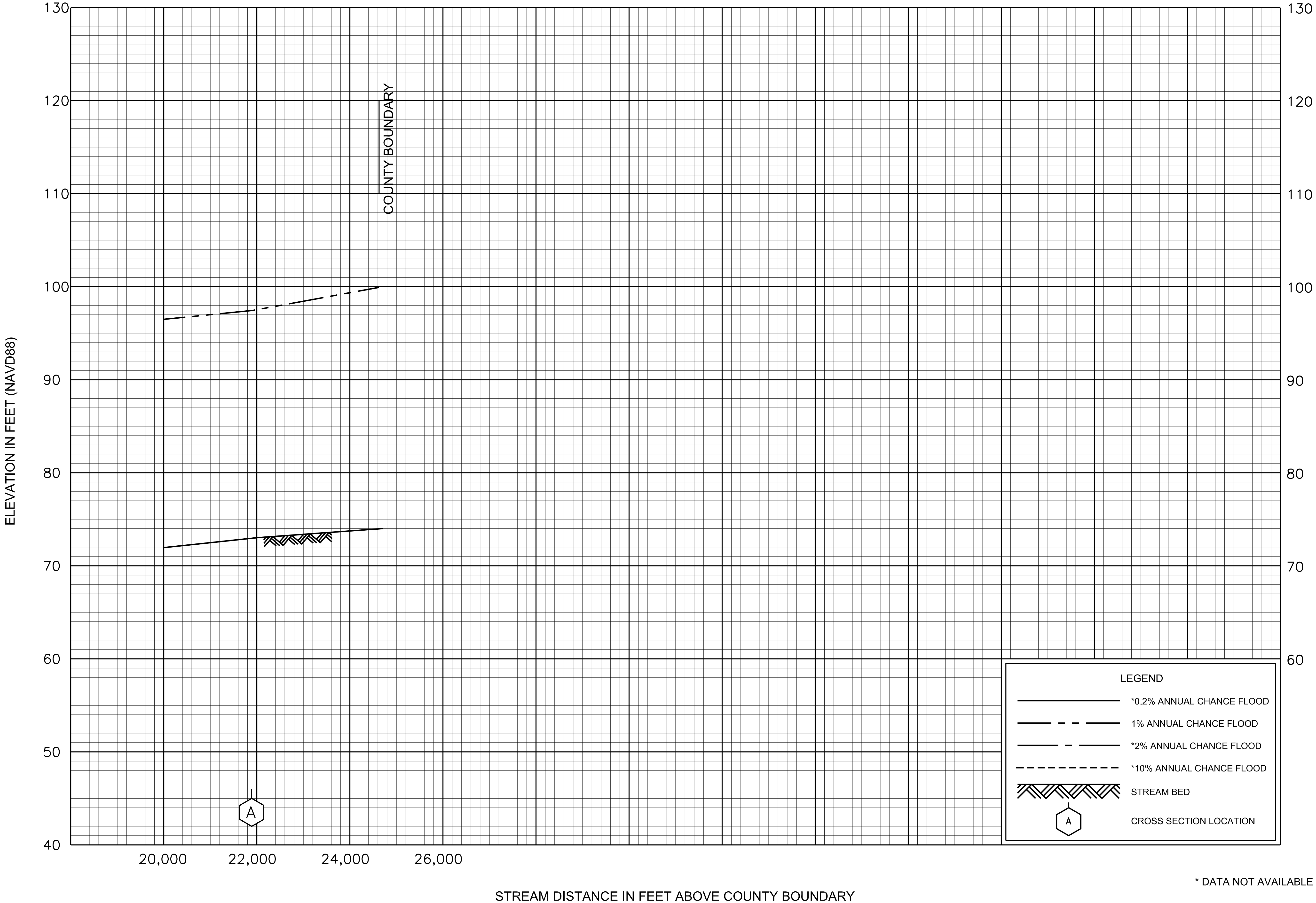
FLOOD PROFILES

WOLF RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



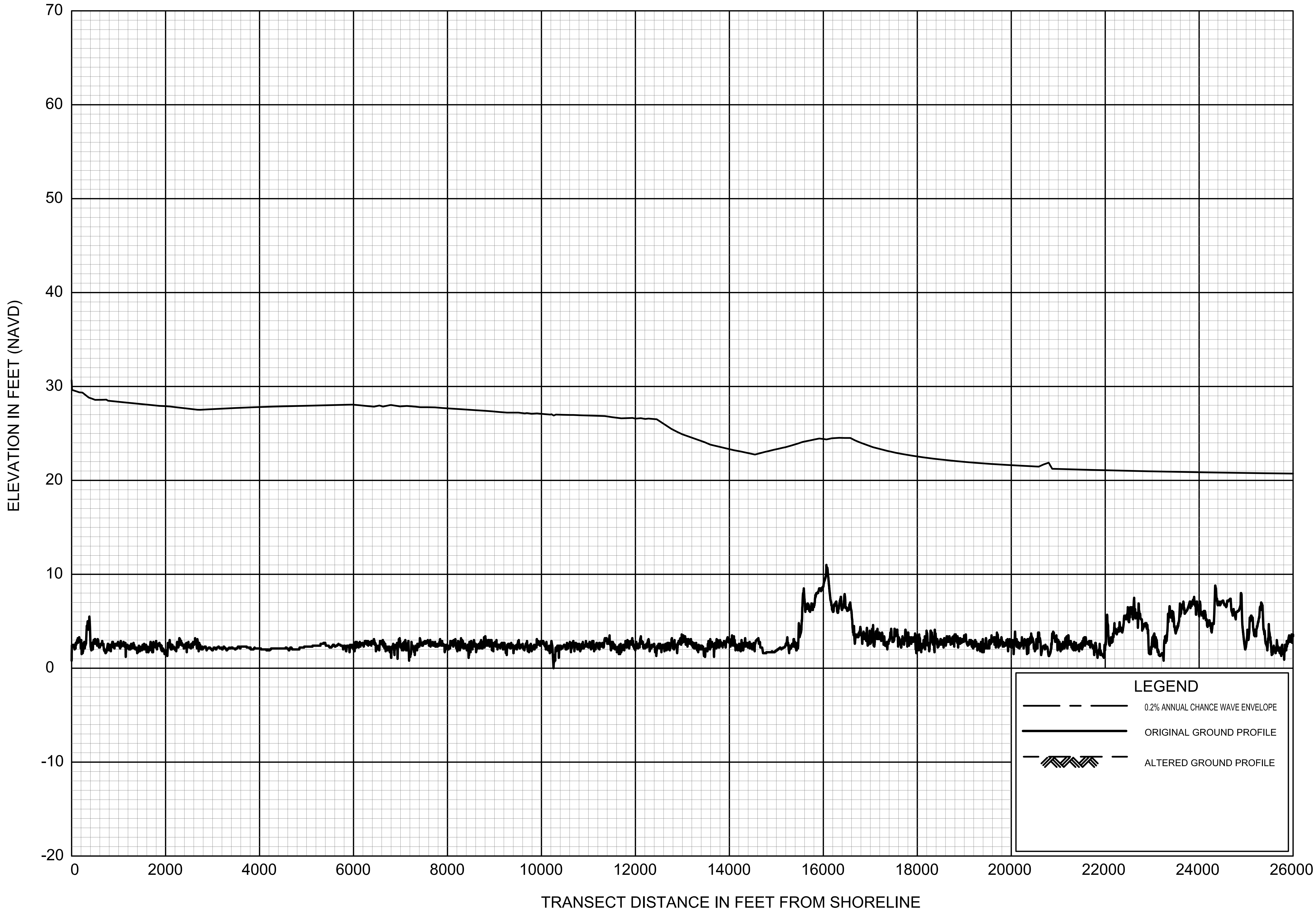
FLOOD PROFILES

WOLF RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



0.2% ANNUAL CHANCE WAVE ENVELOPE

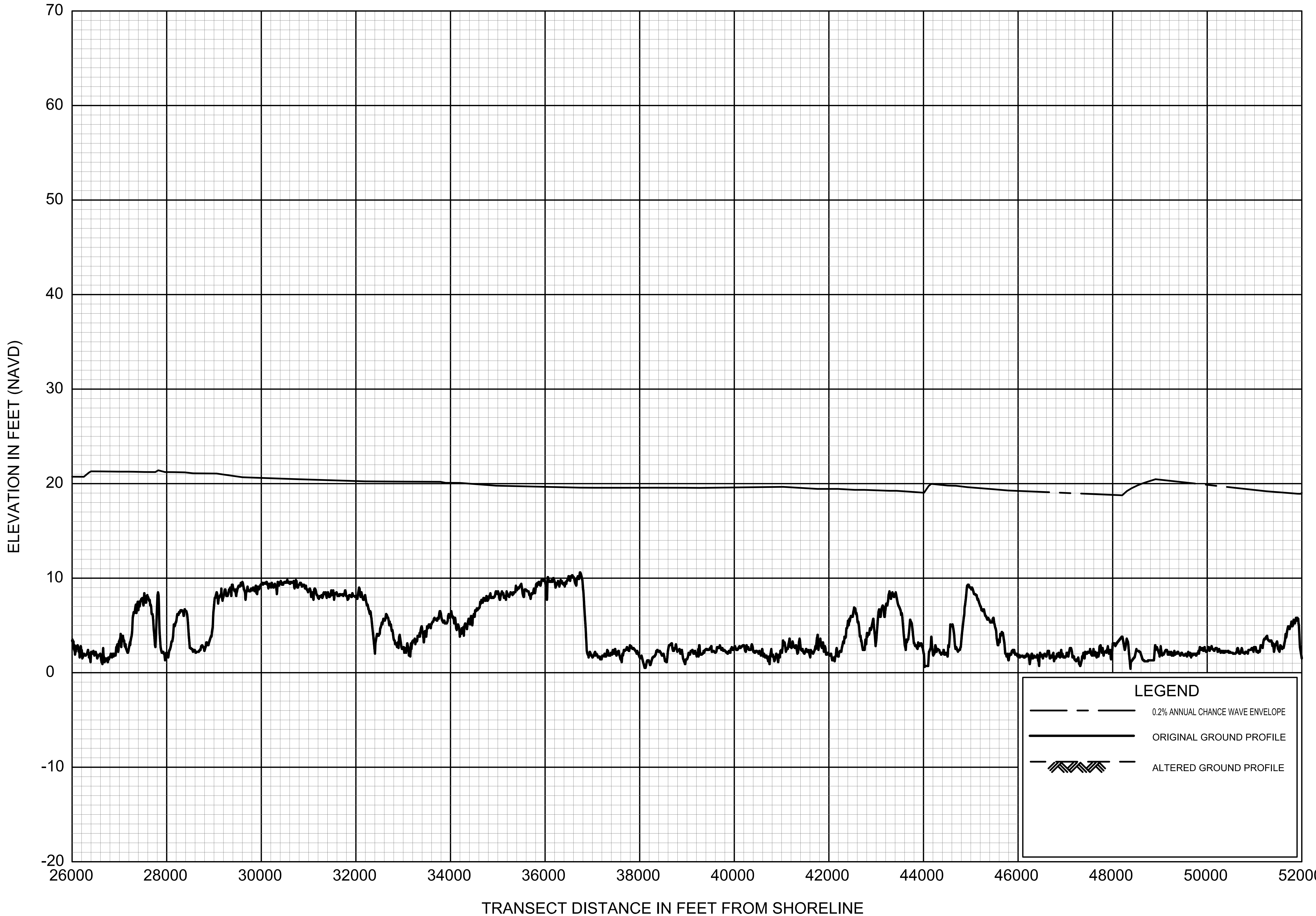
TRANSECT 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

01P



0.2% ANNUAL CHANCE WAVE ENVELOPE

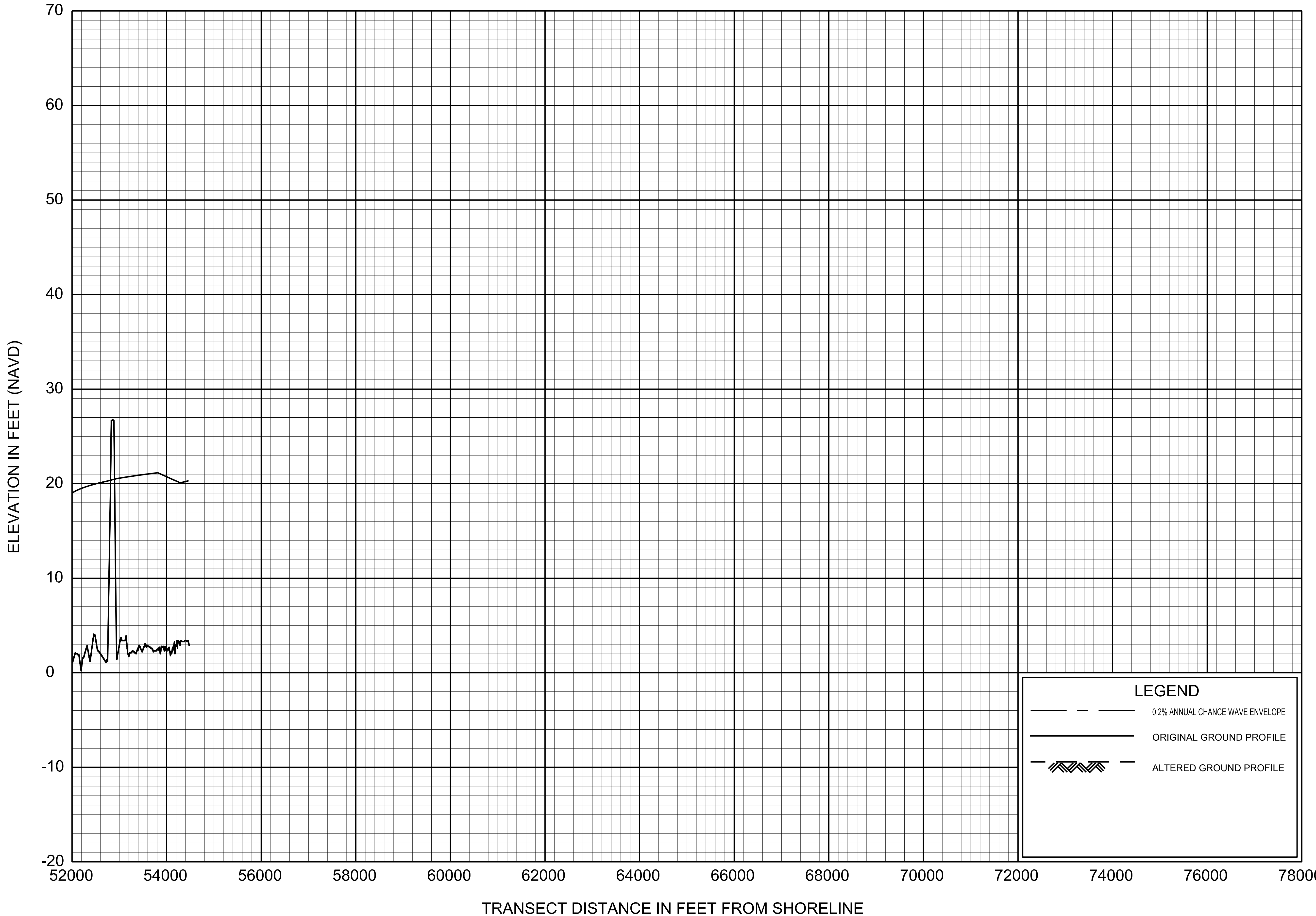
TRANSECT 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

02P



0.2% ANNUAL CHANCE WAVE ENVELOPE

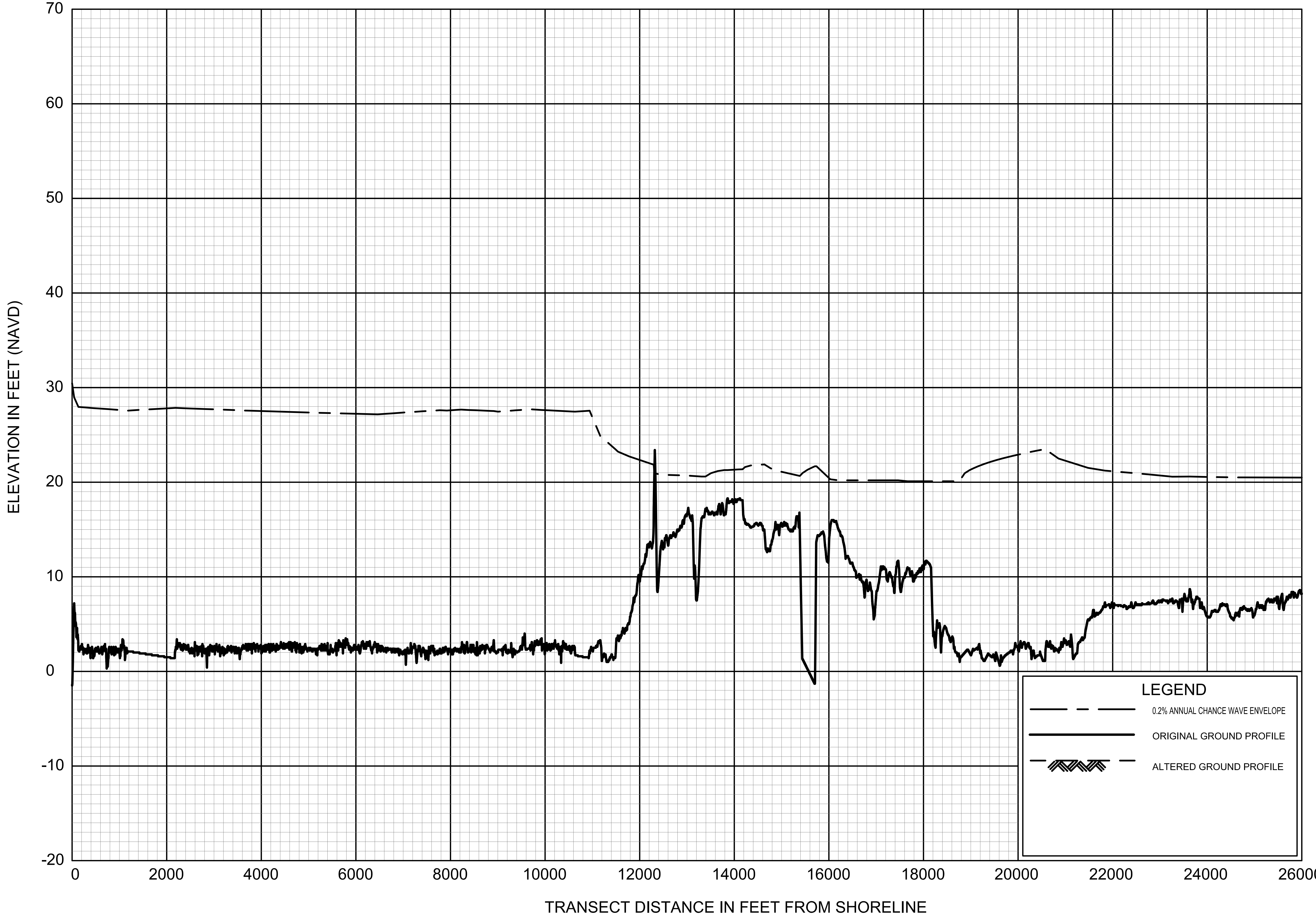
TRANSECT 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

03P



0.2% ANNUAL CHANCE WAVE ENVELOPE

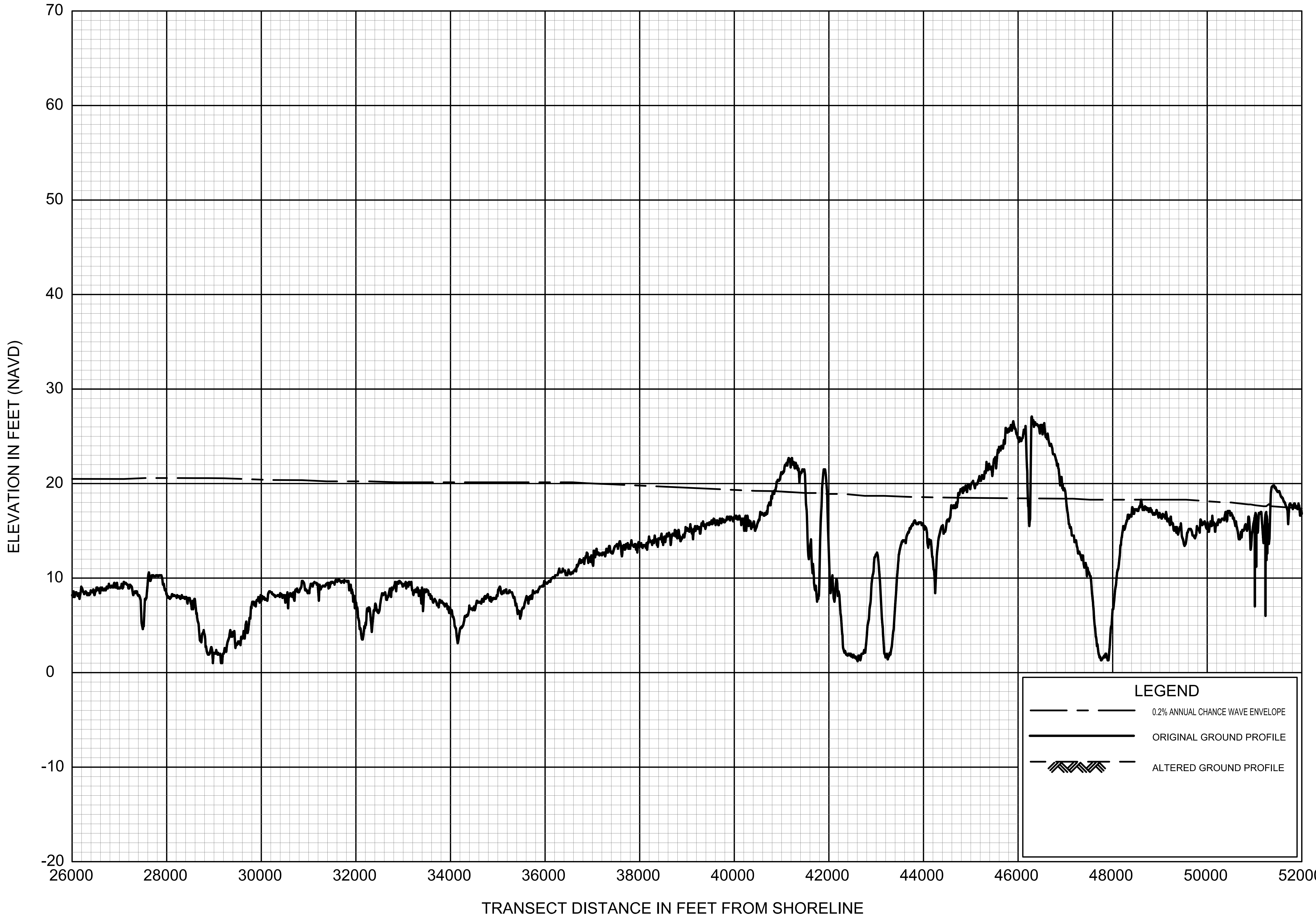
TRANSECT 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

04P



0.2% ANNUAL CHANCE WAVE ENVELOPE

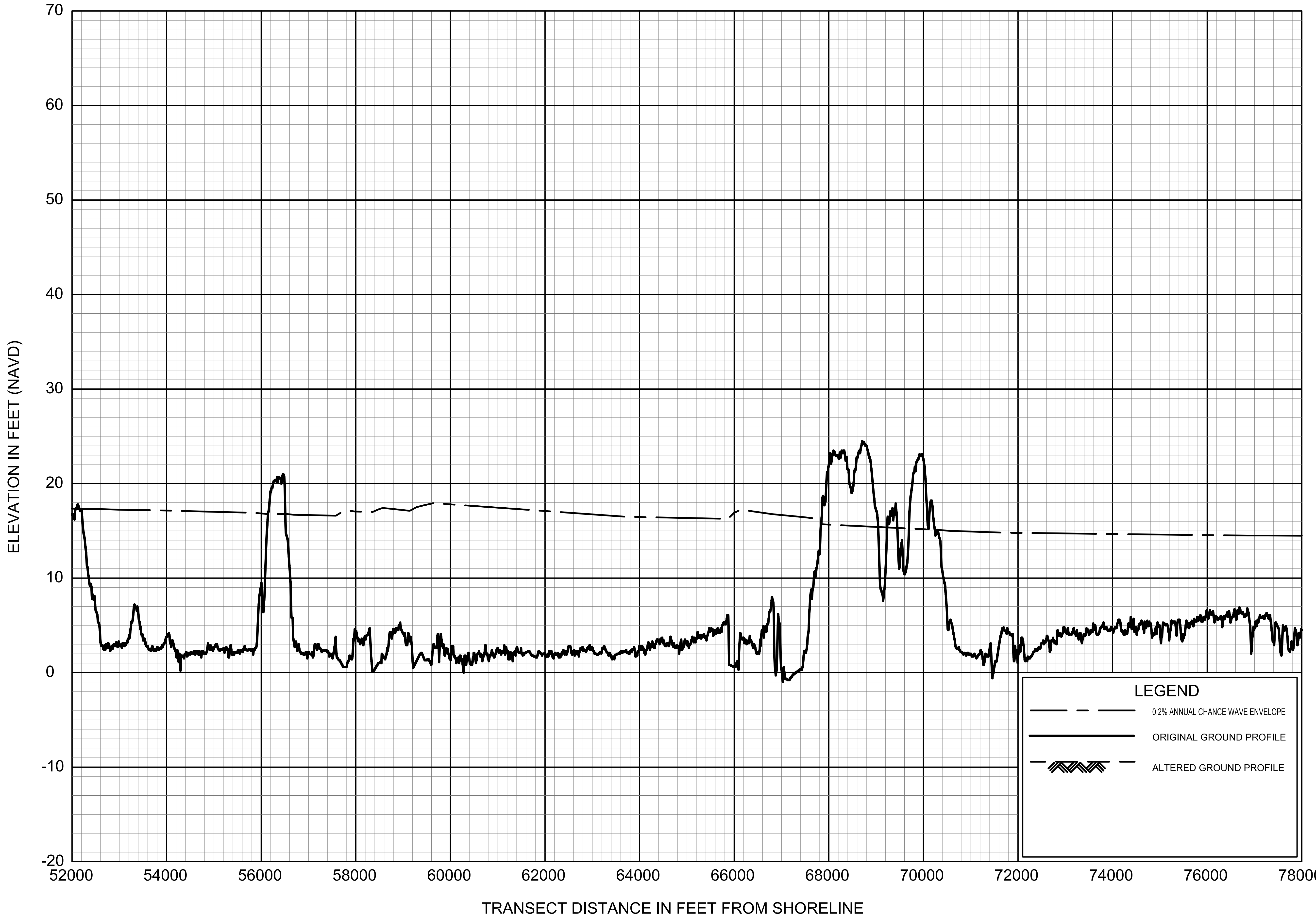
TRANSECT 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

05P



0.2% ANNUAL CHANCE WAVE ENVELOPE

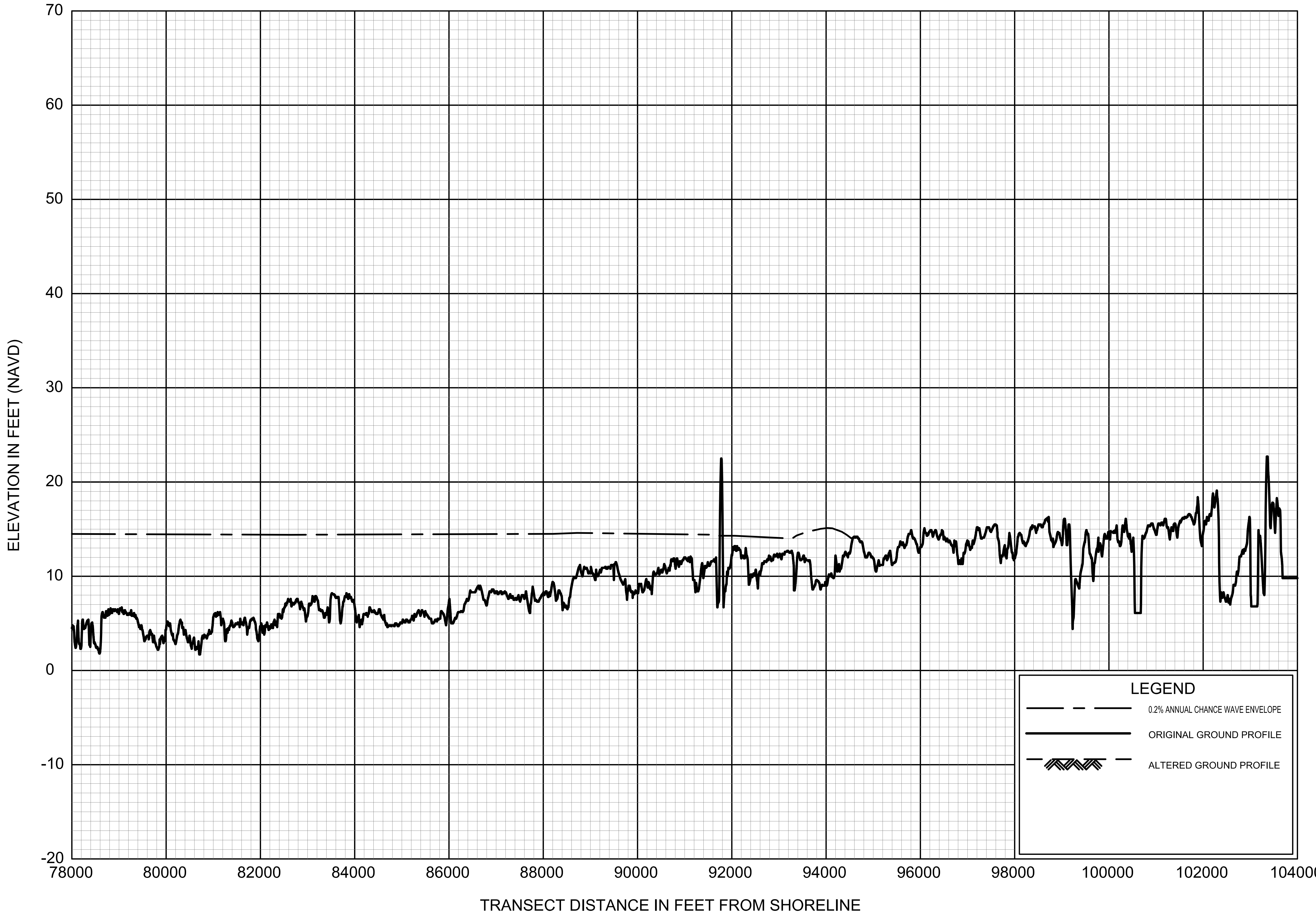
TRANSECT 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

06P



0.2% ANNUAL CHANCE WAVE ENVELOPE

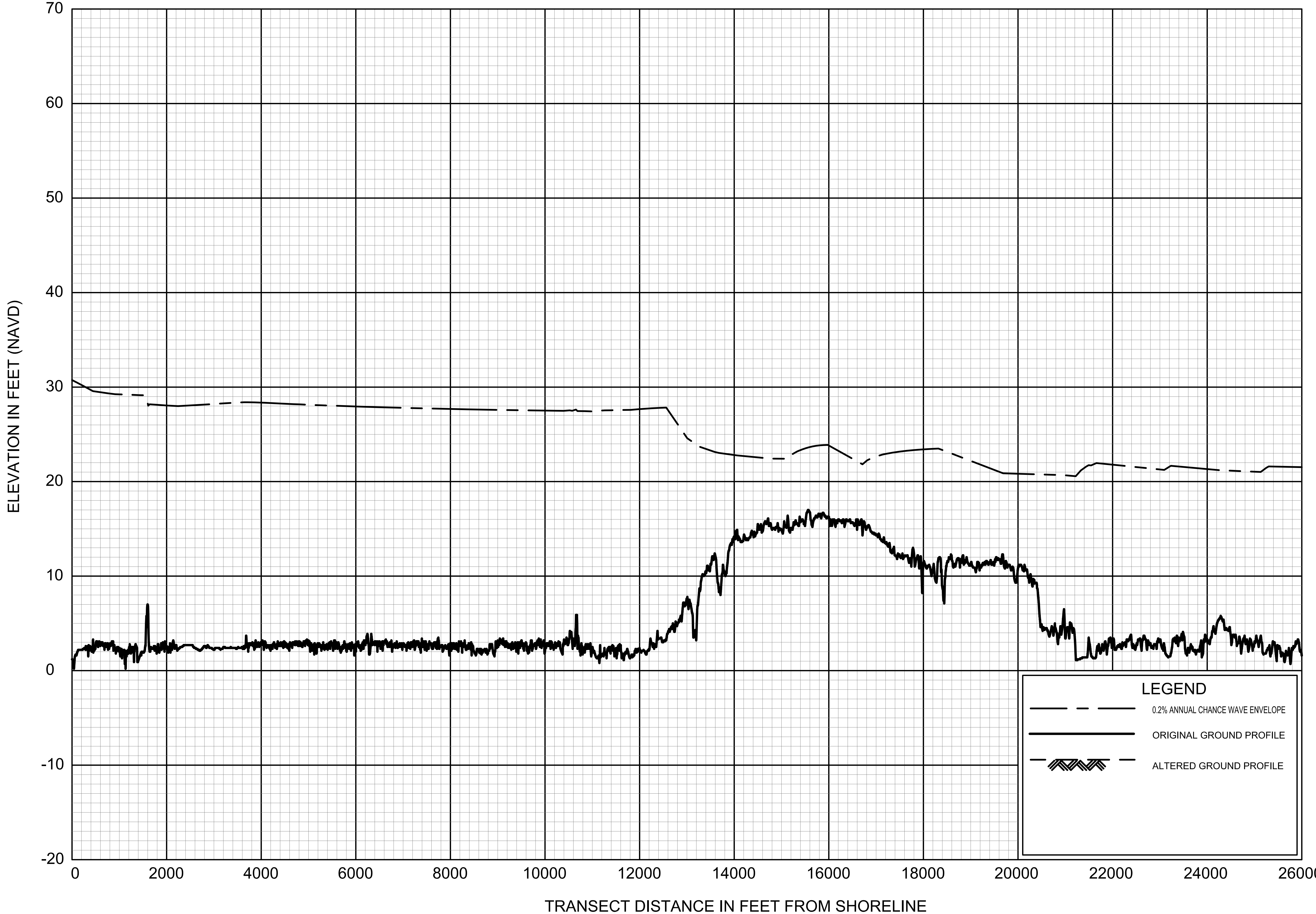
TRANSECT 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

07P



0.2% ANNUAL CHANCE WAVE ENVELOPE

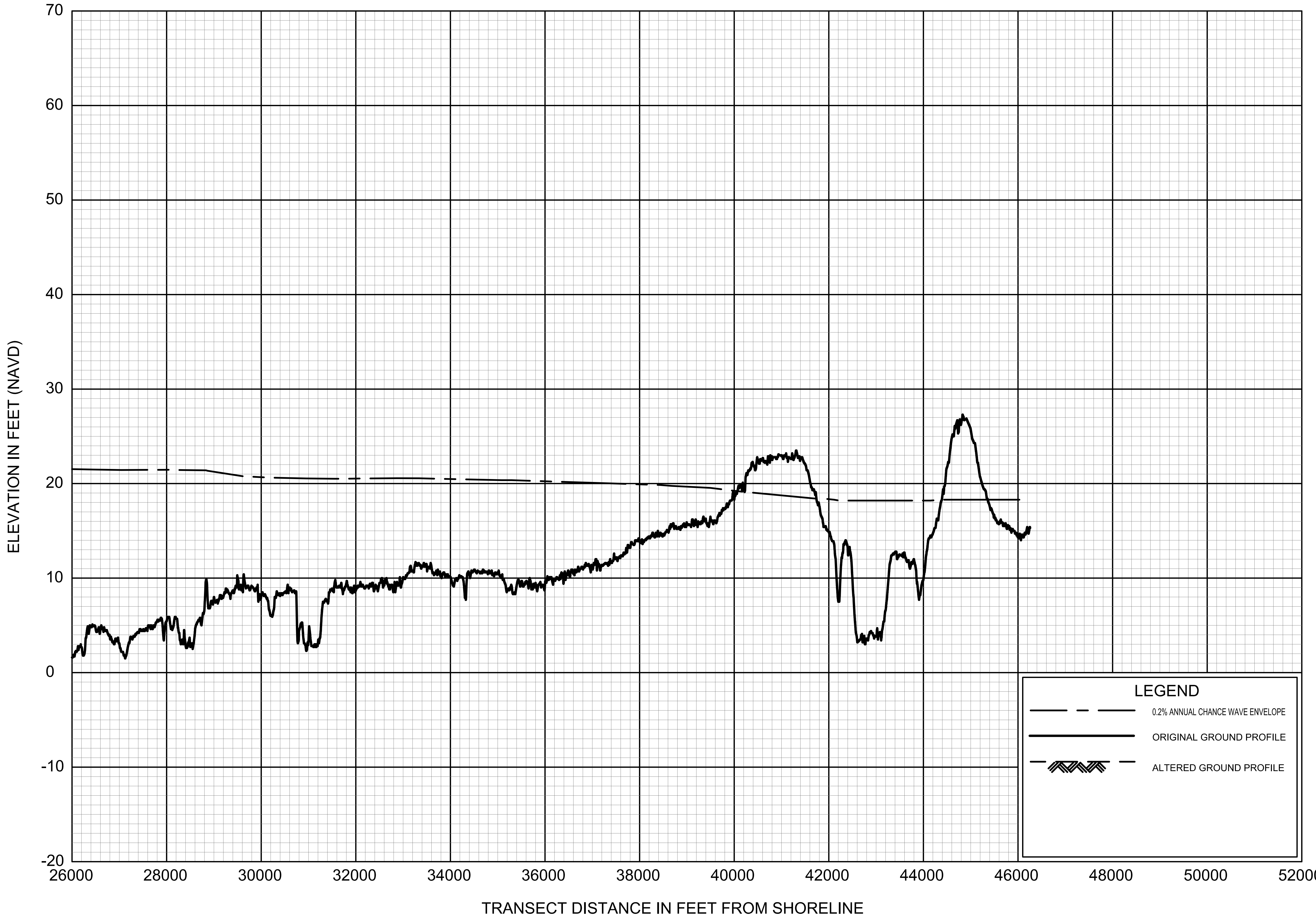
TRANSECT 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

08P



0.2% ANNUAL CHANCE WAVE ENVELOPE

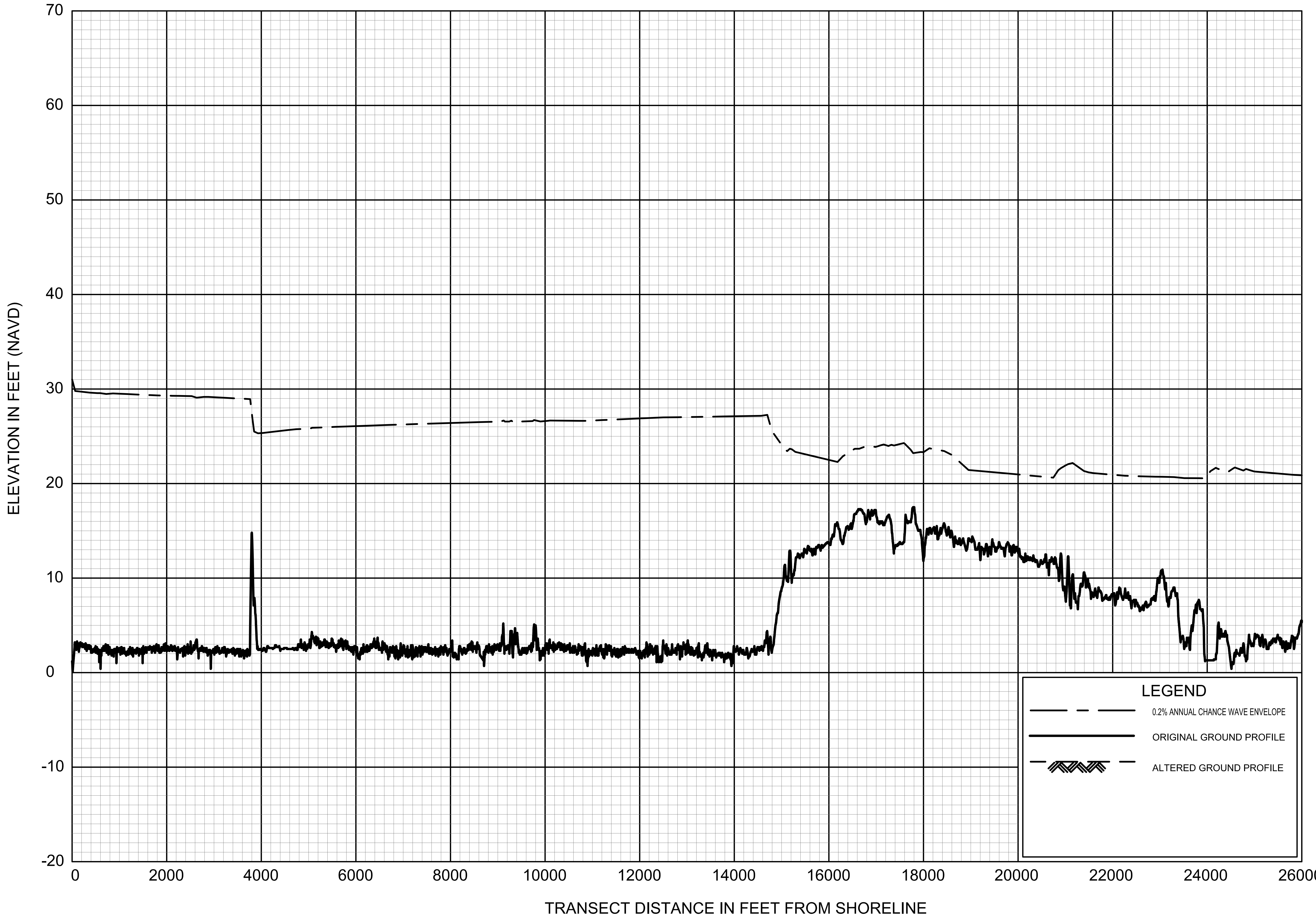
TRANSECT 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

09P



0.2% ANNUAL CHANCE WAVE ENVELOPE

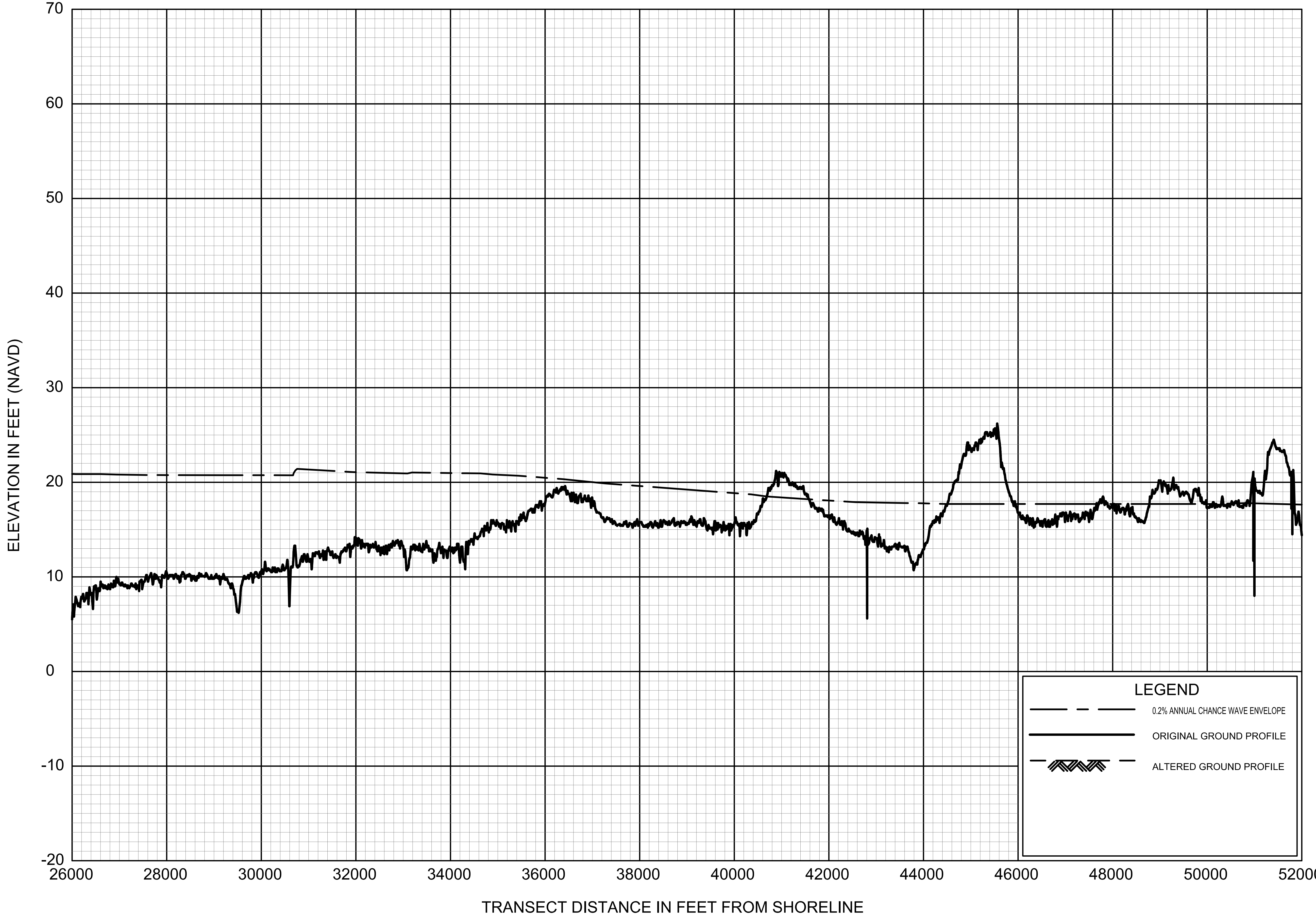
TRANSECT 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

10P



0.2% ANNUAL CHANCE WAVE ENVELOPE

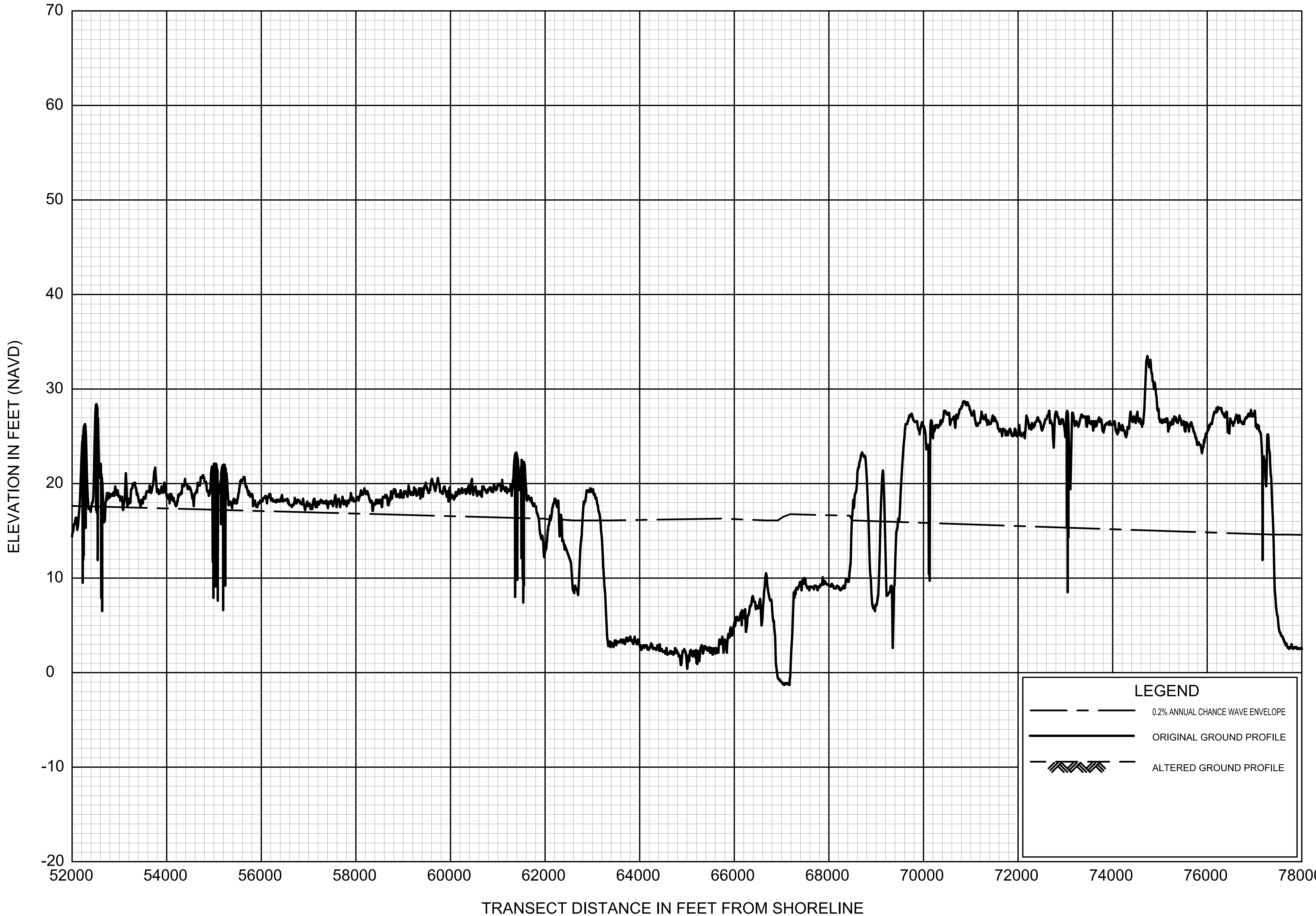
TRANSECT 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

11P



0.2% ANNUAL CHANCE WAVE ENVELOPE

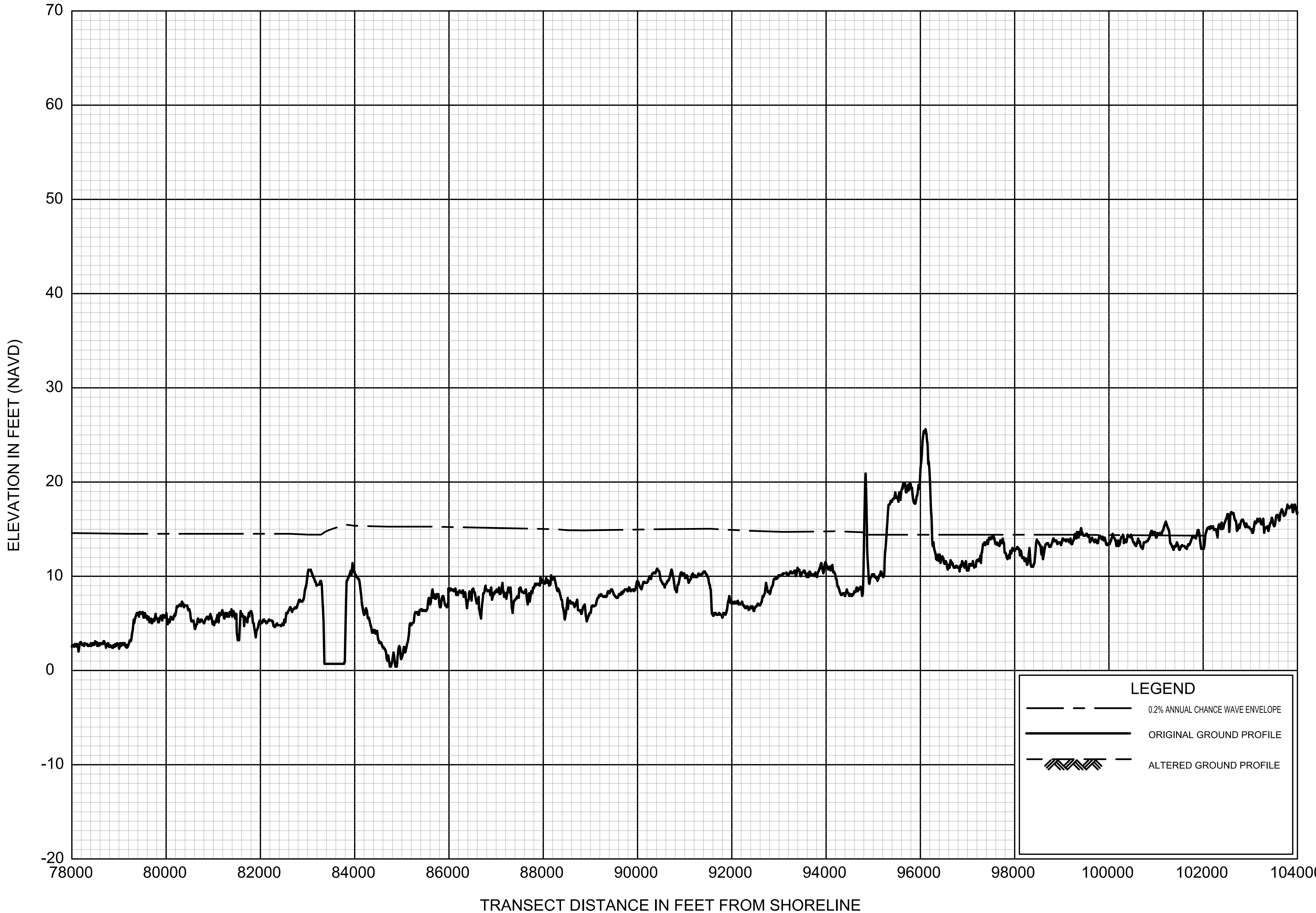
TRANSECT 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

12P



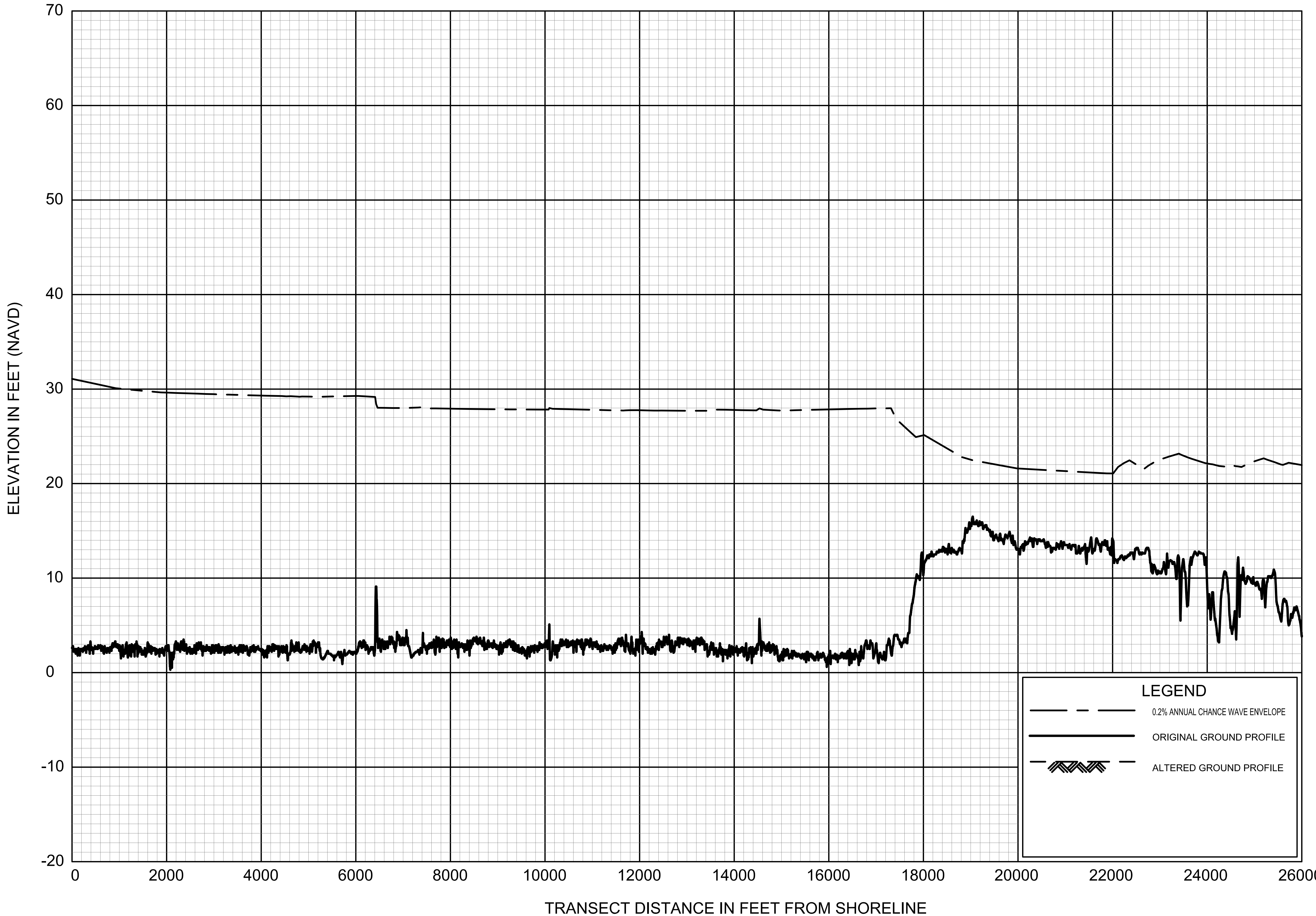
0.2% ANNUAL CHANCE WAVE ENVELOPE

TRANSECT 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



0.2% ANNUAL CHANCE WAVE ENVELOPE

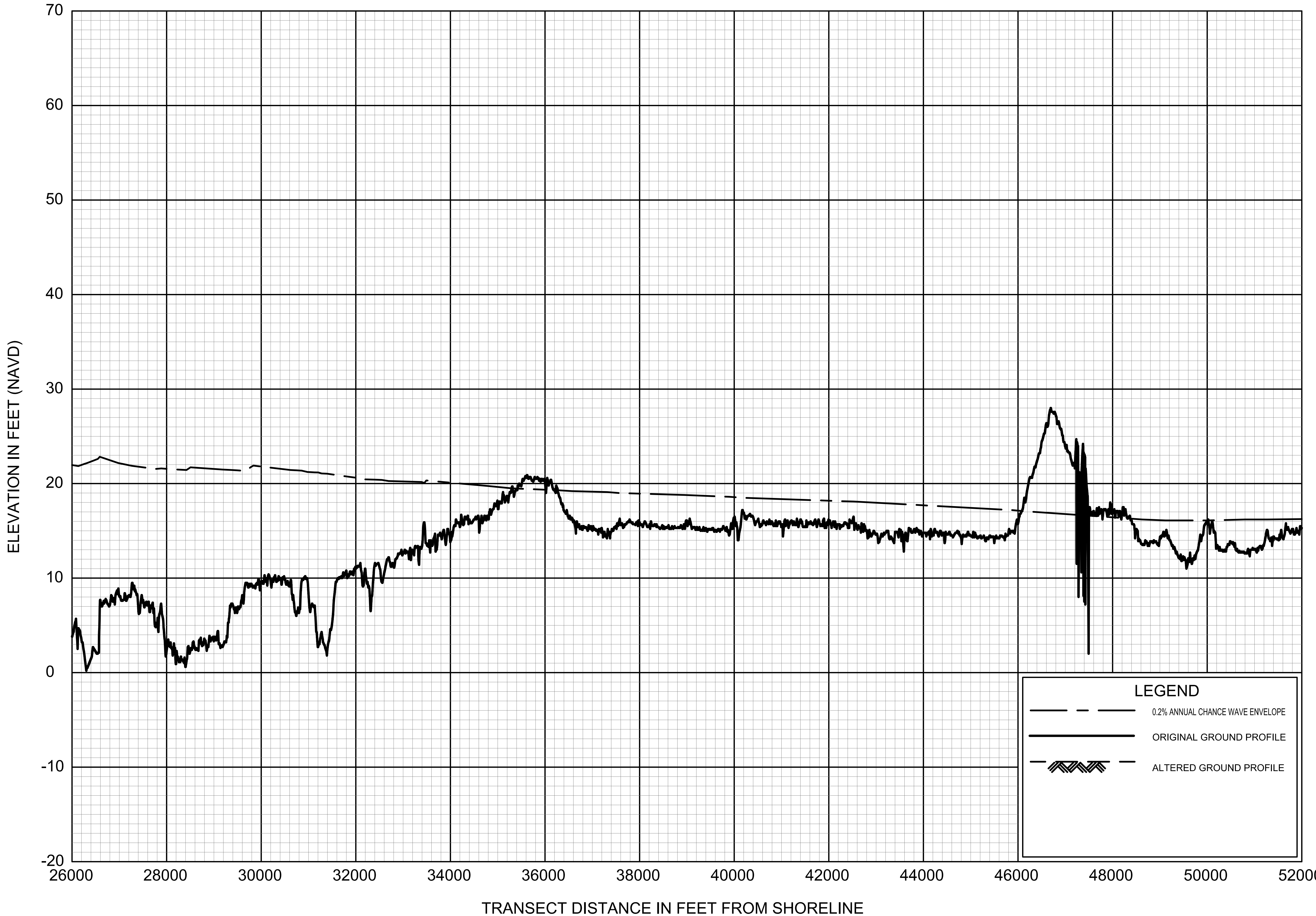
TRANSECT 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

14P



0.2% ANNUAL CHANCE WAVE ENVELOPE

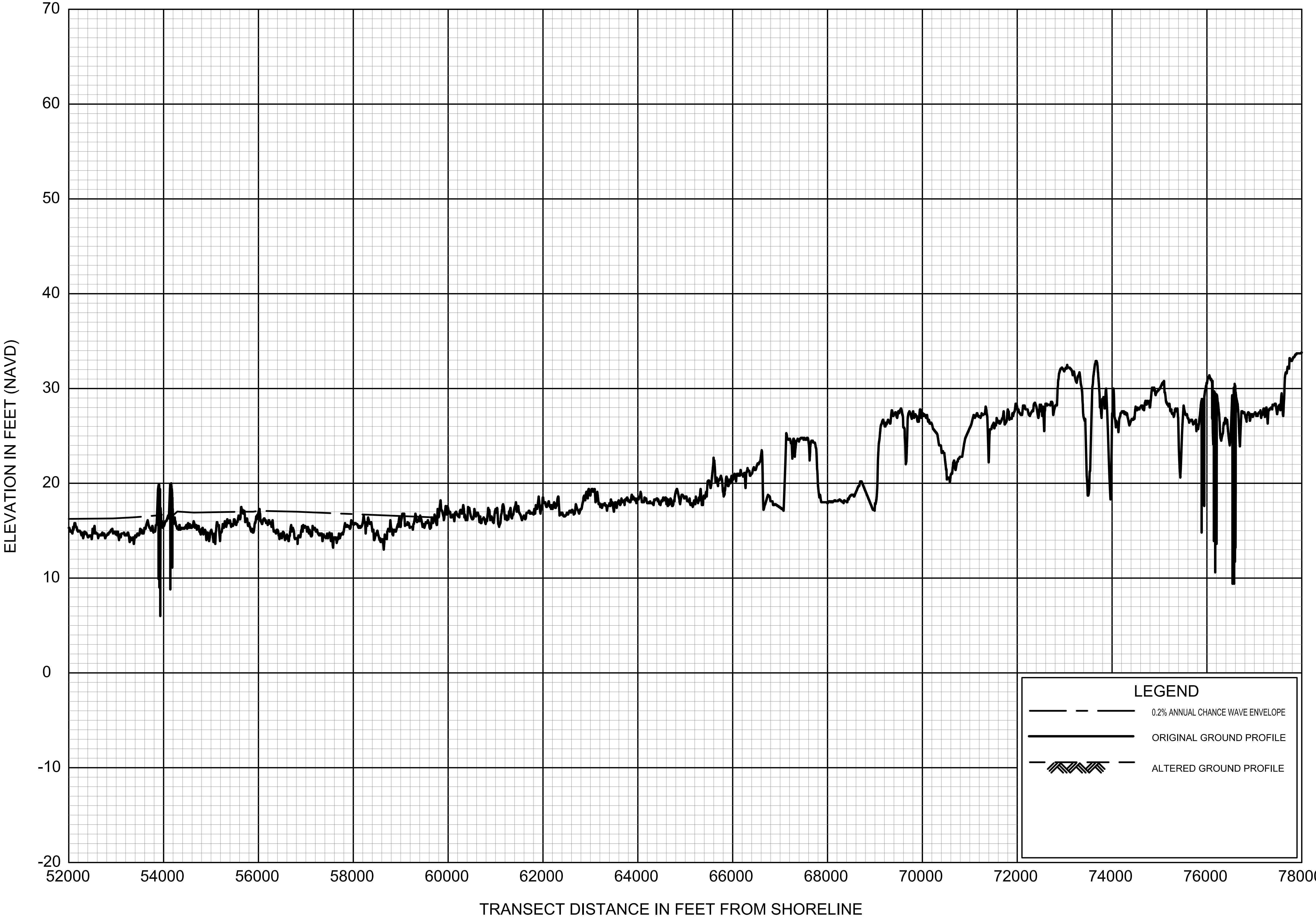
TRANSECT 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

15P



0.2% ANNUAL CHANCE WAVE ENVELOPE

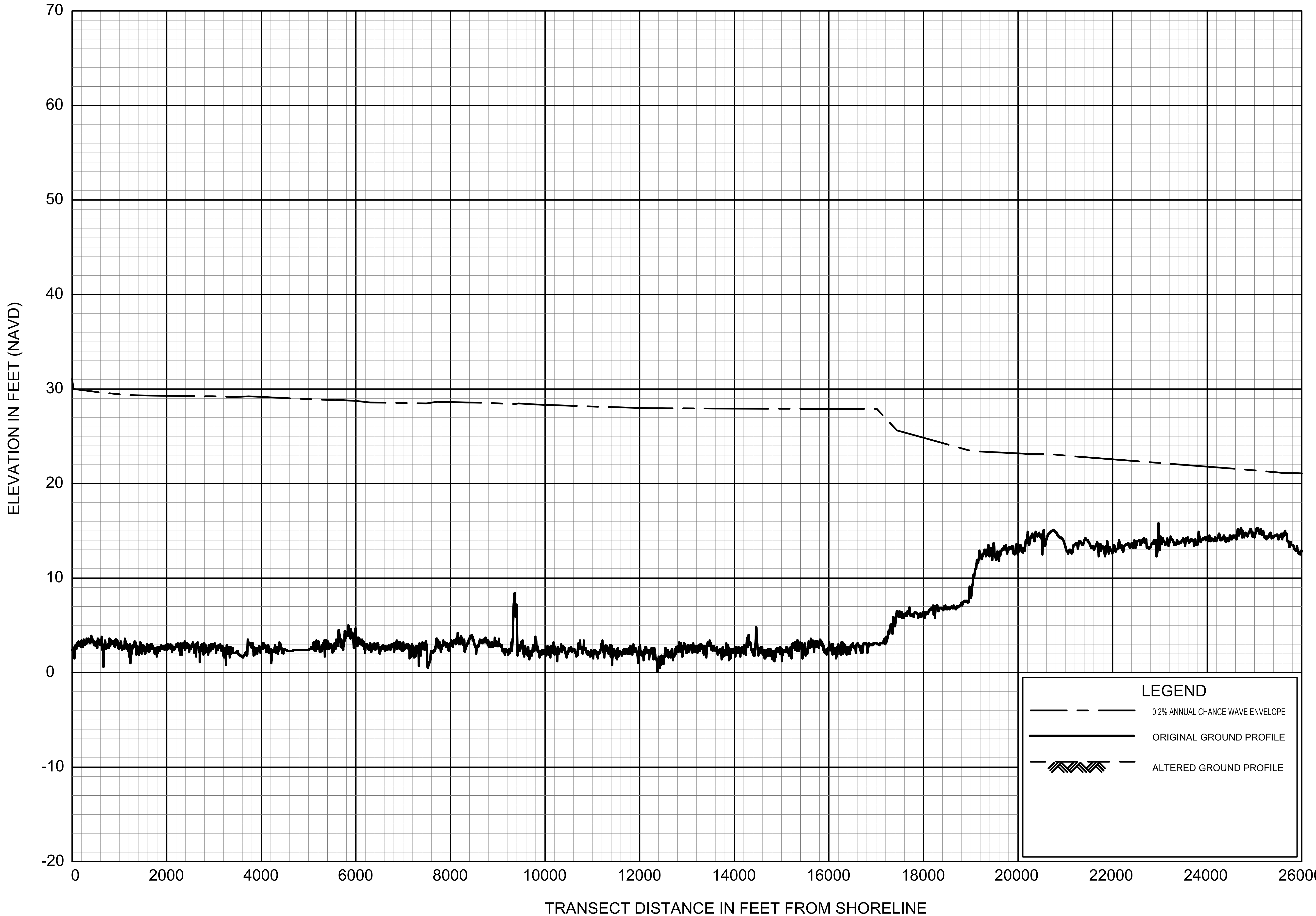
TRANSECT 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

16P



0.2% ANNUAL CHANCE WAVE ENVELOPE

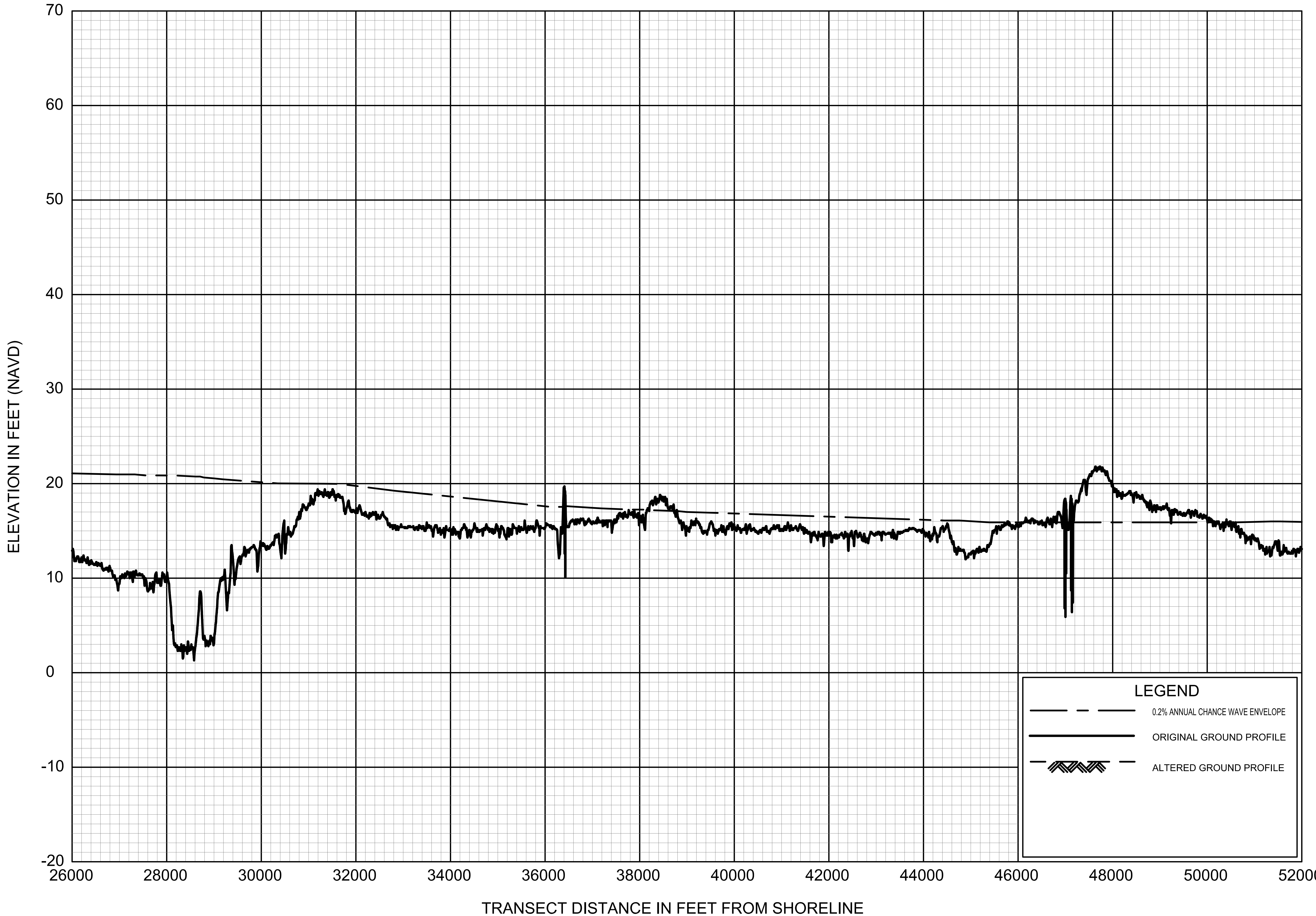
TRANSECT 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

17P



0.2% ANNUAL CHANCE WAVE ENVELOPE

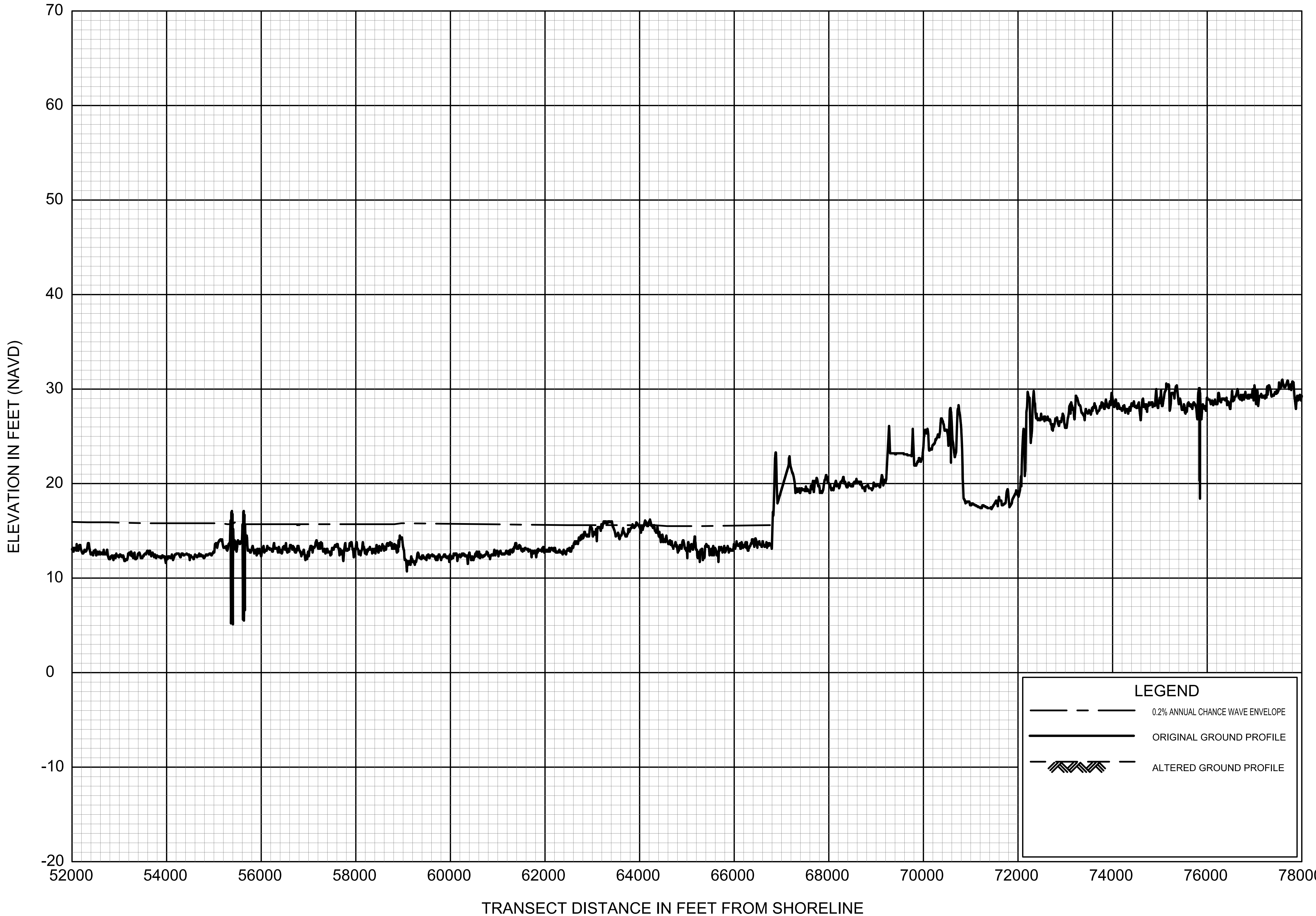
TRANSECT 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

18P



0.2% ANNUAL CHANCE WAVE ENVELOPE

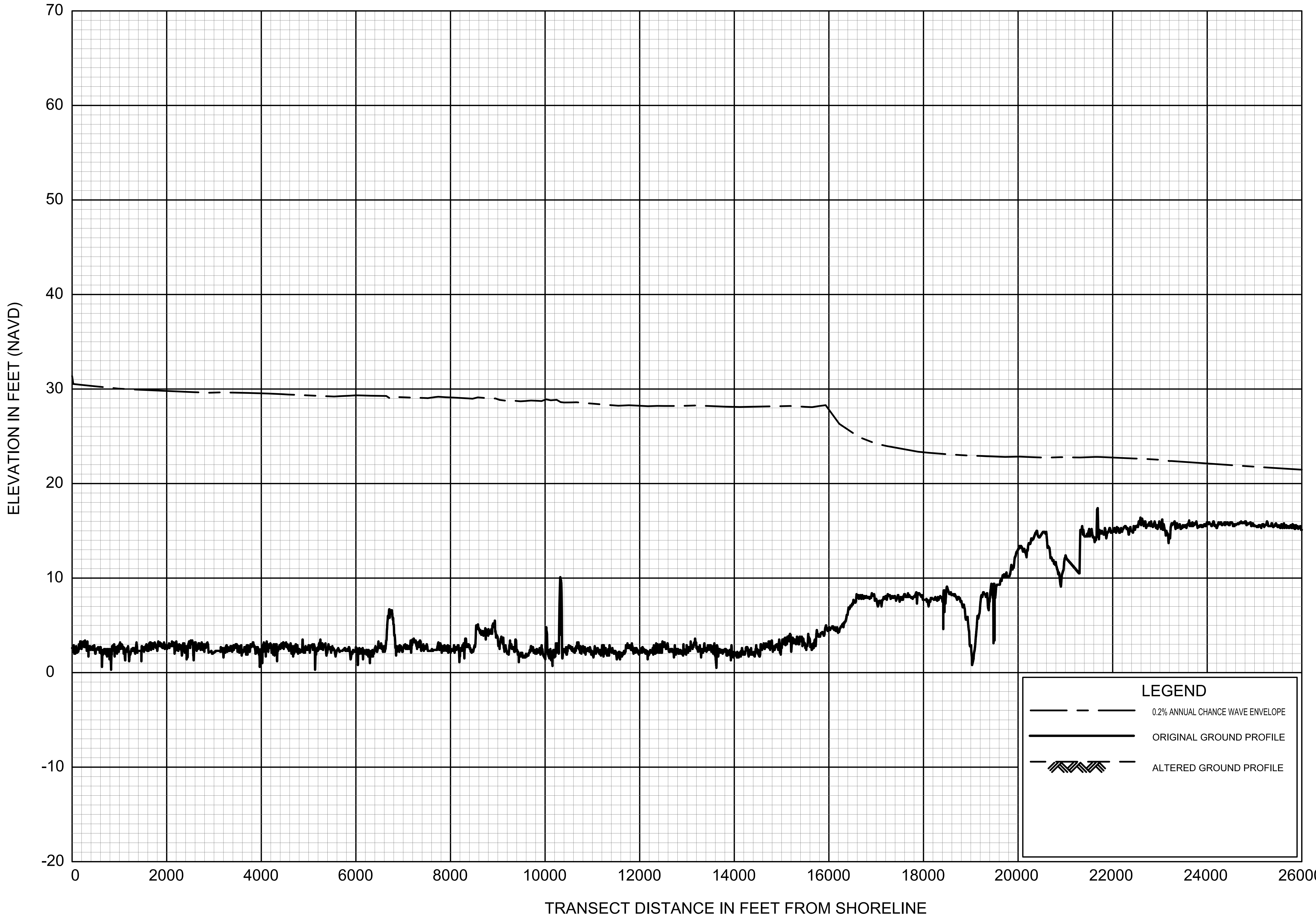
TRANSECT 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

19P



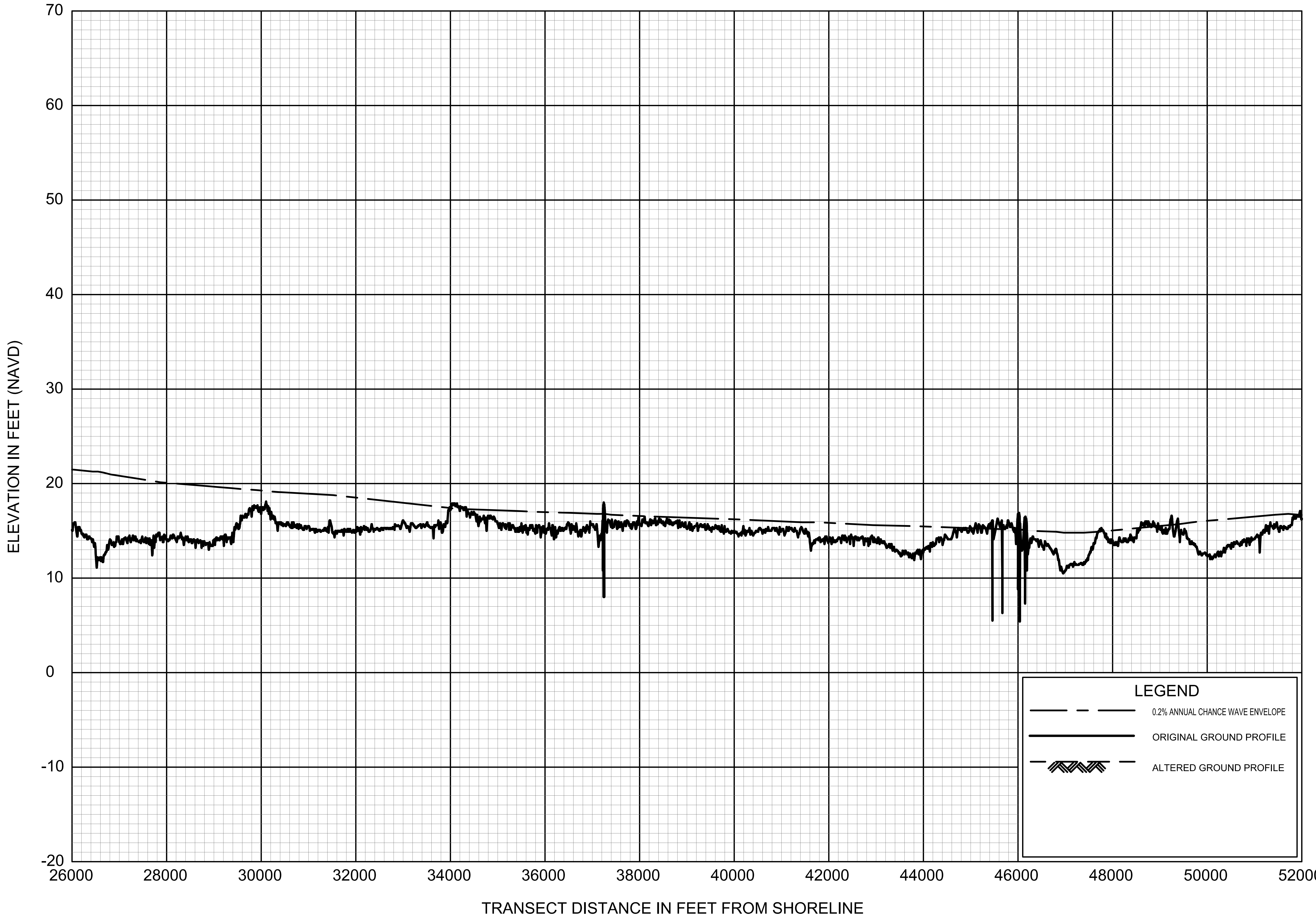
0.2% ANNUAL CHANCE WAVE ENVELOPE

TRANSECT 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



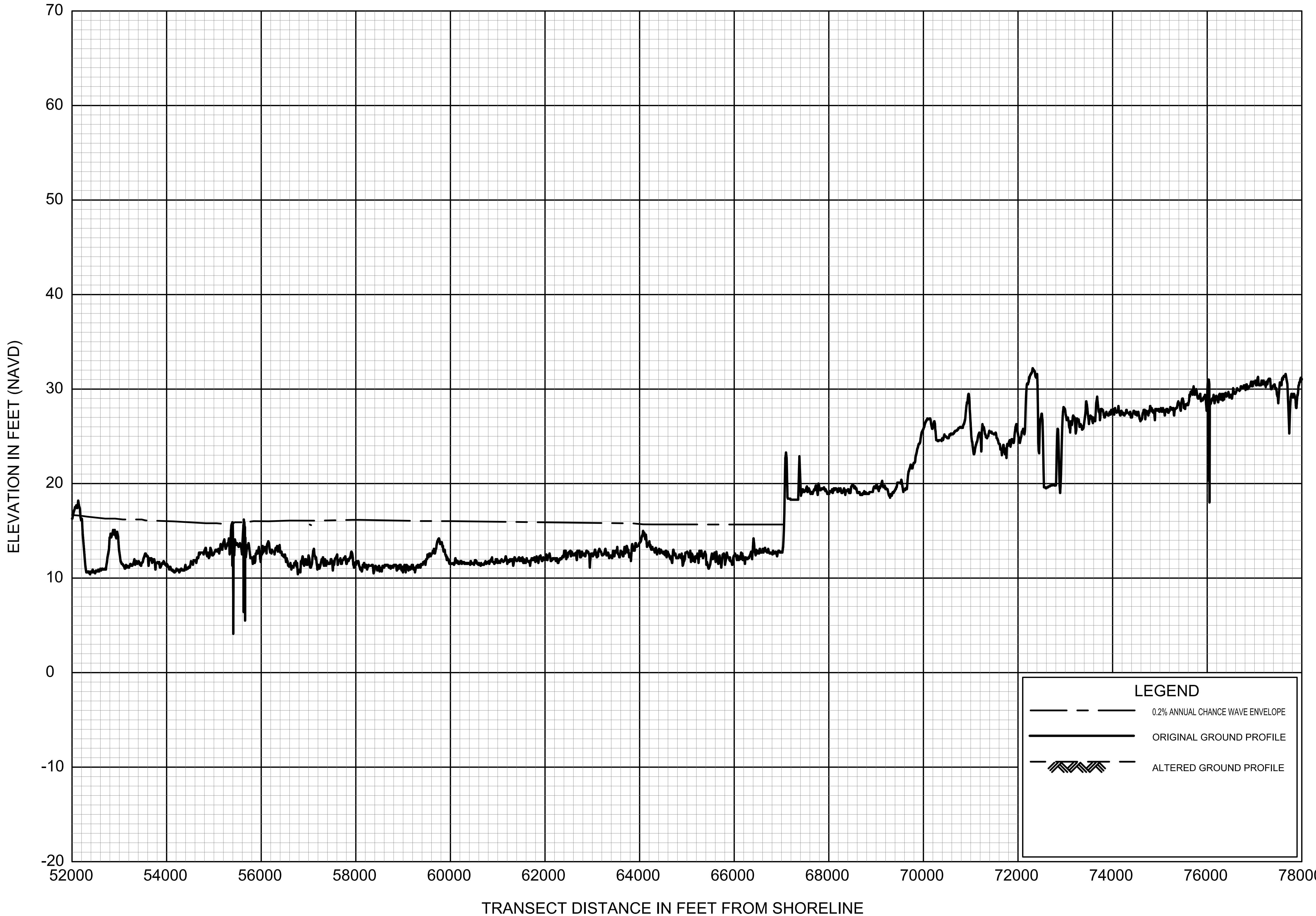
0.2% ANNUAL CHANCE WAVE ENVELOPE

TRANSECT 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



0.2% ANNUAL CHANCE WAVE ENVELOPE

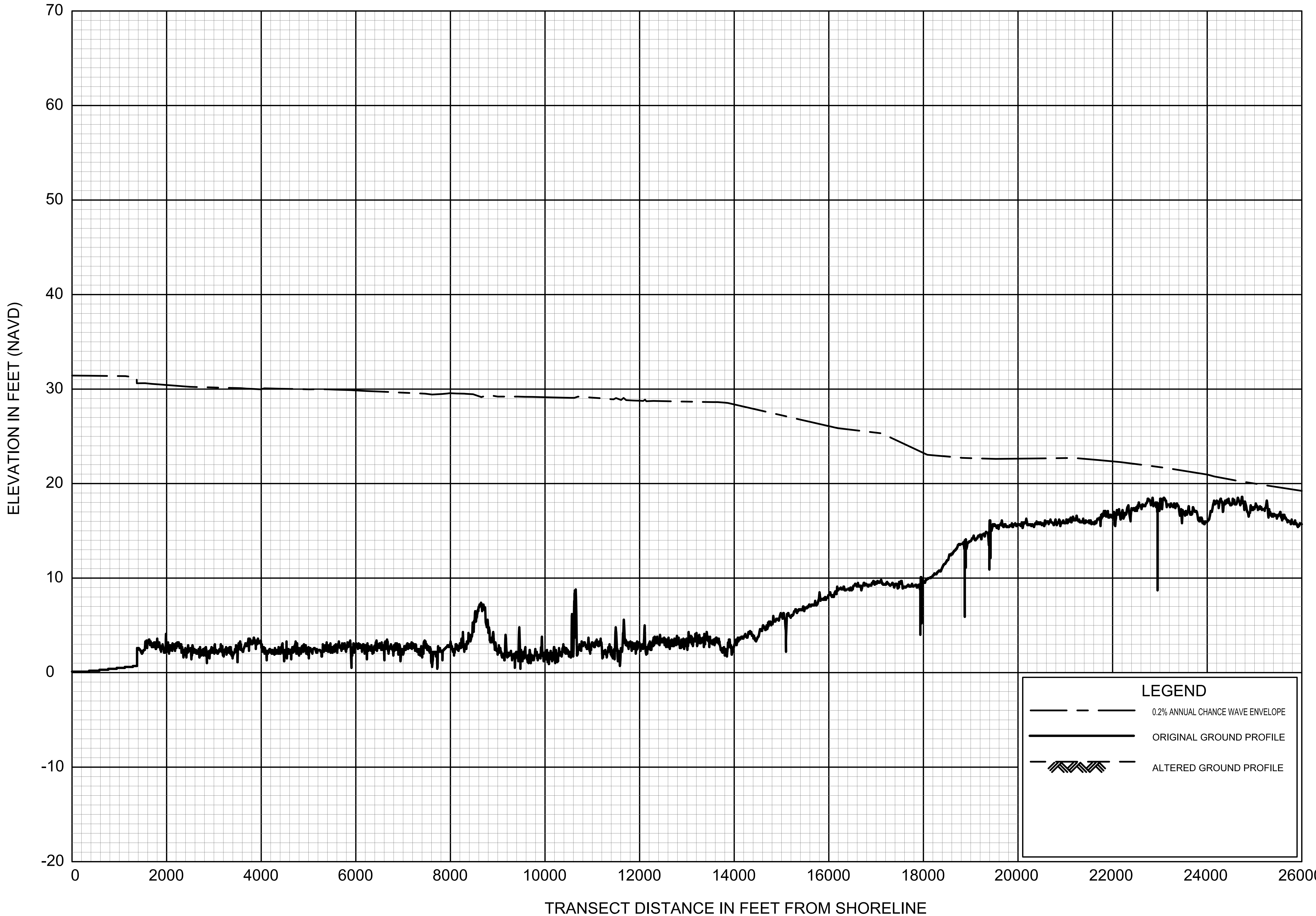
TRANSECT 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

22P



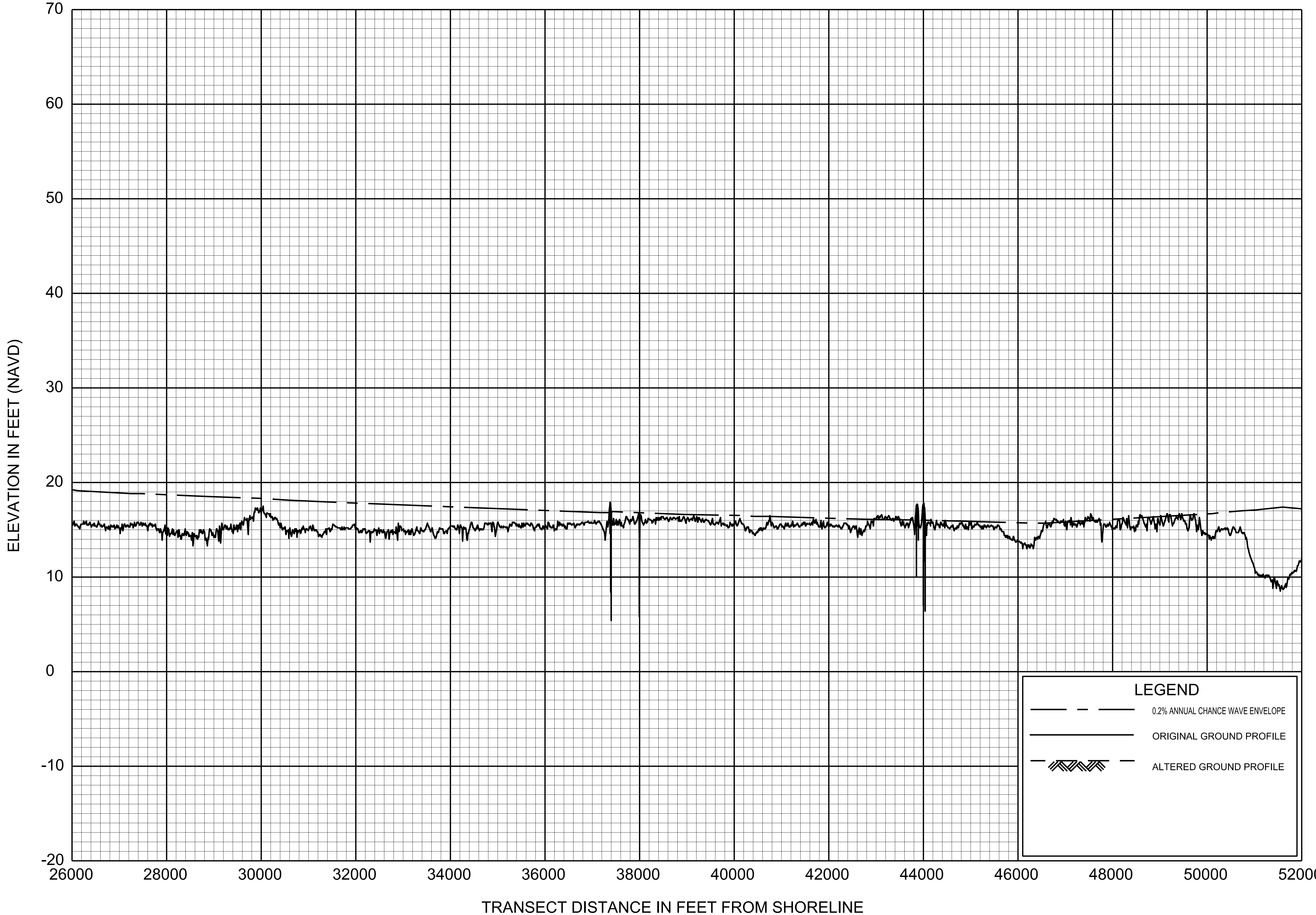
0.2% ANNUAL CHANCE WAVE ENVELOPE

TRANSECT 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



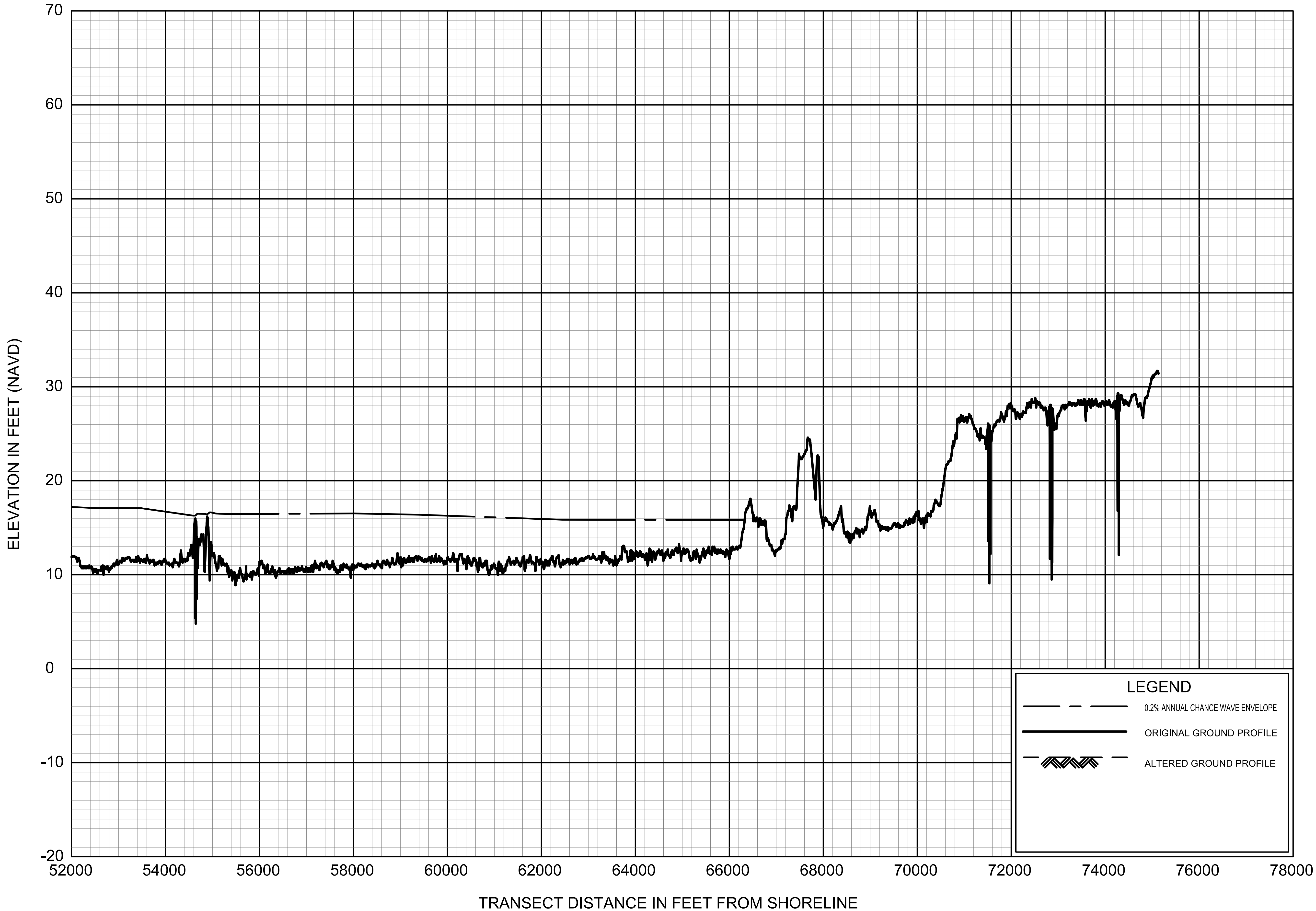
0.2% ANNUAL CHANCE WAVE ENVELOPE

TRANSECT 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



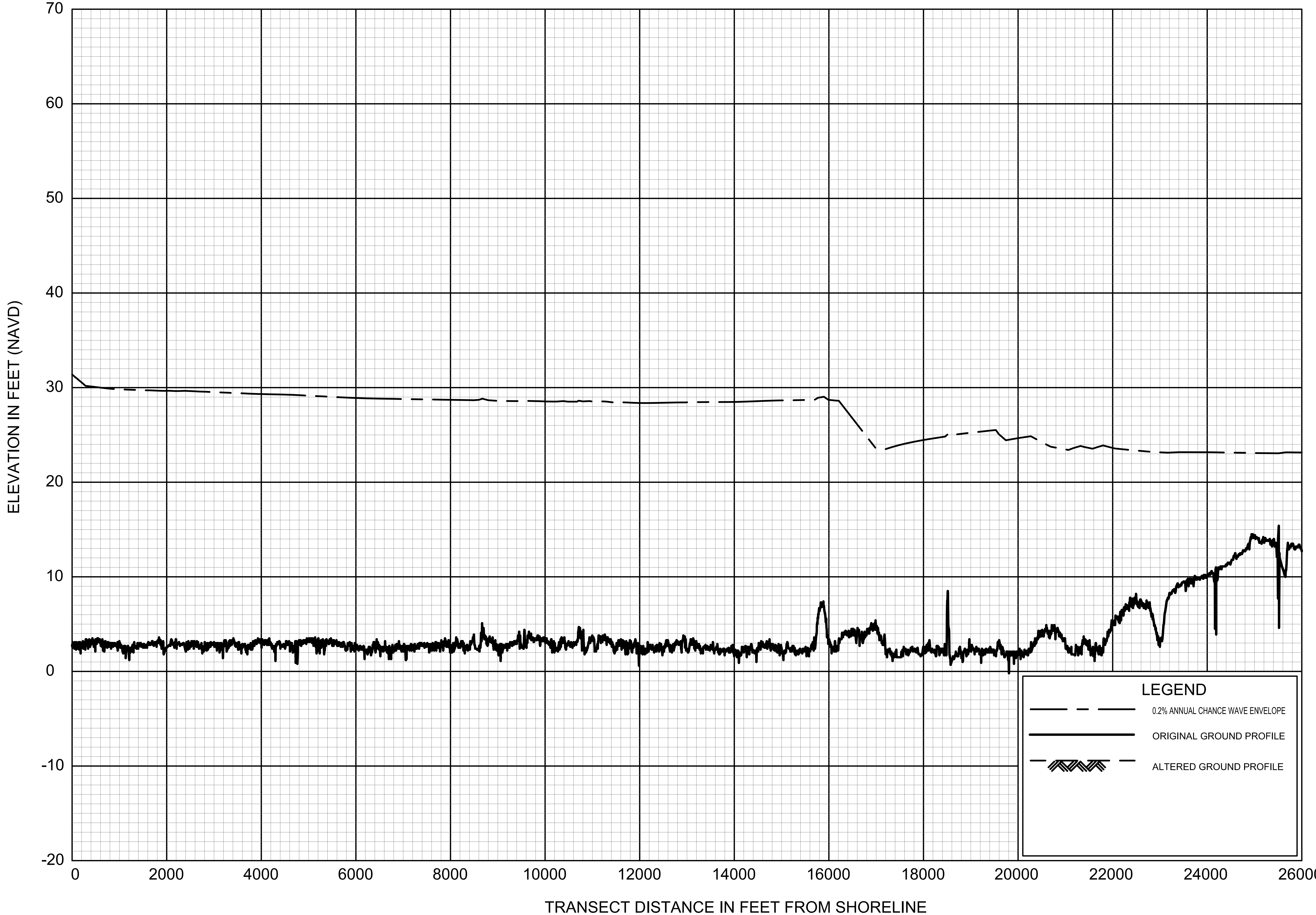
0.2% ANNUAL CHANCE WAVE ENVELOPE

TRANSECT 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



0.2% ANNUAL CHANCE WAVE ENVELOPE

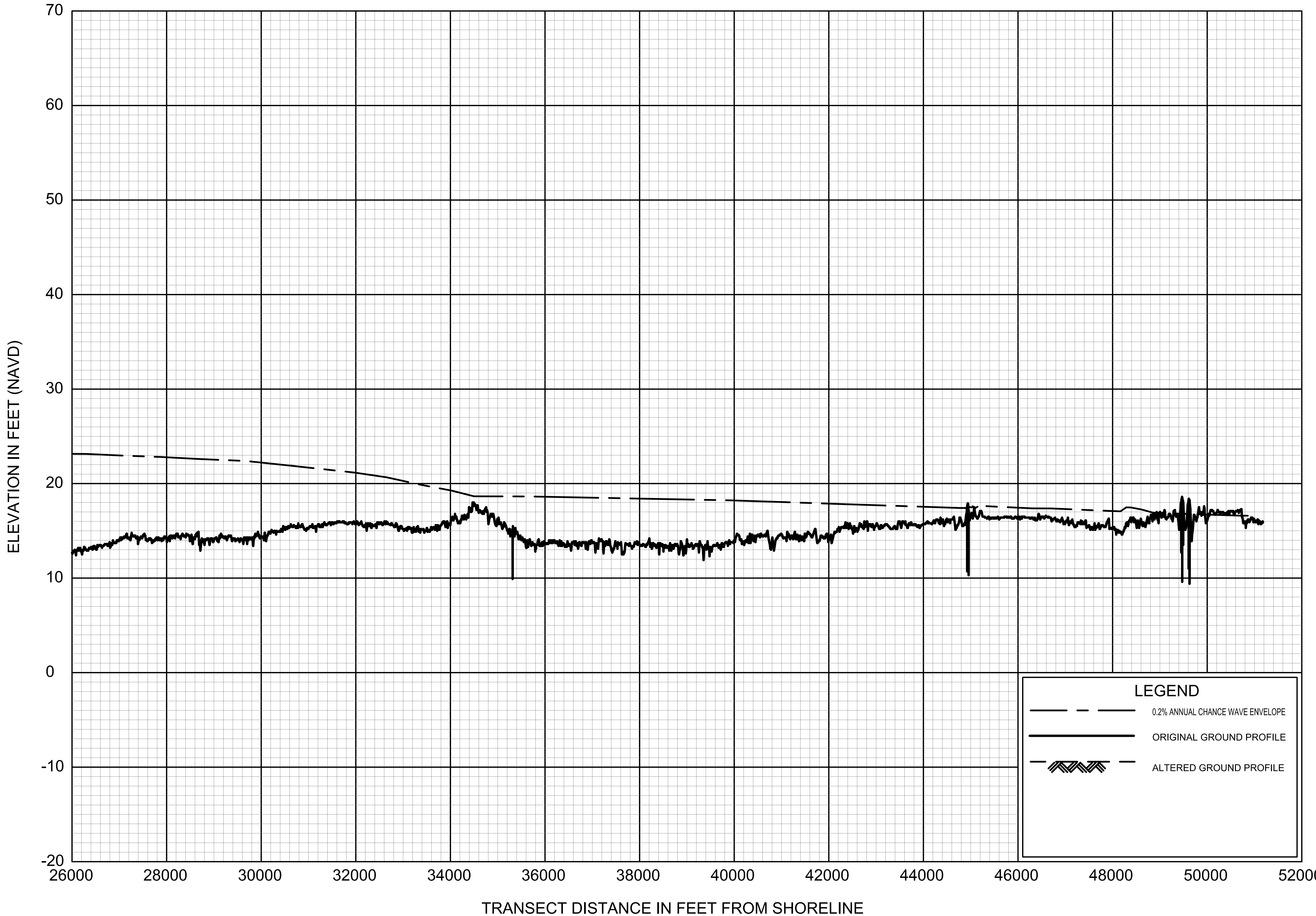
TRANSECT 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

26P



0.2% ANNUAL CHANCE WAVE ENVELOPE

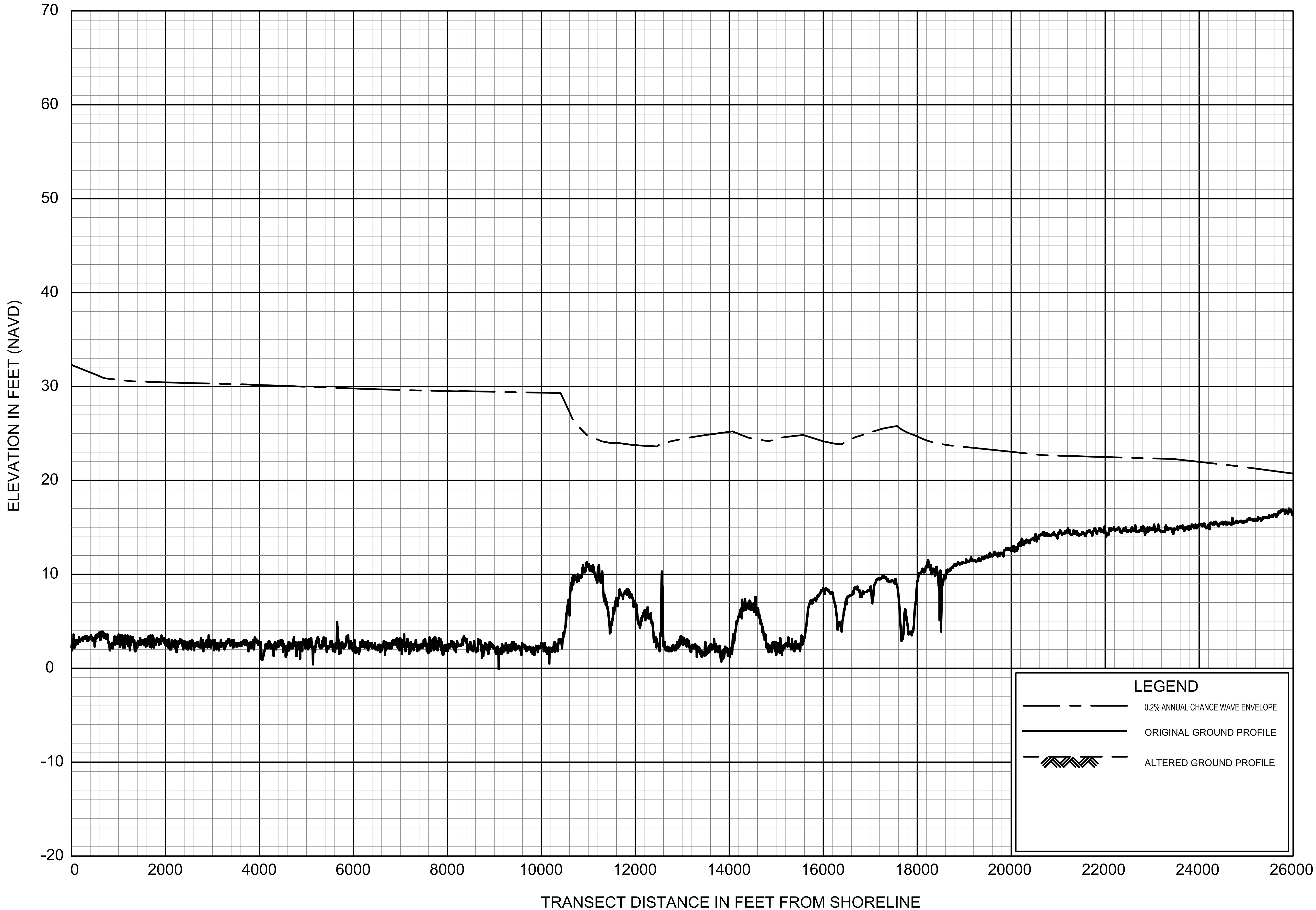
TRANSECT 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

27P



0.2% ANNUAL CHANCE WAVE ENVELOPE

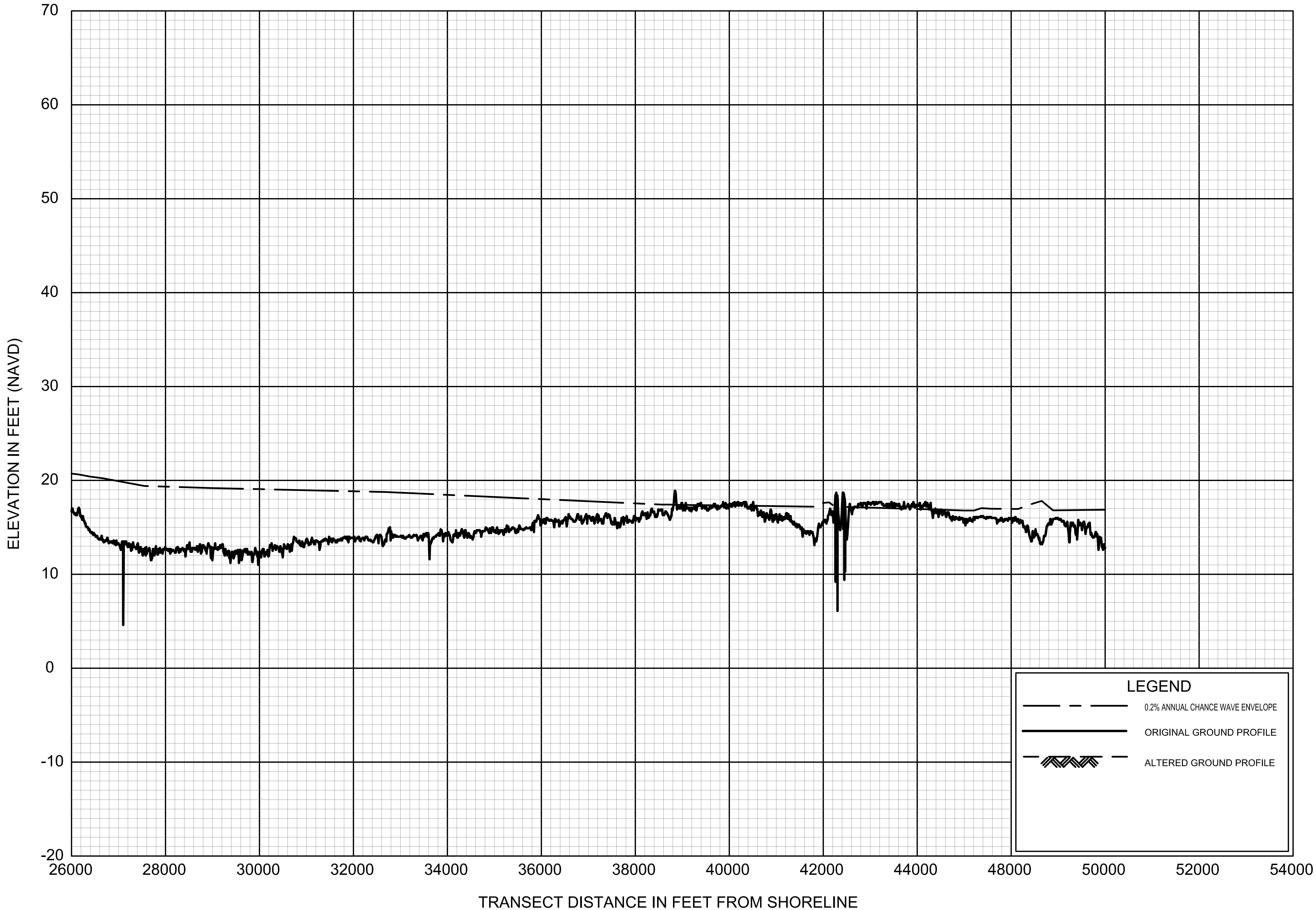
TRANSECT 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

28P



0.2% ANNUAL CHANCE WAVE ENVELOPE

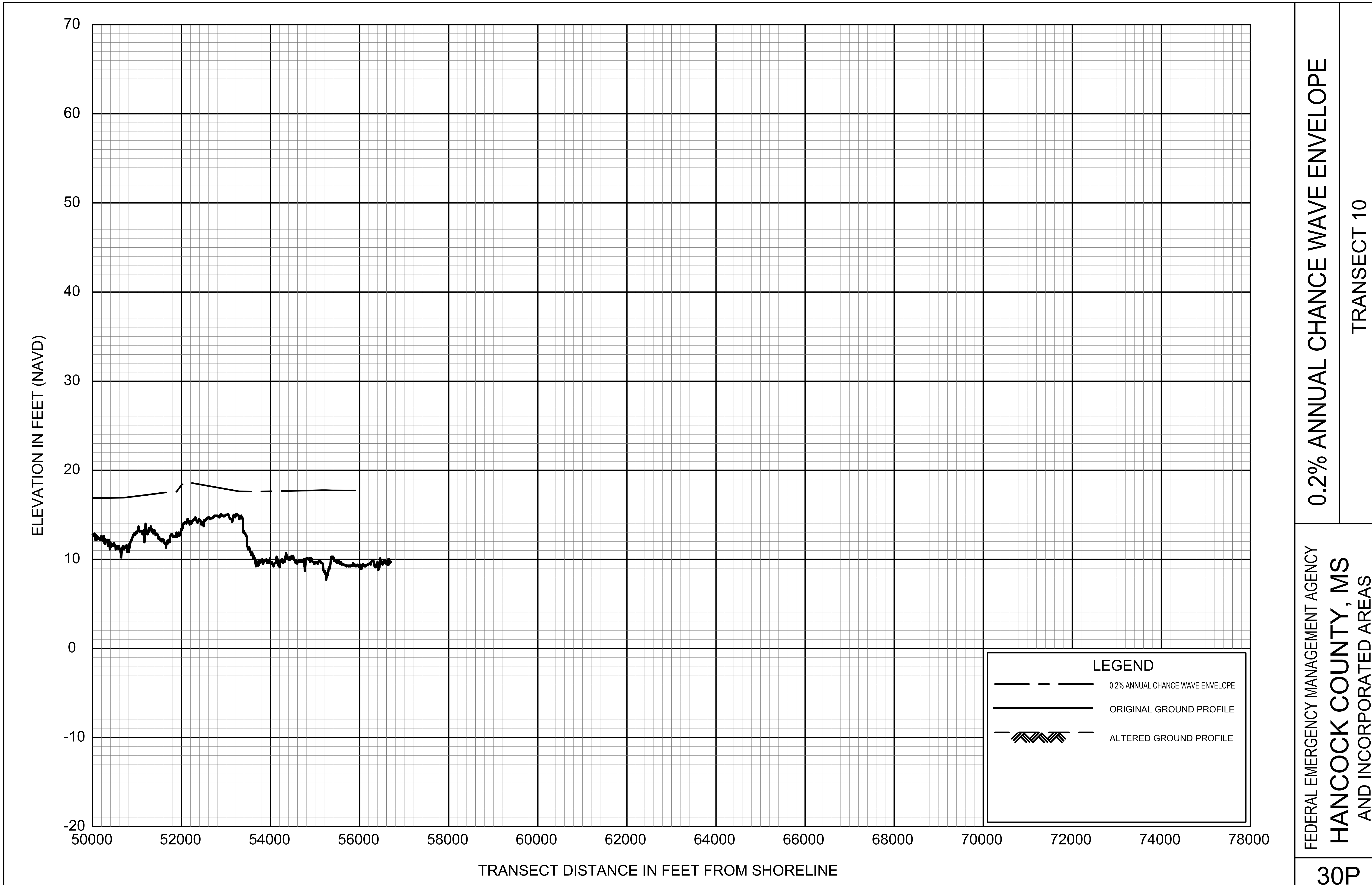
TRANSECT 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

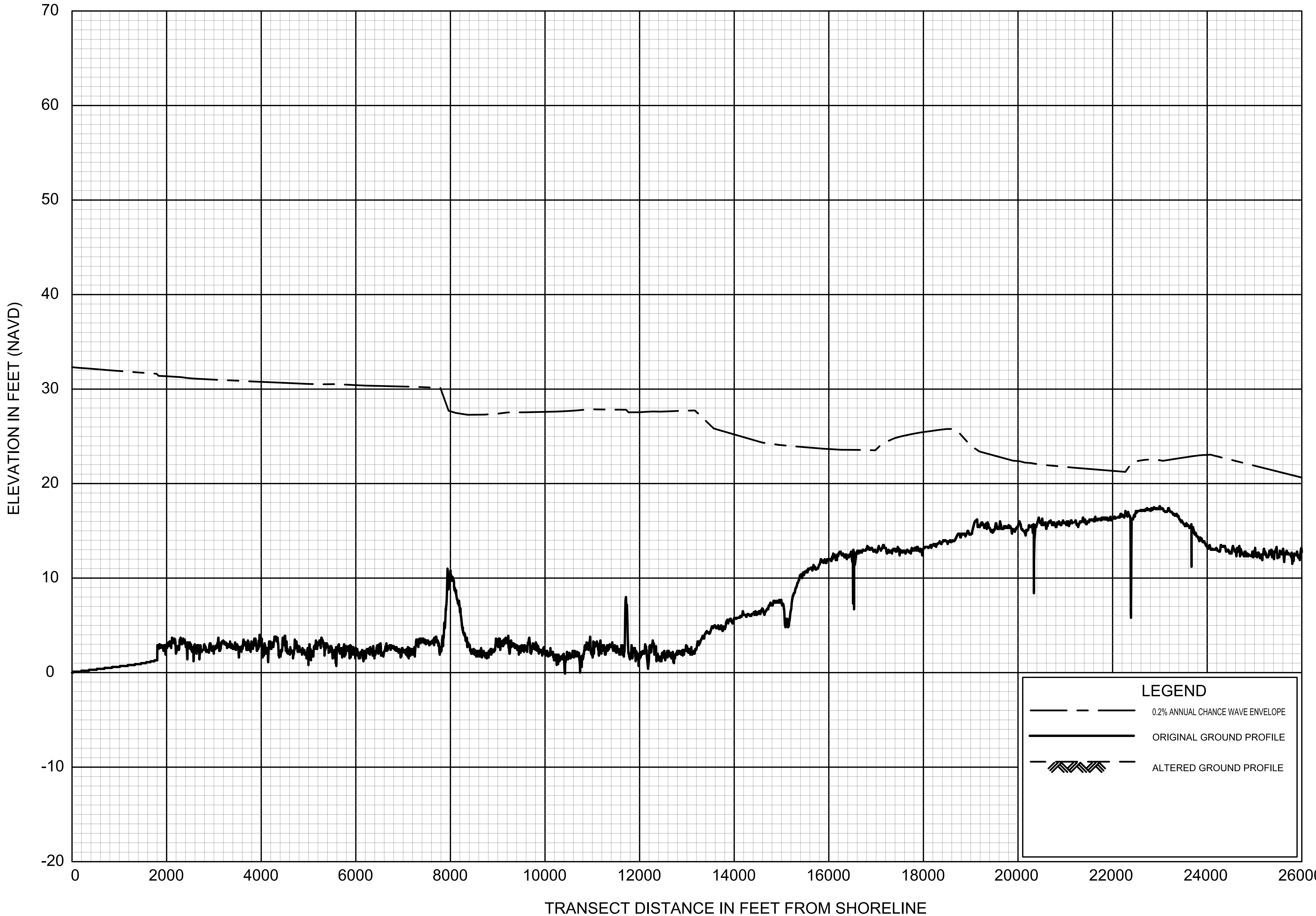
HANCOCK COUNTY, MS

AND INCORPORATED AREAS

29P



0.2% ANNUAL CHANCE WAVE ENVELOPE
TRANSECT 10
FEDERAL EMERGENCY MANAGEMENT AGENCY
HANCOCK COUNTY, MS
AND INCORPORATED AREAS
30P
ELEVATION IN FEET (NAVD)
TRANSECT DISTANCE IN FEET FROM SHORELINE
70
60
50
40
30
20
10
0
-10
-20
50000
52000
54000
56000
58000
60000
62000
64000
66000
68000
70000
72000
74000
76000
78000
LEGEND
0.2% ANNUAL CHANCE WAVE ENVELOPE
ORIGINAL GROUND PROFILE
ALTERED GROUND PROFILE



0.2% ANNUAL CHANCE WAVE ENVELOPE

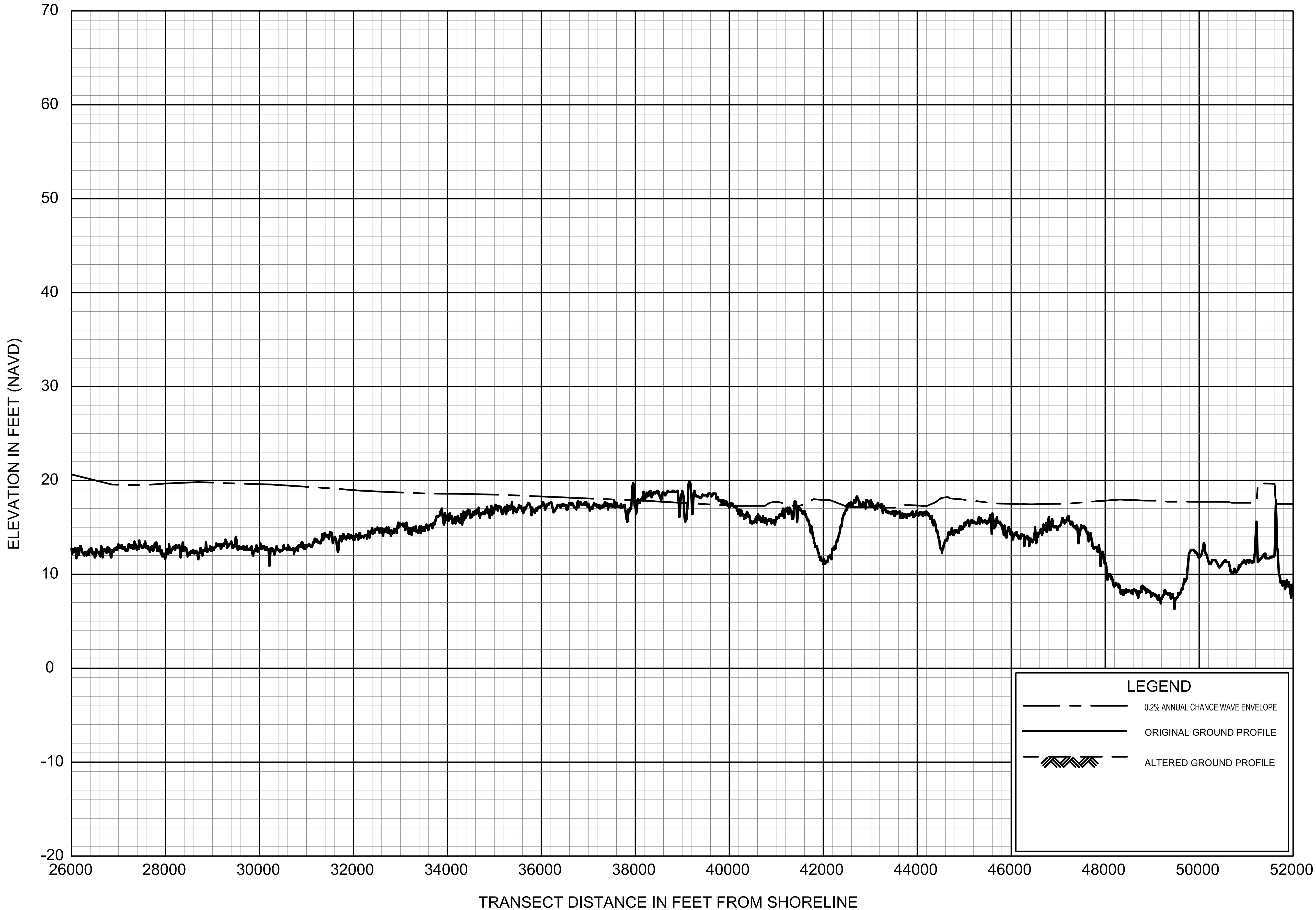
TRANSECT 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

31P



0.2% ANNUAL CHANCE WAVE ENVELOPE

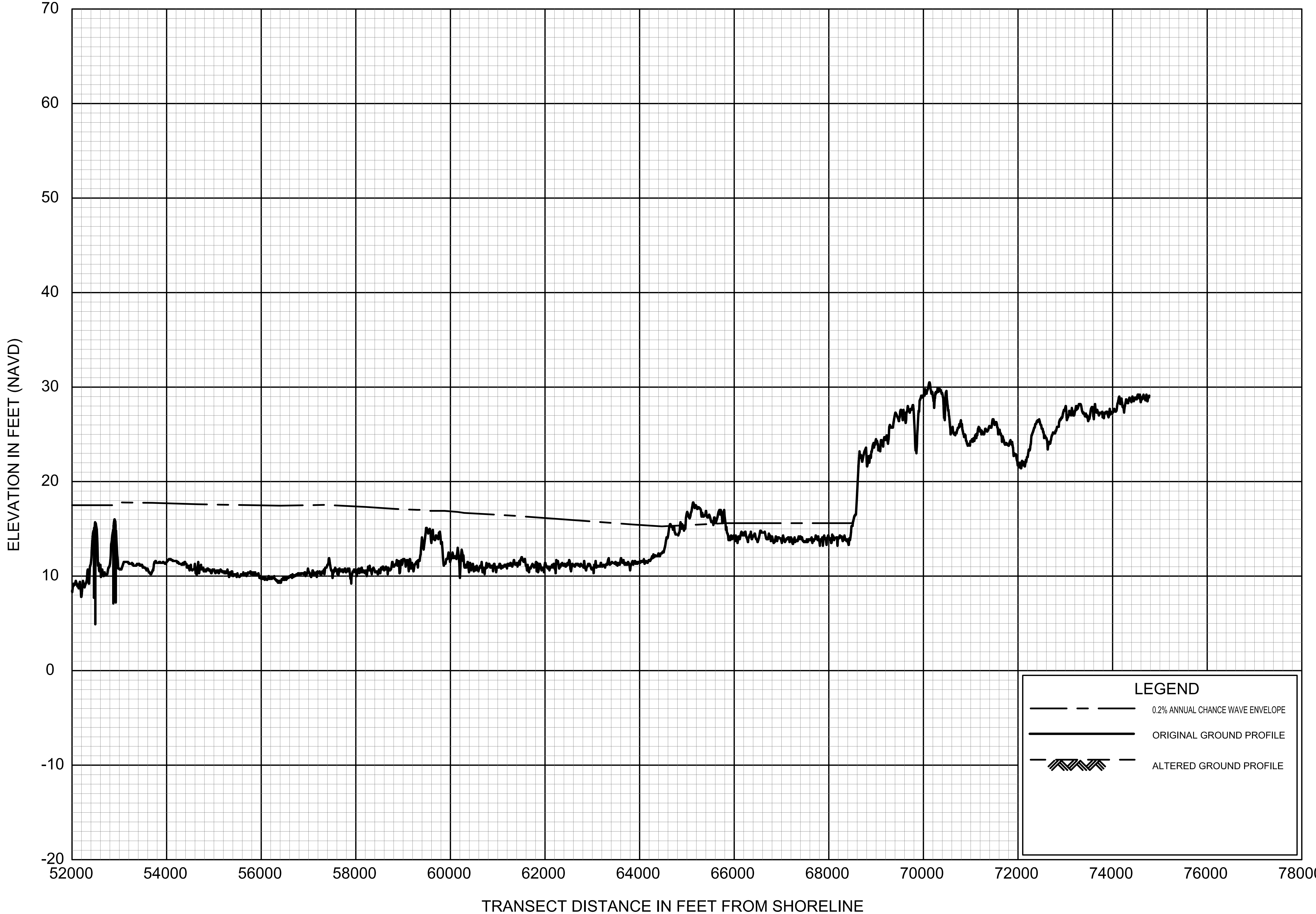
TRANSECT 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

32P



0.2% ANNUAL CHANCE WAVE ENVELOPE

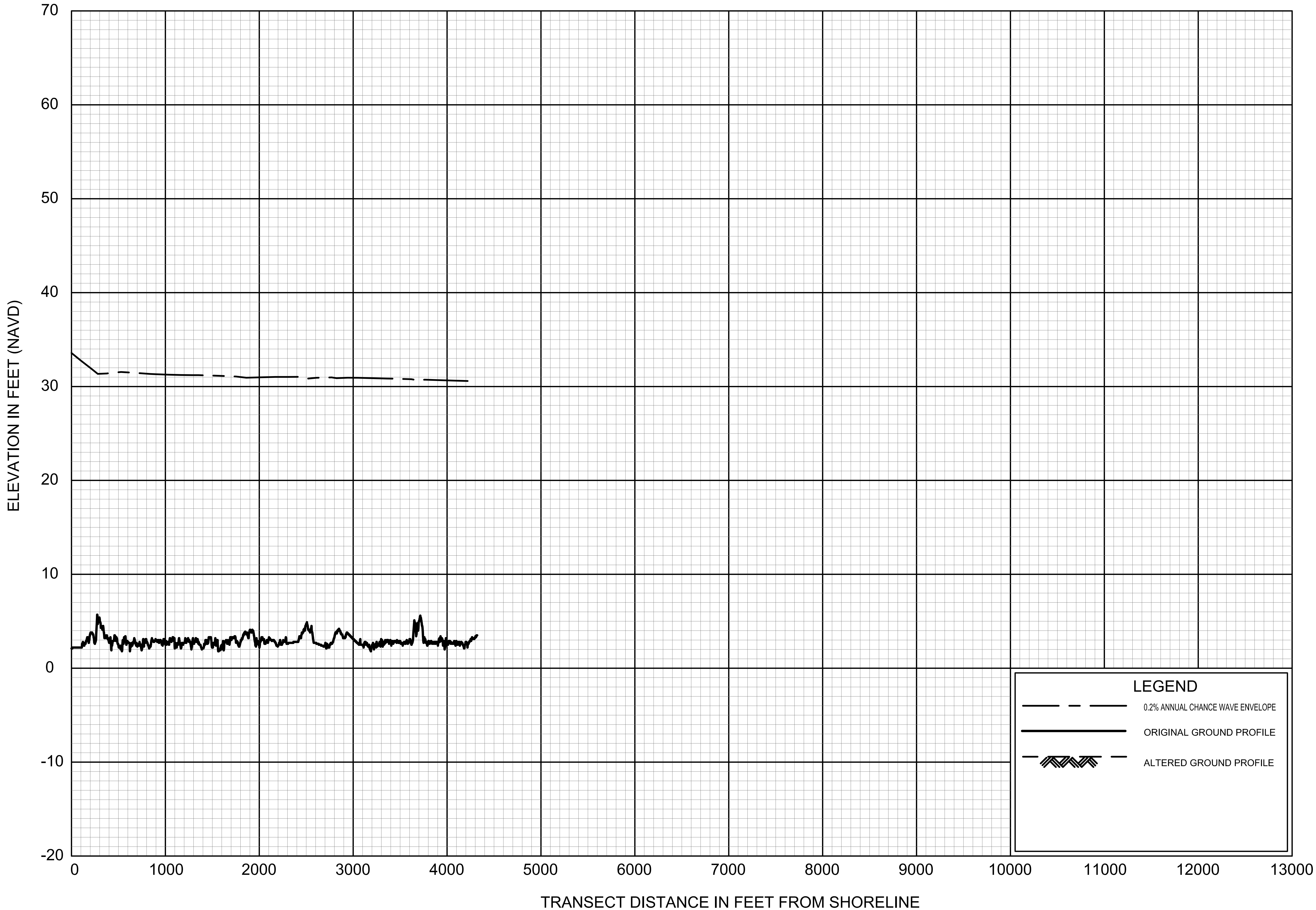
TRANSECT 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

33P



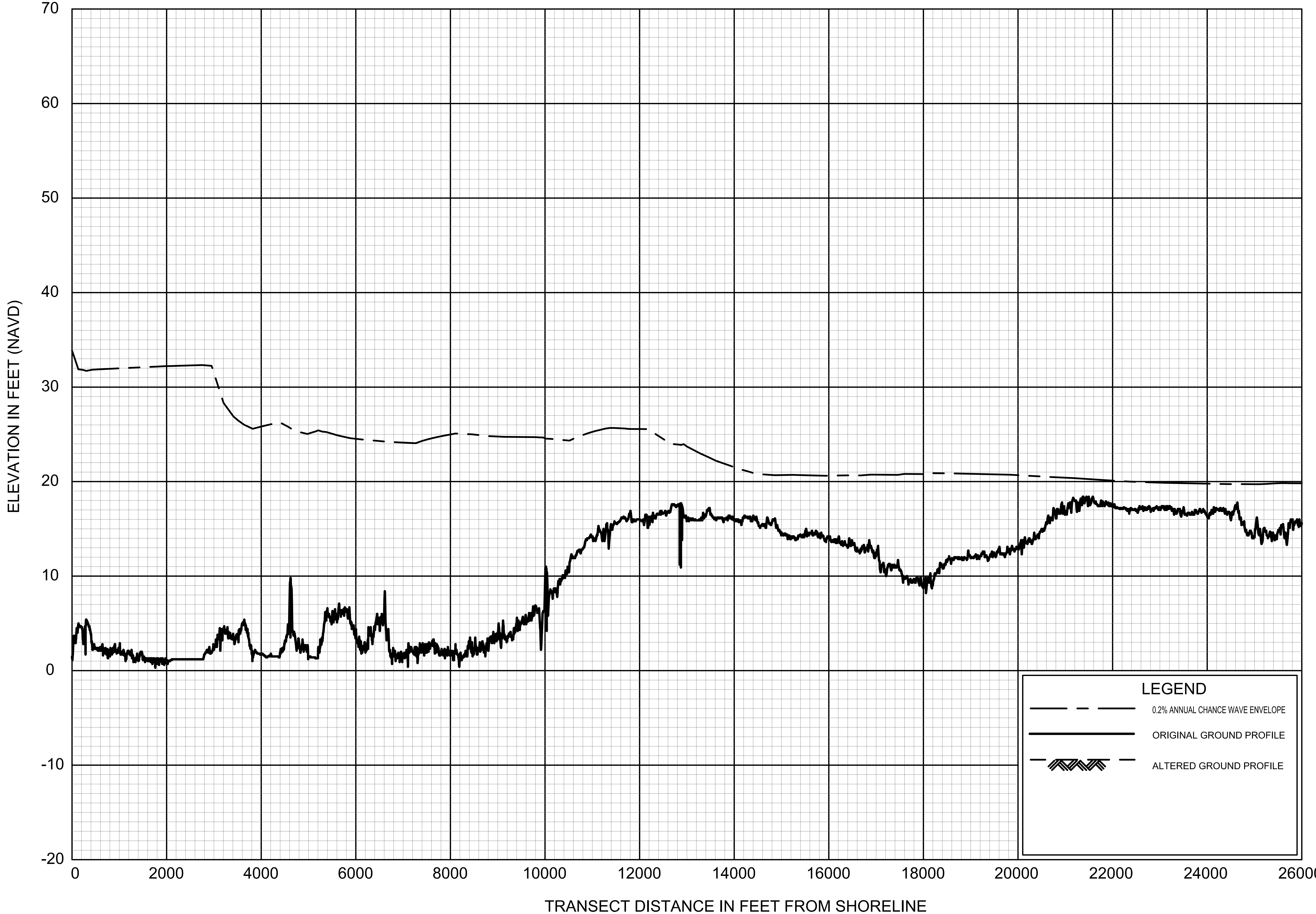
0.2% ANNUAL CHANCE WAVE ENVELOPE

TRANSECT 12

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



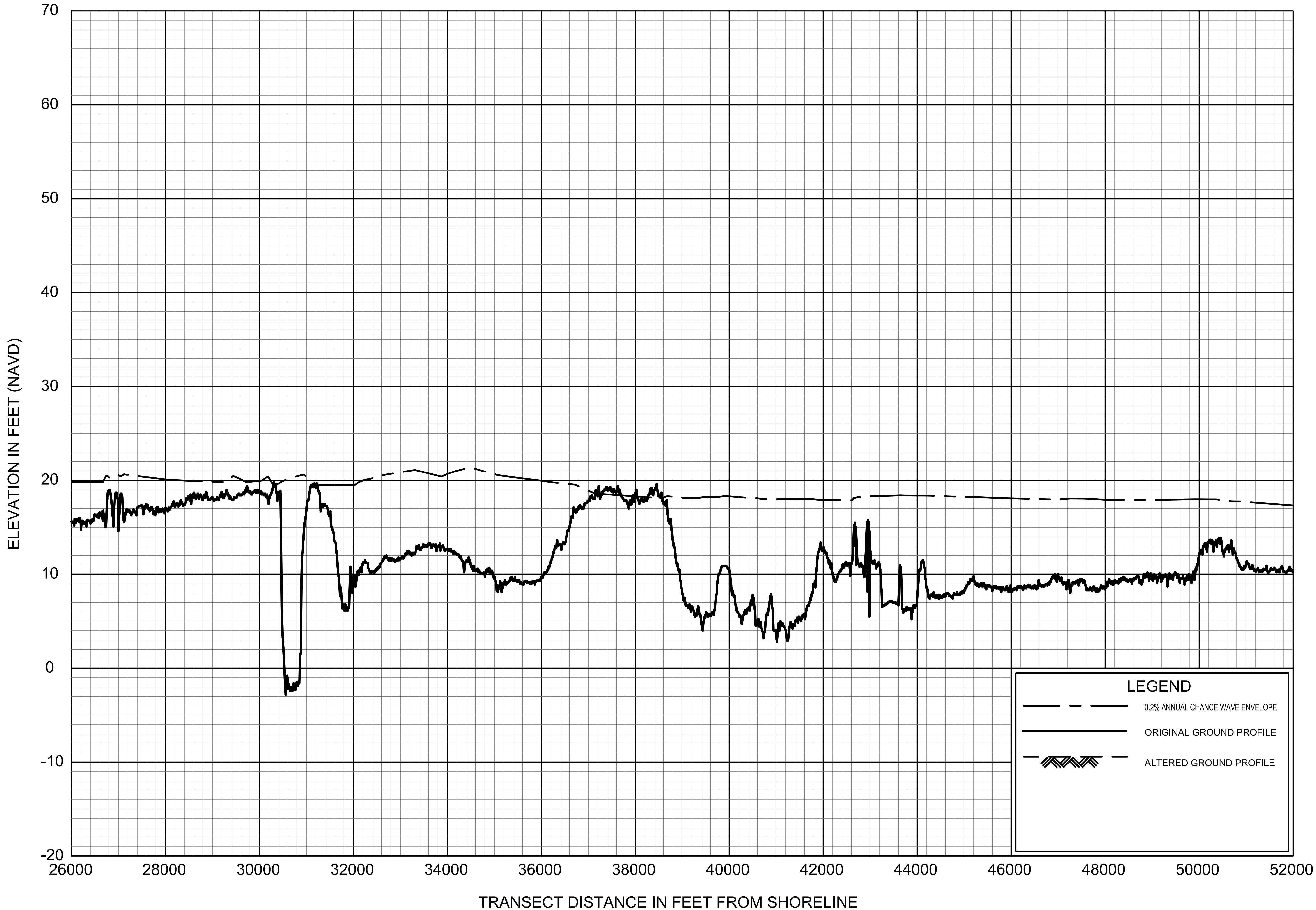
0.2% ANNUAL CHANCE WAVE ENVELOPE

TRANSECT 13

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



0.2% ANNUAL CHANCE WAVE ENVELOPE

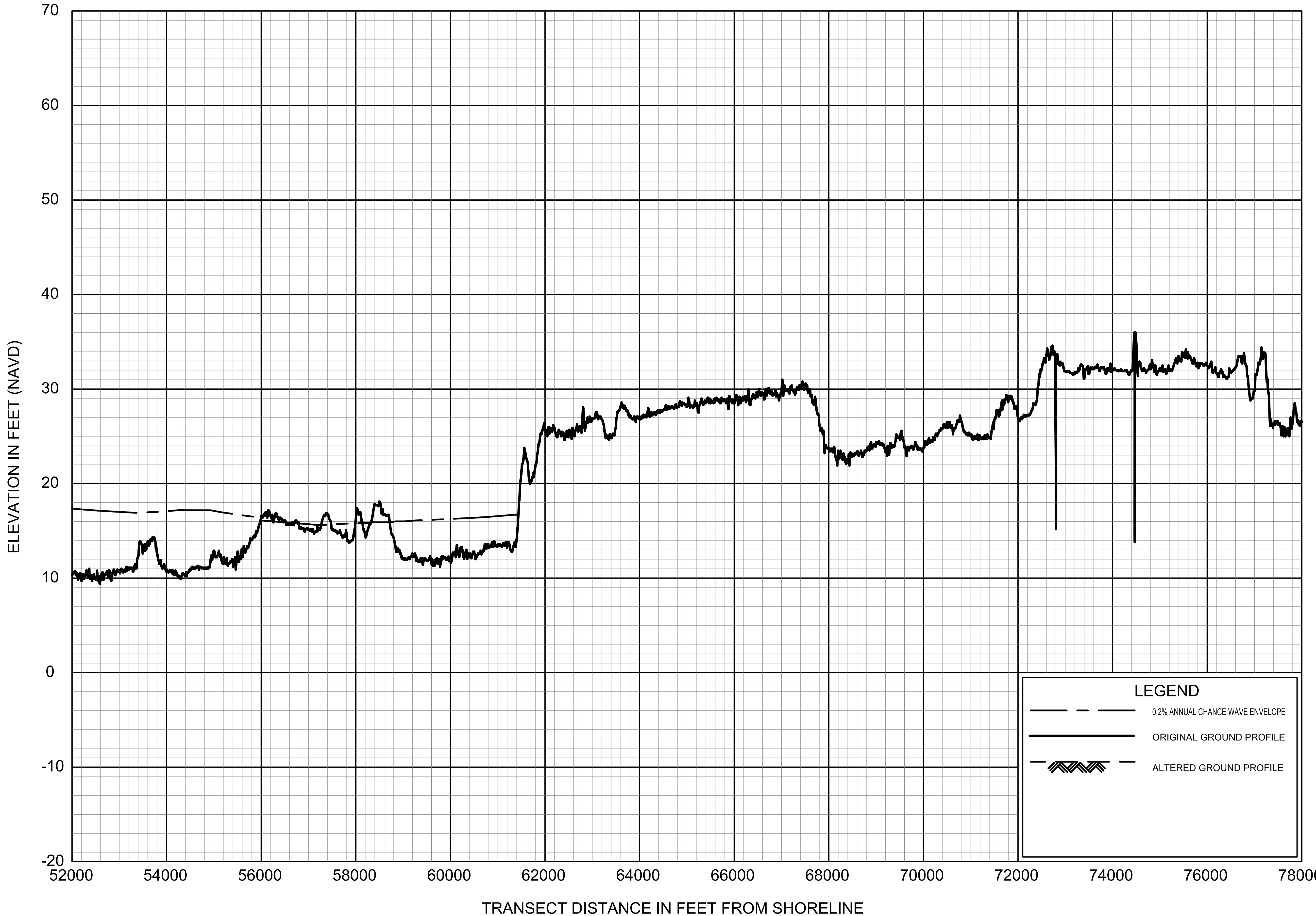
TRANSECT 13

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

36P



0.2% ANNUAL CHANCE WAVE ENVELOPE

TRANSECT 13

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

37P

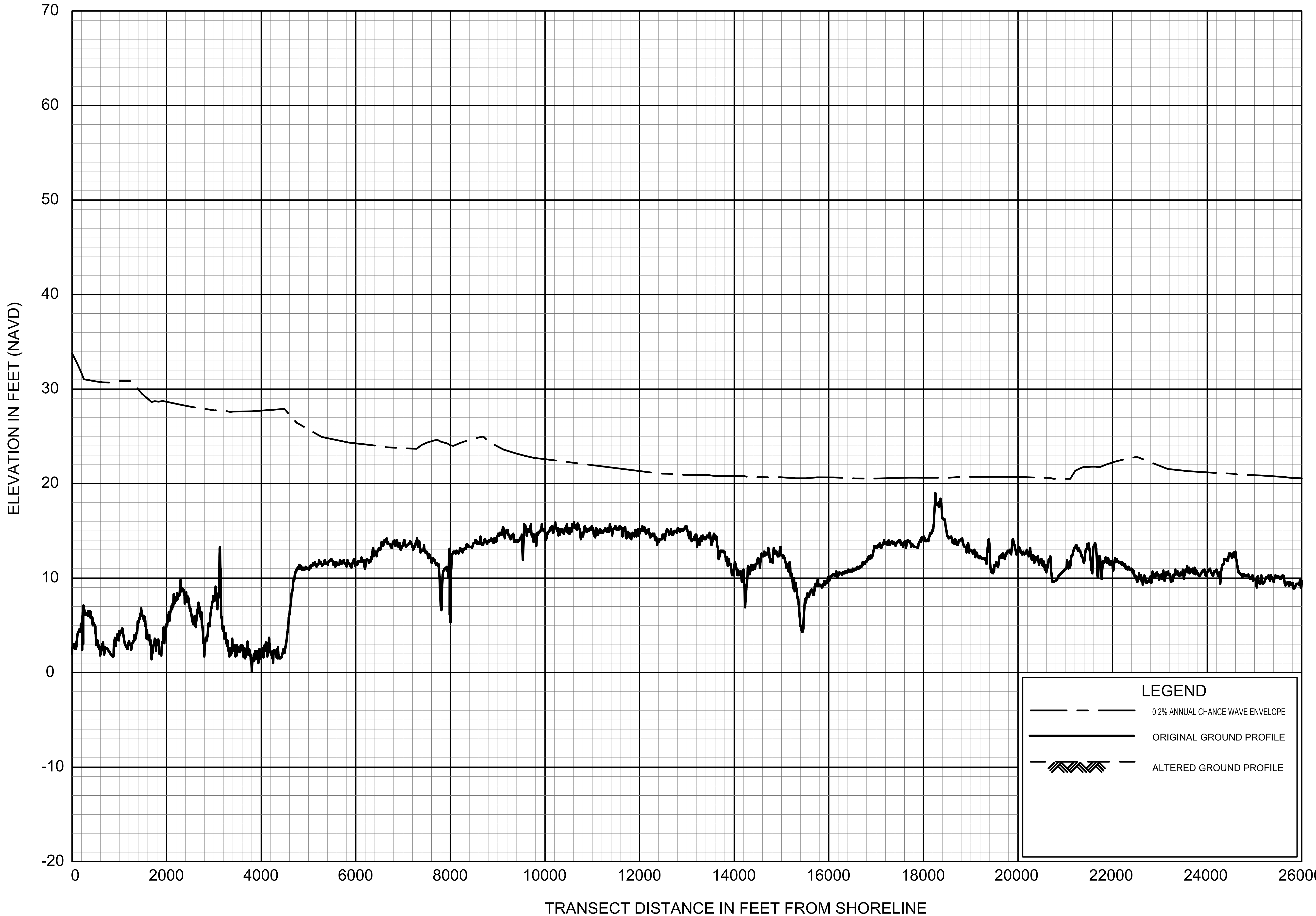
0.2% ANNUAL CHANCE WAVE ENVELOPE

TRANSECT 14

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



0.2% ANNUAL CHANCE WAVE ENVELOPE

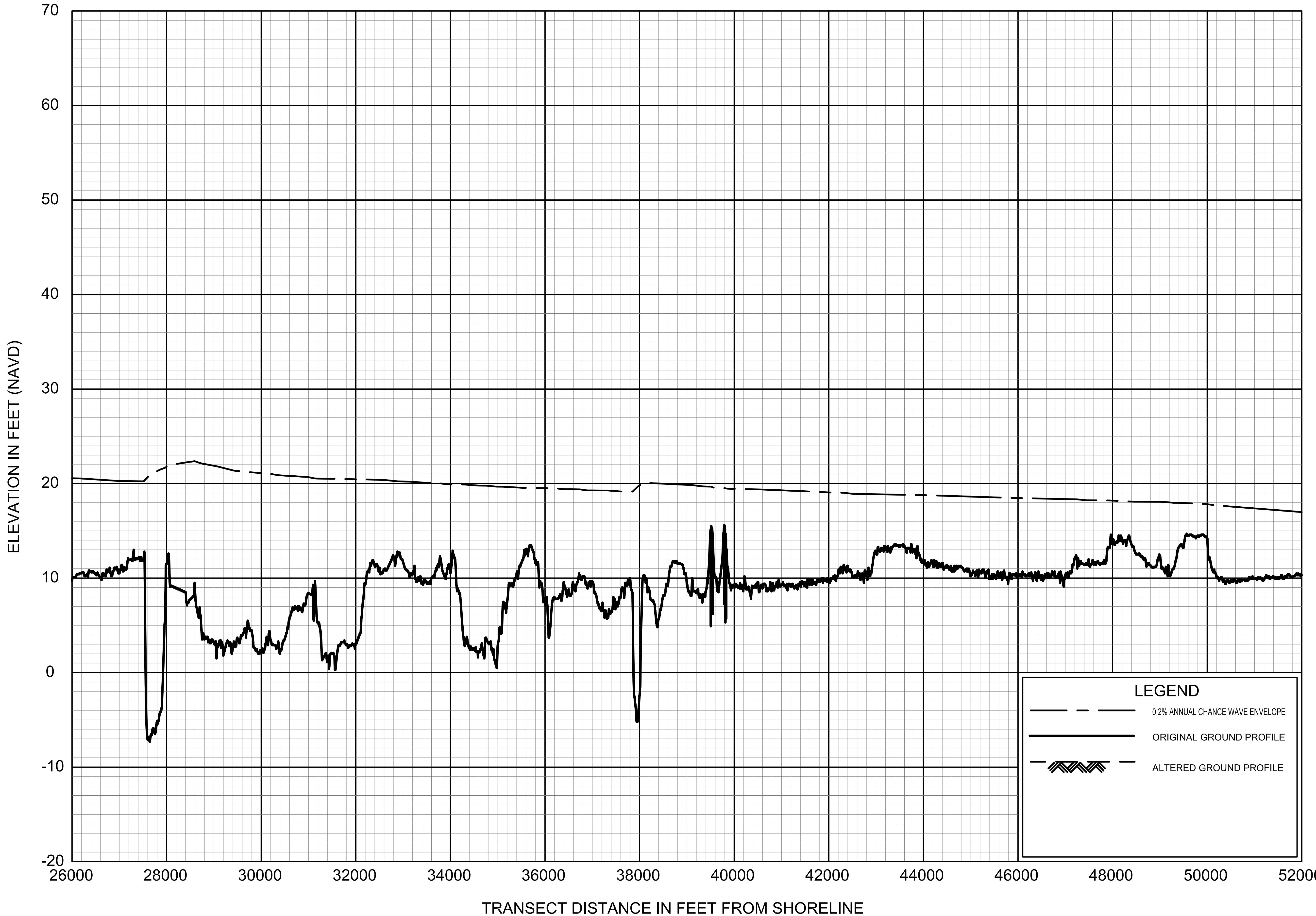
TRANSECT 15

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

39P



0.2% ANNUAL CHANCE WAVE ENVELOPE

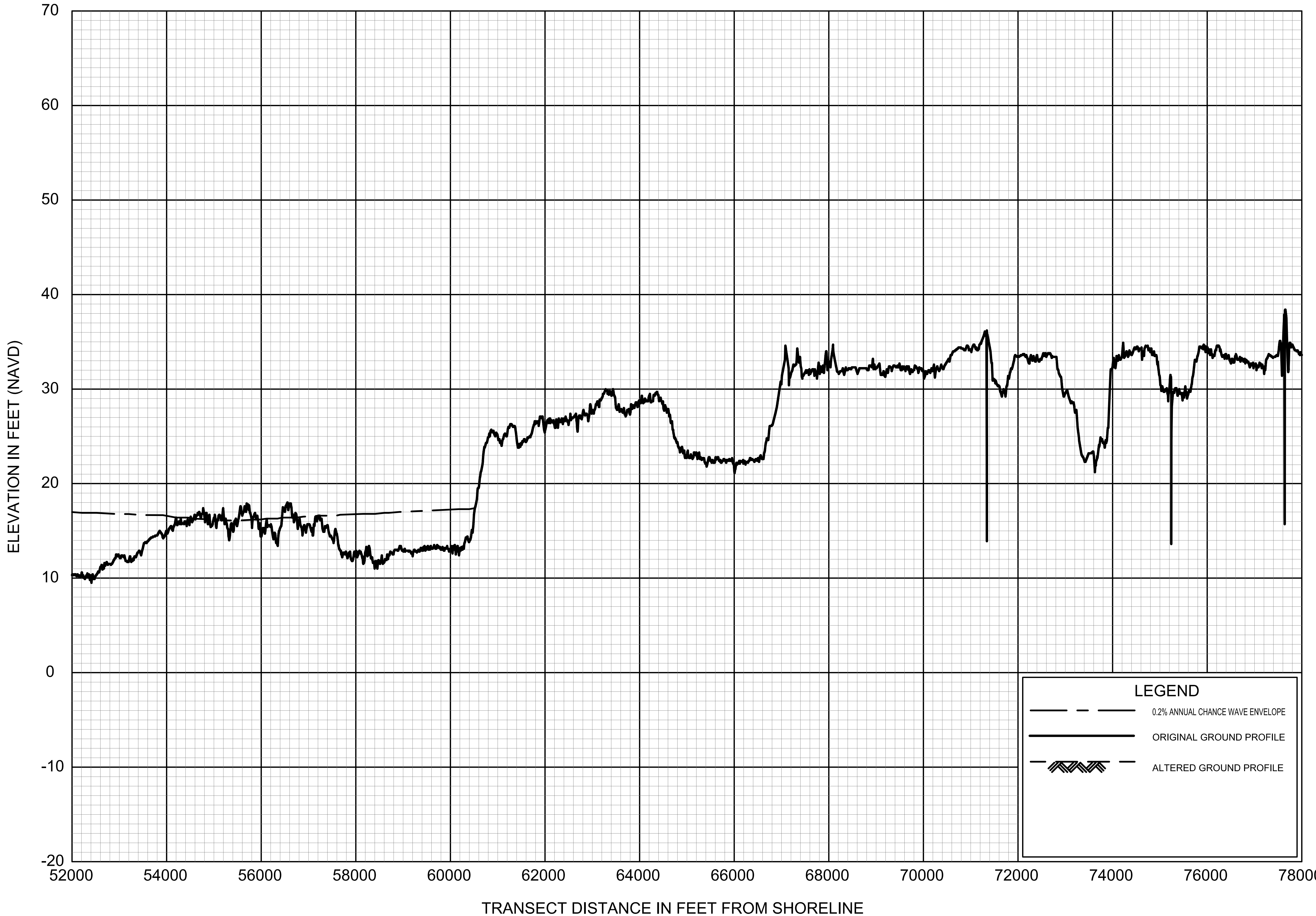
TRANSECT 15

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

40P



0.2% ANNUAL CHANCE WAVE ENVELOPE

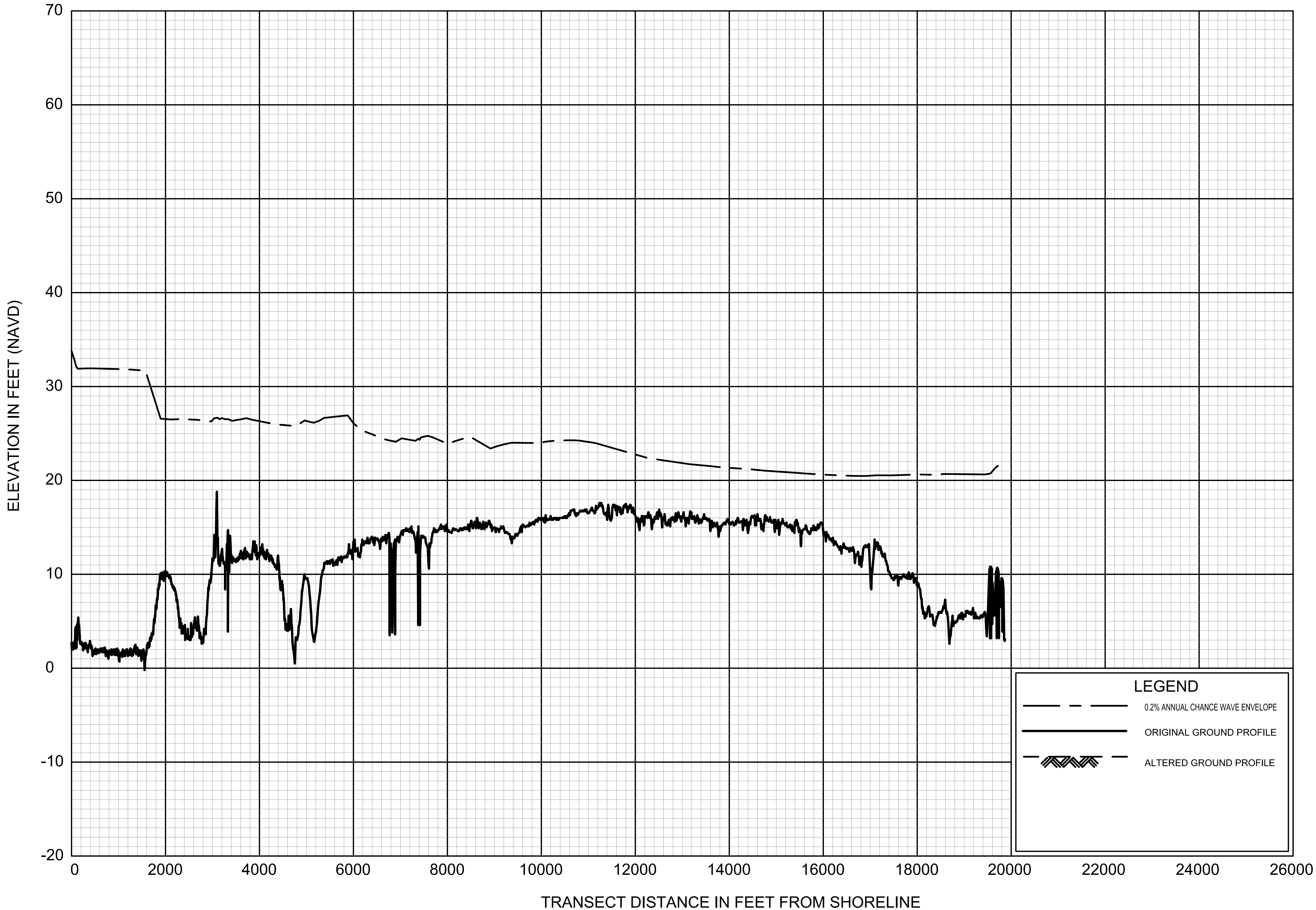
TRANSECT 15

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

41P



0.2% ANNUAL CHANCE WAVE ENVELOPE

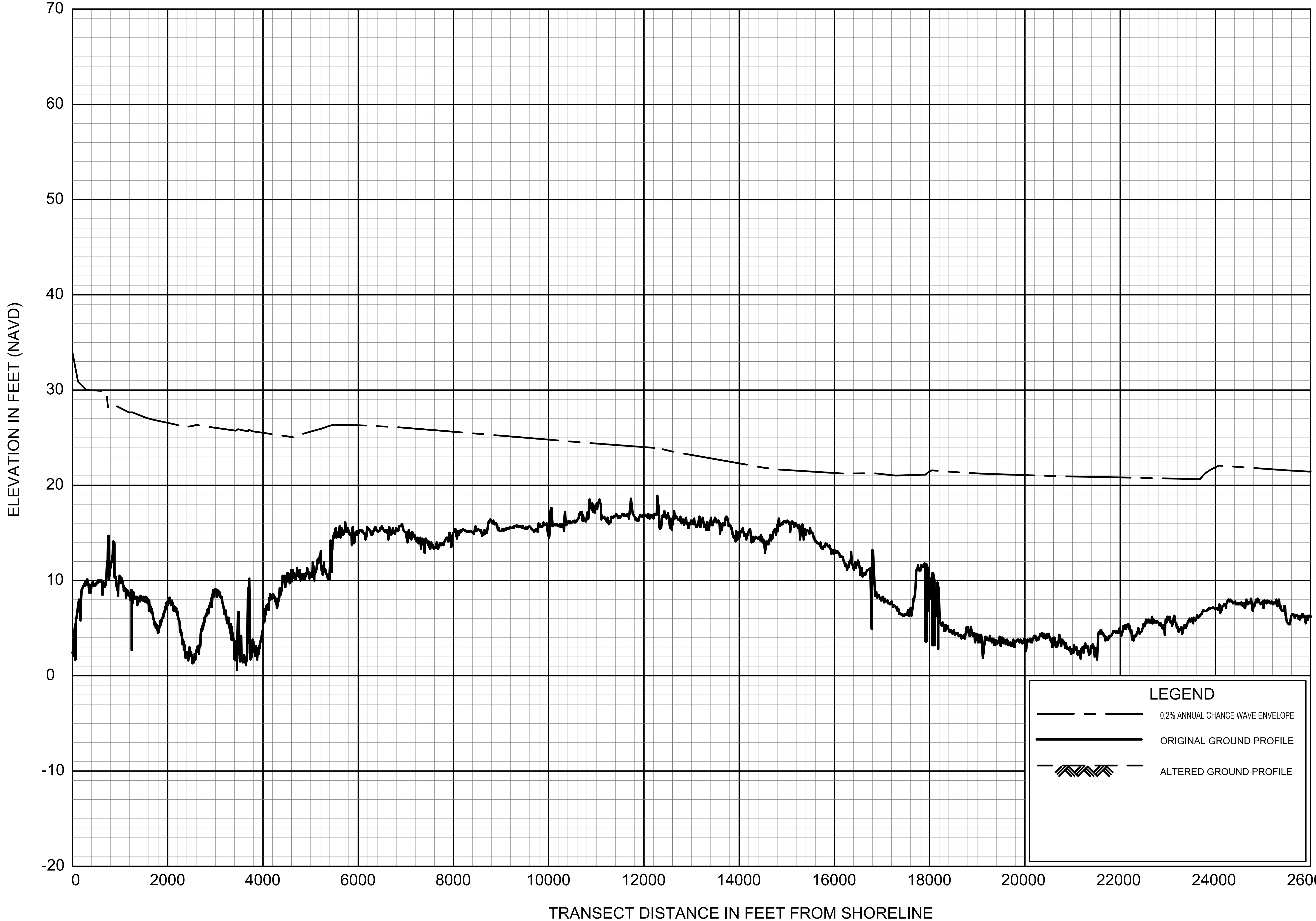
TRANSECT 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

42P



0.2% ANNUAL CHANCE WAVE ENVELOPE

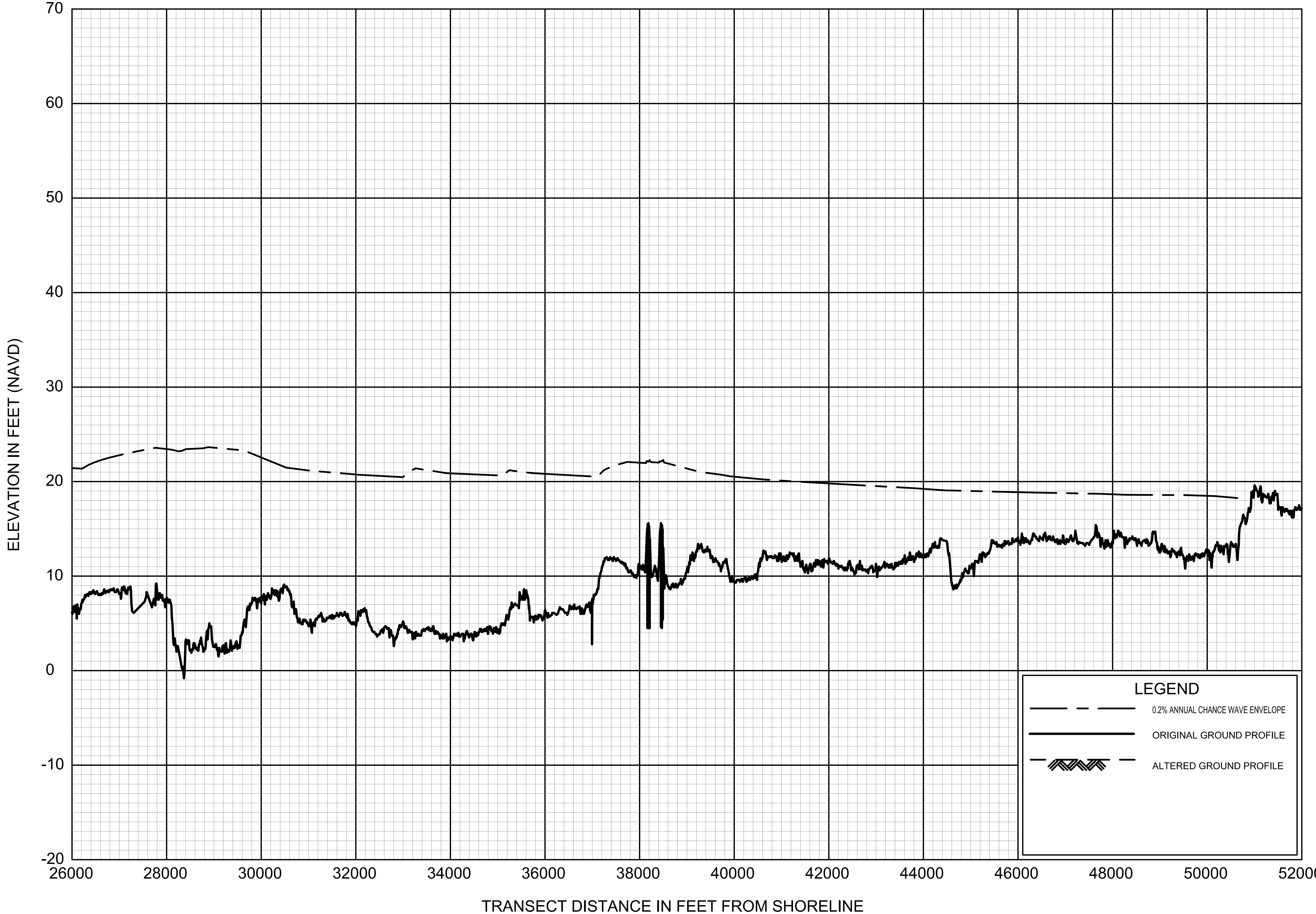
TRANSECT 17

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

43P



0.2% ANNUAL CHANCE WAVE ENVELOPE

TRANSECT 17

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

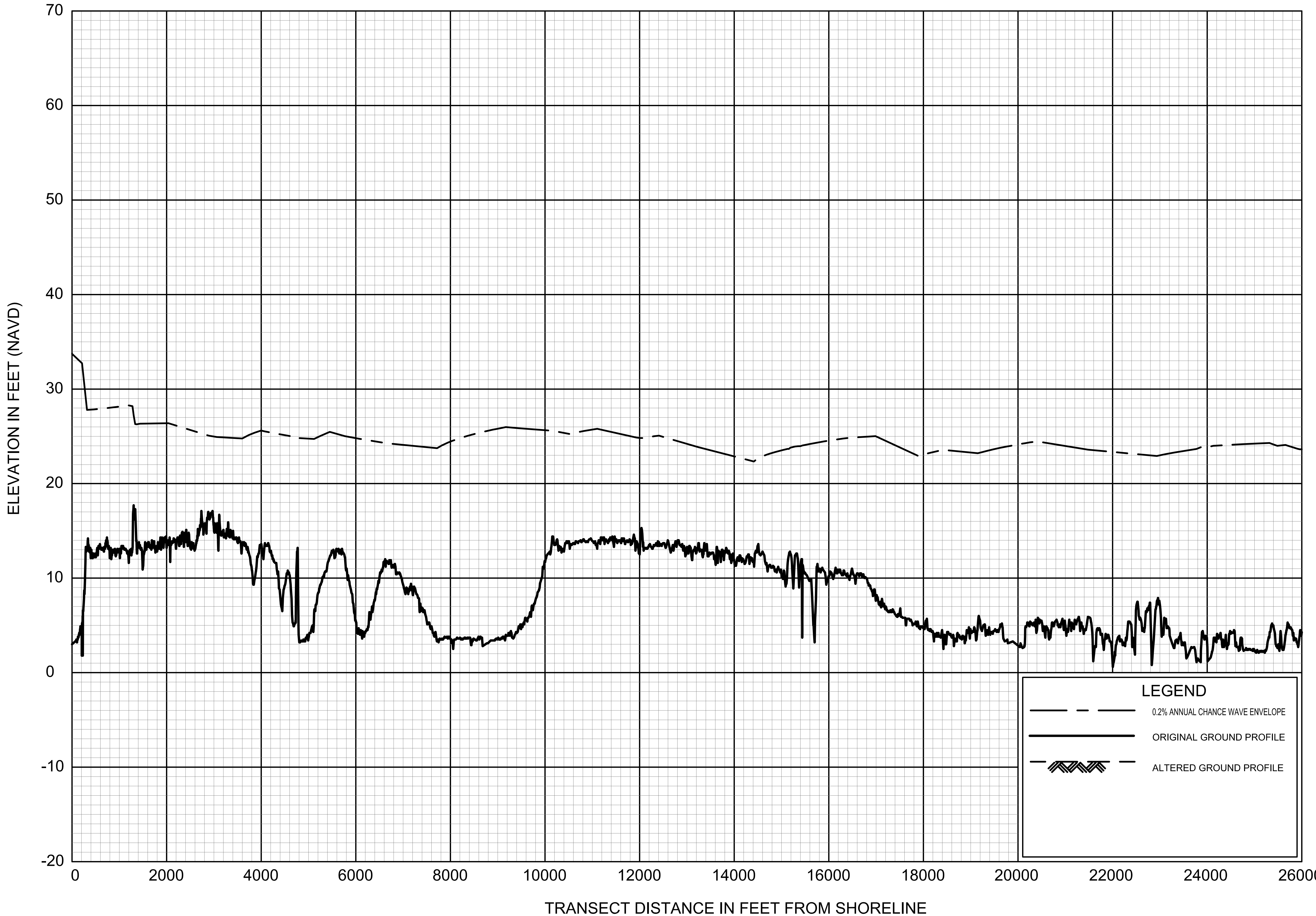
0.2% ANNUAL CHANCE WAVE ENVELOPE

TRANSECT 18

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



0.2% ANNUAL CHANCE WAVE ENVELOPE

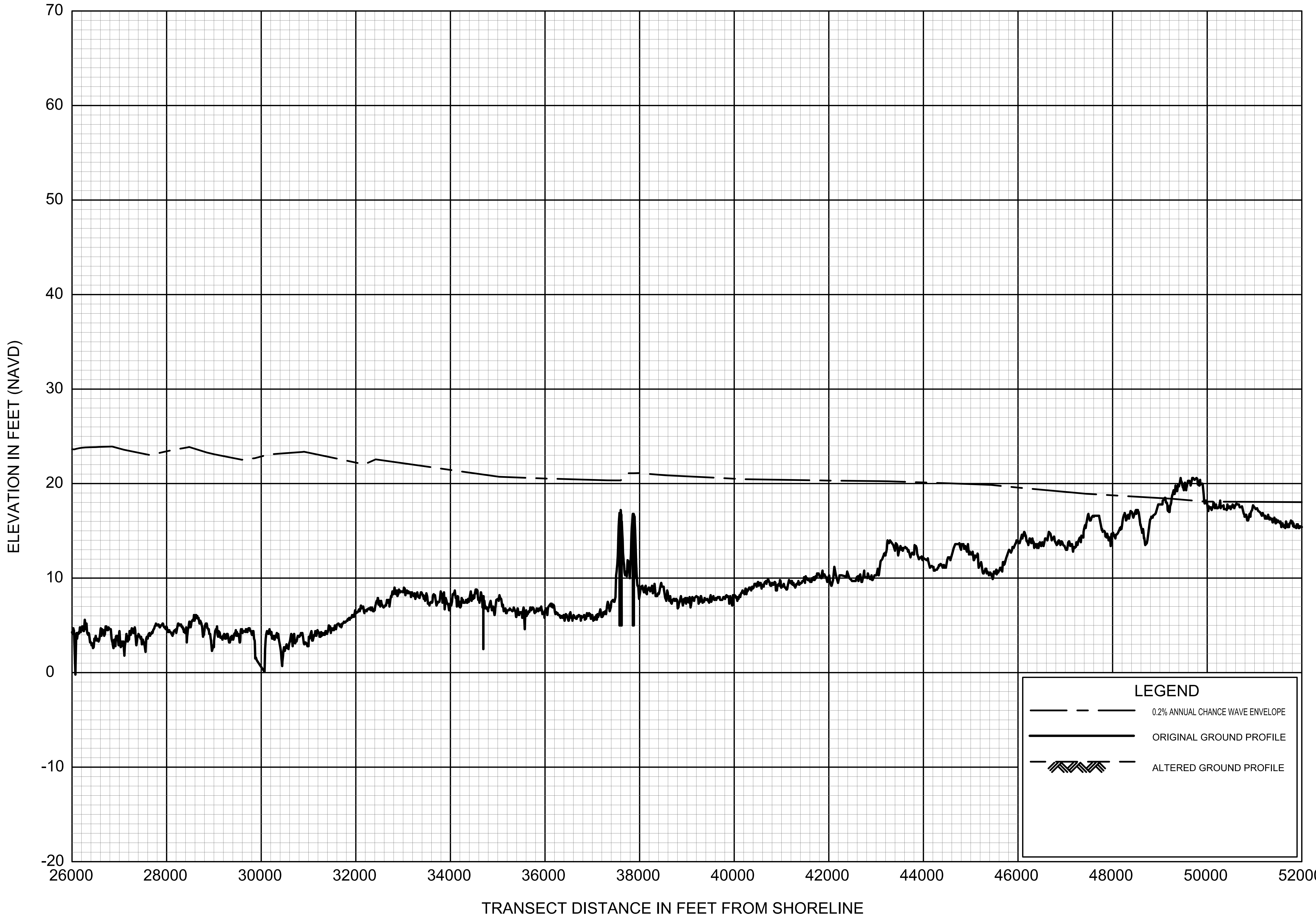
TRANSECT 19

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

46P



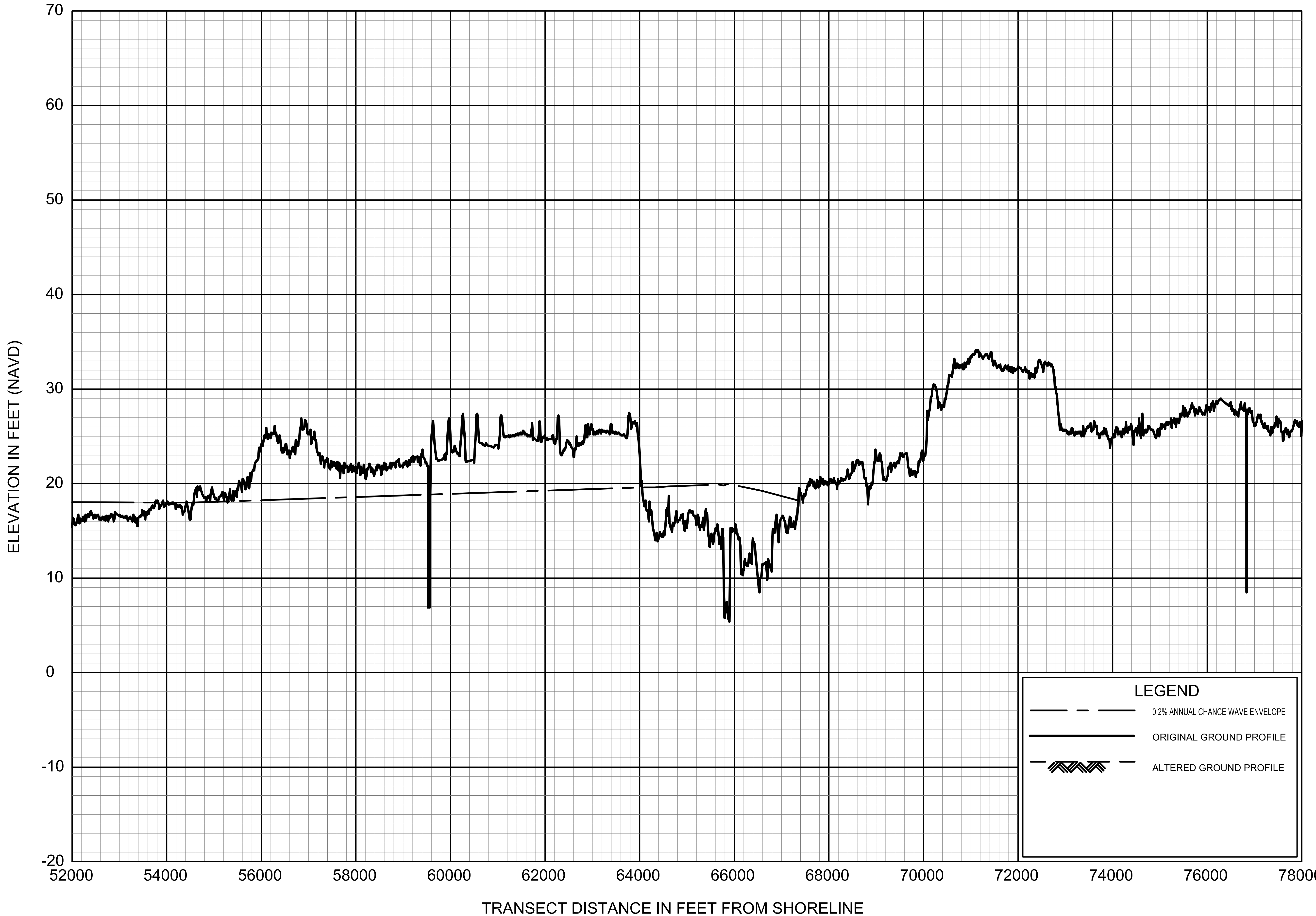
0.2% ANNUAL CHANCE WAVE ENVELOPE

TRANSECT 19

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



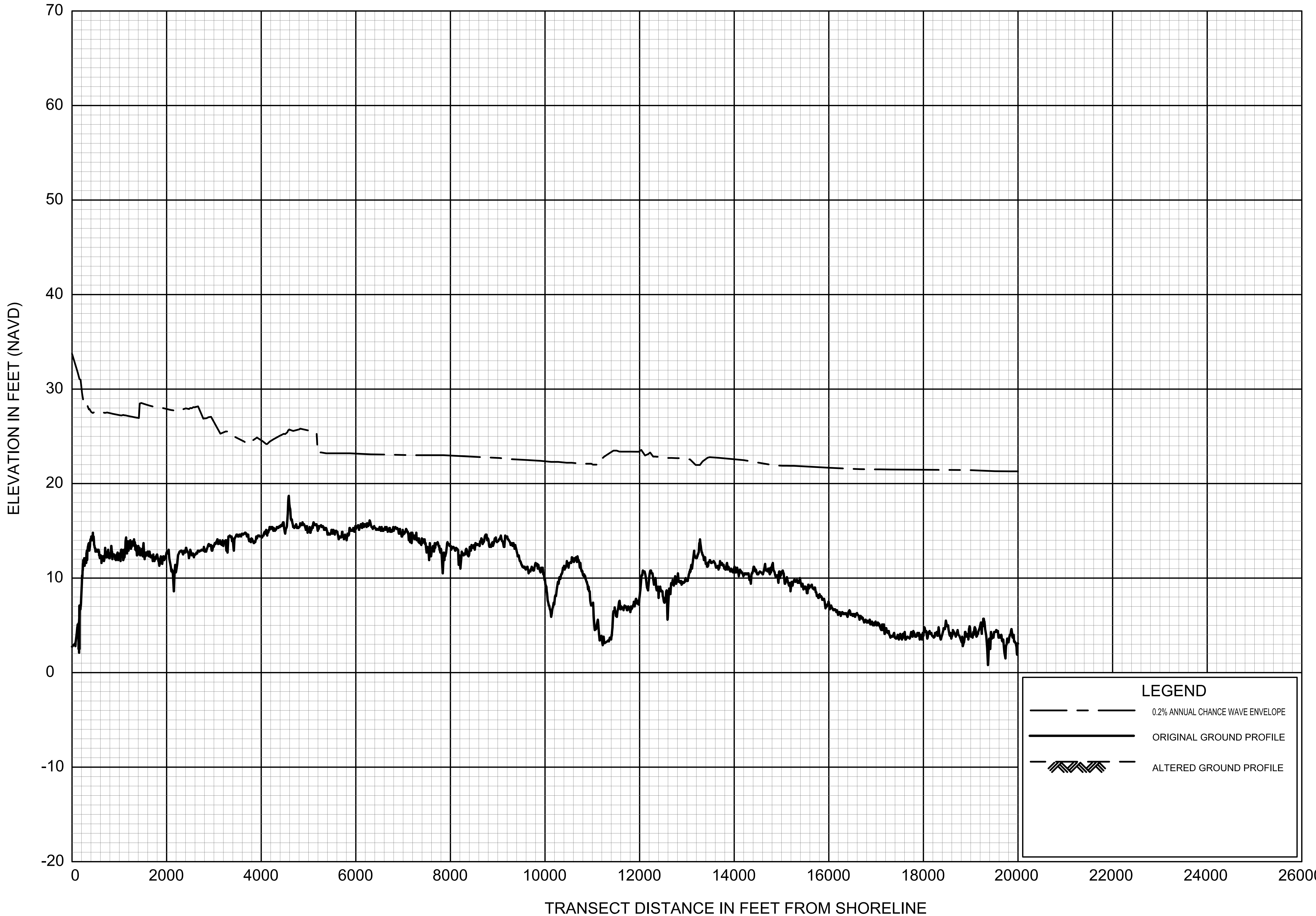
0.2% ANNUAL CHANCE WAVE ENVELOPE

TRANSECT 19

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



0.2% ANNUAL CHANCE WAVE ENVELOPE

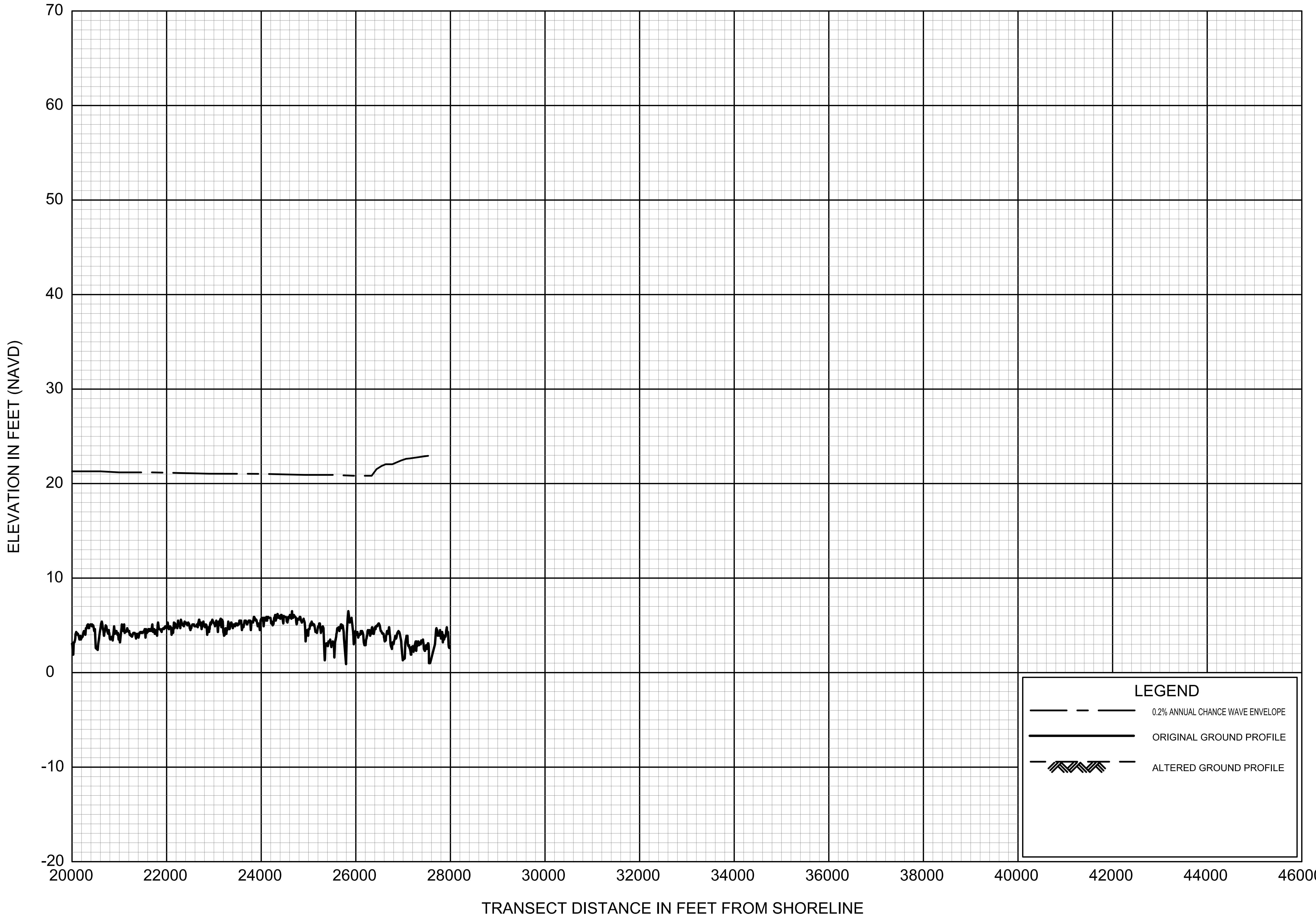
TRANSECT 20

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

49P



0.2% ANNUAL CHANCE WAVE ENVELOPE

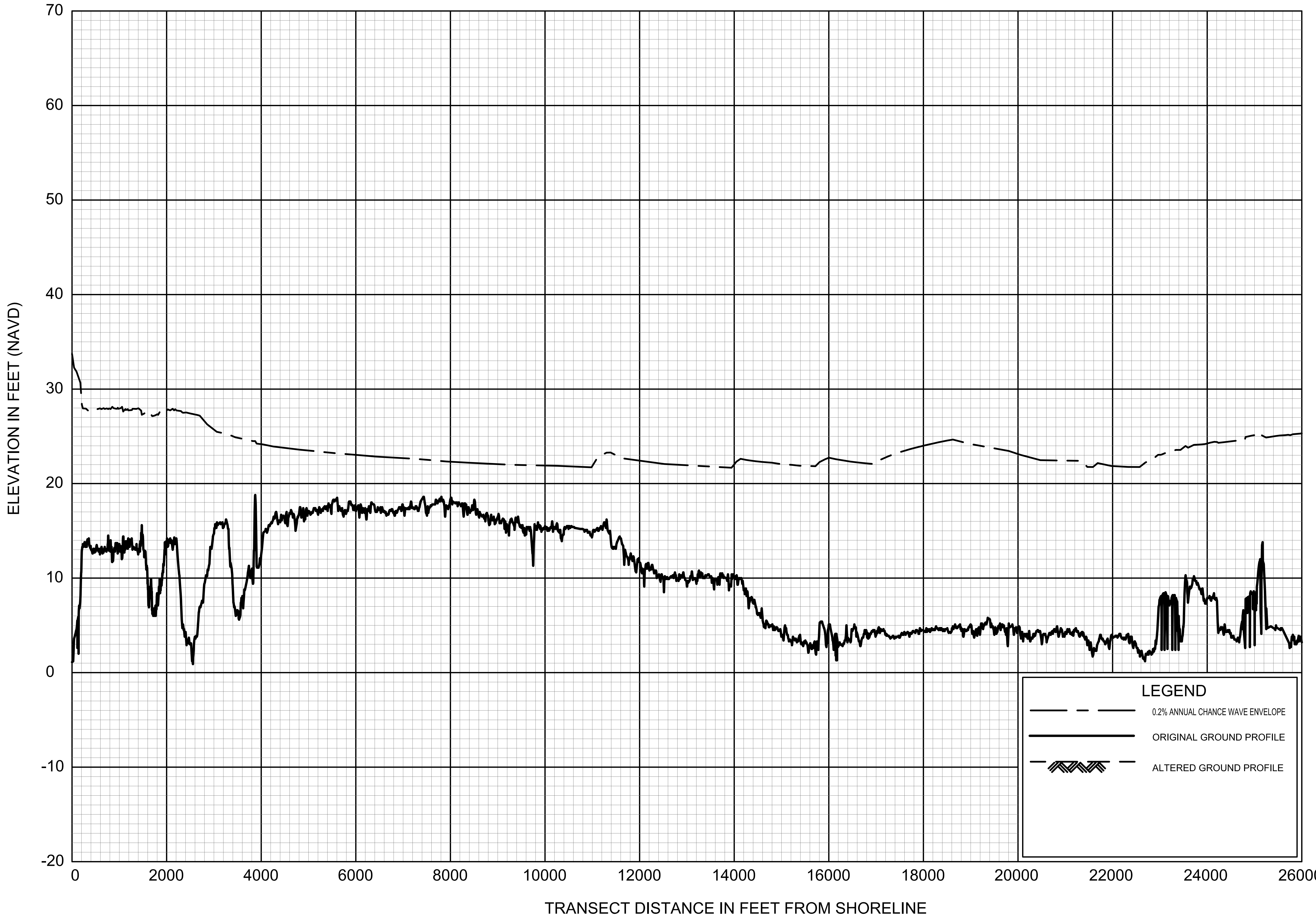
TRANSECT 20

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

50P



0.2% ANNUAL CHANCE WAVE ENVELOPE

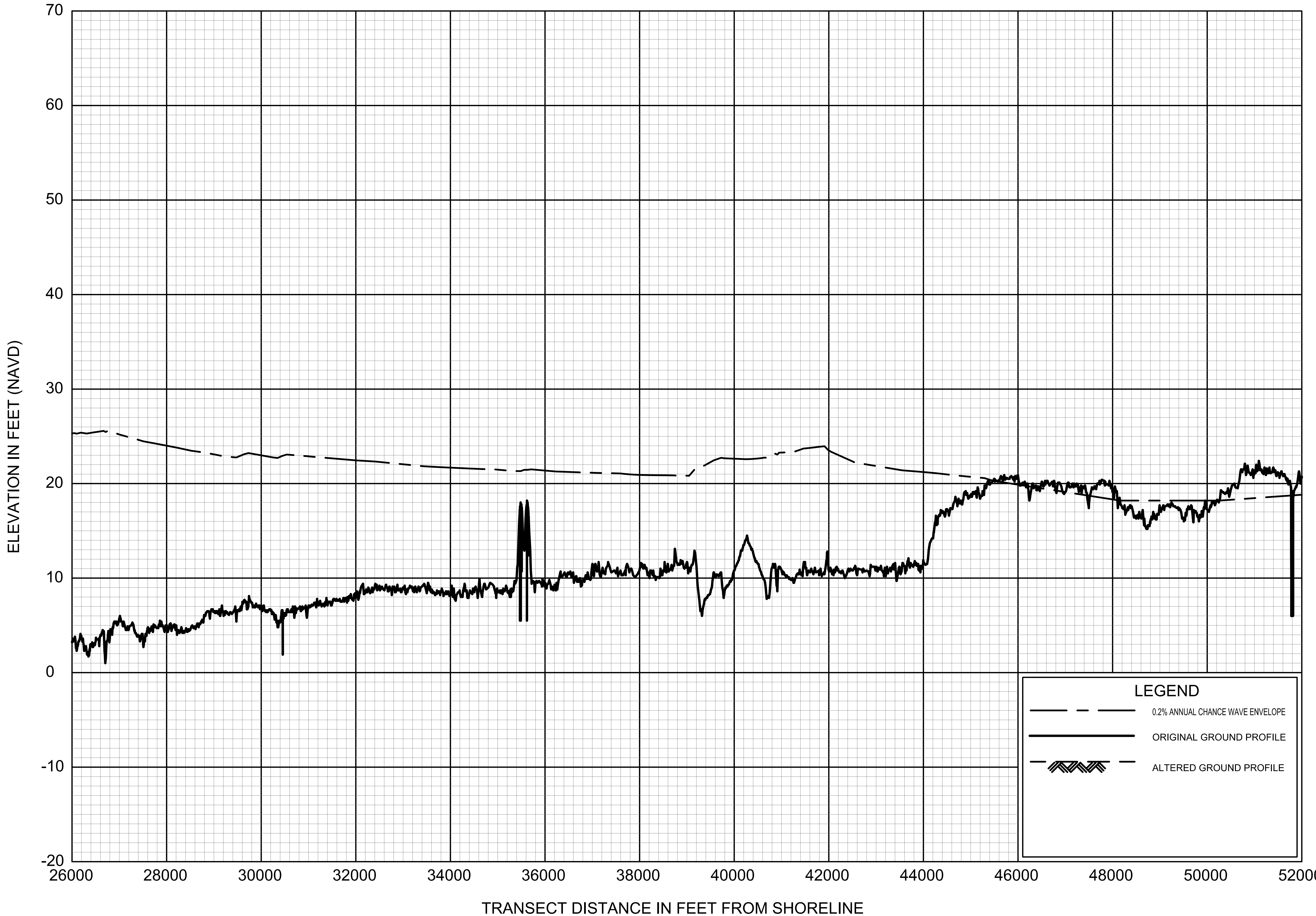
TRANSECT 21

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

51P



0.2% ANNUAL CHANCE WAVE ENVELOPE

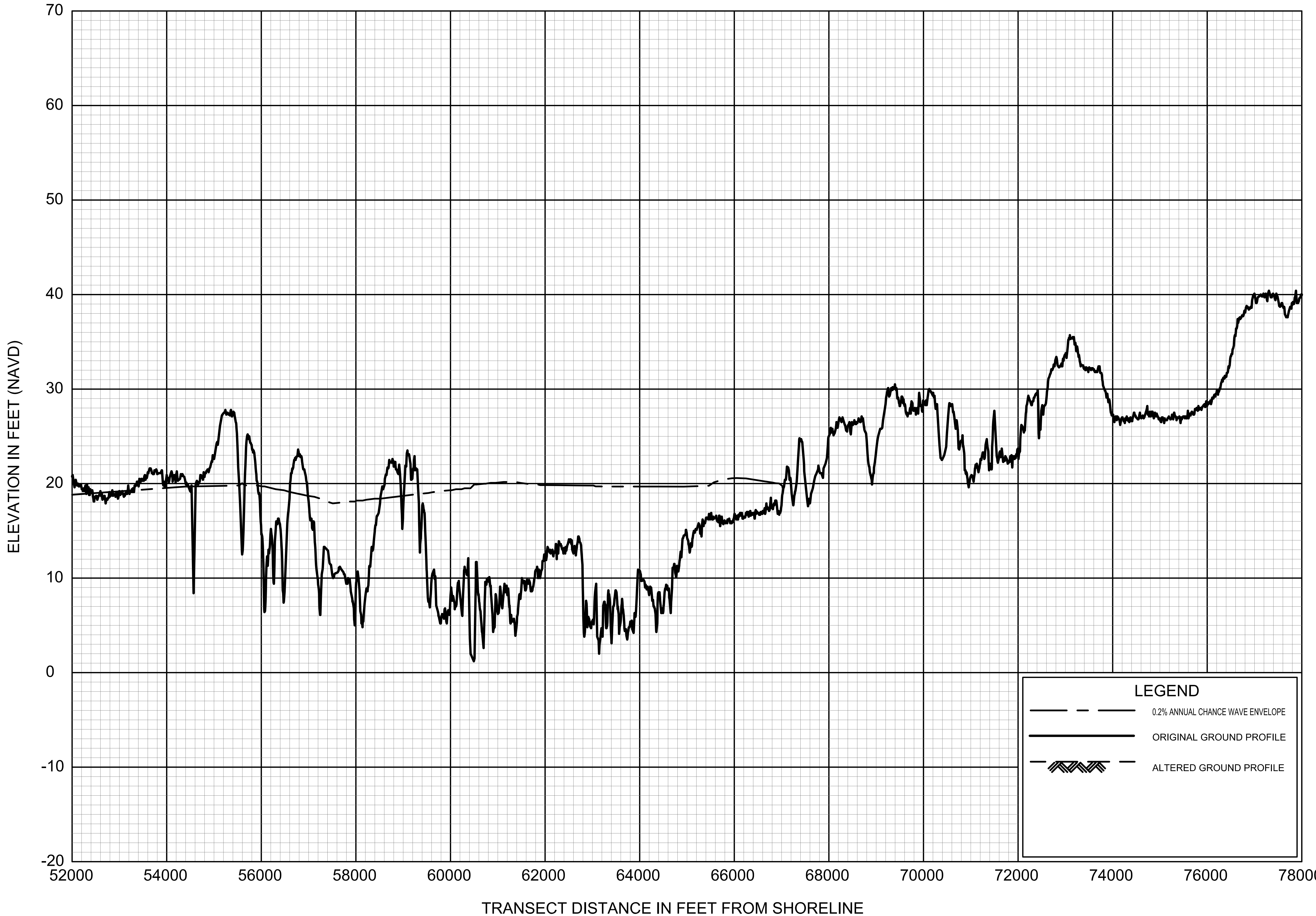
TRANSECT 21

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

52P



0.2% ANNUAL CHANCE WAVE ENVELOPE

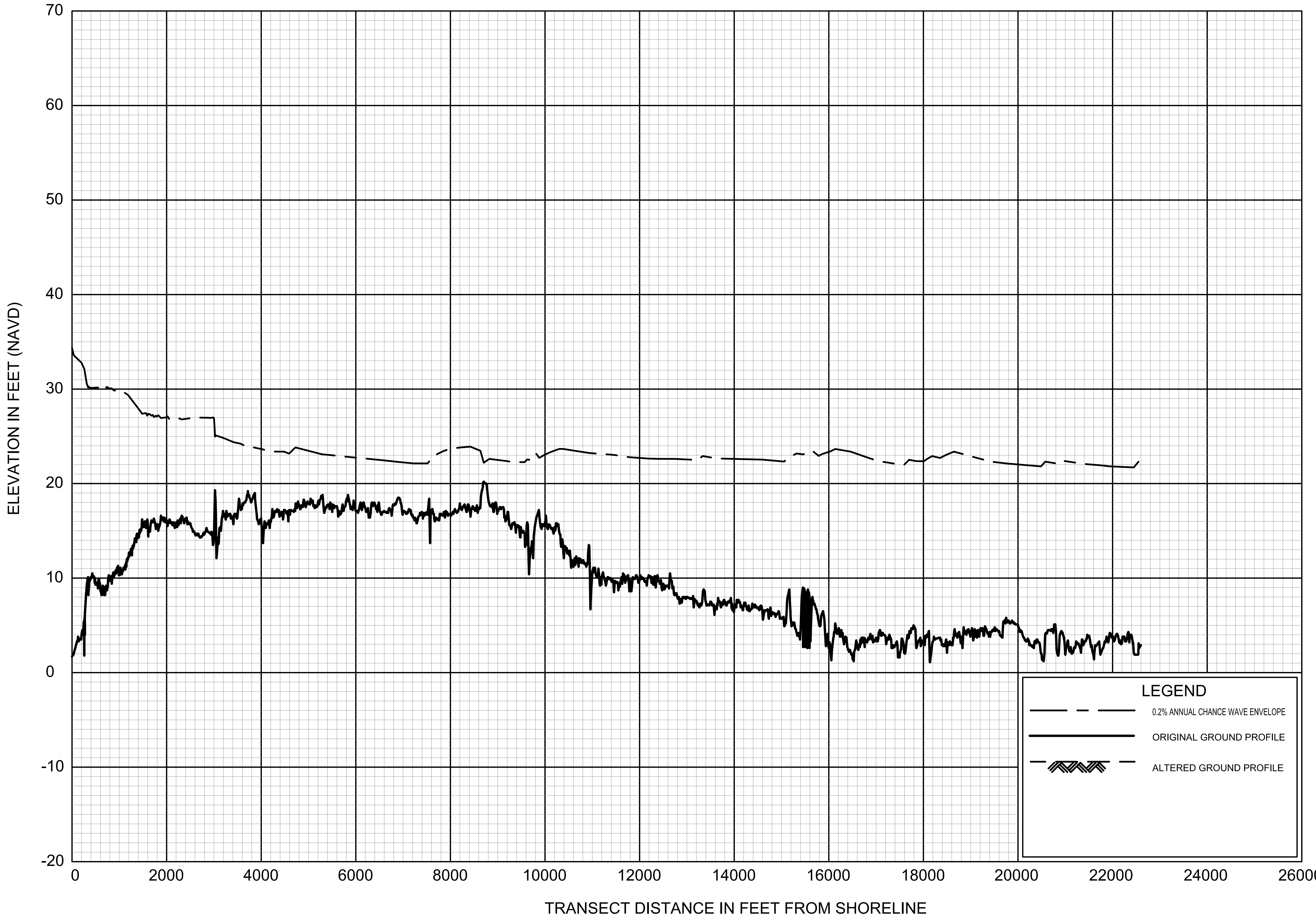
TRANSECT 21

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

53P



0.2% ANNUAL CHANCE WAVE ENVELOPE

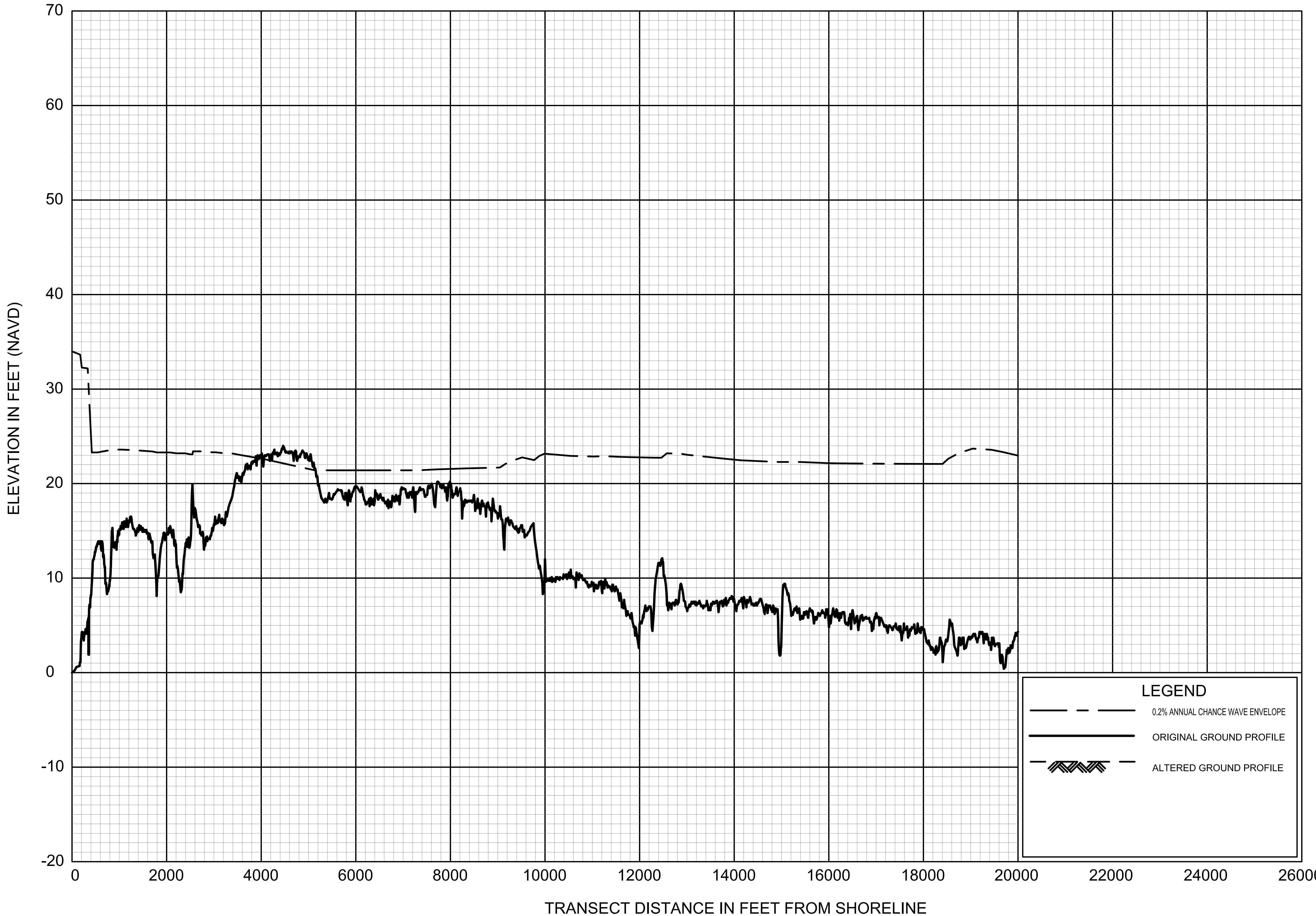
TRANSECT 22

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

54P



0.2% ANNUAL CHANCE WAVE ENVELOPE

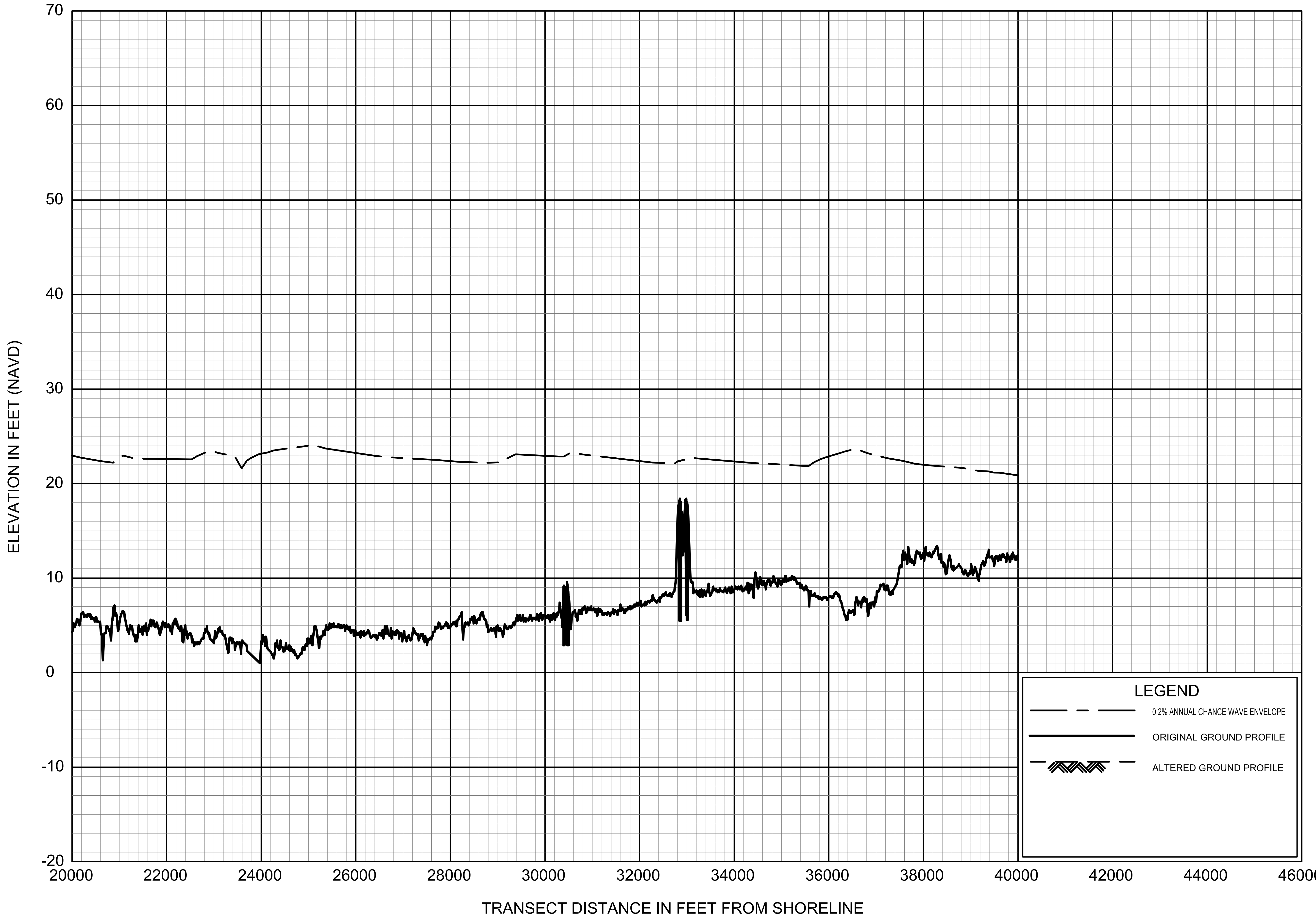
TRANSECT 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

55P



0.2% ANNUAL CHANCE WAVE ENVELOPE

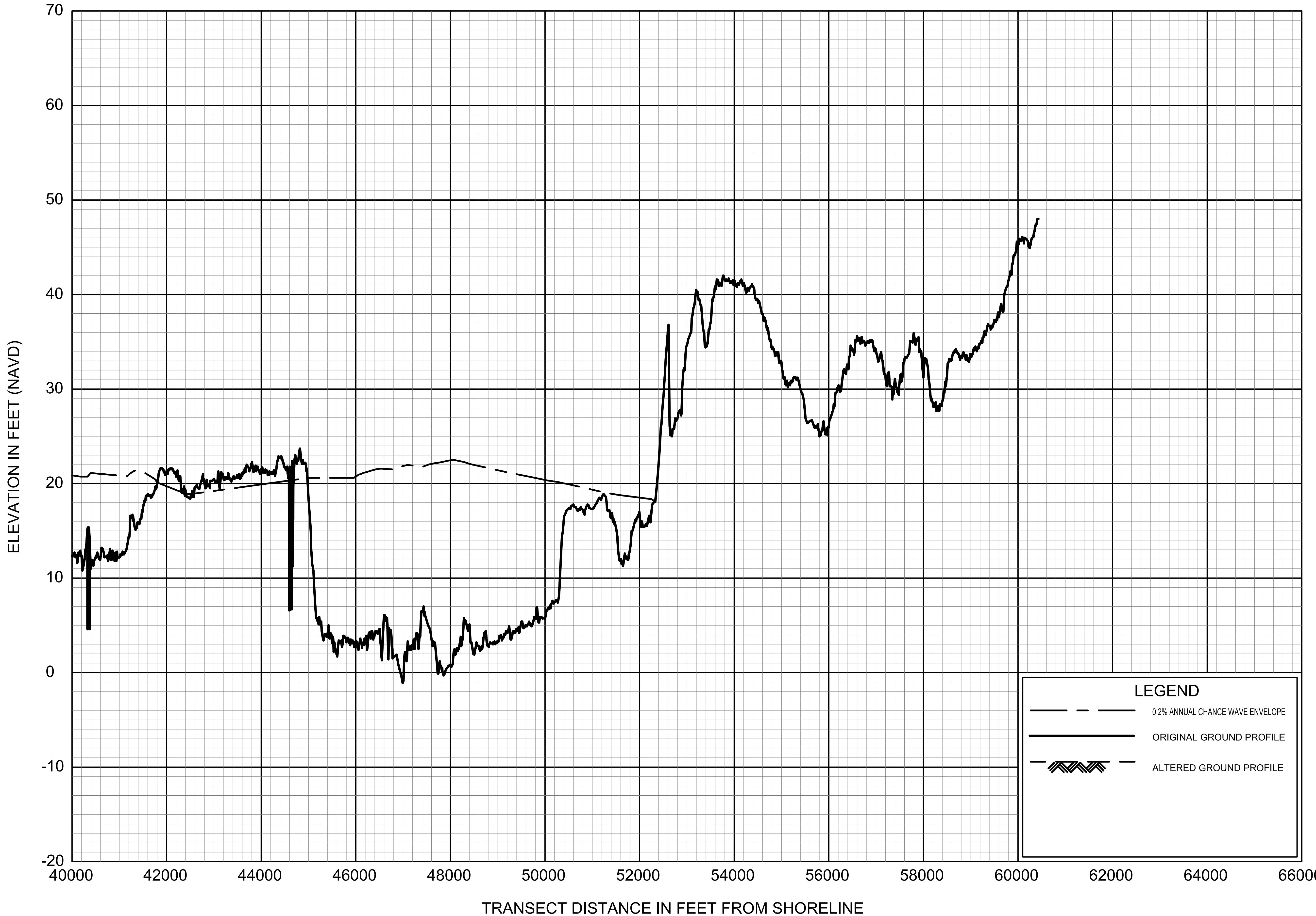
TRANSECT 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

56P



0.2% ANNUAL CHANCE WAVE ENVELOPE

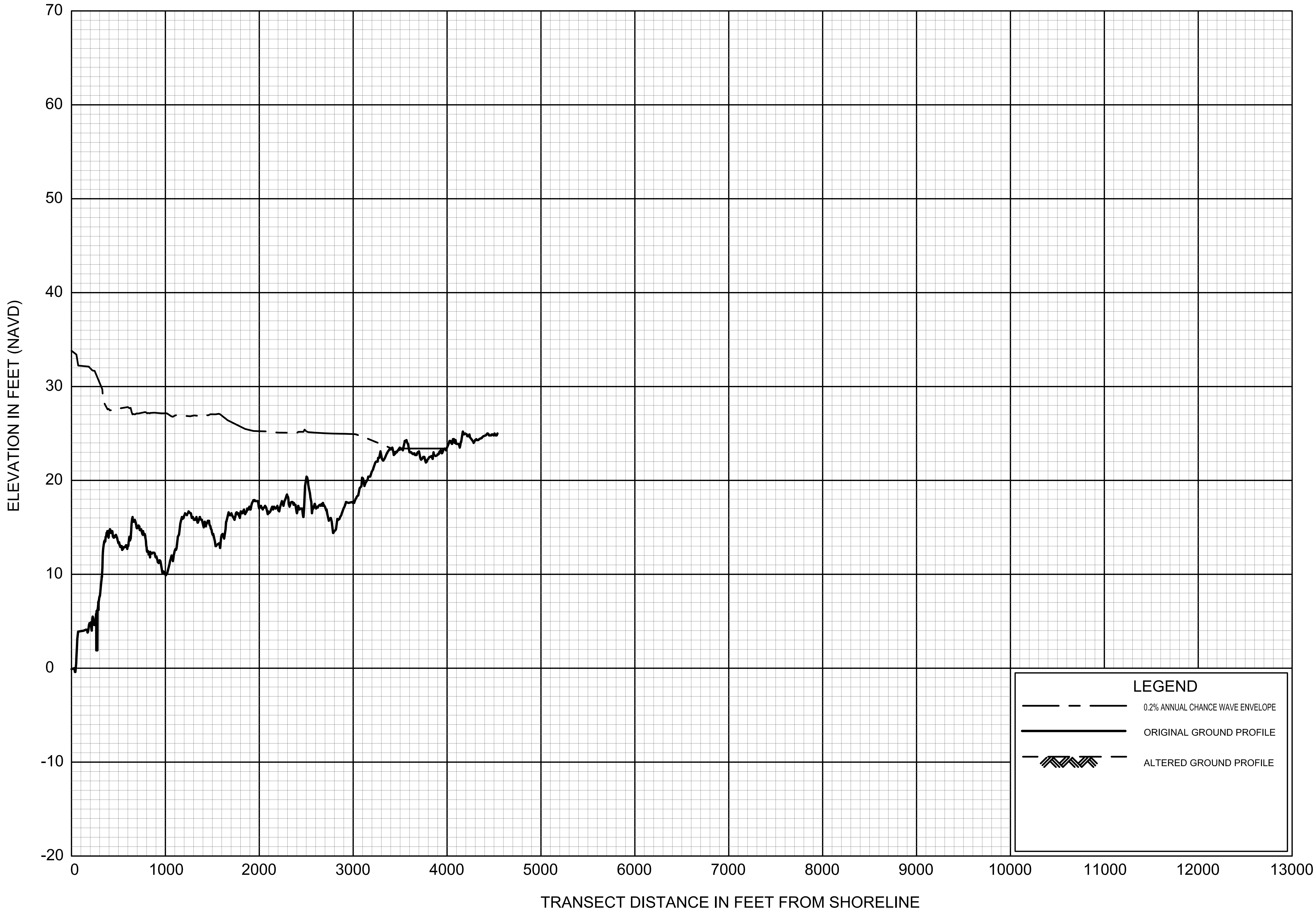
TRANSECT 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

57P



0.2% ANNUAL CHANCE WAVE ENVELOPE

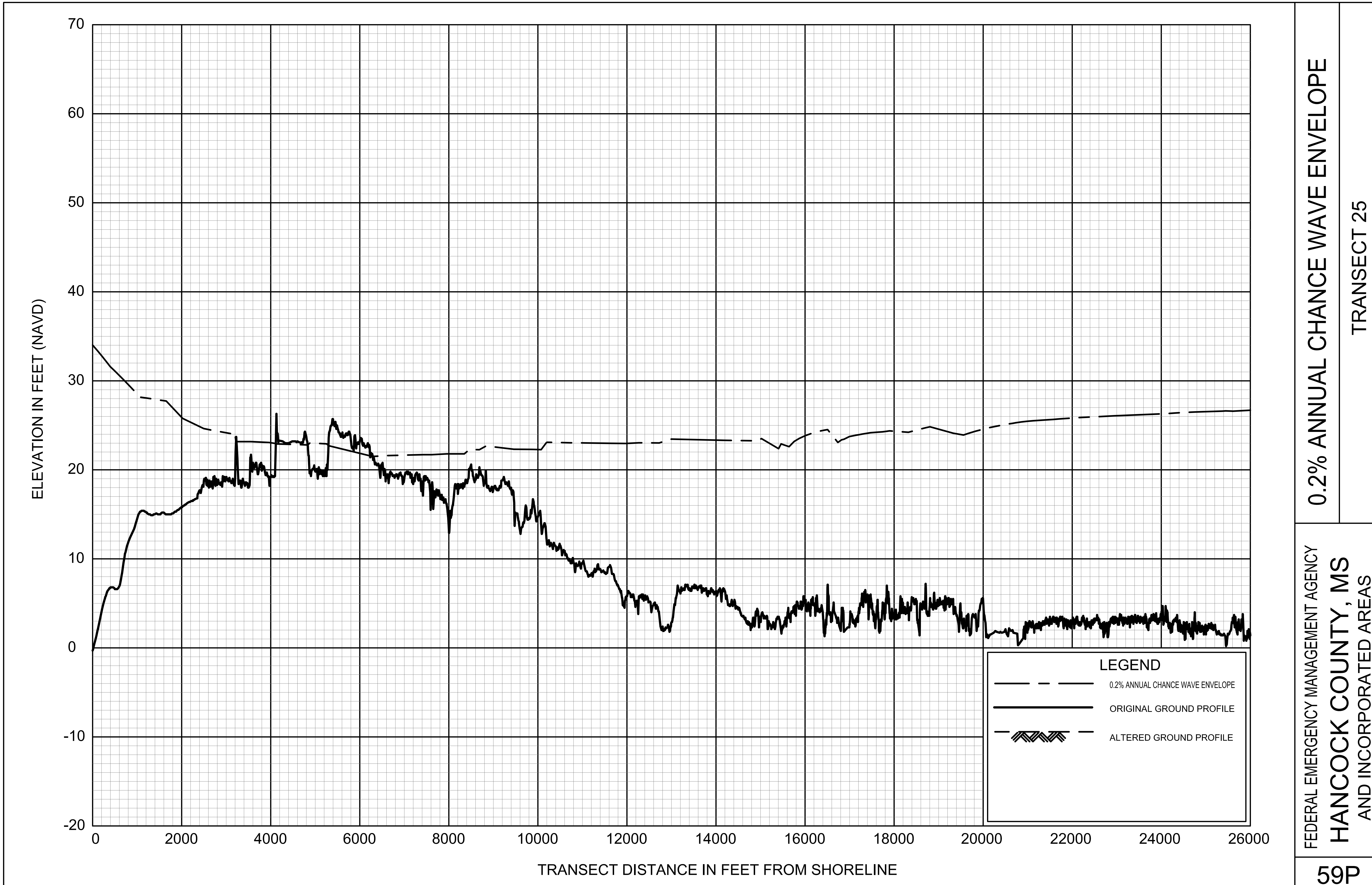
TRANSECT 24

FEDERAL EMERGENCY MANAGEMENT AGENCY

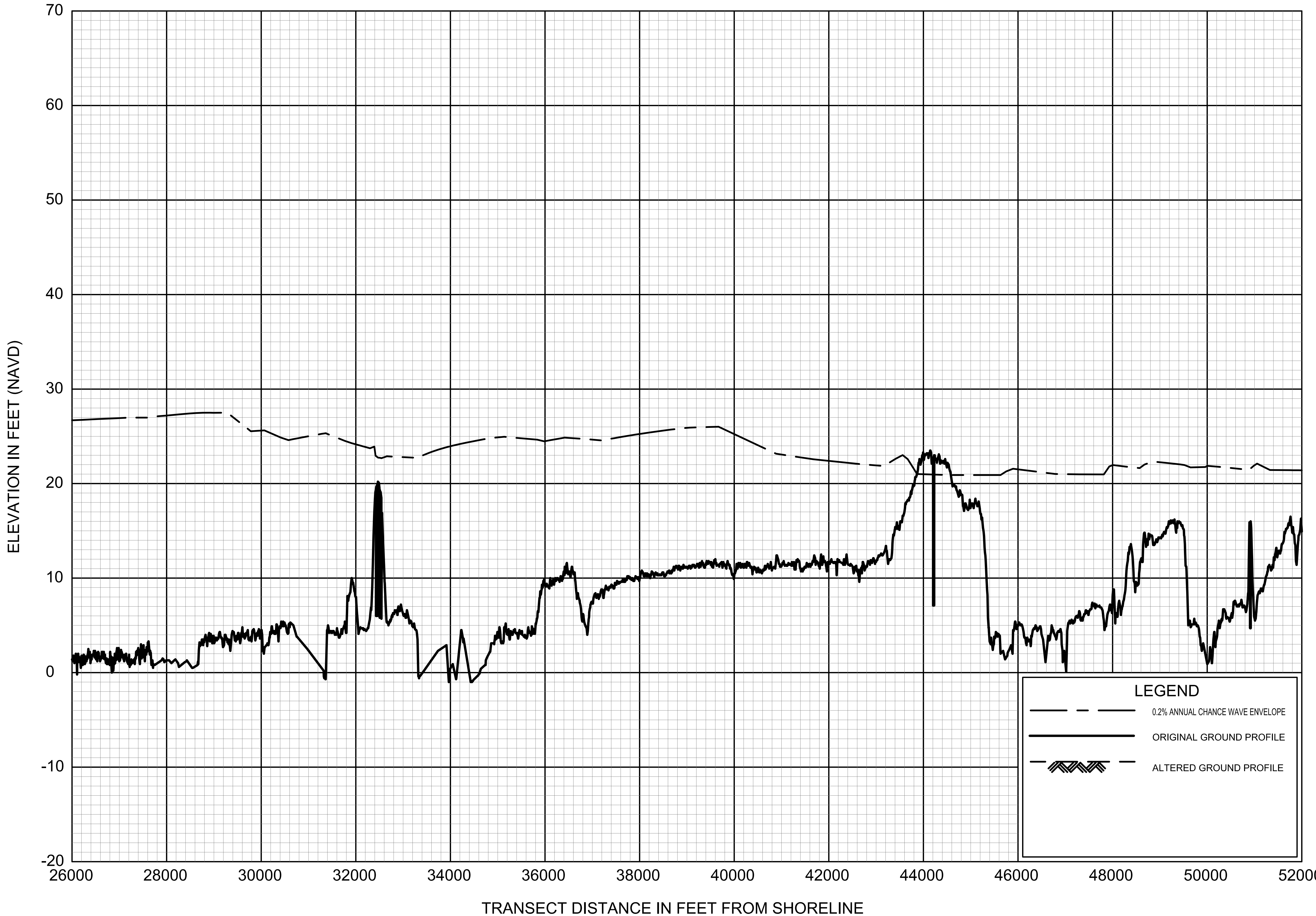
HANCOCK COUNTY, MS

AND INCORPORATED AREAS

58P



0.2% ANNUAL CHANCE WAVE ENVELOPE
TRANSECT 25
FEDERAL EMERGENCY MANAGEMENT AGENCY
HANCOCK COUNTY, MS
AND INCORPORATED AREAS
59P
ELEVATION IN FEET (NAVD)
70
60
50
40
30
20
10
0
-10
-20
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
20000
22000
24000
26000
TRANSECT DISTANCE IN FEET FROM SHORELINE
LEGEND
0.2% ANNUAL CHANCE WAVE ENVELOPE
ORIGINAL GROUND PROFILE
ALTERED GROUND PROFILE



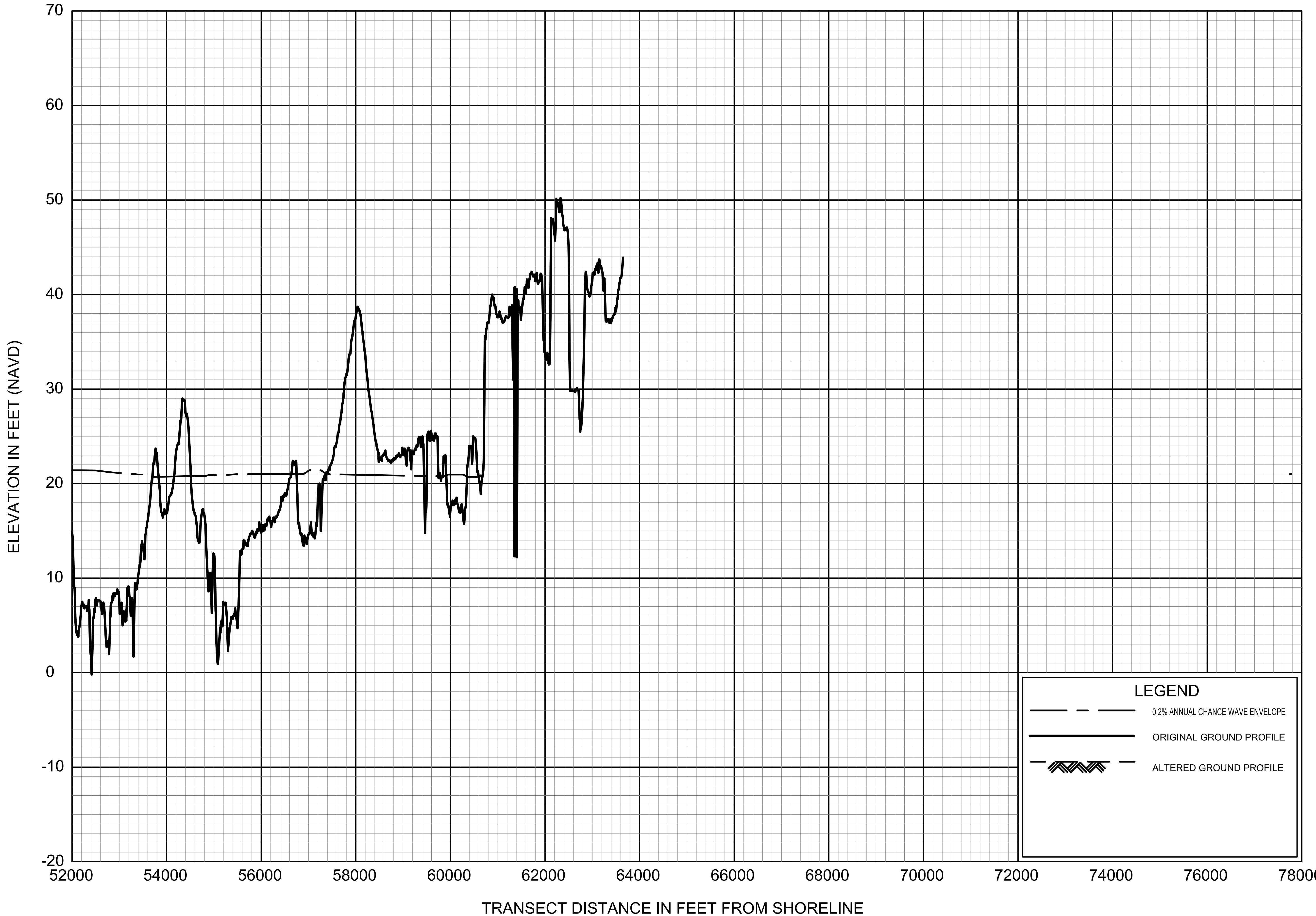
0.2% ANNUAL CHANCE WAVE ENVELOPE

TRANSECT 25

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



0.2% ANNUAL CHANCE WAVE ENVELOPE

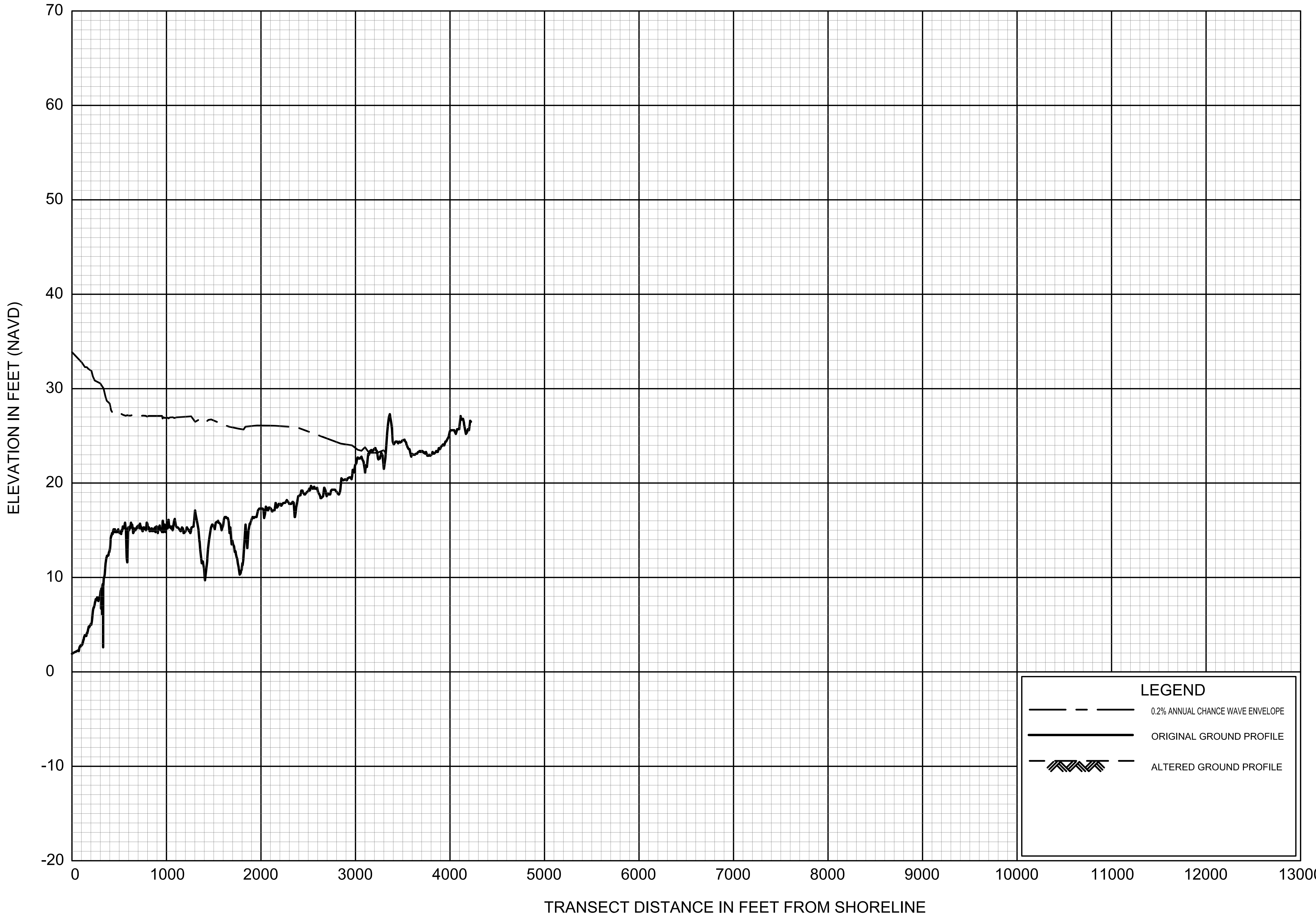
TRANSECT 25

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

61P



0.2% ANNUAL CHANCE WAVE ENVELOPE

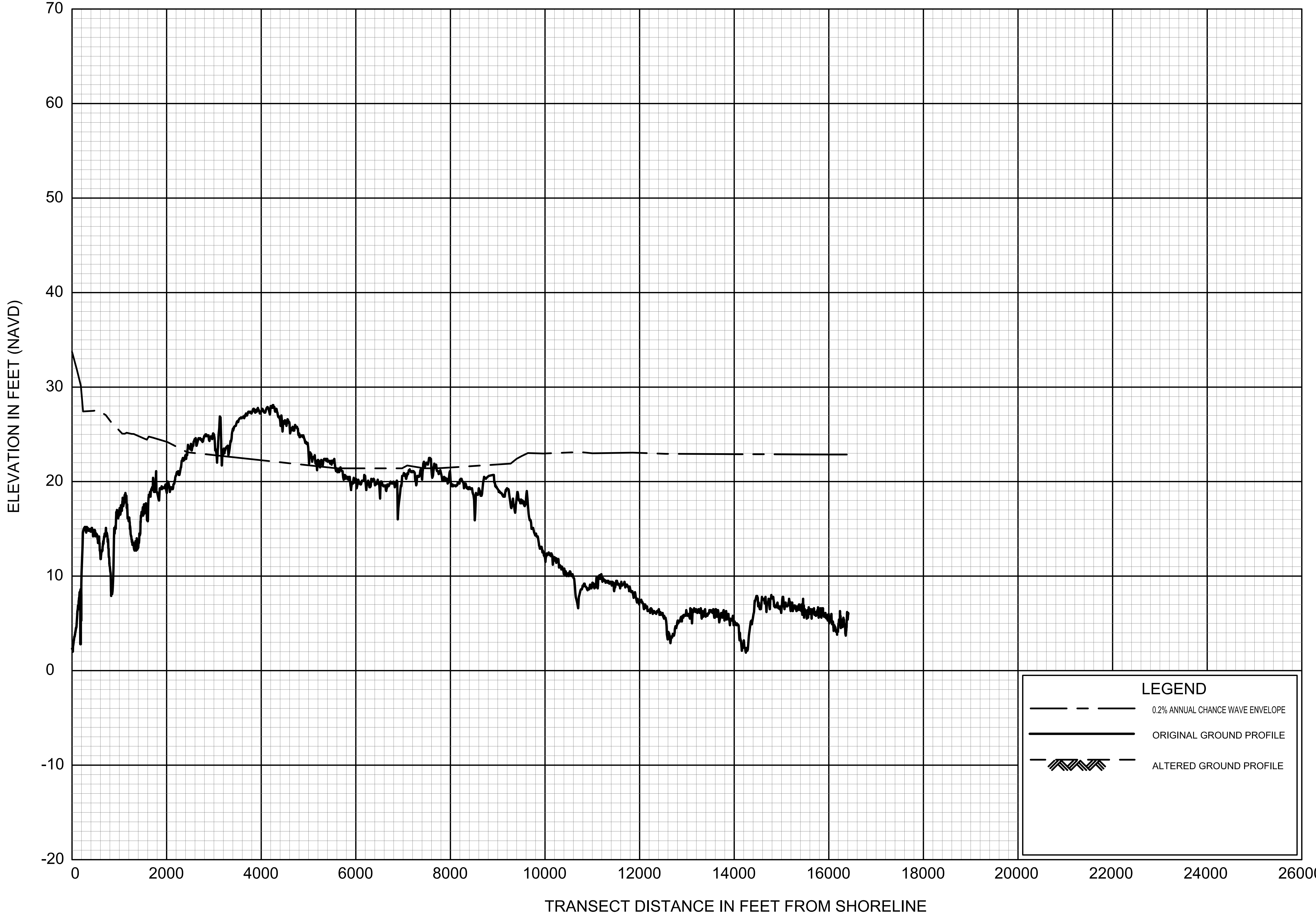
TRANSECT 26

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

62P



0.2% ANNUAL CHANCE WAVE ENVELOPE

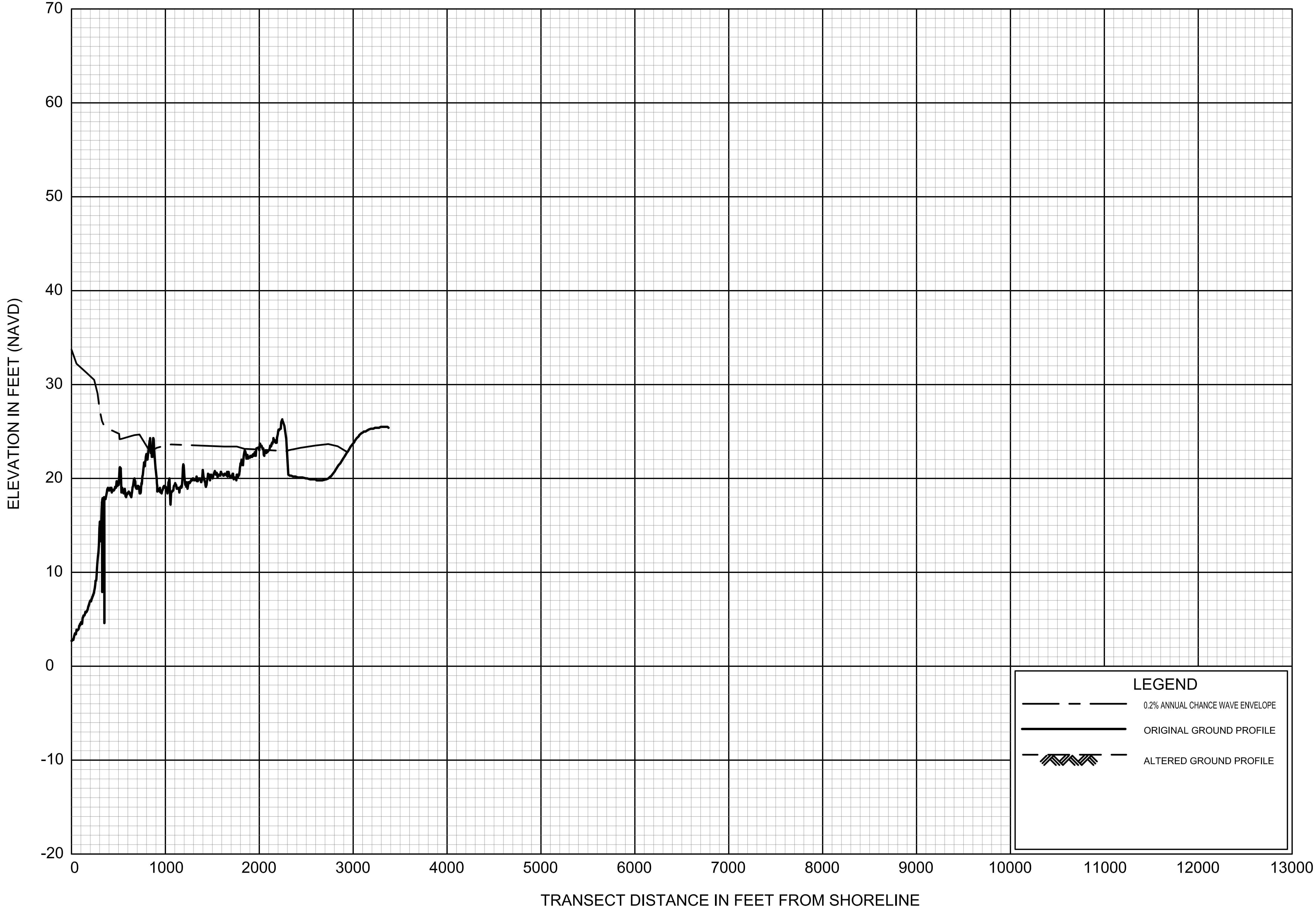
TRANSECT 27

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

63P



0.2% ANNUAL CHANCE WAVE ENVELOPE

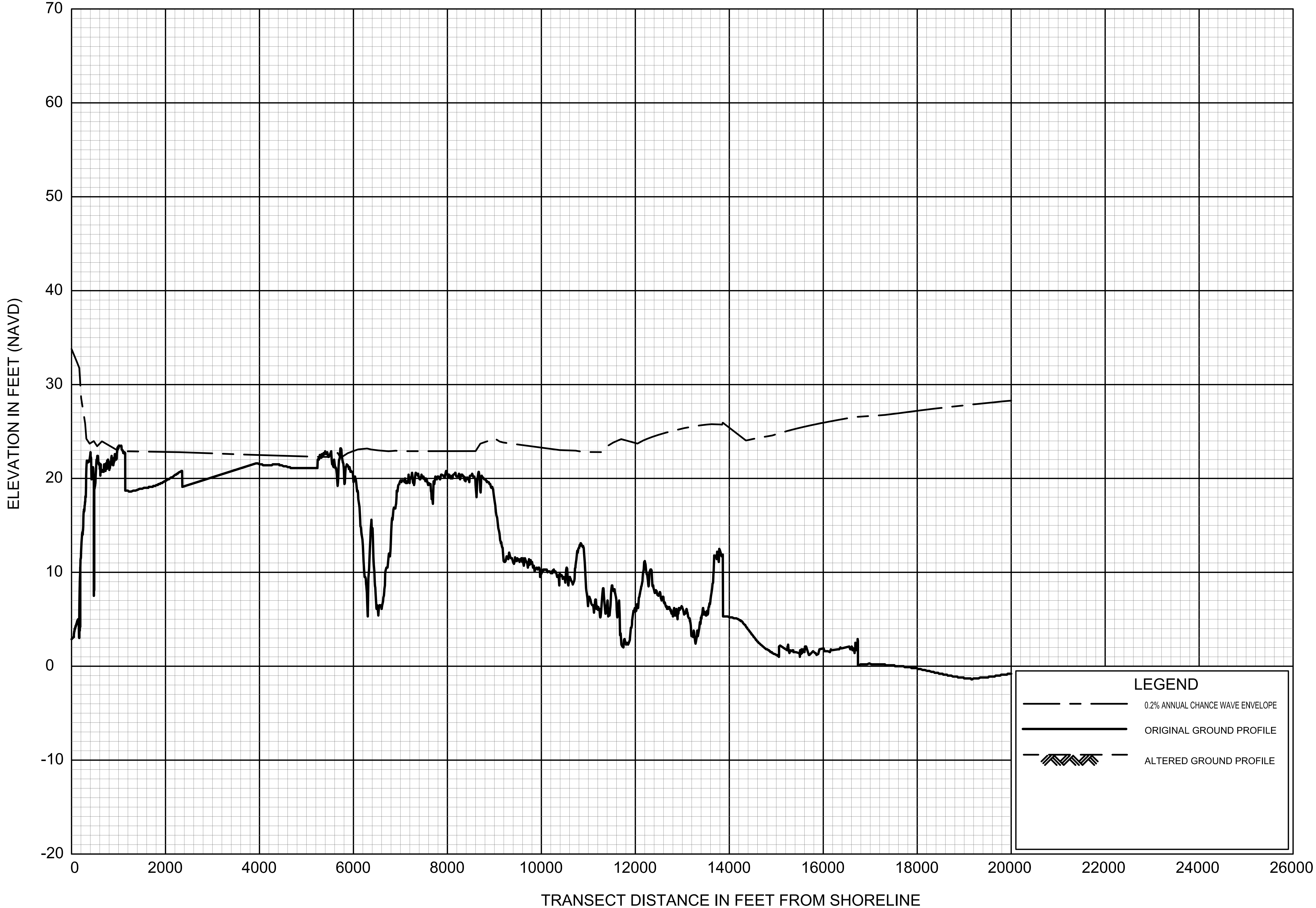
TRANSECT 28

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

64P



0.2% ANNUAL CHANCE WAVE ENVELOPE

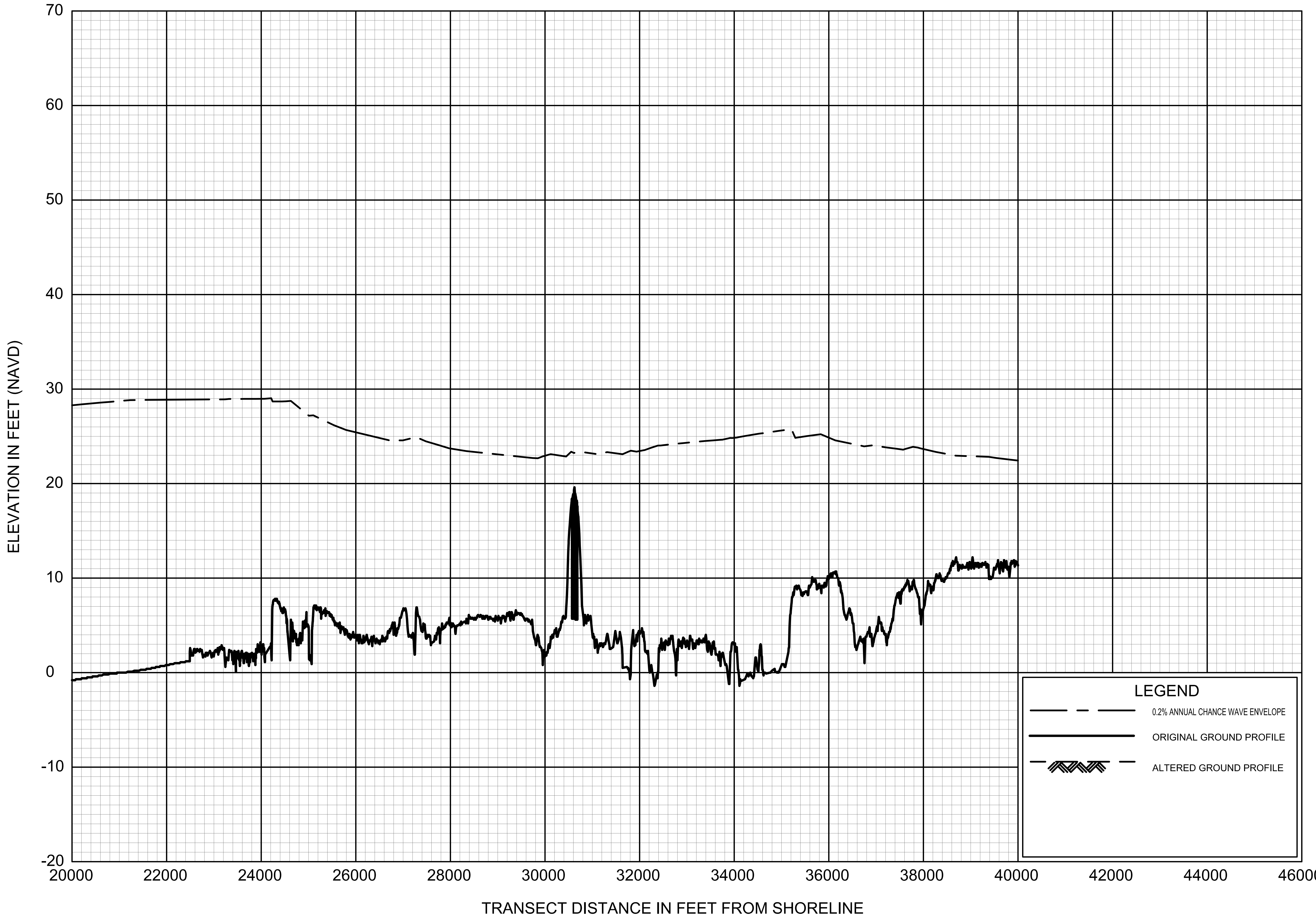
TRANSECT 29

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

65P



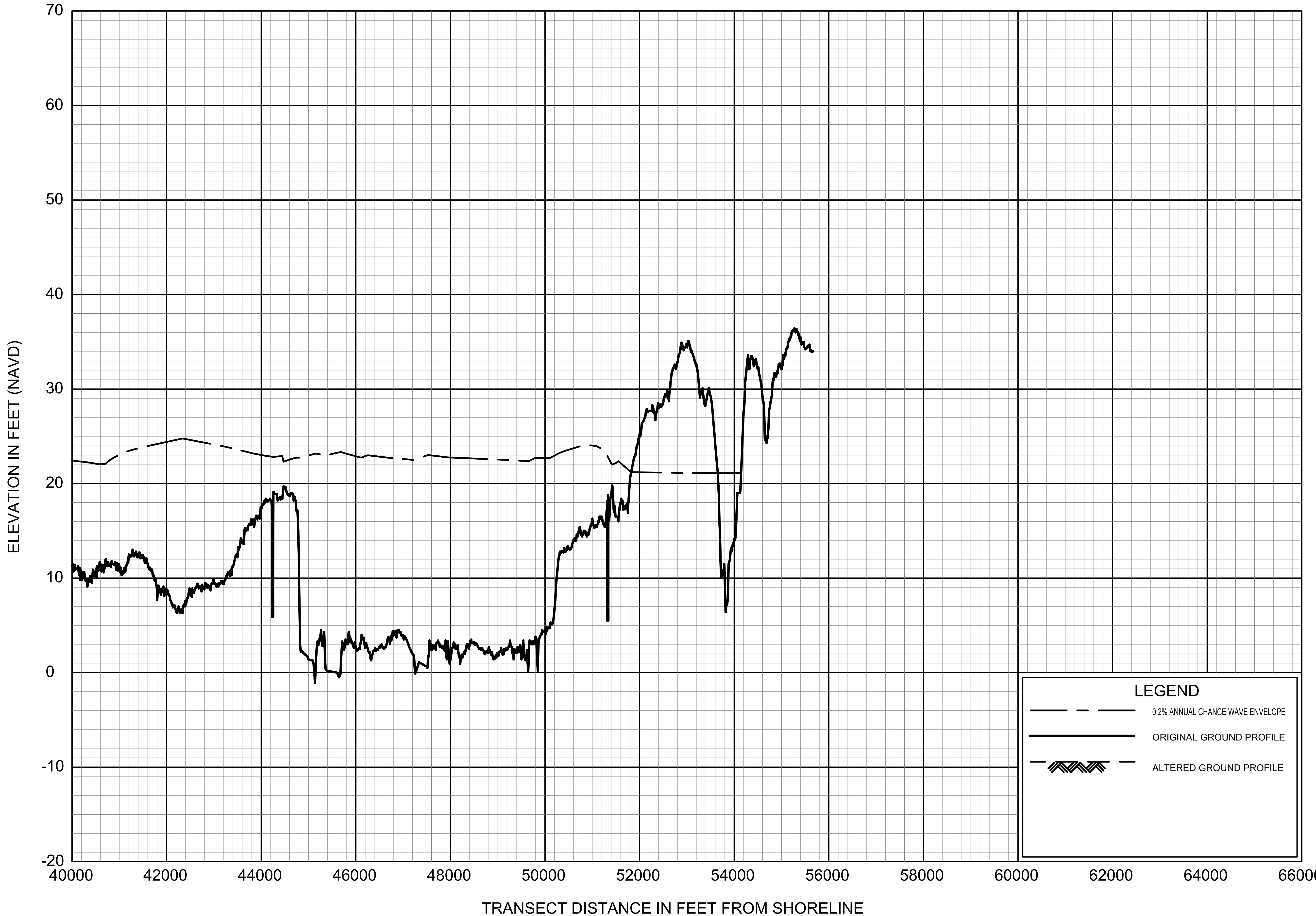
0.2% ANNUAL CHANCE WAVE ENVELOPE

TRANSECT 29

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



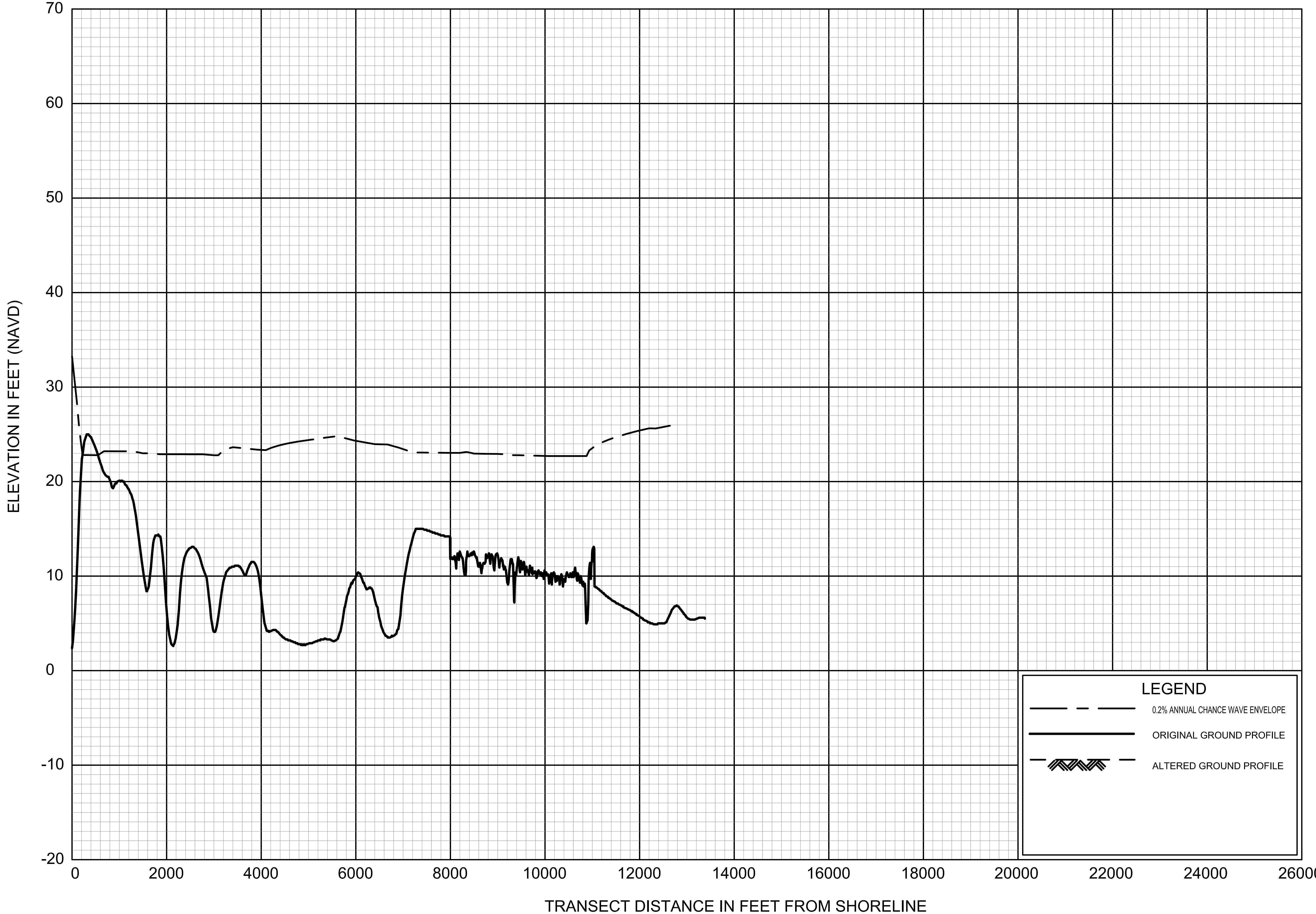
0.2% ANNUAL CHANCE WAVE ENVELOPE

TRANSECT 29

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



0.2% ANNUAL CHANCE WAVE ENVELOPE

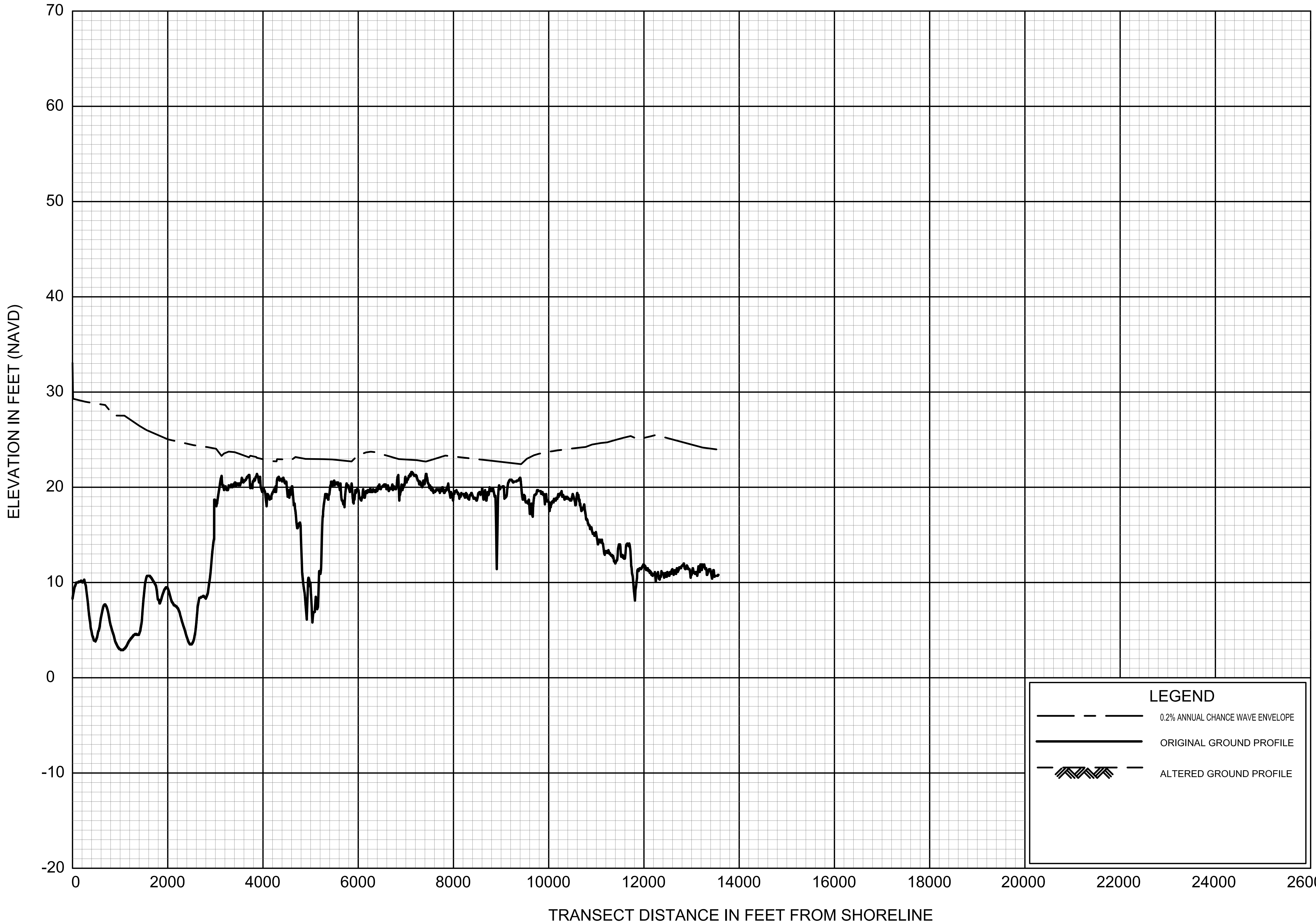
TRANSECT 30

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

68P



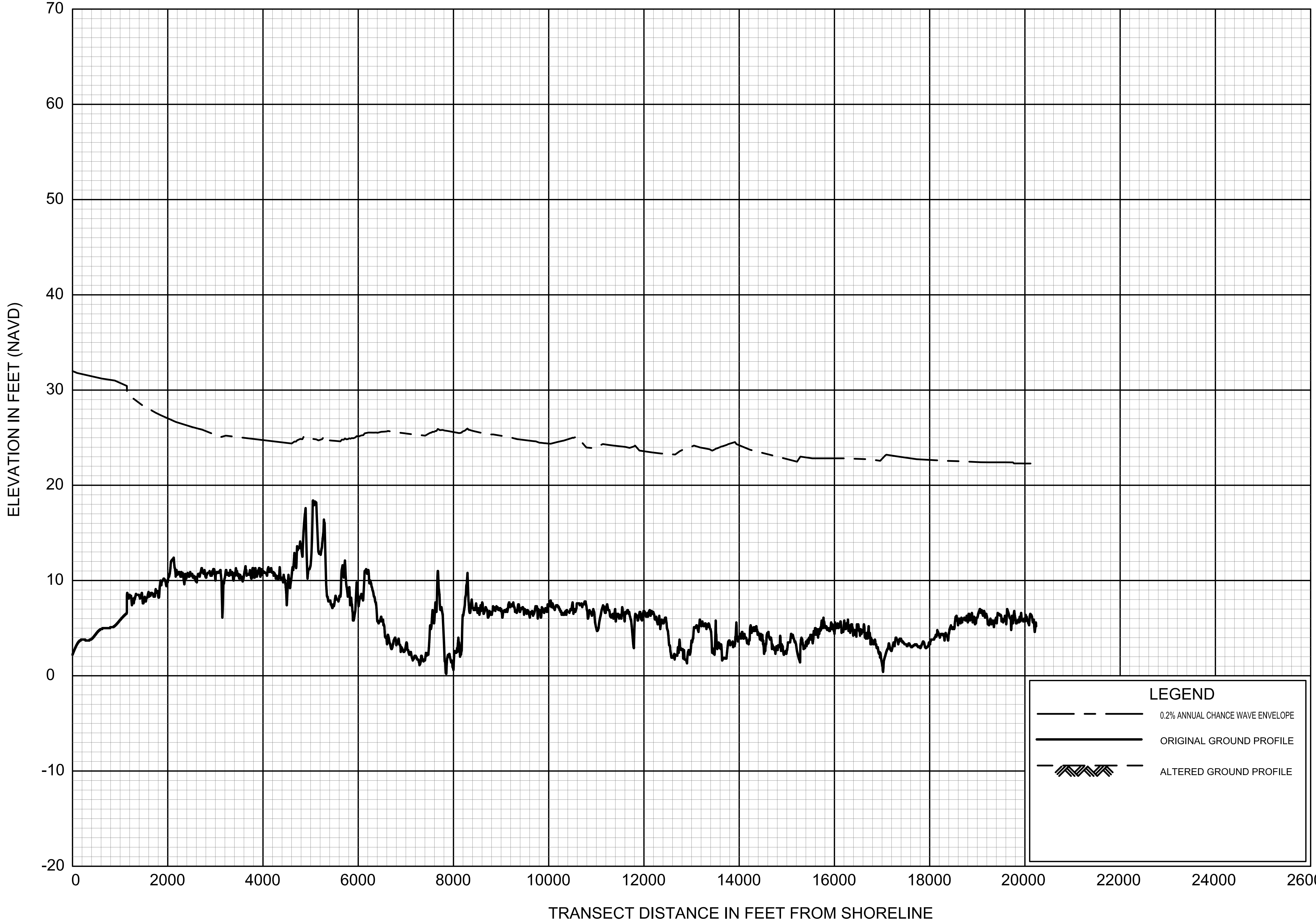
0.2% ANNUAL CHANCE WAVE ENVELOPE

TRANSECT 31

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



0.2% ANNUAL CHANCE WAVE ENVELOPE

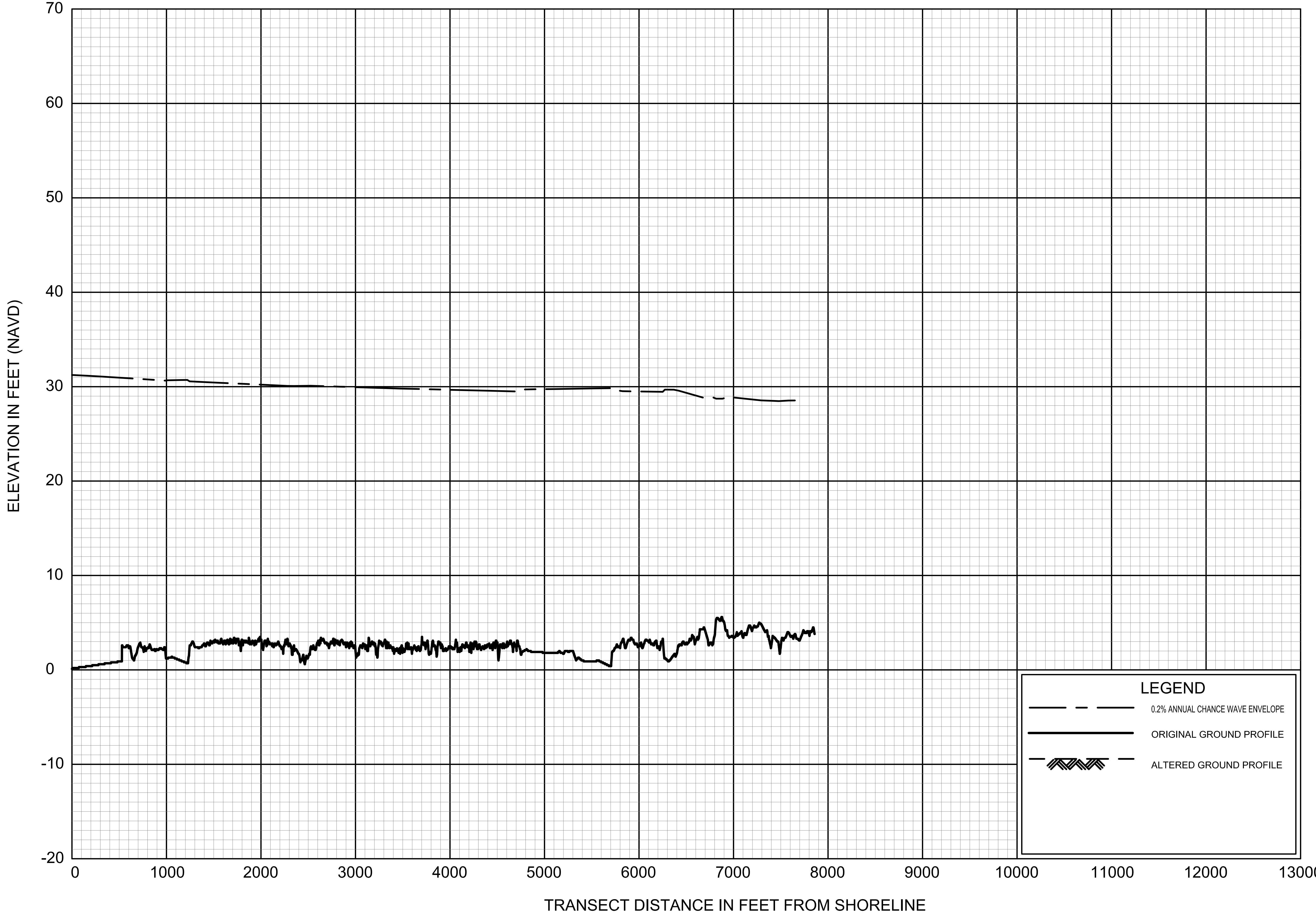
TRANSECT 32

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

70P



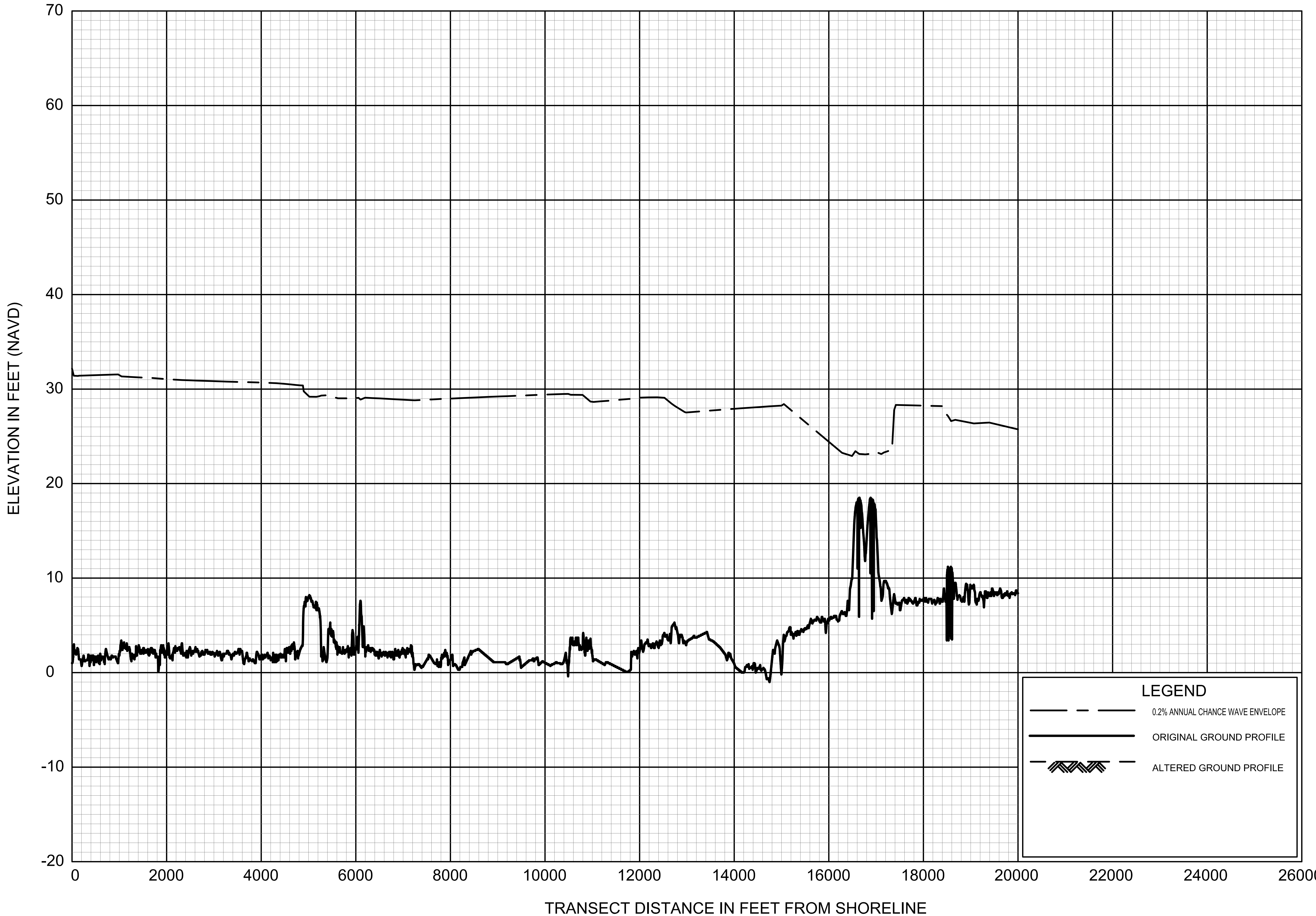
0.2% ANNUAL CHANCE WAVE ENVELOPE

TRANSECT 33

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS



0.2% ANNUAL CHANCE WAVE ENVELOPE

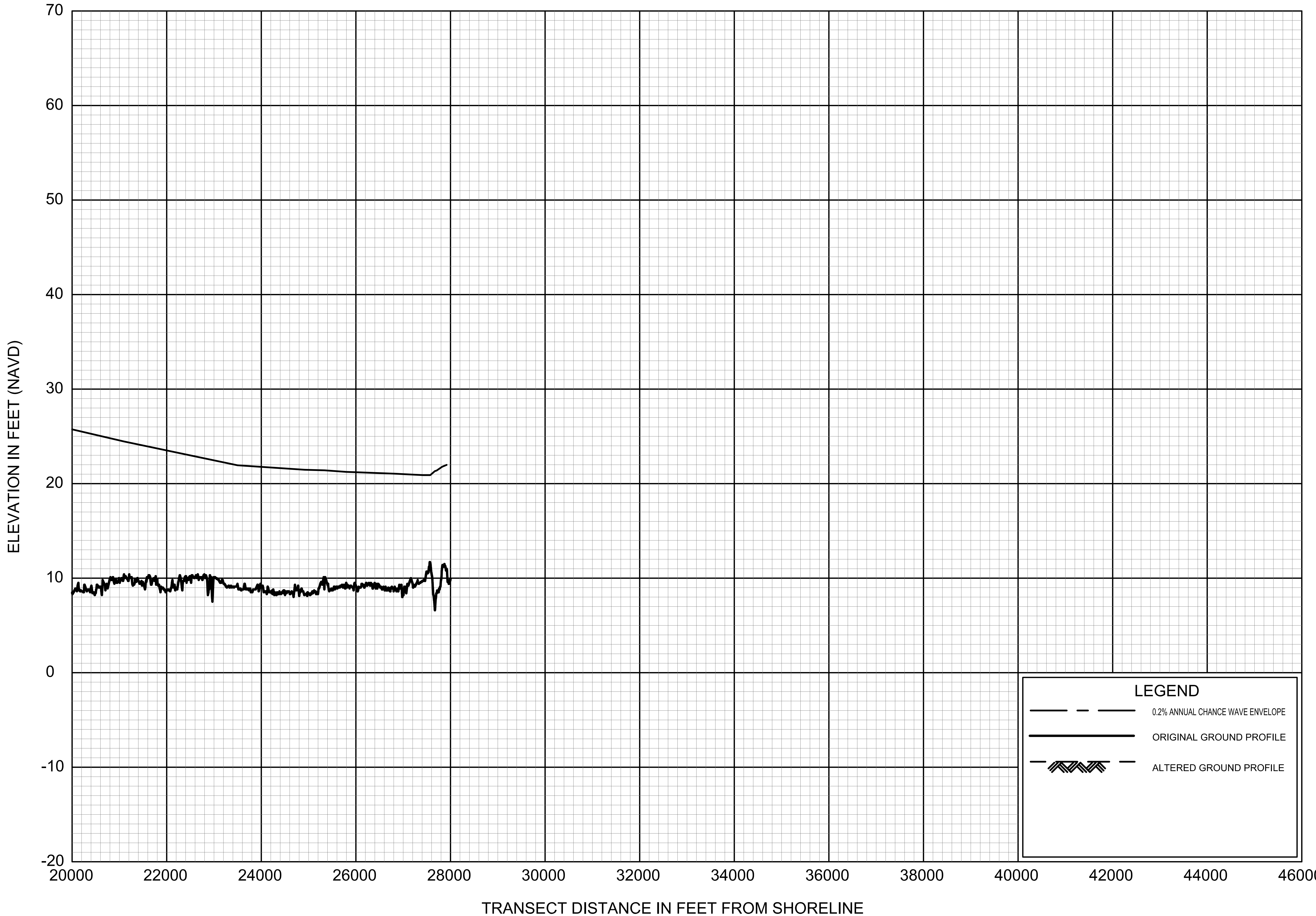
TRANSECT 34

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

72P



0.2% ANNUAL CHANCE WAVE ENVELOPE

TRANSECT 34

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

73P

0.2% ANNUAL CHANCE WAVE ENVELOPE

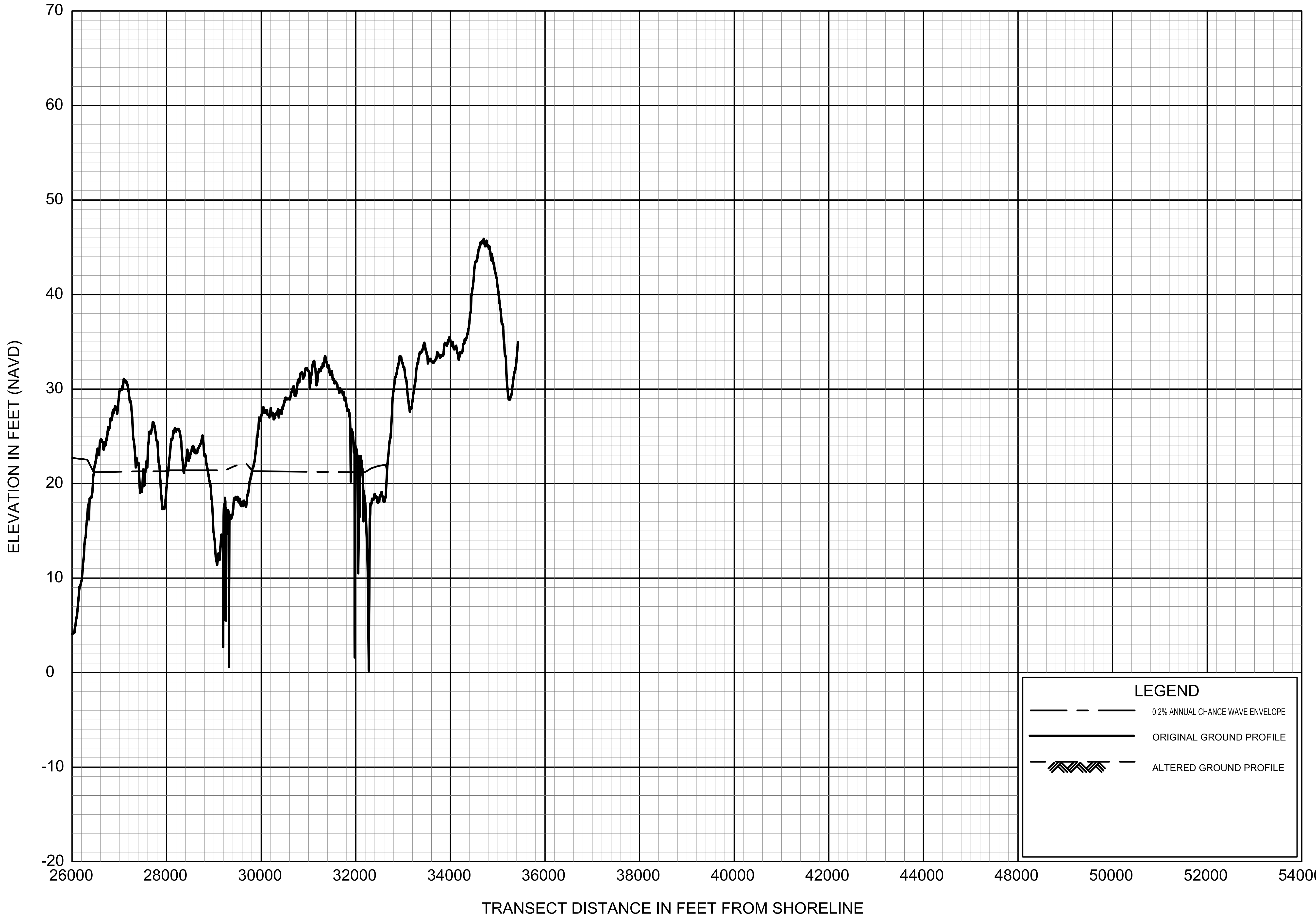
TRANSECT 35

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

74P



0.2% ANNUAL CHANCE WAVE ENVELOPE

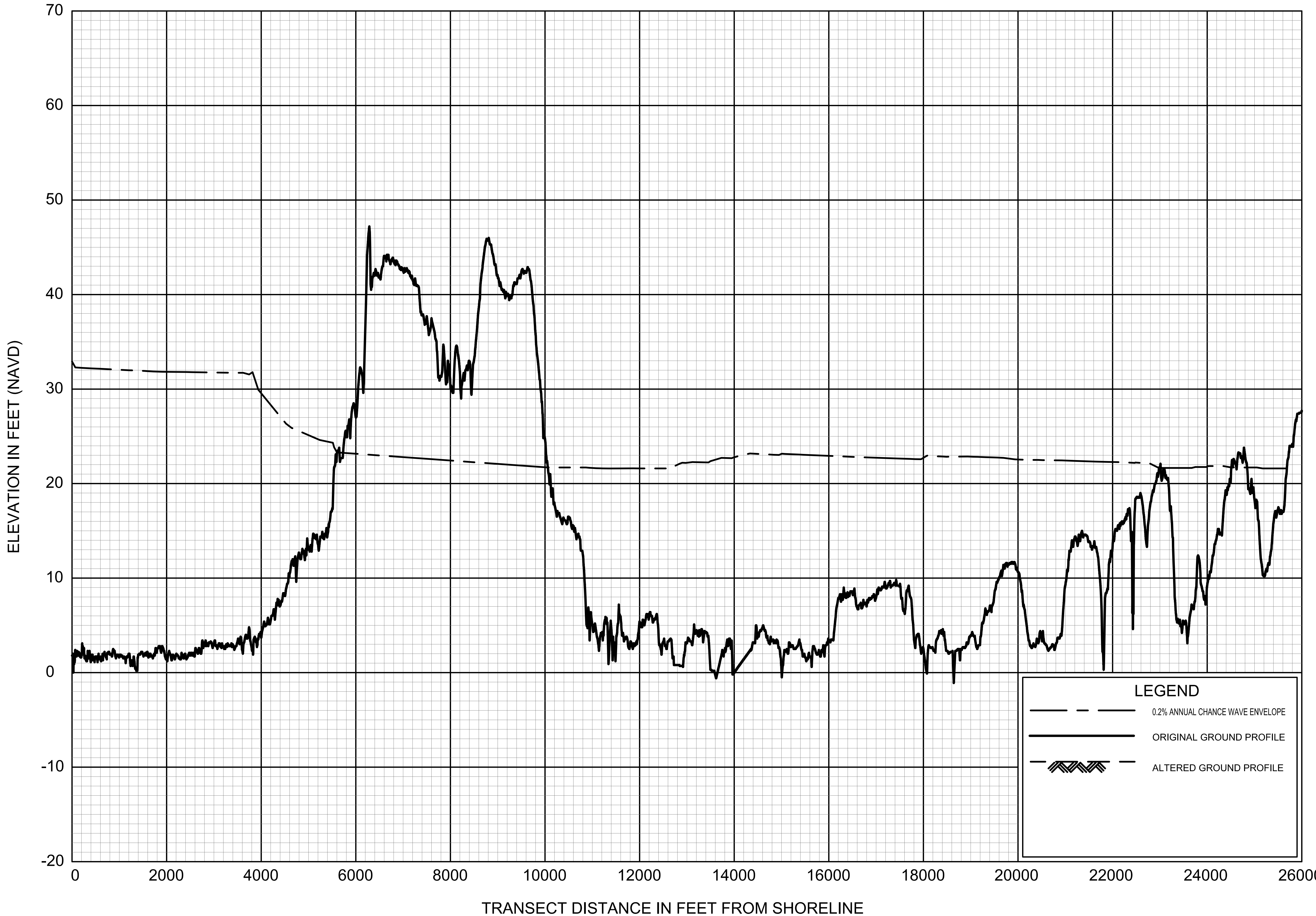
TRANSECT 35

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

75P



0.2% ANNUAL CHANCE WAVE ENVELOPE

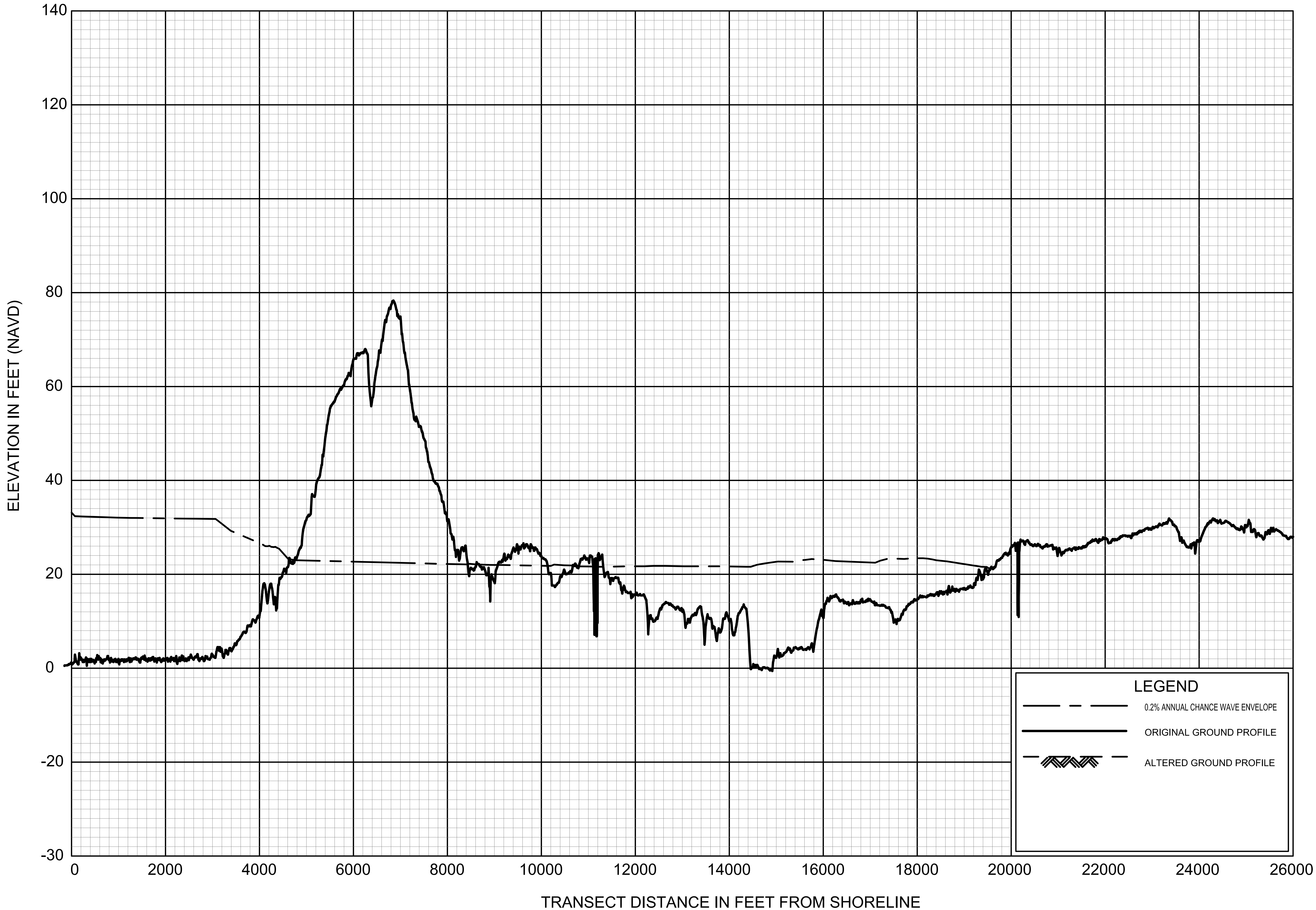
TRANSECT 36

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

76P



0.2% ANNUAL CHANCE WAVE ENVELOPE

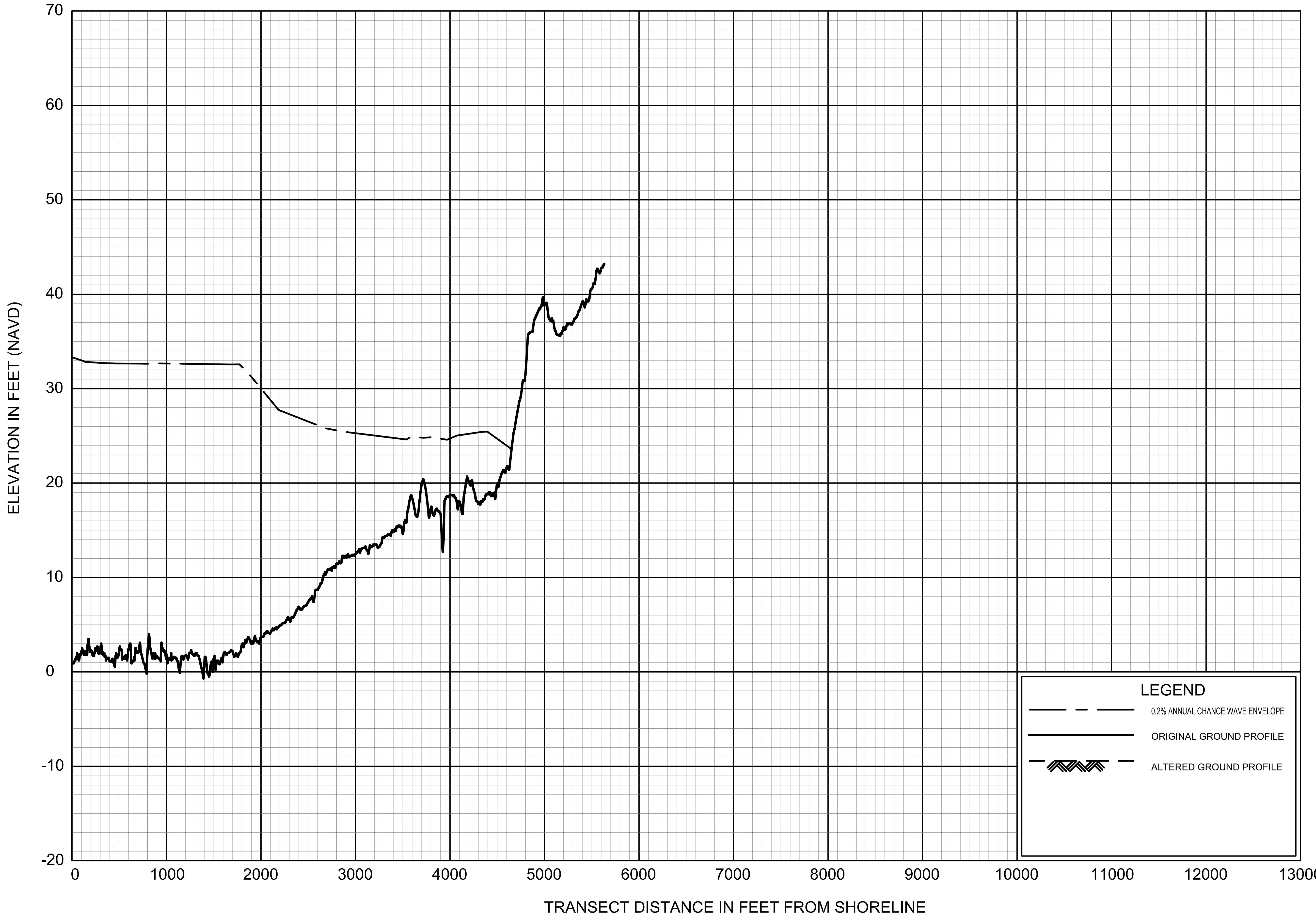
TRANSECT 37

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS

77P



0.2% ANNUAL CHANCE WAVE ENVELOPE

TRANSECT 38

FEDERAL EMERGENCY MANAGEMENT AGENCY

HANCOCK COUNTY, MS

AND INCORPORATED AREAS