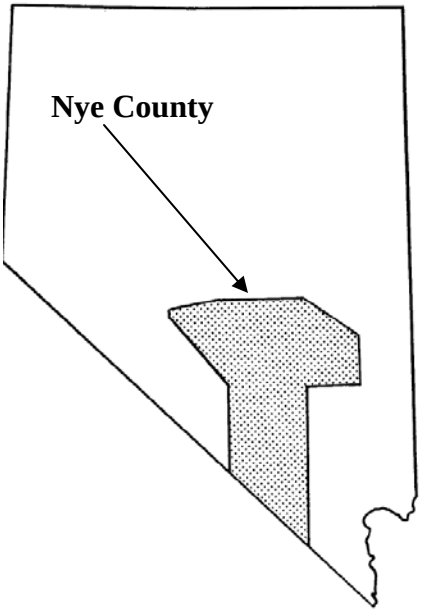
FLOOD INSURANCE STUDY

NYE COUNTY, NEVADA
AND INCORPORATED AREAS

Community Name	Community Number
NYE COUNTY,	
UNINCORPORATED AREAS	320018



February 17, 2010

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
32023CV000A

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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

Old Zone	New Zone
A1 through A30	AE
B	X (Shaded)
C	X (Unshaded)

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: February 17, 2010

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FLOOD INSURANCE STUDY
NYE COUNTY, NEVADA 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 unincorporated areas of Nye County (hereinafter referred to collectively as Nye 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 Nye 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 Title 44 of the Code of Federal Regulations, Section 60.3 (44 CFR, 60.3).

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

1.2 Authority and Acknowledgments

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

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

The original hydrologic and hydraulic analyses for this study were performed by James M. Montgomery, Consulting Engineers, Inc., for the Federal Emergency Management Agency (FEMA), under Contract No. EMW-83-C-1197. This study was completed in September 1985.

A restudy for hydrologic and hydraulic analyses of Slime Wash was conducted by the U. S. Geological Survey (USGS) under Interagency Agreement Nos. EMW-91-E-3535 and EMW-92-E-3847. This study was completed in June 1998.

In February 2010, HDR Engineering Inc. completed a countywide DFIRM and FIS for the County of Nye. HDR Engineering Inc. was hired as a study contractor for FEMA Region IX under contract number EMF-2003-CO-0045, Task Order 28. The DFIRM process included digitizing flood zone boundaries from the effective paper FIRM panels and fitting them to a digital base map, thus converting the existing manually produced FIRM panels to a digitally produced FIRM, referred to as a DFIRM.

Planimetric base map information was provided in digital format for FIRM panels. Public Land Survey System (PLSS) and information on roads and political boundaries were provided by Nye County. National Agricultural Imagery Program (NAIP) aerial imagery was provided by U.S. Department of Agriculture (USDA). Aerial imagery was used to verify road locations. Users of this FIRM should be aware that minor adjustments may have been made to specific base map.

The coordinate system used for the production of this FIRM is Universal Transverse Mercator (UTM), North American Datum of 1983 (NAD 83), and GRS 1980 spheroid. Corner coordinates shown on the FIRM are in latitude and longitude referenced to NAD 83. Differences in datum and spheroid used in the production of FIRMs for adjacent counties may result in slight positional differences in map features and at the county boundaries. These differences do not affect the accuracy of information shown on the FIRM.

1.3 Coordination

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

For the original study of Nye County, flooding sources requiring study by detailed methods were identified at a meeting attended by representatives of the study contractor, FEMA, and Nye County on April 15 and 16, 1983.

Results of the hydrologic analyses were coordinated with the Natural Resources Conservation Service (NRCS), formerly known as U.S. Soil Conservation Service (SCS), Nye County Planning Department, Pahrump Conservation District, U.S. Army Corps of Engineers (USACE), State of Nevada Division of Emergency Management, and the USGS.

On August 15, 1989, the results of the study were reviewed at a final meeting attended by representatives of Nye County, FEMA, and the study contractor.

This study was revised on June 8, 1998 to provide detailed flood-hazard information for Slime Wash along U.S. Highway 95, from the Nye-Esmeralda County line to approximately 0.2 mile upstream of U.S. Highway 6.

An initial CCO meeting was held on July 24, 1991 to identify areas requiring detailed flooding analyses. This meeting was attended by representatives of FEMA, the USGS, the study contractor, and the community.

An intermediate CCO meeting was held on September 26, 1995 to discuss the results of the study. This meeting was attended by representatives of FEMA, the study contractor, and the community.

The results of this revision were reviewed at a final CCO meeting held on May 7, 1997, and attended by representatives of FEMA, Nye County, and the study contractor. All problems raised at that meeting have been addressed in this restudy.

The dates of the initial and final CCO meetings held for Nye County and the incorporated communities in its boundaries are shown in Table 1, "Initial and Final CCO Meetings."

Table 1 – Initial and Final CCO Meetings

Community Name	Initial CCO Date	Final CCO Date
Nye County,	April 15 & 16, 1983	August 15, 1989
(Unincorporated Areas)	July 24, 1991	May 7, 1997

In 2008, the Community of Gabbs disincorporated from the NFIP and mapping for this area is shown under the unincorporated areas of Nye County.

On June 5, 2008, the initial CCO meeting for the Nye countywide DFIRM and FIS was held. Attending the meeting were representatives of FEMA, HDR Engineering Inc. the study contractor, and Nye County.

The Final CCO Meeting for the Nye Countywide DFIRM and FIS was held on April 14, 2009. This meeting was attended by representatives of FEMA, HDR Engineering Inc., and Nye County.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS covers the geographic area of Nye County, NV, including the incorporated communities. The scope and methodologies used in preparation of this FIS were agreed upon in joint consultation between FEMA and Nye County. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction.

Floods caused by the overflow of the Amargosa River from U.S. Highway 95, upstream 2.7 miles to the border between Sections 5 and 6 of Township 12 South, Range 45 East were studied by detailed methods. Shallow flooding in the East and West Pahrump Valley and alluvial fan flooding on Wheeler Wash, Peak Springs, and Unnamed Western Wash were also studied.

In June of 1998, a restudy was completed to provide detailed flood-hazard information for Slime Wash along U.S. Highway 95 from the Nye-Esmeralda County line to approximately 0.2 mile upstream of U.S. Highway 6.

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 September 1994.

All or portions of the flooding sources listed in Table 2, "Flooding Sources Studied by Detailed Methods," were studied by detailed methods. Limits of detailed study are indicated on the Flood Profiles (Exhibit 1) and on the FIRM.

Table 2 – Flooding Sources Studied By Detailed Methods

Amargosa River	Slime Wash

Approximate analyses were used to study only 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 Nye County. All or portions of the flooding sources listed in Table 3, "Flooding Sources Studied by Approximate Methods," were studied by approximate methods.

Table 3 – Flooding Sources Studied By Approximate Methods

Adams-McGill Reservoir	Amargosa River	Bald Mountain Wash
Barley Creek	Beatty Wash	Big Spring Wash
Blackrock Canyon Creek	Bonnie Claire Lake	Box Canyon Creek
Bull Creek	Carson Slough	Clear Creek
Clover Creek	Cockalorum Wash	Conejo Canyon Creek
Craig Canyon Creek	Currant Creek	Dacey Reservoir
Danville Creek	Dry Canyon Creek	Dry Lake
Duck Water Creek	Ellsworth Canyon Creek	Fluorspar Canyon
Fortymile Wash	Gabbs Wash	Germany Canyon Creek
Hay Meadow Reservoir	Hicks Station Wash	Hot Creek
Hunts Canyon Creek	Indian Creek	Jumbled Wash
Lebeau Creek	Little Smokey Valley	Lunar Lake
Luther Waddles Wash	Marble Falls Canyon Creek	Meadow Creek
Milton Canyon Creek	Mission Canyon Creek	Moon River
Moores Station Wash	Mosquito Creek	Mountain View Canyon Creek
Mud Lake	Orange Lichen Creek	Pahrump Valley Wash
Pahrump Wash	Pine Creek	Pritchards Canyon Creek
Reece River	Rock Valley Wash	Sand Springs Wash
Savory Creek	Sevenmile Wash	Silver Creek
Snowball Creek	Spanish Canyon Creek	Stargo Creek
Sunnyside Creek	The Big Wash	Topopah Wash
Tulle Creek	Tulle Field Reservoir	Twin Spring Slough

Table 3 – Flooding Sources Studied By Approximate Methods

Tybo Creek	West Pahrump Valley Wash	Wheeler Wash
White River	White River Pass Canyon Creek	Willow Creek

This FIS also incorporates the determinations of letters issued by FEMA resulting in map changes (Letter of Map Revisions [LOMR], Letter of Map Revision – based on Fill [LOMR-F], and Letter of Map Amendment [LOMA], as shown in Table 4, "Letters of Map Change."

Table 4 – Letters Of Map Change

Community	Flooding Source(s) /Project Identifier	Effective Date	Type	Case Number
Nye County	McCulloch Avenue	04/05/2001	102	01-09-0391P
Nye County	Artesia at Hafen Ranch, Phases 2A & 2B	11/08/2004	102	03-09-1502P
Nye County	Mountain Falls	11/11/2004	102	04-09-0133P

2.2 Community Description

Nye County is located in southern Nevada and is bordered by Churchill, Lander, and Eureka Counties on the north; White Pine, Lincoln, and Clark Counties on the east; Mineral and Esmeralda Counties on the west; and Inyo County, California, on the south. Tonopah, located 207 miles northwest of the City of Las Vegas, is the county seat. The Cities of Beatty and Pahrump are 112 miles and 59 miles from the City of Las Vegas, respectively. The majority of the development in Nye County has occurred in the Pahrump Valley, in the Beatty area, and in the Tonopah area. These regions are located in the southeastern, southwestern, and west-central part of the county, respectively.

The weather in the area is arid, characterized by sparse rainfall, low humidity, and wide extremes in daily temperatures. Winter storms in the area are regional in nature. These storms are associated with broad low-pressure systems that develop over the Pacific Ocean and move easterly. Precipitation from these storms is generally widespread and is intense only on rare occasions.

Summer storms, however, occur as localized thunderstorms and can be intense. These local convective storms are associated with moisture from the Gulf of California and the southern Pacific Ocean that move northeasterly. Floods occurring in the valley are generally associated with precipitation from the summer convective thunderstorms in the mountains, occurring mainly during the cooler months (September through March) (U.S. Department of the Interior, 1832, 1967 and U.S. Department of the Interior, Geological Survey, 1980).

Due to the aridity of the desert in which Nye County is located, the area is dry except during and shortly after a storm. When a major storm does move into the area, water collects rapidly as surface runoff and reaches the area in a short period of time. Consequently, resultant floodflows are of the flash type, having sharp peaks and short durations.

The unincorporated community of Pahrump is situated in the north-central part of the Pahrump Valley, with the majority of the approximately 125 square miles of the township having developed west of State Highway 160. According to the 1980 census (U.S. Department of Commerce, Bureau of the Census, 1980, 1981), an estimated 1,375 people populated the township of Pahrump. The estimated population of the unincorporated areas of Nye County was 16,170 as of July 1988 (U. S. Department of Commerce, Bureau of the Census, July 1988). In 2000, the population was 32,485 (U.S. Census Bureau, 2000) and estimated to be 42,693 in 2006 (U.S. Census Bureau, 2000).

Up until the late 1960s, agriculture was the primary base of the economy, with cotton and alfalfa being the principal crops. Since then, much of the land has been taken out of agricultural production and subdivided for real estate development, which is presently a major factor in the economy of the Pahrump Valley (U.S. Department of the Interior, Geological Survey, 1982). Commercial development is made up mainly of lumber yards, hardware stores, gas stations, restaurants, and motels along the highways. Residential development, consisting primarily of retirement homes, is occurring around the Pahrump Valley.

According to the National Weather Service records for the climatological station maintained by the University of Nevada at the Pahrump Ranch since 1958, temperatures in the Pahrump Valley have ranged from a high of 106°F in July to a low of 17 ºF in January. The average monthly temperature is 62°F. Total rainfall in the area ranges from approximately 1 to 10 inches per year. The annual average rainfall is 4.3 inches. There has been no measurable snowfall recorded in the valley (U. S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service, Climatological Data, State of Nevada).

The topography along the southern part of the Pahrump Valley differs markedly from that along the north. The southeast side of the valley is characterized by large alluvial fans; the northwest by playas, or "dry lakes". Soils in the valley are derived from the unconsolidated and partly consolidated deposits which form the valley fill. This includes boulders, gravel, sand, silt, clay, and mudflow debris (U.S. Department of the Interior, Geological Survey, 1982).

Natural vegetation in the valley is typical of the Mojave Basin desert region and includes creosote bush, a variety of yuccas, mesquite, and sagebrush.

2.3 Principal Flood Problems

Floodwater in the Pahrump Valley originates in the mountains surrounding the valley. Accumulated water drains in a southwesterly direction into the valley. Because of the presence of the alluvial fans surrounding the Town of Pahrump, flowpaths in the valley lack definition. Analyses of topography patterns reveal that shallow flooding may occur all around the valley, particularly in the eastern, central, and western portions.

The last major flood occurred in August 1983. Water from a storm in excess of a 75-year event originated in the north and flooded approximately 14 miles of State Highway 160, and then flowed through the western side of the township of Pahrump (State of Nevada, Department of Transportation, August 18, 1983, October 1983).

2.4 Flood Protection Measures

The township of Pahrump has not adopted any ordinances delineating areas of potential flood hazards. Structural measures installed in the area include pipe culverts located at regular

intervals along State Highways 160 and 372 in order to enable water originating in the mountains to flow southwesterly through the valley. However, the capacities of these culverts can easily be exceeded, resulting in sheet flooding by the overflow.

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-, 2-, 1-, or 0.2-percent annual chance period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent annual chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term, average period between floods of a specific magnitude, rare floods could occur at shorter 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 100-year flood (1-percent chance of annual exceedance) 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.

Nye County has a previously printed FIS report. The hydrologic analyses described in that report is summarized below.

The initial approach for modeling the hydrology of the Pahrump Valley watershed involved the USGS regional regression equations. However, investigations showed that available USGS methods applicable to many regions in Nevada were not applicable to the study area due to lack of reliable regression relationships, or to limitations on the range of parameters (e.g., drainage area) allowed by particular equations. Because of this, a TR-20 analysis of the Pahrump Valley completed by the Las Vegas Office of the NRCS in 1984 was evaluated (U.S. Department of Agriculture, Soil Conservation Service, 1982). Since the NRCS flows appeared to be based on more reliable data (watershed area, time of concentration, curve number), the TR-20 modeling approach of the NRCS was used to estimate the peak flows for this restudy. Data from USGS topographic maps, the National Oceanic and Atmospheric Administration (NOAA) Precipitation Atlas (U. S. Department of Commerce, National Oceanic and Atmospheric Administration, 1973), and the existing TR-20 model of the Pahrump Valley provided by the Las Vegas Office of the NRCS were incorporated into the analysis of the hydrology for this study.

For the Amargosa River watershed, the proposed method for modeling its hydrology also involved the USGS regional regression equations. As with the Pahrump Valley hydrologic analysis, the regression equations were not applicable to the study area. The size of the drainage area (459 square miles) also precluded the use of the TR-55 graphical or tabular hydrograph methods for the Amargosa River watershed. Thus, a TR-20 model of the Amargosa River above Beatty was developed using data from USGS topographic maps, and the NOAA Precipitation

Atlas (U. S. Department of Commerce, National Oceanic and Atmospheric Administration, 1973).

In the June 1998 restudy, hydrologic analyses were carried out to establish peak discharge frequency relationships for Slime Wash. Drainage-basin parameters for the watershed were determined using USGS 7.5-minute series topographic maps (U. S. Department of the Interior, 1987). Precipitation data were obtained from the following NOAA publications: "Climatological Summary, Tonopah, Nevada" (U. S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service, Climatological Summary, Tonopah, Nevada); NOAA Atlas 2, "Precipitation-Frequency Atlas of the Western United States, Volume VII-Nevada" (U.S. Department of Commerce, National Oceanic and Atmospheric Administration, 1973); and "Hourly Precipitation Data, Nevada" (U. S. Department of Commerce, National Oceanic and Atmospheric Administration, Hourly Precipitation Data, Nevada). Additional information for the flood-frequency analyses was provided by the USGS with Open-File Reports 80-963, "Flood Potential of Topopah Wash and Tributaries, Eastern Part of Jackass Flats, Nevada Test Site, Southern Nevada," and 93-419, "Methods for Estimating Magnitude and Frequency of Floods in the Southwestern United States" (U.S. Department of the Interior, 1980 and U.S. Department of the Interior, 1994, respectively).

Estimates of the 1-percent annual chance flood-frequency value for the study area were performed using a Log-Pearson Type III analysis (U. S. Department of Commerce, 1982) of the annual peak record from 12 area stations. This analysis resulted in a peak discharge-frequency relationship and included regression analyses of drainage area versus peak discharge. One estimate of discharge was 950 cubic feet per second (cfs), while another was 2,900 cfs (U.S. Department of the Interior, Geological Survey, 1983 and Arteaga, F.E., Unpublished, 1994, respectively).

For the June 1998 restudy, the USACE HEC-l computer program (U.S. Department of the Army, Corps of Engineers, 1981) was used to develop the hydrograph and routing for the watershed. Using HEC-l, the discharge was determined to be 2,300 cfs at the downstream limit of the watershed. Discharges computed using the HEC-l computer program were used in the hydraulic analyses for this restudy.

A summary of the drainage area-peak discharge relationships for all the streams studied by detailed methods is shown in Table 5, "Summary of Peak Discharges."

Table 5 - Summary of Peak Discharges

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Amargosa River					
At Beatty	459.0	7,490	15,000	18,400	27,000
Peak Springs Fan					
At Fan Apex	11.84	--[1]	--[1]	4,157	--[1]
At State Route 160	39.66	--[1]	--[1]	8,448	--[1]
Slime Wash					
Approximately 1,500 feet downstream of the Nye-Esmeralda County Line	3.29	--[1]	--[1]	2300	--[1]
Approximately 1,100 feet upstream of the Nye-Esmeralda County Line	2.15	--[1]	--[1]	1530	--[1]
Approximately 2,000 feet upstream of the Nye-Esmeralda County Line	1.84	--[1]	--[1]	1360	--[1]
At Florence Ave	1.45	--[1]	--[1]	1130	--[1]
At Magnolia Ave	0.87	--[1]	--[1]	700	--[1]
Wheeler Wash					
At Fan Apex	79.08	10,206	19,032	22,660	30,752

[1]Data Not Computed

3.2 Hydraulic Analyses

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

Cross sections were determined from topographic maps and field surveys. All bridges, dam, and culverts were field surveyed to obtain elevation data and structural geometry. All topographic mapping used to determine cross sections are referenced in Section 4.1.

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 (see Section 4.2), selected cross-section locations are also shown on the FIRM.

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

All qualifying bench marks within a given jurisdiction that are cataloged by the National Geodectic Survey (NGS) and entered into the National Spatial Reference System (NSRS) as First of 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 classifications. 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 monument blow frost line)
- Stability D: Mark of questionable or unknown vertical stability (e.g., concrete monument above frost line, or steel witness post)

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

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

Nye County has a previously printed FIS report. The hydraulic analyses described in that report is summarized below.

Cross sections for the backwater analyses for Amargosa River were obtained from an aerial survey conducted in May 1984. This information was augmented by relative channel sections obtained by field measurements.

Roughness factors (Manning's "n") used in the hydraulic computations were chosen by engineering judgment and based on field observations of the stream and floodplain areas. Roughness values for the main channel of Amargosa River ranged from 0.030 to 0.040, while floodplain values ranged from 0.030 to 0.045.

Water-surface elevations of floods of the selected recurrence intervals were computed through the use of the USACE HEC-2 step-backwater computer program (U.S. Department of the Army, Corps of Engineers, September 1982).

Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals. The starting water-surface elevation for Amargosa River was calculated using the slope-area method. The initial hydraulic analysis indicated that certain portions of Amargosa River will experience supercritical flows. However, for flood insurance purposes the water-surface elevations shown in the Flood Profiles (Exhibit 1) represent the subcritical analyses.

The FEMA alluvial fan methodology was used to determine the flood depths and velocities on the Wheeler Wash alluvial fan (Federal Emergency Management Agency, Office of Natural and Technological Hazards, 1982). For portions of this fan, it was determined that flood events consist of multiple channels. Therefore, the methodology for multiple flood channels was used to analyze the multiple channel regions.

For the shallow flooding areas of East and West Pahrump Valley, the preliminary hydraulic analyses indicated that 1-percent annual chance flooding consisted of sheetflow with average depths of three feet or less. Depths or elevations of shallow flooding in these areas were computed using backwater analyses performed utilizing the USACE HEC-2 computer program (U.S. Department of the Army, Corps of Engineers, Hydrologic Engineering Center, 1982), normal depth calculations, topographic data, and historical information. Computed flow paths and flood depths were compared with accounts of historical flooding and the results of previous studies whenever possible.

Shallow flooding is often characterized by highly unpredictable flow directions, caused by low relief or shifting channels and high debris loads. Where such conditions exist, the entire area susceptible to this unpredictable flow was delineated as a zone of equal risk. Small-scale topographic variations were averaged across inundated areas to determine flood depths.

Approximate Zone A areas were determined based on historical records of flooding, and using engineering judgment. Areas studied by approximate methods include: Peak Springs, Unnamed Western Wash fans, and an area approximately 4 miles southwest of the Town of Pahrump.

For the June 1998 restudy, hydraulic analyses were performed using the Federal Highway Administration WSPRO computer program (U.S. Department of Transportation, Federal Highway Administration, 1988) for the purpose of determining 1-percent annual chance base flood elevations along Slime Wash.

Cross sections for the WSPRO program were obtained from an aerial survey conducted in July 1992 (Boundy Land Surveying, Aerial Photographs: 1992 and Federal Emergency Management Agency 1990).

Roughness factors (Manning's "n" values) used in the hydraulic computations were chosen by engineering judgment and based on observations of channel and floodplain areas as shown on the aerial photographs. Roughness values for the main channel and overbanks ranged from 0.025 to 0.045. Obstructions in overbank areas were noted and given considerably higher "n" values, as high as 0.500.

Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.5 foot for floods of the 1-percent annual chance recurrence interval. The starting water-surface elevation was determined using critical depth. Hydraulic analyses indicate that portions of the flood-hazard area will experience supercritical flows. However, for flood insurance purposes, areas of supercritical flow are plotted at critical depth on the flood profiles.

Exhibit 1, "Flood Profiles," was also revised to reflect changes as a result of the restudy

A summary of Manning's "n" values used in this countywide FIS study is contained in Table 6, "Manning's "n" Values."

Table 6 – Manning's "n" Values

Stream	Left Overbank "n"	Channel "n"	Right Overbank "n"
Amargosa River	0.030-0.045	0.030-0.040	0.030-0.045
Slime Wash	0.025-0.500	0.025-0.045	0.025-0.500

Embankments Hazard Analysis

Some flood hazard information presented in prior FIRM panels and in prior FIS reports for Nye County and its incorporated communities was based on flood protection provided by embankments. Based on the information available and the mapping standards of the NFIP at the time that the prior FISs and FIRM panels were prepared, FEMA accredited the embankments as providing protection from the flood that has a 1-percent-chance of being equaled or exceeded in any given year. For FEMA to continue to accredit the identified embankments with providing protection from the base flood, the embankments must meet the criteria of the Code of Federal Regulations, Title 44, Section 65.10 (44 CFR 65.10), titled "Mapping of Areas Protected by Levee Systems."

On August 22, 2005, FEMA issued *Procedure Memorandum No. 34 - Interim Guidance for Studies Including Levees*. The purpose of the memorandum was to help clarify the responsibility of community officials or other parties seeking recognition of an embankment by providing information identified during a study/mapping project. Often, documentation regarding levee design, accreditation, and the impacts on flood hazard mapping is outdated or missing altogether. To remedy this, *Procedure Memorandum No. 34* provides interim guidance on procedures to minimize delays in near-term studies/mapping projects, to help our mapping partners properly assess how to handle embankment mapping issues.

While 44 CFR Section 65.10 documentation is being compiled, the release of more up-to-date FIRM panels for other parts of a community or county may be delayed. To minimize the impact of

the embankment recognition and certification process, FEMA issued *Procedure Memorandum No. 43 - Guidelines for Identifying Provisionally Accredited Levees* on March 16, 2007. These guidelines will allow issuance of preliminary and effective versions of FIRMs while the embankment owners or communities are compiling the full documentation required to show compliance with 44 CFR Section 65.10. The guidelines also explain that preliminary FIRMs can be issued while providing the communities and embankment owners with a specified timeframe to correct any maintenance deficiencies associated with an embankment and to show compliance with 44 CFR Section 65.10.

Table 7, "List of Embankments Requiring Flood Hazard Revisions" lists all Embankments shown on the FIRM for which corresponding flood hazard revisions were made.

Approximate analyses of "behind embankment" flooding were conducted for all the embankments in Table 7 to indicate the extent of the "behind embankment" floodplains. The methodology used in these analyses is discussed below.

The approximate embankment analysis was conducted using information from existing hydraulic models (where applicable) and USGS topographic maps.

The extent of the 1-percent-annual-chance flood in the event of embankment failure was determined. Base flood elevations and topographic information (where available) were used to estimate an approximate 1-percent-annual-chance floodplain and traced along the contour line representing the base flood elevation. If base flood elevations were not available they were estimated from effective FIRM maps and available information. Topographic features such as highways, railroads, and high ground were used to refine approximate floodplain boundary limits.

Table 7 - List of Embankments Requiring Flood Hazard Revisions

Community	Flood Source	Embankment Inventory ID	Coordinates Latitude/Longitude	FIRM Panel	USACE Levee
Nye County	Hicks Station Wash	10	38.83/-116.24 38.81/-116.24	32023C1950E	No
Nye County	The Big Wash	18	38.64/-115.59 38.68/-115.55	32023C2675E	No
Nye County	Paveline Creek	21a	38.55/-117.26 38.53/-117.26	32023C2900E	No
Nye County	Undetermined	24	38.50/-116.94 38.52/-116.93	32023C2975E	No
Nye County	Hunts Canyon Creek	35	38.49/-116.83 38.49/-116.82	32023C3550E	No
Nye County	Undetermined	36	38.48/-116.05 38.47/-116.03	32023C3700E	No
Nye County	Undetermined	39	38.38/-117.47 38.33/-117.47	32023C3425E 32023C3950E	No
Nye County	Twin Springs Slough	45	38.19/-116.16 38.16/-116.13	32023C2700E	No
Nye County	Undetermined	47	37.97/-116.82 37.98/-116.82	32023C5500E	No

Table 7 - List of Embankments Requiring Flood Hazard Revisions

Community	Flood Source	Embankment Inventory ID	Coordinates Latitude/Longitude	FIRM Panel	USACE Levee
Nye County	Undetermined	51	37.06/-116.78 37.06/-116.77	32023C7425E	No
Nye County	Amargosa River	54a	36.92/-116.75 36.92/-116.75	32023C7695E	No
Nye County	Undetermined	57a	36.49/-116.16 36.49/-116.15	32023C8600E	No
Nye County	Undetermined	61	36.18/-116.08 36.19/-116.06	32023C8825E	No
Nye County	Undetermined	65	38.85/-117.93 38.87/-117.92	32023C1600E	No
Nye County	Undetermined	66	38.87/-117.92 38.87/-117.91	32023C1600E	No
Nye County	Undetermined	67	38.87/-117.91 38.87/-117.90	32023C1600E	No
Nye County	Undetermined	68	36.70/-116.58 36.69/-116.56	32023C8200E	No
Nye County	Wheeler Wash	69	36.18/-115.93 36.16/-115.91	32023C8850E	No

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

All flood elevations shown in this FIS report and on the FIRM are referenced to NAVD. Structure and ground elevations in the community must, therefore, be referenced to NAVD. It is important to note that adjacent communities may be referenced to NGVD. This may result in differences in Base (1-percent-annual-chance) Flood Elevations (BFEs) across the corporate limits between the communities.

The conversion factor for each stream studied by detailed methods is shown below in Table 8, "Stream Conversion Factors."

Table 8 - Stream Conversion Factor

Stream Name	Elevation (feet NAVD above NGVD)
Amargosa River	+2.9
Slime Wash	+4.0

These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the NGVD and NAVD, visit the National Geodetic Survey website at www.ngs.noaa.gov, or contact the National Geodetic Survey at the following address:

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

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

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. To assist in this endeavor, each FIS provides 1-percent annual chance floodplain data, which may include a combination of the following: 10-, 2-, 1-, and 0.2-percent annual chance flood elevations; delineations of the 1-percent annual chance and 0.2-percent annual chance floodplains; and 1-percent annual chance floodway. This information is presented on the FIRM and in many components of the FIS, including Flood Profiles, Floodway Data tables, and Summary of Stillwater Elevation tables. Users should reference the data presented in the FIS as well as additional information that may be available at the local community map repository before making flood elevation and/or floodplain boundary determinations.

4.1 Flood 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. Between cross sections, the boundaries were interpolated using rectified photo-topographic maps at a scale of 1:4,800, with a contour interval of four feet (Cooper Aerial of Nevada, 1983). Shallow and alluvial fan flooding boundaries were delineated using the same set of maps.

For the flooding sources studied by approximate methods, the boundaries of the 1-percent annual chance floodplains were delineated using topographic maps taken from the previously printed FIS reports, and/or FIRMS for all of the incorporated and unincorporated jurisdictions within Nye County.

The 1- and 0.2-percent annual chance floodplain boundaries are shown on the FIRM. On this map, the 1-percent annual chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AE, and AO), 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 because of limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 1-percent annual chance floodplain boundary is shown on the FIRM.

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 one foot, provided that hazardous velocities are not produced. Floodways are presented to local agencies as minimum standards that can be adopted directly or used as a basis for additional floodway studies.

Floodways are normally computed for certain stream segments on the basis of equal-conveyance reduction from each side of the floodplain.

Floodway widths are normally computed at cross sections. Between cross sections, the floodway boundaries are interpolated. 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 normally presented 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.

Encroachment into areas subject to inundation by floodwater having hazardous velocities aggravates the risk of flood damage, and heightens potential flood hazards by further increasing velocities. In order to reduce the risk of property damage in areas where the stream velocities are high, the community may wish to restrict development in areas outside floodway.

The area between the floodway and the boundary of the 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 by more than one foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 1.

Because of the high velocities which were computed for the Amargosa River 1-percent annual chance flood-condition, no encroached floodway was computed, and the entire 1-percent annual chance year floodplain has been designated as floodway.

No floodways were computed for Slime Wash during the June 1998 restudy because the majority of flow through the Town of Tonopah is channeled along U.S. Highway 95. Much of this area already has undergone extensive development.

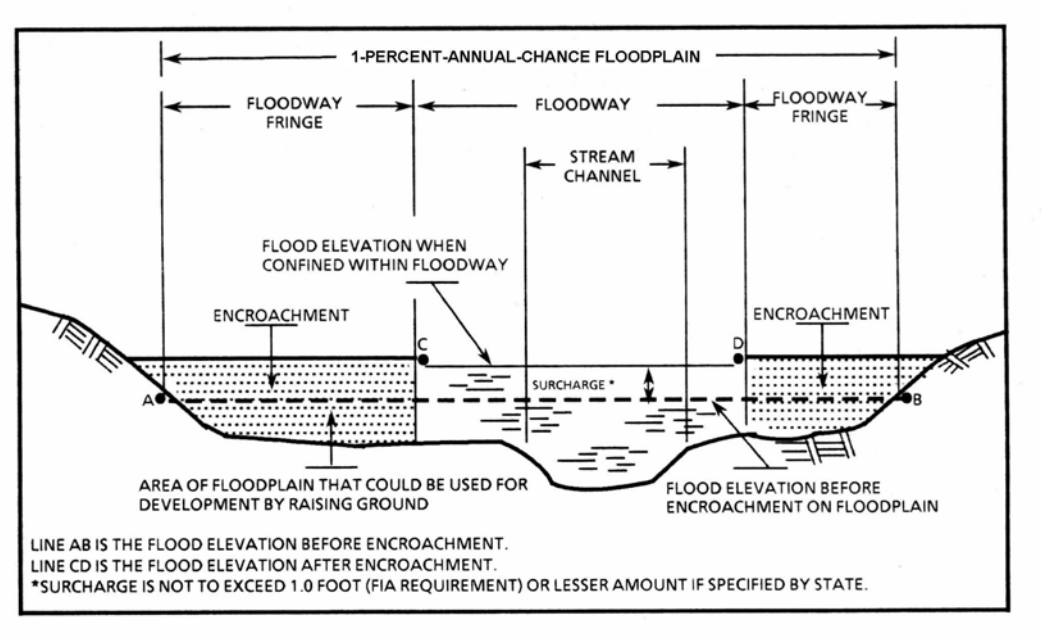

Figure 1 – Floodway Schematic

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

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 1-percent annual chance floodplain that is determined in the FIS report by detailed methods. Whole-foot BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

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

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Amargosa River								
A	--	--	--	--	--	--	--	--
B	--	--	--	--	--	--	--	--
C	--	--	--	--	--	--	--	--
D	--	--	--	--	--	--	--	--
E	--	--	--	--	--	--	--	--
F	--	--	--	--	--	--	--	--
G	--	--	--	--	--	--	--	--
H	--	--	--	--	--	--	--	--
I	--	--	--	--	--	--	--	--
J	--	--	--	--	--	--	--	--
K	--	--	--	--	--	--	--	--
L	--	--	--	--	--	--	--	--
M	--	--	--	--	--	--	--	--

¨ Because of the high velocities computed for Amargosa River, no floodway was computed. The entire 1% Annual Chance Floodplain has been designated a floodway.

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

NYE COUNTY, NEVADA

AND INCORPORATED AREAS

FLOODWAY DATA

AMARGOSA RIVER

Zone X

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

Zone D

Zone D is the flood insurance risk zone that corresponds to unstudied area 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 rate zones as described in Section 5.0 and, in the 1-percent annual chance floodplains that were studied by detailed methods, shows selected whole-foot 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 current FIRM presents flooding information for the entire geographic area of Nye County. Previously, FIRMs were prepared for each incorporated community and the unincorporated areas of the county identified as flood-prone. Historical data relating to the maps prepared for each community are presented in Table 10, “Community Map History.”

7.0 OTHER STUDIES

Information pertaining to revised and unrevised flood hazards for each jurisdiction within Nye County has been compiled into this FIS. Therefore, this FIS supersedes all previously printed FIS Reports and FIRMs for all of the incorporated and unincorporated jurisdictions within Nye County.

A FIS has been prepared for Clark County, Nevada (Federal Emergency Management Agency, September 6, 1989), to the east of Nye County. The results of this study are in agreement with the results of the Clark County study.

This 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.

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISION DATE(S)	FLOOD INSURANCE RATE MAP EFFECTIVE DATE	FLOOD INSURANCE RATE MAP REVISION DATE(S)
Nye County (Unincorporated Areas)	October 18, 1974	October 24, 1978	April 12, 1983	September 28, 1990 June 8, 1998

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

NYE COUNTY, NV

AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting FEMA, Region IX, Federal Insurance and Mitigation Administration, 1111 Broadway, Suite 1200, Oakland, California 94607-4052.

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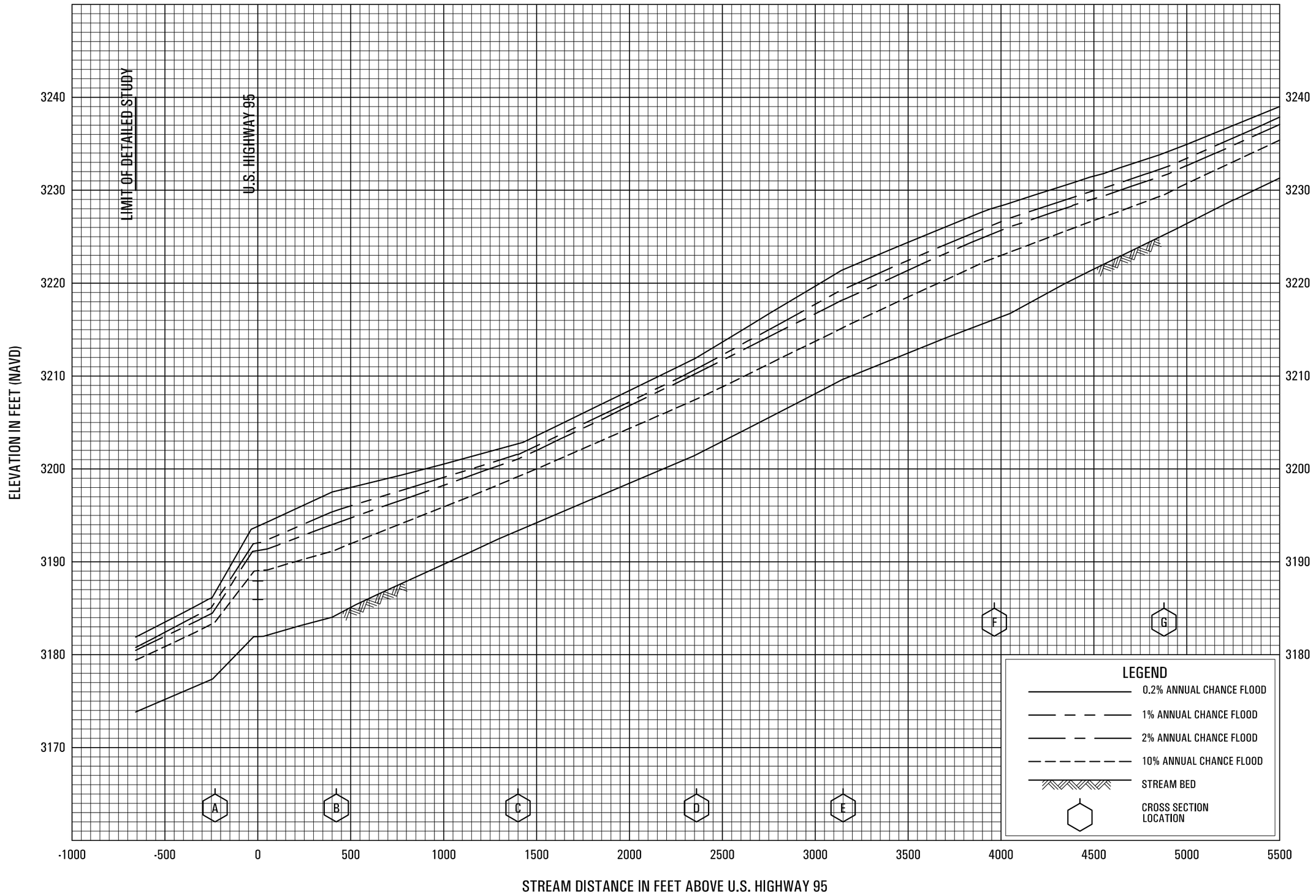

FLOOD PROFILES

AMARGOSA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

NYE COUNTY, NV

AND INCORPORATED AREAS

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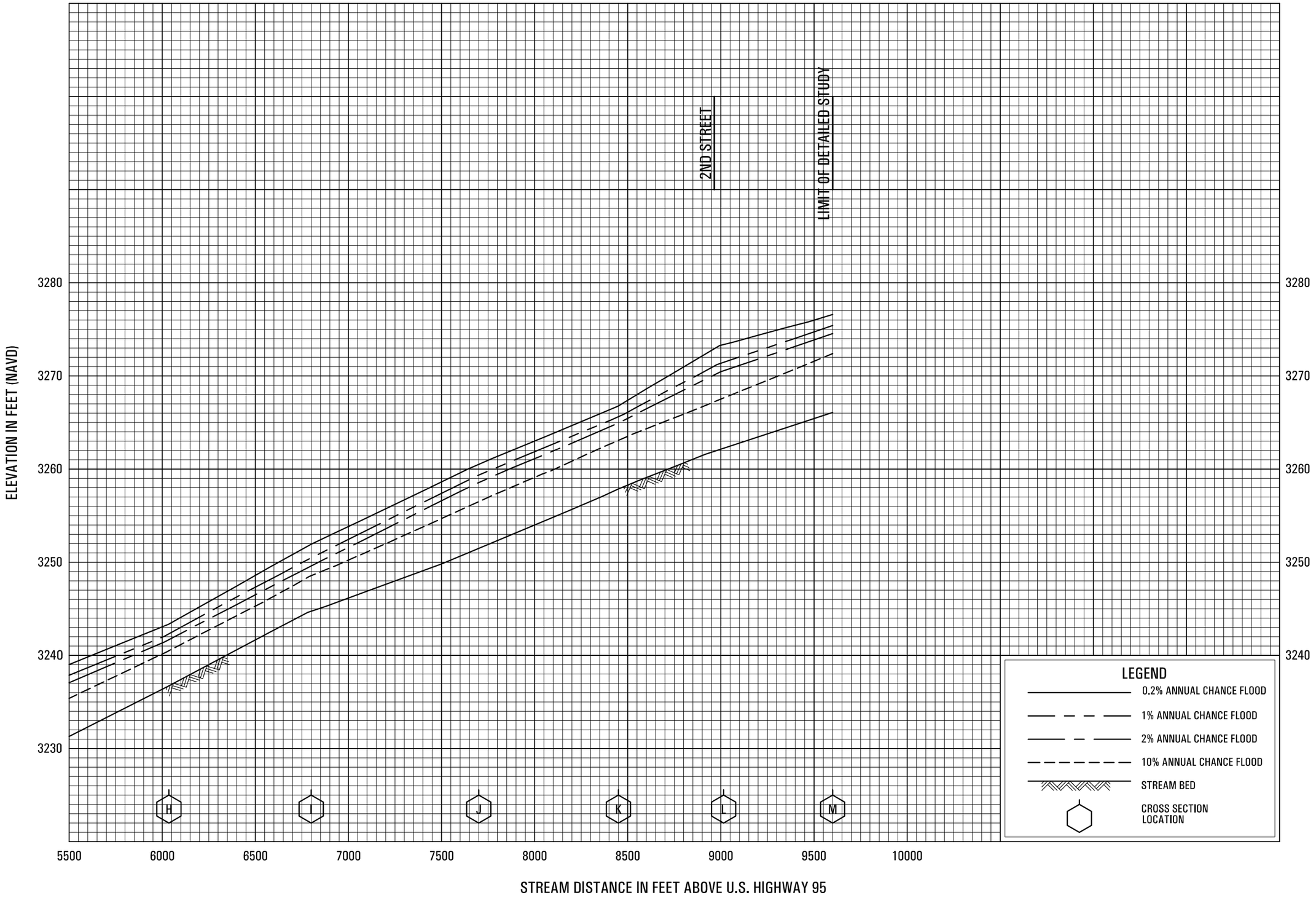

FLOOD PROFILES

AMARGOSA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

NYE COUNTY, NV

AND INCORPORATED AREAS

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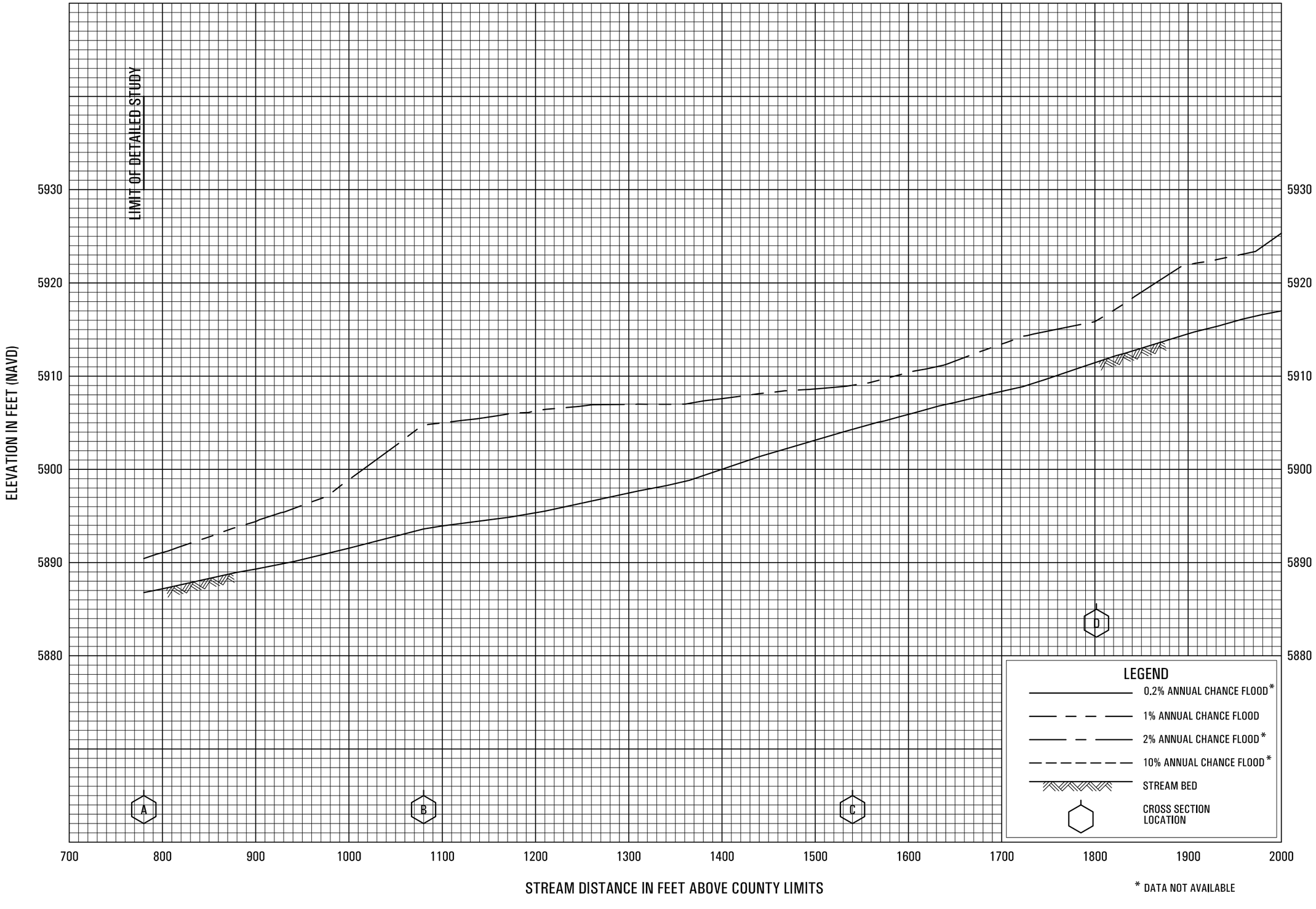


FLOOD PROFILES

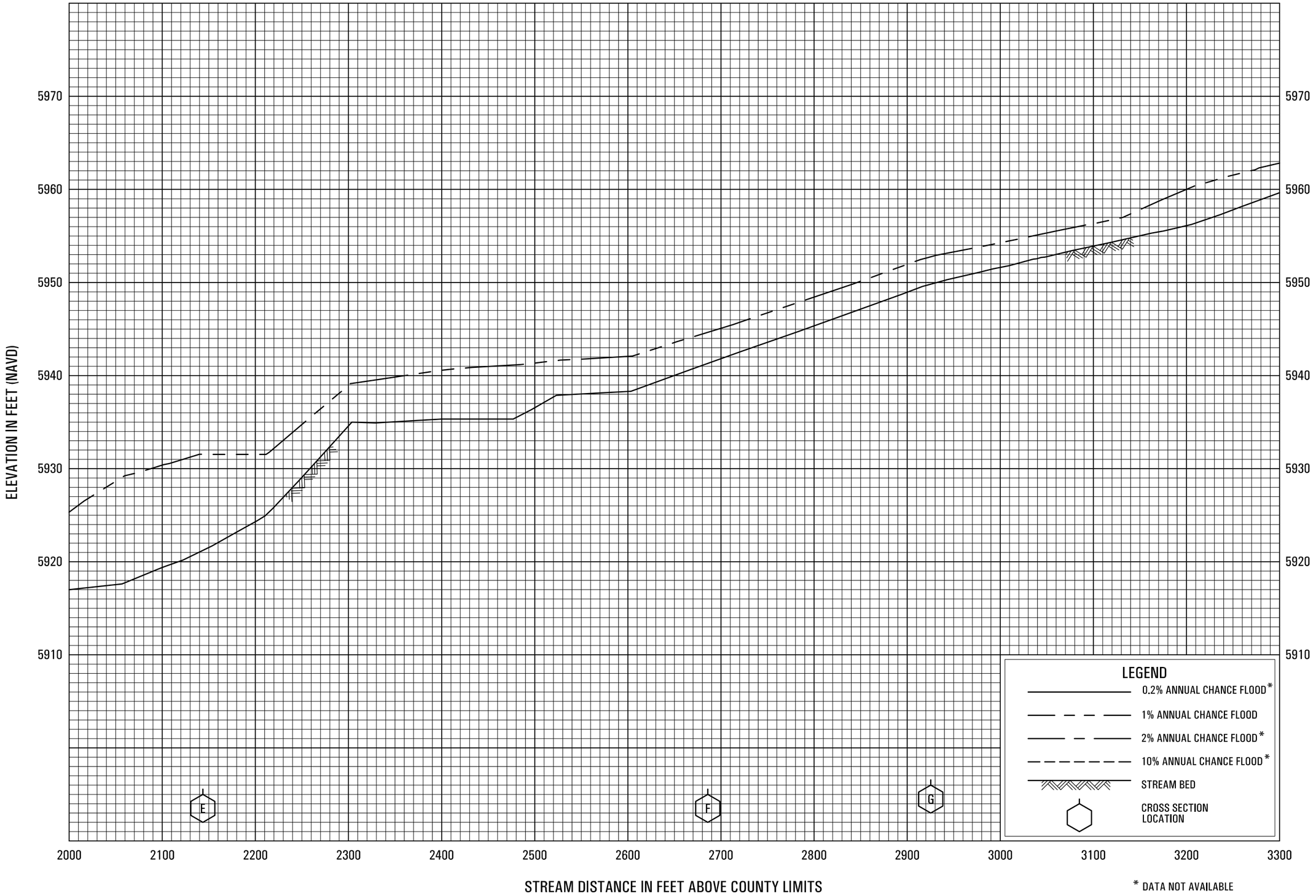
SLIME WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

NYE COUNTY, NV

AND INCORPORATED AREAS

03P



FLOOD PROFILES

SLIME WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

NYE COUNTY, NV

AND INCORPORATED AREAS

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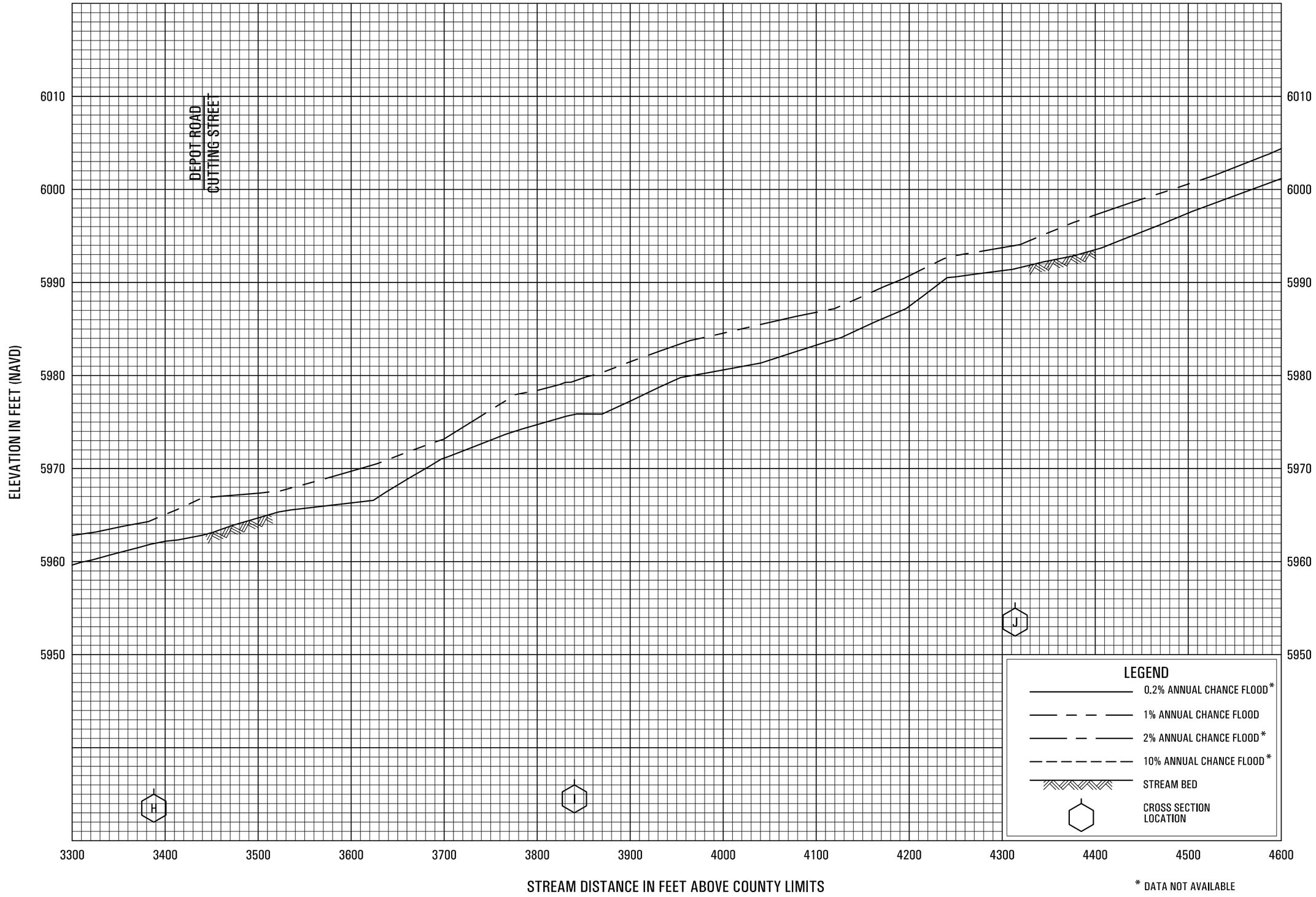

FLOOD PROFILES

SLIME WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

NYE COUNTY, NV

AND INCORPORATED AREAS

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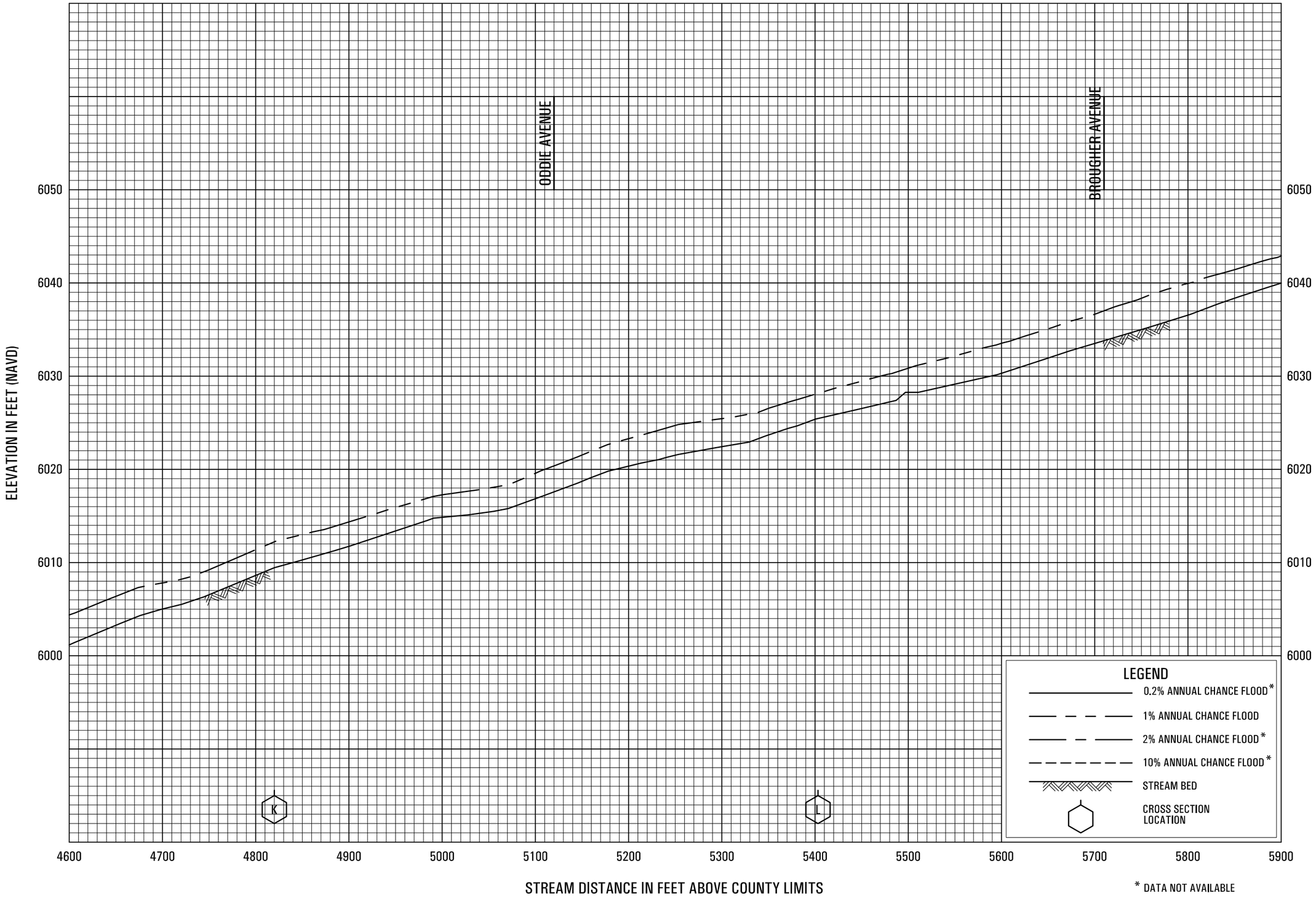

FLOOD PROFILES

SLIME WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

NYE COUNTY, NV

AND INCORPORATED AREAS

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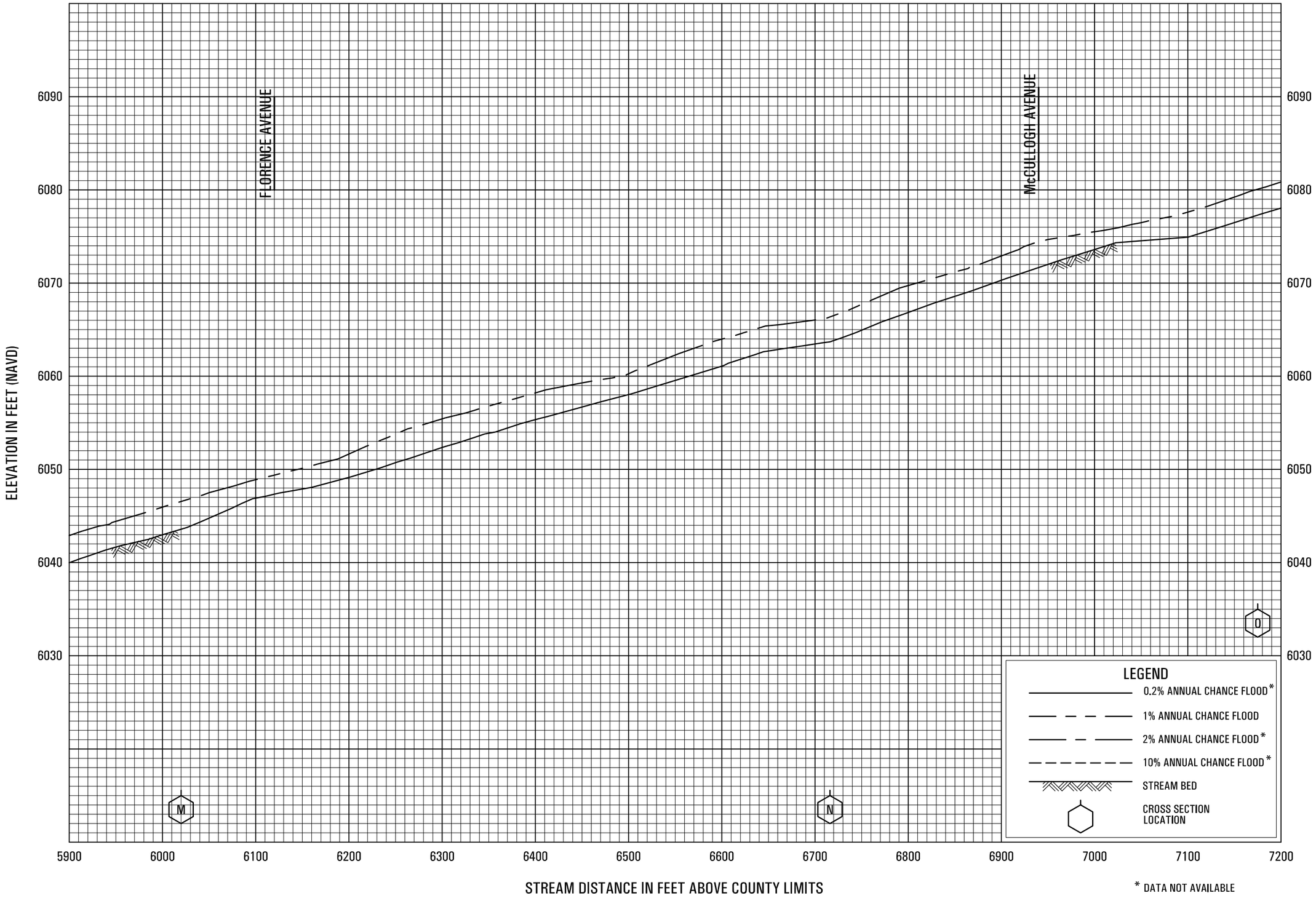

FLOOD PROFILES

SLIME WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

NYE COUNTY, NV

AND INCORPORATED AREAS

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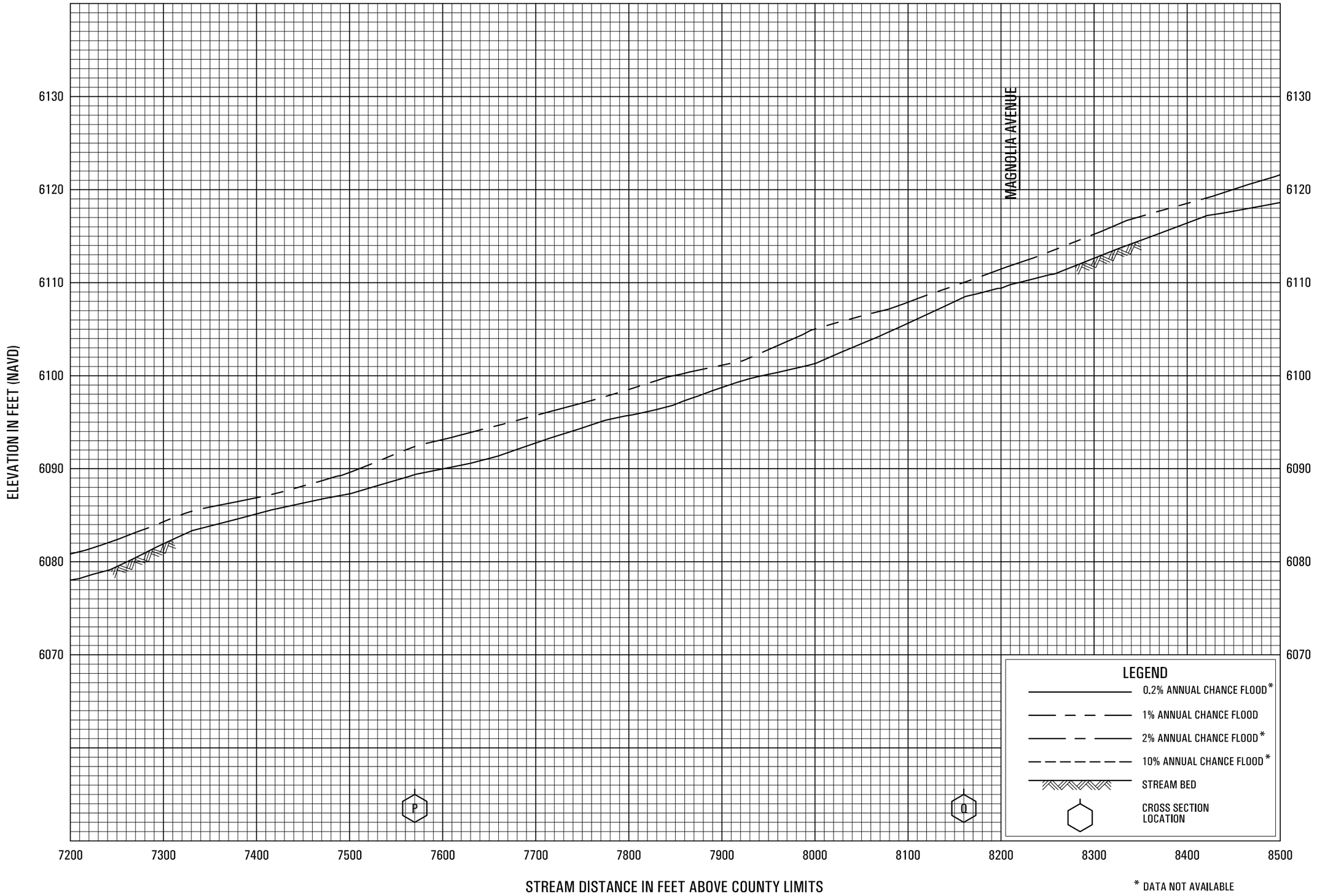

FLOOD PROFILES

SLIME WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

NYE COUNTY, NV

AND INCORPORATED AREAS

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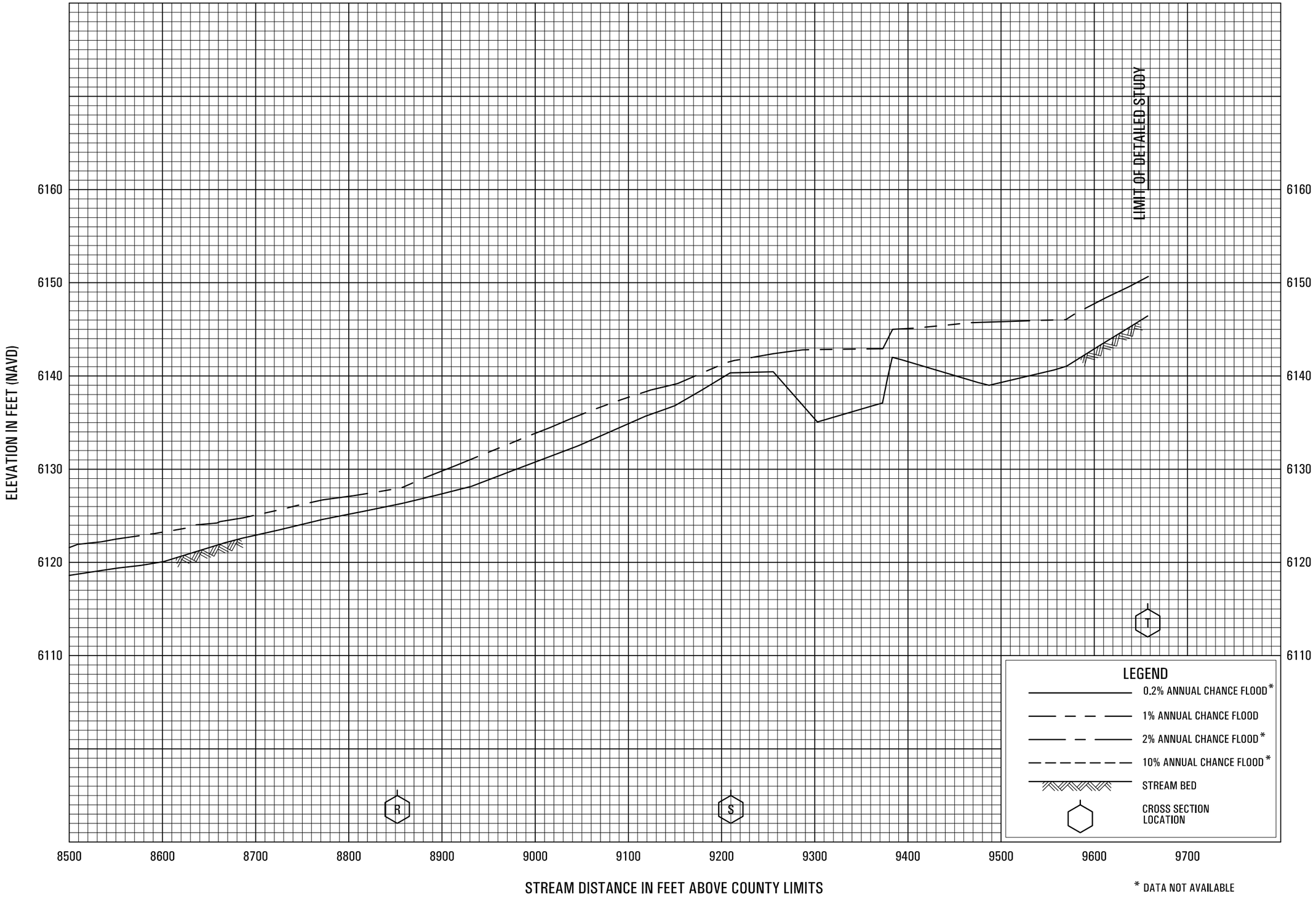

STREAM DISTANCE IN FEET ABOVE COUNTY LIMITS

* DATA NOT AVAILABLE

FLOOD PROFILES

SLIME WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

NYE COUNTY, NV

AND INCORPORATED AREAS

09P