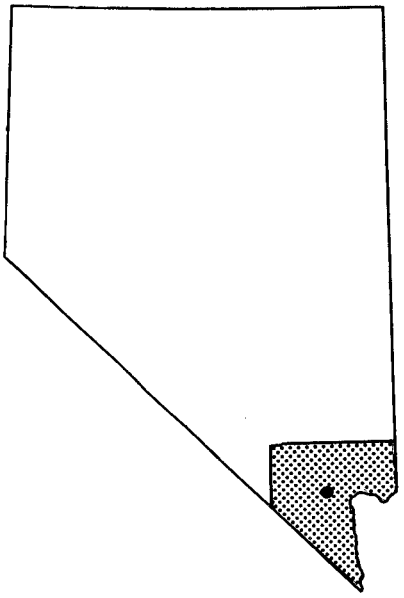
FLOOD INSURANCE STUDY

CITY OF LAS VEGAS, NEVADA
CLARK COUNTY



MARCH 1980

FEDERAL EMERGENCY MANAGEMENT AGENCY
FEDERAL INSURANCE ADMINISTRATION

COMMUNITY NUMBER-325276

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1.0 INTRODUCTION

1.1 Purpose of Study

The purpose of this Flood Insurance Study is to investigate the existence and severity of flood hazards in the City of Las Vegas, Clark County, Nevada, and to aid in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. Initial use of this information will be to convert Las Vegas to the regular program of flood insurance by the Federal Insurance Administration. Further use of the information will be made by local and regional planners in their efforts to promote sound land use and flood plain development.

1.2 Coordination

Detailed and approximate study areas were identified at a meeting attended by representatives of the study contractor, the Federal Insurance Administration, and the City of Las Vegas on January 8, 1976.

A meeting between the study contractor and city representatives was held in July 1977 to inform the city of the study progress.

An inter-agency hydrology coordination meeting was held in December 1977, and was attended by representatives of the U.S. Army Corps of Engineers, the U.S. Geological Survey, the U.S. Bureau of Reclamation, the Federal Insurance Administration, and the study contractor. Discharge values were coordinated with these agencies in April 1978.

On July 19, 1978, the preliminary results of the study were reviewed at an intermediate meeting attended by representatives of the study contractor, the Federal Insurance Administration, and the community.

The results of this study were reviewed at a final community coordination meeting held on June 13, 1979. Attending the meeting were representatives of the Federal Insurance Administration, the study contractor, and the city. This study incorporates all appropriate comments, and all problems have been resolved.

1.3 Authority and Acknowledgments

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968, as amended.

The hydrologic and hydraulic analyses for this study were performed by the U.S. Soil Conservation Service, for the Federal Insurance Administration, under Inter-Agency Agreement No. IAA-H-8-77. This work, which was completed in November 1978, covered all significant flooding sources affecting the City of Las Vegas.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated areas of the City of Las Vegas, Clark County, Nevada. Portions of Clark County within the corporate limits are not included in this study. The area of study is shown on the Vicinity Map (Figure 1).

Las Vegas Wash and the lower portion of Las Vegas Creek were studied in detail. The detailed study area on Las Vegas Wash began at Nellis Boulevard and extended northward to Owens Avenue. Las Vegas Creek was studied by detailed methods from its confluence with Las Vegas Wash (approximately 0.25 mile east of Lamb Boulevard along Washington Avenue) to Las Vegas Boulevard North, a distance of 3.4 miles.

Approximate 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 the Federal Insurance Administration and the City of Las Vegas in 1976.

Those areas studied by detailed methods were chosen with consideration given to all proposed construction and forecasted development through 1983.

2.2 Community Description

The City of Las Vegas is located in central Clark County, in southeastern Nevada, and occupies the central part of a broad, open desert basin. Las Vegas is bounded by the City of North Las Vegas on the north and Clark County on the east, west, and south. Henderson, Nevada is approximately 15 miles southeast of Las Vegas. Interstate Highway 15 and the Union Pacific Railroad run north-south and bisect the city.

The city has experienced considerable growth in population. In 1920, the population was 2304, and grew to 24,624 in 1950, 64,405 in 1960, and 125,787 in 1970 (Reference 1). It is estimated that the 1975 population was 149,750 (Reference 2).

The corporate limits encompass an area of approximately 33 square miles, of which approximately 95 percent is developed. The development consists of single-family residences, some multiple-family

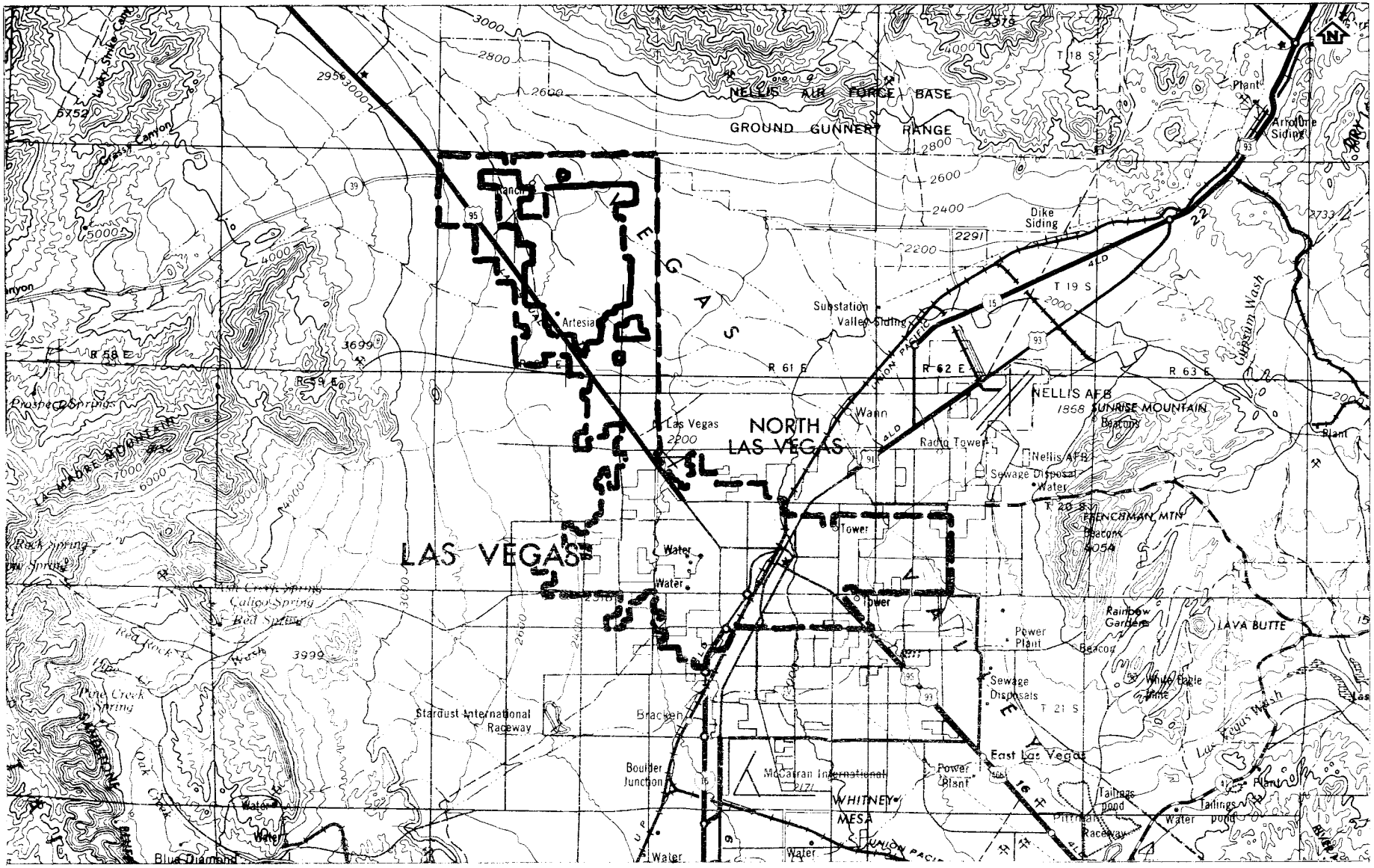

FIGURE 1

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

Federal Insurance Administration

CITY OF LAS VEGAS, NV

(CLARK CO.)

APPROXIMATE SCALE

4 0 4 8 12 MILES

VICINITY MAP

residence complexes, small business, and large casino-hotel facilities in the downtown area.

Las Vegas is a blend of family dwellings and businesses. There is a large gaming industry from the casinos, and many of the businesses support the gaming and tourism industry of Las Vegas.

Las Vegas Wash is located on the east side of the city. Las Vegas Creek flows from west to east between the traffic lanes of Washington Avenue. At the confluence with Las Vegas Creek, the drainage area of Las Vegas Wash is approximately 853 square miles.

The climate in the Las Vegas area has four well-defined seasons. The summer ranges from June to September, with daytime temperatures over 100°F. The spring and fall seasons are relatively short, with temperatures in the seventies. Winters are generally snowless, with daytime temperatures between 50°F and 70°F. Nights during January and February are near freezing. Humidity ranges from 10 to 35 percent during the summer and from 25 to 60 percent during the winter. The average annual precipitation is 3.94 inches, and the average annual temperature is 66°F (Reference 3).

The precipitation that causes flood problems in Las Vegas occurs during two clearly defined rainy seasons. During the winter, frontal storms produce large-area, low-intensity rainfall. Some frontal storms also occur during the summer, but most rainfall during this season results from thundershowers occurring during periods of influx of warm, moist, tropical air. Slightly over one-third of the average annual rainfall falls as short-term, high-intensity rainfall during these thunderstorms, which can be quite severe and commonly result in flash floods. A majority of the flood events in Las Vegas have occurred in July and August (Reference 4).

Las Vegas Wash originates in the mountains, approximately 28 miles north of the City of Las Vegas, and continues southeastward for approximately 42 miles, where it terminates at Lake Mead. The drainage basin is bounded by the Spring Mountains on the west; by parts of the Desert, Sheep, and Las Vegas Ranges on the north; by the Frenchman and River Mountains and a low range of hills on the east; and, by the Spring Mountains and the Bird Spring and McCullough Ranges on the south. The region is characterized by well-defined mountain ranges running generally north and south, with broad alluvial valleys between the ranges (Reference 5).

The drainage area of Las Vegas Creek is bounded on the west by La Madre Mountain, which has an elevation of approximately 7000 feet. Three miles east of this boundary, the drainage area consists of a well-defined alluvial fan that continues eastward to Interstate Highway 15 in downtown Las Vegas. Flows on this fan are often the result of intense, short-duration thunderstorms. The flow

pattern on the fans is complex, and areas of concentrated flows can shift often. Urban development on this fan is changing the runoff potential and the flow paths.

2.3 Principal Flood Problems

The largest recorded flow on Las Vegas Creek occurred on July 3-4, 1975, when a flow of 1000 cubic feet per second (cfs) was measured at a point above F Street (Reference 6). The return period for this event is 28 years. This flood resulted from an average of 1.75 inches of rain. The next largest floods occurred in 1955; when on June 13, 700 cfs, and on July 24, 600 cfs were measured at a point located 300 feet downstream of the intersection of the Tonopah Highway (U.S. Highway 95) and Las Vegas Creek (References 7 and 8). These flows have return periods of 12 and 8 years, respectively. An additional 6000 cfs were measured along the west side of the Union Pacific Railroad, approximately 200 feet north of San Francisco Street, on June 13, 1955. The Charleston Boulevard and Bonanza Road underpasses at the Union Pacific Railroad have been inundated many times in the past. Additional flood history of the Las Vegas area is available in a report entitled, History of Flooding, Clark County, Nevada 1905-1975, prepared by the U.S. Soil Conservation Service (Reference 9).

The largest recorded flood that occurred on Las Vegas Wash happened on July 3, 1976, when 12,010 cfs was measured at the U.S. Geological Survey gaging station located upstream of Las Vegas Boulevard north of Las Vegas. The next measured events occurred on May 31, 1973, and September 25, 1967, when flows measured 1640 cfs and 1170 cfs, respectively. These three floods have return periods of 111, 5, and 4 years, respectively (References 10 and 11).

All of the culverts on Las Vegas Creek are undersized, which increases the flood problems. The Las Vegas Creek channel is mostly unlined, but is kept relatively clear of debris and vegetation. Las Vegas Wash is an excavated, unlined earth channel that has been realined and straightened. Housing developments are located on the banks of both the Las Vegas Creek and Las Vegas Wash channels. As the channels are improved, the housing developments will be less likely to experience flooding from overflow of the channels. All of Las Vegas is subject to sheet flow originating on the alluvial fans surrounding the city.

The potential for sediment damage is high. Some of the soils in the alluvial fans are highly erosive. Floodflows are turbid as a result of the sediment load. Channel banks of the washes are generally unstable and unprotected relative to the erosive forces which accompany infrequent, large stormflows. Concrete or cinder block walls and a few homes constructed close to the top of the channel banks are subject to potential foundation undermining.

2.4 Flood Protection Measures

No floodwater-retarding structures protect Las Vegas. A small (5-foot bottom width) concrete-lined ditch has been constructed along Interstate Highway 15. This ditch empties into a 12- by 8-foot concrete box culvert that is approximately 0.4 mile long. The outlet of this box culvert is located east of Las Vegas Boulevard North at Washington Avenue. The culvert will carry flows with a return period in excess of 100 years. Interstate Highway 15 divides the flows that run off of the alluvial fan to the west of Las Vegas. The City of Las Vegas is rebuilding the road crossings on Washington Avenue. A bridge is being installed on Las Vegas Wash at Carey Avenue. Channel alinement and enlargement is scheduled for portions of Las Vegas Wash within the corporate limits.

3.0 ENGINEERING METHODS

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

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for each stream studied in detail in the community.

Data were obtained for stream gaging stations located within the Las Vegas Valley (References 10 and 11). The lengths of record ranged from 8 to 20 years, and water year 1976 was included. A statistical analysis was performed in accordance with U.S. Water Resources Council Bulletin 17A (Reference 12). A large thunderstorm which occurred on July 3, 1976 (Reference 5) was modeled using

the U.S. Soil Conservation Service Technical Release 20 (TR-20) rainfall-runoff procedure (Reference 13). This provided calibration for a TR-20 model. Rainfall amounts were then obtained from the National Oceanic and Atmospheric Administration Atlas 2, Volume VII (Reference 14) and were input to the TR-20 model. Peak discharges corresponding to the selected frequencies were then calculated for various locations on Las Vegas Wash and Las Vegas Creek within the corporate limits of the City of Las Vegas.

Flood discharges for areas of approximate study were based on rainfall-runoff relationships developed from the U.S. Soil Conservation Service TR-20 computations. Peak discharges are related to runoff volume, which depends on watershed characteristics. The results of the hydrologic analyses have been summarized in a separate report (Reference 15).

Peak discharge-drainage area relationships for Las Vegas Wash and Las Vegas Creek are shown in Table 1.

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of streams in the community were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each stream studied in the community.

Water-surface elevations of floods of the selected recurrence intervals were computed through use of the U.S. Soil Conservation Service WSP-2 step-backwater computer program (Reference 16).

Cross sections for the backwater analysis of Las Vegas Wash and Las Vegas Creek were obtained from field surveys, construction drawings of Washington Avenue, and topographic maps compiled in 1976 and 1977 from photographs dated February 1974 (Reference 17). Additional bridge and culvert data were obtained by field measurement.

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

Roughness factors (Manning's "n") used in the hydraulic computations were chosen by engineering judgment and based on field observations of the streams and flood plain areas. Roughness values for the main channel of Las Vegas Wash ranged from 0.030 to 0.040, while flood plain roughness values ranged from 0.040 to 0.050 for all floods. Roughness values for Las Vegas Creek channel ranged from 0.013 to 0.035, while flood plain roughness values ranged from 0.015 to 0.055 for all floods.

Table 1. Summary of Discharges

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (Cubic Feet Per Second) 10-Year	50-Year	100-Year	500-Year
Las Vegas Wash					
At Carey Avenue[1]	836	3,050	8,750	11,800	21,400
At Charleston Boulevard	858	3,180	9,000	12,100	21,800
Las Vegas Creek					
At Las Vegas Boulevard	13	640	1,280	1,570	2,420
At Confluence With Las Vegas Wash	14	660	1,300	1,600	2,450

[1] Located Outside Corporate Limits

Starting water-surface elevations for Las Vegas Wash were based on computed channel slopes. The starting water-surface elevations for Las Vegas Creek were determined by normal slope.

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

Shallow flooding areas were determined by using topographic information and engineering judgment.

For the areas studied by approximate methods, the elevation of the 100-year flood was developed from normal depth calculations.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation Reference marks used in the study are shown on the maps.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

A prime purpose of the National Flood Insurance Program is to encourage State and local governments to adopt sound flood plain management programs. Each Flood Insurance Study, therefore, includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the Federal Insurance Administration as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the boundaries of the 100- and 500-year floods have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:2400, with a contour interval of 5 feet (Reference 17).

Shallow flooding areas were delineated using topographic maps (Reference 17).

In cases where the 100- and 500-year flood boundaries are close together, only the 100-year flood boundary has been shown.

Approximate 100-year flood boundaries were delineated using the previously cited topographic maps (Reference 17) and topographic maps at a scale of 1:24,000, with a contour interval of 20 feet (Reference 18).

Flood boundaries for the 100- and 500-year floods are shown on the Flood Boundary and Floodway Map (Exhibit 2).

Small areas within the flood boundaries may lie above the flood elevations and, therefore, not be subject to flooding; owing to limitations of the map scale, such areas are not shown.

4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity and increases flood heights, thus increasing flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent flood plain areas, that must be kept free of encroachment in order that the 100-year flood be carried without substantial increases in flood heights. As minimum standards, the Federal Insurance Administration limits such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced.

The floodways presented in this study were computed on the basis of equal conveyance reduction from each side of the flood plain. The results of these computations are tabulated at selected cross sections for each stream segment for which a floodway is computed (Table 2).

As shown on the Flood Boundary and Floodway Map (Exhibit 2), the floodway boundaries were determined at cross sections; between cross sections, the boundaries were interpolated. In cases where the floodway and 100-year flood boundaries are close together, only the floodway boundary has been shown.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 2.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Las Vegas Wash								
A	38,670[1]	140	1,493	8.2	1,738.7	1,738.7	1,739.7	1.0
B	41,070[1]	110	1,100	11.0	1,740.2	1,740.2	1,741.2	1.0
C	42,665[1]	160	1,042	11.6	1,751.0	1,751.0	1,752.0	1.0
D	44,120[1]	157	1,320	9.2	1,757.6	1,757.6	1,758.6	1.0
E	45,500[1]	550	2,773	4.4	1,764.8	1,764.8	1,765.8	1.0
F	47,245[1]	500	2,861	4.2	1,773.6	1,773.6	1,774.6	1.0
G	49,340[1]	150	2,755	4.4	1,782.9	1,782.9	1,783.9	1.0
H	51,265[1]	145	1,235	9.8	1,791.1	1,791.1	1,792.1	1.0
I	53,365[1]	200	1,200	10.1	1,800.4	1,800.4	1,801.4	1.0
Las Vegas Creek								
A	1,789[2]	33	242	6.6	1,779.9	1,779.9	1,780.9	1.0
B	2,039[2]	20	166	9.6	1,783.4	1,783.4	1,784.4	1.0
C	4,598[2]	19	123	13.0	1,793.8	1,793.8	1,794.8	1.0
D	7,035[2]	26	159	10.1	1,802.7	1,802.7	1,803.7	1.0
E	7,740[2]	30	155	10.3	1,806.8	1,806.8	1,807.8	1.0
F	15,157[2]	36	152	10.5	1,870.6	1,870.6	1,871.6	1.0

[1]Feet Above Mouth [2]Feet Above Confluence With Las Vegas Wash

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CITY OF LAS VEGAS, NV
(CLARK CO.)

FLOODWAY DATA

LAS VEGAS WASH-LAS VEGAS CREEK

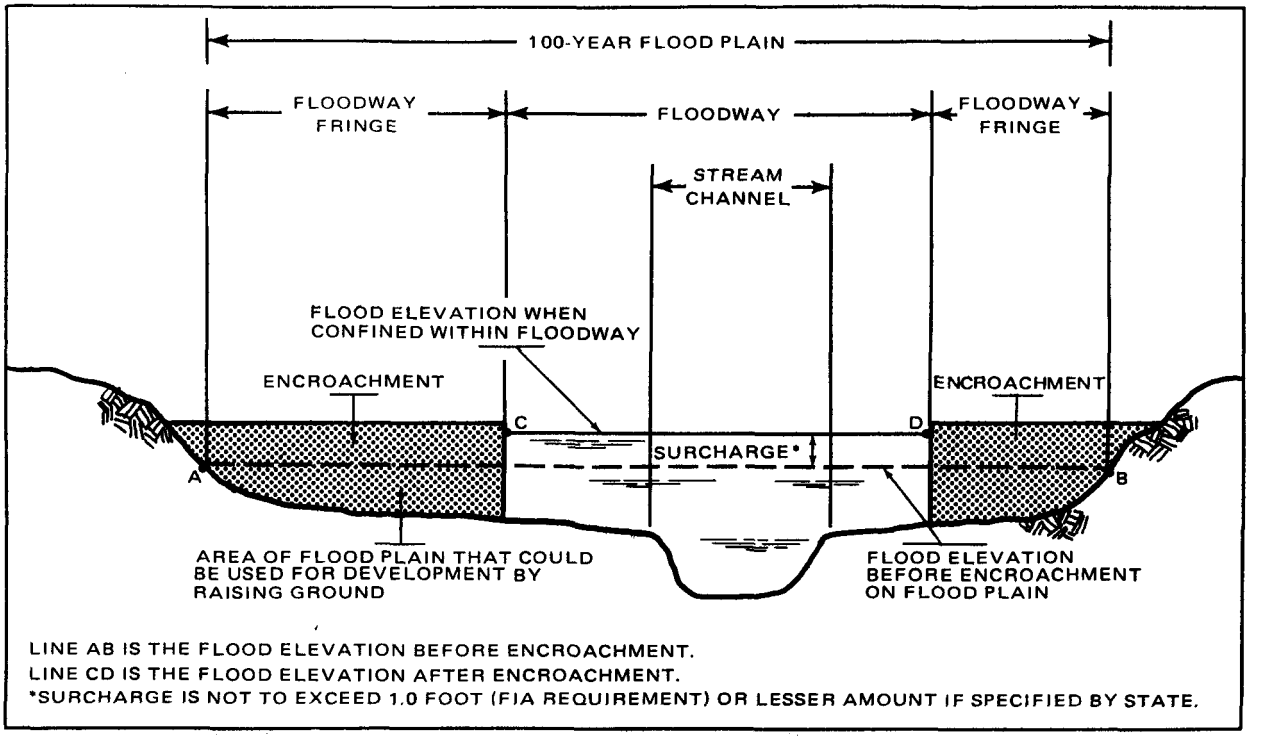

Figure 2. Floodway Schematic

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the Federal Insurance Administration has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors, and flood insurance zone designations for each flooding source studied in detail affecting the City of Las Vegas.

5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach:

Average Difference Between 10- and 100-year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot
7.1 to 12 feet	2.0 feet
More than 12 feet	3.0 feet

The locations of the reaches determined for the flooding sources of the City of Las Vegas are shown on the Flood Profiles (Exhibit 1) and summarized in Table 3.

5.2 Flood Hazard Factors

The Flood Hazard Factor (FHF) is the Federal Insurance Administration device used to correlate flood information with insurance rate tables. Correlations between property damage from floods and their FHF are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest one-half foot, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year water-surface elevations is greater than 10.0 feet, accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective Flood Hazard Factors, the entire incorporated area of the City of Las Vegas was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

Zone A:	Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations shown or Flood Hazard Factors determined.
Zone AO:	Special Flood Hazard Areas inundated by types of 100-year shallow flooding where depths are between 1.0 and 3.0 feet; depths are shown, but no Flood Hazard Factors are determined.
Zones A2, A4, A7, A8, A12, and A14:	Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations shown, and zones subdivided according to Flood Hazard Factors.
Zone B:	Areas between the Special Flood Hazard Areas and the limits of the 500-year flood, including areas of the 500-year

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1% (100-YEAR) FLOOD AND			FLOOD HAZARD FACTOR	ZONE	BASE FLOOD ELEVATION (FEET NGVD)[3]
		10% (10-YEAR)	2% (50-YEAR)	0.2% (500-YEAR)			
Las Vegas Wash							
Reach 1	0025	-7.2	-2.6	2.2	070	A14	Varies - See Map
Reach 2	0025	-3.3	-1.5	1.9	035	A7	Varies - See Map
Reach 3	0025	-5.9	-1.0	3.6	060	A12	Varies - See Map
Reach 4	0025	-3.9	-0.8	0.8	040	A8	Varies - See Map
Reach 5	0025	-2.0	-0.8	1.0	020	A4	Varies - See Map
Sheetflow Area	0025	N/A	N/A	N/A	N/A	A0	Depth 1
Las Vegas Creek							
Reach 1	0025	-1.9	-0.4	1.2	020	A4	Varies - See Map
Reach 2	0025	-0.9	-0.2	0.7	010	A2	Varies - See Map

[1]Flood Insurance Rate Map Panel [2]Weighted Average [3]Rounded to Nearest Foot

TABLE 3

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CITY OF LAS VEGAS, NV
(CLARK CO.)

FLOOD INSURANCE ZONE DATA

LAS VEGAS WASH-LAS VEGAS CREEK

flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; also areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.

Zone C: Areas of minimal flooding.

The flood elevation differences, Flood Hazard Factors, flood insurance zones, and base flood elevations for each flooding source studied in detail in the community are summarized in Table 3.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the the City of Las Vegas is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by the Federal Insurance Administration.

6.0 OTHER STUDIES

A Flood Insurance Study is being conducted for the City of North Las Vegas (Reference 19), the unincorporated metropolitan areas of Clark County (Reference 20), and the nearby cities of Henderson and Boulder City (Reference 21 and 22, respectively). The results of the present study will match exactly with these studies of adjoining areas.

A Flood Plain Information report for lower Las Vegas Wash was prepared by the U.S. Army Corps of Engineers in 1967 (Reference 5). The limits of this report extended to the southern corporate limits of the City of Las Vegas. Peak discharge values calculated for Las Vegas Wash for the present study did not correspond to values used in the U.S. Army Corps of Engineers Flood Plain Information report. However, these differences were resolved during the coordination meetings.

The Federal Insurance Administration previously published a Flood Hazard Boundary Map for the City of Las Vegas (Reference 23). This Flood Insurance Study is more detailed; thus, it supersedes that map.

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

7.0 LOCATION OF DATA

Survey, hydrologic, hydraulic, and other pertinent data used in this study can be obtained by contacting the Insurance and Mitigation Division, Federal Emergency Management Agency, 450 Golden Gate Avenue, P.O. Box 36003, San Francisco, California 94102.

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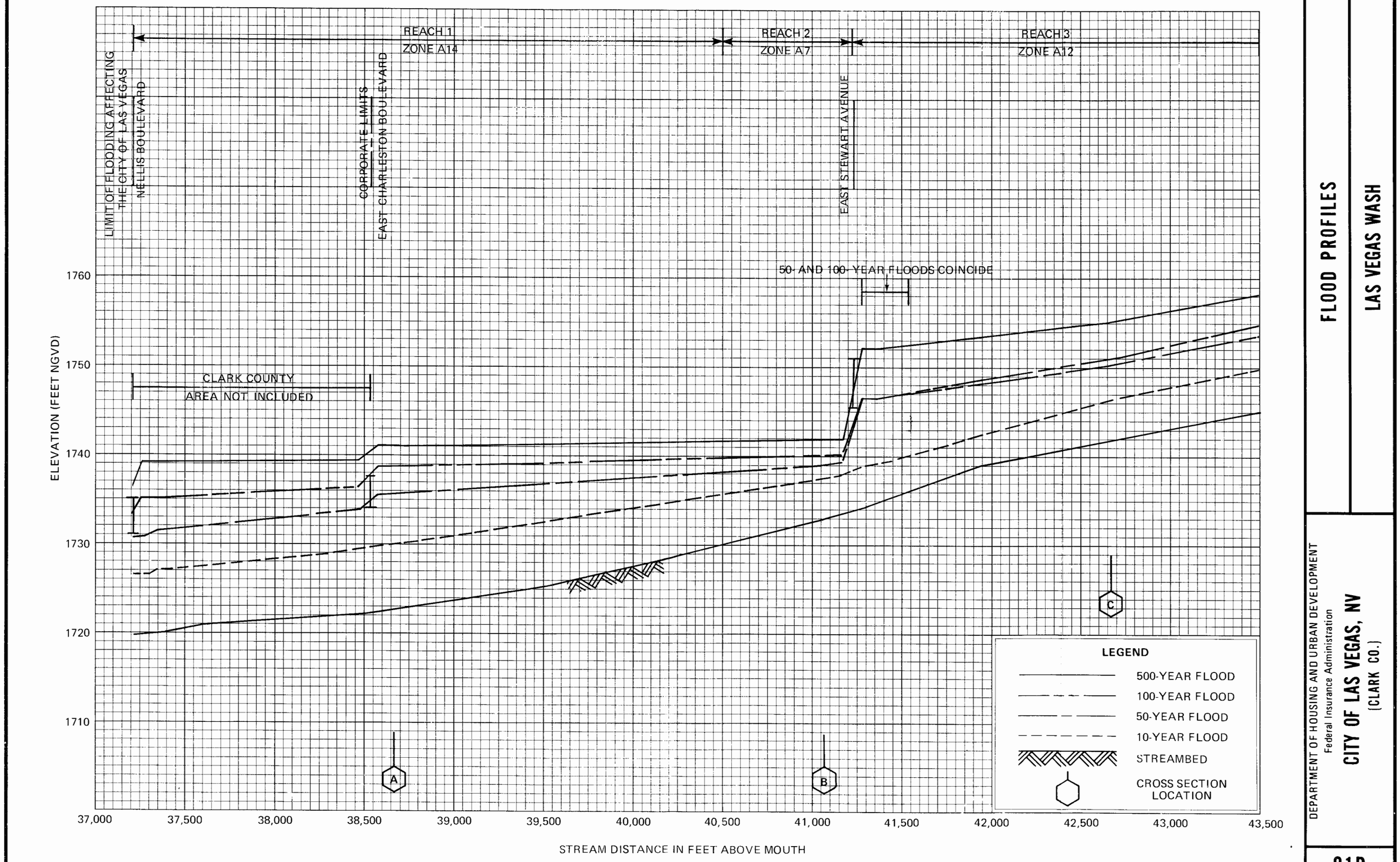
23. ----------, Flood Hazard Boundary Map, City of Las Vegas, Nevada, Scale 1:12,000, December 3, 1976



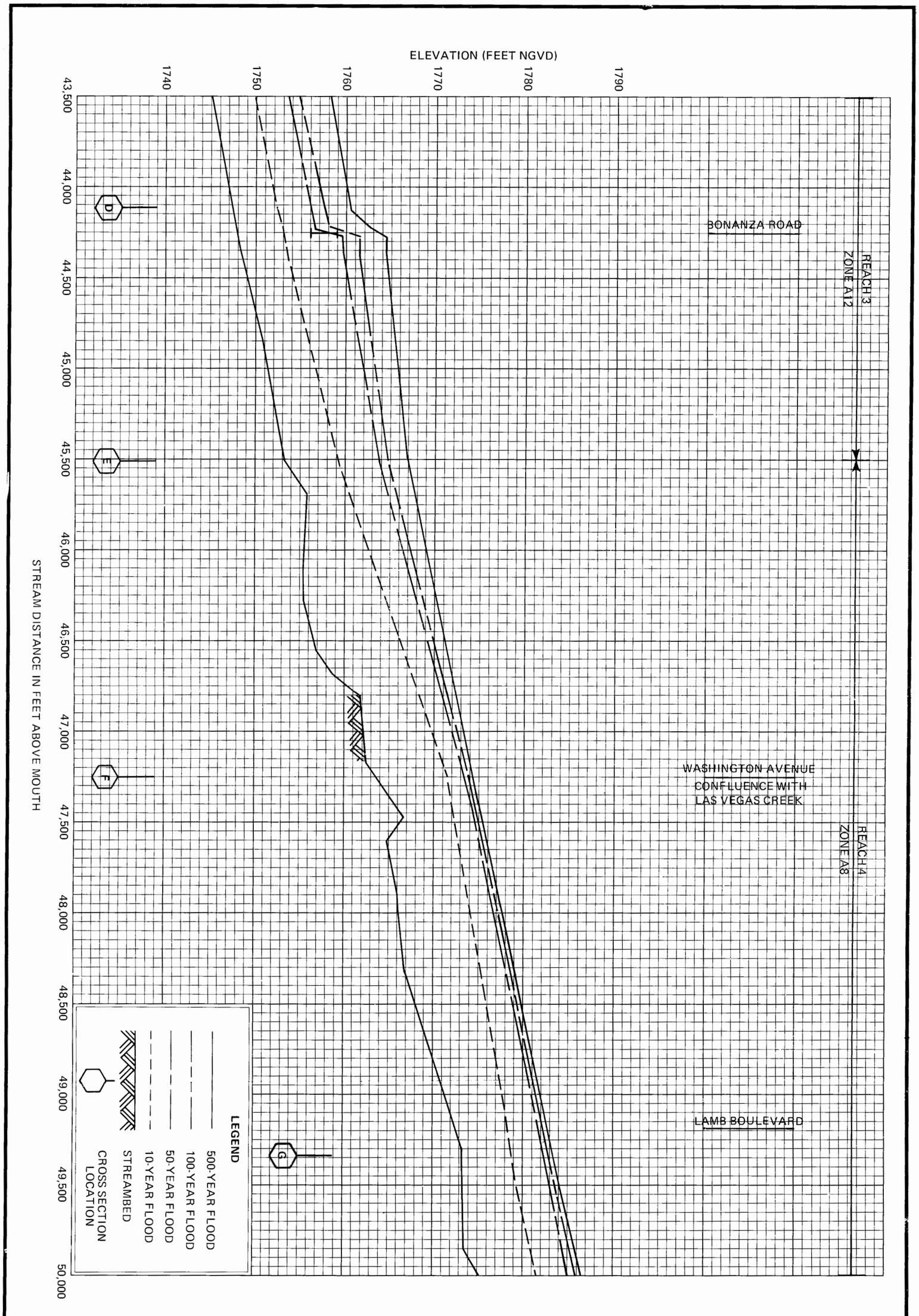
FLOOD PROFILES

LAS VEGAS WASH

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CITY OF LAS VEGAS, NV
(CLARK CO.)

01P



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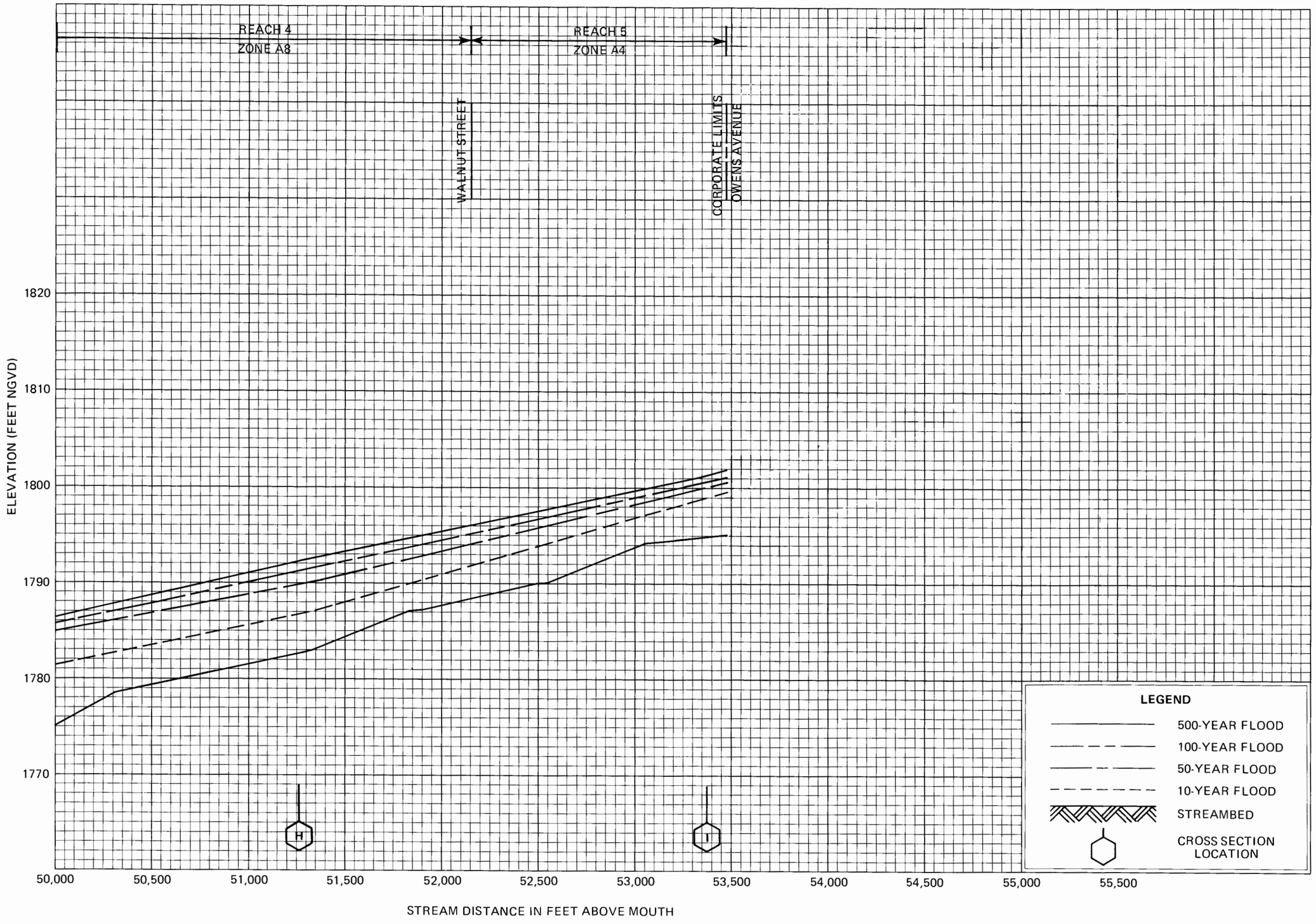
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CITY OF LAS VEGAS, NV
(CLARK CO.)

FLOOD PROFILES

LAS VEGAS WASH



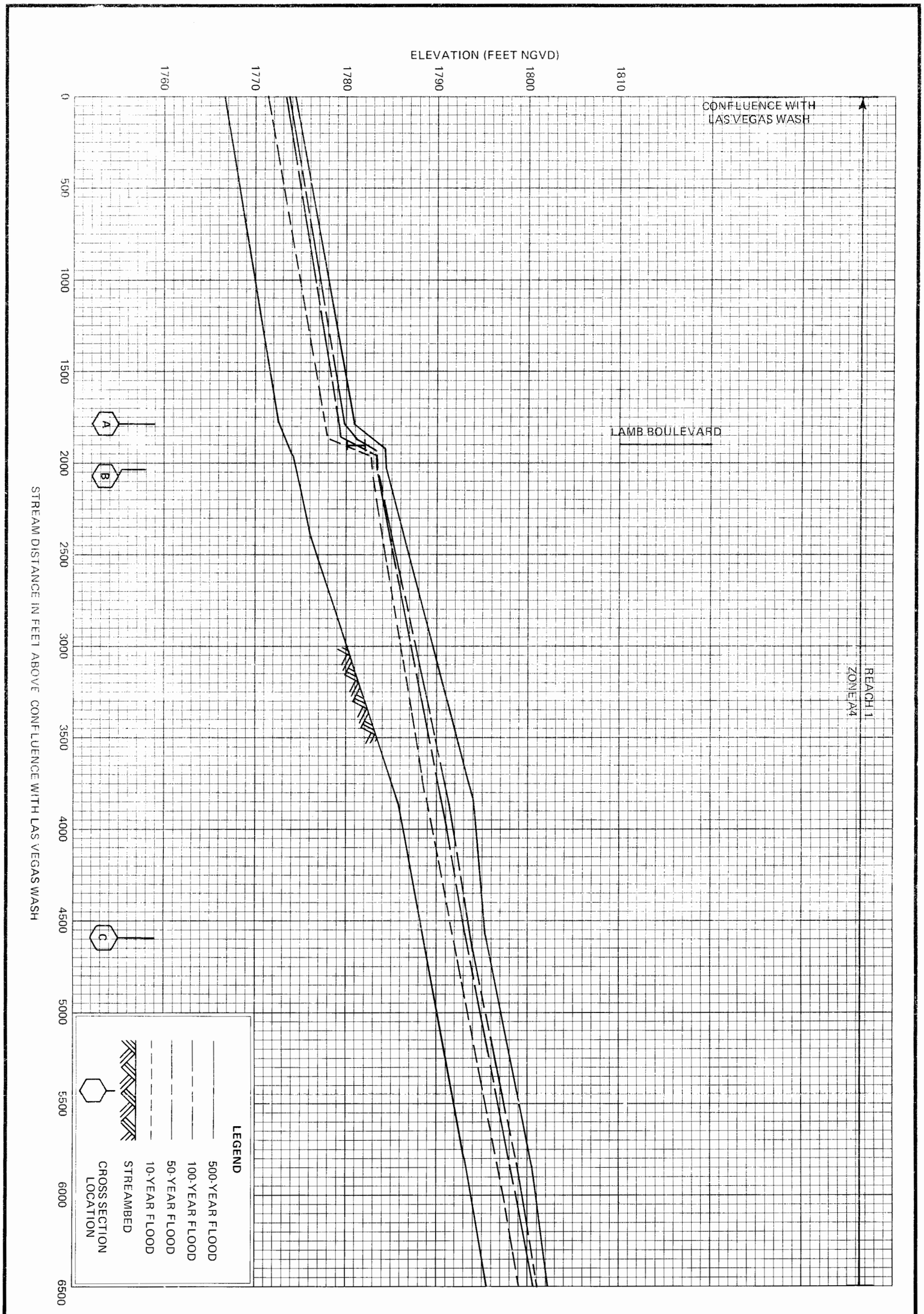
FLOOD PROFILES

LAS VEGAS WASH

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CITY OF LAS VEGAS, NV
(CLARK CO.)

03P



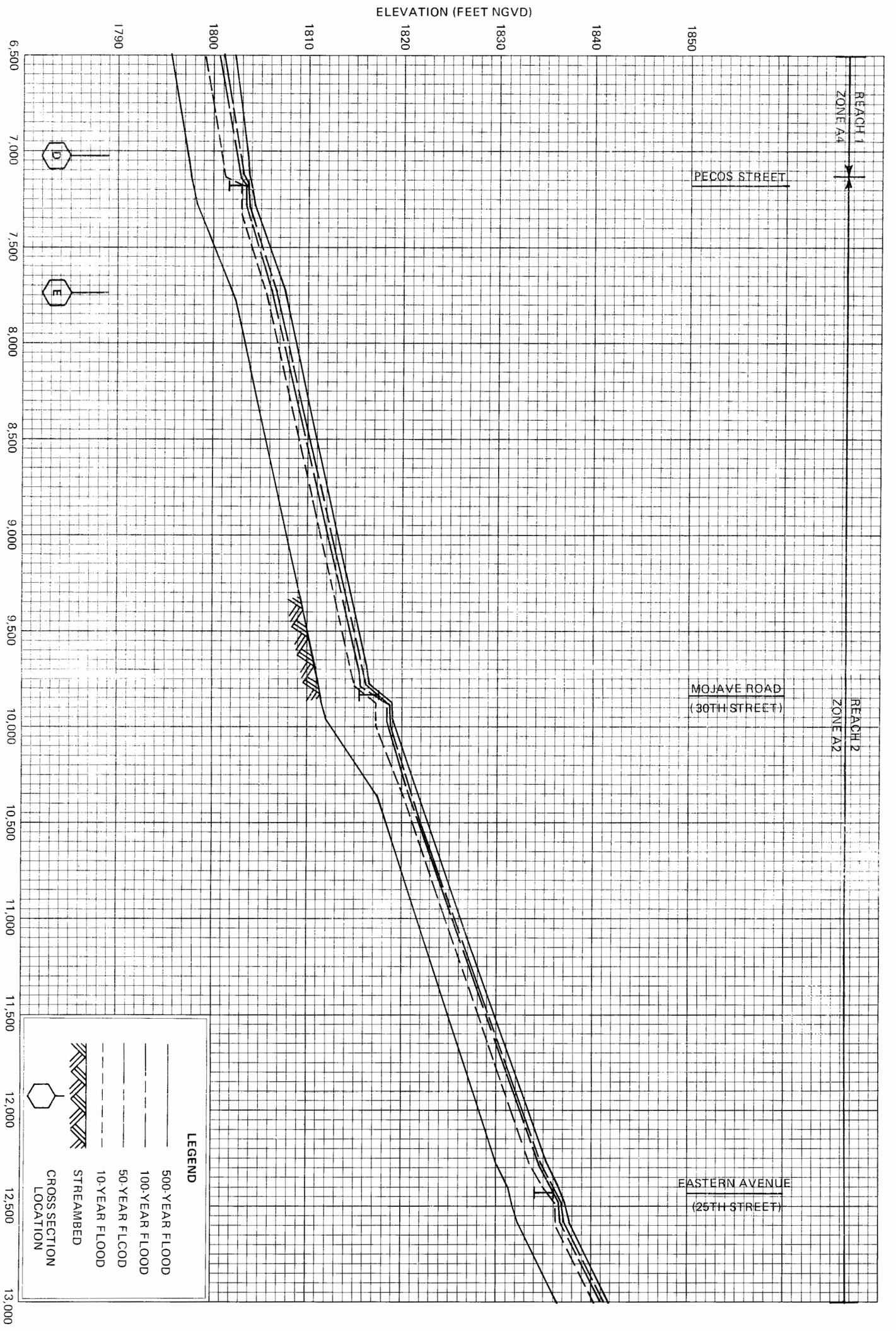
04P

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CITY OF LAS VEGAS, NV
(CLARK CO.)

FLOOD PROFILES

LAS VEGAS CREEK



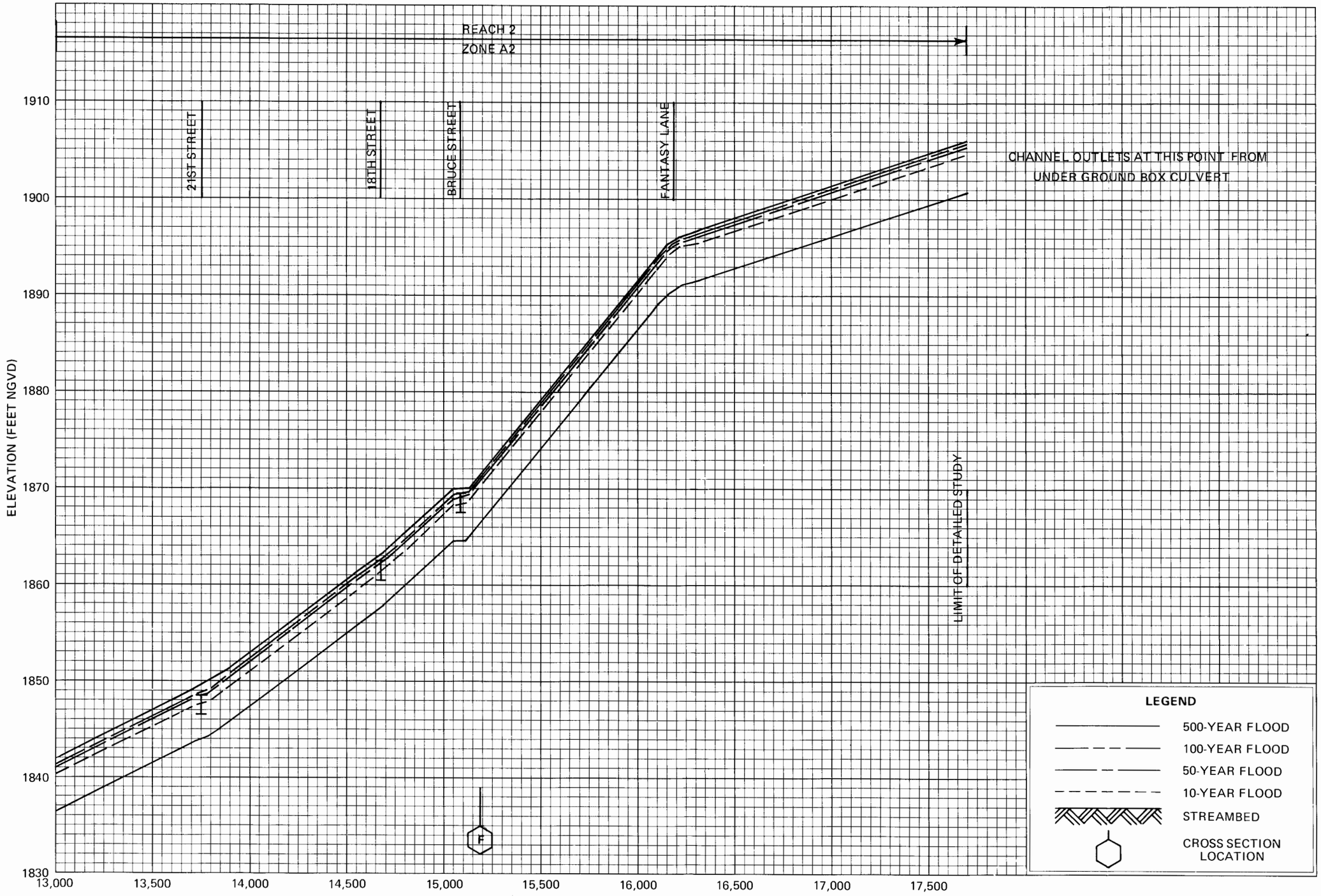
05P

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CITY OF LAS VEGAS, NV
(CLARK CO.)

FLOOD PROFILES

LAS VEGAS CREEK



FLOOD PROFILES

LAS VEGAS CREEK

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CITY OF LAS VEGAS, NV
(CLARK CO.)

06P