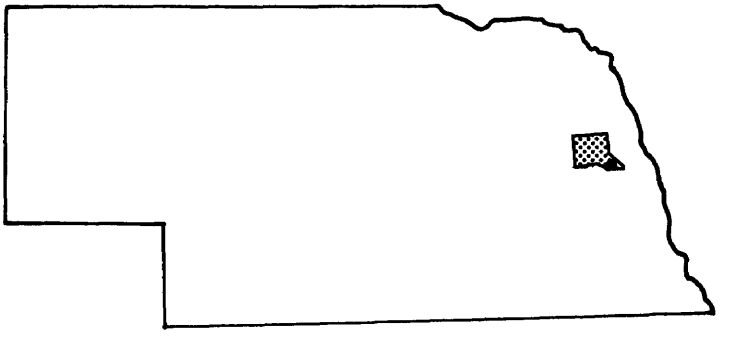
FLOOD INSURANCE STUDY

CITY OF FREMONT, NEBRASKA
DODGE COUNTY



AUGUST 1978

U.S. DEPARTMENT of HOUSING & URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION

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PUBLISHED SEPARATELY:

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 Fremont, Dodge County, Nebraska, 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 Fremont 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

Streams requiring detailed study were identified through joint agreement among personnel of the U.S. Army Corps of Engineers and the Federal Insurance Administration and representatives of the City of Fremont. Information necessary for developing a base map was obtained from the City of Fremont.

A meeting was held with representatives of the City of Fremont, the U.S. Army Corps of Engineers, and the Federal Insurance Administration at Fremont on December 4, 1974. The purpose of the meeting was to collect data from which to develop a time and cost estimate to do this Flood Insurance Study.

A meeting was held on June 29, 1976, in Fremont to present preliminary results of the Flood Insurance Study to the local officials. Representatives from the U.S. Army Corps of Engineers, the Federal Insurance Administration, and the City of Fremont attended the meeting.

A meeting was held in Fremont on July 16, 1976, to present the computed floodways in the Fremont area and the results of the Rawhide Creek analysis to local officials. Representatives of the City of Fremont, the U.S. Army Corps of Engineers, and local financial institutions attended the meeting.

On November 29, 1976, the results of this study were reviewed at the final community coordination meeting. The meeting was attended by representatives of the Federal Insurance Administration and the U.S. Army Corps of Engineers, as well as interested members of the community. No serious problems were encountered during this meeting.

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. Army Corps of Engineers, Omaha District, for the Federal Insurance Administration, under Inter-Agency Agreement No. IAA-H-7-76, Project Order No. 13. This work, which was completed in October 1976, covered all significant flooding sources affecting the City of Fremont.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the area within the 2-mile extra-territorial limits of the City of Fremont, Dodge County, Nebraska. Portions of the extraterritorial area extend beyond the Platte River and into Saunders County, Nebraska. The area of study is shown on the Vicinity Map (Figure 1).

The Platte and Elkhorn Rivers were studied in detail. Rawhide Creek was studied by approximate methods because the irregular nature of the floodwater patterns made it impractical for it to be studied by detailed methods.

Areas studied by detailed methods were chosen with consideration given to all proposed construction and forecasted development through April 1978.

2.2 Community Description

The City of Fremont is located in southwest Dodge County, in east-central Nebraska, approximately 35 miles northwest of Omaha, Nebraska. Fremont is bordered to the north by Nickerson, to the east by Arlington, to the west by Ames, and generally on all four borders by unincorporated areas of Dodge and Saunders Counties.

Fremont is the largest city in Dodge County, and had a 1970 population of 22,962 (Reference 1). The city is a progressive community in the center of a large agricultural area. While the city itself is basically agricultural in nature, business enterprises consist of feed and grain elevator operations, meat processing, hydraulic hose manufacturing, steel building fabrication, pre-stressed concrete manufacturing, and chemical manufacturing.

Fremont has a hospital, as well as homes for the elderly. The city is served by several major transportation routes, including U.S. Highways 30, 77, and 275; the Burlington Northern and Union Pacific Railroads, and the Chicago and North Western Railway; and the Fremont Municipal Airport.

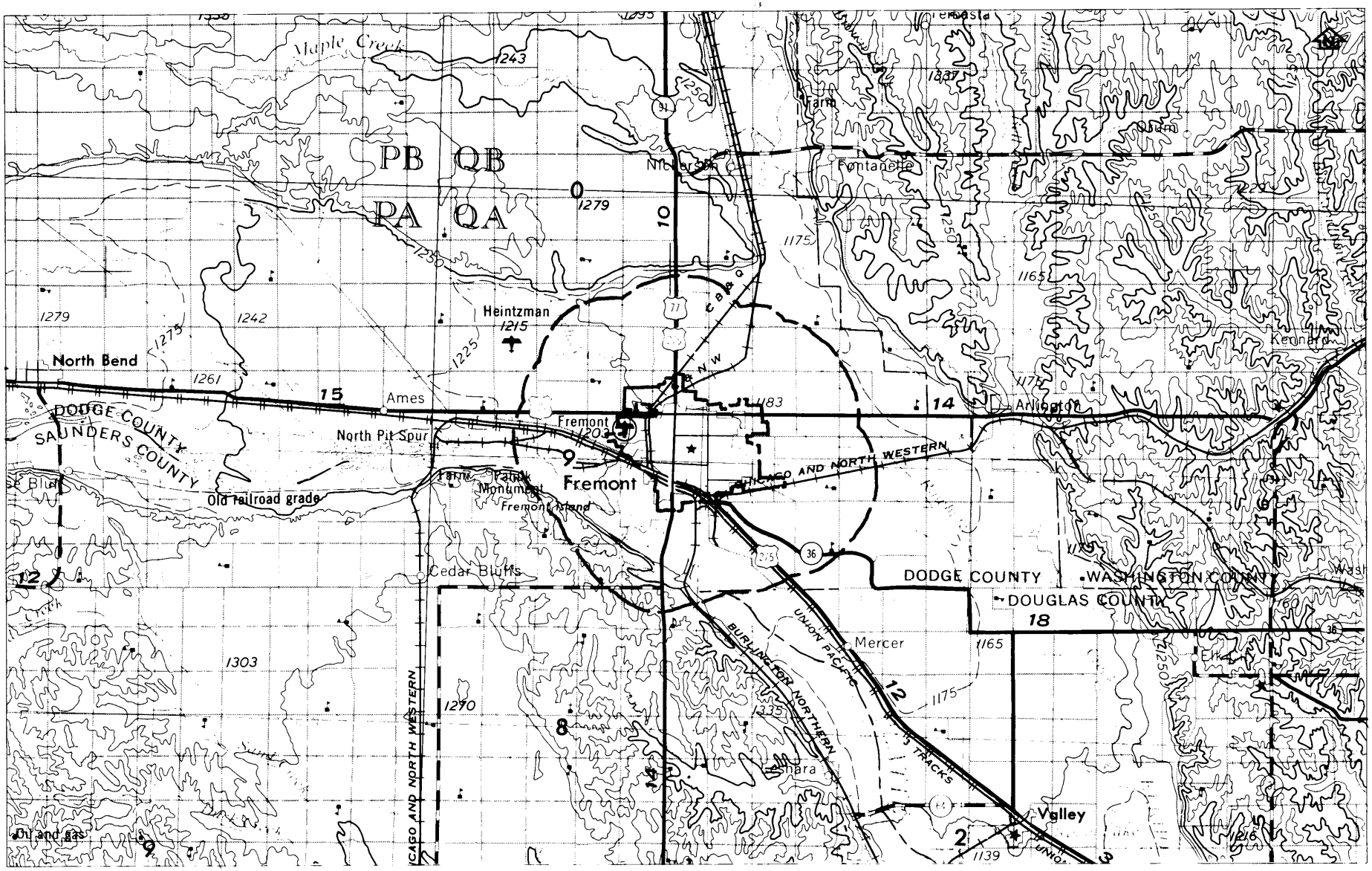

FIGURE 1

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CITY OF FREMONT, NB
(DODGE CO.)

APPROXIMATE SCALE

4.8 0 4.8 9.6 14.4 MILES

VICINITY MAP

The climate in the Platte River basin upstream from the Fremont area, inclusive of the Elkhorn River basin and the Rawhide Creek basin, varies over a wide range. This variation is due to the length of the basin and the large elevation differences between the headwater areas and the Fremont area. The following table gives climatological data for the Platte River basin upstream from Fremont (Reference 2):

Table 1. Platte River Basin Climatological Data

Location	Mean Annual Precipitation (Inches)	July Mean Temperature (°F)	January Mean Temperature (°F)
Walden, Colorado	9.61	58.7	15.4
Idaho Springs, Colorado	15.92	62.7	26.8
Sterling, Colorado	14.96	73.5	24.7
North Platte, Nebraska	19.90	74.3	23.4
Central City, Nebraska	25.13	76.7	23.1
O'Neill, Nebraska	23.12	74.8	20.3
Fremont, Nebraska	30.95	76.9	22.4

Soils in the Fremont area generally range from sandy to silty loams in the uplands and from clays to sandy loams to gravels in the river valley.

Relative to Fremont, the Platte River flows southeasterly through the city's southwestern portion, the Elkhorn River flows southeasterly outside the extraterritorial limits to the east of the city, and Rawhide Creek flows southeasterly through the north-central portion of the city.

The Platte River begins at the confluence of the North and South Platte Rivers near North Platte, Nebraska. From this location, the river flows in a general easterly direction to the vicinity of Fremont. The Platte River drains an area of approximately 82,400 square miles upstream from Fremont. This area comprises southeastern Wyoming, northeastern Colorado, and the central three-fourths of Nebraska running in a west to east direction. Elevations in the basin vary greatly, ranging from 13,000 feet in the mountainous area in the western portion of the basin to from 5000 to 6000 feet on the plains just east of the Rocky Mountains to approximately 1200 feet at Fremont.

The Platte River valley in the vicinity of Fremont is a broad, relatively shallow stream valley, ranging from 4 to 7 miles in width. It has characteristics typical of a braided stream, such as several channels with intermittent islands. The flow is erratic, varying from a few hundred cubic feet per second (cfs) to several thousand cfs depending upon the time of year and the climatic conditions. The main channel is continually changing locations throughout the overall braid pattern.

The Elkhorn River drains an area of approximately 6400 square miles in northeastern Nebraska, beginning near Bassett, Nebraska. Elevations in the basin generally range from 2500 feet in the upper basin to approximately 1170 feet near Fremont. The Elkhorn River, in its natural state, can be classified as a meandering stream, with one main, somewhat sinuous, channel. The adjacent flood plain is scarred with abandoned channels which, depending upon age, vary from lakes to marshes to lower farmland. These abandoned channels, especially along the lower Elkhorn River, resulted from artificial straightening of the river. The streambanks are usually bordered by stands of timber and associated flora except where this type of vegetation has been removed and replaced for agricultural purposes.

The combined width of the Platte and Elkhorn River valleys near Fremont is approximately 7.5 miles.

Rawhide Creek is a relatively small stream originating north of Schuyler, Nebraska. The stream flows in a general easterly direction in the northern portion of the Platte River flood plain. The overall Rawhide Creek drainage area is approximately 100 square miles at Fremont. However, the effective drainage area at Fremont is only approximately 30 square miles due to a network of intercepter drains which diverts Rawhide Creek upstream from Fremont to the Platte River. Elevations in the overall basin range from approximately 1550 feet in the upper basin to approximately 1190 feet at Fremont. Generally, the topography ranges from steep near the river valley to gently rolling away from the river.

Flood plain development along the Elkhorn River is sparse, consisting mainly of scattered farmhouses. The Platte River flood plain is slowly developing into a residential area.

2.3 Principal Flood Problems

Fremont lies entirely within the flood plains of the Platte River, Elkhorn River, and Rawhide Creek; overflow from these streams is the city's principal flood problem. Flooding from these streams can occur in Fremont as a result of rapid snowmelt, heavy rainfall, or combinations thereof. Flooding on these streams under open-river conditions would normally be of relatively long duration, with ample warning prior to the peak. Flooding on Rawhide Creek would occur much earlier, following heavy rainfall, than on either the Platte or Elkhorn Rivers due to its smaller drainage basin. The flood duration, however, would be relatively long due to the physical characteristics of the Rawhide Creek flood plain, which tends to convey floodwaters rather slowly.

Iceflows can also influence flooding on the Platte and Elkhorn Rivers. This phenomenon is a problem in late winter and early spring. Stage increases of several feet, relative to open-river conditions, can occur in the event of an ice jam.

The Platte River historically has been a flood problem for Fremont. Since 1945, the Platte River has flooded in the vicinity of Fremont in 1947, 1948, 1949, 1950, 1960, 1962, 1966, 1967, and 1971. The majority of these floods occurred in February and March as a result of rapid snowmelt and ice jams. The 1971 flood, however, resulted from heavy rainfall over frozen ground.

The 1960 flood was the flood of record on the Platte River in the vicinity of Fremont. Record cold temperatures followed by above-freezing temperatures caused rapid snowmelt. The resultant high discharges were further aggravated by ice jams, some of which formed directly south of Fremont. Floodwaters overtopped the Fremont Cutoff Ditch west of Fremont and flowed north of U.S. Highway 30 to the Rawhide Creek flood plain. Floodwaters also overtopped the Union Dike south and east of Fremont. The Union Pacific Railroad and the Fremont Dike, located west and south of Fremont, respectively, contained the floodwaters in that vicinity. Portions of the Fremont State Recreation Area and development adjacent to several sand pit lakes southwest of Fremont were flooded.

Figures 2 through 5 show Platte River flooding in the immediate Fremont area from the 1960 flood. The photographs were taken at approximately 4 p.m. on March 30. Note that the photographs are continuous, showing the Platte River flood from west of Fremont to southeast of Fremont. The ice formations along the river should also be noted.

The Elkhorn River, like the Platte River, has historically been a flood problem for the Fremont area. However, due to its remoteness from the urbanized area of Fremont, damages in the Fremont area due to flooding along the Elkhorn River have been mainly agricultural. Since 1940, at least eight floods have occurred on the Elkhorn River in the Fremont area. These floods occurred in 1940, 1944, 1951, 1960, 1962, 1966, 1967, and 1971. Approximately one-half of these floods were due to rapid snowmelt augmented by ice jams, with the remaining one-half resulting from heavy rainfall. Highways, railroads, and low-lying agricultural land in the area sustained heavy damages.

Rawhide Creek has flooded many times since the Fremont area was settled; however, accounts of flooding along Rawhide Creek near Fremont are sparse. Since 1940, flooding due to Rawhide Creek has occurred in at least 1940, 1944, 1945, 1957, and 1971. Flooding produced by Rawhide Creek is shallow in nature.

Portions of the flood plain of the Platte River west and south of Fremont and upstream from U.S. Highway 77 have some unique features that could cause flooding in Fremont from a 100-year or smaller flood. First, the area has been extensively gravel mined, with the result that there is an intricate pattern of ridges, roads, lakes, and channels. Second, the outer boundary of the 100-year flood plain is formed by intermittent high ground, the Union Pacific

Figure 2. Platte River Flood of March 1960

Figure 3. Platte River Flood of March 1960

Figure 4. Platte River Flood of March 1960

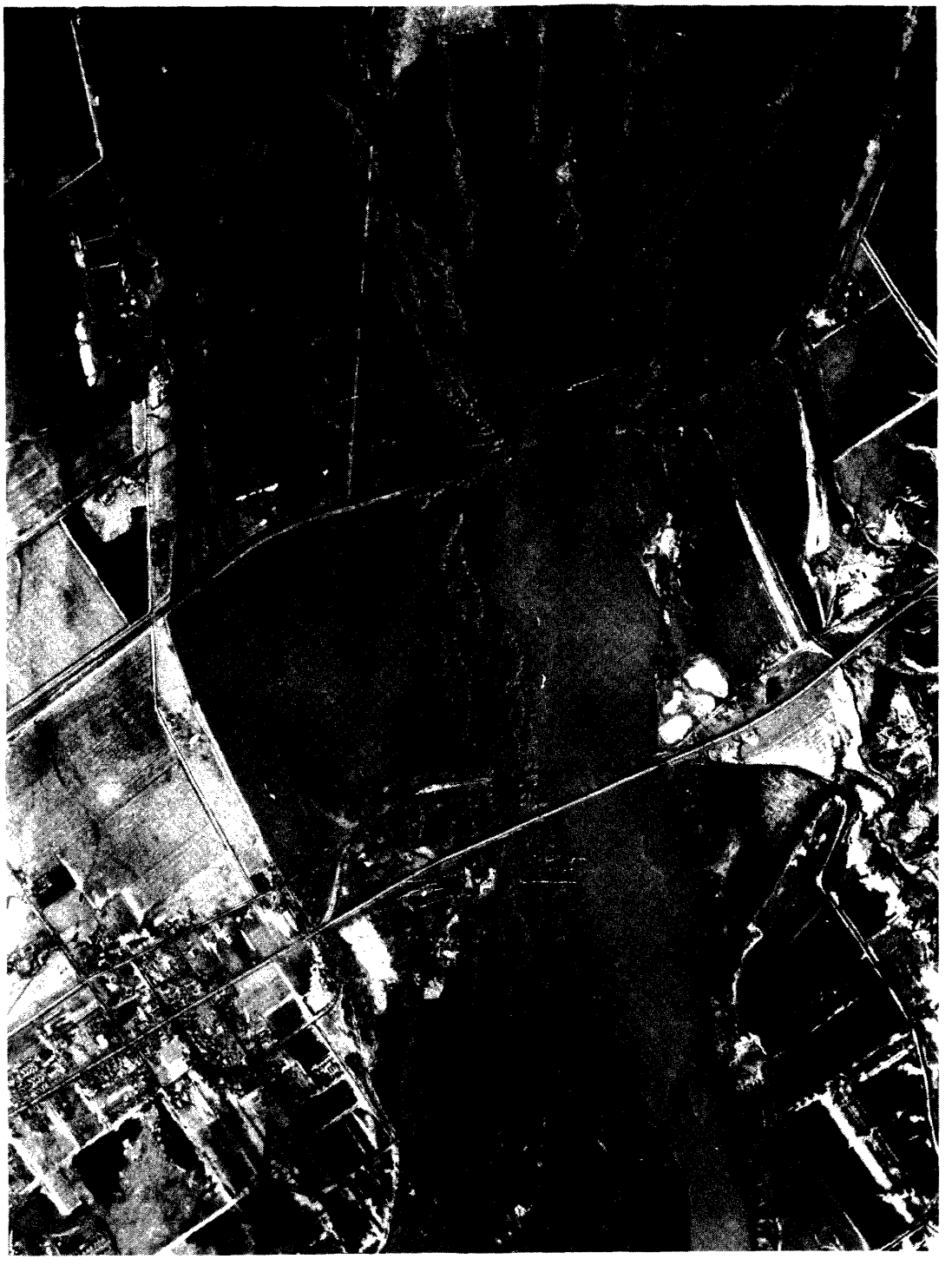

Figure 5. Platte River Flood of March 1960

Railroad, and the Fremont Dike. These features are elevated only a small distance above the 100-year flood and, if overtopped, significant portions of Fremont which are presently excluded from the 100-year flood plain could be flooded.

2.4 Flood Protection Measures

Several dams and reservoirs are located in the Platte River basin in Colorado, Wyoming, and western Nebraska. The influence of these dams and reservoirs was included in the frequency-discharge relationships for the Platte River at Fremont.

The Fremont Cutoff Ditch Dike, the Fremont Dike, and the Union Dike are located west of Fremont, south of Fremont, and southeast of Fremont, respectively. These dikes protect Fremont from more frequent floods, but are of insufficient size to protect Fremont from a 100-year flood. Ice jams, if located in the vicinity, can create high flood stages with relatively little discharge, thereby reducing the amount of protection provided by these dikes relative to open-river conditions.

A dike also exists southeast of Fremont, south of the Platte River, which protects the development known as Woodcliff. This dike, although untested by a large flood event, appears to provide protection similar to that provided north of the Platte River by the Union Dike.

Few flood protection measures have been implemented for the Elkhorn River in Fremont other than some channel straightening in the lower reaches of the river. The upper basin contains some erosion control structures and floodwater-retarding structures. These structures, however, provide little, if any, flood peak reduction in the Fremont area.

Several flood protection measures have been implemented to reduce the flood peaks and flood frequency of Rawhide Creek at Fremont. Upstream from Fremont, the major flood reduction structures are the cutoff ditches, such as the Fremont Cutoff Ditch, which diverts Rawhide Creek to the Platte River. In the immediate vicinity of Fremont, the Rawhide Creek channel, a naturally sinuous stream, has been straightened and realigned at various locations.

3.0 ENGINEERING METHODS

For 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. Floods having recurrence intervals of 10, 50, 100, and 500 years have been selected as having special significance for flood plain management and for flood insurance premium rates. The analyses reported here reflect current conditions in the watersheds of the streams.

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.

The discharge-frequency relationship for the Platte River was developed from stream gaging records for the Platte River at North Bend, Nebraska, compiled by the U.S. Geological Survey (Reference 3). The log-Pearson Type III probability distribution was then utilized to statistically analyze these gage data (Reference 4). Due to the close proximity of North Bend to Fremont and the extremely small change in drainage area between North Bend and Fremont relative to the entire Platte River basin upstream from Fremont, the discharge-frequency relationship developed at North Bend was used at Fremont.

The discharge-frequency relationship for the Elkhorn River was developed from stream gage records for the Elkhorn River at Waterloo, Nebraska, and at Norfolk, Nebraska, compiled by the U.S. Geological Survey (Reference 5). The data at these gages were statistically analyzed using the log-Pearson Type III probability distribution (Reference 4). The resultant discharge-frequency relationships between gages were adjusted on a drainage area basis.

Data were also taken directly from a paper concerning the Platte River basin, published by the Missouri River Basin Commission (Reference 6).

Discharges for the 500-year floods on the Platte and Elkhorn Rivers are based upon the previously described hydrologic analysis for each respective stream. This discharge was determined by extrapolation of those data.

For Rawhide Creek, a hydrologic investigation was done by using unit hydrograph techniques together with point rainfall data (Reference 7). With this information, it was possible to determine an approximate 100-year discharge.

For the streams studied in detail, Frequency-Discharge, Drainage Area Curves are shown in Figure 6.

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 detail.

Water-surface elevations for floods of the selected recurrence intervals on the Platte and Elkhorn Rivers were computed through the use of the U.S. Army Corps of Engineers' HEC-2 step-backwater

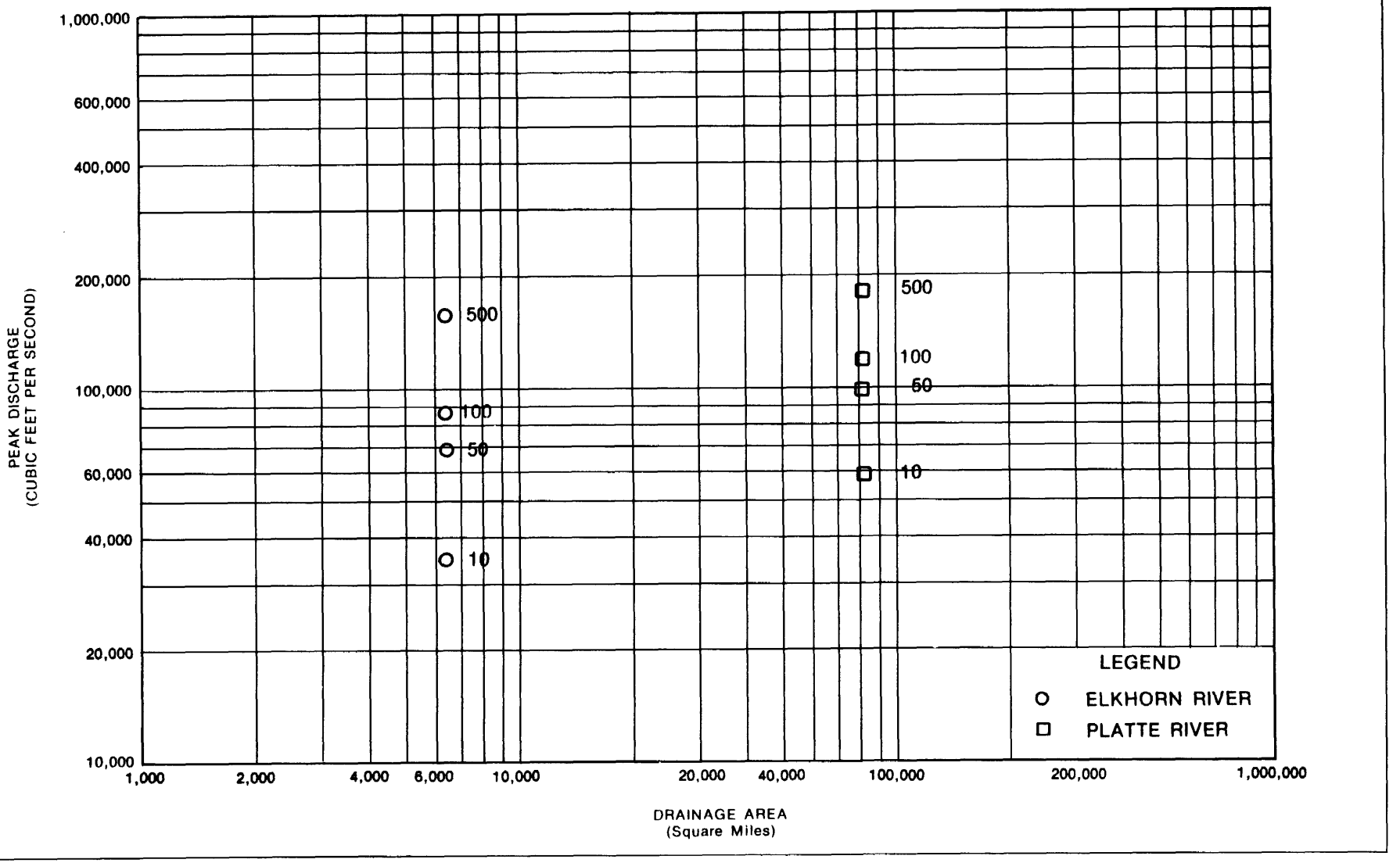

FIGURE 6

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CITY OF FREMONT, NB
(DODGE CO.)

FREQUENCY DISCHARGE, DRAINAGE AREA CURVES

PLATTE RIVER AND ELKHORN RIVER

computer program (Reference 8). Head losses at bridges were computed using bridge routines contained in the program. Cross sections for the hydraulic analyses on the Platte and Elkhorn Rivers were obtained by photogrammetric methods using aerial photography obtained in November 1974 (Reference 9). Hydrographic survey data and bridge data were surveyed in 1974 by ground methods. Survey data on Union Dike, provided by the Papio Natural Resources District, and railroad survey data, provided by the Union Pacific Railroad, were also used to determine cross sections on the rivers.

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

Roughness factors (Manning's "n") for computations for the Platte River were assigned on the basis of inspection and engineering judgment and in order to match previously established high-water marks. These values are 0.120 for the overbank and range from 0.020 to 0.0325 for the channel. Roughness factors for the Elkhorn River were assigned on the basis of visual inspection and engineering judgment. These values are 0.065 and 0.030 for the overbank and channel, respectively.

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). Starting water-surface elevations for the Elkhorn and Platte Rivers were determined by normal depth computations, with verification by comparison with historic flood data.

The flood elevations, as shown on the profiles, are based on open-channel conditions with neither debris in hydraulic structures nor ice jams in the channel. The flood elevations, as shown on the profiles, are thus considered valid only if the hydraulic structures and channel remain, in general, unobstructed.

Due to the large width of the Rawhide Creek flood plain relative to the Rawhide Creek discharge, the water in the flood plain is quite shallow and flows in irregular flow patterns, making conventional hydraulic computations impractical.

The study for Rawhide Creek is based upon field observations, past flood accounts, and approximate computations. The information, derived from the previously mentioned hydrologic analysis, coupled with data derived from an approximate hydraulic analysis on Rawhide Creek to determine the channel capacity, was used to determine the elevation of floodwater on the flood plain.

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-year and the 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 scale of 1:24,000, with a contour interval of 10 feet (Reference 10).

Aerial photographs of the Platte River flood in 1960 were used to assist in establishing and validating the flood boundaries on the Platte River (Reference 11). Historic flood data of the 1971 flood on the Elkhorn River were used to validate the flood boundaries determined for the Elkhorn River.

The Platte River is a source of shallow flooding in three areas within Fremont. Northwest of the city, shallow flooding that is 2 feet in depth and 1 foot in depth is created by the Platte River and by Rawhide Creek.

The Elkhorn River is a source of shallow flooding directly south of the Chicago and North Western Railway, which borders the eastern extraterritorial limits. This flooding is 1 foot deep and is actually a combination of Rawhide Creek and Elkhorn River floodwaters flowing through drainage structures in the railroad embankment.

The flood boundaries for Rawhide Creek were established by approximate methods, but are not portrayed as such due to the dominance of the Platte and Elkhorn River detailed study boundaries. U.S. Geological Survey 7.5-Minute Series Quadrangle Maps (Reference 10) were combined with field observation and historical flood data to establish the flood boundaries.

The boundaries of the 100-year and the 500-year floods are shown on the Flood Boundary and Floodway Map (Exhibit 2). In cases where the 100-year and 500-year flood boundaries are close together, only the 100-year flood boundary has been shown.

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 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 for the Platte and Elkhorn Rivers were computed on the basis of equal conveyance reduction from each side of the flood plain and by specifying left and right bank encroachment stations where the computed floodway is located at the flood plain edge. 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 coincide, 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 7.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WITH FLOODWAY	WITHOUT FLOODWAY (FEET NGVD)	DIFFERENCE
Platte River							
C	293,170	2,560[2]	19,679	6.05	1,188.9	1,188.6	0.3
D	295,390	2,400	22,180	5.37	1,191.7	1,191.5	0.2
E	296,820	1,760	18,914	6.29	1,194.1	1,193.5	0.6
F	297,860	1,950	23,761	5.01	1,195.1	1,194.9	0.2
G	299,620	1,550	22,351	5.32	1,195.6	1,195.3	0.3
H	301,370	2,000	19,870	5.99	1,197.1	1,197.0	0.1
I	303,280	2,600	19,768	6.02	1,198.0	1,197.8	0.2
J	305,750	3,050	25,925	4.59	1,200.6	1,200.3	0.3
K	308,270	3,400	28,407	4.19	1,203.5	1,202.8	0.7
L	310,220	2,300	27,743	4.29	1,204.6	1,203.8	0.8
M	312,500	3,550	20,972	5.67	1,206.1	1,205.2	0.9
N	313,500	3,250	24,225	4.91	1,207.5	1,206.5	1.0
O	315,350	2,750	25,095	4.74	1,209.4	1,208.4	1.0
P	317,730	3,100	24,964	4.77	1,211.4	1,210.8	0.6
Q	319,800	3,600	28,838	4.13	1,213.8	1,212.9	0.9
R	321,050	2,950	23,130	5.14	1,215.0	1,214.0	1.0
Elkhorn River							
G	177,700	7,602[2]	38,230	2.25	1,172.3	1,171.3	1.0

[1]Feet Above Mouth [2]This Width Extends Beyond Extraterritorial Limits

TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CITY OF FREMONT, NB
(DODGE CO.)

FLOODWAY DATA

PLATTE RIVER-ELKHORN RIVER

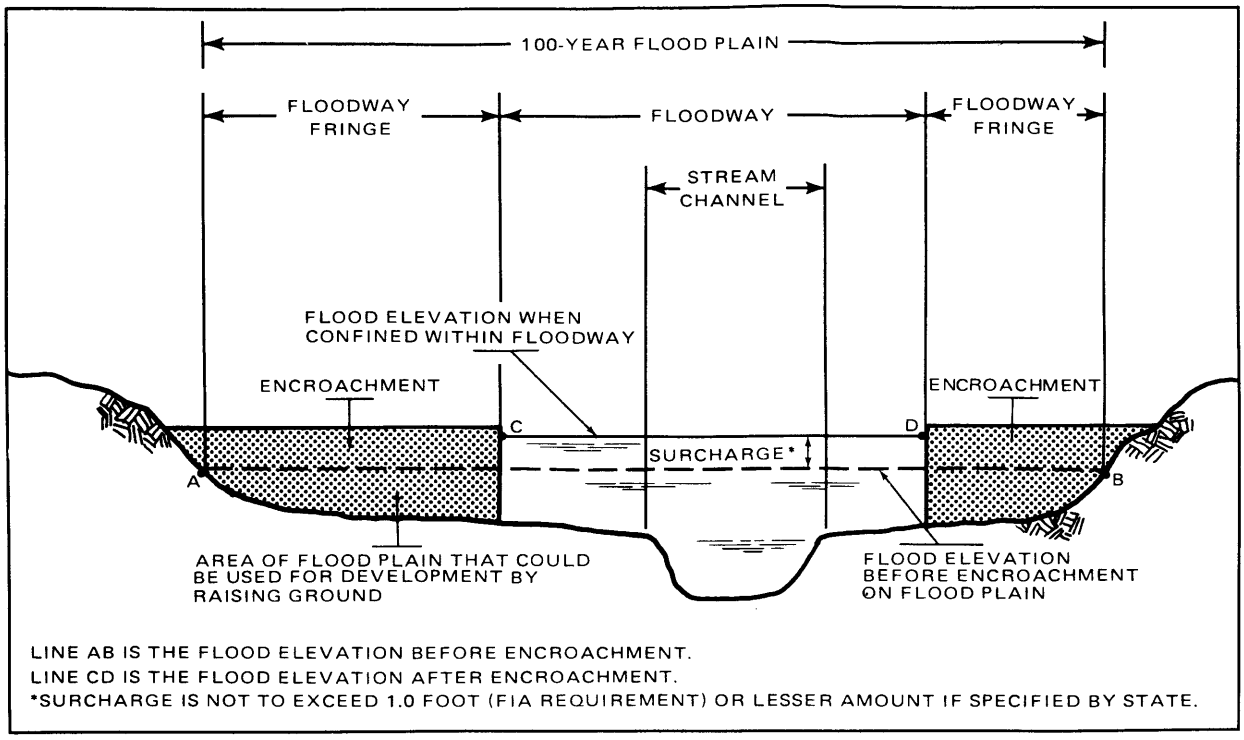

Figure 7. Floodway Schematic

The Fremont 2-mile zoning limit is not inclusive of the entire Platte River floodway or of much of the Elkhorn River floodway. This could present problems in jurisdiction and regulation of these floodways because adjacent governing bodies are involved.

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 Fremont.

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
2 to 7 feet	1.0 foot

Two reaches meeting the above criterion were required for the flooding sources of Fremont. These included one reach each on both the Platte and Elkhorn Rivers. The locations of the reaches are shown on the Flood Profiles (Exhibit 1).

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 area of Fremont within the 2-mile extraterritorial limits 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 A0:	Special Flood Hazard Areas inundated by types of 100-year shallow flooding where depths are between 1.0 and 3.0 feet; no Flood Hazard Factors determined.
Zones A5 and A6:	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 Area and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; or, areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot. 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 City of Fremont 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 Level B study conducted on the Platte River basin in Nebraska was used as a direct source for the hydrologic portion of the study for the Platte and Elkhorn Rivers (Reference 6). The results of these two studies are, therefore, compatible.

Initially, there was a disagreement between this study and the Flood Insurance Study for Saunders County, Nebraska (Reference 12). However, this was resolved and the Saunders County study will be changed to match the Fremont study.

This study is authoritative for the purposes of the 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 office of the Federal Insurance Administration, Regional Director, Federal Office Building, 911 Walnut Street, Kansas City, Missouri 64106.

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)			
Platte River							
Reach 1	0002	-2.5	-0.8	2.5	025	A5	Varies - See Map
Shallow Flooding	0001,0002 0003	N/A	N/A	N/A	N/A	A0	Depth 2
Shallow Flooding	0001,0002, 0003	N/A	N/A	N/A	N/A	A0	Depth 1
Elkhorn River							
Reach 1	0001,0003	-3.0	-0.8	2.2	030	A6	Varies - See Map
Shallow Flooding	0003	N/A	N/A	N/A	N/A	A0	Depth 1

[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 FREMONT, NB
(DODGE CO.)

FLOOD INSURANCE ZONE DATA

PLATTE RIVER-ELKHORN RIVER

8.0 BIBLIOGRAPHY AND REFERENCES

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2. U.S. Department of Commerce, National Weather Service, Platte River Basin Climatological Data, 1941-1970

3. U.S. Department of the Interior, Geological Survey, Water Supply Paper No. 1680, Magnitude and Frequency of Floods in the United States, Part 6B, Missouri River Basin Below Sioux City, Iowa, 1968

4. U.S. Water Resources Council, "A Uniform Technique for Determining Flood Flow Frequencies," Bulletin 15, December 1967

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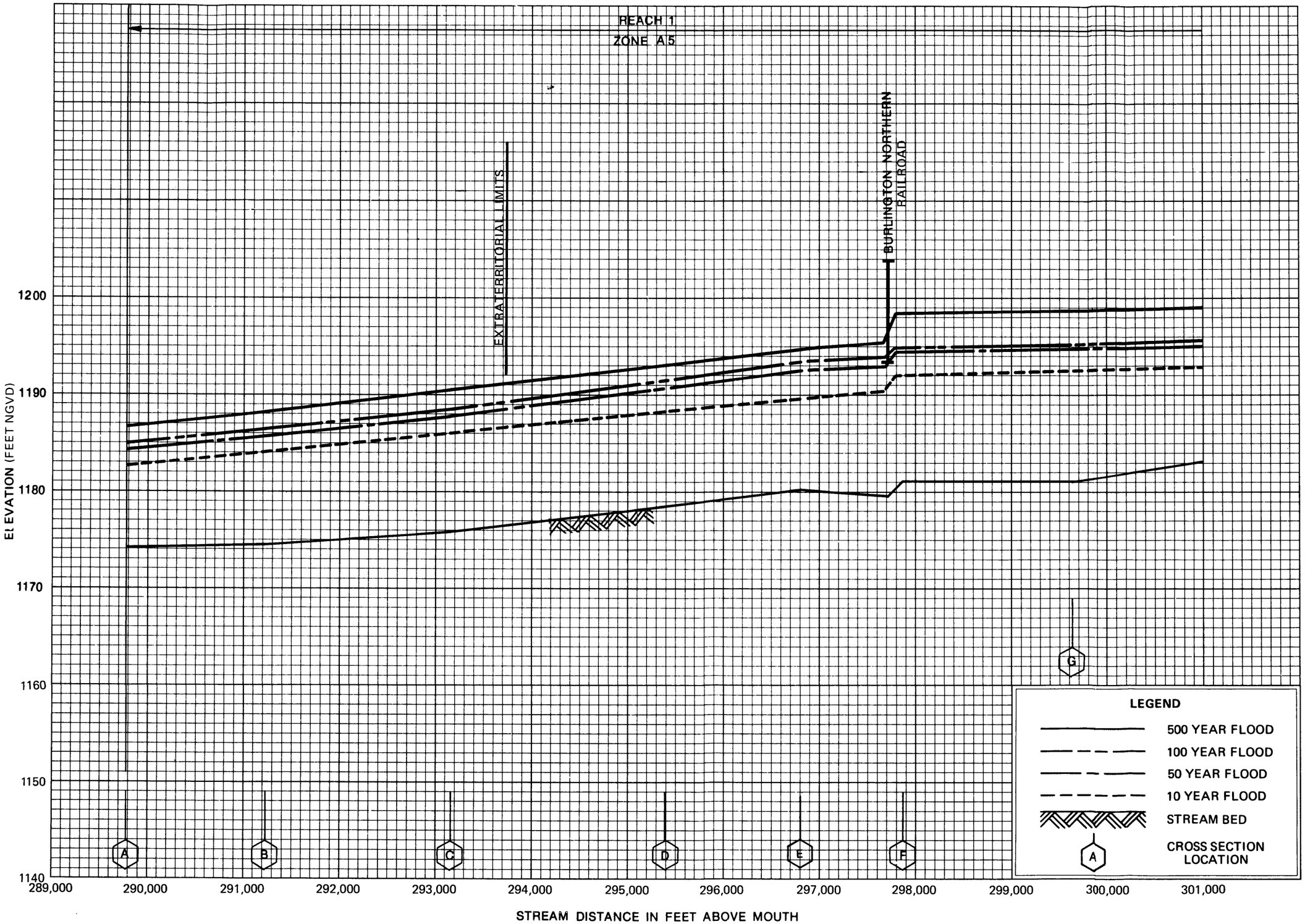
8. U.S. Department of the Army, Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water-Surface Profiles, Generalized Computer Program, Davis, California, October 1973

9. Gollehon and Schemmer Associates, Inc., Aerial Photographs, Fremont, Nebraska, 1974

10. U.S. Department of the Interior, Geological Survey, 7.5-Minute Series Topographic Maps, Scale 1:24,000, Contour Interval 10 feet: Fremont East, Nebraska (1968); Fremont West, Nebraska (1968); Arlington, Nebraska (1968)

11. U.S. Department of the Army, Corps of Engineers, Aerial Photographs, Platte River Basin From North Bend to South Bend, Nebraska, 1960

12. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Study, Saunders County, Nebraska, October 1976



FLOOD PROFILES

PLATTE RIVER

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CITY OF FREMONT, NB
(DODGE CO.)

01P

REACH 1
ZONE A5

U.S. HIGHWAY 77

ELEVATION (FEET NGVD)

1210
1200
1190
1180
1170
1160
1150

300,000 301,000 302,000 303,000 304,000 305,000 306,000 307,000 308,000 309,000 310,000 311,000 312,000

STREAM DISTANCE IN FEET ABOVE MOUTH

H I J K L

LEGEND

- 500 YEAR FLOOD
- 100 YEAR FLOOD
- 50 YEAR FLOOD
- 10 YEAR FLOOD
- STREAM BED
- A — CROSS SECTION LOCATION

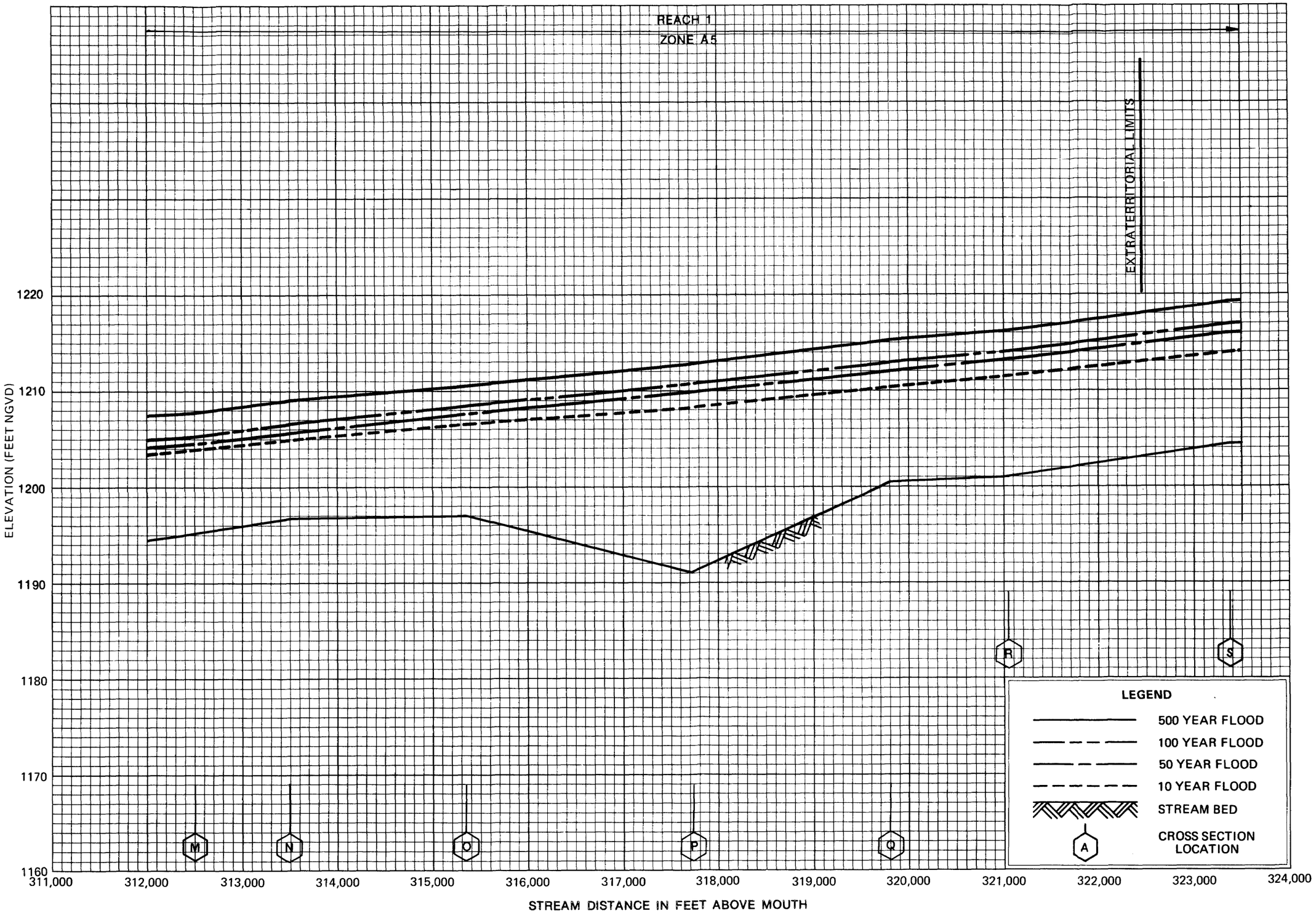
FLOOD PROFILES

PLATTE RIVER

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CITY OF FREMONT, NB
(DODGE CO.)

02P



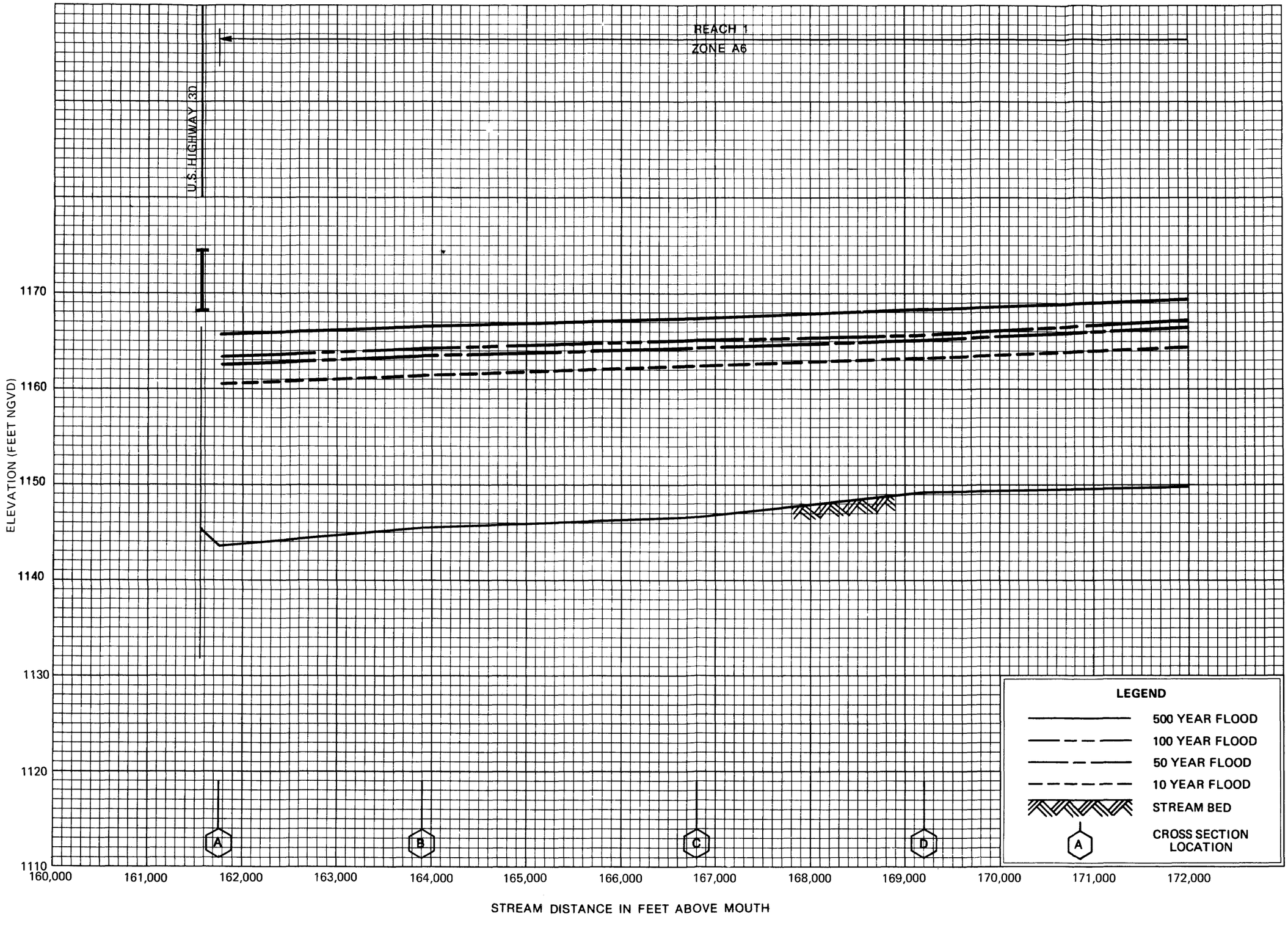
FLOOD PROFILES

PLATTE RIVER

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CITY OF FREMONT, NB
(DODGE CO.)

03P



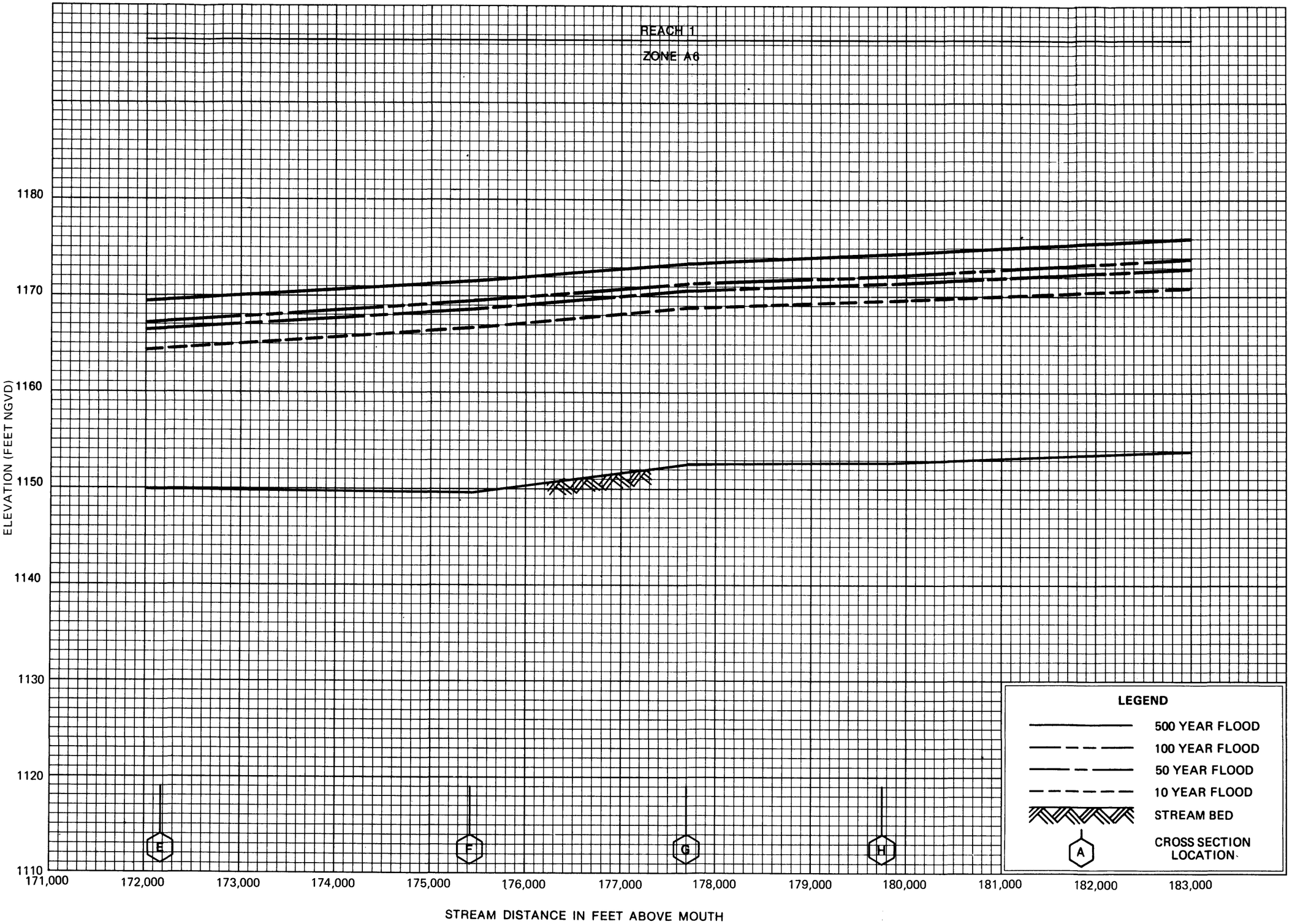
FLOOD PROFILES

ELKHORN RIVER

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CITY OF FREMONT, NB
(DODGE CO.)

04P



FLOOD PROFILES

ELKHORN RIVER

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CITY OF FREMONT, NB
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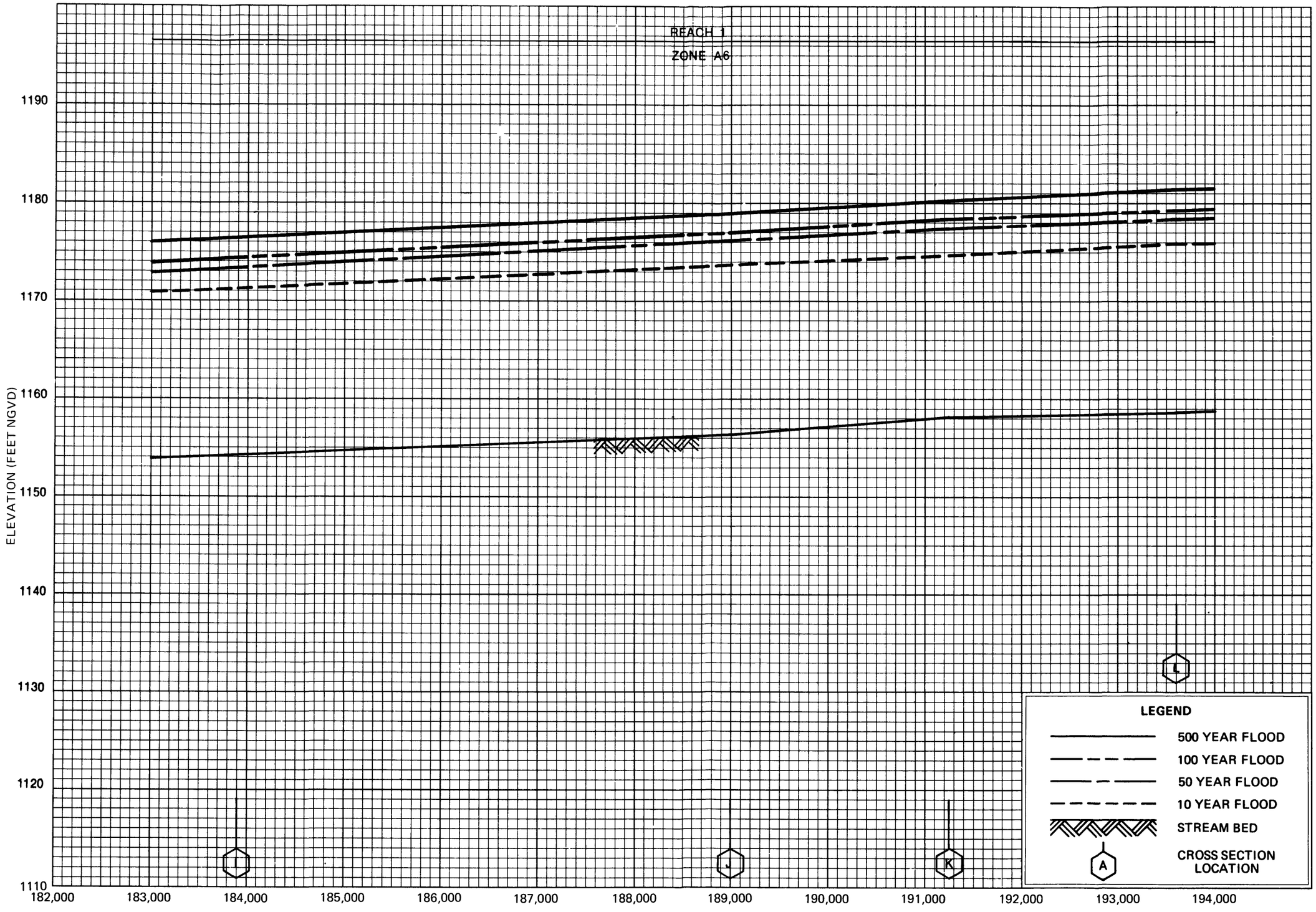
05P



FLOOD PROFILES

ELKHORN RIVER

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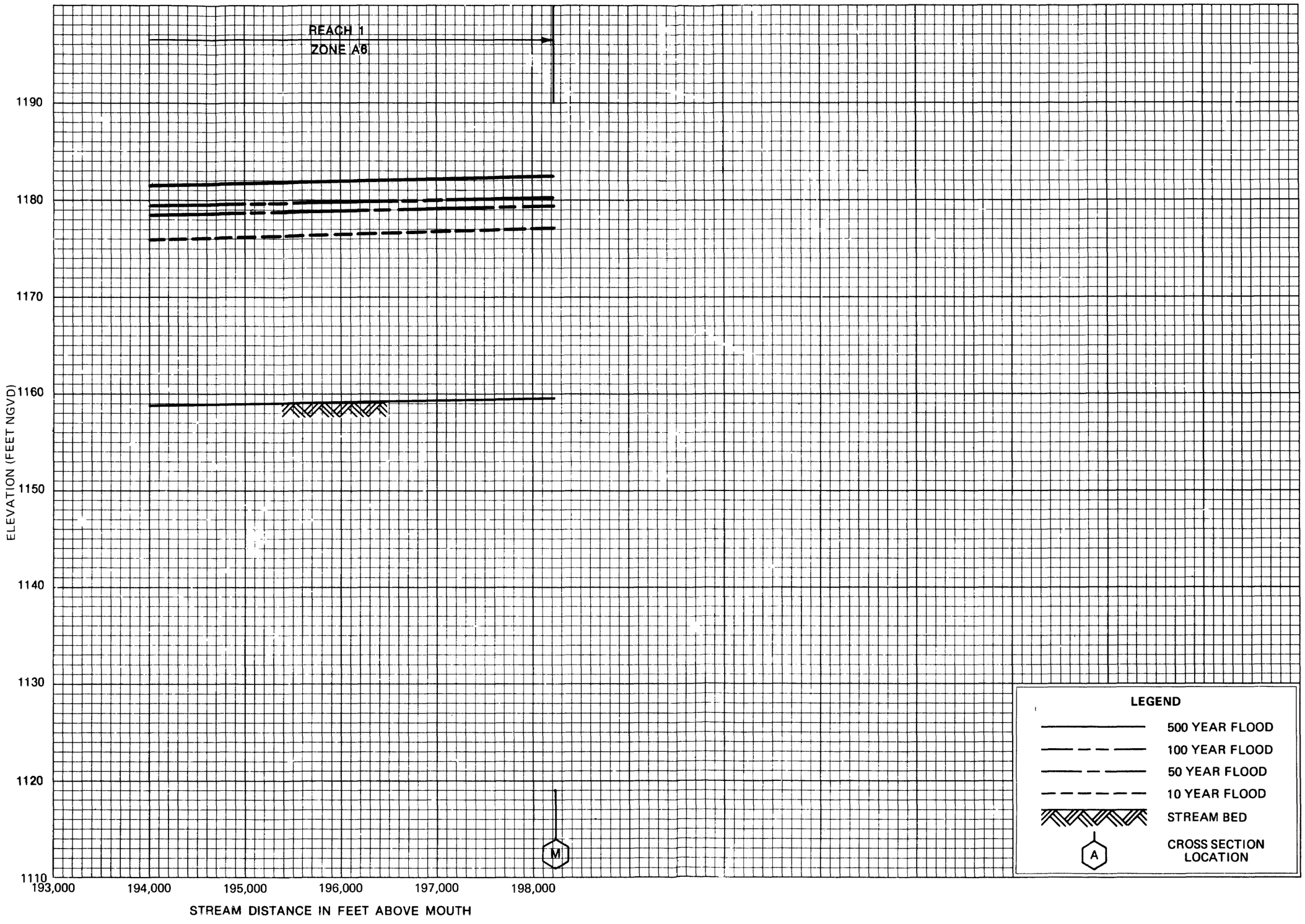
06P



FLOOD PROFILES

ELKHORN RIVER

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

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07P