FLOOD INSURANCE STUDY

CITY OF PRESTON, MINNESOTA
FILLMORE COUNTY

REVISED:
NOVEMBER 2, 1994

Federal Emergency Management Agency

COMMUNITY NUMBER - 270129

NOTICE TO
FLOOD INSURANCE STUDY USERS

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

Part or all of this FIS may be revised and republished at any time. In addition, part of this FIS may be revised by the Letter of Map Revision (LOMR) 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 FIS Effective Date: FIS report dated February 1979/Flood Insurance Rate Map dated August 1, 1979

Revised FIS Dates: November 2, 1994

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FLOOD INSURANCE STUDY
CITY OF PRESTON, FILLMORE COUNTY, MINNESOTA

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study (FIS) revises and updates a previous FIS/Flood Insurance Rate Map (FIRM) for the City of Preston, Fillmore County, Minnesota. This information will be used by the City of Preston to update existing floodplain regulations as part of the Regular Phase of the National Flood Insurance Program (NFIP). The information will also be used by local and regional planners to further promote sound land use and floodplain development.

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

1.2 Authority and Acknowledgments

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

In the original study, the hydrologic and hydraulic analyses for South Branch Root River were prepared by the U.S. Army Corps of Engineers (USACE) for the Federal Insurance Administration (FIA), under Inter-Agency Agreement No. IAA-H-10-77, Project Order No. 15. That work was completed in September 1977.

In this revision, the hydrologic and hydraulic analyses for South Branch Root River were prepared by the USACE, St. Paul District, for the Federal Emergency Management Agency (FEMA), under Inter-Agency Agreement No. EMW-91-E-3529, Project Order No. 4A. This work was completed in January 1993.

1.3 Coordination

The purpose of an initial Consultation Coordination Officer's (CCO) meeting is to discuss the scope of the FIS. A final CCO meeting is held to review the results of the study.

For the original study, an initial CCO meeting was held on September 9, 1976, and was attended by representatives of the city, the Minnesota Department of Natural Resources (MDNR), the USACE, and the FIA. A second meeting was held on June 21, 1977, and was attended by representatives of the city, the MDNR, and the USACE. A final CCO meeting was held on August 8, 1978, and was attended by the city, the MDNR, the USACE, and the FIA.

For this revised study, an initial CCO meeting was held on May 20, 1991, and was attended by representatives of the city, the MDNR, the

USACE, and FEMA. The MDNR provided copies of the HEC-2 computer data used to generate the existing FIS South Branch Root River water-surface profiles. The Minnesota Highway Department and the Fillmore County engineer provided plans for bridges that were replaced since the previous FIS was published. A floodway coordination meeting was held on October 21, 1992, and was attended by representatives of the city, the MDNR, and the USACE. The existing South Branch Root River floodway alignment was discussed in detail. The community requested a revision of the existing floodway in two areas to accommodate existing development. Draft study data was provided to the MDNR for review in December 1992. The MDNR provided review comments pertaining to the floodway alignment. The floodway presented in the revision reflects a MDNR approved alignment. A final CCO meeting was held on July 8, 1993, and was attended by representatives of the city, the MDNR, the USACE, and FEMA.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS covers the incorporated area of the City of Preston, Fillmore County, Minnesota.

The South Branch Root River has been studied by detailed methods for its entire length within the community. Limits of detailed study are indicated on the Flood Profiles (Exhibit 1) and on the FIRM (Exhibit 2). 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.

Camp Creek, a tributary near the eastern corporate limit, was not studied, except for a short distance within the floodplain of the South Branch Root River, because it lies outside the corporate limits; however, allowance was made for its discharge into the South Branch Root River during flood periods.

2.2 Community Description

The City of Preston is located in the extreme southeastern portion of the state. The city is approximately 30 miles southeast of Rochester, 40 miles southwest of Winona, and 100 miles southeast of Minneapolis/St. Paul, Minnesota. The nearest neighboring communities are the small cities of Fountain, Lanesboro, and Wykoff which are located four, nine, and ten miles from the City of Preston, respectively. The economy of the area is primarily related to providing services to the surrounding agricultural communities.

The climate in this region is characterized by short, warm summers and long, cold winters. The average annual temperature is 45 degrees Fahrenheit (°F) with monthly averages varying from 15°F in January to 75°F in July. Average annual precipitation in the Root River Basin is approximately 30 inches. Annual snowfall averages about 40 inches and generally accounts for 15 percent of annual precipitation (Reference 1).

The topography of the study area is characterized by rugged, rolling uplands and a deeply incised river valley. Elevations vary from 940 to 1,200 feet. The area is generally well drained by the South Branch Root River and its numerous tributaries. The geologic history indicates that, with the exception of a strip of land 10 to 20 miles wide along the eastern end of the Root River drainage basin, the area is of pre-Wisconsin glaciation. Glacial drift deposits in the uplands vary from traces of foreign pebbles and boulders along the eastern boundary of the glaciated area to deposits of stiff clayey till which fill preglacial valleys 150 to 200 feet deep (Reference 1).

The soils found in the Root River basin are varied in origin. Included are glacial loessial upland soils, rough stony land on slopes between the uplands and the terraces, terrace soils, and floodplain soils. The glacial upland soils, a part of the old gray drift, are located in the western part of the drainage area. In general, these soils are classified as loams or silt loams having good drainage and are underlain by drift materials of a more clayey character. The loessial upland soils are found in the driftless area as well as in the easterly old gray portion. In the latter area, the loess overlies the drift deposits. The loess is silty in character and is highly productive. Where it lies on steep rolling slopes, the loess is easily subjected to erosion. Associated with the rough stony land of the steeper slopes are residual soils and subsoils which have developed from the disintegration of the underlying sedimentary strata. The poor soil textures and the steep slopes combine to make this land easily adaptable to timber or pastureland. The terrace soils consist of silt loams and sandy soils of glacial outwash formation. The silt loam soils are very productive while the sandy soils are subject to erosion. The principal types soil found on the floodplain are silty loams, sandy loams, and sand (Reference 1).

Floodplain forests and forests on the steep, untillable bluffs and slopes account for the majority of the study area woodlands. Isolated stands consisting of mixed hardwoods and oaks are scattered throughout the uplands.

The South Branch Root River, which flows generally in the southern portion of the city, has a drainage area at Preston of approximately 188 square miles. The river flows in a narrow, well-defined channel having a relatively flat slope.

2.3 Principal Flood Problems

Low-lying areas of Preston are subject to periodic overflow from the South Branch Root River. The most severe flooding occurs in early spring as a result of heavy rain or a combination of heavy rain and snowmelt. Major floods have occurred in 1881, 1911, 1942, 1950, and 1965. Reliable information is available only for the floods of 1950 and 1965, when discharges were 18,900 and 7,000 cubic feet per second (cfs), respectively. These discharges correspond to frequencies of about once in 200 years and 7 years, respectively. Damages occur primarily to residential and commercial properties along the left (northern) bank. Damage sustained during the 1965 flood was approximately $67,000.

2.4 Flood Protection Measures

In 1966, the St. Paul Street bridge was replaced. At that time the channel was widened in a reach 100 feet upstream and 400 feet downstream to aid in the conveyance of the floodwaters. No other flood improvement project has been undertaken in Preston.

3.0 ENGINEERING METHODS

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

3.1 Hydrologic Analyses

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

Discharge-frequencies were developed for South Branch Root River at the downstream corporate limit of Preston. The adopted frequency curve was based on results of three methods: general relations; rainfall-runoff; and the U.S. Geological Survey (USGS) regression equations. An adopted curve was drawn that reflects the results of these three methods with more weight given to the general relations method.

The general relations method involves a regional analysis of five gaging stations representing hydrologically similar drainage areas. A general relationship of discharge versus drainage area on a log-log plot was used to determine the adopted frequency values. The discharge-frequency values for each of the five gaging stations were determined by applying the log-Pearson Type III statistical analysis as per the Water Resources Council Bulletin 17B Guidelines and the USACE Hydrologic Engineering Center's computer program "Flood Flow Frequency Analysis" (References 2 and 3). The resulting 10-, 50-, 100-, and 500-year flood events were plotted versus drainage area on a log-log plot. The five gaging station locations and the gaging station drainage areas used in the analysis are listed below:

Gaging Station Location	Drainage Area (sq. miles)
Root River near Houston	1,270
Root River near Lanesboro	615
South Branch Root River near Lanesboro	297
South Fork Root River near Houston	275
Root River below South Fork near Houston	1,560

Data for the South Branch Root River near Lanesboro gage was supplemented with data from a USACE gaging station No. R043-8 (Reference 4).

The USGS regression equations were based on the Water Resources Investigation Report 87-4170 (Reference 5). The 500-year flood event for the regression model was estimated from the log-probability plot of the 2-, 5-, 10-, 25-, 50-, and 100-year flood events that the regression equations determined. The rainfall-runoff analysis was based on the USACE study of May 1975 using the HEC-1 computer program (Reference 6).

A summary of the drainage area-peak discharge relationships for South Branch Root River is shown in Table 1, "Summary of Discharges."

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
SOUTH BRANCH ROOT RIVER					
Downstream of Camp Creek	217	8,700	14,400	17,300	24,000
Upstream of Camp Creek	188	8,100	13,300	15,800	22,100

3.2 Hydraulic Analyses

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

Valley cross sections for South Branch Root River were obtained from aerial photography at a scale of 1:6,000 with a contour interval of 20 feet (Reference 7). Channel cross sections were obtained by field survey (Reference 7). Bridge data were obtained, in part, from aerial photographs and, in part, from the Minnesota Department of Transportation drawings (Reference 8). The bridge data were revised to reflect the replaced bridges.
Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross-section locations are also shown on the FIRM (Exhibit 2).

Water-surface elevations of floods of the selected recurrence intervals were computed using the USACE HEC-2 step-backwater computer program (Reference 9). Starting water-surface elevations were based on an elevation versus discharge rating curve developed from the existing HEC-2 cross section data. Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals.

Channel roughness factors (Manning's "n") used in the hydraulic computations were based on engineering judgment. The channel "n" values ranged from 0.030 to 0.035, and the overbank "n" values ranged from 0.150 to 0.060.

The hydraulic analysis 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 elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study, and their descriptions, are shown on the maps.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each FIS provides 100-year flood

elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For the stream studied in detail, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using aerial photographs at a scale of 1:6,000 with a contour interval of 20 feet (Reference 7). In this revision, USGS quadrangles were used to adjust the floodplain boundaries in some areas to reflect the revised water-surface elevations (Reference 10).

The 100- and 500-year floodplain boundaries are shown on the FIRM (Exhibit 2). On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A and AE), and the 500-year floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

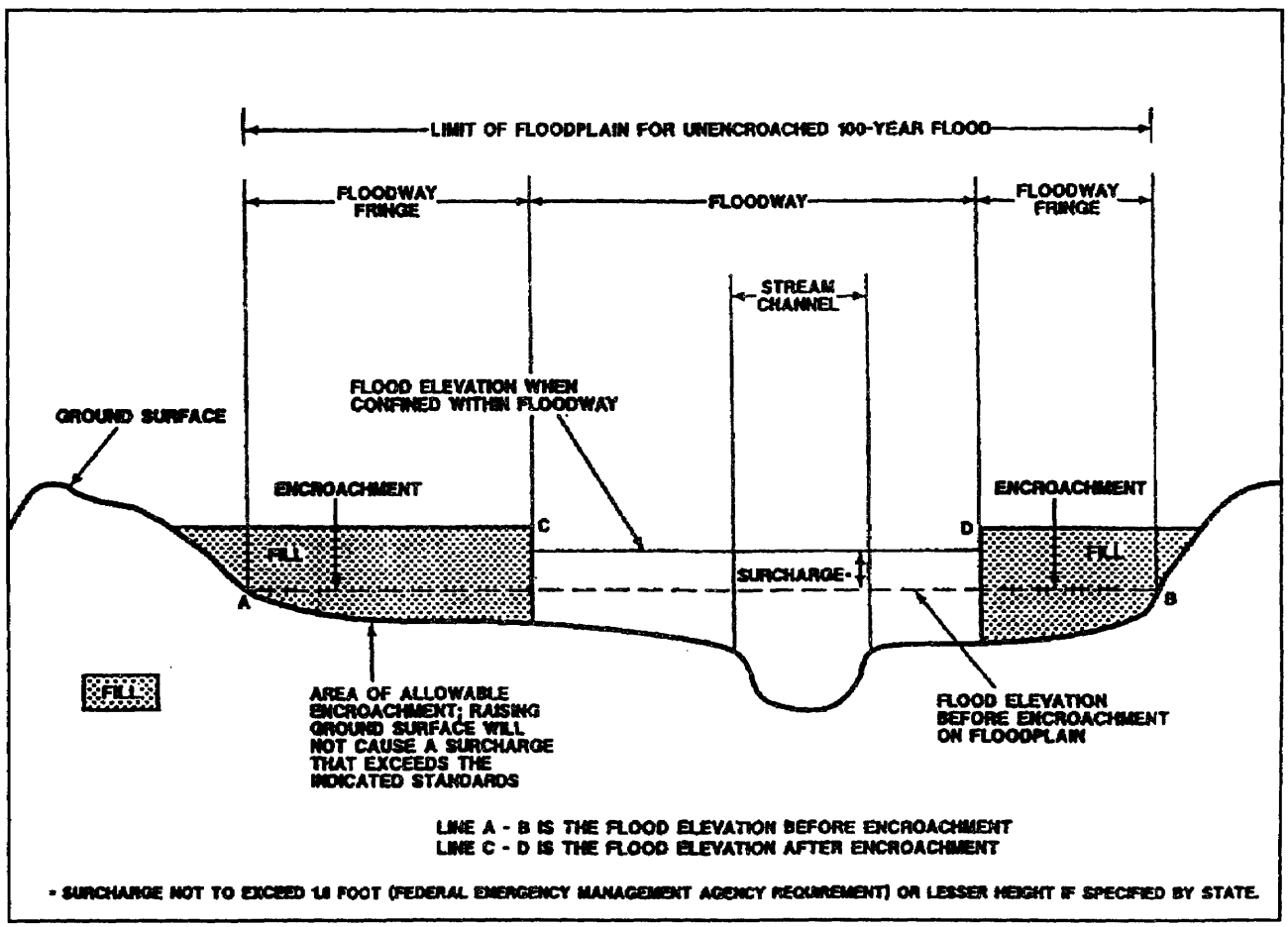
4.2 Floodways

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 100-year 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 100-year flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodway in this study is presented to local agencies as a minimum standard that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodway presented in this study is an engineered floodway. The community selected a floodway alignment that considered existing and

future development needs. The floodway was based on encroachment of effective flow limit boundaries. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections (Table 2). The computed floodway is shown on the FIRM (Exhibit 2). In cases where the floodway and 100-year floodplain boundaries are either close together or collinear, only the floodway boundary is shown.

The area between the floodway and 100-year 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 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 1.



FLOODWAY SCHEMATIC Figure 1

Encroachment into areas subject to inundation by floodwaters having hazardous velocities aggravates the risk of flood damage, and heightens potential flood hazards by further increasing velocities. A listing of stream velocities at selected cross sections is provided in Table 2, "Floodway Data." 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 the floodway.

5.0 INSURANCE APPLICATIONS

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

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the FIS by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the FIS by detailed methods. In most instances, whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-depths derived from the detailed hydraulic analyses are shown within this zone.

Zone A99

Zone A99 is the flood insurance rate zone that corresponds to areas of the 100-year floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						(FEET NGVD)		
South Branch Root River								
A	1,245	297	2,263	7.0	931.1	931.1	931.6	0.5
B	2,415	526	2,739	5.8	933.6	933.6	933.6	0.0
C	3,235	933	4,931	3.2	934.8	934.8	935.2	0.4
D	3,835	1,160	4,421	3.6	935.4	935.4	935.7	0.3
E	4,475	840	4,342	3.6	935.8	935.8	936.2	0.4
F	5,075	436	2,965	5.3	936.6	936.6	937.0	0.4
G	6,005	370	2,162	7.3	937.9	937.9	938.1	0.2
H	7,425	299	2,494	6.3	941.3	941.3	941.7	0.4
I	8,100	380	2,654	6.0	941.8	941.8	942.2	0.4
J	9,150	237	3,667	4.3	945.7	945.7	945.9	0.2
K	11,140	1,156	2,755	5.7	947.6	947.6	947.9	0.3
L	12,515	882	3,245	4.9	951.5	951.5	951.5	0.0
M	15,180	1,259	7,870	2.0	953.8	953.8	953.8	0.0

[1]Feet above U.S. Routes 16 and 52

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PRESTON, MN
(FILLMORE CO.)

FLOODWAY DATA

SOUTH BRANCH ROOT RIVER

milestones. No base flood elevations or depths are shown within this zone.

Zone V

Zone V is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no base flood elevations are shown within this zone.

Zone VE

Zone VE is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain, and to areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

Zone D

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

6.0 FLOOD INSURANCE RATE MAP

The 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 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 100- and 500-year floodplains. Floodways and the locations of selected cross sections used in the hydraulic analyses and floodway computations are shown where applicable. The FIRM includes flood hazard information that was presented separately on the Flood Boundary and Floodway Map in the previously printed FIS for the City of Preston.

7.0 OTHER STUDIES

Prior studies and reports concerning water and related resource problems of the Root River basin in the vicinity of Preston include the following: the Root River Basin Study provided information on the flood control structures in the basin which includes the flood control structures in the City of Preston (Reference 1); and the Special Flood Hazard Information Report includes discharges, flood profiles, and flood boundaries which agree exactly with the Root River Basin Study, except at the area near the eastern corporate limit where a railroad bridge was removed (Reference 11). Variances were found in the profile elevations and are due to the removal of the bridge.

A FIS has been prepared for the unincorporated areas of Fillmore County (Reference 12).

Because it is based on more up-to-date analyses, this FIS supersedes the previously printed FIS for the City of Preston (Reference 13).

Please note that this FIS also supersedes the Flood Boundary and Floodway Map for the City of Preston, which was published as part of the previously printed Flood Insurance Study. The information on the Flood Boundary and Floodway Map has been added to the FIRM accompanying this FIS.

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, 175 West Jackson Boulevard, Fourth Floor, Chicago, Illinois 60604.

9.0 BIBLIOGRAPHY AND REFERENCES

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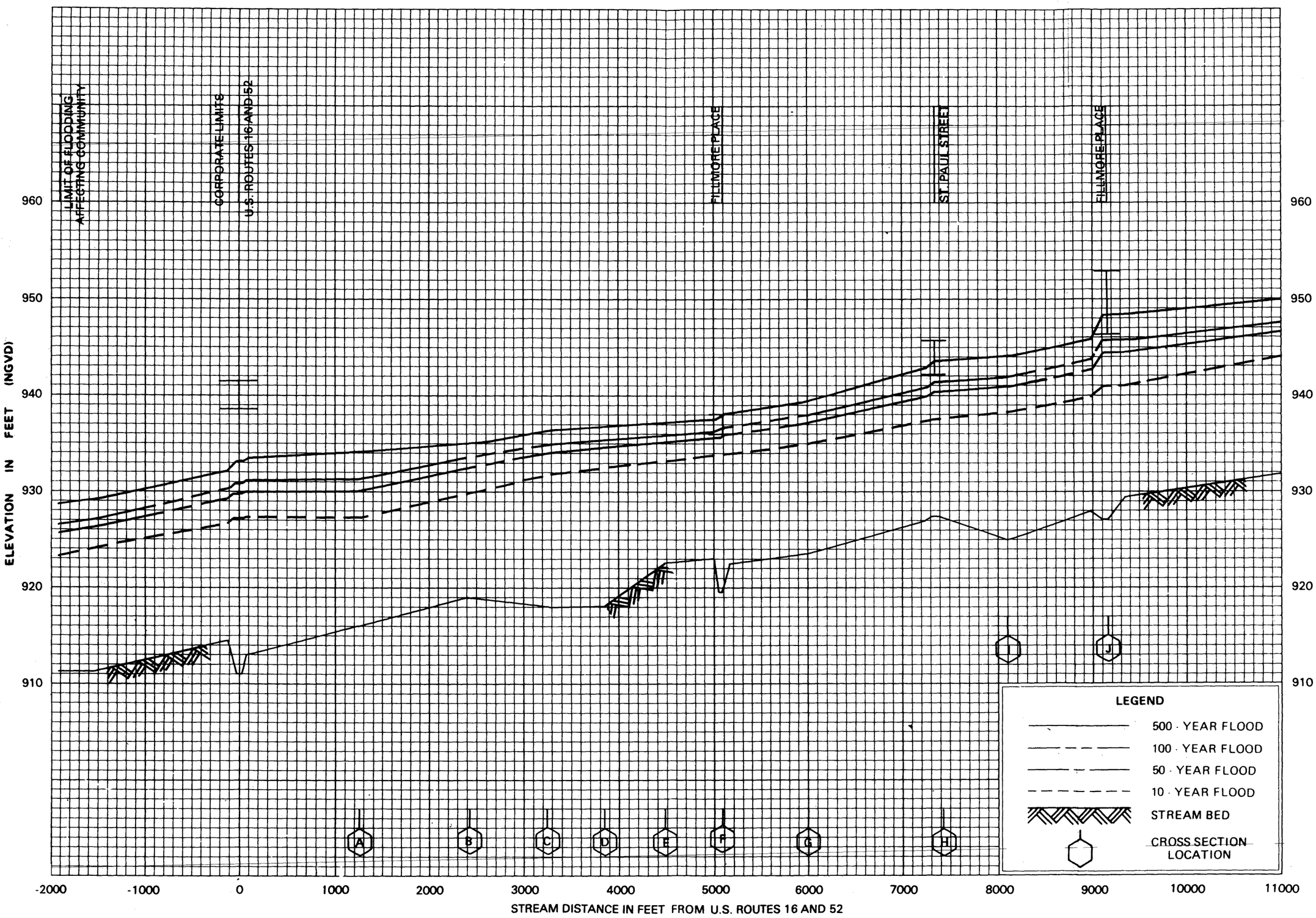

FLOOD PROFILES

SOUTH BRANCH ROOT RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PRESTON, MN

(FILLMORE CO.)

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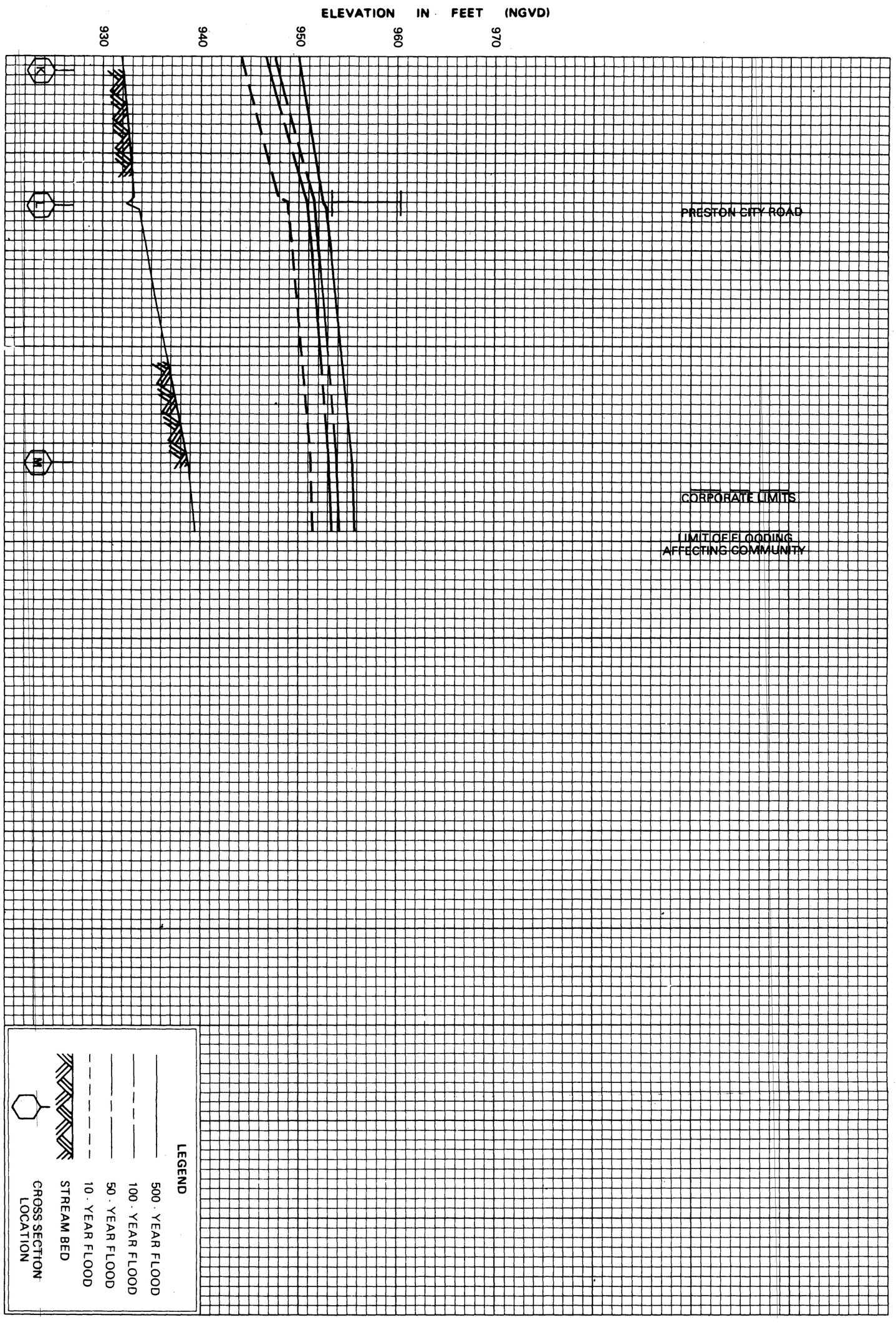

02P	FEDERAL EMERGENCY MANAGEMENT AGENCY **CITY OF PRESTON, MN** (FILLMORE CO.)	**FLOOD PROFILES** **SOUTH BRANCH ROOT RIVER**