

FLOOD INSURANCE STUDY



VILLAGE OF BOLIVAR, NEW YORK ALLEGANY COUNTY

REVISED:
JANUARY 19, 1996



Federal Emergency Management Agency

COMMUNITY NUMBER - 360026

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: May 1978 (FIS report); November 1, 1978
(Flood Insurance Rate Map)

Revised FIS Dates: January 19, 1996

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FLOOD INSURANCE STUDY
VILLAGE OF BOLIVAR, ALLEGANY COUNTY, NEW YORK

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 Village of Bolivar, Allegany County, New York. This information will be used by the Village of Bolivar 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 were prepared by the New York State Department of Environmental Conservation for the Federal Insurance Administration (FIA), under Contract No. H-3856. That work was completed in October 1976.

In this revision, the hydrologic and hydraulic analyses were prepared by Leonard Jackson Associates, for the Federal Emergency Management Agency (FEMA), under Contract No. EMW-90-R-3127, Option 2. This work was completed in January 1994.

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, the purpose of the FIS was explained at a meeting on September 22, 1975, with representatives of the Village of Bolivar, the FIA, and the New York State Department of Environmental Conservation. The U.S. Army Corps of Engineers (USACE), Pittsburgh District, provided a detailed project report on Root Creek, cross sections for Little Genesee Creek, and Root Creek and flood marks for the storm of June 22-24, 1972. The New York State Department of Transportation supplied information regarding the new Main Street Bridge and channel work done on Root Creek. They also aided in resolving the data discrepancy between the Department of Transportation data and the U.S. Geological Survey (USGS) data which

was used throughout this project. On April 21, 1976, an informational meeting was held with the mayor and councilmen of the Village of Bolivar to explain the findings of the study, to present the preliminary flood profiles and flood delineations and to solicit their ideas. The final CCO meeting was held on September 29, 1976, where the final draft of the FIS was presented for further local comments.

The community was notified by letter on March 24, 1994, that a revision to its FIS was being prepared.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS covers the incorporated area of the Village of Bolivar, Allegany County, New York. The area of study is shown on the Vicinity Map (Figure 1).

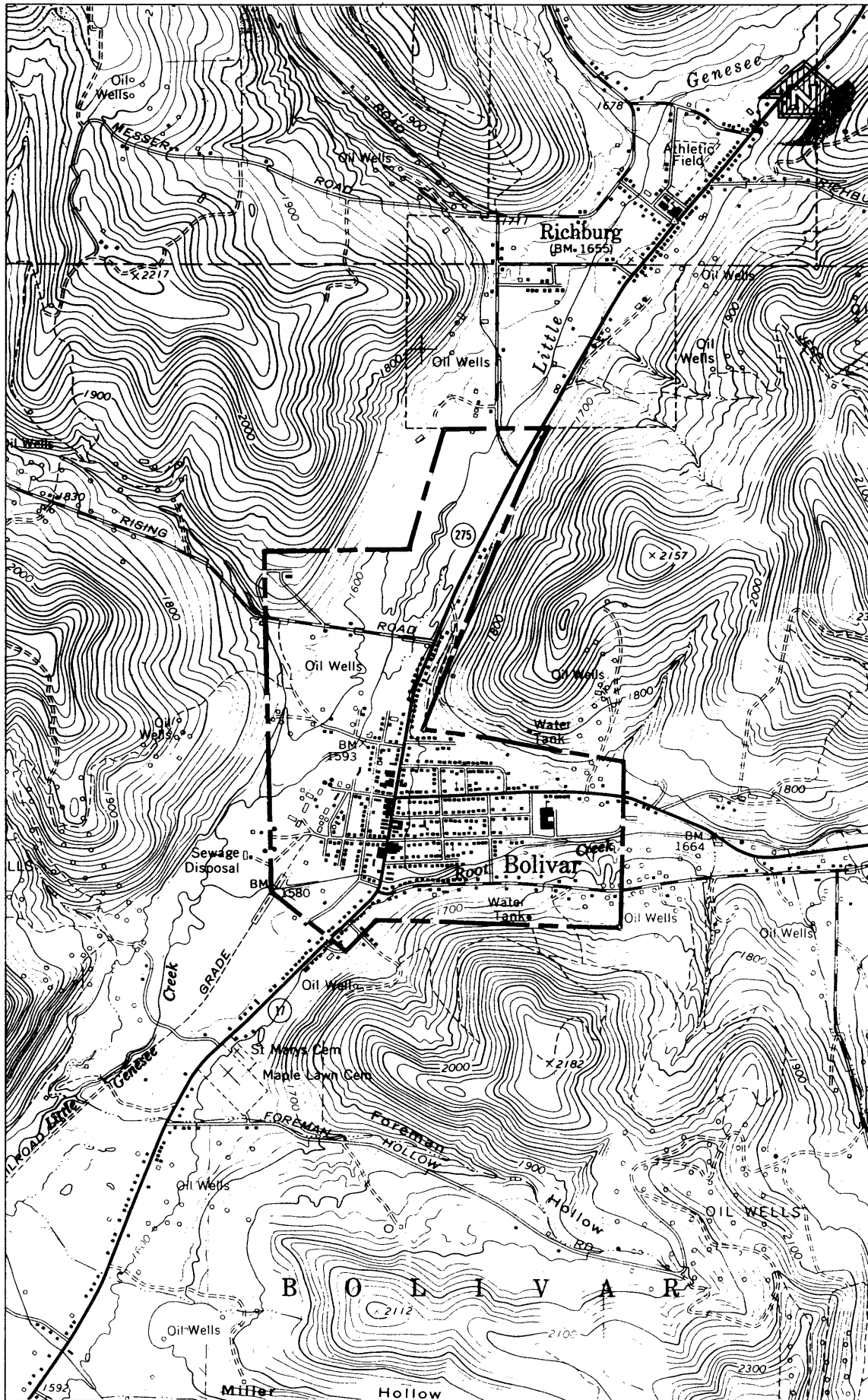
In the original study, Little Genesee Creek and Root Creek were studied by detailed method. In this revision, Root Creek was restudied by detailed methods from approximately 0.3 mile downstream of Main Street to approximately 0.4 mile upstream of Davis Street. Limits of detailed study are indicated on 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.

2.2 Community Description

The Village of Bolivar is located in the southwestern portion of Allegany County in western New York State, approximately 10 miles east of the City of Olean. It is bordered by the Village of Richburg to the northeast, and the Town of Bolivar to the northeast, southeast, southwest, and northwest.

Little Genesee Creek rises in the hills approximately four miles north of the Village of Bolivar and flows southwesterly through the village for a distance of 1.2 miles, skirting the western edge of the most densely populated area. Throughout the village, Little Genesee Creek is characterized by a wide floodplain.

Root Creek rises in the hills about four miles east of the Village of Bolivar, traverses the village from east to west for about one mile and joins Little Genesee Creek.



APPROXIMATE SCALE



VICINITY MAP

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF BOLIVAR, NY
(ALLEGANY CO.)

FIGURE 1

Elevations range from approximately 1,600 feet National Geodetic Vertical Datum of 1929 (NGVD) in the populated valley of Little Genesee Creek in the village, to approximately 2,200 feet NGVD in the hills immediately surrounding the village. The topography consists of steep hills and relatively flat floodplains.

The community was primarily engaged in agriculture from its settlement in the early 1800s until the oil boom of the 1880s. During the oil boom, the village grew practically overnight into a small city. The production of oil and gas has declined to its present level, where it produces only a minor part of the area's income. As production declined, so did employment opportunities and the village population. The village population was 1,261 in 1990 (Reference 1).

New York State Route 275 runs parallel to Little Genesee Creek in the northern part of the village. Several small roads cross Little Genesee Creek, and Root Creek is crossed by U.S. Route 17 and other local roads. Some portions of the floodplain showing typical development, vegetation and hydraulic control structures are shown in Figures 2 and 3.

The climate of the area is characteristic of southwestern New York State, with warm summers and winters of moderate to heavy snowfalls. Average daily temperatures range from 19 degrees Fahrenheit (°F) in January to 65°F in July. Mean annual precipitation is 35.7 inches, of which 21 inches become runoff.

2.3 Principal Flood Problems

Due to the steep terrain, the Village of Bolivar is subject to flash flooding from intense cyclonic disturbances that occur in summer and fall. Heavy rains in winter or early spring augmented by snowmelt also cause flooding problems. Backwater created by ice jams tends to aggravate the winter and early spring flood problems.

Although Little Genesee Creek often overtops its banks, only minor damage is done because the adjacent, low-lying lands are not highly developed. However, flooding along Root Creek causes damage almost annually. Damage results primarily from erosion of banks and adjacent properties, although basement flooding also is a problem as a result of sheet flow as water overtops the banks.

The USGS has maintained no stream flow records within the study area. Interviews and newspaper searches have revealed that severe storms produced significant flooding in July 1942, January 1959, September 1967, July 1970, and June 1972. Damage surveys indicate



Figure 2 - Little Genesee Creek looking south (downstream) at Salt Rising Road.



Figure 3 - Root Creek looking east (upstream) at Davis Street.

that the Village of Bolivar suffers as much damage as any other urban area in Allegany County.

2.4 Flood Protection Measures

The State of New York Department of Transportation completed a flood control project along Root Creek in December of 1975. The project consisted of a considerable amount of roadway rebuilding, replacement of the Main Street Bridge and the improvement of 400 feet of the Root Creek channel. The roadway rebuilding eliminated a flow restriction caused by inadequate bridge clearance. The channel rehabilitation further improved conditions to the extent that the design flow can now be carried under the bridge unrestricted. The actual improvement consisted of a widening and deepening of the present channel centerline. The work started approximately 300 feet upstream from the existing bridge and extended approximately 100 feet downstream. The new channel is lined with a six-inch layer of concrete. At the upstream end ahead of the bridge, there is a four foot concrete drop structure.

The USACE completed a flood control project along Root Creek in 1980. The project consisted of approximately 5,000 feet of channel improvements, which included widening, deepening, slope protection and stabilization, and minor realignment. The project reach extended from a point approximately 900 feet downstream of the Main Street Bridge to a point approximately 4,100 feet upstream, excluding the previously completed New York State Department of Transportation project around the bridge. The new channel is lined with nine inch thick gabions and includes 6 drop structures. The renovated channel effectively contains the 100-year flood.

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 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 sources studied in detail affecting the community.

A regional analysis using USGS stream gaging records for maximum peak flow data was prepared by the New York State Department of Environmental Conservation to establish Exceedence Interval/Discharge Curves at selected points along the waterways of the Allegheny River Basin within the boundary of the State of New York for uncontrolled drainage areas larger than five square miles, such as Little Genesee Creek (References 2 and 3). For drainage areas below five square miles, such as Root Creek, a Bureau of Public Roads technique was used to establish the hydrology (Reference 4). The statistical procedures used in the regional analysis are those presented by Leo R. Beard (Reference 5). The methodology conforms with the uniform technique for determining flood flow frequencies as set forth by the Hydrology Committee of the Water Resources Council (Reference 6). In this revision, peak discharges were taken from the design calculations of the renovated Root Creek channel. The discharges agree very closely with those used in the original study.

A summary of the drainage area-peak discharge relationships for the streams studied by detailed methods 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
LITTLE GENESEE CREEK					
At west corporate limits	*	920	1,400	1,650	2,250
ROOT CREEK					
At downstream corporate limits	8.6	677	1,043	1,218	1,660

* Data not available

3.2 Hydraulic Analyses

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

In the original study, cross sections for Little Genesee Creek and Root Creek were developed using the HEC-2 water-surface computer program (Reference 7). In this revision, cross sections for Root Creek were obtained from the HEC-2 model used to design the channel improvement (Reference 8). The cross sections were supplemented with as-built survey data of the renovated channel. All bridges, dams, and culverts were field surveyed to obtain elevation data and structural geometry.

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 7). Starting elevations were determined using the slope/area method. Along Root Creek, the narrow channel configuration and broad low overbank area to the north result in shallow sheet flow from east to west, averaging one foot in depth. The sources of this shallow flooding are local direct runoff from the north, plus diverted floodwaters from backwater from the Davis Street bridge. The latter condition begins 470 feet upstream of Davis Street and continues downstream to the floodplain of Little Genesee Creek.

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 for Little Genesee Creek and Root Creek were assigned on the basis of on-site field inspections and ground level photographs (Figures 2 and 3). These photographs were compared with USGS calibrated photographs, taking into consideration channel conditions, overbank vegetation and land use (Reference 9). The following tabulation shows the channel and overbank "n" values for the streams studied by detailed methods:

<u>Stream</u>	<u>Channel "n"</u>	<u>Overbank "n"</u>
Little Genesee Creek	0.036-0.040	0.050-0.070
Root Creek	0.033-0.040	0.050-0.070

As noted above, flood elevations in the village are often raised by ice jams during spring thaws; the hydraulic analyses for this study, however, 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 NGVD. Elevation reference marks used in this study, and their descriptions, are shown on the map.

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 streams studied in detail, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. In the original study, the boundaries were interpolated between cross sections using aerial photographs at a scale of 1:4,800 with a contour interval of five feet (Reference 10). In this revision, the boundaries for Root Creek were interpolated between cross sections using topographic maps at a scale of 1"=200' with a contour interval of 5 feet (Reference 11).

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 (Zone 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 floodways in this study are 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 was computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations 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.

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.

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 4.

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 (FEET NGVD)	WITH FLOODWAY	INCREASE
Little Genesee Creek	1,210 ¹	122	451	3.6	1,589.2	1,589.2	1,590.2	1.0
	2,010 ¹	46	279	5.8	1,592.2	1,592.2	1,592.7	0.5
	2,410 ¹	43	251	6.5	1,593.5	1,593.5	1,594.1	0.6
	3,115 ¹	435	2,003	0.8	1,598.2	1,598.2	1,599.1	0.9
	3,615 ¹	346	1,298	1.3	1,598.6	1,598.6	1,599.4	0.8
	4,115 ¹	246	668	2.4	1,599.9	1,599.9	1,600.7	0.8
	4,705 ¹	221	599	2.7	1,603.7	1,603.7	1,604.7	1.0
	5,715 ¹	207	652	2.5	1,610.7	1,610.7	1,611.5	0.8
	6,385 ¹	50	260	5.9	1,614.1	1,614.1	1,614.8	0.7
Root Creek	1,620 ²	64	160	7.6	1,586.9	1,586.9	1,587.1	0.2
	2,400 ²	41	155	7.9	1,591.3	1,591.3	1,591.3	0.0
	2,800 ²	37	119	10.3	1,598.2	1,598.2	1,598.2	0.0
	3,307 ²	41	157	7.8	1,601.7	1,601.7	1,601.7	0.0
	3,720 ²	41	164	7.4	1,607.1	1,607.1	1,607.1	0.0
	4,320 ²	45	199	6.1	1,613.8	1,613.8	1,613.8	0.0
	4,820 ²	41	157	7.8	1,619.4	1,619.4	1,619.4	0.0
	5,400 ²	63	143	8.5	1,632.0	1,632.0	1,632.0	0.0
	5,900 ²	54	178	6.3	1,636.7	1,636.7	1,636.7	0.0

¹Feet above corporate limits

²Feet above confluence with Little Genesee Creek

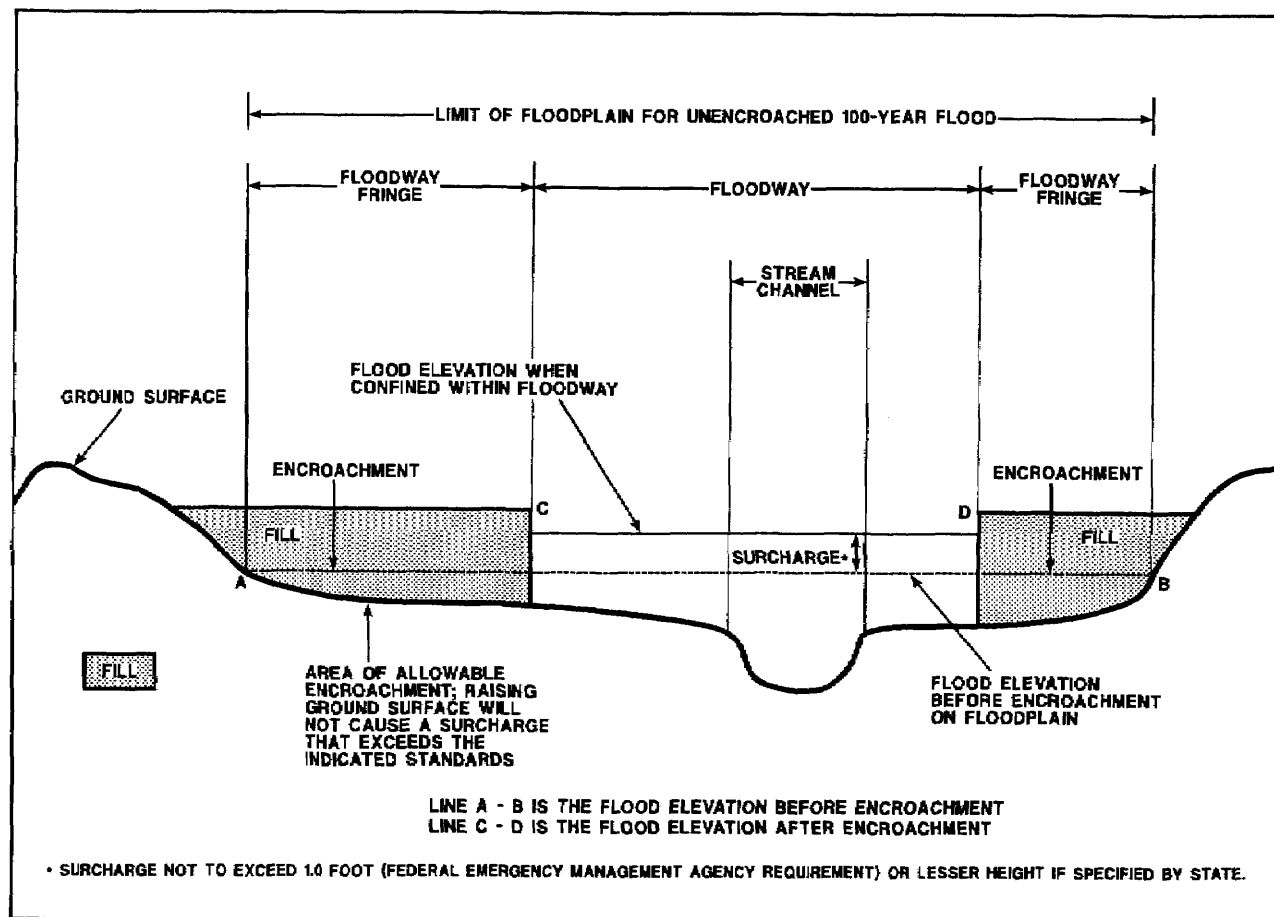
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VILLAGE OF BOLIVAR, NY
(ALLEGANY CO.)

FLOODWAY DATA

LITTLE GENESEE CREEK - ROOT CREEK

TABLE 2



FLOODWAY SCHEMATIC

Figure 4

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 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 Village of Bolivar.

7.0 OTHER STUDIES

FISs have been prepared for the Town of Bolivar and the Village of Richburg (References 12 and 13).

Because it is based on more up-to-date analyses, this FIS supersedes the previously printed FIS for the Village of Bolivar (Reference 14). Please note that this FIS also supersedes the Flood Boundary and Floodway Map for the Village of Bolivar, which was published as part of the previously printed FIS. 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 preparation of this study can be obtained by contacting FEMA, Mitigation Division, 26 Federal Plaza, Room 1351, New York, New York 10278.

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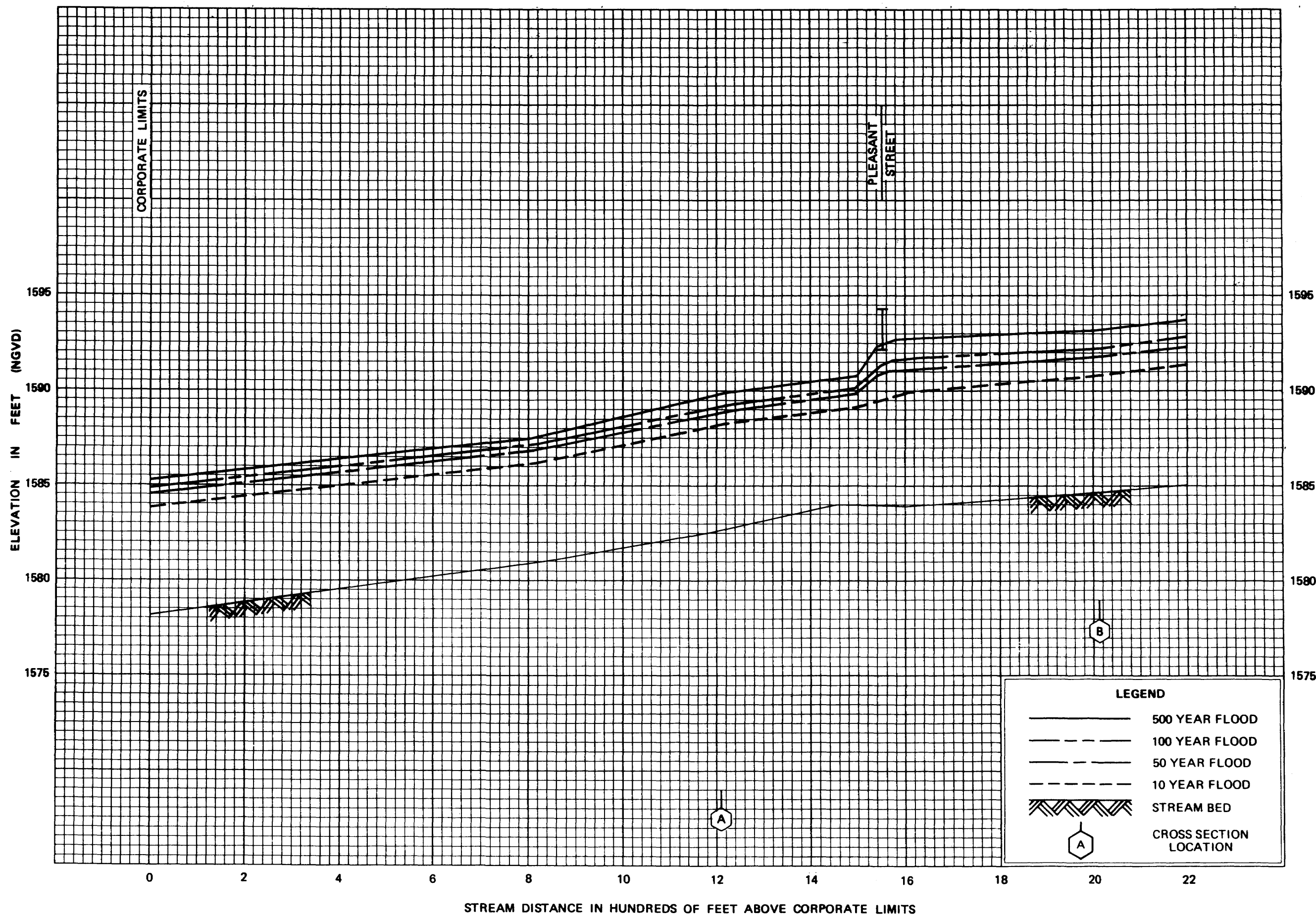
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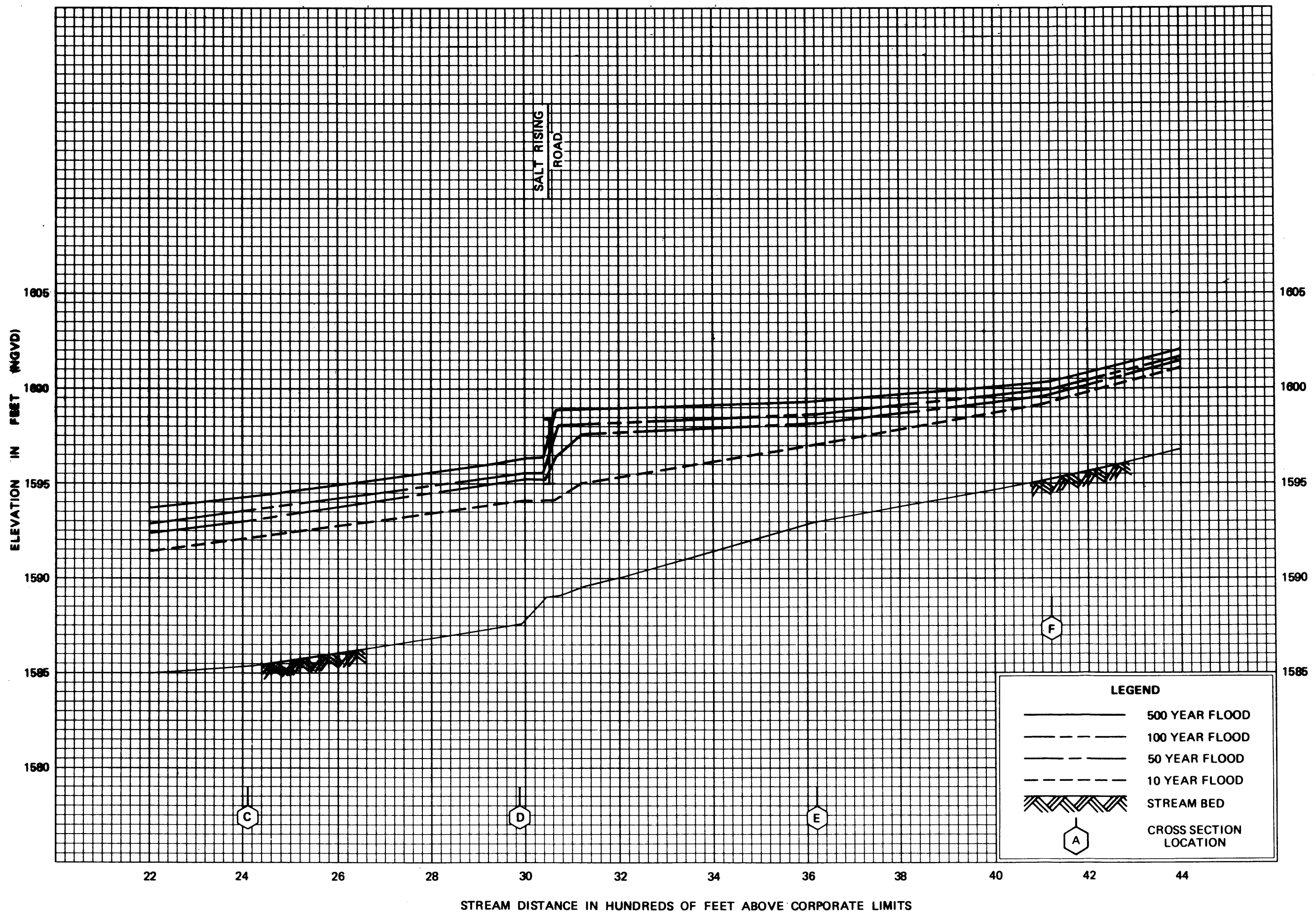


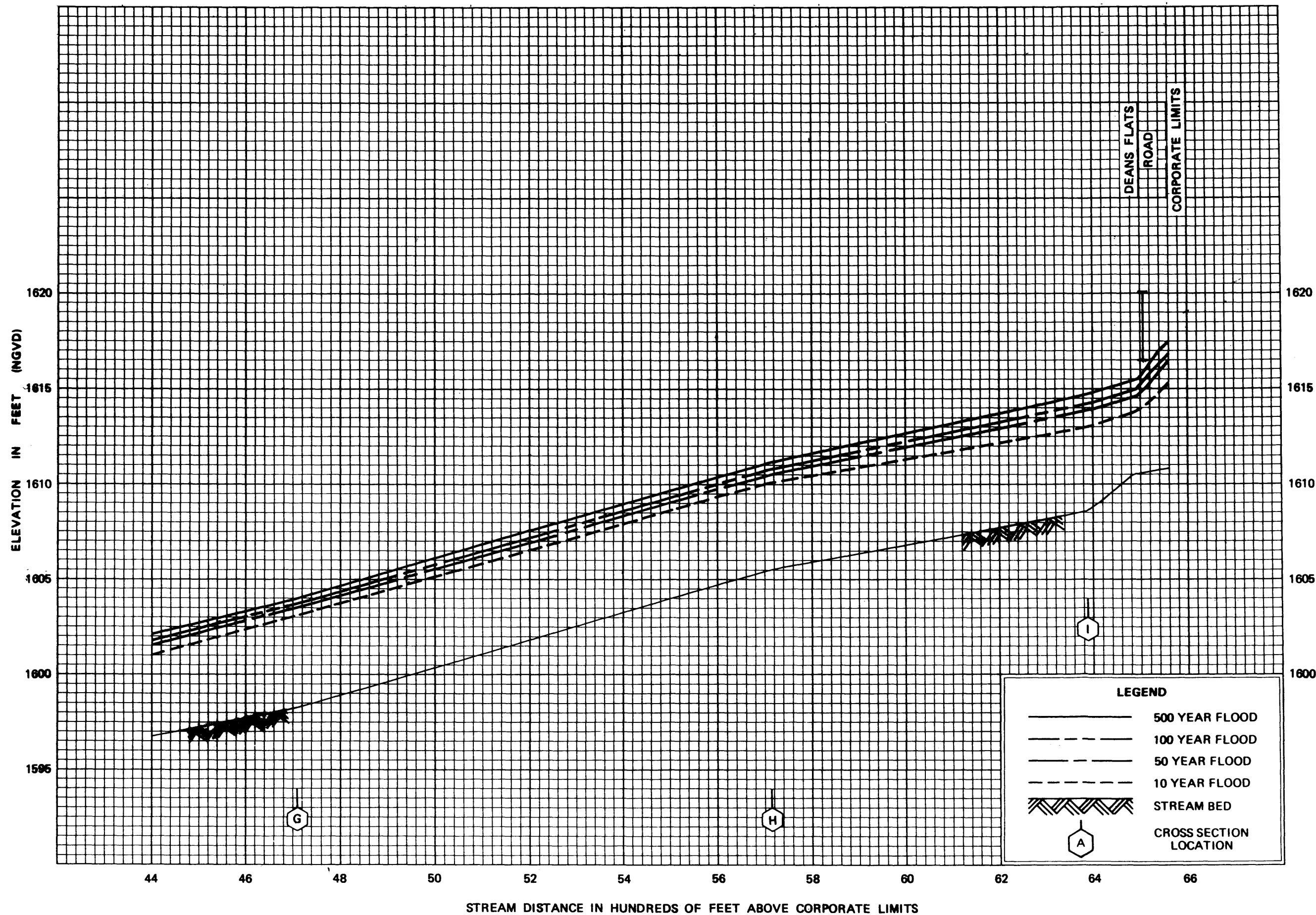
FLOOD PROFILES

LITTLE GENESEE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF BOLIVAR, NY
(ALLEGANY CO.)





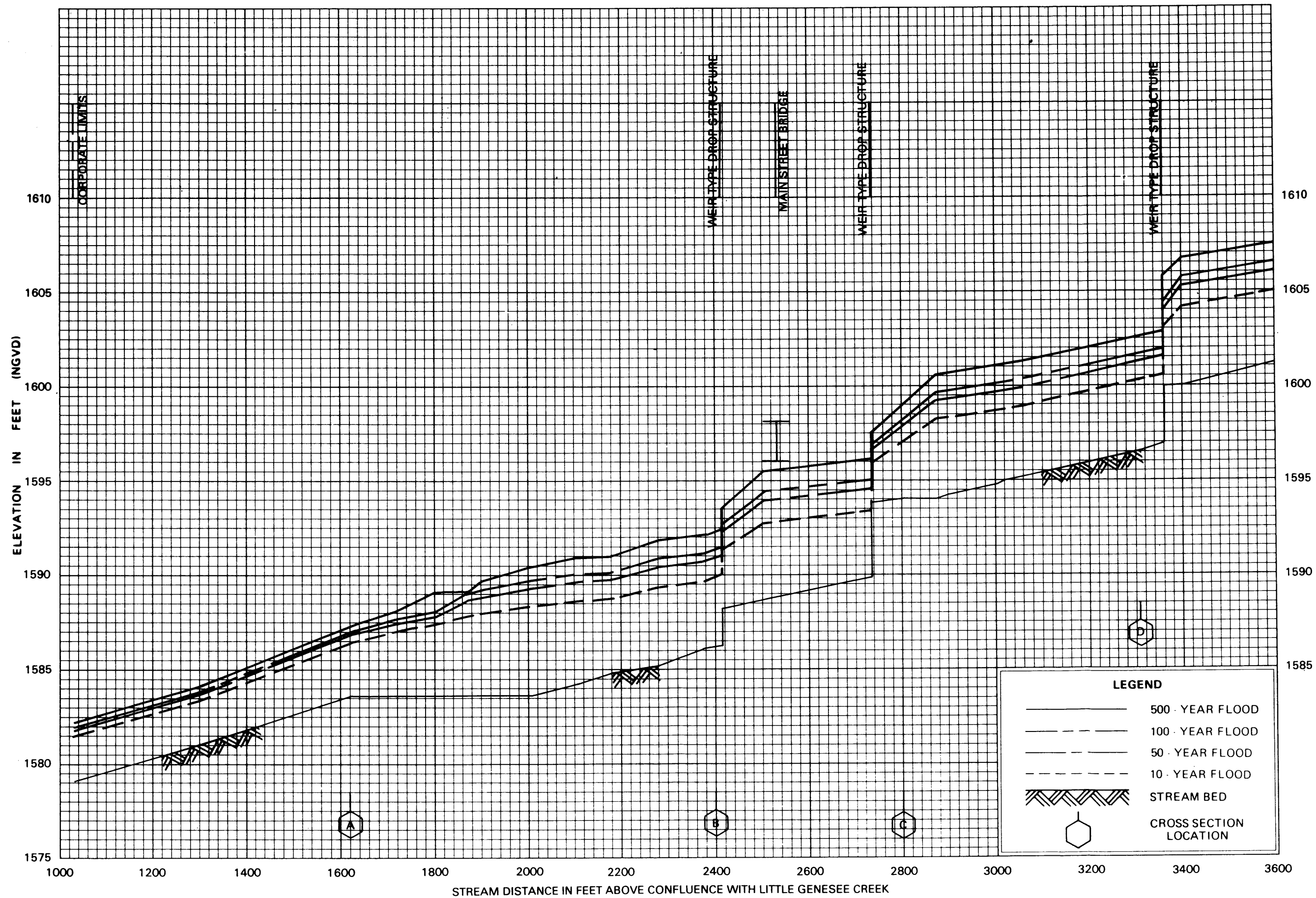
FLOOD PROFILES

LITTLE GENESEE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF BOLIVAR, NY
(ALLEGANY CO.)

03P



FLOOD PROFILES

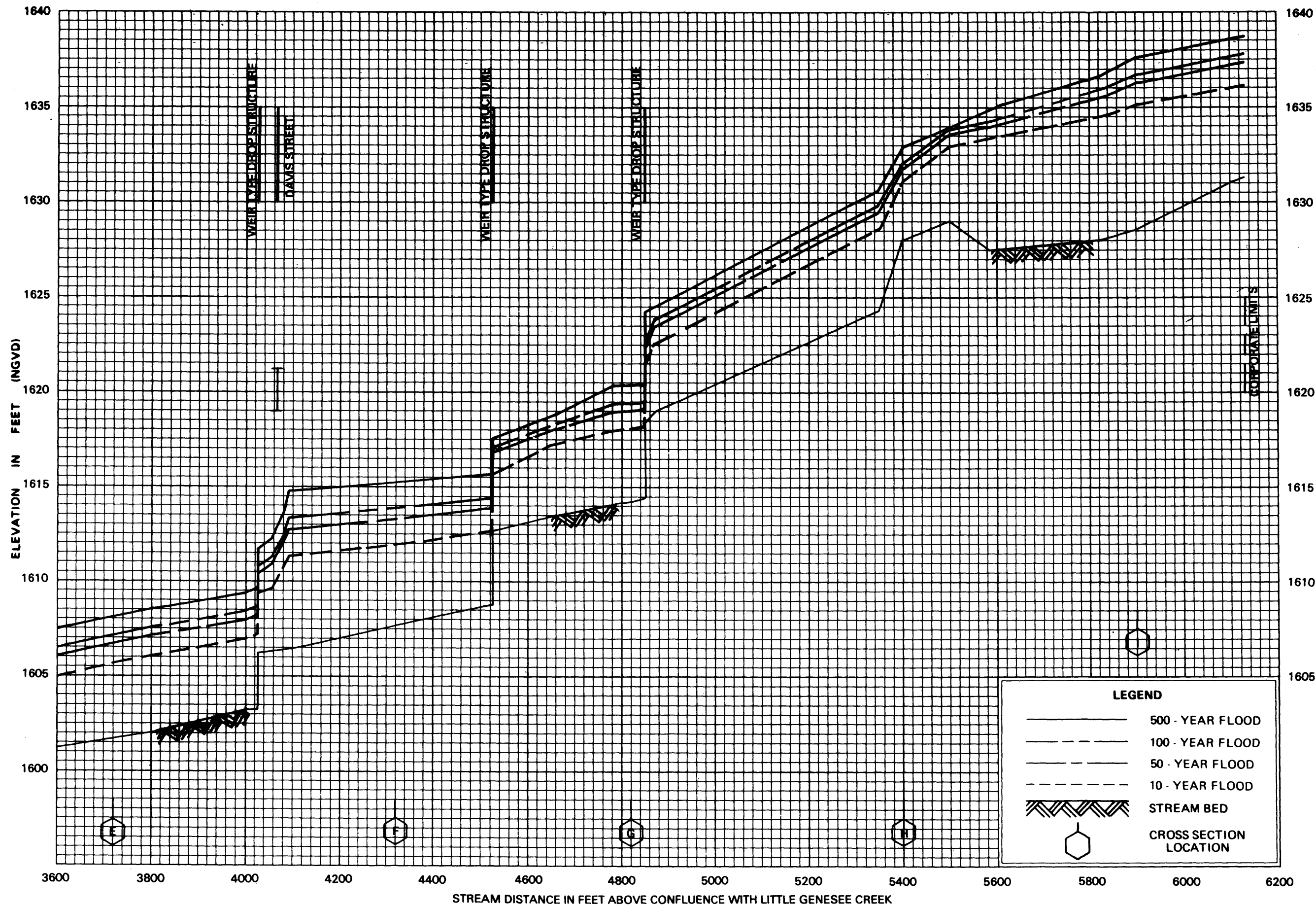
ROOT CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF BOLIVAR, NY

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