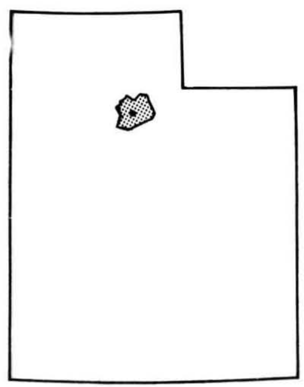
1994

Flood Insurance Study, City of South Jordan, Utah, Salt Lake County

Federal Emergency Management Agency

FLOOD INSURANCE STUDY



CITY OF SOUTH JORDAN, UTAH
SALT LAKE COUNTY

REVISED: SEPTEMBER 30,1994

Federal Emergency Management Agency

COMMUNITY NUMBER - 490107

NOTICE TO FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study 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 Flood Insurance Study may be revised and republished at any time. In addition, part of this Flood Insurance Study may be revised by the Letter of Map Revision process, which does not involve republication or redistribution of the Flood Insurance Study. It is, therefore, the responsibility of the user to consult with community officials and to check the community repository to obtain the most current Flood Insurance Study components.

This publication incorporates revisions to the original Flood Insurance Study. These revisions are presented in Section 9.0.

This preliminary revised Flood Insurance Study contains only profiles added or revised as part of the restudy. All profiles will be included in the final published report.

TABLE OF CONTENTS

TABLE OF CONTENTS (Cont'd)

FIGURES

TABLES

EXHIBITS

FLOOD INSURANCE STUDY

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the City of South Jordan, Salt Lake County, Utah, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study will be used to convert South Jordan to the regular program of flood insurance by the Federal Emergency Management Agency. Local and regional planners will use this study in their efforts to promote sound flood plain management.

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

1.2 Authority and Acknowledgments

The 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 Rollins, Brown and Gunnell, Inc., for the Federal Emergency Management Agency, under Contract No. H-4593. This work, which was completed in May 1982, covered all significant flooding sources affecting South Jordan.

1.3 Coordination

Streams designated for detailed and approximate study were identified at a meeting in September 1977 attended by representatives of the study contractor, the Federal Emergency Management Agency, Salt Lake County, and the City of South Jordan. Results of the hydrologic and hydraulic analyses were coordinated with representatives of the Salt Lake County Public Works Department, Flood Control and Water Quality Division; the U.S. Army Corps of Engineers; and the incorporated communities of Salt Lake County.

An intermediate community coordination meeting was held on February 18, 1982, to allow community representatives to review the draft study. Representatives of the Federal Emergency Management Agency; the study contractor; the U.S. Army Corps of Engineers; Salt Lake County; and the Cities of Sandy City, Riverton, Bluffdale, Draper, West Jordan, and South Jordan attended the meeting. Representatives from several of the communities west of the Jordan River expressed concern that only approximate studies had been performed on the ephemeral streams that drain the Oquirrh Mountains. It was explained that this was done because of the limited development on that side of the valley.

A final community coordination meeting for Salt Lake County and the Cities of Riverton and South Jordan was held on December 14, 1983. In attendance were representatives of the Federal Emergency Management Agency, the study contractor, the county, and the incorporated communities. Two major concerns raised at the meeting were that the studies did not reflect flows from the 1983 flood, and the conversion of the detailed study reaches of the Jordan River between 2100 South Street and the North Jordan Canal Diversion Dam to approximate study. It was agreed that these problems would be addressed during the appeals period along with other minor concerns raised by the individual communities and the county. All requests were considered and, where appropriate, were acted upon in the preparation of this study.

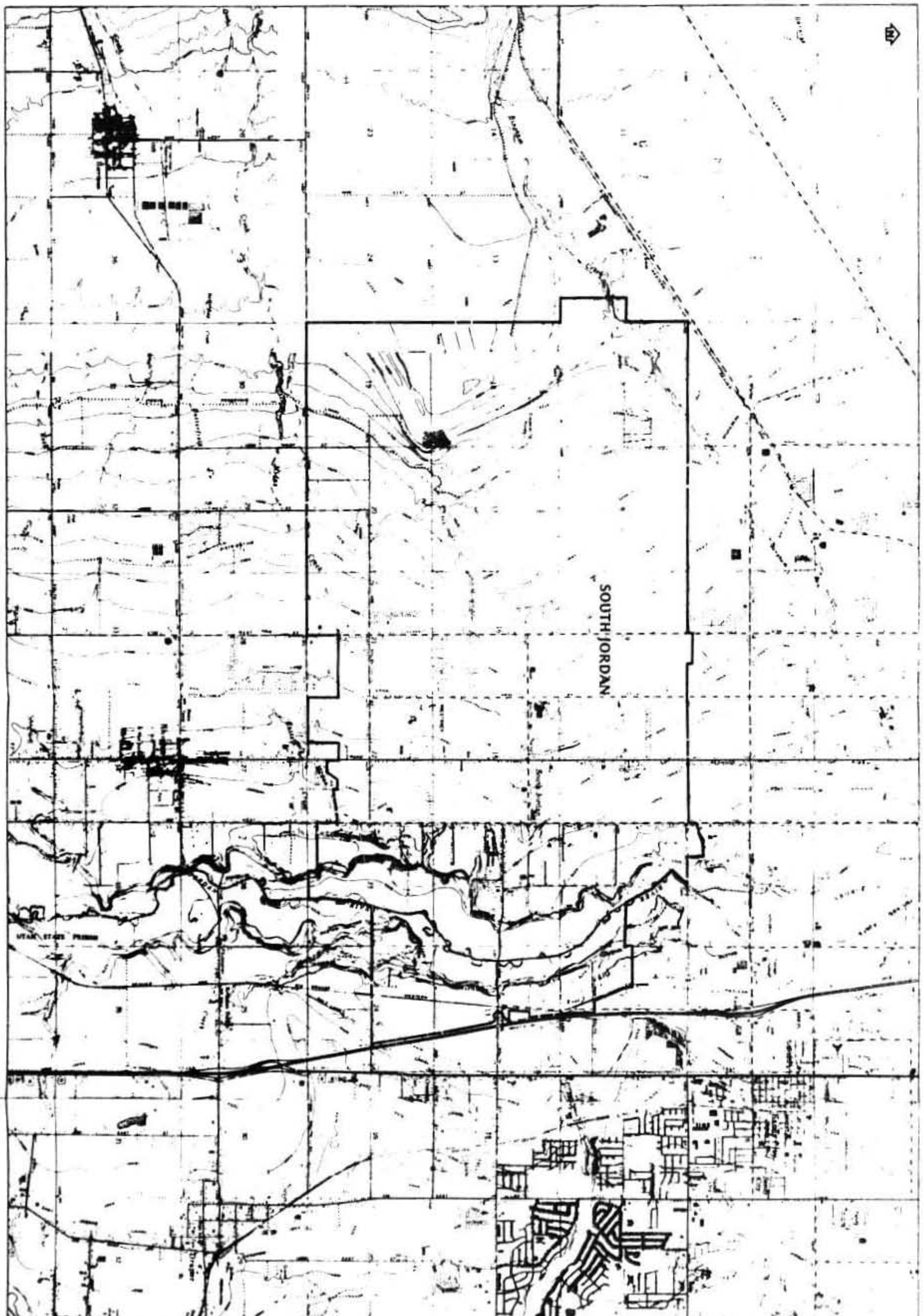
2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated areas of the City of South Jordan, Salt Lake County, Utah. The area of study is shown on the Vicinity Map (Figure 1).

The Jordan River and Dry and Willow Creeks were studied in detail for their entire length within the community.

The detailed study reach of the Jordan River within South Jordan was converted to approximate study. This change resulted from uncertainties in frequency analysis of the hydrologic data and from uncertainties in hydraulic modeling caused by completed and ongoing modifications to the river channel initiated after the completion date of this study. In addition, downstream of the North Jordan Canal Diversion Dam, problems were encountered with elevation data on the orthophoto topographic maps used for the detailed flood boundary delineations; there were also discrepancies between the results of the step-backwater analysis and the detailed flood boundary delineations. Downstream of the diversion dam, approximate flood boundaries were taken from the Flood Hazard Boundary Map (Reference 1). Upstream of the diversion dam, approximate flood boundaries were adopted from the study contractor's detailed 100-year flood boundary delineations.



FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF SOUTH JORDAN, UT
(SALT LAKE CO.)

VICINITY MAP

FIGURE 1

Those areas studied by detailed methods were chosen with consideration given to all proposed construction and forecasted development through 1987.

Midas and Bingham Creeks were studied by approximate methods. Preliminary hydrologic and hydraulic analyses for these streams revealed that the approximate 100-year flood boundaries shown on the Flood Hazard Boundary Map (Reference 1) were accurate; therefore, the Flood Hazard Boundary Map was chosen as the source of approximate flood boundaries for these streams.

Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to and agreed upon by the Federal Emergency Management Agency and the City of South Jordan.

2.2 Community Description

South Jordan is located along the west bank of the Jordan River in southwestern Salt Lake County, in north-central Utah. The city has an average elevation of 4,500 feet and is surrounded by several distinct terrain features. To the immediate west are the Oquirrh Mountains, whose peaks rise to 10,000 feet. Twenty-five miles to the north is the Great Salt Lake. To the east, approximately 15 miles across the valley floor, the Wasatch Mountains rise to heights of 11,000 feet. Finally, Utah Lake is located to the south in nearby Utah County. This lake is the source of the Jordan River and empties into the Great Salt Lake.

South Jordan is bordered by the City of West Jordan on the north, the Cities of Sandy City and Draper on the east, the City of Riverton on the south, and unincorporated areas of Salt Lake County on the south and west. South Jordan covers an area of approximately 26.0 square miles, 16.0 square miles of which are used for agriculture (mostly in the western portion of the city). Another 9.4 square miles are used for residential areas. The remaining area is used for commercial purposes.

In the Salt Lake Valley, the Jordan River flood plains are largely undeveloped. They do, however, contain some agricultural developments and a few residences. Recently, residential, industrial, and commercial development has shifted from the densely developed areas near Salt Lake City toward the lesser developed areas of the southern and western portions of the valley.

The Jordan River is the major waterway in Salt Lake County and the principal source of water for South Jordan. From its origin at Utah Lake, the Jordan River flows 55 river miles northward to the Great Salt Lake. The Jordan River gradient is approximately 5.2 feet per mile. There are no major tributaries to the Jordan River in South Jordan; however, a series of diversions and irrigation canals act to deplete the river volume during the summer. South Jordan is located near the area where the Jordan River begins to

flow smoothly. This point coincides with a gradual deterioration of river quality as it proceeds downstream.

The County masterplan uses the canals to carry storm runoff to the natural channels. The excess from the canal would be discharged to the natural channel. Many improvements to the canals and the channels are required before this system can fully function.

Dry and Willow Creeks are intermittent streams that drain the southeastern part of the valley. These streams have fairly steep gradients as they cross the terraces, but become quite flat as they reach the valley floor.

Two intermittent streams originate from the Oquirrh Mountains and traverse the terraces between the mountains and the valley floor. Bingham Creek cuts through the northwestern corner of the city, and Midas Creek nearly parallels the southern corporate limits. These streams usually flow during snowmelt and storm runoff. Irrigation company policy allows storm drainage from new subdivisions to be channeled into the canal systems. Consequently, during periods of heavy runoff, the intermittent streams will carry the volume that the canal systems are incapable of handling. This process has been adopted by Salt Lake County as a flood-control measure.

South Jordan has a network of five major canals or ditches flowing in the south-north direction. This network consists of Provo Reservoir Canal, Utah Lake Distributing Canal, Utah and Salt Lake Canal, South Jordan Canal, and Beckstead Ditch. These canals and ditches divert water directly from the Jordan River and end at various points in Salt Lake County. This water is used to fulfill water rights and agricultural needs. As more agricultural land in the valley is developed into urban land, less water will need to be diverted from the river for farming.

South Jordan is an area of mostly confined and shallow unconfined aquifers. Ground water occurs in the unconsolidated deposits of the Salt Lake Valley under natural water table and artesian conditions. In the mountain areas, some ground water seeps into stream channels and flows to the Jordan River, and the remaining ground water moves through openings in the bedrock, eventually reaching the Jordan River.

Soils typically found in the terraces are granular, while the valley floor is primarily composed of clays or clayey gravels.

Vegetation ranges from conifer, aspen, and oak in the higher mountain elevations to scrub oak, sage, and underbrush in the lower mountain elevations. Residential valley areas are vegetated mainly with lawn grasses, ornamental shrubbery, and shade trees. Undeveloped valley areas are mostly covered by grasses and sagebrush. Aspen and cottonwood trees grow along the stream courses.

South Jordan has a temperate, semiarid climate with four distinguishable seasons. Temperatures generally range from 10°F in the winter to 102°F in the summer. Precipitation tends to vary directly with elevation, from 16 inches annually on the valley floor to 40 inches annually in the high mountains (Reference 2).

2.3 Principal Flood Problems

Flooding in the Salt Lake Valley generally occurs due to three types of events; snowmelt runoff, cloudburst rainstorms, and general rainstorms. Snowmelt floods usually occur in April, May, and June. Cloudburst rainstorms are high-intensity, short-duration storms that usually occur over a relatively small area. These storms are characterized by high runoff peaks, but low volumes. They generally occur from June through October. General rainstorms are caused by low-intensity, rainfall occurring over a longer period of time. These storms can have a higher peak than the snowmelt flood and a higher volume than the cloudburst events. General rainstorms can occur at any time. The history of Salt Lake County indicates that flooding can occur from any of these events. However, the most dramatic and extensive flooding has been due to snowmelt and cloudburst floods.

Significant snowmelt flows occurred in the area in 1909, 1912, 1921, 1949, 1952, 1953, and 1975. In the 1921 flood, the Jordan River had a mean daily flow of 1,020 cubic feet per second (cfs) at the Jordan Narrows U.S. Geological Survey stream gage (No. 10167000), with an estimated return interval of 20 years. The most notable flood on record in the Salt Lake Valley occurred during April and May 1952. This flood was caused by the rapid melting of an unusually large snowpack on the Wasatch Mountains. The mean daily flow for this flood was 1,410 cfs, with an estimated return interval of 50 years, and was also recorded at the Jordan Narrows stream gage.

2.4 Flood Protection Measures

Utah Lake, at the head of the Jordan River, affords a reduction of floodflows along the Jordan River above 2100 Street South. This lake is a natural water body that has been artificially modified so that the water-surface elevation can be controlled through the use of several large radial gates and a pumping station. The ability to raise and lower the lake elevation caused conflicts between the water users and the property owners adjacent to the lake. To resolve the conflicts, a "compromise level," on elevation of 4,489.34 feet, was agreed on in 1885. Whenever runoff forecasts indicate that the water surface will exceed the compromise level, the lake is drawn down to permit discharges comparable to natural conditions.

A number of irrigation diversions along the Jordan River near the southern boundary of Salt Lake County, such as Turner Dam at Jordan Narrows, can substantially reduce floodflows. Most outflow from Utah Lake, except during periods of high flow, can be diverted to these canals.

Several roadway and railroad fills on Dry and Willow Creeks afford limited detention storage and reduced downstream discharges as conduit capacities are exceeded.

Officials of Salt Lake County have established a Flood Control and Water Quality Division in their Public Works Department. It is the responsibility of this office to manage and enforce development and flood-control ordinances in the unincorporated areas of the county. The department also works with the incorporated communties within the county, as requested, to manage and review flood-control projects. Salt Lake County also has a countywide flood-control tax that enables it to obtain funds for use in construction of new flood control projects and maintenance of existing facilities.

3.0 ENGINEERING METHODS

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

3.1 Hydrologic Analyses

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

Several stream gages have been operated by the City of Salt Lake City and the U.S. Geological Survey on county streams since the beginning of the century (References 3 and 4). The U.S. Geological Survey has operated stream gage No. 10167000 at Jordan Narrows since 1913 and also ran a stream gage at 9400 South Street (No. 10167200) from 1965 to 1968.

Existing streamflow information is not adequate to predict cloudburst runoff values downstream of the canyon mouths, where flows depend on inflow from the urban area. To obtain flow values for Dry and Willow Creeks, the U.S. Army Corps of Engineers HEC-1 computer runoff model was used (Reference 5). This model uses a kinematic wave calculation to produce runoff due to rainfall. The model computes and routes flows based on physical characteristics of the basin (such as percentage of imperviousness, infiltration rates, basin area, and slope) and storm characteristics (such as precipitation depths and rainfall distribution and duration). Rainfall depths were obtained from Precipitation Frequency Atlas of the Western United States, Volume VI, prepared by the National Oceanic and Atmospheric Administration (Reference 6). Because of the lack of available rainfall-runoff data, it was not possible to calibrate the computer model.

Peak discharge-drainage area relationships for each stream studied in detail are shown in Table 1.

3.2 Hydraulic Analyses

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

Water-surface elevations of floods of the selected recurrence intervals for the detailed studied streams were computed using the U.S. Army Corps of Engineers HEC-2 step-backwater computer program (Reference 7).

Cross section data for Dry and Willow Creeks were developed by the U.S. Army Corps of Engineers for the 1974 Flood Plain Information report (Reference 8). Cross sections were taken from topographic maps at a scale of 1:600, with a contour interval of 4 feet (Reference 9), supplemented by additional survey data provided by the county. Supplemental cross sections to define new bridges or changes in topography were made as a part of this Flood Insurance Study. All bridges, dams, and culverts were field checked to obtain information to describe their 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 is computed (Section 4.2), selected cross section locations are also shown on the Flood Boundary and Floodway Map (Exhibit 2).

Channel roughness factors (Manning's "n") used in the hydraulic computations were chosen by engineering judgment and based on field observations of the streams and flood plain areas. Roughness values ranged from 0.030 to 0.040 for main channels and from 0.040 to 0.060 for overbank areas.

Table 1. Summary of Discharges

Flooding Source and Location	Drainage Area (square miles)	Peak Discharges (cubic feet per second) 10-Year	50-Year	100-Year	500-Year
Dry Creek					
At 700 East Street (upstream of South Jordan)	13	130[1]	240[1]	550[1]	1,750[1]
At 300 West Street	14	125[1]	195[1]	420[1]	750[1]
Willow Creek					
At 12300 South Street (west of Interstate Highway 15, upstream of South Jordan)	17	25[1]	150[1]	276[1]	922[1]
Jordan River					
Narrows	2,755	1,260	2,400	3,000	4,800
9000 South Street	2,905	1,170	2,230	2,790	4,465
5800 South Street	2,985	1,200	2,280	2,850	4,560
Little Cottonwood Creek Confluence	--[2]	1,585	3,010	3,740	5,925
Big Cottonwood Creek Confluence	--[2]	1,930	3,665	4,535	7,145
Mill Creek Confluence	--[2]	2,000	3,800	4,700	7,400
2100 South Street	3,165[3]	2,000	3,800	4,700	7,400

[1] Discharge Reductions are due to Overbank Storage (generally, a result of construction in the floodplain) and/or Losses to Canals and Irrigation Systems
[2] Data Not Available
[3] Value Estimated Based on Published Drainage Area for Gage at 1700 South Street

Starting water-surface elevations for all streams were determined by normal depth calculations.

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).

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

Approximate flood depths for the Jordan River, upstream of the North Jordan Canal Diversion Dam, were determined using the U.S. Army Corps of Engineers HEC-2 step-backwater computer program (Reference 7).

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

The National Flood Insurance Program encourages State and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study 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 Emergency Management Agency as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the boundaries of the 100- and 500-year floods have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using topographic maps at scales of 1:24,000 and 1:2,400, with a contour interval of 5 feet (References 10 and 11).

Approximate flood boundaries for the Jordan River, upstream of the North Jordan Canal Diversion Dam, were delineated using the 1:24,000 scale topographic maps discussed previously (Reference 10).

Approximate flood boundaries in some portions of the study area were taken from the Flood Hazard Boundary Map (Reference 1).

Flood boundaries for the 100- and 500-year floods are shown on the Flood Boundary and Floodway Map (Exhibit 2). In cases where the 100- 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, increases the flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood may be carried without substantial increases in flood heights. Minimum standards of the Federal Emergency Management Agency limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this report are presented to local agencies as minimum standards that can be adopted or that can be used as a basis for additional studies.

All floodways computed as a part of this study were determined on the basis of equal-conveyance reduction from each side of the flood plain. The results of these computations were tabulated at selected cross sections for each stream segment for which a floodway was computed (Table 2).

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

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

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE
Dry Creek								
A	5,325	48	151	2.8	4,340.6	4,340.6	4,341.3	0.7
B	5,830	35	126	3.3	4,344.6	4,344.6	4,344.8	0.2
C	6,290	60	166	2.5	4,346.2	4,346.2	4,346.7	0.5
D	6,700	36	91	4.6	4,346.7	4,346.7	4,347.5	0.8
E	7,330	36	96	4.4	4,351.4	4,351.4	4,352.2	0.8
F	7,818	160	939	0.4	4,358.9	4,358.9	4,359.8	0.9
G	7,920	57	256	1.6	4,358.9	4,358.9	4,359.8	0.9
H	8,760	92	201	2.1	4,360.5	4,360.5	4,361.2	0.7
I	10,130	38	107	3.9	4,369.3	4,369.3	4,370.1	0.8
Willow Creek								
A	1,000	16	35	7.8	4,317.9	4,317.9	4,318.2	0.3
B	2,260	5	26	10.7	4,339.1	4,339.1	4,340.1	1.0
C	2,560	30	67	4.1	4,344.4	4,344.4	4,345.2	0.8
D	3,360	60	190	1.5	4,351.3	4,351.3	4,352.2	0.9

[1]Feet Above Mouth

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF SOUTH JORDAN, UT
(SALT LAKE CO.)

FLOODWAY DATA

DRY CREEK-WILLOW CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
Jordan River								
A	67,856	79	569	5.3	4,303.0	4,303.0	4,303.0	0.0
B	68,516	68	447	6.7	4,303.4	4,303.4	4,303.6	0.2
C	69,226	83	785	3.8	4,304.1	4,304.1	4,304.5	0.4
D	70,426	76	564	5.3	4,304.8	4,304.8	4,305.1	0.3
E	70,726	89	533	5.6	4,305.1	4,305.1	4,305.4	0.3
F	71,616	362	926	3.2	4,306.5	4,306.5	4,306.7	0.2
G	73,086	310	994	3.0	4,308.4	4,308.4	4,309.4	1.0
H	74,396	367	1,272	2.4	4,310.6	4,310.6	4,311.5	0.9
I	74,926	317	1,266	2.4	4,310.9	4,310.9	4,311.8	0.9
J	75,706	92	736	4.1	4,311.2	4,311.2	4,312.1	0.9
K	76,066	74	625	4.8	4,311.5	4,311.5	4,312.3	0.8
L	77,342	96	537	5.6	4,313.3	4,313.3	4,313.9	0.6
M	77,632	144	1,017	3.0	4,313.9	4,313.9	4,314.5	0.6
N	78,542	108	517	5.8	4,314.8	4,314.8	4,315.3	0.5
O	79,652	104	718	4.2	4,316.4	4,316.4	4,317.1	0.7
P	80,902	105	763	3.9	4,317.5	4,317.5	4,318.4	0.9
Q	82,032	128	913	3.3	4,318.5	4,318.5	4,319.5	1.0
R	82,502	86	654	4.6	4,319.1	4,319.1	4,320.0	0.9
S	82,892	87	559	5.4	4,320.0	4,320.0	4,320.7	0.7
T	83,957	88	527	5.7	4,321.7	4,321.7	4,322.3	0.6
U	84,777	67	536	5.6	4,322.5	4,322.5	4,323.2	0.7

[1]Feet Above Surplus Canal Diversion

TABLE 2	FEDERAL EMERGENCY MANAGEMENT AGENCY CITY OF SOUTH JORDAN, UT (SALT LAKE CO.)	FLOODWAY DATA JORDAN RIVER

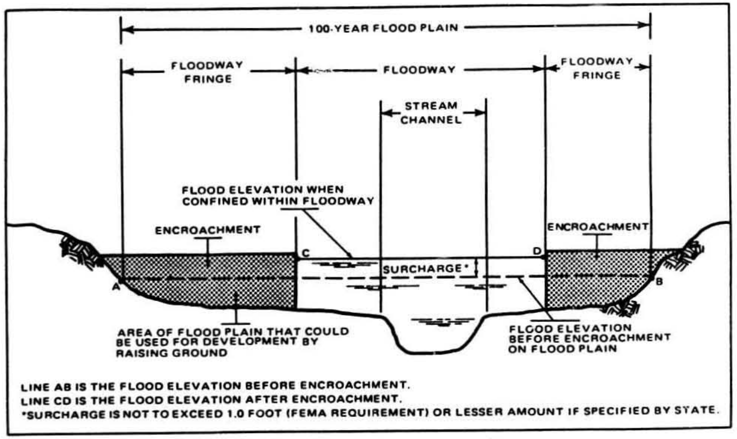


Figure 2. Floodway Schematic

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the Federal Emergency Management Agency 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 South Jordan, Utah.

5.1 Reach Determinations

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

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

5.2 Flood Hazard Factors (FHFs)

The FHF is the Federal Emergency Management Agency 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 FHFs, the entire incorporated area of the City of South Jordan was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

Zone A:	Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations shown or FHFs determined.
Zones A3 and A5:	Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations shown, and zones subdivided according to FHFs.
Zone B:	Areas between the Special Flood Hazard Areas 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; also areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.

Zone C: Areas of minimal flooding.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for South Jordan 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 Emergency Management Agency.

6.0 OTHER STUDIES

Flood Insurance Studies are being prepared for the adjacent Cities of Sandy City (Reference 12), Draper (Reference 13), and the unincorporated areas of Salt Lake County (Reference 14). This study is in agreement with these Flood Insurance Studies.

A revised Flood Hazard Boundary Map is being prepared for the adjacent City of West Jordan (Reference 15). A Flood Insurance Rate Map is being prepared for the adjacent City of Riverton (Reference 16). Flood boundaries shown on those maps are in agreement with flood boundaries shown in this Flood Insurance Study.

The U.S. Army Corps of Engineers Flood Plain Information report for Midvale-Draper, Utah (Reference 8) included analyses of Jordan River and Dry and Willow Creeks. Because of the revised hydrology and additional topographic information used in this study, it supersedes the Flood Plain Information report.

Discharges from a study by the U.S. Army Corps of Engineers (Reference 17) were utilized for the Jordan River during the course of this study.

The Federal Emergency Management Agency previously published a Flood Hazard Boundary Map for the City of South Jordan (Reference 1). This map was used as the source for some approximate flood boundaries for this Flood Insurance Study. This study represents a more recent and comprehensive analysis; therefore, it supersedes the Flood Hazard Boundary Map.

Following the disastrous flooding along Utah Lake and the Jordan River in 1983 and 1984, Salt Lake County and Utah County officials commissioned an investigation by CH2M HILL, Inc., of remedial measures to mitigate

future flood losses. The resulting report (Reference 18) proposed channel modifications on the Jordan River, a flow control structure for Utah Lake, and a plan for regulating Utah Lake outflows. These proposals were based on design discharge values established through an analysis of historical Jordan River and tributary floodflow records and a synthesis of impacts of controlled releases from Utah Lake. These design discharges are shown in Table 3. The design discharges were used in a hydraulic step-backwater model (Reference 7) of the Jordan River which assumed all proposed channel modifications to be in place. This analysis resulted in a water-surface profile shown in this Flood Insurance Study as the Utah Lake/Jordan River Flood Management Plan Profiles. No comparison or correlation between these profiles and the data presented in this study can be made or is intended. Most of the Jordan River channel modifications and the Utah Lake Outflow control structure have not been completed. The proposed plan for regulating outflows from Utah Lake is not being used at present.

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

7.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, Federal Emergency Management Agency, Building 710, Denver Federal Center, Lakewood, Colorado 80225.

8.0 BIBLIOGRAPHY AND REFERENCES

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Table 3. Jordan River Proposed Design Discharges

Location	Design Discharge (cfs)[1]
5800 South Street (Bullion Street) to 9400 South Street	3,330
9400 South Street to Jordan Narrows	3,260

[1]Source of Discharge Data: Utah Lake/Jordan River Flood Management Plan, Phase I Report (Reference 18)

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9.0 REVISION DESCRIPTIONS

This section has been added to provide information regarding significant revisions made since the original Flood Insurance Study was printed. Future revisions may be made that do not result in the republishing of the Flood Insurance Study report. To assure that any user is aware of all revisions, it is advisable to contact the community repository of flood hazard data located at the Salt Lake County Department of Public Works, Flood Control and Highway Division, 20001 South State Street, Number N3300, Salt Lake City, Utah 84190-4600.

9.1 First Revision

This study was revised on September 30, 1994, to include the restudy of the Jordan River conducted for FEMA by CH2M Hill under Contract No. EMW-90-C-3104. The restudy was completed in November 1992.

The Jordan River was studied in detail from the Utah - Salt Lake County line to the Surplus Canal diversion near 2100 South Street. The study area includes portions of the unincorporated areas of Salt Lake County, as well as portions of the Cities of West Valley, South Salt Lake, Murray, Midvale, West Jordan, South Jordan, Sandy, Riverton, Draper, Bluffdale, and Salt Lake City.

Hydrologic analyses were performed to establish discharge-frequency relationships at four locations in the study reach of the Jordan River. Historic streamflow data were analyzed in accordance with criteria outlined in Bulletin No. 17B, Guidelines for Determining Flood Flow Frequency (Reference 19).

Historic Utah Lake stage records beginning in 1884, and a high water reference of 1862, were used in conjunction with a stage-discharge curve to estimate historic natural discharges in the Jordan River. These data were used to supplement the U.S. Geological Survey (USGS) streamflow data to develop the discharge-frequency curves.

The streamflow gaging records for the Jordan River consist of two data populations as a result of the operational effects of the Compromise Agreement: natural releases and pumped releases (Reference 20). The two data populations were analyzed independently to develop flood flow frequency curves for snowmelt events, as it was determined that floods caused by snowmelt events are generally more severe than those caused by rainfall events. Flood peaks caused by rainfall events were not evaluated with peaks caused by snowmelt events so that the data populations would be homogeneous. The most severe snowmelt floods on the Jordan River are associated with natural releases and high levels of Utah Lake.

Discharge contributions to the Jordan River from Mill Creek, Big Cottonwood Creek, and Little Cottonwood Creek were based on estimated 100-year tributary discharges at the canyon mouths developed by the U.S. Army Corps of Engineers (USACE) (Reference 21).

The peak discharge-drainage area relationships developed for the Jordan River were added to Table 1.

The HEC-2 computer model developed by the study contractor as part of the Utah Lake/Jordan River Flood Management Program in 1984 was used as a basis for performing the hydraulic analyses of the Jordan River (Reference 18). The cross sections used to develop that model were field surveyed in June 1984 during the peak flow period. That model was calibrated to the 1984 event. To update the model developed in 1984, 78 additional cross sections were added to the 1984 model. Cross section data for approximately 38 of the supplemental cross sections were obtained from a 1987 survey where monumented cross sections were established between 2100 South and 14600 South to monitor erosion and deposition. The data for the remaining 40 cross sections were field surveyed in 1990 and 1991. Overbank and underwater data were obtained by field survey for all channel cross sections. In some areas (i.e., between 2100 South and the Mill Creek confluence) supplemental overbank cross section data were obtained from the 1990 orthophoto topographic maps provided by Salt Lake County (Reference 22). The portion of the HEC-2 model for the study reach upstream of Turner Dam was obtained from data developed by the USACE. All hydraulic structures were surveyed to obtain elevation and structural geometry data.

Water-surface elevations for floods of the selected recurrence intervals were computed using the HEC-2 Water Surface Profiles computer program developed by the USACE (Reference 23). Starting water-surface elevations were determined using the slope-area method.

Natural channel and overbank roughness factors (Manning's "n") used in the hydraulic computations were chosen by engineering judgment and based on field observations and of the stream and floodplain areas. Roughness values ranged from 0.022 to 0.077 for the natural main channel and from 0.075 to 0.225 for overbank areas. Main channel roughness coefficients of 0.012 and 0.013 were used to

model flow through two of the concrete diversion structures on the river.

Orthophoto topographic maps with a scale of 1:4,800 and a contour interval of 4 feet, with 2-foot supplemental contours, were provided to the study contractor by Salt Lake County (Reference 22). The photograph date of the study area was November 11, 1990.

Five shallow flooding or ponding zones (Zone AH) are identified on the maps. One of these areas is located just downstream of the Big Cottonwood Creek confluence. Another is located just upstream of the 4500 South Street bridge. The other three are located between the south side of the Sharon Steel tailings pile and the North Jordan Diversion structure.

The AH Zone located just downstream of the Big Cottonwood Creek confluence is located in a low area behind a short levee. This levee is not a FEMA certified levee, it provides less than 3 feet of freeboard during the 100-year flood, and shallow flooding occasionally occurs in the area because of inadequate internal drainage facilities. The flood elevation in this area was assumed to be equal to the water-surface elevation in the Jordan River.

The other four AH Zones are shallow flooding areas in low overbank areas along the Jordan River. The flood elevations in those areas were estimated from the water surface in the river at the low points where water enters those areas.

Flood boundaries for the Jordan River were delineated using orthophoto topographic maps at a scale of 1:4,800 with a contour interval of 4 feet and supplemental 2-foot contours. The contours on these maps extend to a point that is either 1,000 feet from the channel or 10 feet above the top of the bank, whichever comes first. In areas where the floodplain exceeded contoured areas on the maps, USGS quadrangle maps were used to supplement the contours on the orthophoto topographic maps (Reference 24). In the west overbank area between 2100 South Street and the Decker Lake Drain, the orthophoto topographic map contour data were supplemented with contour data from 1985 orthophoto topographic mapping with a contour interval of 5 feet provided by West Valley City (Reference 25).

The Summary of Discharges Table and Floodway Data Table were revised to include data for the Jordan River, and Flood Profiles for the Jordan River were added. In addition, Flood Profile Panel 04P for Willow Creek was revised to show the backwater effects from the Jordan River.

As a part of this update, the Utah Lake/Jordan River Flood Management Plan Profiles (Jordan River) have been removed from this report.

Also, as a part of this update, the Flood Insurance Rate Map for the City of South Jordan was converted to the Map Initiatives format. In the map initiatives format, all base flood elevations, cross sections, and floodplain and floodway boundaries are shown on the Flood Insurance Rate Map. The Flood Insurance Zone Designations were changed to reflect the Map Initiatives format as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study 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 Flood Insurance Study by detailed methods. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

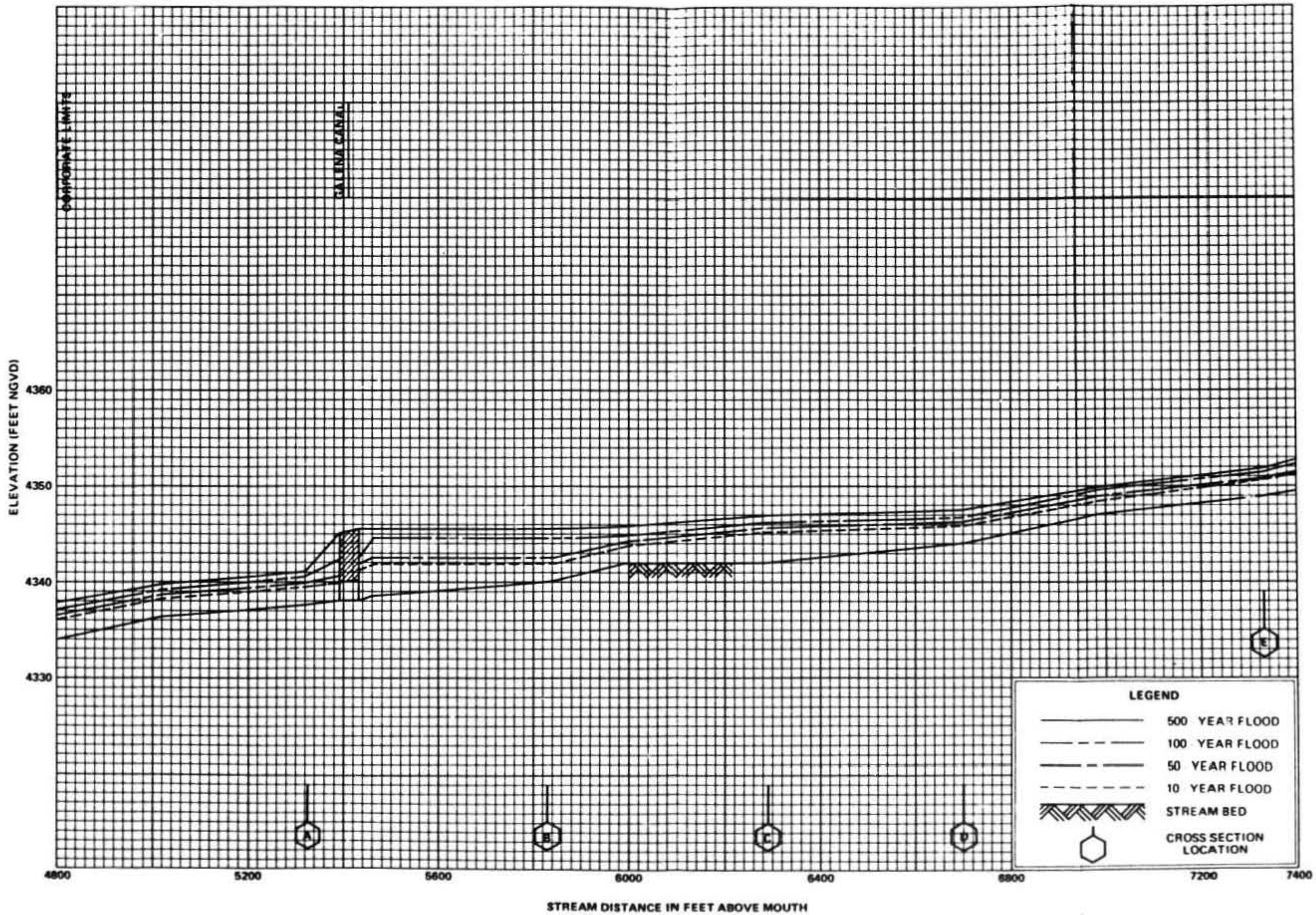
Zone AH

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 X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain, 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.

In addition, the Flood Insurance Zone Data Table was removed from the Flood Insurance Study report, and all zone designations and reach determinations were removed from the profiles.



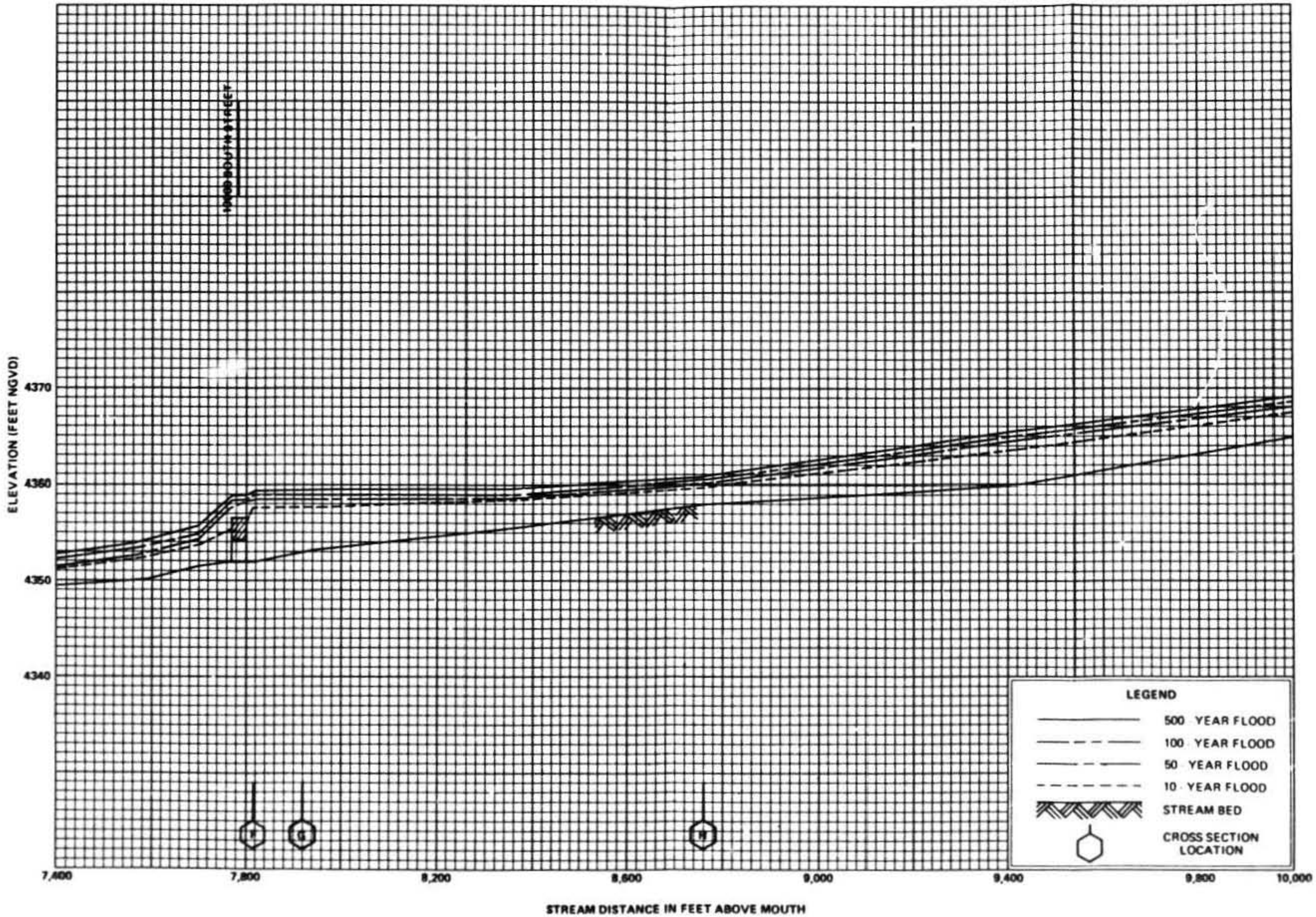
FLOOD PROFILES

DRY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF SOUTH JORDAN, UT
(SALT LAKE CO.)

01P



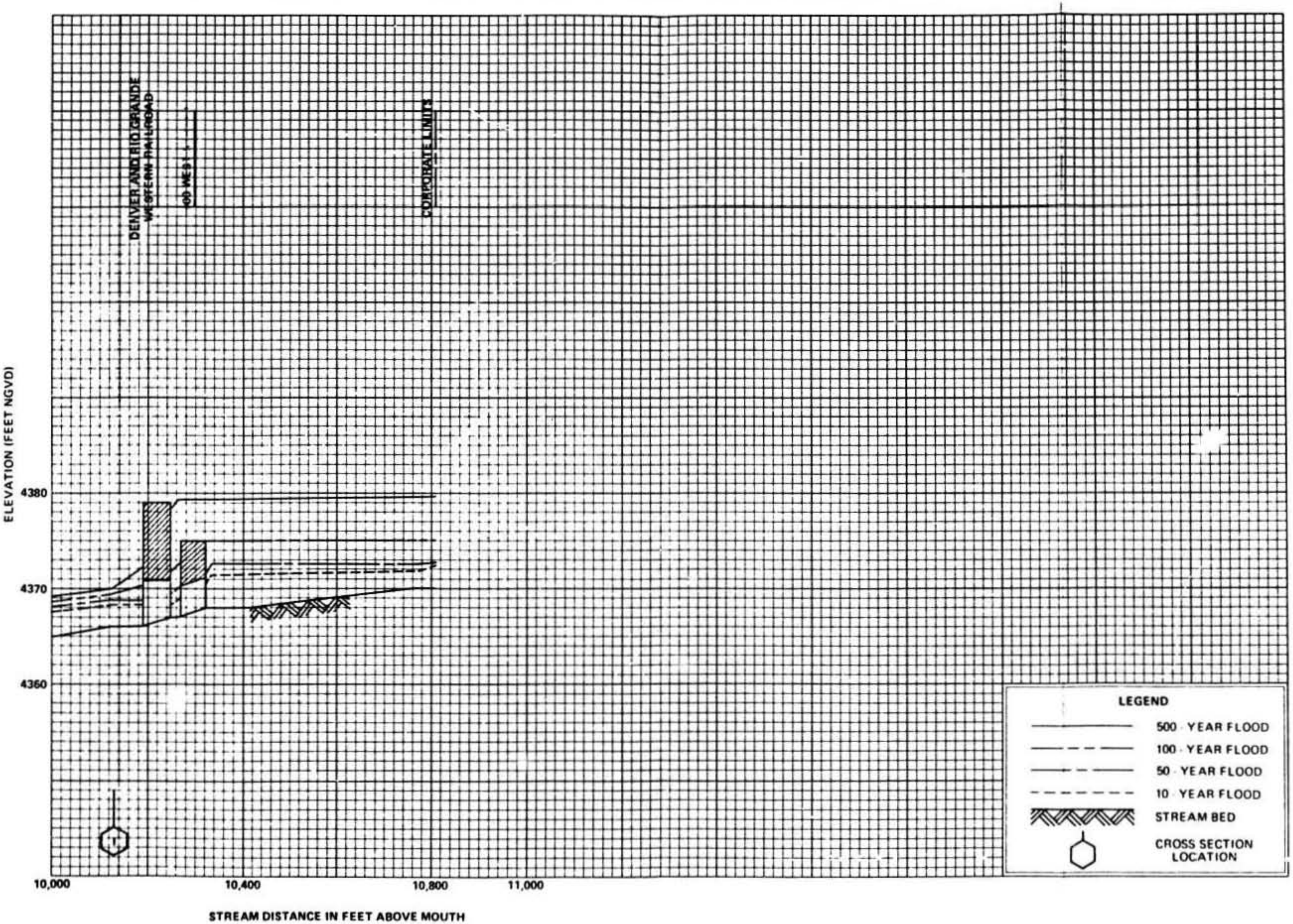
FLOOD PROFILES

DRY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF SOUTH JORDAN, UT
(SALT LAKE CO.)

02P



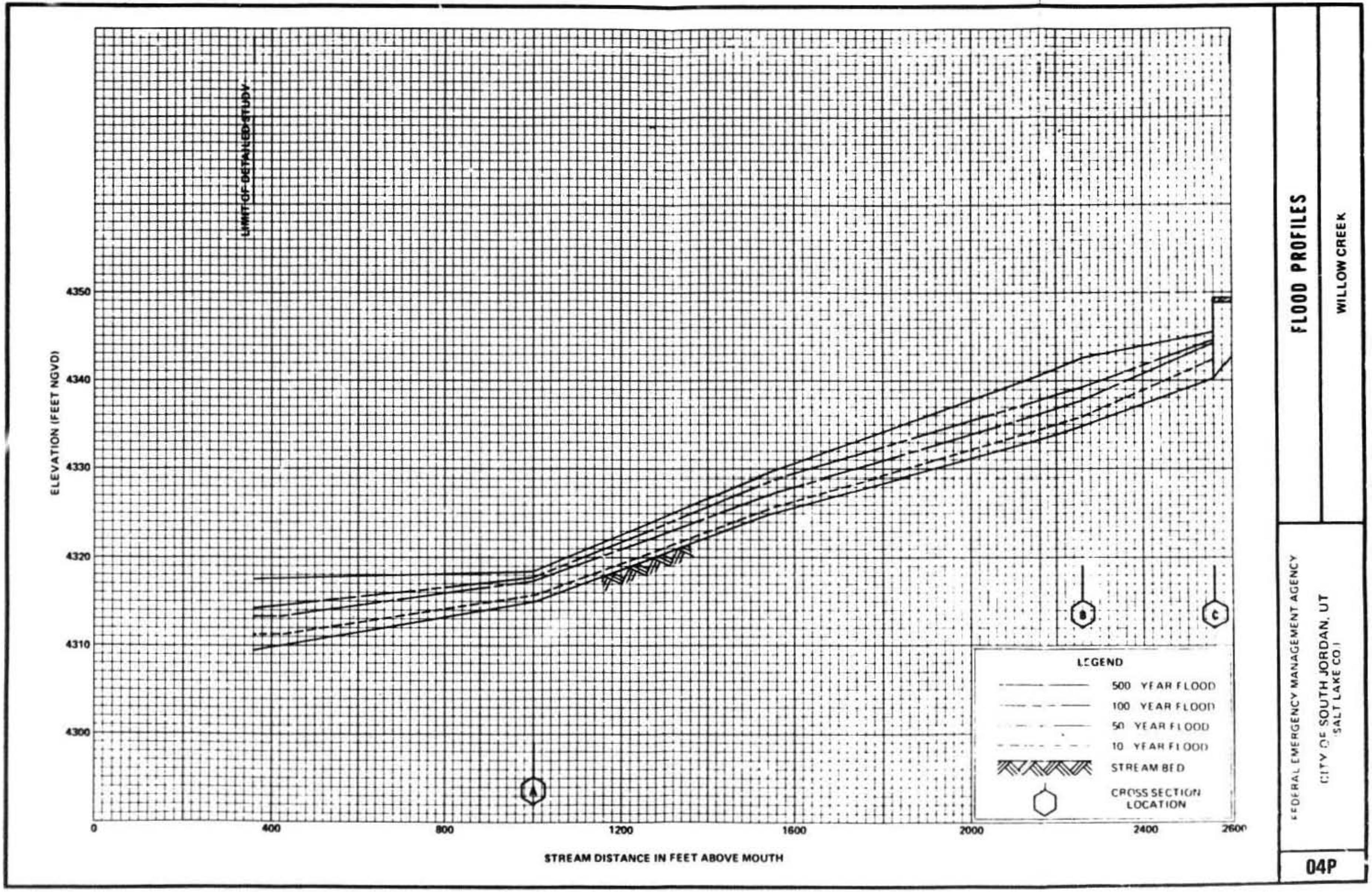
FLOOD PROFILES

DRY CREEK

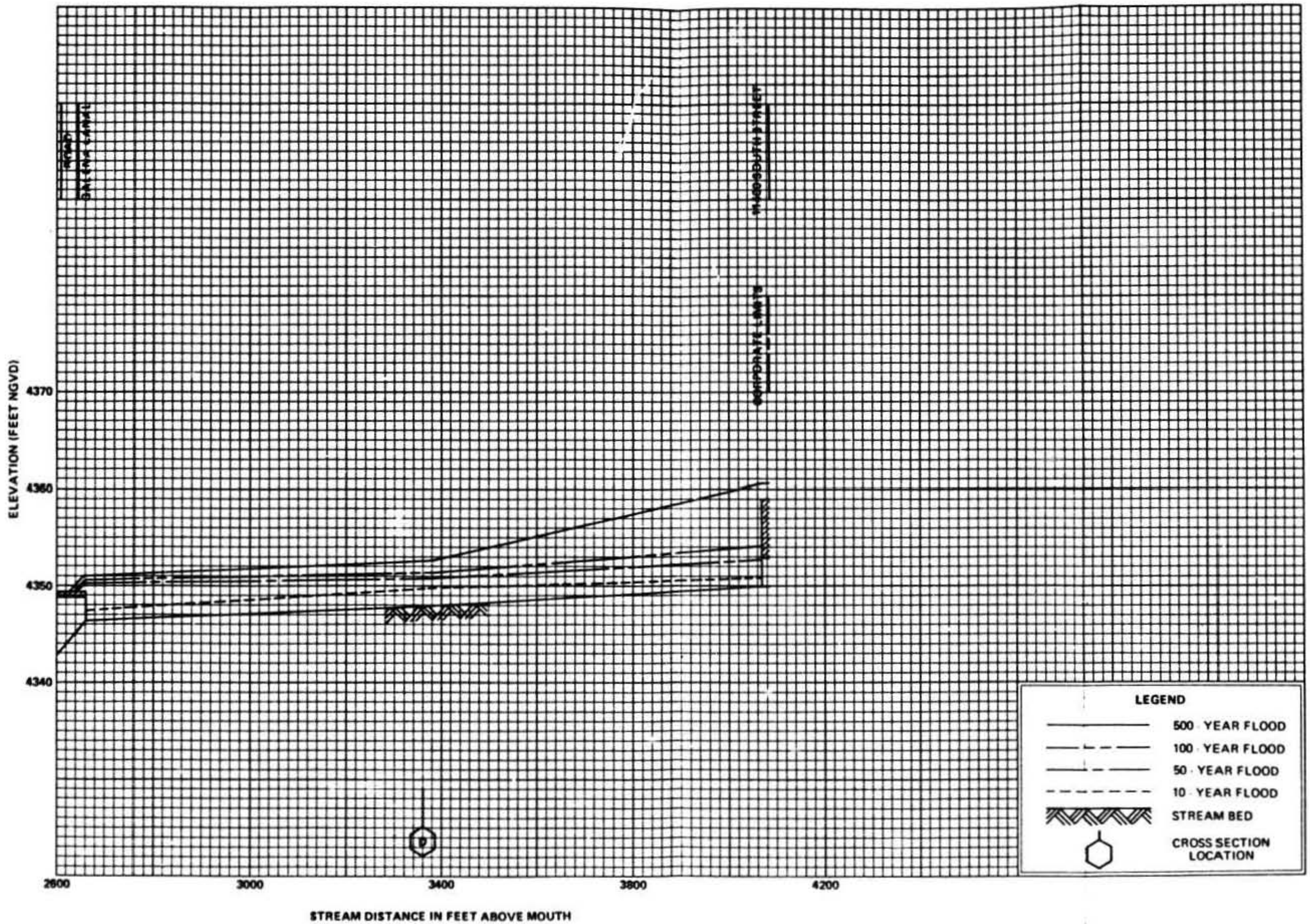
FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF SOUTH JORDAN, UT
(SALT LAKE CO.)

03P



LIMIT OF DETAILED STUDY
ELEVATION (FEET NGVD)
4350
4340
4330
4320
4310
4300
0
400
800
1200
1600
2000
2400
2600
STREAM DISTANCE IN FEET ABOVE MOUTH
A
B
C
LEGEND
500 YEAR FLOOD
100 YEAR FLOOD
50 YEAR FLOOD
10 YEAR FLOOD
STREAM BED
CROSS SECTION LOCATION
FLOOD PROFILES
WILLOW CREEK
FEDERAL EMERGENCY MANAGEMENT AGENCY
CITY OF SOUTH JORDAN, UT
(SALT LAKE CO.)
04P



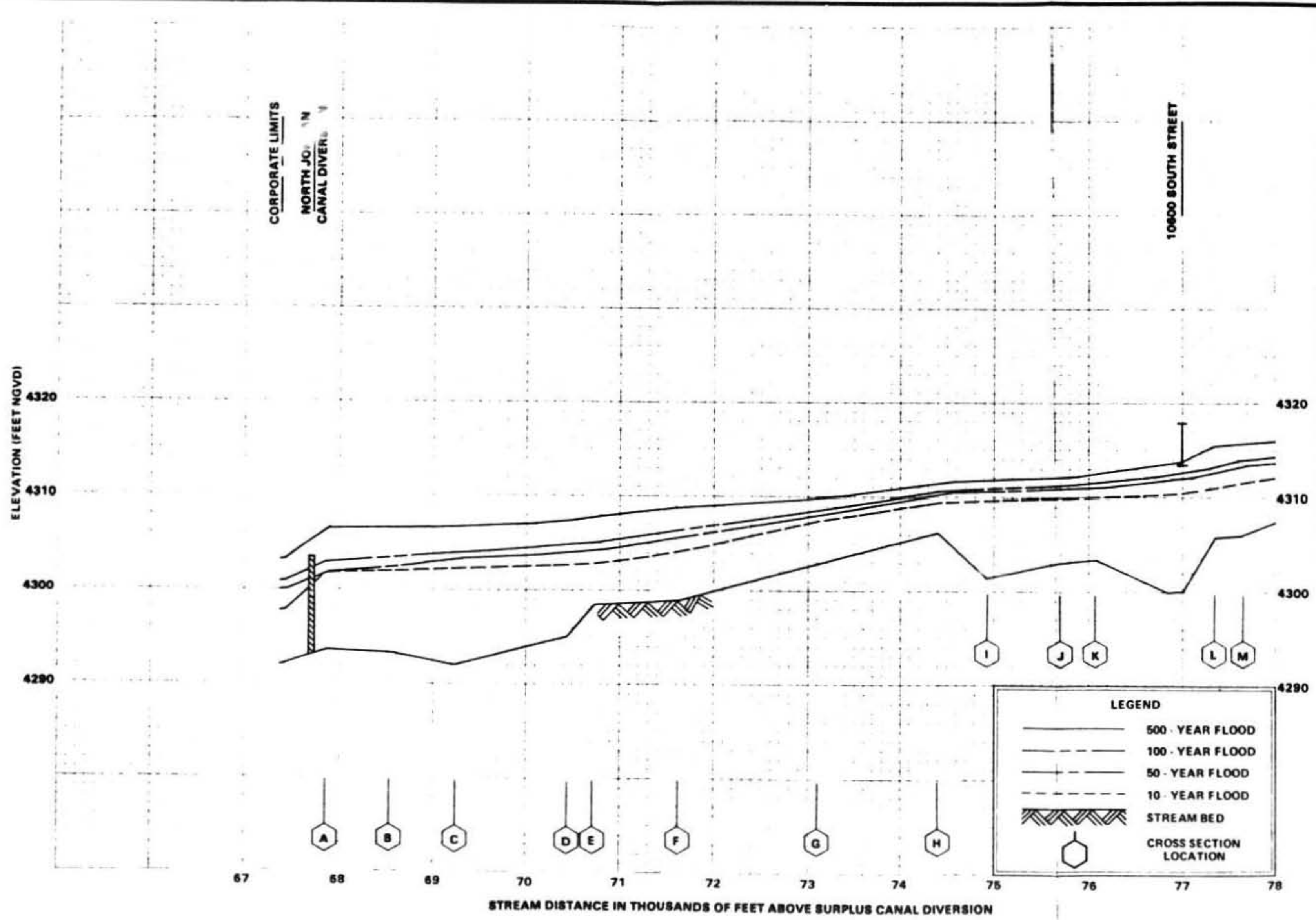
FLOOD PROFILES

WILLOW CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF SOUTH JORDAN, UT
(SALT LAKE CO.)

05P



FLOOD PROFILES

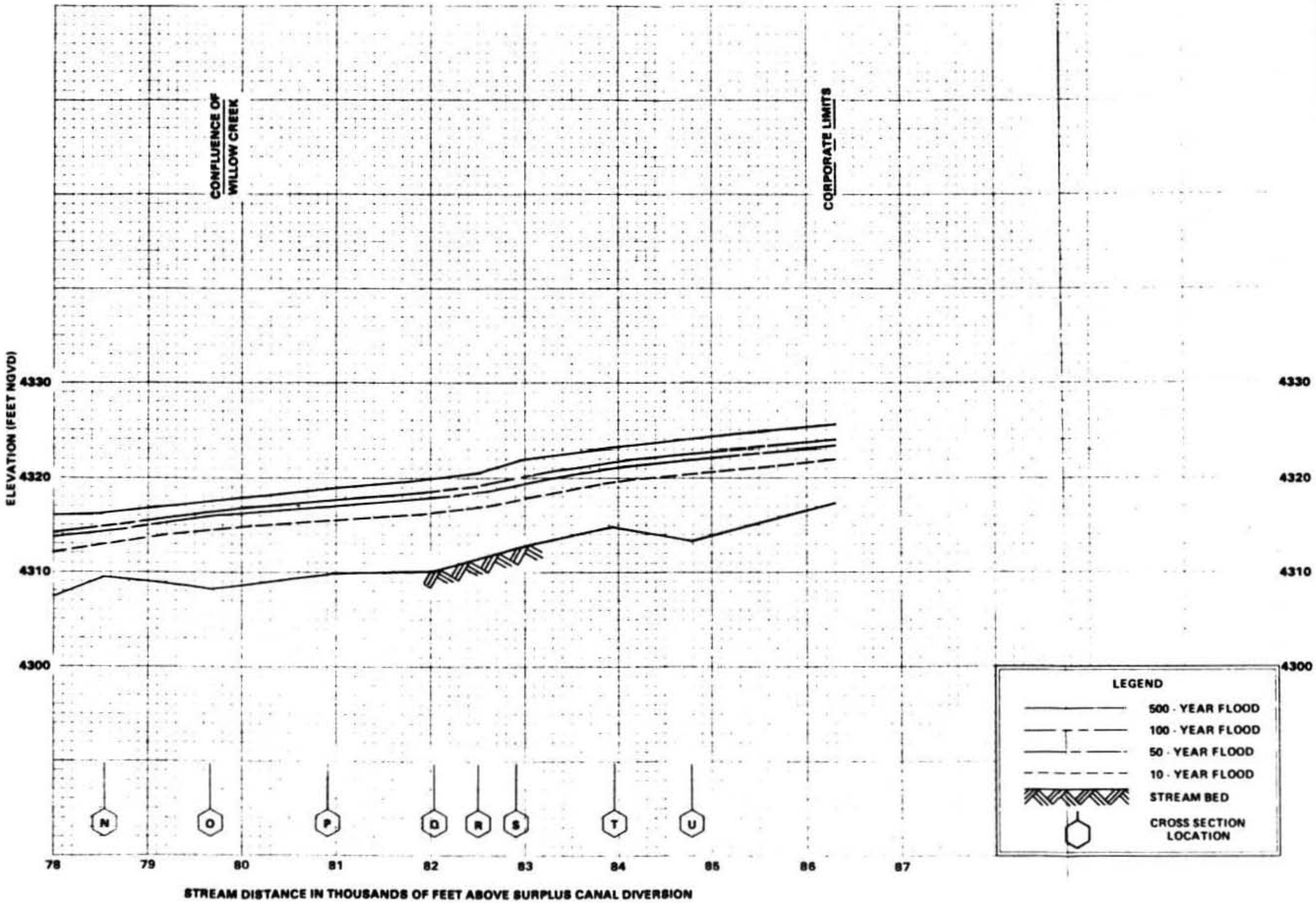
JORDAN RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF SOUTH JORDAN, UT

(SALT LAKE CO.)

06P



FLOOD PROFILES

JORDAN RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF SOUTH JORDAN,UT

(SALT LAKE CO.)

07P