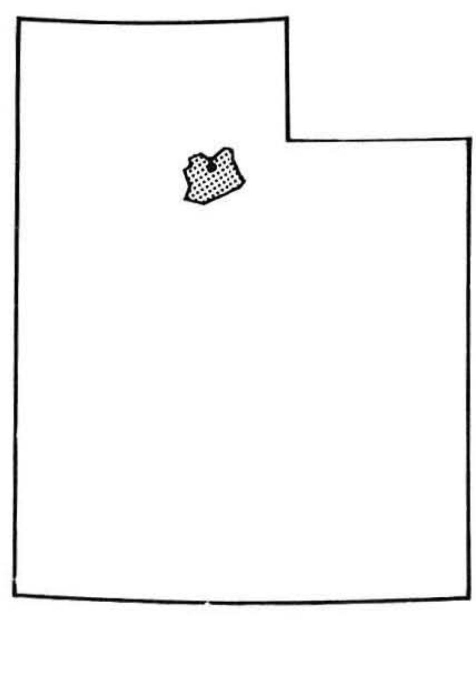
1994

Flood Insurance Study , Riverton, Utah, Salt Lake County

Federal Emergency Management Agency

FLOOD INSURANCE STUDY



CITY OF RIVERTON, UTAH
SALT LAKE COUNTY

REVISED: SEPTEMBER 30,1994

Federal Emergency Management Agency

COMMUNITY NUMBER - 490104

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.

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FLOOD INSURANCE STUDY
CITY OF RIVERTON, SALT LAKE COUNTY, UTAH

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study revises and updates a previous Flood Insurance Rate Map for the City of Riverton, Salt Lake County, Utah. This information will be used by the City of Riverton 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 Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by CH2M Hill, for the Federal Emergency Management Agency (FEMA), under Contract No. EMW-90-C-3104. This study was completed in November 1992.

1.3 Coordination

On July 7, 1989, an initial community meeting was held with representatives from FEMA, Salt Lake County, Utah County, South Salt Lake City, Murray City, and the study contractor in attendance. FEMA specified the study area for this study to be the Jordan River from the Utah County line to 2100 South Street.

Another community meeting was held on August 30, 1991, with representatives from FEMA, Salt Lake County, and the study contractor in attendance. During this meeting, the scope of work was reviewed and the methodology to be used in the hydrologic analysis and the acquisition of orthophoto topographic maps of the study area were discussed.

After completing the hydrologic analysis, a draft hydrology report was prepared to summarize the study methodology and present the revised hydrology results for the study reach of the Jordan River. Copies of this report were sent to FEMA, Salt Lake County, the eleven cities that border the Jordan River (the Cities of Salt Lake, South Salt Lake, West Valley City, Murray, Midvale, Sandy, West Jordan, South Jordan, Riverton, Draper, and Bluffdale), and six state and federal agencies (Utah State Engineer, Utah Department of Transportation, Utah Division of Comprehensive Emergency Management, U.S. Army Corps of Engineers (COE), U.S. Geological Survey (USGS), and the U.S. Soil Conservation Service). An intermediate community meeting was held on September 16, 1991, where the study contractor summarized the hydrologic analysis study methodologies and results, and representatives from each of the agencies listed above were given the opportunity to comment on the draft hydrology report. During this meeting, the revised hydrology results for the study area were discussed and adopted (Reference 1).

As the hydraulic analysis proceeded, meetings were held on November 7, 1991, and February 5, 1992, with representatives from FEMA, Salt Lake County, and the study contractor attending to discuss how to evaluate the effectiveness of levees in certain reaches of the study area. After these issues were resolved, the hydraulic analysis was completed and the provisional flood elevation, floodplain, and floodway data were sent to FEMA, Salt Lake County, Utah Division of Comprehensive Emergency Management, and the eleven cities that border the Jordan River for review. On September 21, 1992, another intermediate community meeting was held where the study contractor presented the provisional information and representatives from each of these agencies were given the opportunity to comment or identify any problems. During this meeting, the provisional flood elevations, floodplains, and floodways were adopted.

A final coordination meeting was held on November 18, 1993. In attendance were representatives of the City of Riverton, Salt Lake County, and FEMA.

2.0 AREA STUDIED

2.1 Scope of Study

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

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 unincorporated portions of Salt Lake County and incorporated portions of West Valley City, the City of South Salt Lake, Murray City, Midvale City, West Jordan City, South Jordan City, Sandy City, Riverton City, Draper City, and Bluffdale City.

Riverine flooding for the study reach was restudied by detailed methods to replace the previous study which was completed using approximate methods (Reference 2). No flooding sources other than the Jordan River were studied in detail as part of this study. Therefore, the original flood insurance information for the other streams previously studied in the affected communities will remain unchanged.

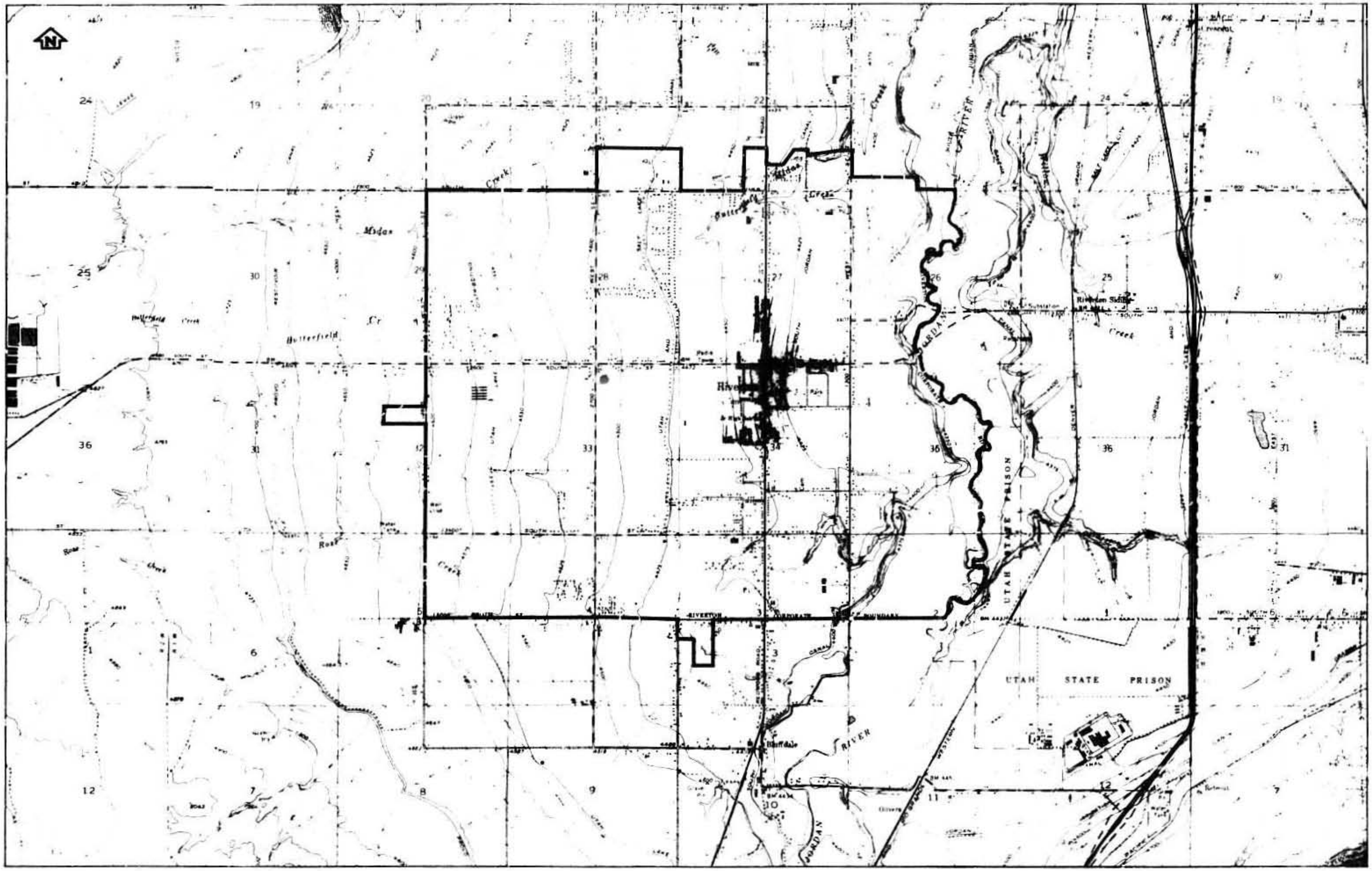

FIGURE 1	FEDERAL EMERGENCY MANAGEMENT AGENCY **CITY OF RIVERTON, UT** **(SALT LAKE CO.)**	APPROXIMATE SCALE 4450 0 4450 8900 13350 FEET **VICINITY MAP**

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The scope and methods of study were proposed to, and agreed upon by, FEMA and the City of Riverton, Utah.

2.2 Community Description

The City of Riverton is located in south-central Salt Lake County, in north-central Utah. Communities adjoining Riverton include the City of South Jordan on the north, the City of Bluffdale on the south, unincorporated areas of Salt Lake County on the west, and the City of Draper and the City of Sandy City on the east.

The City of Riverton covers approximately 8.1 square miles and the population was estimated at 11,261 in the 1990 U.S. Census.

The principal stream in the Salt Lake Valley is the Jordan River. It originates in Utah Lake at an elevation of approximately 4,489 feet and flows northerly through the center of the valley to terminate in the Great Salt Lake. The east side streams tributary to the Jordan River originate in the high elevations of the Wasatch Mountains. These streams emerge at the foothill line and flow westerly across terraces formed by the recession of prehistoric Lake Bonneville. Dry and Willow Creeks are intermittent streams which drain the southeastern part of the valley. These east side streams have fairly steep gradients as they cross the terraces, but become quite flat as they reach the valley floor. Drainage basins of the tributaries to the Jordan River range from the high areas of the Wasatch Mountains at an elevation of more than 11,000 feet, to the valley floor at an elevation of 4,250 feet.

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

Vegetation ranges from conifer, aspen, and oaks 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.

The Salt Lake Valley has a temperate, semi-arid climate with four distinguishable seasons. Temperatures generally range from 20°F below zero in the winter to 105°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 11).

2.3 Principal Flood Problems

Historical records indicate that flooding on the Jordan River is closely associated with the stage of Utah (Reference 1). The lake stage varies from month to month, usually reaching its annual peak in May or June, and then falling steadily until the beginning of winter. These seasonal fluctuations are a result of heavy inflows in the spring, evaporation and releases for irrigation, municipal, and industrial uses during the summer. Over the period of record, there is also a wide variation of the peak annual lake stage. These variations are a result of varying climatic conditions. The annual maximum lake levels have fluctuated between a low of 4,480.5 in 1935 to a high of 4,495.7 in 1862.

Historically, floods have occurred on the Jordan River during each year that the peak lake stage exceeded elevation 4,491.1 (1862, 1884, 1885, 1907, 1909, 1910, 1921, 1922, 1923, 1952, 1953, 1983, 1984, 1985, and 1986). Flooding during these years was most severe during the months of April, May, and June, the major annual snowmelt period. These floods were intensified in the lower portion of the study reach by inflow from the tributary streams. Some of the historic flood discharges on the Jordan River, with estimated recurrence intervals, are listed in Table 1.

Historic information indicates that high stages of Utah Lake and flooding on the Jordan River and its tributaries is most commonly associated within runoff from snowmelt. However, limited flooding on the Jordan River and flooding on the major tributaries has also resulted from cloudburst storms, general rainstorms, and from a combination of rainfall and snowmelt.

Since the last Flood Insurance Study was completed for the study area in 1982, the Jordan River has experienced the three largest flood events that have occurred since the streamflow gage was established at the Narrows in August 1913. These events occurred in 1984, 1986, and 1983, respectively, and were associated with high stages at Utah Lake caused by runoff from the melting of heavy snowpack. Floods in 1985 and 1987 are also ranked among the ten largest floods that have occurred during this 76-year period of record.

The floods of 1983 and 1984 caused severe property damage along the Jordan River. The magnitude and duration of these flood flows caused the five irrigation diversion structures on the Jordan River to fail. During this high flow period, the river also experienced severe bank erosion and channel migration as the river responded to channelization, dredging, and channel straightening work that was completed after the 1952 flood. In some reaches of the study area, the river channel migrated laterally between 300 and 400 feet. To mitigate flood damage, the Utah Lake/Jordan River Flood Management Program was implemented by Salt Lake and Utah Counties (Reference 3). This program was completed between the summers of 1985 and 1987 and included the following:

- Constructing a new gated outlet structure at the head of the Jordan River to increase the Utah Lake outlet capacity.

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Table 1. Jordan River Historic Flood Data

Year	Location	Station No.	Flow-Cubic Feet Per Second (cfs)[1]	Estimated Return Interval (Years)
1862	Jordan Narrows	--[2]	3,800[3]	250
	2100 South Street	--[2]	5,900[3]	250
1884	Jordan Narrows	--[2]	2,600[3]	70
	2100 South Street	--[2]	4,050[3]	70
1922	Jordan Narrows	10167000	1,370[4]	13
1952	Jordan Narrows	10167000	1,410	15
	2100 South Street	10170490[5]	1,820	9
1978	2100 South Street	10170490	2,426[6]	--
1982	2100 South Street	10170490	2,670[6]	--
1983	Jordan Narrows	10167000	2,150	42
	9000 South Street	10167230	1,630	23
	5800 South Street	10167300	2,090	43
	2100 South Street	10170490	3,350	42
1984	Jordan Narrows	10167000	3,030	100
	9000 South Street	10167230	2,790	100
	5800 South Street	10167300	2,850	97
	2100 South Street	10170490	4,510	93
1986	Jordan Narrows	10167000	2,660	75
	9000 South Street	10167230	2,510	80
	2100 South Street	10170490	3,980	65

[1]Flow values shown are mean daily. Instantaneous peaks would be somewhat higher.
[2]Not applicable. Streamflow gage not yet established.
[3]Estimated discharge
[4]Approximate discharge
[5]Combined discharge obtained from adding discharges from gaging Station Nos. 10170500 and 10171000, located at the Surplus Canal near 2100 South and 1700 South, respectively.
[6]Peak discharge from rainfall event. Return interval not estimated because frequency curves were developed from snowmelt events.

- Dredging the channel reach between Utah Lake and Turner Dam, near the Utah Salt Lake County line, to increase channel conveyance capacity.
- Replacing the five failed irrigation diversion structures between Turner Dam and 4500 South.
- Stabilizing river banks in several critical channel reaches to prevent further channel migration.

To address the concerns with the channel instability of the Jordan River, Salt Lake County retained CH2M Hill to evaluate the stability of the Jordan River (Reference 4). The primary purpose of the stability study was to develop a stability management plan that would supplement information presented in this Flood Insurance Study that could be used by Salt Lake County and the ten incorporated cities that border the Jordan River to manage and protect the river, as well as development along the river. This management plan stresses the importance of utilizing nonstructural management techniques, such as zoning restrictions and control of land use, within a defined channel meander/bend migration corridor. Some structural improvements were also recommended to enhance the natural, on-going fluvial processes that are reestablishing a more natural channel pattern, as well as to protect existing development from erosion hazards.

2.4 Flood Protection Measures

Efforts to control flooding on the Jordan River in Salt Lake County extend back to 1885 when local interests constructed the Surplus Canal. The Surplus Canal flows northwest from its head on the Jordan River near 2100 South Street to its outfall at the Great Salt Lake. This canal was constructed to convey flood flows around Salt Lake City by diverting water from the Jordan River. The capacity of the canal was enlarged in 1960 as part of a COE project. As part of this same project, levees were also constructed on the Jordan River from the head of the Surplus Canal to the Mill Creek confluence.

Gated control structures have been constructed at the head of the Surplus Canal and on the adjacent diversion to the Jordan River north of 2100 South. During periods of high runoff, the gates to the Jordan River north of 2100 South are closed, diverting all water in the Jordan River upstream of 2100 South into the Surplus Canal. This action reduces flood damage along the Jordan River in Salt Lake City by reserving channel capacity for inflow from the Salt Lake City streams.

The levees along the Jordan River between the head of the Surplus Canal and the Mill Creek confluence were designed to convey 3,300 cubic feet per second (cfs) with a minimum freeboard of 3 feet. The 3,300 cfs was previously the estimate of the 100-year discharge. As a result of this study, 3,300 cfs is now estimated to be the approximate 40-year discharge. The channel through this reach can convey the 100-year discharge with a minimum freeboard of approximately 2 feet on the west levee, but under FEMA criteria, levees with less than 3 feet of freeboard are considered ineffective. The east levee in this area was constructed approximately 2 feet higher than the west levee, so it is considered effective during the 100-year flood event. Other levees along the Jordan River in the County are not certified and are considered to have little or no effect during the 100-year flood flows.

In 1902, a gated outlet structure and pumping station were constructed at the head of the Jordan River on Utah Lake. Since that time, Utah Lake, a natural body of water, has been operated as a reservoir. Releases from Utah Lake into the Jordan River are regulated by a legal agreement. This agreement, commonly known as the Compromise Agreement, was established in 1885 and modified in 1985. Highlights of the agreement are listed below.

- The gates at the Utah Lake outlet will be opened to release the lesser of the Utah Lake outlet capacity or the capacity at the Jordan River at 2100 South in Salt Lake County when the lake stage is above elevation 4,489.045 (compromise elevation).

- Minimum flows are released or pumped into the Jordan River when the lake level falls below compromise elevation. These minimum flows are determined by the water rights of the canal and irrigation companies in Salt Lake County and their ability to distribute water for use.

- An agent of Salt Lake County is authorized to control releases into the Jordan River when emergency conditions develop that could cause damage to property or injury to persons. This would allow the gates at the Utah Lake outlet to be partially closed during tributary flood peaks that would be expected to cause flow in the lower reach of the Jordan River to exceed channel capacity.

- The gates at Turner Dam may also be regulated during flood flows by this agreement.

The effects of the human intervention associated with regulating releases at Utah Lake could be substantial in reducing flood damage between 2100 South and the confluence of Little Cottonwood Creek.

The operation of irrigation canals during floods may also reduce flood flows in the Jordan River. During normal years, the canal companies divert water from the river from about April 15 to October 15, which includes the normal annual peak snowmelt period. Canal operation was responsible for reducing the peak flood flow between the Narrows and 9000 South by approximately 550 cfs, 420 cfs, and 780 cfs, respectively, during the floods of 1983, 1984, and 1985. However, this operating alternative cannot be considered to be a reliable flood control feature because normal irrigation demands can fluctuate, depending on weather conditions.

A parkway is under various stages of planning and development along the Jordan River in Salt Lake County. In areas where the parkway has been developed, nature and recreational trails and portions of golf courses have been constructed near the river. In these areas, efforts have been made to preserve old oxbows and wetland and riverine habitat in a 100- to 200-foot-wide corridor on both sides of the river. The preservation of a natural corridor along the river can have substantial flood control benefits.

Salt Lake County officials are currently encouraging officials from the ten incorporated communities that border the Jordan River to restrict structural improvements in a channel meander/bend migration corridor that was delineated as part of the Jordan River Stability Study (Reference 4), mentioned above. It was recommended that this corridor be preserved to let the river naturally reestablish a more natural channel pattern. Preserving this natural corridor could also have substantial flood control benefits.

3.0 ENGINEERING METHODS

For the flooding sources studied by detailed methods 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); 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 peak discharge-frequency relationships for each flooding source studied by detailed methods affecting the community.

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 5).

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 USGS streamflow data to develop the discharge-frequency curves. The locations, length of record, and operating agency, and type of record available for the streamflow gages used for this study are summarized in Table 2.

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 1). 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 COE (Reference 6).

The peak discharge-drainage area relationships developed for the Jordan River are summarized in Table 3.

3.2 Hydraulic Analyses

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

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 3). 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

Table 2. Stream Gaging Stations

Stream	Location	Station No.	Drainage Area (Square Miles)	Data Source[1]	Period of Record	Type of Record Available	
						Mean Daily Flow	Peak Daily Flow[2]
Jordan River	The Narrows	10167000	2,755	USGS	1904, 1913 - Present	X	
Jordan River	9000 South	10167230	2,905	USGS, SLCo	1980 - Present	X	X
Jordan River	5800 South	10167300	2,985	USGS	1980 - 1985	X	
Jordan River	1700 South	10171000	3,183	USGS	1942 - Present	X	X
Surplus Canal	2100 South	10170500	NP[3]	USGS	1942 - Present	X	X
Little Cottonwood Creek	Canyon Mouth	10167500	27.4	SLC	1912 - Present	X	
		10167499		SLC	1981 - Present	X	
Little Cottonwood Creek	2050 East	10167700	35.2	USGS	1980 - 1987	X	
Little Cottonwood Creek	Near Jordan River	10168000	NP	USGS, SLCo	1980 - 1983; 1984 - Present	X	X
Big Cottonwood Creek	Canyon Mouth	10170000	50.0	SLC	1901 - Present	X	
		10169999		SLCo	1981 - Present	X	
Big Cottonwood Creek	Cottonwood Lane	10169000	57.3	USGS, SLCo	1964 - 1968; 1979 - Present	X	X
Big Cottonwood Creek	Near Jordan River	10169500	NP	USGS, SLCo	1979 - Present	X	X
Mill Creek	Canyon Mouth	10170000	21.7	SLC	1899 - Present	X	
		10169999		SLCo	1981 - Present	X	X
Mill Creek	Near Jordan River	10170250	NP	USGS, SLCo	1980 - Present	X	X

[1]USGS = U.S. Geologic Survey
SLCo = Salt Lake County Engineering
SLC = Salt Lake City Water Department
[2]Peak Daily Flow = Instantaneous Peak Flow
[3]Value Not Published

Table 3. 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
Jordan River:					
At 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	--[1]	1,585	3,010	3,740	5,925
Big Cottonwood Creek Confluence	--[1]	1,930	3,665	4,535	7,145
Mill Creek Confluence	--[1]	2,000	3,800	4,700	7,400
2100 South Street	3,165[2]	2,000	3,800	4,700	7,400

[1]Value Not Published
[2]Value Estimated Based on Published Drainage Area for Gage at 1700 South Street

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 7). The portion of the HEC-2 model for the study reach upstream of Turner Dam was obtained from data developed by the COE. 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 COE (Reference 8). 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 7). 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.

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

The hydraulic analyses 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 the descriptions of the marks 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 Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist communities 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 each stream studied by detailed methods, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section.

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 9). 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 10).

The 100- and 500-year floodplain boundaries are shown on the Flood Insurance Rate Map. On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zone(s) A, AE, AH, AO, A99, V, and VE); 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.

For the streams studied by approximate methods, only the 100-year floodplain boundary is shown on the Flood Insurance Rate Map.

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 minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this study were 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 4). 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 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 2.

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These 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 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.

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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)			
Jordan River								
A	87,787	205	843	3.6	4,325.6	4,325.6	4,326.0	0.4
B	88,087	78	411	7.3	4,326.0	4,326.0	4,326.2	0.2
C	88,847	77	441	6.8	4,327.5	4,327.5	4,328.2	0.7
D	89,907	109	658	4.6	4,329.4	4,329.4	4,329.9	0.5
E	90,677	115	617	4.9	4,330.2	4,330.2	4,330.6	0.4
F	91,752	69	503	6.0	4,331.9	4,331.9	4,332.1	0.2
G	92,242	170	1,025	2.9	4,333.3	4,333.3	4,333.5	0.2
H	92,862	60	432	6.9	4,334.6	4,334.6	4,334.6	0.0
I	93,427	50	354	8.5	4,336.2	4,336.2	4,336.2	0.0
J	94,027	194	989	3.0	4,337.3	4,337.3	4,338.0	0.7
K	94,937	85	483	6.2	4,337.7	4,337.7	4,338.4	0.7
L	96,257	155	697	4.3	4,339.2	4,339.2	4,340.1	0.9
M	96,717	114	612	4.9	4,339.7	4,339.7	4,340.4	0.7
N	97,257	136	483	6.2	4,340.8	4,340.8	4,341.2	0.4
O	98,257	81	471	6.4	4,342.9	4,342.9	4,343.0	0.1
P	98,777	108	541	5.6	4,343.5	4,343.5	4,343.8	0.3
Q	99,407	62	430	7.0	4,344.3	4,344.3	4,344.6	0.3
R	100,527	65	418	7.2	4,346.2	4,346.2	4,346.6	0.4
S	101,387	100	428	7.0	4,348.8	4,348.8	4,349.2	0.4
T	102,737	131	557	5.4	4,352.1	4,352.1	4,352.7	0.6
U	104,287	104	603	5.0	4,354.4	4,354.4	4,354.7	0.3

[1]Feet Above Surplus Canal Diversion

TABLE 4	FEDERAL EMERGENCY MANAGEMENT AGENCY CITY OF RIVERTON, UT (SALT LAKE CO.)	FLOODWAY DATA JORDAN RIVER

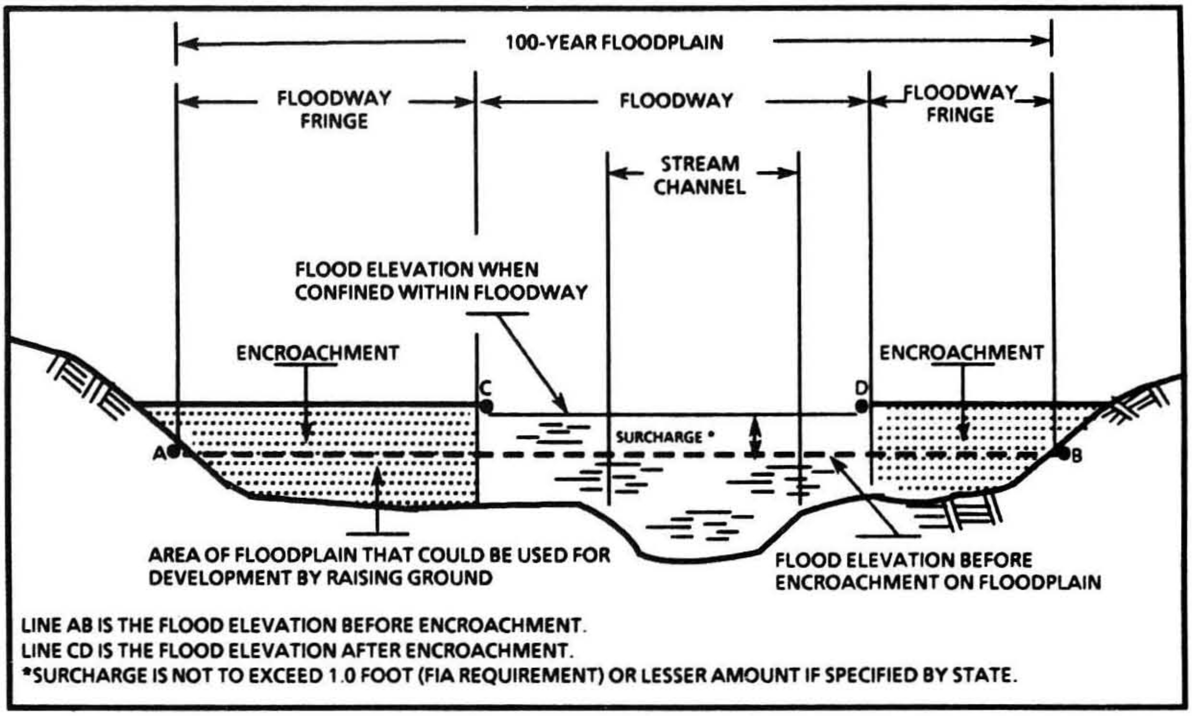

Figure 2. Floodway Schematic

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.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map 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.

7.0 OTHER STUDIES

This report either supersedes or is compatible with all previous studies published on streams studied in this report and should be considered authoritative for the purposes of the NFIP.

As a result of the restudy performed by CH2M Hill, Flood Insurance Study reports were created for the incorporated Cities of Bluffdale, Midvale, Riverton, West Jordan, and West Valley City. Existing Flood Insurance Study reports for the unincorporated areas of Salt Lake County and the incorporated Cities of Draper, Murray, Salt Lake City, Sandy, South Jordan, and South Salt Lake were revised as a result of the restudy. The flooding information for the Jordan River presented in these communities' Flood Insurance Study reports is in complete agreement.

A Flood Insurance Study has been prepared for Utah County where the Jordan River was studied using detailed methods. This study is not in agreement with the Utah County study because the hydrology has been revised. Therefore, the 10-, 50-, 100-, and 500-year peak discharges, base flood elevations, flood profiles, and floodplain boundaries will not match. Utah County has requested that the Jordan River in Utah County be restudied using the hydrology developed in this study. Until then, the two studies will remain in disagreement.

It should also be noted that the Jordan River Stability Study was recently completed for Salt Lake County. The primary goals of this report were to delineate a river meander/bend (Reference 4) migration corridor along the river, identify existing and potential stability problems, and to develop a management and maintenance plan for the Jordan River. The results of the stability study are intended to be used in conjunction with the results from this Flood Insurance Study to help control development in the floodplains of the river.

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, Denver Federal Center, Building 710, Box 25267, Denver, Colorado 80225-0267.

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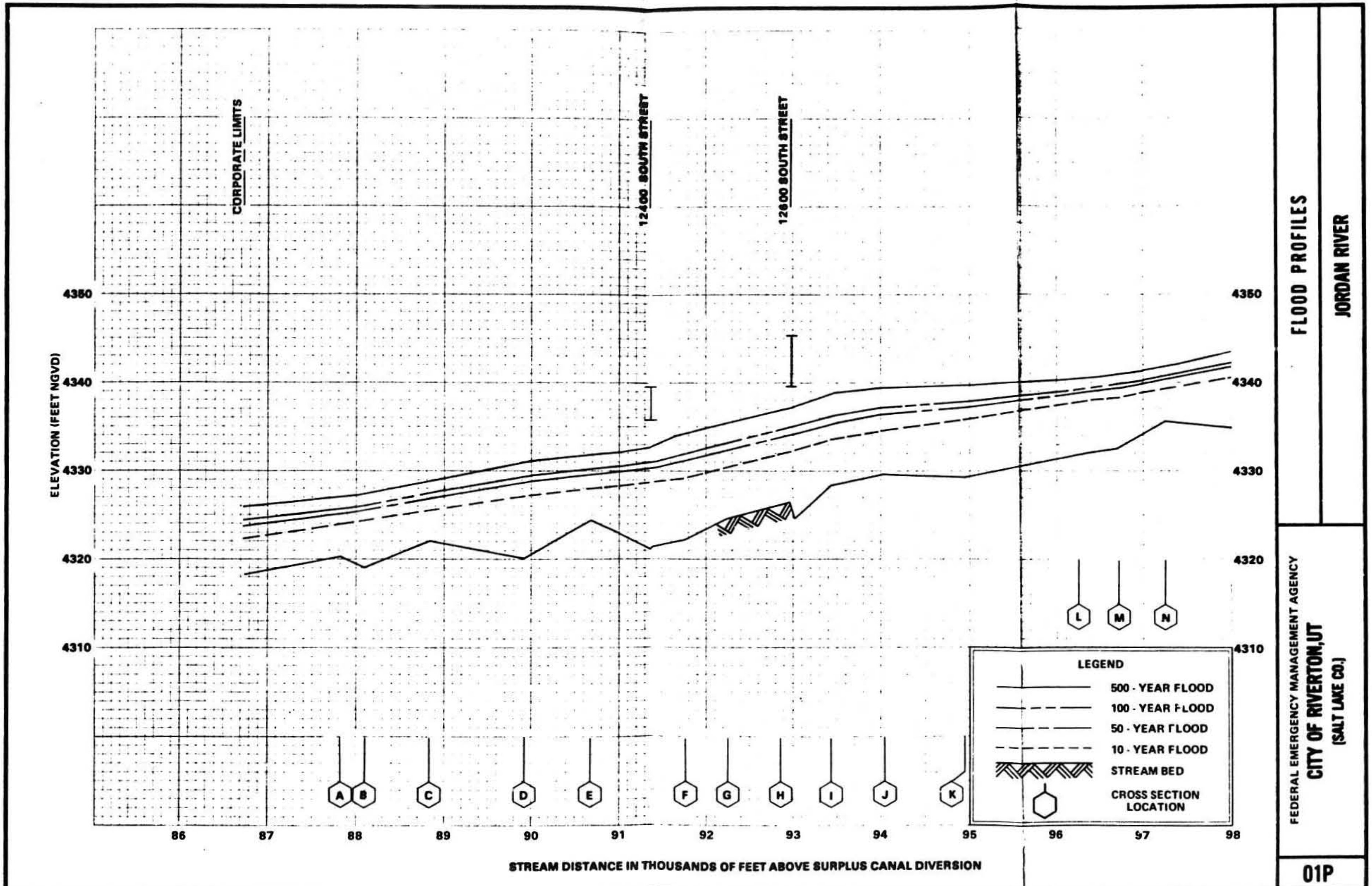
CORPORATE LIMITS
12400 SOUTH STREET
12600 SOUTH STREET
ELEVATION (FEET NGVD)
4350
4340
4330
4320
4310
86
87
88
89
90
91
92
93
94
95
96
97
98
A
B
C
D
E
F
G
H
I
J
K
L
M
N
LEGEND
500 - YEAR FLOOD
100 - YEAR FLOOD
50 - YEAR FLOOD
10 - YEAR FLOOD
STREAM BED
CROSS SECTION LOCATION
STREAM DISTANCE IN THOUSANDS OF FEET ABOVE SURPLUS CANAL DIVERSION
FLOOD PROFILES
JORDAN RIVER
FEDERAL EMERGENCY MANAGEMENT AGENCY
CITY OF RIVERTON, UT
(SALT LAKE CO.)
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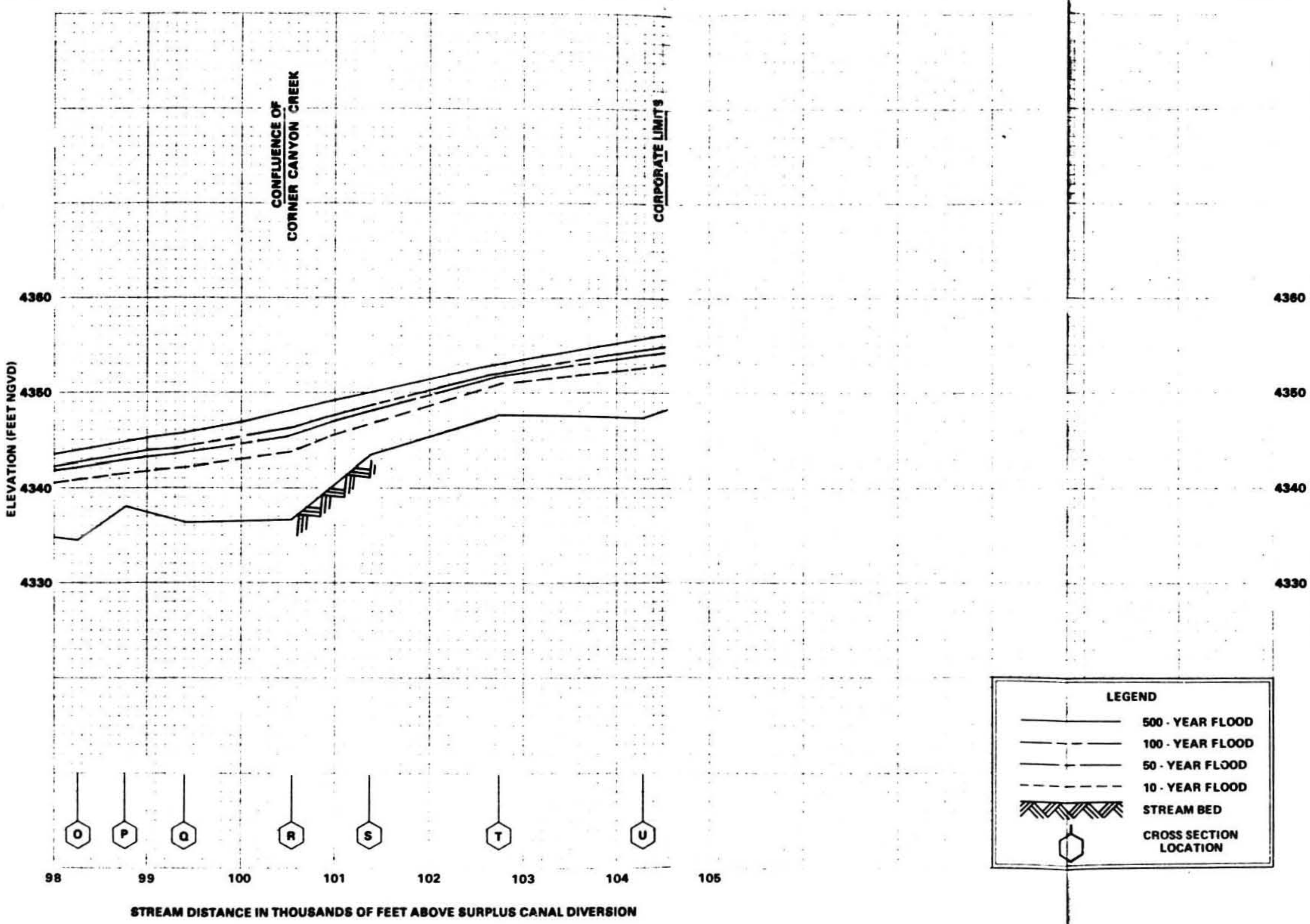

FLOOD PROFILES

JORDAN RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF RIVERTON, UT

(SALT LAKE CO.)

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