FLOODPLAIN INFORMATION REPORT

CRYSTAL RIVER and COAL CREEK PITKIN COUNTY, COLORADO

COAL CREEK AFTER JULY 1977 FLOOD

Prepared for
PITKIN COUNTY and the
COLORADO WATER CONSERVATION BOARD

by

WRIGHT WATER ENGINEERS, INC.

1979

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WRIGHT WATER ENGINEERS, INC.
2420 Alcott Street
Denver, Colorado 80211

October 1979

This Floodplain Information Report, Crystal River and Coal Creek, Pitkin County, Colorado was prepared under the supervision and direction of the undersigned whose seal as a Professional Engineer is affixed.

Kenneth R. Wright, President

Edward W. Rovey, Project Engineer

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PREFACE

This floodplain information report presents the results of a study on the Crystal River floodplain in the vicinity of Redstone, Colorado. It was prepared by Wright Water Engineers, Inc., of Denver, Colorado at the request of Pitkin County in cooperation with the Colorado Water Conservation Board.

Limited copies of this report are available for public distribution, for a nominal fee, at the offices listed below. A Technical Addendum to this report is also available for review at the same offices; however, it has not been published in sufficient quantities for public distribution. The Technical Addendum includes all pertinent data and calculations used in the floodplain analysis.

Aspen/Pitkin Planning Office
130 South Galena Street
Aspen, Colorado 81611

Colorado Water Conservation Board
823 State Centennial Building
1313 Sherman Street
Denver, Colorado 80203

INTRODUCTION

AUTHORIZATION

This report was authorized by the Colorado Water Conservation Board in joint sponsorship with Pitkin County, Colorado.

The Board's power and duty is . . .

> . . . to devise and formulate methods, means and plans for bringing about the greater utilization of the waters of the state and prevention of flood damages therefrom and to designate and approve storm or floodwater runoff channels or basins, and to make such designations available to legislative bodies of cities and incorporated towns, to county planning commissions, and to boards of adjustment of cities, incorporated towns, and counties of this state . . . .

as stated in Section 37-60-106(1)(c) of the Colorado Revised Statutes 1973.

The county within the study area shall provide zoning regulations . . .

> . . . to establish, regulate, restrict, and limit such uses on or along any storm or floodwater run-off channel or basin, as such storm or floodwater runoff channel or basin has been designated and approved by the Colorado Water Conservation Board, in order to lessen or avoid the hazards to persons and damage to property resulting from the accumulation of storm or floodwaters . . . .

as stated in Section 30-28-111 for county governments of the Colorado Revised Statutes 1973.

In addition, House Bill 1041, Colorado's Land Use Act, allows a local government to designate certain natural hazard areas of state interest. Floodplains are natural hazards which may be designated areas of state interest.

> . . .Floodplains shall be administered so as to minimize significant hazards to public health and safety or to property. . . .Open space activities such as agriculture, recreation, and mineral extraction shall be encouraged in the floodplains. Any combination of these activities shall be conducted in a mutually compatible manner. Building of structures in the floodplain shall be designed in terms of the availability of flood protection devices, proposed intensity of use, effects on the acceleration of floodwaters, potential significant hazards to public health and safety or to property, and other impact of such development on downstream communities such as the creation of obstructions during floods. Activities shall be discouraged which, in time of flooding, would create significant hazards to public health and safety or to property.

(Section 24-65.1-202(2)(a) of the Colorado Revised Statutes 1973).

> . . .The local government shall develop guidelines for administration of the designated matters of state interest. . . . A local government may adopt regulations interpreting and applying its adopted guidelines in relation to specific developments in areas of state interest and to specific activities of state interest.

(Section 24-65.1-402 of the Colorado Revised Statutes 1973).

Upon review and approval of this report, the Colorado Water Conservation Board will designate and approve as floodplain areas those areas inundated by the 100-year flood[1] as described by the floodwater surface elevations and profiles in this report. The use of the designated floodplain areas may then be regulated by the local government.

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(1) The terms "Intermediate Regional Flood," "100-year flood," and "one percent flood" can be used interchangeably as they are all defined by the same type of flood event (see Glossary). However, for brevity and clarity, the term "100-year flood" will be used exclusively throughout this report.

PURPOSE AND SCOPE

This report was prepared to provide information relative to the occurrence of floods and to guide local officials in planning the use and regulation of the floodplain areas so that flood hazards and future flood damages are minimized. It includes information on historical floods, existing factors which influence the flood hazards, and the nature and extent of probable future floods.

The report data includes flooded area maps delineating the 100-year flood boundary, flood profiles and floodwater surface elevations for the 10-, 50-, 100-, and 500-year floods at selected reference points. A supplement to this report in the form of a technical addendum includes the supporting hydrologic and hydraulic analysis upon which this study is based. The addendum provides data which may also be used in the location, design, or modification of roads, bridges, and the channel.

ACKNOWLEDGMENTS

The assistance and cooperation of the following agencies, firms, and organizations, in addition to numerous private citizens, in supplying information and data are appreciated and gratefully acknowledged.

Colorado Water Conservation Board
Colorado Department of Highways
Aspen/Pitkin Planning Office
Pitkin County Engineer
U.S. Army Corps of Engineers
U.S. Bureau of Land Management
U.S. Geological Survey
White River National Forest
Mid-Continent Coal and Coke Company

MAPS AND SURVEYS

Aerial photography and contour mapping were provided by Pitkin County in cooperation with the Colorado Water Conservation Board. They were prepared

by Benchmark Mapping Services of Denver, Colorado. The mapping in this report is at a scale of 1" = 200'; the contour interval is 2 feet. Maps at the scale of 1" = 100' are also available at the Aspen/Pitkin Planning Office.

RELATED FLOOD STUDIES

No previous flood studies of the Crystal River are available which show water surface profiles and flooded areas. In February 1979, the U.S. Army Corps of Engineers, Sacramento District, completed a flood hydrology report on the Crystal River (3). The Corps' report provides the 10-, 50-, 100-, and 500-year flows on the Crystal River at 15 locations. The Corps of Engineers flows were used in this current floodplain information study.

STUDY AREA DESCRIPTION

DRAINAGE BASIN CHARACTERISTICS

The Crystal River Basin is located in west central Colorado. The Crystal River is a tributary of the Roaring Fork River near Carbondale. The Roaring Fork is a tributary of the Colorado River at Glenwood Springs as shown in Figure 1. The total drainage area of the Crystal River Basin is 364 square miles. The Crystal River has its headwaters in the Elk Mountains and is bounded by the Gunnison River Basin to the south, the Roaring Fork River Basin to the east and north, and small tributaries of the Colorado River to the west. Elevations range from about 6,000 feet to over 14,000 feet.

Most of the land in the Crystal River drainage basin is government owned (2). Large portions of this government land are in the White River National Forest with a smaller amount administered by the Bureau of Land Management in the vicinity of Carbondale. The largest portion of privately owned land is in the wide flat river valley in the vicinity of Carbondale, with lesser amounts scattered along the river valley in areas such as Redstone, Placita, and Marble.

Vegetation consists of alpine meadows at the high elevations, sub-alpine forests (spruce, pine, fir, aspen, and grasses) at the middle elevations, and brushlands at the lower elevations.

The climate in this area of Colorado is influenced greatly by the mountain ranges which have their influence on the movement of air masses. The high mountains are relatively wet and cool, whereas the plateaus and lower mountains are drier and subject to wide ranges of temperature. Air masses from the Pacific dominate the weather from October through April, and Gulf of Mexico air masses dominate during the late spring and summer. There are no precipitation gages located in the Crystal River Basin. Normal annual precipitation varies from about 20 inches to 50 inches and averages about 32 inches over the basin. May to September precipitation varies from about 8 inches to 16 inches while average October to April precipitation varies from about 10 inches to 40 inches. This precipitation information is based on NOAA maps of the state (5).

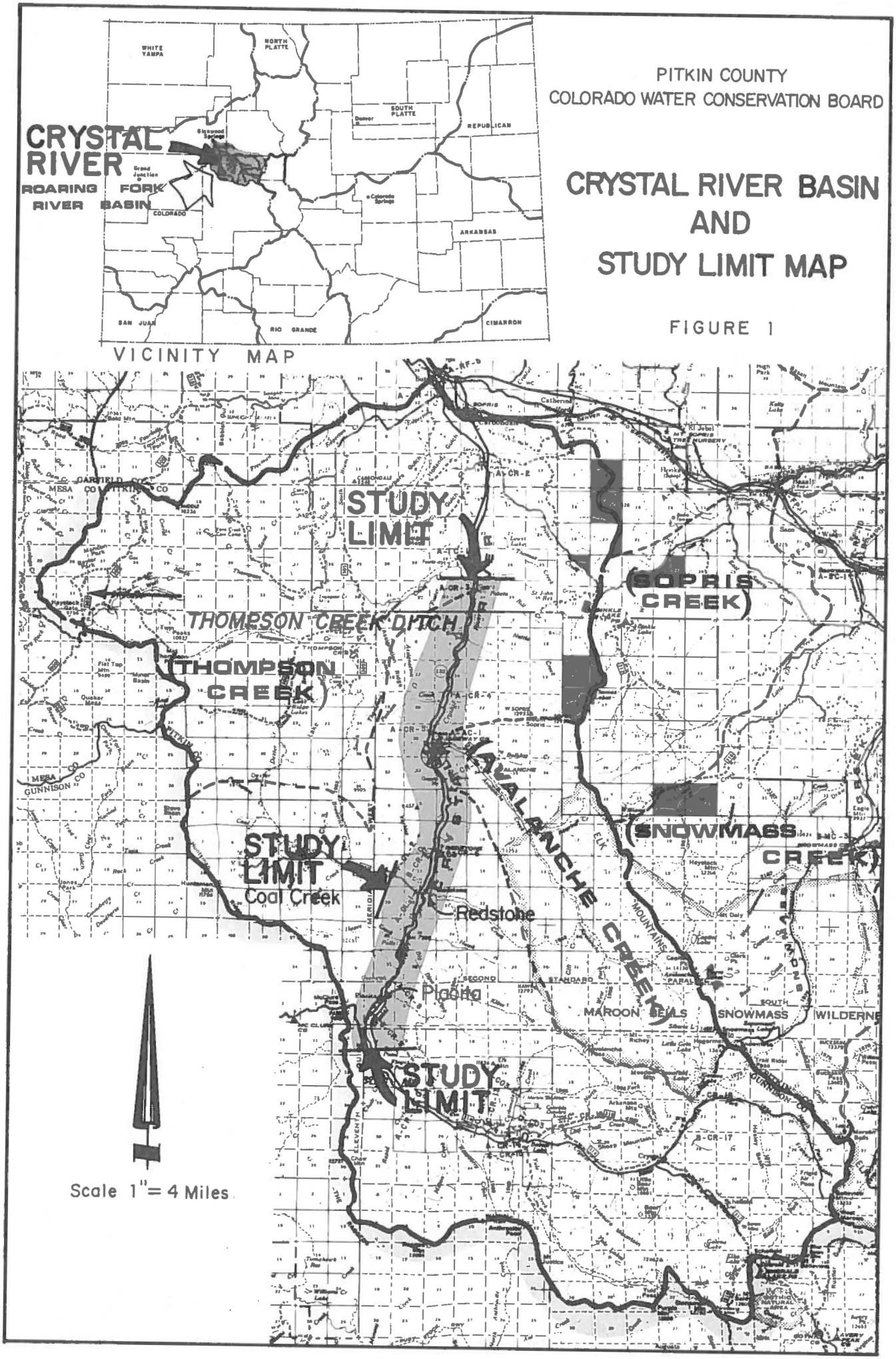

CRYSTAL RIVER
ROARING FORK RIVER BASIN
VICINITY MAP
PITKIN COUNTY
COLORADO WATER CONSERVATION BOARD
CRYSTAL RIVER BASIN AND STUDY LIMIT MAP
FIGURE 1
STUDY LIMIT
STUDY LIMIT
Coal Creek
STUDY LIMIT
THOMPSON CREEK DITCH
(THOMPSON CREEK)
(SOPRIS CREEK)
(SNOWMASS CREEK)
AVALANCHE CREEK
Redstone
Placita
MAROON BELLS
SNOWMASS
Scale 1"= 4 Miles

Table 1 is a list of locations along the Crystal River, the associated drainage areas, and 100-year flood flows.

TABLE 1
DRAINAGE BASIN AREAS
AND 100-YEAR FLOWS

Index Pt.	Location	Drainage Area (sq.mi.)	Q_{100} (cfs)
1	Crystal River above Carbonate Creek	69.2	2250
2	Carbonate Creek	5.1	560
3	Crystal River at Marble (USGS Gage #0815)	74.3	2400
4	Crystal River at Pitkin - Gunnison Co. Line	102	3050
5	Crystal River at Placita (USGS Gage #08155)	107	3150
6	Crystal River above Coal Creek	131	3650
7	Crystal River below Coal Creek	158	4200
8	Crystal River above Avalanche Creek near Redstone (USGS Gage #0816)	167	4400
9	Crystal River above Avalanche Creek	168	4400
10	Crystal River below Avalanche Creek	212	5300
11	Crystal River near Redstone (USGS Gage #0825)	229	5500
12	Crystal River above Thompson Creek	235	5600
13	Crystal River below Thompson Creek	313	7100
14	Crystal River at Pitkin - Garfield Co. Line	323	7200
15	Crystal River above Roaring Fork	364	7800

STUDY REACH DESCRIPTION

This floodplain study encompasses about 15 miles of the Crystal River beginning at a point approximately one-half mile upstream of Thompson Creek and extending southward to one and one-half miles above Placita. In addition, approximately one mile of Coal Creek above its confluence with the Crystal River is included in this study. Figure 1 shows the limits of this study. Redstone is the main community within the study reach. It lies at the confluence of the Crystal River and Coal Creek.

The channel of the Crystal River is characterized by a series of confining geologic formations. Periodically, the river valley widens. In the study reach below Avalanche Creek, the channel width varies from about 40 to 120 feet. From Avalanche Creek to Redstone, channel width varies from 60 to 300 feet. The widest channel is in the vicinity of Redstone. Above Redstone, the channel varies from 50 feet in width in the narrow canyon but opens up to about 300 feet and has a braided low-flow channel in the vicinity of Placita. The channel width of Coal Creek is about 20 to 50 feet.

The slope in the lower reach of the Crystal River is about one to one and one-half percent. The channel slope above Avalanche Creek to Redstone alternates between a steep slope of 3 to 4 percent to mild slopes of about six-tenths of a percent. Steep slopes occur where outcroppings of resistent sandstone prevent flow from eroding the streambed. Mild slopes upstream of the resistant sandstone formations result from deposition of sediment. The most profound example of this is in the vicinity of Redstone where the deposition of coarse gravel and small cobbles has raised the channel bed and threatens the community of Redstone with flooding. Above Redstone, the channel slope is about one percent.

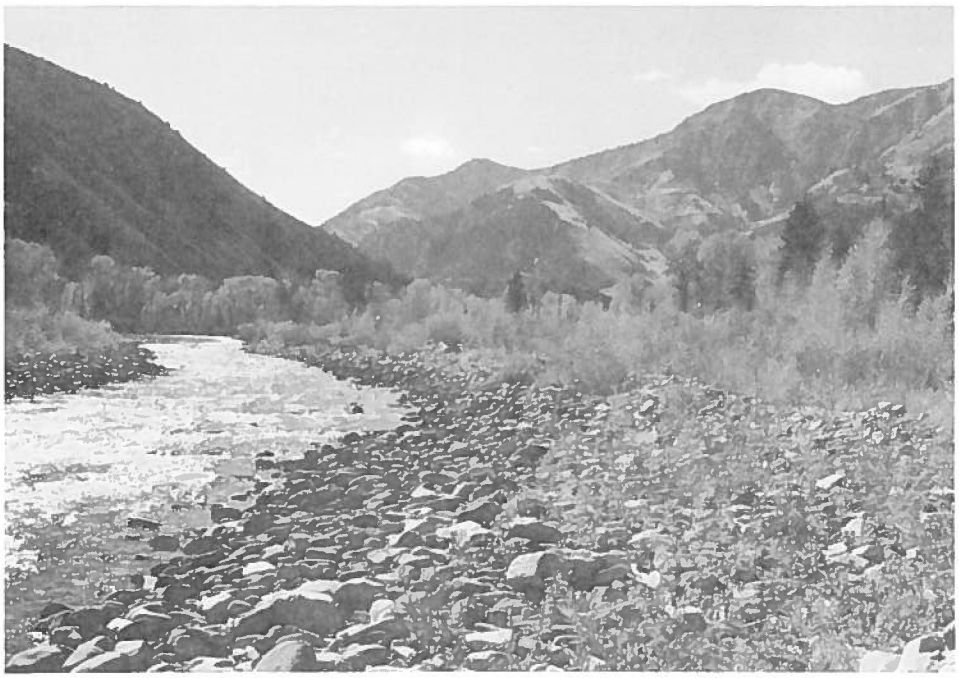
The bed of the stream channel is composed mainly of cobbles and small rounded boulders ranging in size from six inches to one foot in diameter, in the stream reaches where the slope is one to two percent. In reaches where the slope exceeds two percent, the bed consists mainly of large boulders and bare bedrock. In stream reaches of slope less than one percent, the bed consists mainly of gravel and small cobbles.

The main obstructions to flow on the Crystal River are the bridges which cross the stream. There are 14 bridges or culverts crossing the Crystal River within the study reach. There is one bridge which crosses Coal Creek within the study reach. These bridges and culverts present an obstruction to the flow, and a point at which debris and brush eroded from the upland areas and the channel banks can collect. The bridges with tension cables or supporting beams below the bridge deck present the greatest obstruction to flow. During floods, these structures cause backwater conditions that increase the flood height upstream of the obstruction. During the 100-year flood, flow overtops several of the bridges or the approach roadways. This flow overtopping and scour around bridge abutments may cause structural damage or failure of the bridges.

The only flood control structure within the study reach is a levee constructed in the vicinity of Redstone. Periodically, some dredging of the channel in the vicinity of Redstone has been done to remove the sediment and debris which are deposited there. However, due to the nature of the stream, only a short amount of time is required before sediment and debris are redeposited in these areas.

The following photographs are representative samples of the river channel in the study reach.

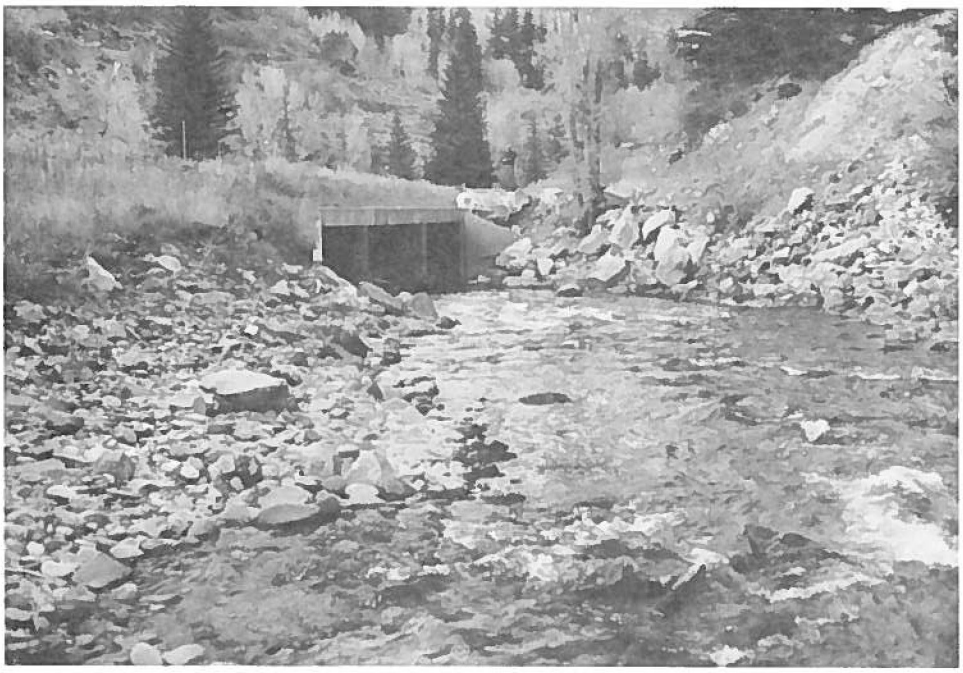
Upstream from BRB Resort Bridge
Station 24+00



Upstream from Station 232+00

Upstream from Station 442+00

Coal Creek/Crystal River Confluence
Station 578+50



Upstream from Highway 133 Culvert, Station 772+00

Looking East (Across River) at Station 838+50

HISTORY OF FLOODING

The information about the historic floods comes from two main sources: interviews with long-time local residents and a Corps of Engineers hydrologic study of the Crystal River (3). The largest flows recorded on the Crystal River are due to snowmelt during the spring and early summer months. Late summer and fall floods, induced by rainstorms and often accompanied by large mud and debris flows, have been experienced on tributaries of the Crystal River.

Many descendents of the early pioneers still live in the area. None of the "old timers" interviewed remembered a major flood on the Crystal. The flooding incidences they do remember had been caused by cloudbursts - not snowmelt runoff. They state that debris from tributaries cause more problems and damage than inundation along the main river. These cloudbursts reportedly have occurred in late July or early August. These cloudbursts have caused many mud slides and carried large amounts of debris into the river including huge boulders the size of elephants. Highway 133 has been closed many times by mud slides in the summer months. The largest recorded snowmelt and rainfloods in the Crystal River basin are tabulated in Table 2. The source of data for Table 2 is from the U.S.G.S. Water Supply records (6, 7, 8).

TABLE 2

HISTORIC FLOODS

Date	Location	Drainage Area (sq. mi.)	Source*	Peak Discharge (cfs)
06/25/17	Crystal River at Marble	74.3	S	2980
06/21/38	Crystal River near Redstone	229	S	4400
08/08/41	Carbonate Creek at Marble	5.1	R	?
07/31/45	Carbonate Creek at Marble	5.1	R	?
06/18/49	Crystal River near Redstone	229	S	3960
06/15/52	Crystal River near Redstone	229	S	3960
06/14/53	Crystal River near Redstone	229	S	4110
07/01/57	Crystal River above Avalanche Creek	167	S	3980
06/20/59	Thompson Creek near Carbondale	76	S?	780
06/12/65	Thompson Creek near Carbondale	76	S	630
06/22/65	Crystal River above Avalanche Creek	167	S	2780
06/24/71	Crystal River at Placita	107	S	1940
07/12/73	Crystal River above Avalanche Creek	167	R	1780
07/24/77	Dutch Creek (trib. of Coal Creek)	2.7	R	1000**

*S = snow; *R = rain
** indirect flow estimate
? flooding source or discharge unknown

Carbonate Creek, located near the Town of Marble, has a history of cloudburst floods accompanied by large mud and debris flows. Mrs. Marjorie Orlosky, widow of Charles Orlosky - pioneer trapper and hunter, has lived in Marble since the turn of the century. She recalls that Carbonate Creek has flooded several times inundating sections of Marble with silt and debris. One cloudburst occurred on July 31, 1945. High water from that storm took out several bridges along the Crystal River from Marble to Carbondale; however, the bridge at Redstone held.

Mr. Charles Thomas, son of Charles Thomas who was a homesteader and cattleman, ran sheep for more than 25 years along the Crystal River. He remembered the 1945 flood because he was caught in Marble and had to leave his car there for 10 days until the road could be reopened. He said that four years of drought during the depression caused much of the vegetation to die allowing many mud slides and large boulders to be rolled down into the river during the occasional heavy rain or cloudburst.

During the cloudburst of August 8, 1941, a big rock rolled down, caught under the bridge on Carbonate Creek and piggy-backed the bridge down to the main street of Town. The damage caused by this flood is thought to be the final disastrous blow to fall on the economically stricken community of Marble. The mills and marble quarry were closed a few months after the flood and have never reopened.

Mrs. Orlosky also remembered hearing of the time in the 1880's when a portion of the cliff above the west end of Marble broke off damming up the Crystal River. It was two years before the river could work a channel through the slide and flow again into the Crystal River Valley.

A recent cloudburst occurred over the Coal Creek watershed on July 24, 1977. Estimates of flows and damages were reported by the U.S. Forest Service and the Mid-Continent Coal and Coke Company. It was estimated that a 2.7 square mile area of the South Fork of Dutch Creek (a tributary of Coal Creek) produced a peak flow of 1,000 cfs. A substantial portion of this flow consisted of mud and debris. One road embankment that was elevated 30 feet above the streambed had the small culvert plugged with debris. Subsequently, the sediment accumulated to the top of the embankment and overtopped it.

Other tributaries have flooded and caused damage to the roads. One flash flood on Hayes Creek, about two miles above Redstone, closed the highway temporarily. In 1957 when Highway 133 was still a gravel road, there was one to two feet of water over the road about one mile above Redstone but the road did not wash out. The road grade was raised when it was paved in 1965 and it has not been inundated since. The Avalanche bridge was destroyed by the high water in 1957 and was rebuilt by the U.S. Forest Service in 1959.

HYDROLOGIC AND HYDRAULIC ANALYSIS

FLOOD CHARACTERISTICS

Flood flows on the Crystal River generally result from rapid melting of the mountain snowpack during the period of May to July. The snowmelt runoff is characterized by sustained periods of high flows and diurnal fluctuation. The summer cloudbursts represent the greatest flooding hazard to the tributaries of the Crystal River. These flashfloods impact the mainstem of the Crystal for some distance below the tributary, and also result in substantial debris being washed into the Crystal River.

HYDROLOGIC ANALYSIS

The hydrologic analysis for this study of the Crystal River drainage basin was completed by the U.S. Army Corps of Engineers (3). A regional analysis of stream flow data taken at gaging stations in the region was performed by the Corps of Engineers and natural flow frequency curves were developed. The peak flows determined for the 10-, 50-, 100-, and 500-year floods were used to determine the flood profiles and the 100-year floodplain for this report. For a detailed description of the hydrologic analysis performed by the Corps of Engineers, refer to the Technical Addendum (11) and Reference 3.

HYDRAULIC ANALYSIS

The water surface elevations for floods of the selected recurrence intervals were computed through use of the Corps of Engineers' HEC-2 backwater computer program (4). One-hundred thirty-four cross sections for the hydraulic analysis of the Crystal River and Coal Creek were digitized from the aerial photographs. The locations of these cross sections are shown by reference points on the flooded area maps and the flood profiles in the back of this report. The 10-, 50-, 100-, and 500-year flood elevations and discharges are listed in Table 3 which is found at the end of the report text. Channel roughness factors (Manning's n) for these computations were assigned on the basis of field inspection of the floodplain areas and recommendations of the U.S.

Geological Survey. Typical channel roughness factors ranged from 0.045 to 0.050. The overbank roughness factors ranged from 0.050 to 0.075.

Area reductions for the bridges at cross sections 26, 35, 47, 80, 94, 107, 112, 116 and Coal Creek were used in the hydraulic analysis to account for probable debris blockage. A detailed computer listing of the hydraulic analysis showing all parameters is included in the Technical Addendum.

SPECIAL FLOOD HAZARDS

Special flood hazards exist in the Crystal River Valley that merit detailed explanation.

Mud and Debris Flows

Although not studied in great detail, mud and debris flows have been observed on several tributaries to the Crystal River. Mud and debris flows are mass movements involving rapid flowage of debris that includes mud, sand, gravel and angular rock resulting from unusually heavy rainfall. The most significant flows were observed on Coal Creek near Redstone, and Hawk and Hayes Creeks upstream from Redstone. Field observations indicate that mud and debris flows can occur on all tributaries to the Crystal River within the study area. These flows may cause significant damage to bridges, culverts, roads and other types of structures.

Before any building permits are issued in the vicinity of a tributary stream, a thorough hydrologic/geologic investigation should be made of the proposed building site.

Flood Hazard at Redstone

The Town of Redstone is protected from flooding by the Crystal River and Coal Creek by a levee along the west side of town. Field investigations during the study indicated that the levee is mostly built from river-run gravels and would probably be eroded and/or overtopped during the 100-year flood. Therefore, to evaluate the true hazard potential at Redstone, hydraulic calculations were made for the following two conditions:

a) The existing levee will remain intact during the 100-year flood.
b) The existing levee will be substantially destroyed during the 100-year flood.

The flood outlines and water surface elevations for these two conditions are shown on sheets 21 through 23 and Table 3 (pgs. 8 and 9), respectively.

If a regular program of levee inspection, maintenance and construction can be instituted so that the levee will not be eroded or overtopped, then Redstone will be outside of the 100-year floodplain. Without such a program, the levee may fail and all or parts of Redstone will be subject to shallow flooding ($\pm$1.5 ft.) during the 100-year flood.

The maintenance and construction program should include:
a) Raising the top of the existing dike to at least 2 ft. above the 100-year water surface profile,
b) Protecting the face of the levee on the stream side with angular rock riprap,
c) Cleaning out sediment brought by Coal Creek into the Crystal River channel,
d) Periodically (after major flows) inspecting the levee for required maintenance and repairs.

INTERPRETATION AND USE OF REPORT DATA

FLOOD FREQUENCY AND DISCHARGE

The 10-, 50-, 100-, and 500-year flood events were used as the flood frequencies for this floodplain analysis. Thus, the data developed in this report will be compatible not only for regulation purposes and State of Colorado H.B. 1041 designations, but also for Federal Insurance Administration flood insurance rate studies.

These various flood events have an average occurrence of once in the number of years indicated. For example, the 100-year flood occurs (on the average) once in a 100-year period and has a one percent chance of being equaled or exceeded in any given year.

The particular uses of the various flood events, in addition to those stated above, are listed below.

Information regarding the 10-year and 50-year frequency floods is especially useful for future engineering studies and land-use planning purposes related to minor road systems, minor channel improvements, and appurtenant structures. For structures and uses of this type on the smaller tributaries, and in areas where the high risk of structural failure is economically feasible and the hazard to life and property nonexistent, the use of the lower frequency floods may be considered.

The 100-year flood event may also be used for engineering design purposes where a lower risk of failure than the 10-year or 50-year flood is desired. However, the most important use of the 100-year flood event lies in floodplain designation and land-use regulation as set forth in the State statutes. The State of Colorado considers the 100-year frequency flood as the flood event to be used in designing and protecting structures and dwellings for human occupation. Therefore, floodplain regulations are based upon the 100-year flood. Also, the area which would be inundated by the 100-year flood may be delineated as an area of State interest as set forth in H.B. 1041.

The 500-year flood event is important in making the public aware that floods larger than the 100-year flood can and do occur. The 500-year flood event can also be used for regulating high risk developments within the floodplain.

Flooded Area

The 100-year frequency flood has been selected by the State of Colorado as the flood event to be used for floodplain delineation and regulation. Since the base map for the Flooded Area plates is a contour map, the outlines of other floods can be readily plotted using information in Table 3.

The area delineated on the flooded area sheets as the 100-year floodplain meets the requirements of H.B. 1041 as an area of State interest. Also, upon official approval of this report by the Colorado Water Conservation Board, the area outlined by the 100-year flood boundary can be designated a floodplain area and may be regulated accordingly by the local officials.

Shallow Flooding

On several of the flooded area maps in this report, areas subject to "Shallow Flooding Hydraulically Disconnected from the Main Channel" have been delineated. In these areas flooding is generally less than $\pm$1.5 feet in depth and is due to flows leaving the channel upstream and following the terrain of the land. Water surface elevations in these areas are generally higher than the elevations for main channel flow. Although these areas are generally low hazard areas, development should be permitted only after a detailed site investigation of potential flow depths and flow patterns.

Flood Elevations

The flood frequency elevation and discharge data table, Table 3, lists the 10-, 50-, 100-, and 500-year flood elevations at selected reference points. The flooded area sheets give the plan view of the flooded area on a contour base map and the high water elevations for the 100-year flood can be interpolated from this. Also, the cross section figures show a graphical representation of the high water elevations at typical valley cross sections throughout the study reach.

The flood profiles may be used in areas where controversy arises over the 100-year flood boundary on the flooded area sheets. Since the flood profile plates give the elevation and distance or stationing from a known point, the high water elevations can be surveyed on the ground to alleviate any discrepancies on the base map.

To determine the depth of flooding or the floodplain limits at any location in the field, the following procedures should be used:

1. Locate the ground point at which the depth of flooding or the floodplain limit is to be established on the 1" = 200' flooded area map.

2. Determine the elevation of the water surface at the selected ground point from Table 3 by interpolating between the water surface elevations given for two adjacent cross sections and referring to the profile drawings.

3. Using the closest monument for elevation control, determine the water surface elevation at the ground point by standard surveying techniques. The floodplain limit is established when the water surface elevation intercepts the ground surface.

   To locate the edge of the floodplain by simple scaling methods, measure the distance on the map from two or more physical features that can be identified both on the map and in the field to the edge of the floodplain. The floodplain limits can be established by laying out the measured distances in the field.

As explained in the paragraphs describing Shallow Flooding, there are portions of the floodplain which are subject to flooding to depths ±1.5 feet, caused by upstream conditions. Thus, flooding in these areas cannot be verified by the traditional methods described above. These special areas were delineated by special analysis.

FLOOD INSURANCE

The National Flood Insurance Program is a Federal program that enables property owners to buy flood insurance at a reasonable, subsidized cost. In

return, communities and counties are required to carry out floodplain management measures to protect lives and new construction from future flooding.

Flood insurance through the National Flood Insurance Program is available to all residents of Pitkin County under the Emergency Phase of the program.

The following amounts at the subsidized rates are available under the Emergency Phase:

	Total Amount Available	Subsidized Rate per $100 of Coverage
Single Family Residential	$35,000	$0.25
Other Residential	100,000	0.25
Contents, Residential	10,000	0.35
Small Businesses	100,000	0.40
Contents, Small Business	100,000	0.75
Other Non-Residential	100,000	0.40
Contents, Other Non-Residential	100,000	0.75

When Pitkin County is converted from the Emergency Phase to the Regular Phase of the program, substantially increased flood insurance coverage will be available. All property owners shown in this study to be within areas subject to flooding should consider the purchase of flood insurance.

Additional information on the Flood Insurance Program is available from local insurance agents or brokers and the:

Federal Insurance Administration
Building 710
Denver Federal Center
Lakewood, Colorado 80225

Telephone: 234-6582

TABLE 3
FLOOD FREQUENCY ELEVATION AND DISCHARGE DATA
Crystal River, Pitkin County, Colorado

Ref. Point No.	Station from Start (feet)	Location	Low Water Elevation (ft MSL)	10-YEAR W.S Elev. (ft MSL)	10-YEAR Peak Discharge (cfs)	50-YEAR W.S. Elev. (ft MSL)	50-YEAR Peak Discharge (cfs)	100-YEAR W.S. Elev. (ft MSL)	100-YEAR Peak Discharge (cfs)	500-YEAR W.S. Elev. (ft MSL)	500-YEAR Peak Discharge (cfs)
3	2+00		6390.6	6394.3	3950	6394.7	4900	6395.0	5600	6396.1	9200
4	7+00		6395.5	6398.7	3950	6399.0	4900	6399.2	5600	6400.1	9200
5	13+50	BRB Resort	6400.7	6405.7	3950	6406.2	4900	6406.5	5600	6407.6	9200
6	18+50		6406.6	6411.3	3950	6411.7	4900	6412.0	5600	6412.9	9200
7	19+25	BRB brd.	6407.0	6413.1	3950	6413.7	4900	6414.1	5600	6415.3	9200
7.5	19+75		6407.0	6413.4	3950	6414.0	4900	6414.4	5600	6415.8	9200
8	24+00		6413.1	6416.3	3950	6416.6	4900	6416.9	5600	6418.0	9200
8.5	26+00		6415.6	6419.4	3950	6419.8	4900	6420.1	5600	6421.5	9200
8.8	27+50		6417.6	6421.2	3950	6421.7	4900	6422.0	5600	6423.4	9200
9	29+50	Potato Bill Creek	6419.7	6425.2	3950	6426.1	4900	6426.8	5600	6429.4	9200
9.5	33+50		6424.0	6430.9	3950	6431.9	4900	6432.4	5600	6434.6	9200
10	37+50		6429.3	6434.5	3950	6435.4	4900	6436.0	5600	6438.6	9200

TABLE 3 (Page 2)
FLOOD FREQUENCY ELEVATION AND DISCHARGE DATA
Crystal River, Pitkin County, Colorado

ef. oint o.	Station from Start (feet)	Location	Low Water Elevation (ft MSL)	10-YEAR W.S Elev. (ft MSL)	10-YEAR Peak Discharge (cfs)	50-YEAR W.S. Elev. (ft MSL)	50-YEAR Peak Discharge (cfs)	100-YEAR W.S. Elev. (ft MSL)	100-YEAR Peak Discharge (cfs)	500-YEAR W.S. Elev. (ft MSL)	500-YEAR Peak Discharge (cfs)
11	43+50		6435.1	6438.8	3950	6439.3	4900	6439.6	5600	6441.3	9200
12	51+50		6441.7	6445.6	3950	6446.1	4900	6446.4	5600	6447.4	9200
13	60+00		6450.6	6455.6	3950	6456.2	4900	6456.6	5600	6458.5	9200
14	64+50		6455.8	6461.0	3950	6461.8	4900	6462.3	5600	6464.5	9200
15	69+75		6460.2	6465.2	3950	6465.8	4900	6466.1	5600	6467.8	9200
16	75+50		6466.9	6470.3	3950	6470.9	4900	6471.3	5600	6472.9	9200
17	89+00		6477.8	6484.8	3950	6485.6	4900	6486.1	5600	6488.4	9200
18	97+00		6488.2	6493.5	3900	6494.4	4850	6495.0	5500	6497.8	9100
19		Nettle Creek Bridge	6488.2	6495.4	3900	6496.5	4850	6497.3	5500	6499.7	9100
19.5			6488.2	6498.6	3900	6499.9	4850	6500.6	5500	6504.1	9100
20	103+00		6494.4	6499.8	3900	6500.9	4850	6501.6	5500	6504.9	9100
21	110+50		6503.2	6506.6	3900	6507.0	4850	6507.2	5500	6508.9	9100

TABLE 3 (Page 3)
FLOOD FREQUENCY ELEVATION AND DISCHARGE DATA
Crystal River, Pitkin County, Colorado

Ref. Point No.	Station from Start (feet)	Location	Low Water Elevation (ft MSL)	10-YEAR W.S Elev. (ft MSL)	10-YEAR Peak Discharge (cfs)	50-YEAR W.S. Elev. (ft MSL)	50-YEAR Peak Discharge (cfs)	100-YEAR W.S. Elev. (ft MSL)	100-YEAR Peak Discharge (cfs)	500-YEAR W.S. Elev. (ft MSL)	500-YEAR Peak Discharge (cfs)
22	119+00		6514.3	6517.7	3900	6518.1	4850	6518.3	5500	6519.1	9100
23	126+00		6527.1	6532.3	3900	6533.1	4850	6533.6	5500	6536.0	9100
24	138+50		6546.0	6550.7	3900	6551.3	4850	6551.7	5500	6553.6	9100
25	146+00	Sec. 9/16	6555.1	6560.3	3900	6561.1	4850	6561.7	5500	6564.3	9100
26	147+00	Crystal R. Estates	6555.1	6562.5	3900	6563.1	4850	6563.0	5500	6570.0	9100
26.5	147+50		6556.0	6563.8	3900	6565.3	4850	6566.4	5500	6570.0	9100
27	149+50		6559.0	6564.7	3900	6565.8	4850	6566.7	5500	6570.0	9100
28	159+00		6571.3	6577.8	3900	5678.6	4850	6579.0	5500	6581.4	9100
29	163+00		6573.9	6581.2	3900	6582.2	4850	6582.8	5500	6585.2	9100
30	166+00		6577.4	6583.0	3900	6583.7	4850	6584.2	5500	6586.3	9100
31	174+50		6585.3	6589.9	3900	6590.5	4850	6590.8	5500	6592.6	9100
32	179+00		6590.8	6595.9	3900	6596.6	4850	6597.1	5500	6599.0	9100

TABLE 3 (Page 4)
FLOOD FREQUENCY ELEVATION AND DISCHARGE DATA
Crystal River, Pitkin County, Colorado

Ref. Point No.	Station from Start (feet)	Location	Low Water Elevation (ft MSL)	10-YEAR W.S Elev. (ft MSL)	10-YEAR Peak Discharge (cfs)	50-YEAR W.S. Elev. (ft MSL)	50-YEAR Peak Discharge (cfs)	100-YEAR W.S. Elev. (ft MSL)	100-YEAR Peak Discharge (cfs)	500-YEAR W.S. Elev. (ft MSL)	500-YEAR Peak Discharge (cfs)
33	189+00		6605.0	6609.4	3900	6610.2	4850	6610.7	5500	6613.1	9100
34	203+50	Sec. 16/21	6625.8	6632.5	3700	6633.4	4700	6633.9	5200	6636.0	8600
35	204+50	Sweet Jessup Canal	6626.7	6633.1	3700	6640.6	4700	6637.6	5200	6648.5	8600
35.5	204+80		6627.4	6635.3	3700	6640.7	4700	6637.7	5200	6648.5	8600
36	211+00	Perham Cr.	6637.1	6641.3	3700	6645.0	4700	6642.4	5200	6649.0	8600
37	216+50		6643.7	6648.6	3700	6649.2	4700	6649.4	5200	6650.5	8600
38	222+00		6649.1	6654.3	3700	6655.2	4700	6655.6	5200	6658.0	8600
39	227+00		6654.9	6658.9	3700	6659.7	4700	6660.1	5200	6662.7	8600
40	232+00		6661.3	6664.0	3700	6664.3	4700	6664.4	5200	6665.2	8600
41	236+00		6664.6	6669.0	3700	6669.3	4700	6669.5	5200	6670.5	8600
42	245+00		6675.3	6678.2	3700	6678.7	4700	6678.9	5200	6679.7	8600
43	255+50		6688.4	6692.7	3700	6693.1	4700	6693.3	5200	6694.6	8600

TABLE 3 (Page 5)
FLOOD FREQUENCY ELEVATION AND DISCHARGE DATA
Crystal River, Pitkin County, Colorado

Ref. Point No.	Station from Start (feet)	Location	Low Water Elevation (ft MSL)	10-YEAR W.S Elev. (ft MSL)	10-YEAR Peak Discharge (cfs)	50-YEAR W.S. Elev. (ft MSL)	50-YEAR Peak Discharge (cfs)	100-YEAR W.S. Elev. (ft MSL)	100-YEAR Peak Discharge (cfs)	500-YEAR W.S. Elev. (ft MSL)	500-YEAR Peak Discharge (cfs)
44	263+50	Sec. 20/29	6698.3	6701.7	3700	6702.2	4700	6702.4	5200	6703.4	8600
45	271+50		6708.7	6712.0	3700	6712.3	4700	6712.5	5200	6714.0	8600
46	285+50		6728.7	6732.8	3700	6733.7	4700	6734.1	5200	6735.4	8600
47	286+00	Janeway Campground brd.	6728.7	6734.5	3700	6735.4	4700	6735.4	5200	6740.1	8600
47.5	286+40		6728.7	6735.1	3700	6736.1	4700	6736.6	5200	6740.2	8600
48	293+00		6735.6	6740.9	3700	6742.0	4700	6742.4	5200	6745.2	8600
49	296+00		6744.0	6749.0	3700	6749.9	4700	6750.3	5200	6753.1	8600
50	305+50		6756.7	6760.6	3700	6761.2	4700	6761.4	5200	6762.8	8600
51	310+00	Avalanche Cr.	6761.5	6766.7	3700	6767.3	4700	6767.6	5200	6769.1	8600
52	314+50		6767.0	6771.8	3100	6772.7	3850	6773.1	4400	6774.5	7100
53	323+50		6779.3	6782.3	3100	6782.7	3850	6782.9	4400	6784.1	7100
54	329+00	Sec. 29/32	6788.3	6791.5	3100	6792.0	3850	6792.2	4400	6792.9	7100
55	351+00		6852.0	6855.8	3100	6856.5	3850	6856.9	4400	6858.8	7100

TABLE 3 (Page 6)
FLOOD FREQUENCY ELEVATION AND DISCHARGE DATA
Crystal River, Pitkin County, Colorado

Ref. Point No.	Station from Start (feet)	Location	Low Water Elevation (ft MSL)	10-YEAR W.S Elev. (ft MSL)	10-YEAR Peak Discharge (cfs)	50-YEAR W.S. Elev. (ft MSL)	50-YEAR Peak Discharge (cfs)	100-YEAR W.S. Elev. (ft MSL)	100-YEAR Peak Discharge (cfs)	500-YEAR W.S. Elev. (ft MSL)	500-YEAR Peak Discharge (cfs)
56	369+00	USGS Gage 0816 U/S	6901.3	6904.6	3100	6905.1	3850	6905.5	4400	6907.3	7100
57	376+00		6905.2	6911.9	3100	6912.8	3850	6913.4	4400	6915.6	7100
58	383+00		6908.3	6914.5	3100	6915.4	3850	6916.1	4400	6918.7	7100
59	389+50	Sec. 4/33	6911.6	6916.1	3100	6916.9	3850	6917.5	4400	6919.8	7100
60	392+50		6914.9	6919.2	3100	6919.7	3850	6920.1	4400	6922.1	7100
61	396+00		6916.9	6921.3	3100	6921.7	3850	6921.9	4400	6923.2	7100
62	401+50		6920.2	6924.2	3100	6924.7	3850	6925.1	4400	6926.3	7100
63	407+50		6923.0	6928.1	3100	6928.6	3850	6928.9	4400	6930.0	7100
64	408+00	Penney Hot Springs	6923.3	6928.8	3100	6929.7	3850	6930.4	4400	6930.4	7100
64.5	408+50		6923.5	6929.0	3100	6929.8	3850	6930.4	4400	6930.5	7100
65	413+00		6926.0	6930.5	3100	6931.0	3850	6931.3	4400	6932.2	7100
66	419+00		6931.7	6934.5	3100	6934.9	3850	6935.2	4400	6936.1	7100

TABLE 3 (Page 7)
FLOOD FREQUENCY ELEVATION AND DISCHARGE DATA
Crystal River, Pitkin County, Colorado

Ref. Point No.	Station from Start (feet)	Location	Low Water Elevation (ft MSL)	10-YEAR W.S Elev. (ft MSL)	10-YEAR Peak Discharge (cfs)	50-YEAR W.S. Elev. (ft MSL)	50-YEAR Peak Discharge (cfs)	100-YEAR W.S. Elev. (ft MSL)	100-YEAR Peak Discharge (cfs)	500-YEAR W.S. Elev. (ft MSL)	500-YEAR Peak Discharge (cfs)
67	427+50		6940.9	6943.7	3100	6943.9	3850	6944.1	4400	6944.8	7100
68	433+00		6946.9	6950.2	3000	6951.1	3700	6951.4	4200	6952.5	6800
69	441+75		6960.3	6965.2	3000	6965.5	3700	6965.8	4200	6967.4	6800
70	442+00	Flatcar brd.	6960.9	6965.8	3000	6966.2	3700	6966.6	4200	6969.0	6800
70.5	442+50		6961.7	6967.1	3000	6968.7	3700	6969.6	4200	6973.6	6800
71	447+50		6972.3	6976.0	3000	6976.5	3700	6976.9	4200	6978.6	6800
72	448+00	Flatcar brd.	6972.7	6976.7	3000	6977.3	3700	6977.7	4200	6982.5	6800
72.5	448+50		6973.6	6978.6	3000	6979.8	3700	6980.6	4200	6982.7	6800
73	453+00		6981.0	6983.9	3000	6984.4	3700	6984.7	4200	6986.3	6800
74	460+00		6989.0	6993.2	3000	6993.8	3700	6994.2	4200	6995.8	6800
74.1	463+50		6993.0	6996.1	3000	6996.7	3700	6997.0	4200	6998.6	6800
75	467+00		7002.6	7006.2	3000	7006.9	3700	7007.3	4200	7008.9	6800

TABLE 3 (Page 8)
FLOOD FREQUENCY ELEVATION AND DISCHARGE DATA
Crystal River, Pitkin County, Colorado

Ref. Point No.	Station from Start (feet)	Location	Low Water Elevation (ft MSL)	10-YEAR W.S Elev. (ft MSL)	10-YEAR Peak Discharge (cfs)	50-YEAR W.S. Elev. (ft MSL)	50-YEAR Peak Discharge (cfs)	100-YEAR W.S. Elev. (ft MSL)	100-YEAR Peak Discharge (cfs)	500-YEAR W.S. Elev. (ft MSL)	500-YEAR Peak Discharge (cfs)
76	468+00	McKinney brd.	7003.0	7007.4	3000	7007.7	3700	7008.1	4200	7012.5	6800
76.5	468+50		7004.4	7008.2	3000	7008.7	3700	7010.6	4200	7012.7	6800
77	473+00		7015.0	7019.1	3000	7019.7	3700	7020.1	4200	7021.7	6800
77.9	487+00		7096.4	7100.6	3000	7101.3	3700	7101.7	4200	7103.5	6800
78	493+00	Osgood Campground	7104.3	7109.0	3000	7109.7	3700	7110.1	4200	7112.1	6800
79	502+75		7110.6	7116.5	3000	7117.4	3700	7117.9	4200	7120.5	6800
80	503+50	N. Redstone brd.	7111.0	7116.9	3000	7117.7	3700	7118.3	4200	7120.5	6800
80.5	504+00		7112.1	7117.4	3000	7118.3	3700	7119.1	4200	7123.4	6800
81	514+50	Sec. 8/17	7119.7	7124.1	3000	7124.8	3700	7125.3	4200	7127.8	6800
82	524+50		7128.8	7132.3	3000	7132.9	3700	7133.3	4200	7135.3	6800
83	536+00	Redstone STP	7134.5	7138.3	3000	7138.8	3700	7138.9 (7138.7)*	4200 (4200)	7140.3 (7140.2)*	6800 (6800)
84	543+00	Vorhies Cr.	7137.0	7140.2	3000	7140.2	3700	7140.3 (7140.4)*	4200 (4200)	7141.5 (7141.5)*	6800 (6800)

*without Redstone dike; upper values represent condition with existing dike.

TABLE 3 (Page 9)
FLOOD FREQUENCY ELEVATION AND DISCHARGE DATA
Crystal River, Pitkin County, Colorado

Ref. Point No.	Station from Start (feet)	Location	Low Water Elevation (ft MSL)	10-YEAR W.S Elev. (ft MSL)	10-YEAR Peak Discharge (cfs)	50-YEAR W.S. Elev. (ft MSL)	50-YEAR Peak Discharge (cfs)	100-YEAR W.S. Elev. (ft MSL)	100-YEAR Peak Discharge (cfs)	500-YEAR W.S. Elev. (ft MSL)	500-YEAR Peak Discharge (cfs)
85	548+50		7140.4	7143.6	3000	7144.1	3700	7144.3 (7144.3)*	4200 (4200)	7145.3 (7145.2)*	6800 (6800
86	554+00		7142.5	7145.9	3000	7146.2	3700	7146.6 (7146.4)*	4200 (4200)	7147.4 (7147.4)*	6800 (6800)
87	558+00	Redstone 87-95	7145.2	7147.8	3000	7148.0	3700	7148.2 (7148.2)*	4200 (4200)	7149.2 (7149.2)*	6800 (6800)
88	563+50		7147.9	7151.5	3000	7152.0	3700	7152.2 (7151.6)*	4200 (4200)	7152.8 (7152.4)*	6800 (6800)
89	570+00		7151.7	7156.3	3000	7156.7	3700	7157.0 (7156.4)*	4200 (4200)	7157.4 (7157.3)*	6800 (6800)
90	578+50	Coal Cr.	7160.5	7164.0	3000	7164.4	3700	7164.4 (7164.2)*	4200 (4200)	7165.3 (7164.9)*	6800 (6800)
91	582+50		7164.6	7169.0	2600	7169.0	3200	7169.6 (7168.7)*	3650 (3650)	7170.1 (7170.4)*	6000 (6000)
92	586+50		7166.4	7171.3	2600	7172.0	3200	7172.4 (7172.4)*	3650 (3650)	7174.5 (7174.1)*	6000 (6000)
93	590+00		7168.3	7172.5	2600	7173.0	3200	7173.4 (7173.4)*	3650 (3650)	7175.0 (7175.0)*	6000 (6000)
94	590+50	S. Redstone brd.	7168.7	7172.8	2600	7173.4	3200	7173.8	3650	7175.7	6000
94.5	591+00		7170.1	7173.4	2600	7174.0	3200	7174.4	3650	7176.2	6000
95	594+25	East Cr.	7170.5	7175.9	2600	7176.5	3200	7177.0	3650	7178.7	6000

*without Redstone dike; upper values represent condition with existing dike.

TABLE 3 (Page 10)
FLOOD FREQUENCY ELEVATION AND DISCHARGE DATA
Crystal River, Pitkin County, Colorado

Ref. Point No.	Station from Start (feet)	Location	Low Water Elevation (ft MSL)	10-YEAR W.S Elev. (ft MSL)	10-YEAR Peak Discharge (cfs)	50-YEAR W.S. Elev. (ft MSL)	50-YEAR Peak Discharge (cfs)	100-YEAR W.S. Elev. (ft MSL)	100-YEAR Peak Discharge (cfs)	500-YEAR W.S. Elev. (ft MSL)	500-YEAR Peak Discharge (cfs)
96	598+00		7175.0	7177.4	2600	7177.8	3200	7178.1	3650	7179.4	6000
97	604+50		7180.7	7184.3	2600	7184.7	3200	7185.0	3650	7186.3	6000
98	612+50		7184.7	7188.1	2600	7188.4	3200	7188.6	3650	7189.3	6000
99	617+75		7191.0	7193.0	2600	7193.2	3200	7193.3	3650	7194.0	6000
100	624+50		7195.6	7200.0	2600	7200.2	3200	7200.5	3650	7201.6	6000
101	630+25		7202.6	7205.1	2600	7205.5	3200	7205.8	3650	7207.1	6000
102	633+75		7205.1	7209.7	2600	7210.2	3200	7210.6	3650	7212.1	6000
103	652+50	Sec. 20/29 d/s	7229.8	7233.5	2600	7233.8	3200	7234.0	3650	7235.1	6000
104	664+75	Hawk Cr.	7259.3	7263.3	2400	7263.9	2950	7264.3	3400	7266.4	5600
105	670+50		7265.0	7269.0	2400	7269.5	2950	7270.0	3400	7271.8	5600
106	678+00		7271.9	7276.0	2400	7276.2	2950	7276.1	3400	7276.8	5600
107	678+50	Redstone Ranches	7272.1	7277.0	2400	7277.6	2950	7278.2	3400	7280.9	5600

TABLE 3 (Page 11)
FLOOD FREQUENCY ELEVATION AND DISCHARGE DATA
Crystal River, Pitkin County, Colorado

Ref. Point No.	Station from Start (feet)	Location	Low Water Elevation (ft MSL)	10-YEAR W.S Elev. (ft MSL)	10-YEAR Peak Discharge (cfs)	50-YEAR W.S. Elev. (ft MSL)	50-YEAR Peak Discharge (cfs)	100-YEAR W.S. Elev. (ft MSL)	100-YEAR Peak Discharge (cfs)	500-YEAR W.S. Elev. (ft MSL)	500-YEAR Peak Discharge (cfs)
107.5	679+00		7272.6	7277.1	2400	7277.8	2950	7278.2	3400	7280.9	5600
108	683+50		7276.5	7280.1	2400	7280.9	2950	7281.3	3400	7282.5	5600
109	692+00	Big Kline Cr.	7287.5	7292.8	2400	7293.0	2950	7293.4	3400	7295.4	5600
110	714+00	Hays Cr. d/s		7328.0	2400	7329.2	2950	7329.9	3400	7332.3	5600
111	720+00		7330.8	7335.8	2400	7336.4	2950	7336.9	3400	7339.4	5600
112	721+00	Culvert, north	7331.1	7336.1	2400	7336.9	2950	7338.3	3400	7340.5	5600
112.5	721+50		7331.8	7336.8	2400	7337.5	2950	7338.7	3400	7340.9	5600
113	733+50		7346.8	7351.7	2400	7352.3	2950	7352.4	3400	7354.8	5600
114	754+75	U.S.G.S Gage 08155 U/S	7369.9	7374.0	2200	7374.7	2750	7375.4	3150	7377.1	5200
115	771+00	Hwy. 133 Culvert	7384.8	7389.0	2200	7389.6	2750	7389.7	3150	7391.6	5200
116	772+00		7385.6	7390.0	2200	7390.8	2750	7391.4	3150	7396.4	5200

TABLE 3 (Page 12)
FLOOD FREQUENCY ELEVATION AND DISCHARGE DATA
Crystal River, Pitkin County, Colorado

Ref. Point No.	Station from Start (feet)	Location	Low Water Elevation (ft MSL)	10-YEAR W.S Elev. (ft MSL)	10-YEAR Peak Discharge (cfs)	50-YEAR W.S. Elev. (ft MSL)	50-YEAR Peak Discharge (cfs)	100-YEAR W.S. Elev. (ft MSL)	100-YEAR Peak Discharge (cfs)	500-YEAR W.S. Elev. (ft MSL)	500-YEAR Peak Discharge (cfs)
116.5	772+50		7386.6	7392.9	2200	7394.3	2750	7395.4	3150	7396.5	5200
117	780+00		7392.3	7396.3	2200	7396.8	2750	7396.9	3150	7398.6	5200
118	795+00		7409.3	7413.1	2200	7413.8	2750	7414.5	3150	7416.2	5200
119	800+00		7412.9	7416.4	2200	7416.9	2750	7417.2	3150	7418.9	5200
120	807+00	Placita	7419.2	7421.4	2200	7421.6	2750	7421.7	3150	7422.3	5200
121	813+00		7423.2	7425.8	2200	7426.2	2750	7426.4	3150	7427.3	5200
121.5	819+00		7424.5	7428.7	2200	7429.1	2750	7429.4	3150	7430.5	5200
122	829+00		7429.8	7432.8	2200	7433.1	2750	7433.3	3150	7334.4	5200
123	838+50		7436.1	7438.8	2200	7439.0	2750	7439.1	3150	7439.6	5200
124	849+50		7442.7	7446.7	2200	7447.2	2750	7447.4	3150	7448.3	5200
125	865+00		7457.9	7461.5	2200	7462.0	2750	7462.3	3150	7463.5	5200
126	877+00		7469.8	7472.9	2200	7473.2	2750	7473.3	3150	7473.4	5200

TABLE 3 (Page 13)
FLOOD FREQUENCY ELEVATION AND DISCHARGE DATA
Coal Creek, Pitkin County, Colorado

Ref. Point No.	Station from Start (feet)	Location	Low Water Elevation (ft MSL)	10-YEAR W.S Elev. (ft MSL)	10-YEAR Peak Discharge (cfs)	50-YEAR W.S. Elev. (ft MSL)	50-YEAR Peak Discharge (cfs)	100-YEAR W.S. Elev. (ft MSL)	100-YEAR Peak Discharge (cfs)	500-YEAR W.S. Elev. (ft MSL)	500-YEAR Peak Discharge (cfs)
90	0+00		7160.5	7164.0	850	7164.4	1100	7164.6	1350	7165.3	2300
131	2+00		7166.0	7168.3	850	7168.7	1100	7169.1	1350	7170.3	2300
131.6	2+50	Hwy. 133 brd.	7167.0	7169.9	850	7170.5	1100	7171.1	1350	7172.9	2300
131.7	3+25		7167.8	7170.4	850	7170.9	1100	7171.4	1350	7173.1	2300
131.9	4+75		7170.8	7172.6	850	7172.9	1100	7173.2	1350	7174.3	2300
130	6+00		7173.9	7176.7	850	7177.1	1100	7177.5	1350	7178.8	2300
140	13+50		7190.4	7192.6	850	7192.8	1100	7192.9	1350	7193.5	2300
150	21+25		7207.7	7210.9	850	7211.2	1100	7211.4	1350	7212.2	2300
160	26+25		7221.4	7224.6	850	7224.6	110	7225.0	1350	7225.6	2300
170	35+00		7243.3	7244.8	850	7245.0	110	7245.2	1350	7245.8	2300
180	41+50		7262.8	7265.5	850	7265.8	1100	7266.4	1350	7266.9	2300
190	46+75		7278.2	7280.7	850	7280.9	1100	7281.0	1350	7281.5	2300

GLOSSARY

Basin. An enclosed or partly enclosed water area or depression on the surface of the earth.

Designated floodplain. The area designated as a floodplain by official action (the board of county commissioners or city council) with the prior concurrence of the Colorado Water Conservation Board.

Flood. A temporary rise in the water level of a stream or basin that results in inundation of overflow areas not usually covered by water. The 100-year flood is a flood with a peak flow magnitude that has a 1 percent chance of being equalled or exceeded in any given year, and a frequency of occurrence of about 1 in 100 years on the long-term average.

Flood frequency. The average frequency, statistically determined, for which a specific flood flow magnitude may be equalled or exceeded. Frequency is expressed as an occurrence within a specified number of years.

Flood profile. A graph or a plotting of water surface elevations of a specific flood frequency of a stream or basin.

Flood protection level. A level which is established above the 100-year flood elevation for regulating uses in high hazard areas.

Floodplain (general definition). An area along and adjacent to a stream or basin which is subject to flooding.

Floodplain (regulatory definition). An area in and adjacent to a stream, which area is subject to flooding as the result of the occurrence of an intermediate regional flood and which area thus is so adverse to past, current, or foreseeable construction or land use as to constitute a significant hazard to public health and safety or to property.

Intermediate regional flood. A type of flood, including the water surface elevation and territorial occupation thereof which can be expected to occur at any time in a given area based upon recorded historical preciptiation and other valid data, but with an average statistical 1 percent chance of being equalled or exceeded during any 1 year. The term is used interchangeably with a 1 percent flood or 100-year flood.

Obstruction. Any dam, wall, wharf, embankment, levee, dike, pile, abutment, projection, excavation, channel rectification, bridge, conduit, culvert, building, wire, fence, rock, gravel, refuse, fill, structure or matter in, along, across, or projecting into any channel, watercourse, or regulatory flood hazard area which may impede, retard or change the direction of the

flow of water, either in itself or by catching or collecting debris carried by such water, or that is placed where the flow of the water might carry the same downstream to the damage of life or property. An artifical obstruction is any obstruction which is not a natural obstruction. A natural obstruction is any rock, tree, gravel, or other matter that has been located by a non-human cause.

Reach. A longitudinal segment of a stream or river. A reach will generally include the segment of the flood hazard area where flood heights are influenced by a man-made or natural obstruction. In an urban area, the segment of a stream or river between two consecutive bridge crossings would typically constitute a reach.

Stream. Any natural channel or depression through which water flows either continuously, intermittently or periodically, including any artificial modification of the natural channel or depression.

Watershed. The contributing drainage area above a specified point on a stream or basin.

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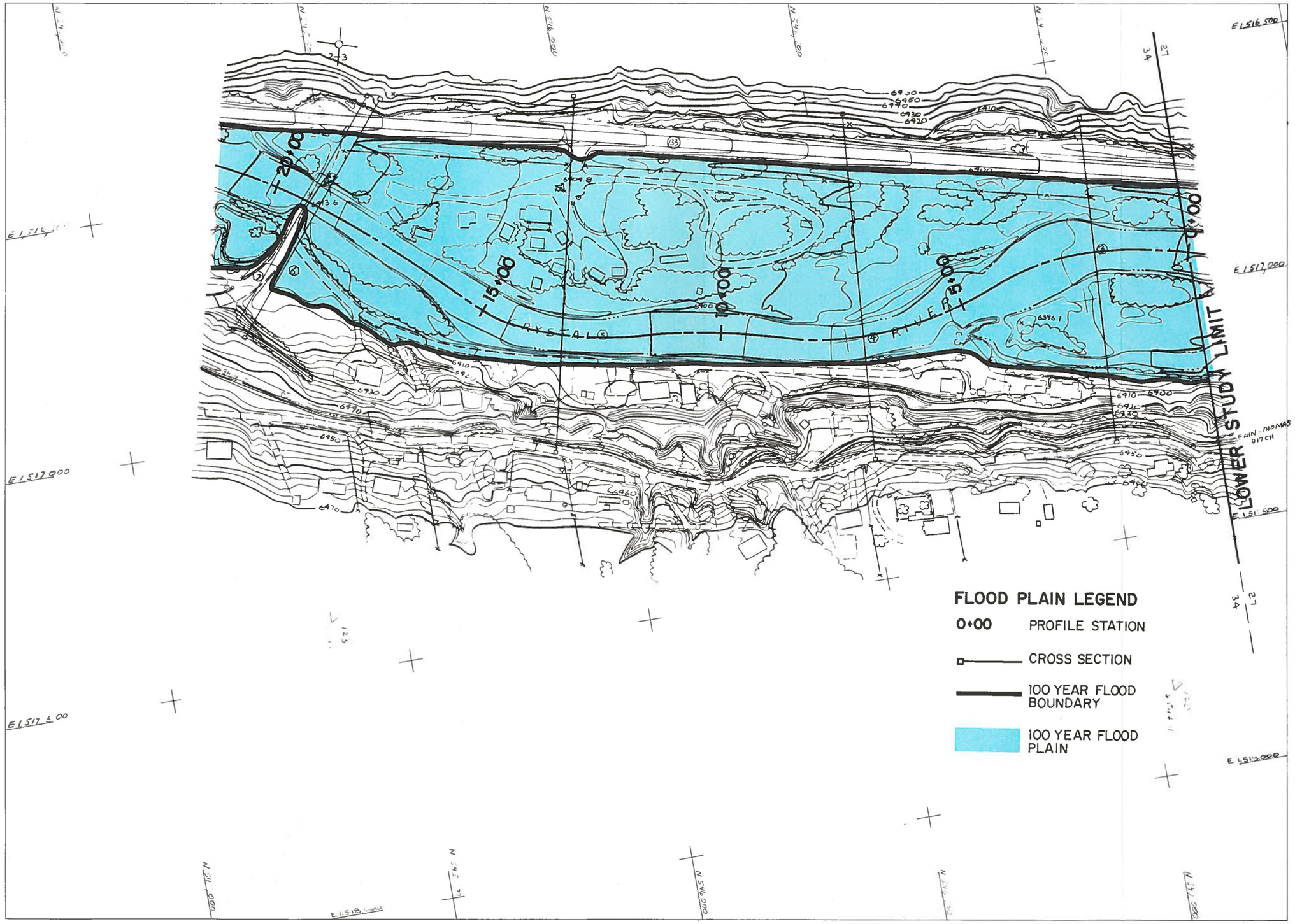

FLOOD PLAIN LEGEND

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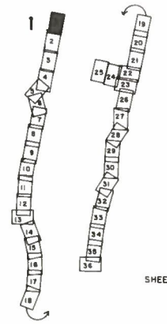
- CROSS SECTION
- 100 YEAR FLOOD BOUNDARY
- 100 YEAR FLOOD PLAIN



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AVERAGE LATITUDE 39°16'00", SCALE FACTOR (0.999940I).
COMBINED FACTOR (.9996051)
RECIP FACTOR (1.0003949)

VERTICAL CONTROL BASED ON U.S.C. & G.S. 1929 SEA LEVEL DATUM.

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COMPILATION BY PHOTOGRAMMETRIC METHODS FROM 6" C.F.L. VERTICAL AERIAL PHOTOGRAPHY FLOWN MAY 19, 1978

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LEGEND

- PERMANENT MONUMENT
- HORIZONTAL CONTROL
- VERTICAL CONTROL
- PHOTO CENTER
- GRID POINT
- CROSS SECTIONS
- POWER POLE
- FENCE
- SECTION LINE

SCALE FEET
100 75 50 25 0 100 200

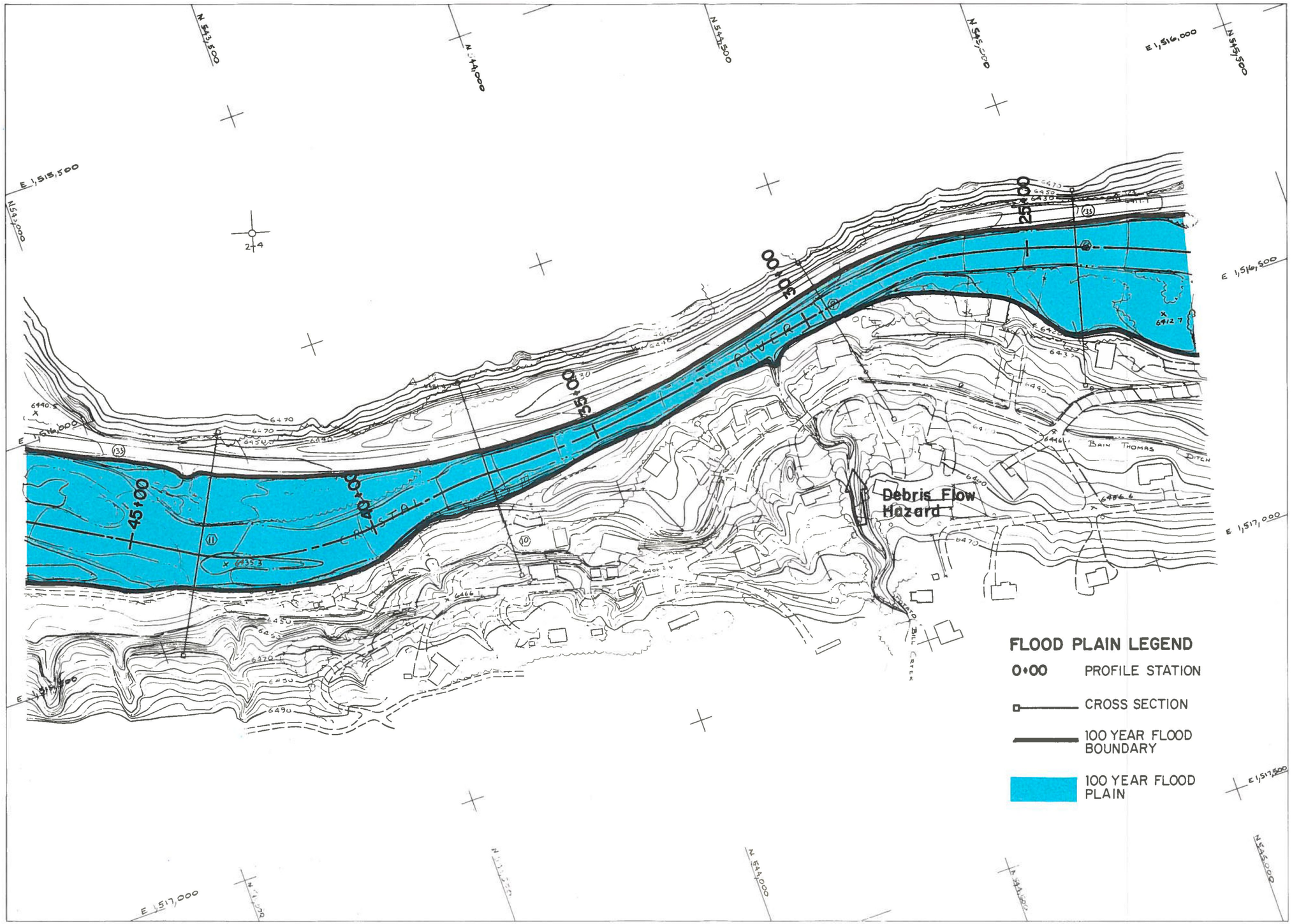
CONTOUR INTERVAL: 2 FEET

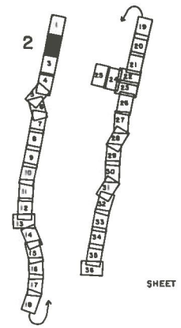
CRYSTAL RIVER
FLOOD PLAIN STUDY

PREPARED FOR
PITKIN COUNTY, COLORADO

IN COOPERATION WITH
COLORADO WATER CONSERVATION BOARD
DENVER, COLORADO

WRIGHT WATER ENGINEERS, INC.
JUNE 1979





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LEGEND

- PERMANENT MONUMENT
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- 317 PHOTO CENTER
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SCALE FEET
100 75 50 25 0 100 200

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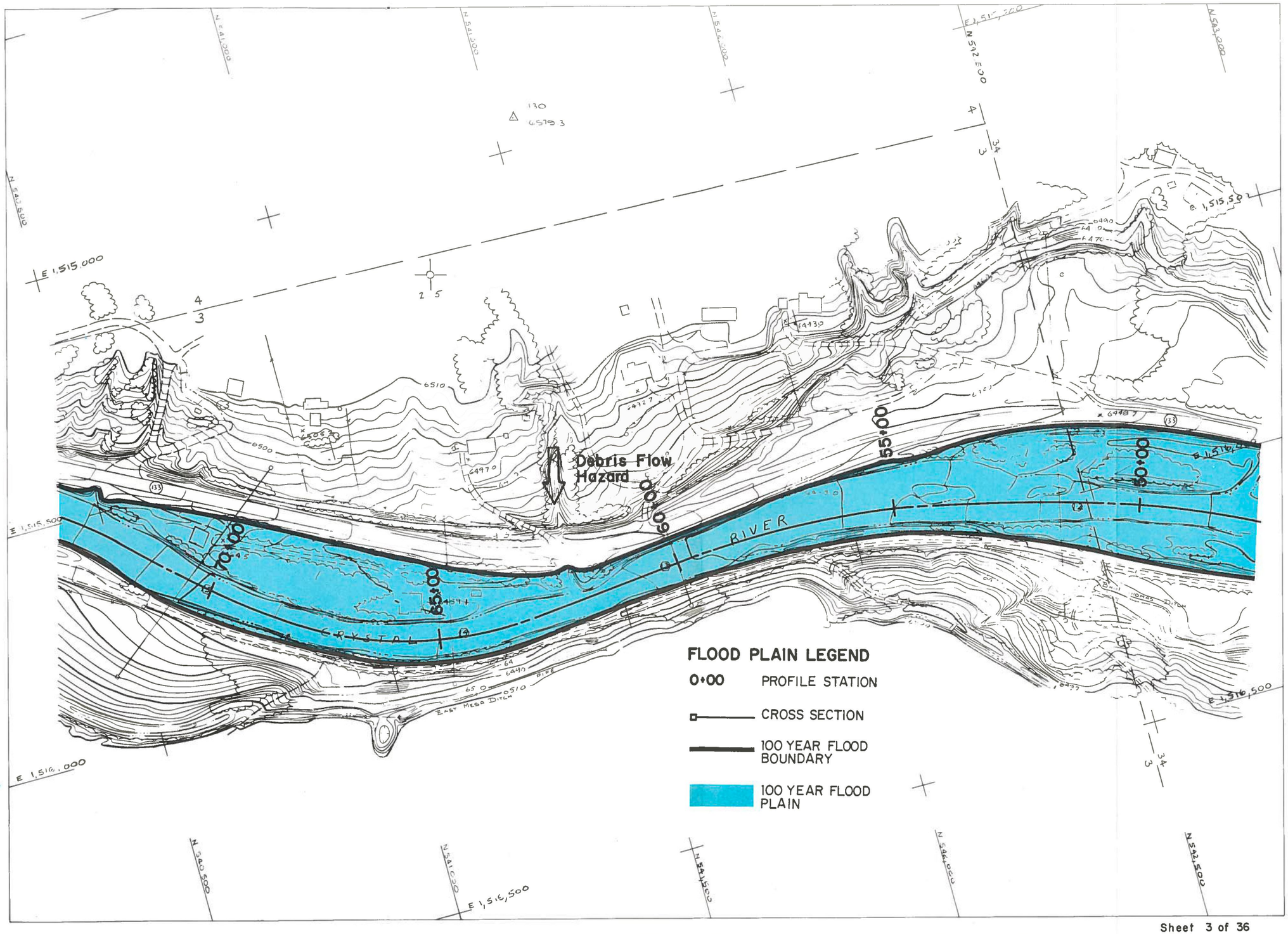

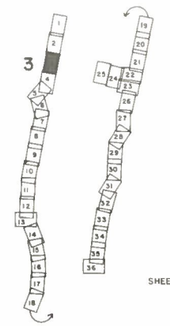

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LEGEND

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- GRID POINT
- CROSS SECTIONS
- POWER POLE
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SCALE FEET
100 75 50 25 0 100 200

CONTOUR INTERVAL: 2 FEET

CRYSTAL RIVER
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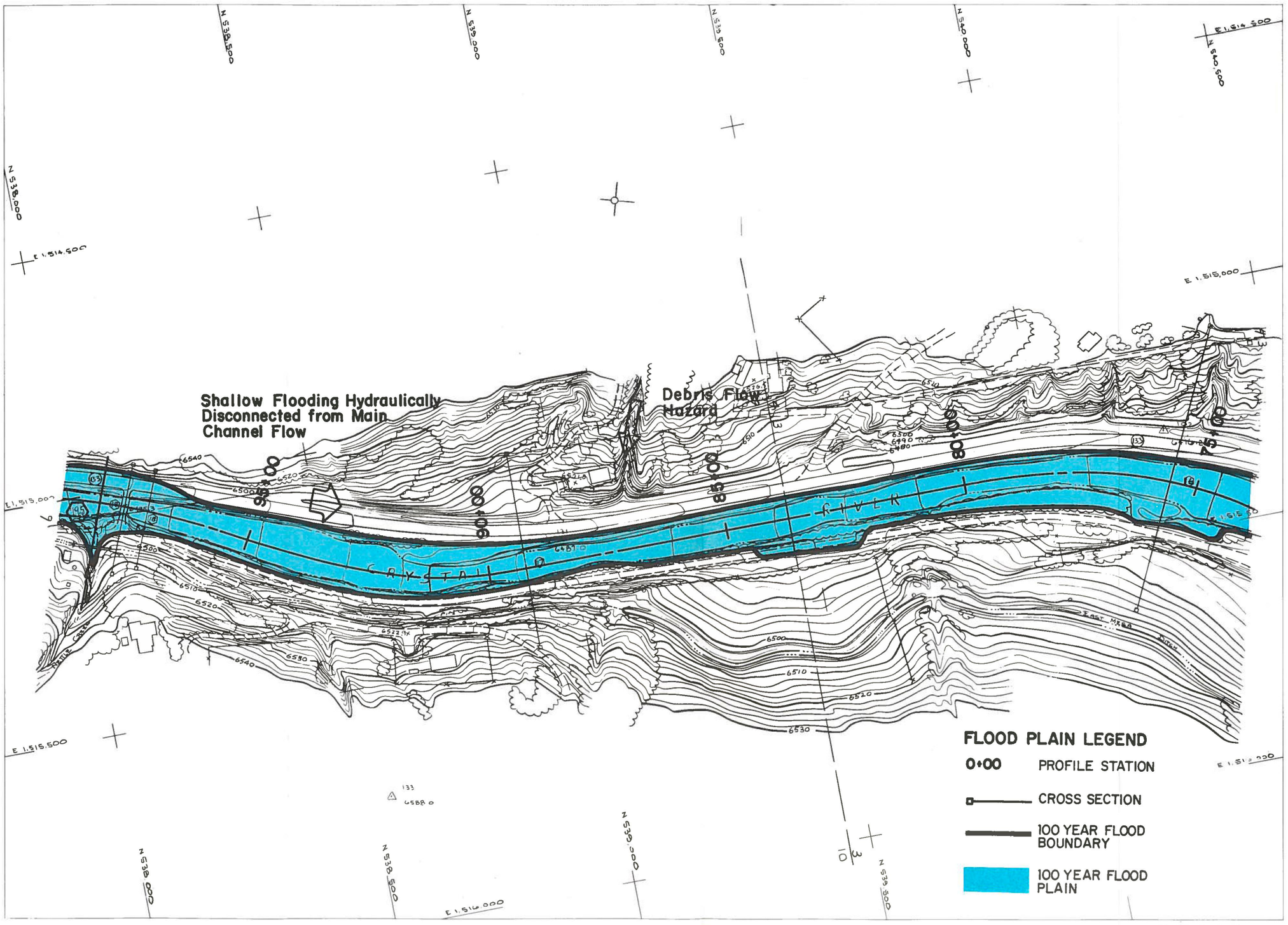

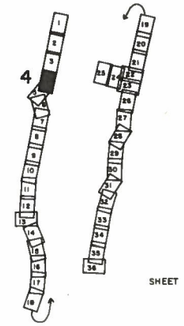

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LEGEND

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- 3|7 PHOTO CENTER
- GRID POINT
- CROSS SECTIONS
- POWER POLE
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SCALE FEET
100 75 50 25 0 100 200

CONTOUR INTERVAL: 2 FEET

CRYSTAL RIVER FLOOD PLAIN STUDY

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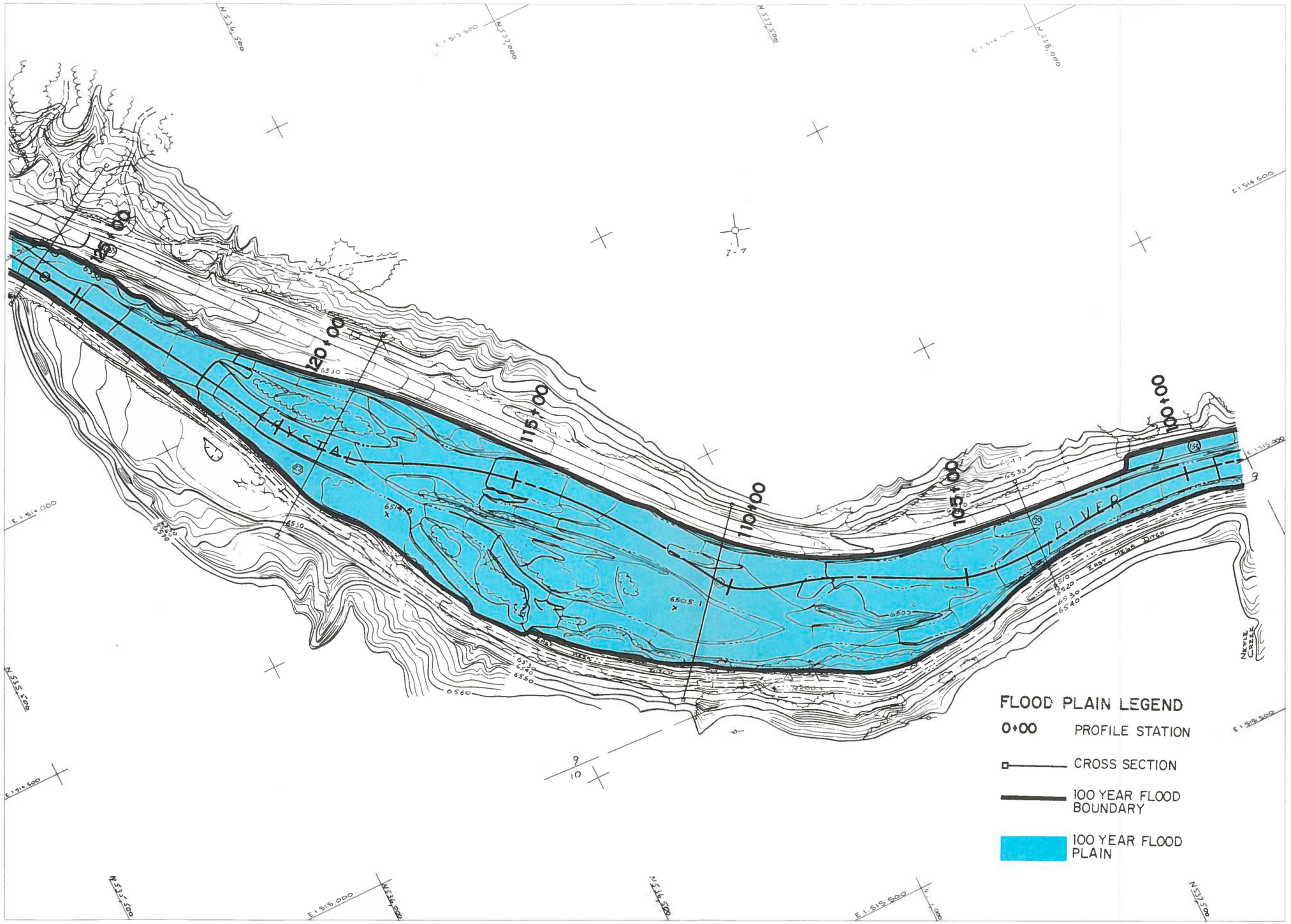

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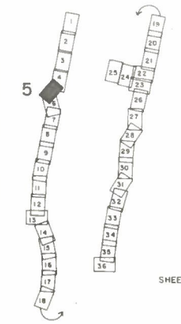

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SCALE FEET
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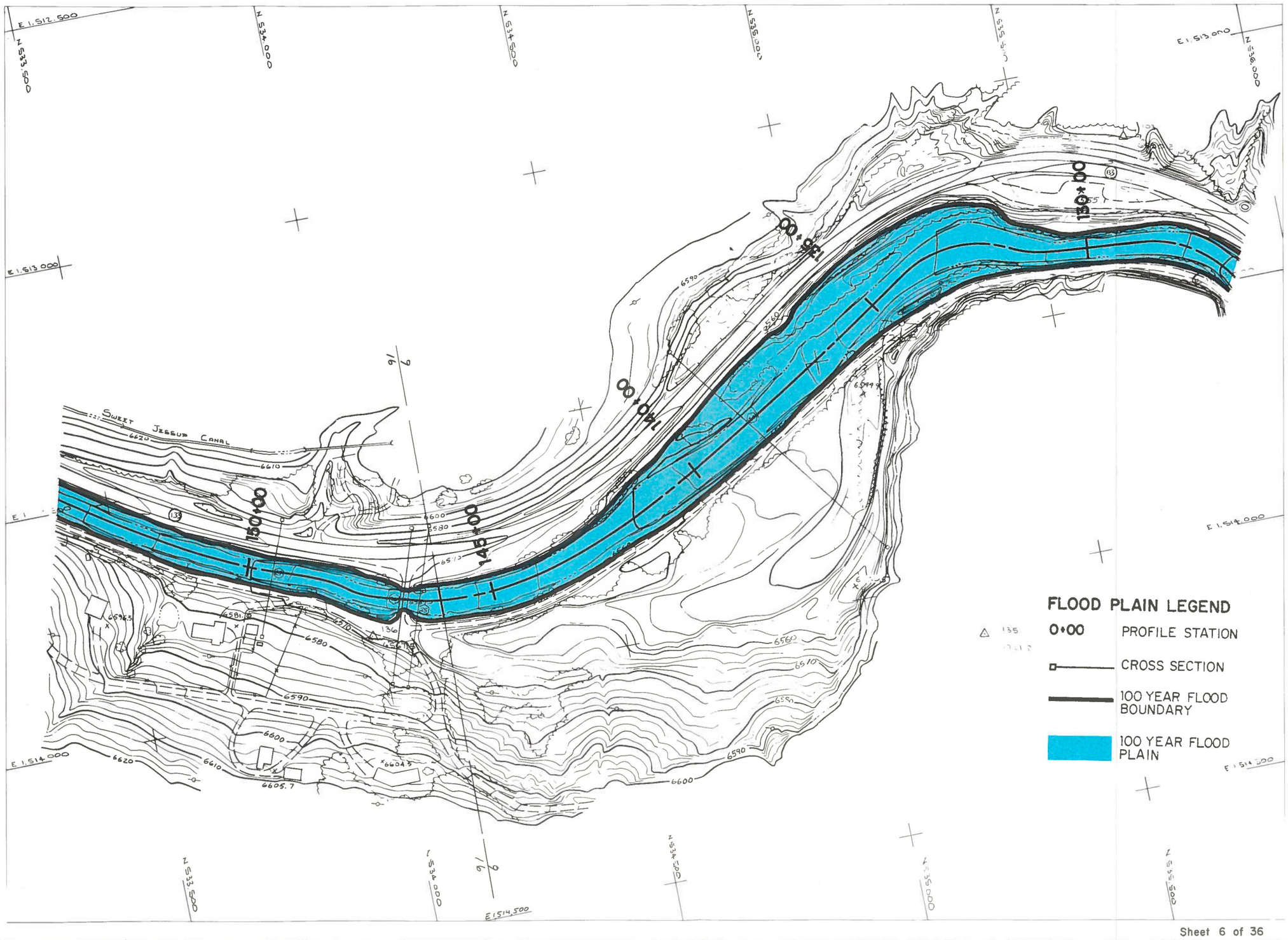

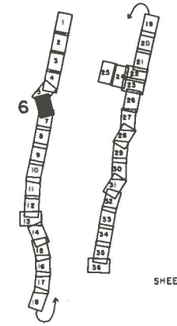

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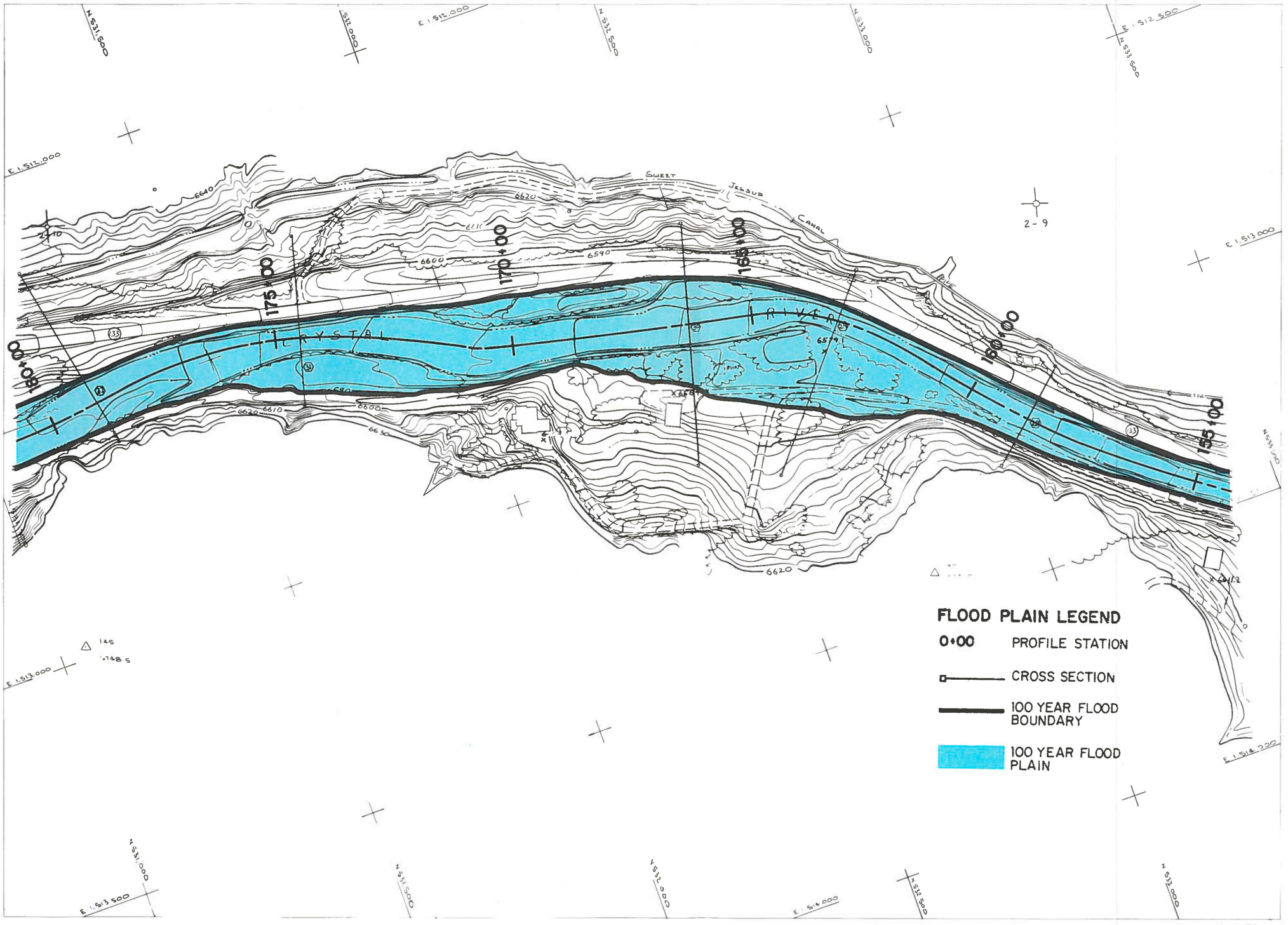

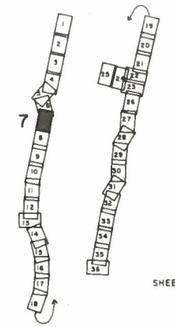

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100 75 50 25 0 100 200

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CRYSTAL RIVER
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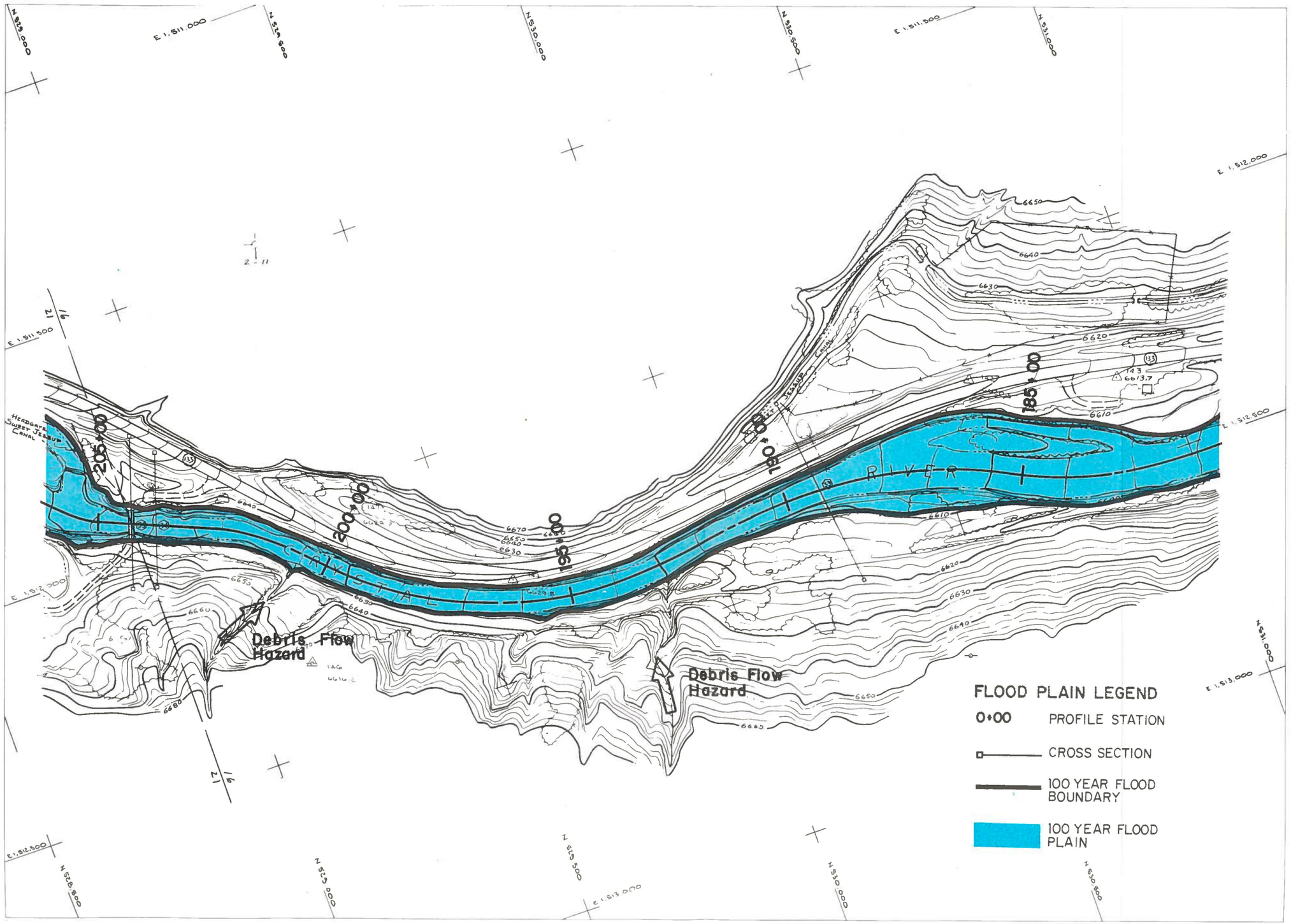

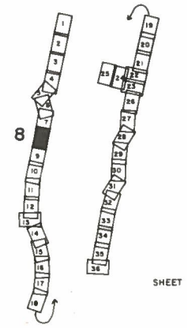

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THE COLORADO STATE PLANE - COORDINATE SYSTEM, CENT. ZONE, ESTABLISHED FROM U.S. DEPARTMENT OF THE INTERIOR, GEOLOGICAL SURVEY CONTROL POINTS "CATHERINE 2", AND "PASS 4"

PROJECT AT AVERAGE ELEVATION OF 7000.0 AT SEA LEVEL FACTOR (0.9996650) AVERAGE LATITUDE 39°16'00", SCALE FACTOR (0.9994401) COMBINED FACTOR (1.9996051) RECIP. FACTOR 1.0003949

VERTCAL CONTROL BASED ON U.S.C.& G.S. 1929 SEA LEVEL DATUM.

TOPOGRAPHY ON THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS.

COMPILATION BY PHOTOGRAMMETRIC METHODS FROM 6 C.F.L. VERTICAL AERIAL PHOTOGRAPHY FLOWN MAY 19, 1978

PREPARED BY:

Benchmark Mapping Services
- PHOTOGRAMMETRIC CONSULTANTS -
1582 South Parker Road, Suite 208
Denver, Colorado 80231 Ph. (303) 751-8011

LEGEND

- PERMANENT MONUMENT
- HORIZONTAL CONTROL
- VERTICAL CONTROL
- PHOTO CENTER
- GRID POINT
- CROSS SECTIONS
- POWER POLE
- FENCE
- SECTION LINE

SCALE FEET
100 75 50 25 0 100 200

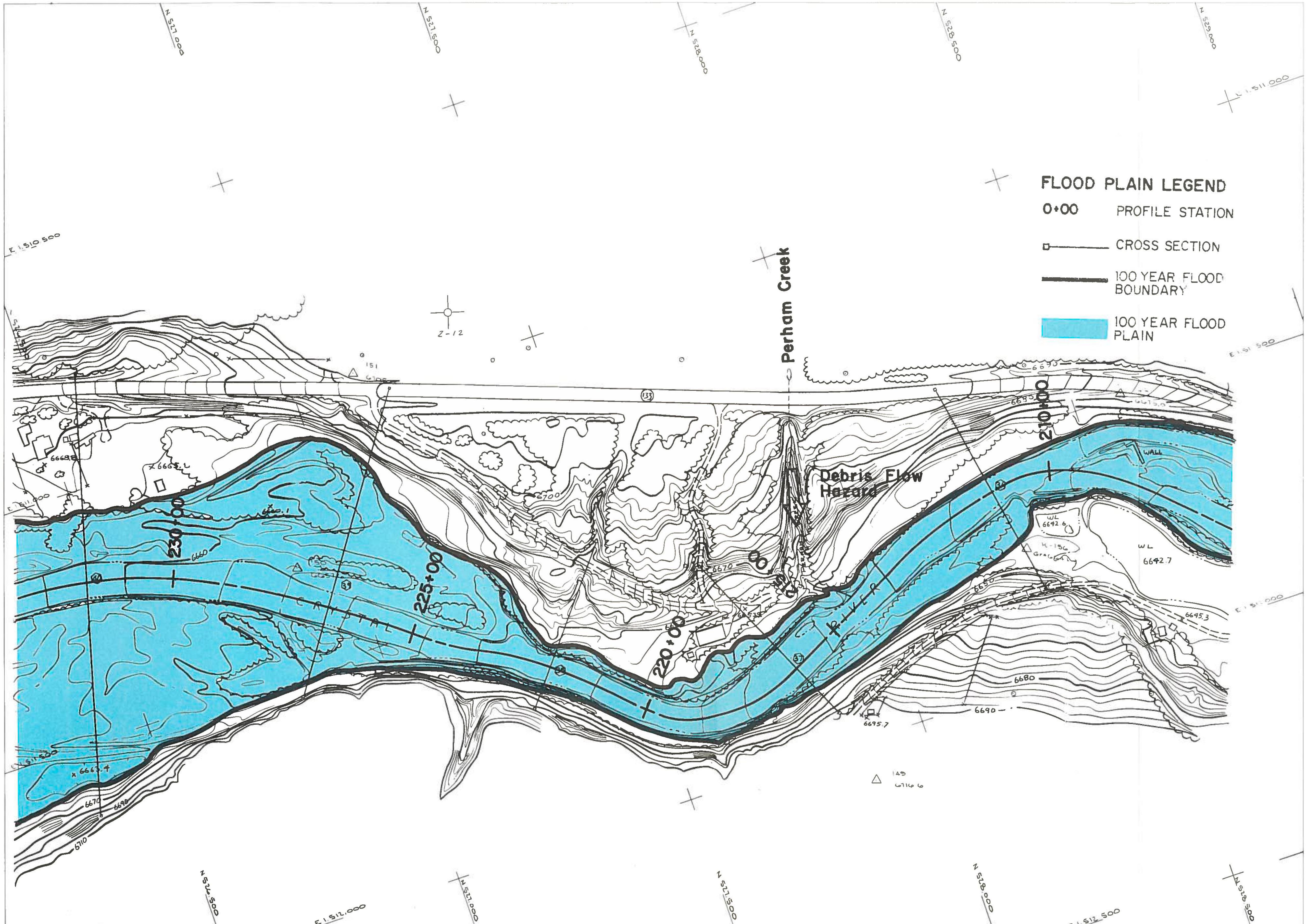
CONTOUR INTERVAL: 2 FEET

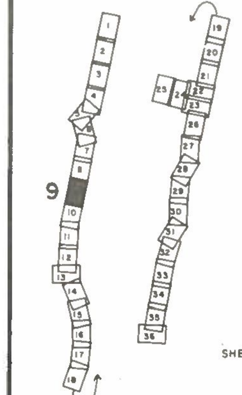
CRYSTAL RIVER FLOOD PLAIN STUDY

PREPARED FOR
PITKIN COUNTY, COLORADO

IN COOPERATION WITH
COLORADO WATER CONSERVATION BOARD
DENVER, COLORADO

WRIGHT WATER ENGINEERS, INC.
JUNE 1979





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SCALE FEET
100 75 50 25 0 100 200

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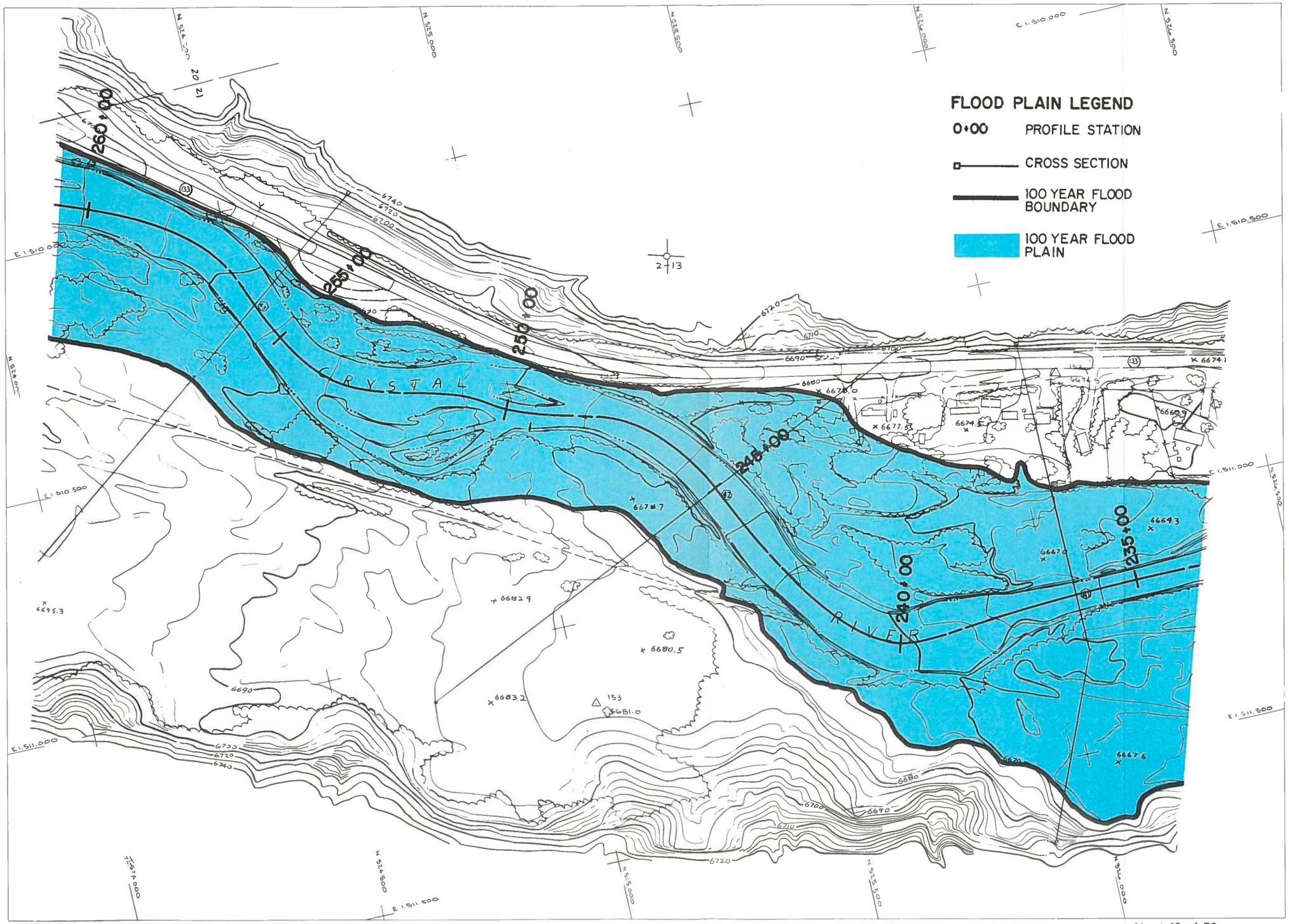

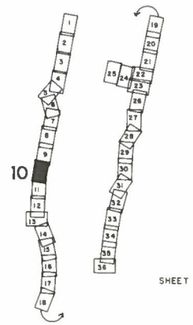

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SCALE FEET
100 75 50 25 0 100 200

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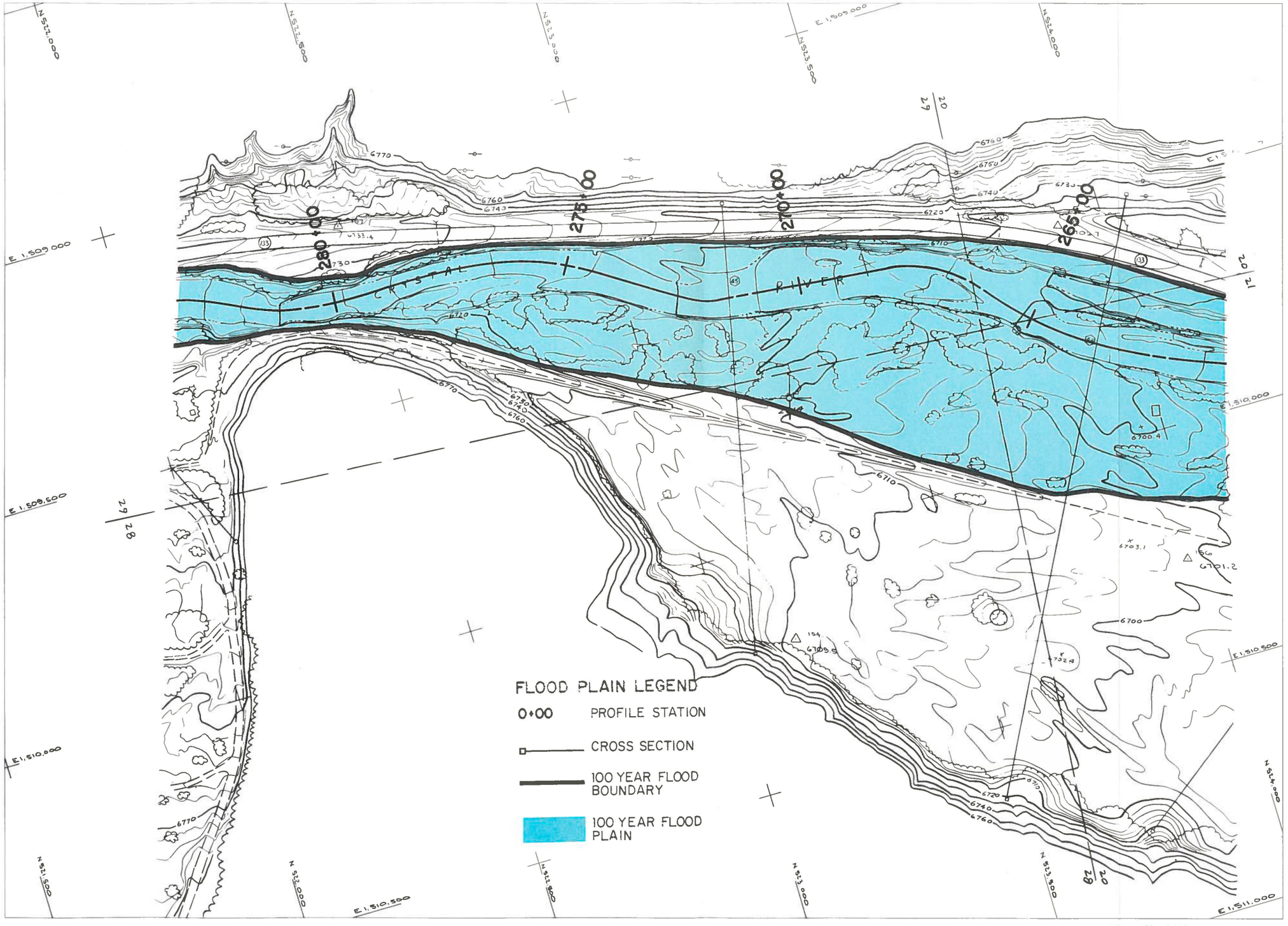

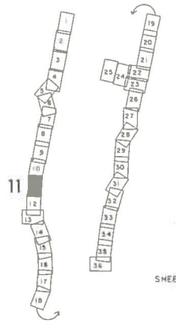

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BASIS OF CONTROL

THE COLORADO STATE PLANE-COORDINATE SYSTEM, CENT. ZONE, ESTABLISHED FROM U.S. DEPARTMENT OF THE INTERIOR, GEOLOGICAL SURVEY CONTROL POINTS "CATHERINE 2", AND "PASS"

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SCALE FEET

100 75 50 25 0 100 200

CONTOUR INTERVAL 2 FEET

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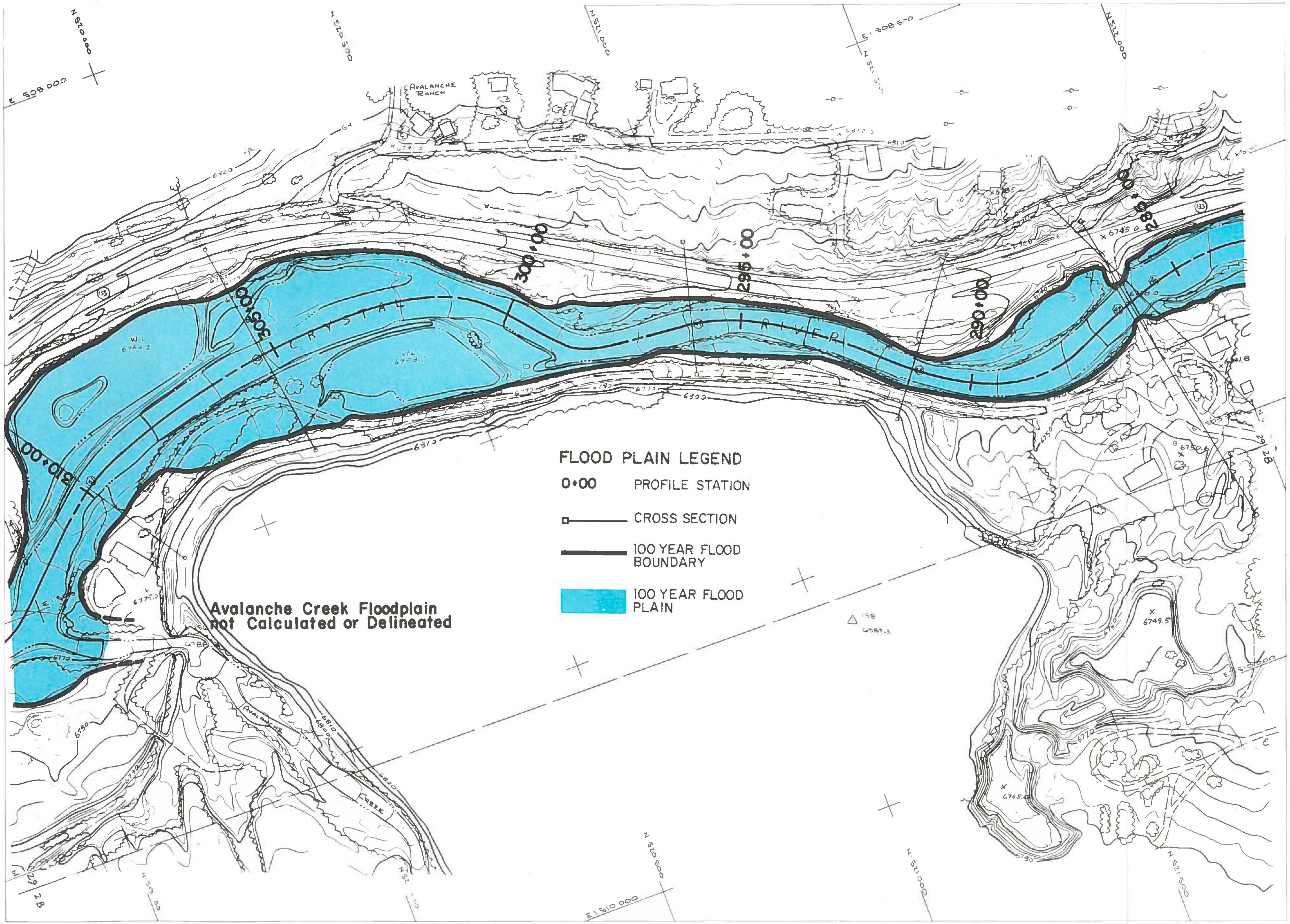

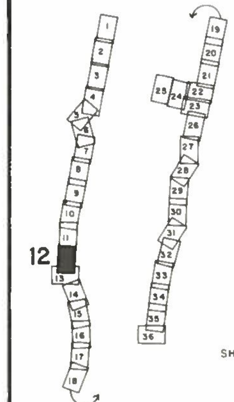

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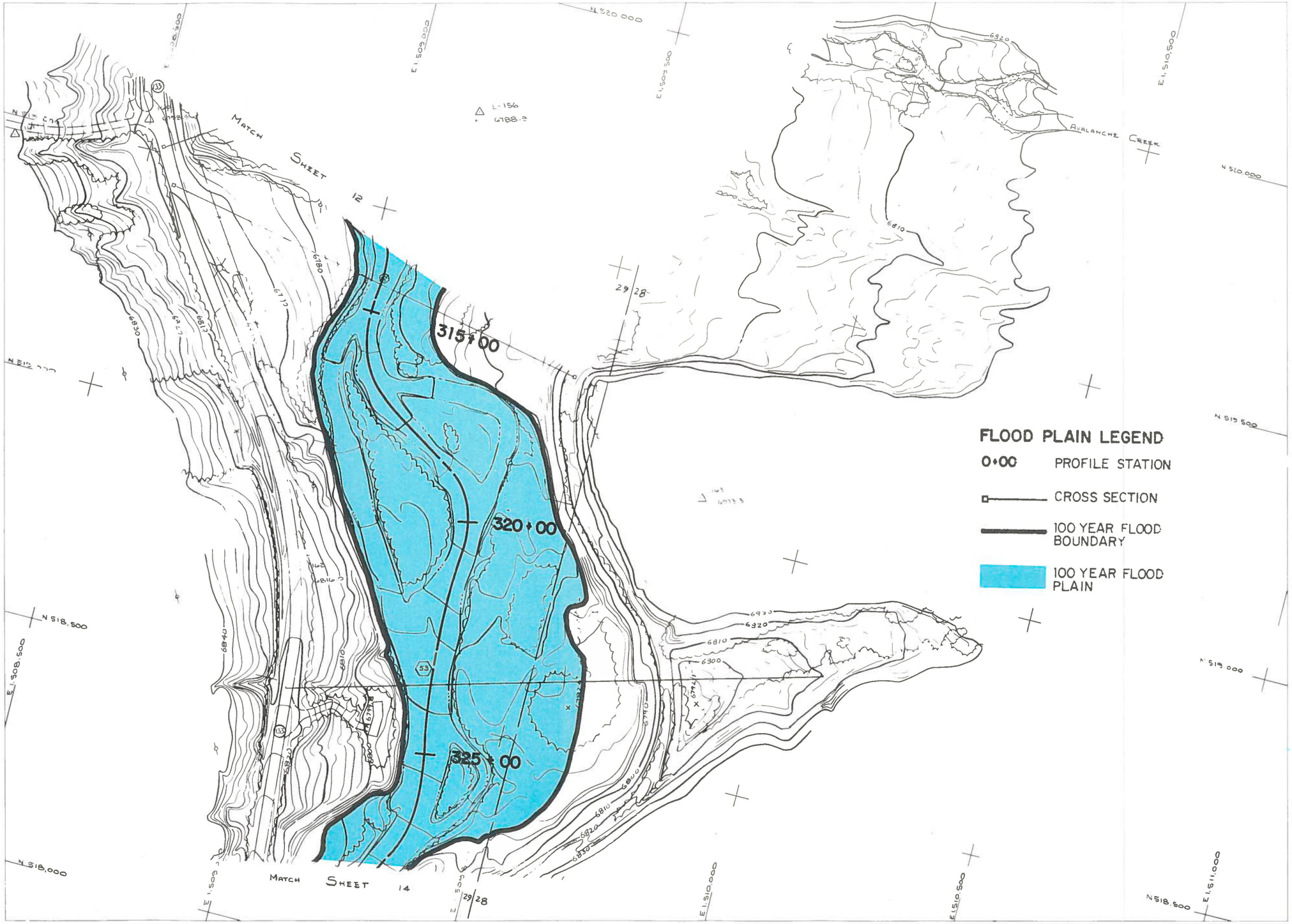

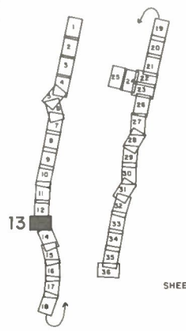

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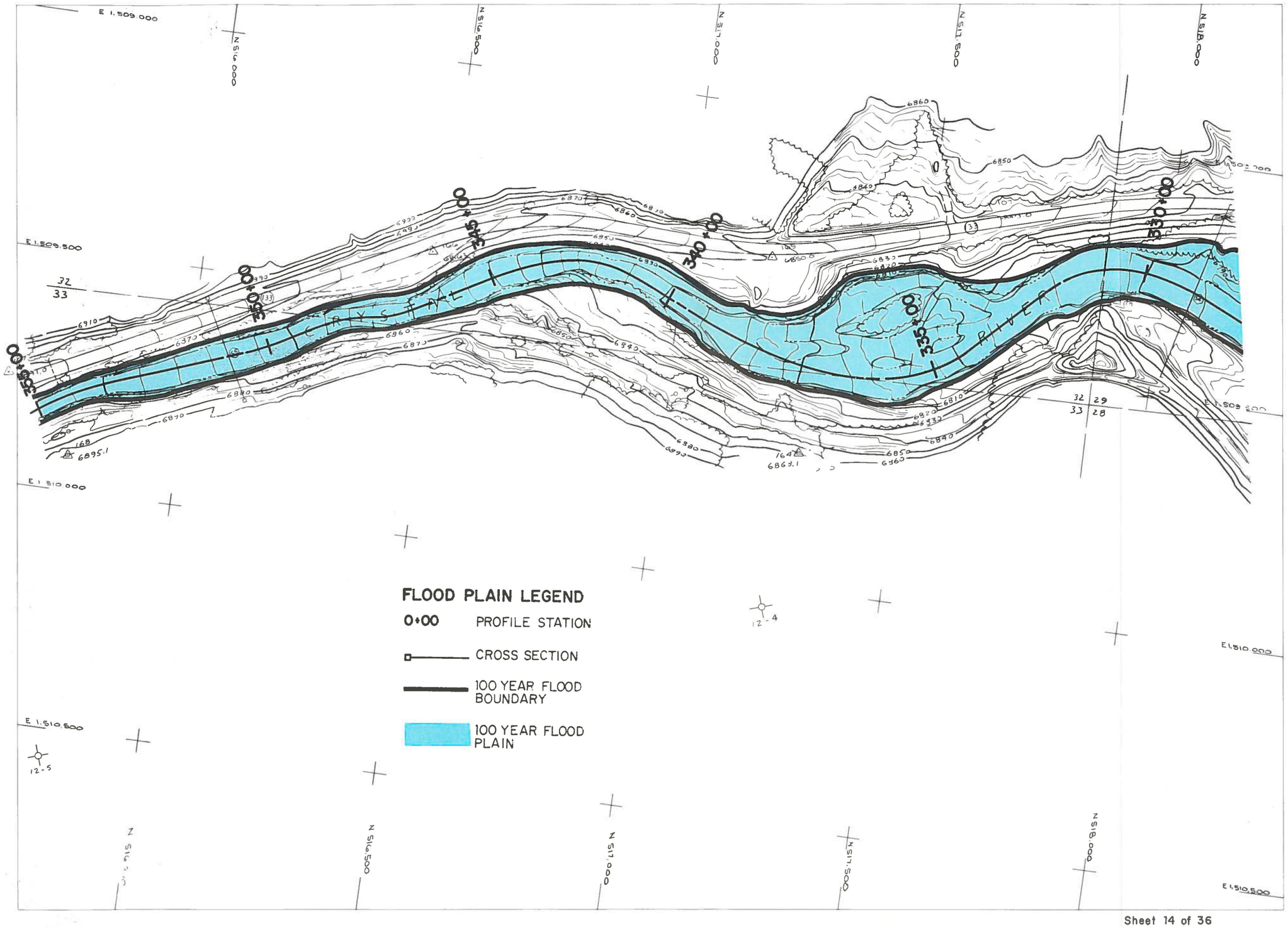


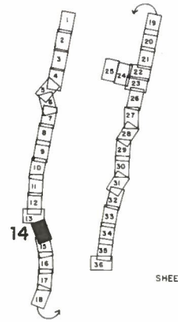
FLOOD PLAIN LEGEND

0+00 PROFILE STATION

CROSS SECTION

100 YEAR FLOOD BOUNDARY

100 YEAR FLOOD PLAIN



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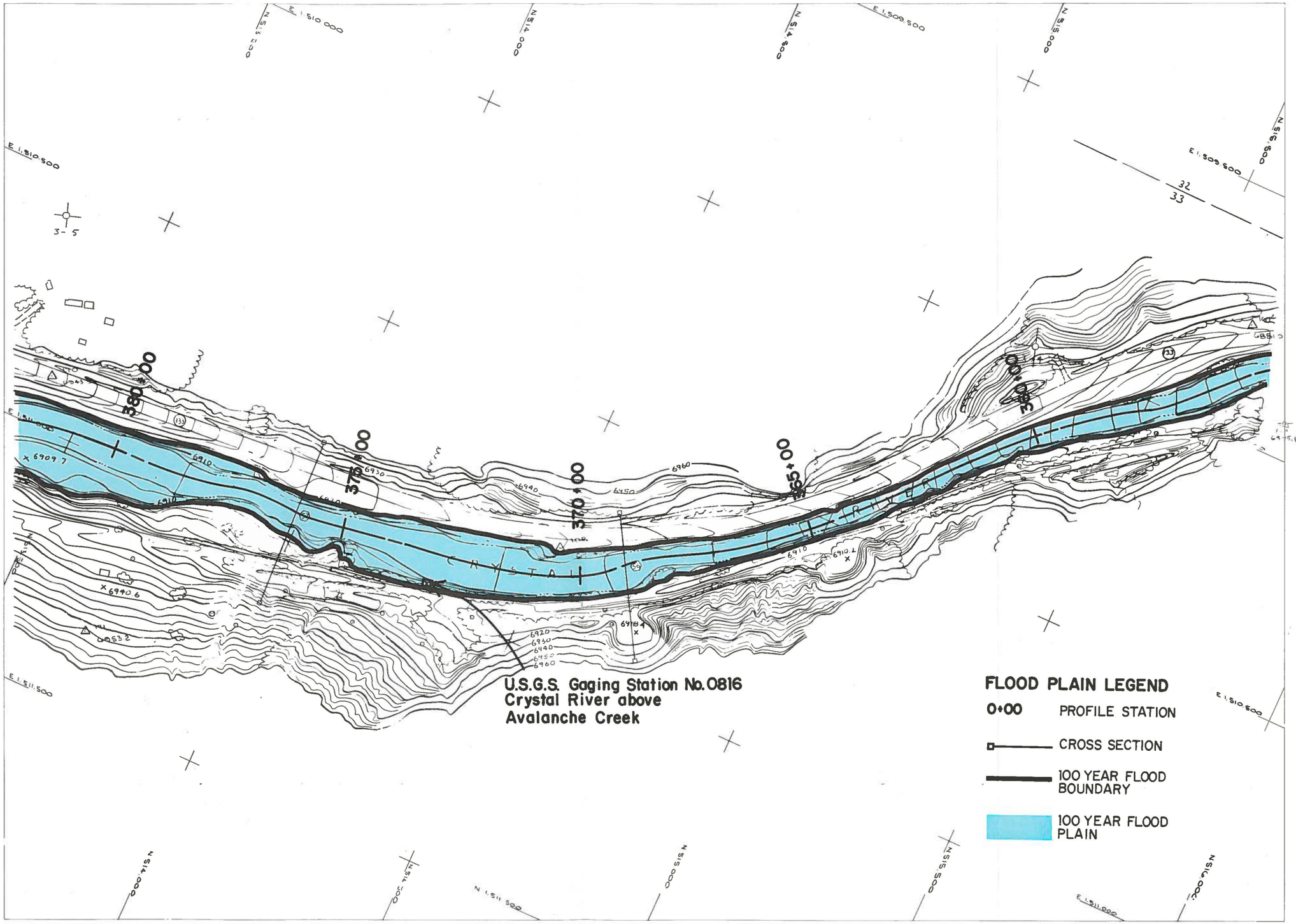

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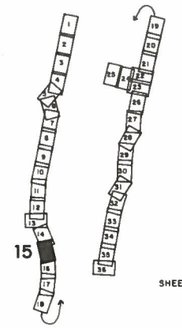

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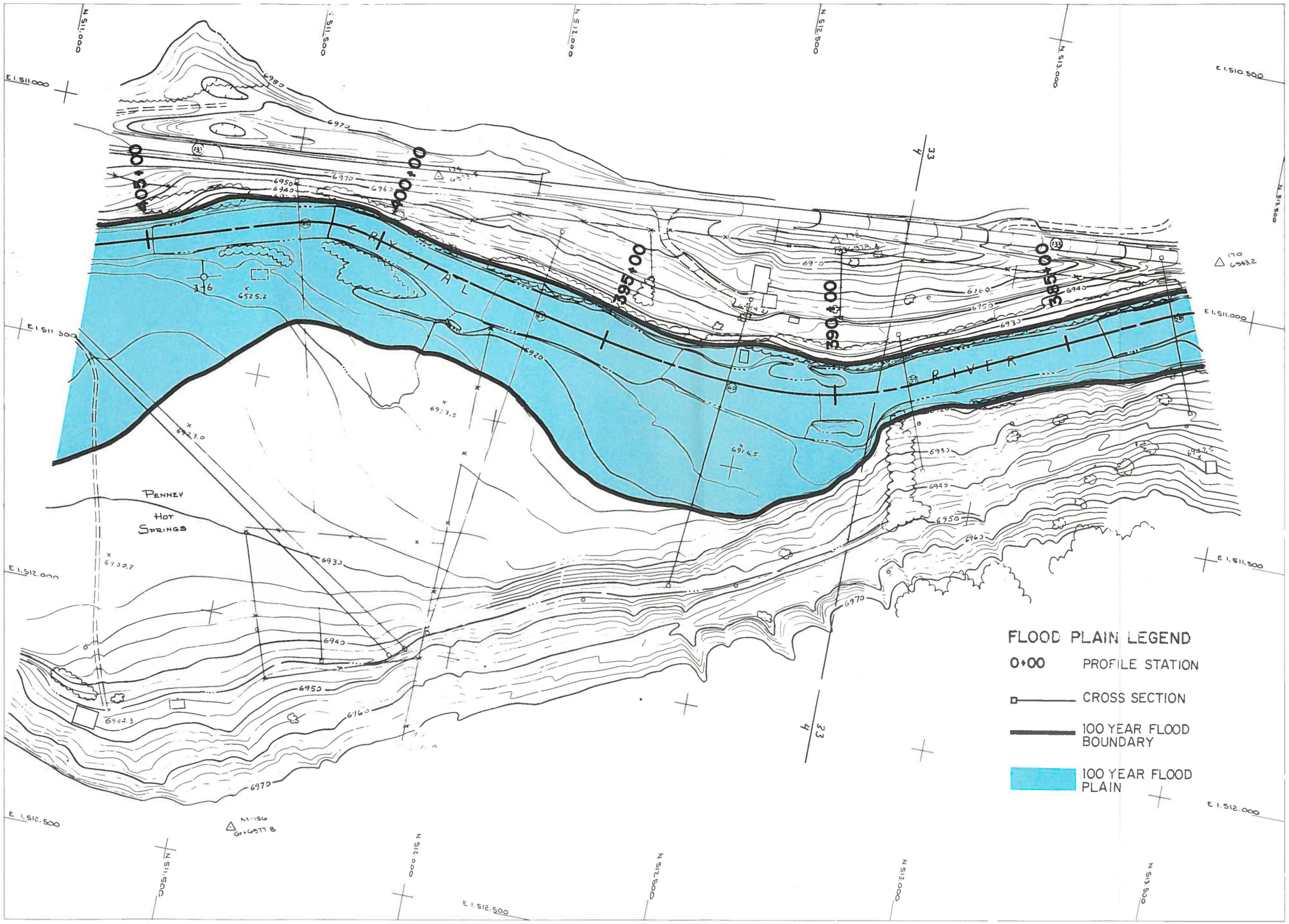

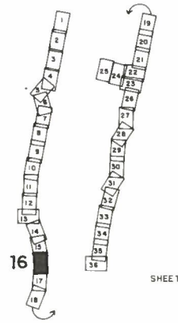

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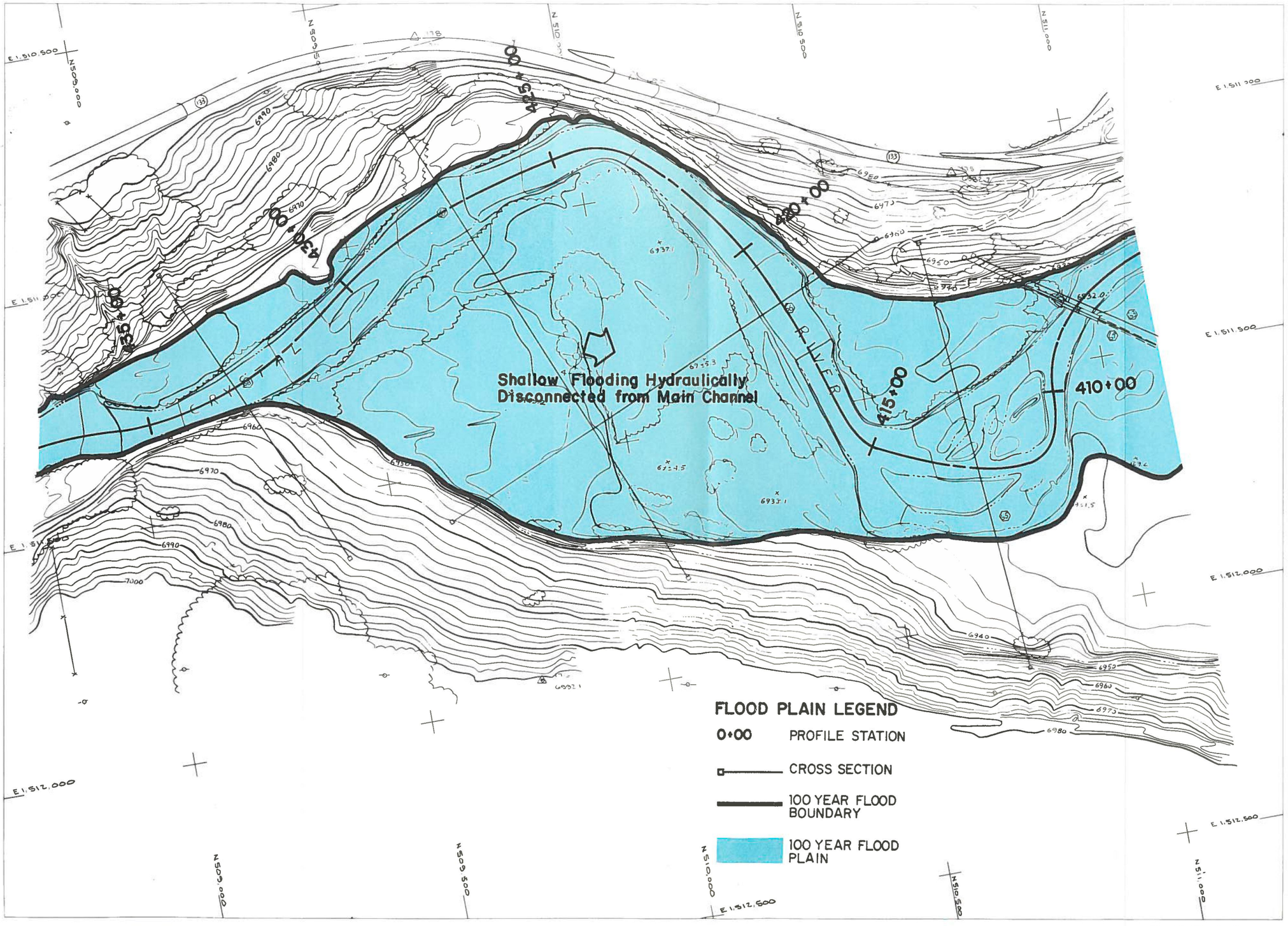

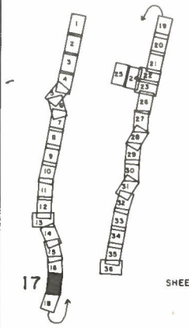

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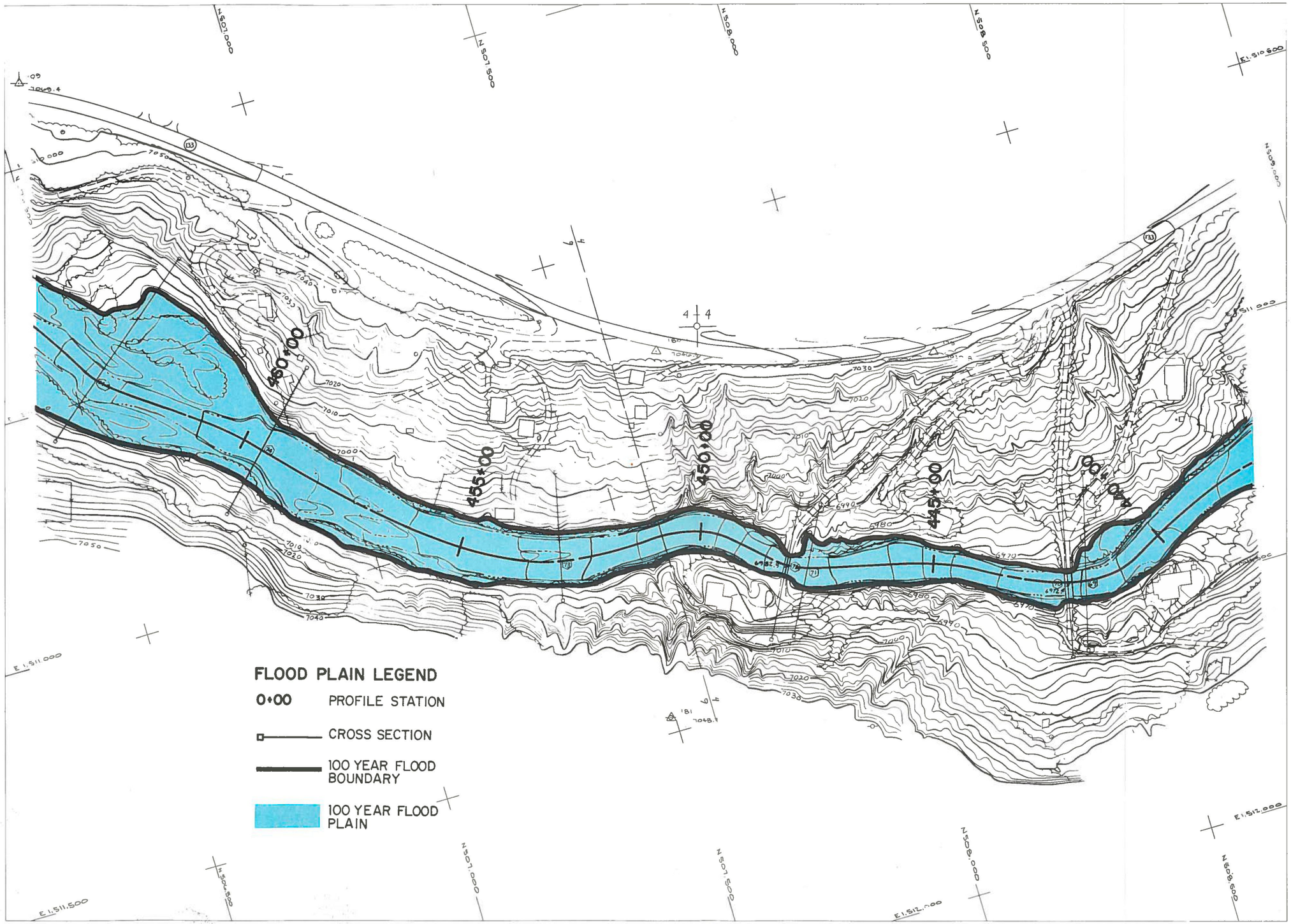

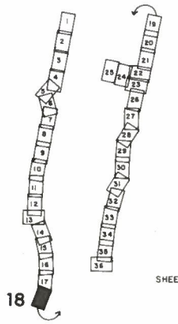

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SHEET INDEX

BASIS OF CONTROL

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Benchmark Mapping Services
PHOTOGRAMMETRIC CONSULTANTS
1582 South Parker Road Suite 200
Denver, Colorado 80231 Ph. (303) 751-8011

LEGEND

- PERMANENT MONUMENT
- HORIZONTAL CONTROL
- VERTICAL CONTROL
- PHOTO CENTER
- GRID POINT
- CROSS SECTIONS
- POWER POLE
- FENCE
- SECTION LINE

SCALE FEET
100 75 50 25 0 100 200

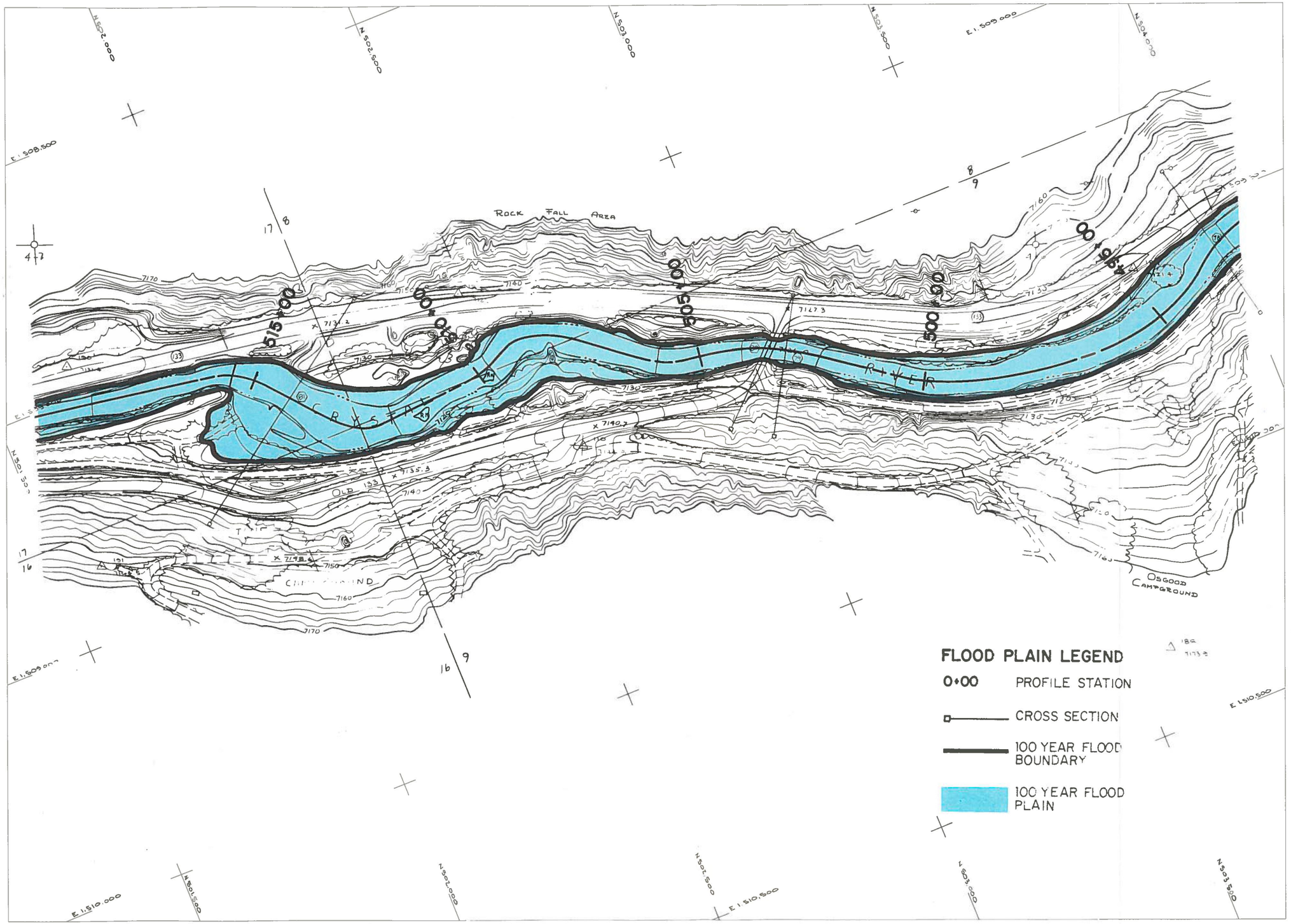
CONTOUR INTERVAL 2 FEET

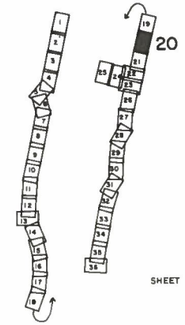
CRYSTAL RIVER
FLOOD PLAIN STUDY

PREPARED FOR
PITKIN COUNTY, COLORADO

IN COOPERATION WITH
COLORADO WATER CONSERVATION BOARD
DENVER, COLORADO

WRIGHT WATER ENGINEERS, INC.
JUNE 1979





SHEET INDEX

BASIS OF CONTROL:

THE COLORADO STATE PLANE-COORDINATE SYSTEM, CENT. ZONE, ESTABLISHED FROM U.S. DEPARTMENT OF THE INTERIOR, GEOLOGICAL SURVEY CONTROL POINTS "CATHERINE 2" AND "PASS"

PROJECT AT AVERAGE ELEVATION OF 7000.0 AT SEA LEVEL FACTOR (0.9996650) AVERAGE LATITUDE 39°16'00", SCALE FACTOR (0.9999401) COMBINED FACTOR (.9996051) RECIP. FACTOR 1.0003949

VERTCAL CONTROL BASED ON U.S.C.& G.S. 1929 SEA LEVEL DATUM

TOPOGRAPHY ON THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS

COMPILATION BY PHOTOGRAMMETRIC METHODS FROM 6" C.F.L. VERTICAL AERIAL PHOTOGRAPHY FLOWN MAY 19, 1978

PREPARED BY:

Benchmark Mapping Services
-PHOTOGRAMMETRIC CONSULTANTS-
1582 South Parker Road, Suite 209
Denver, Colorado 80231 Ph. (303) 751-6011

LEGEND

- PERMANENT MONUMENT
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- VERTICAL CONTROL
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- GRID POINT
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- POWER POLE
- FENCE
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SCALE FEET
100 75 50 25 0 100 200

CONTOUR INTERVAL: 2 FEET

CRYSTAL RIVER FLOOD PLAIN STUDY

PREPARED FOR
PITKIN COUNTY, COLORADO

IN COOPERATION WITH
COLORADO WATER CONSERVATION BOARD
DENVER, COLORADO

WRIGHT WATER ENGINEERS, INC.
JUNE 1979

FLOOD PLAIN LEGEND

0+00 PROFILE STATION

CROSS SECTION

100 YEAR FLOOD BOUNDARY

100 YEAR FLOOD PLAIN

Debris Flow Hazard

Shallow Flooding Hydraulically Disconnected From Main Channel

525+00

520+00

535+00

530+00

540+00

545+00

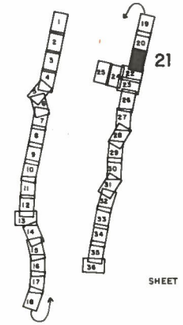
CRYSTAL RIVER

OLD 133

TREATMENT PLANT

W L 7137.4

E 1,507,500 N 499,500 N 500,000 N 500,500 N 501,000 E 1,508,000 N 501,500 E 1,508,500 E 1,509,000 E 1,509,500 N 499,000 N 499,500 N 500,000 N 500,500 N 501,000



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1560 South Parker Road, Suite 208
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LEGEND

- PERMANENT MONUMENT
- HORIZONTAL CONTROL
- VERTICAL CONTROL
- 3|7 PHOTO CENTER
- GRID POINT
- CROSS SECTIONS
- POWER POLE
- FENCE
- SECTION LINE

SCALE FEET
100 75 50 25 0 100 200

CONTOUR INTERVAL: 2 FEET

CRYSTAL RIVER FLOOD PLAIN STUDY

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JUNE 1979

FLOOD PLAIN LEGEND

0+00 PROFILE STATION

CROSS SECTION

100 YEAR FLOOD BOUNDARY

100 YEAR FLOOD PLAIN

100 YEAR FLOODPLAIN WITHOUT DIKE

Shallow Flooding Hydraulically Disconnected From Main Channel

550+00

553+00

560+00

565+00

CRYSTAL RIVER

REDSTONE

W/L 7149.2

7141.7

7146.6

7149.5

7149.3

7150.2

7150.5

7153.0

7151.6

7159.9

7152.9

7154.6

7154.7

7149.5

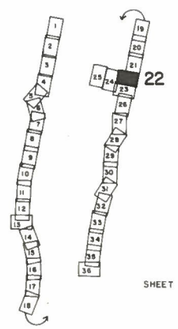
N498,500

N498,000

E 1,500,500

E 1,501,000

E 1,501,500



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CRYSTAL RIVER
FLOOD PLAIN STUDY

PREPARED FOR
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FLOOD PLAIN LEGEND

0+00 PROFILE STATION

CROSS SECTION

100 YEAR FLOOD BOUNDARY

100 YEAR FLOOD PLAIN

100 YEAR FLOODPLAIN WITHOUT DIKE

Shallow Flooding Hydraulically Disconnected from Main Channel

Debris Flow Hazard

570+00

575+00

580+00

CRYSTAL RIVER

CASTLE CREEK

REDSTONE

COAL

MOTEL

MATCH LINE SHEET 24

MATCH LINE SHEET 26

SHEET INDEX

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CONTOUR INTERVAL: 2 FEET

CRYSTAL RIVER FLOOD PLAIN STUDY

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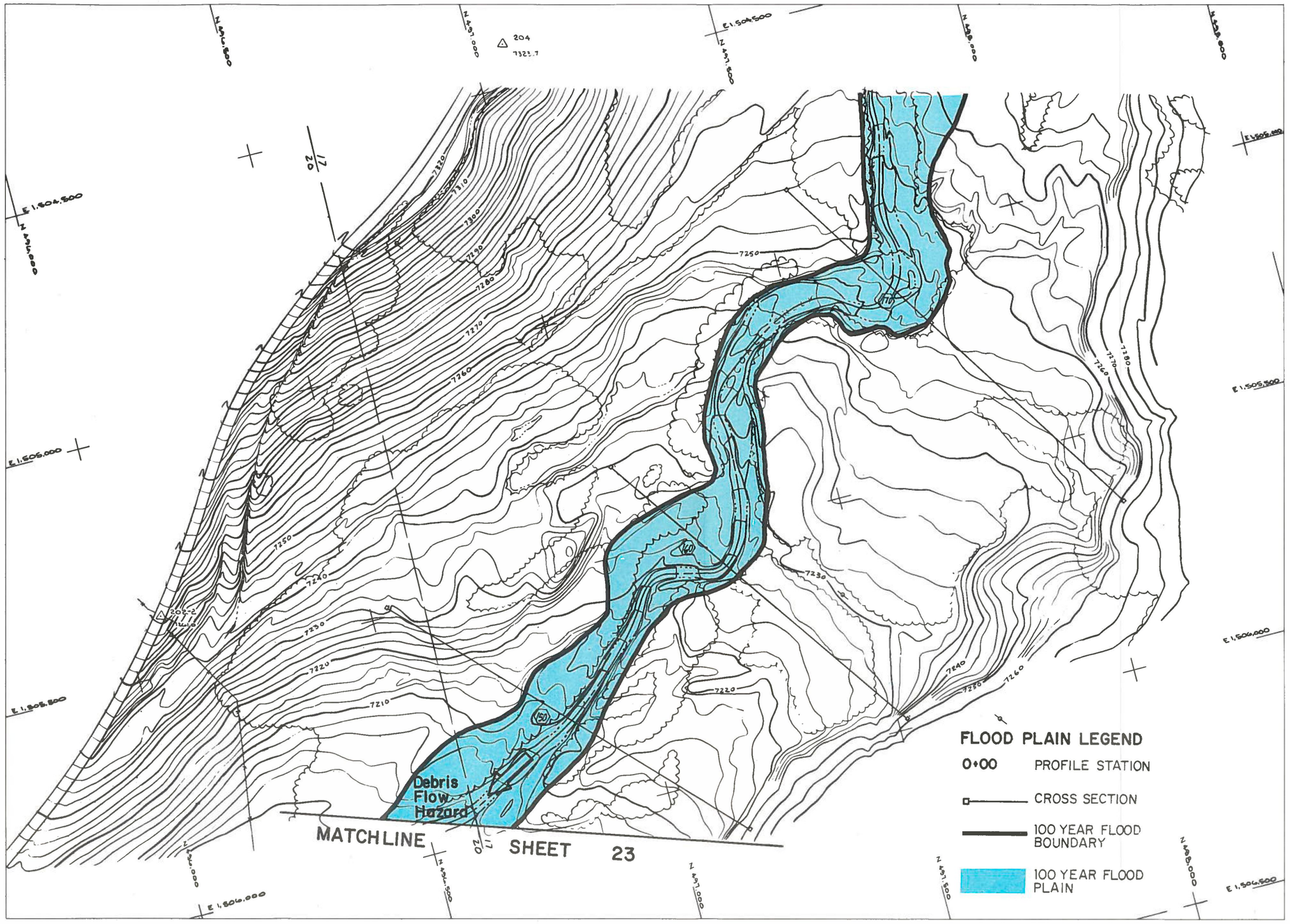
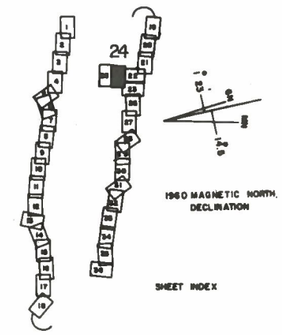
JUNE 1979





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COMBINED FACTOR (.9996051)
RECIP. FACTOR 1.0003949

COORDINATES:

CATHERINE 2	N 481,255.78 E 1,516,508.42
PASS	N 475,991.984 E 1,494,182.71

VERTICAL CONTROL BASED ON U.S.C. & G.S. 1929 SEA LEVEL DATUM

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1900 South Parker Road, Suite 200
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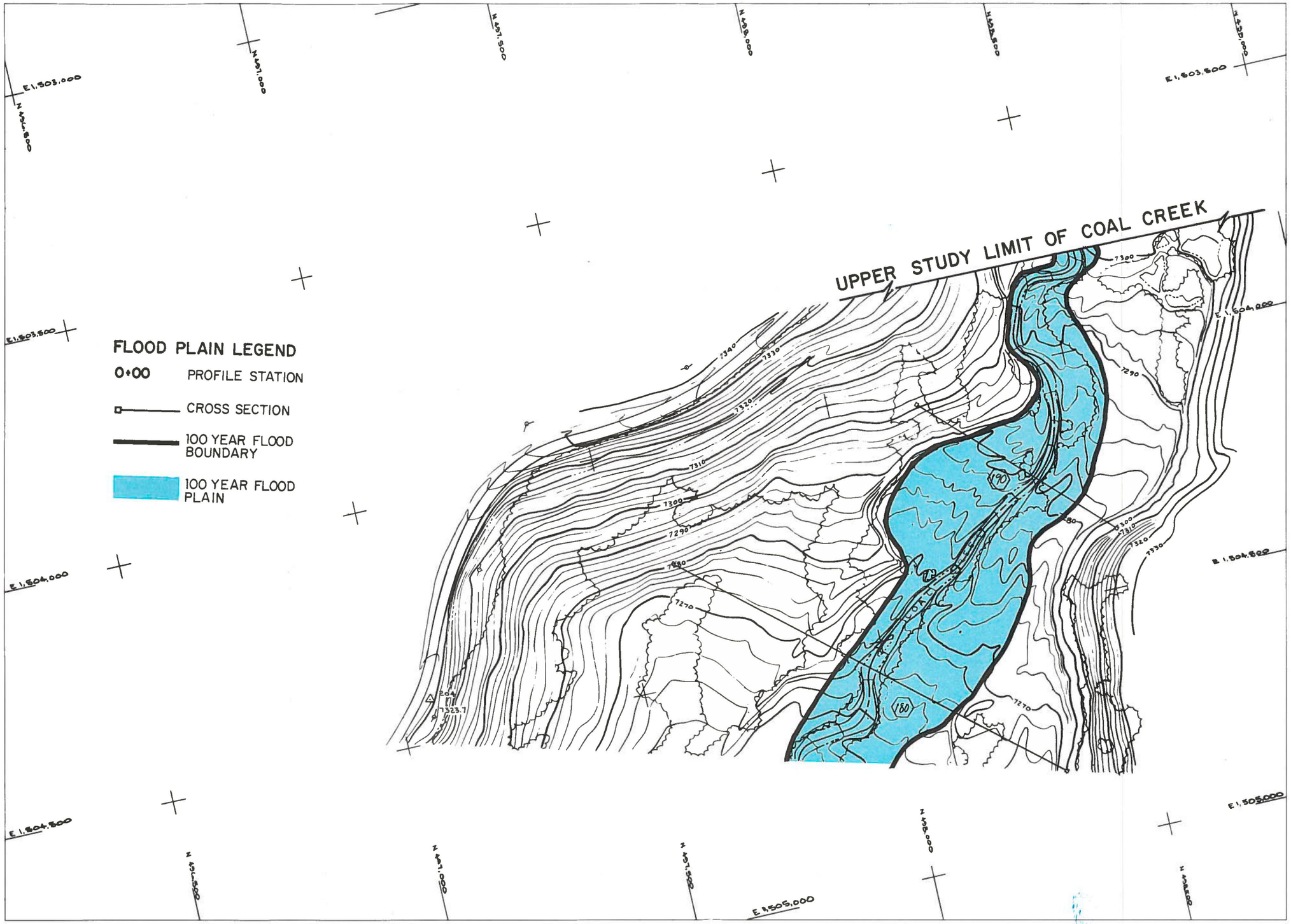

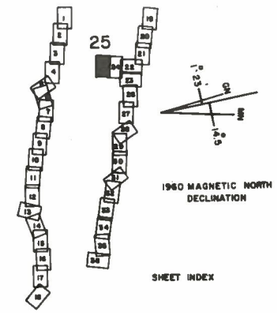

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PASS	N 475,991.984 E 1,494,182.71

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COMPILATION BY PHOTOGRAMMETRIC METHODS FROM 6" C.F.L. VERTICAL AERIAL PHOTOGRAPHY FLOWN MAY 19, 1978

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1952 South Parker Road, Suite 209
Denver, Colorado 80231 Ph. (303) 751-0911

LEGEND

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CONTOUR INTERVAL: 2 FEET

CRYSTAL RIVER FLOOD PLAIN STUDY

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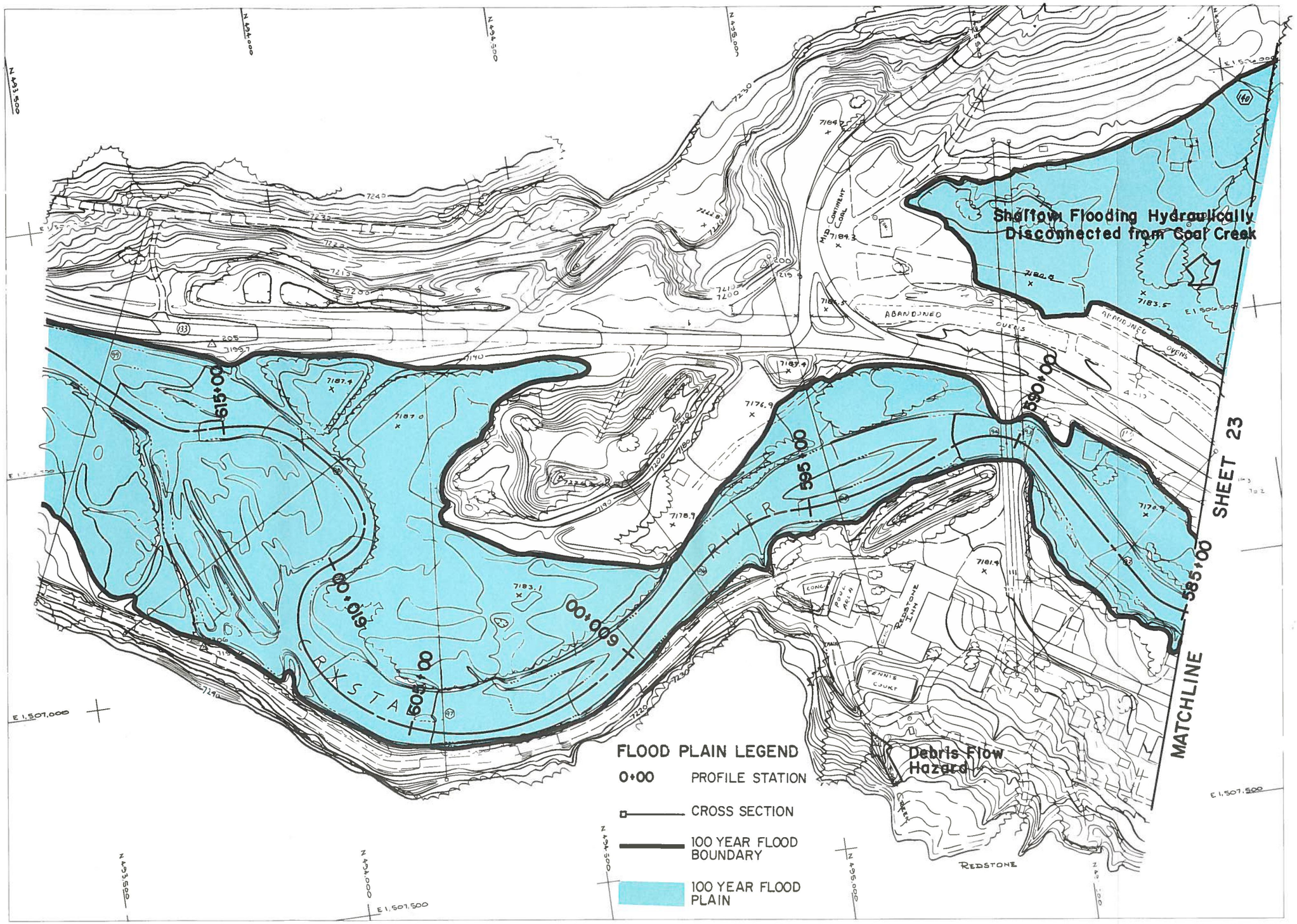

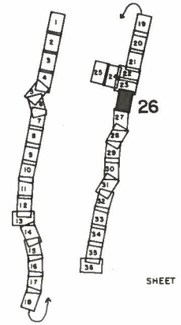

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COMPILATION BY PHOTOGRAMMETRIC METHODS FROM 6 C.F.L. VERTICAL AERIAL PHOTOGRAPHY FLOWN MAY 19, 1978

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Denver, Colorado 80231 Ph. (303) 751-8011

LEGEND

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- PHOTO CENTER
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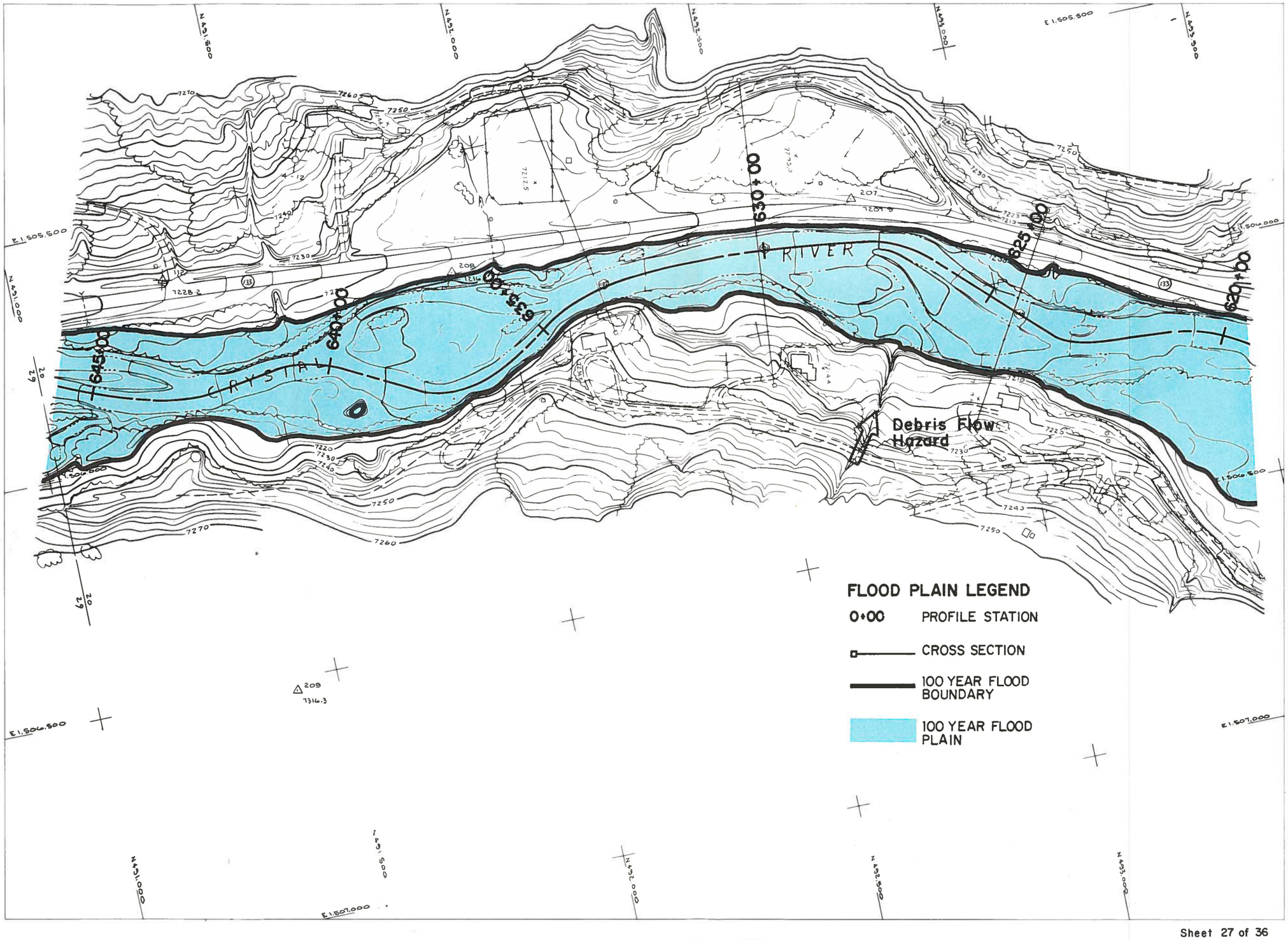
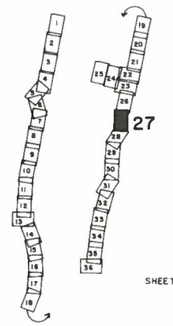


FLOOD PLAIN LEGEND

- 0+00 PROFILE STATION
- CROSS SECTION
- 100 YEAR FLOOD BOUNDARY
- 100 YEAR FLOOD PLAIN



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CRYSTAL RIVER
FLOOD PLAIN STUDY

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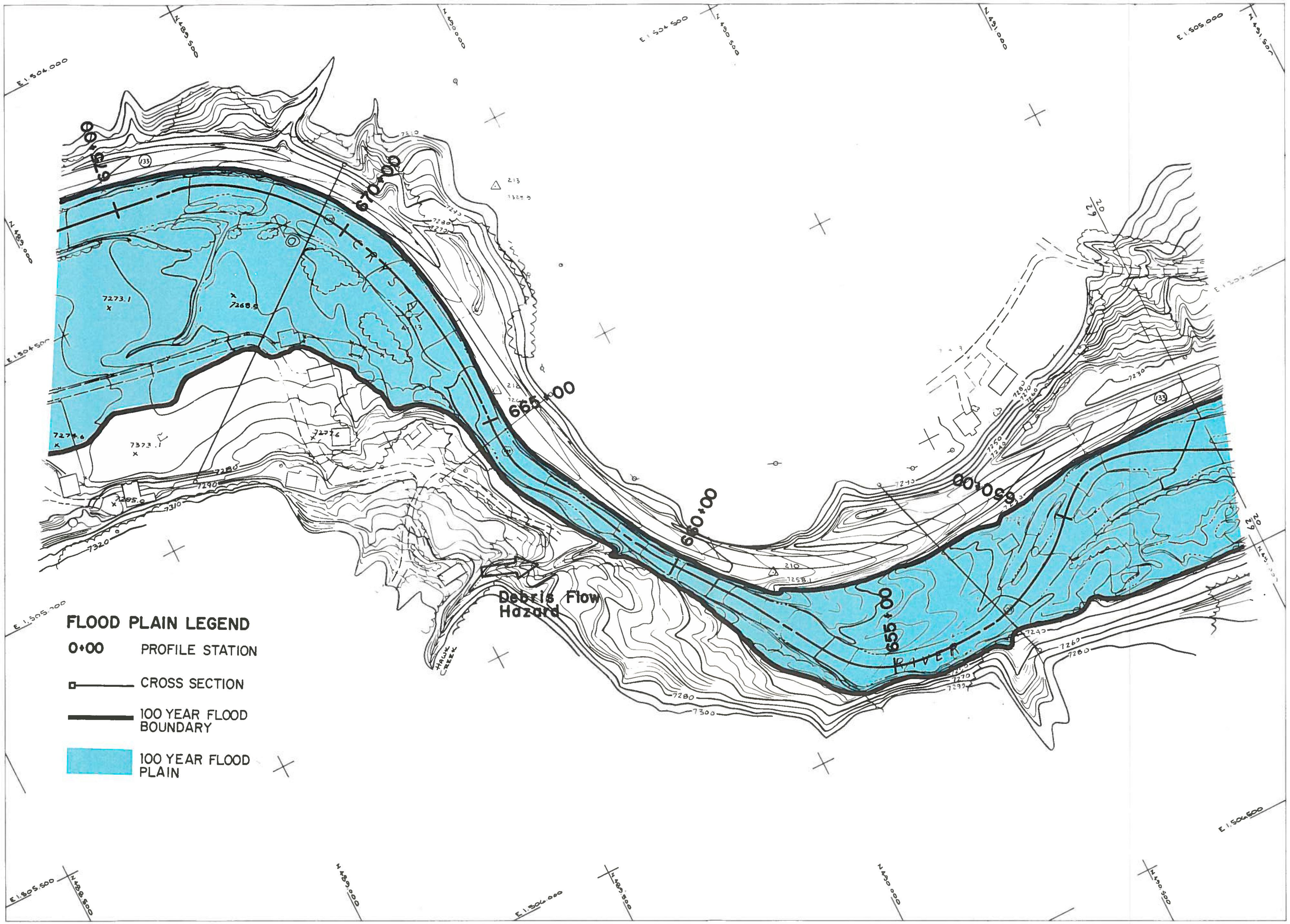

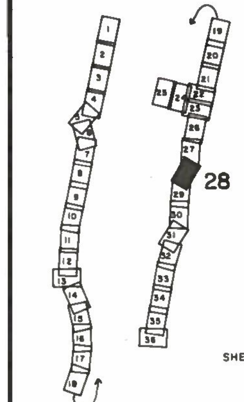

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CRYSTAL RIVER
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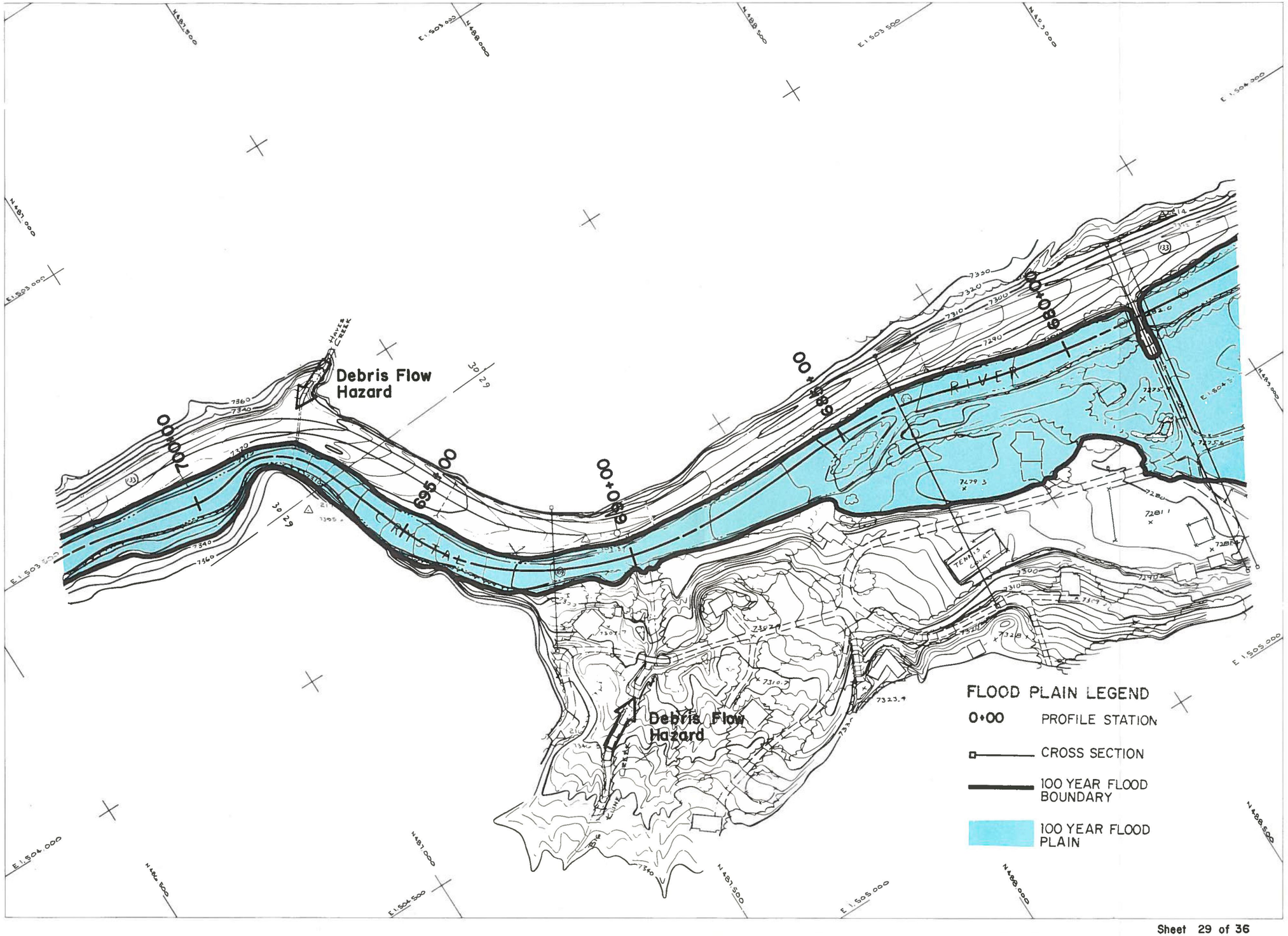

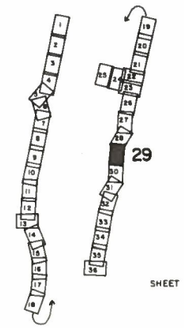

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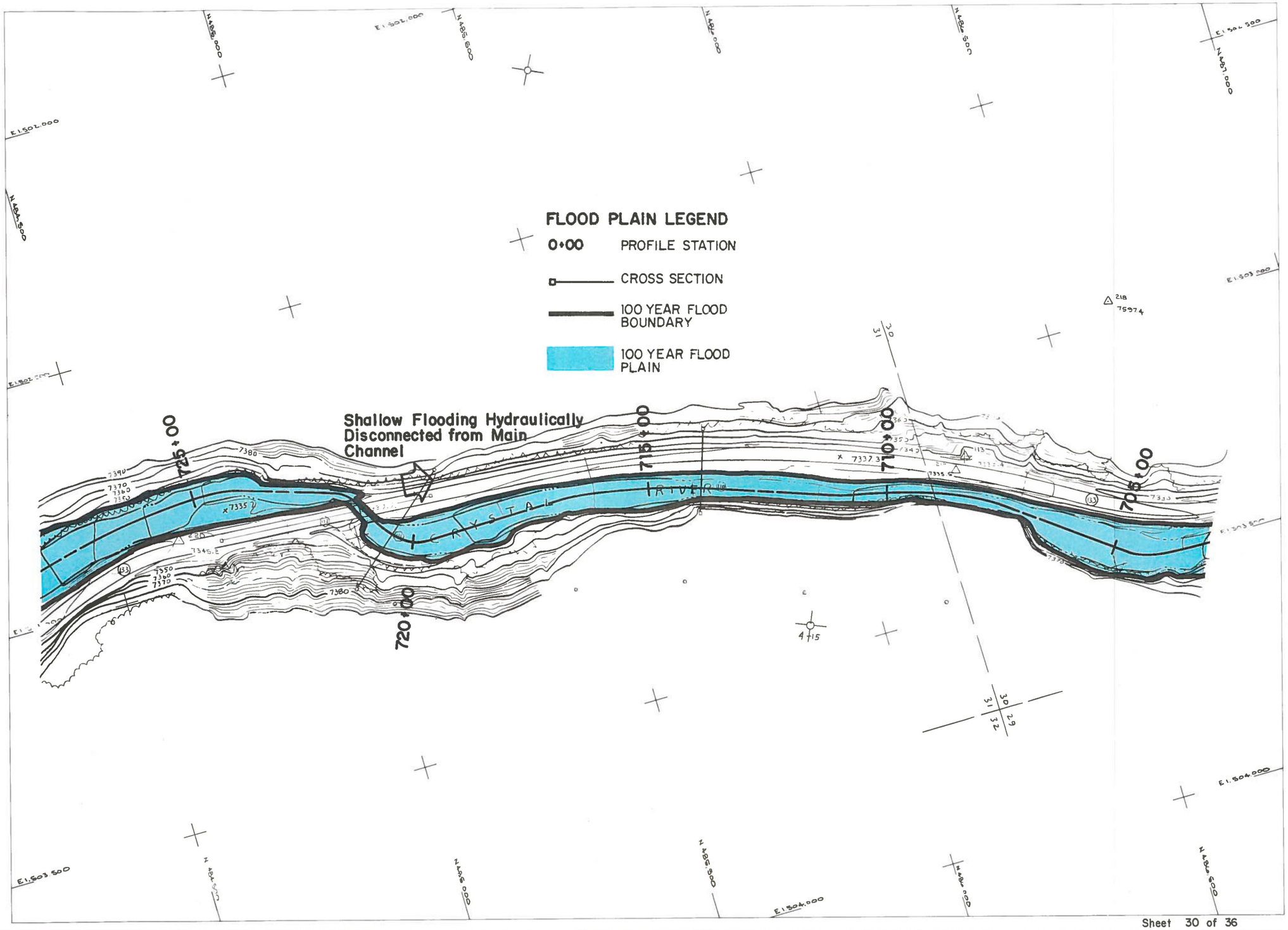

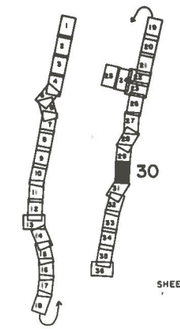

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TOPOGRAPHY ON THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS.

COMPILATION BY PHOTOGRAMMETRIC METHODS FROM 8 C.F.L. VERTICAL AERIAL PHOTOGRAPHY FLOWN MAY 19, 1978

PREPARED BY:

Benchmark Mapping Services
PHOTOGRAMMETRIC CONSULTANTS
1663 South Parker Road, Suite 208
Denver, Colorado 80231 Ph. (303) 751-0011

LEGEND

- PERMANENT MONUMENT
- HORIZONTAL CONTROL
- VERTICAL CONTROL
- PHOTO CENTER
- GRID POINT
- CROSS SECTIONS
- POWER POLE
- FENCE
- SECTION LINE

SCALE FEET
100 75 50 25 0 100 200

CONTOUR INTERVAL 2 FEET

CRYSTAL RIVER FLOOD PLAIN STUDY

PREPARED FOR
PITKIN COUNTY, COLORADO

IN COOPERATION WITH
COLORADO WATER CONSERVATION BOARD
DENVER, COLORADO

WRIGHT WATER ENGINEERS, INC.

JUNE 1979

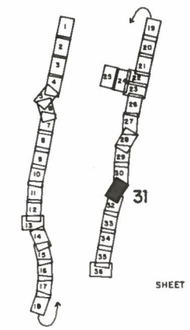
FLOOD PLAIN LEGEND

0+00 PROFILE STATION

CROSS SECTION

100 YEAR FLOOD BOUNDARY

100 YEAR FLOOD PLAIN



SHEET INDEX

BASIS OF CONTROL:

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PREPARED BY:

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1583 South Parker Road, Suite 208
Denver, Colorado 80231 Ph. (303) 751-8011

LEGEND

- PERMANENT MONUMENT
- HORIZONTAL CONTROL
- VERTICAL CONTROL
- 3|7 PHOTO CENTER
- GRID POINT
- CROSS SECTIONS
- POWER POLE
- FENCE
- SECTION LINE

SCALE FEET

100 75 50 25 0 100 200

CONTOUR INTERVAL: 2 FEET

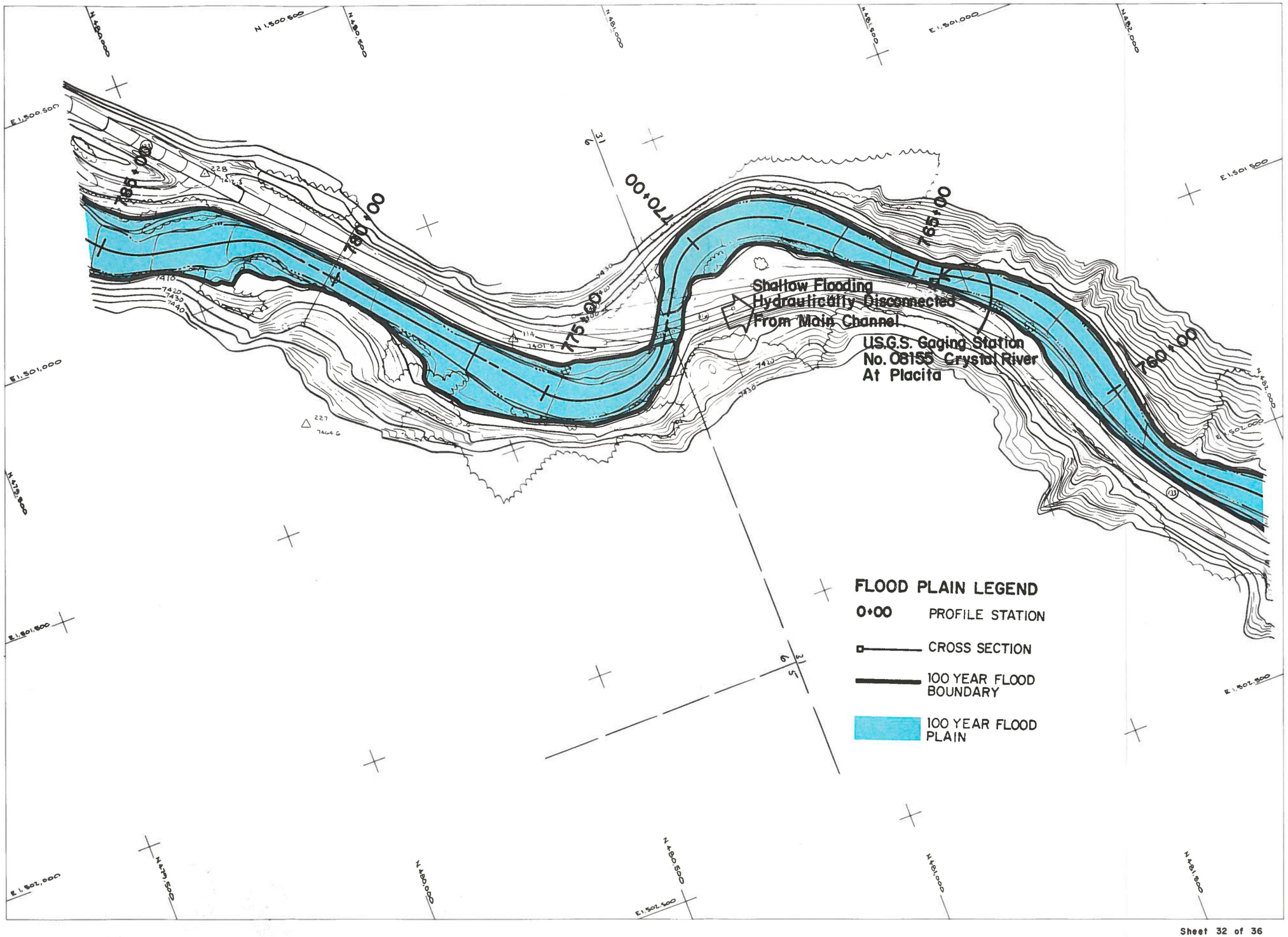
CRYSTAL RIVER FLOOD PLAIN STUDY

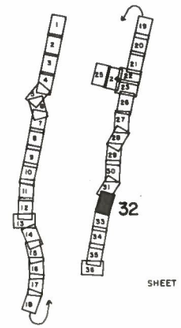
PREPARED FOR
PITKIN COUNTY, COLORADO

IN COOPERATION WITH
COLORADO WATER CONSERVATION BOARD
DENVER, COLORADO

WRIGHT WATER ENGINEERS, INC.
JUNE 1979

Sheet 31 of 36





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- VERTICAL CONTROL
- 317 PHOTO CENTER
- GRID POINT
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- FENCE
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SCALE FEET
100 75 50 25 0 100 200

CONTOUR INTERVAL: 2 FEET

CRYSTAL RIVER
FLOOD PLAIN STUDY

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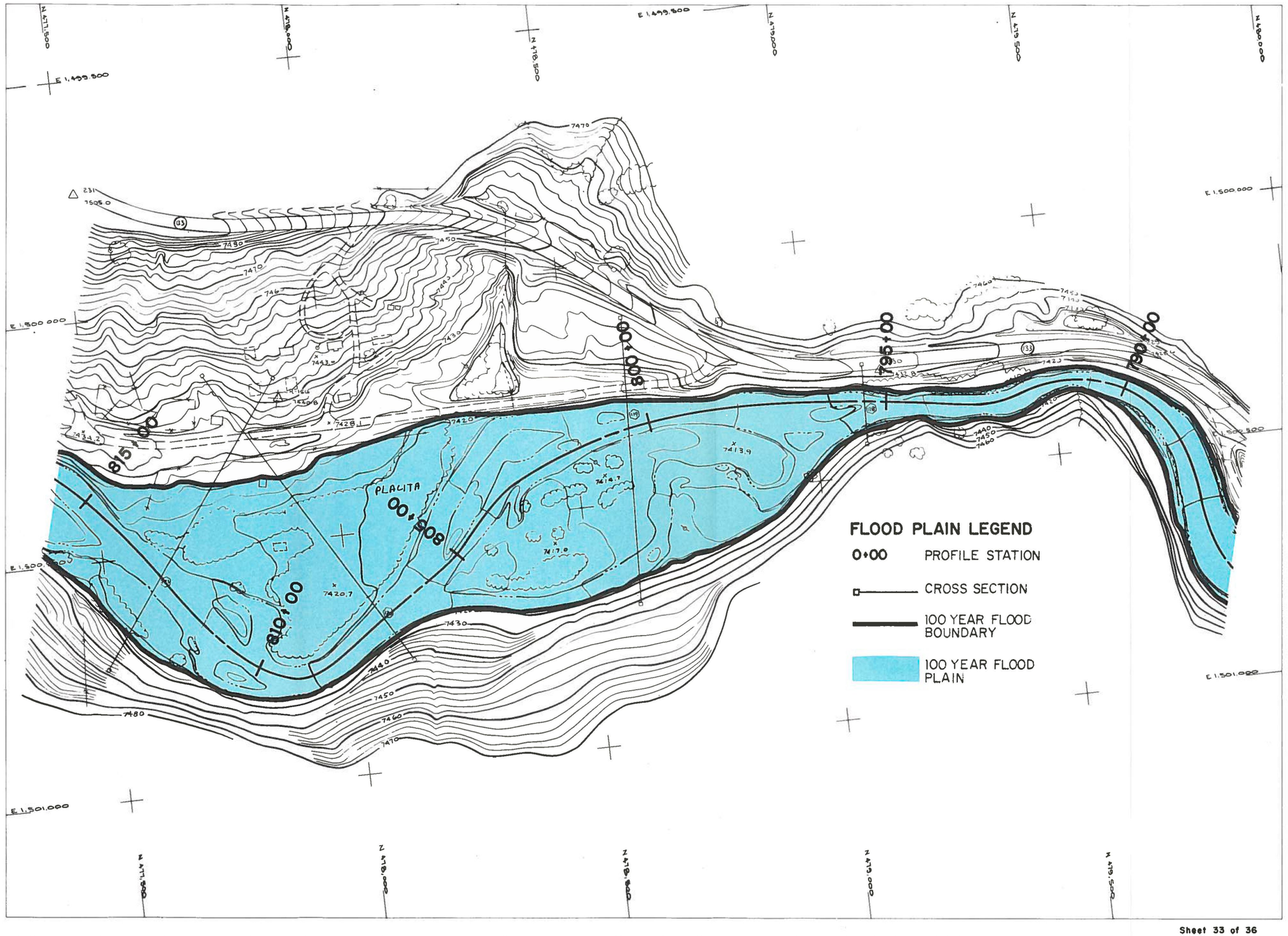
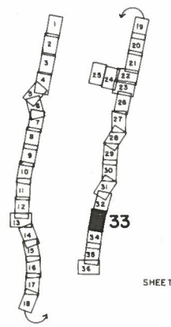


Sheet 33 of 36



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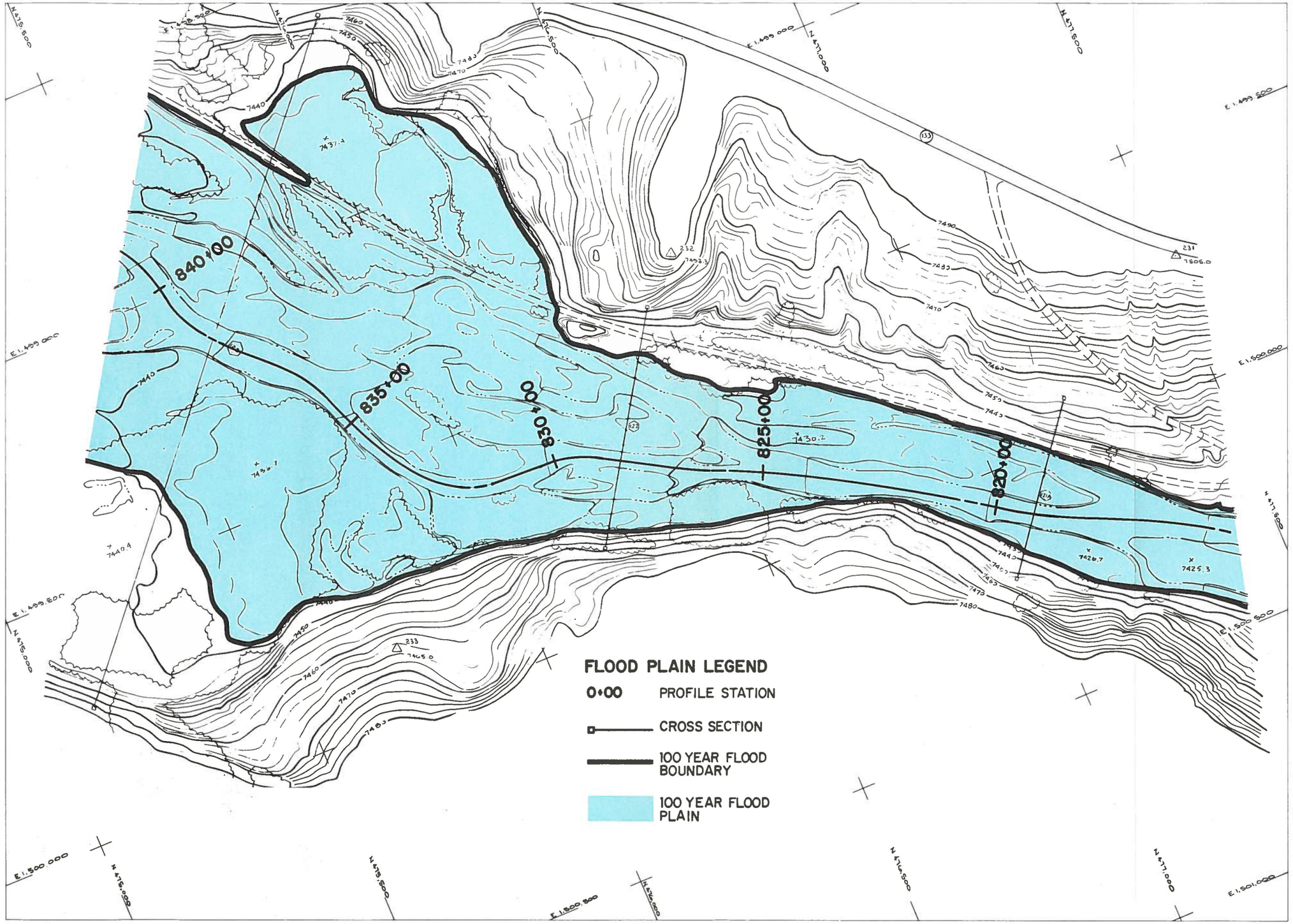
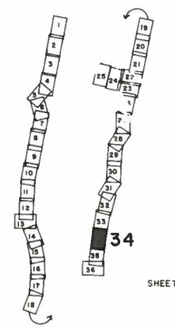
JUNE 1979





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SCALE FEET
100 75 50 25 0 100 200

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PREPARED FOR
PITKIN COUNTY, COLORADO

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DENVER, COLORADO

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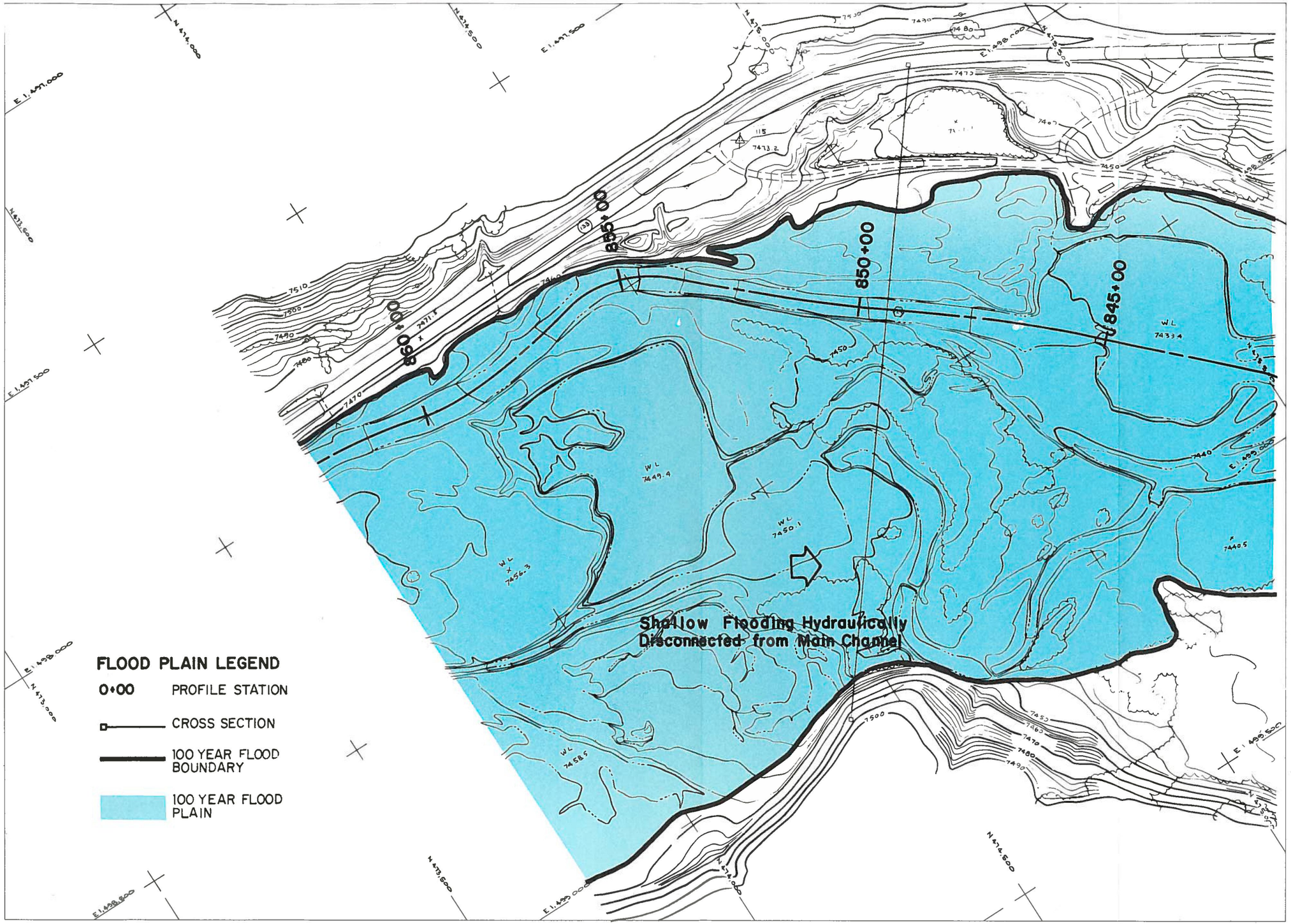
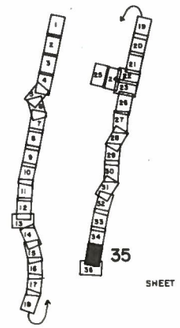


Sheet 35 of 36



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PREPARED FOR
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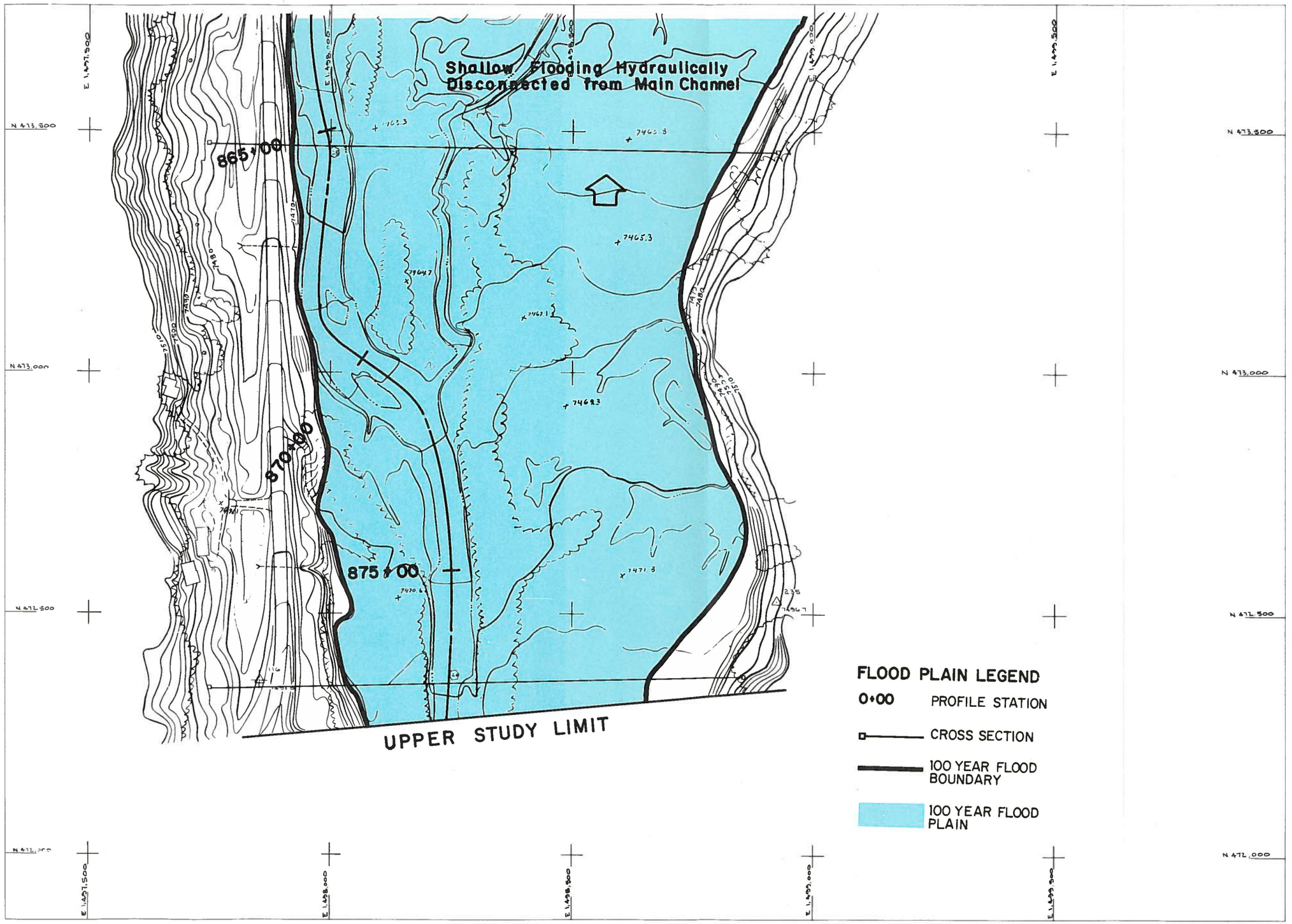


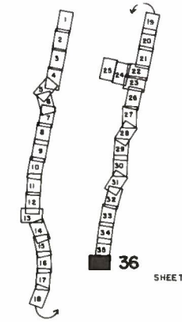
FLOOD PLAIN LEGEND

0+00 PROFILE STATION

CROSS SECTION

100 YEAR FLOOD BOUNDARY

100 YEAR FLOOD PLAIN



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- VERTICAL CONTROL
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- GRID POINT
- CROSS SECTIONS
- POWER POLE
- FENCE
- SECTION LINE

SCALE FEET

100 75 50 25 0 100 200

CONTOUR INTERVAL: 2 FEET

CRYSTAL RIVER FLOOD PLAIN STUDY

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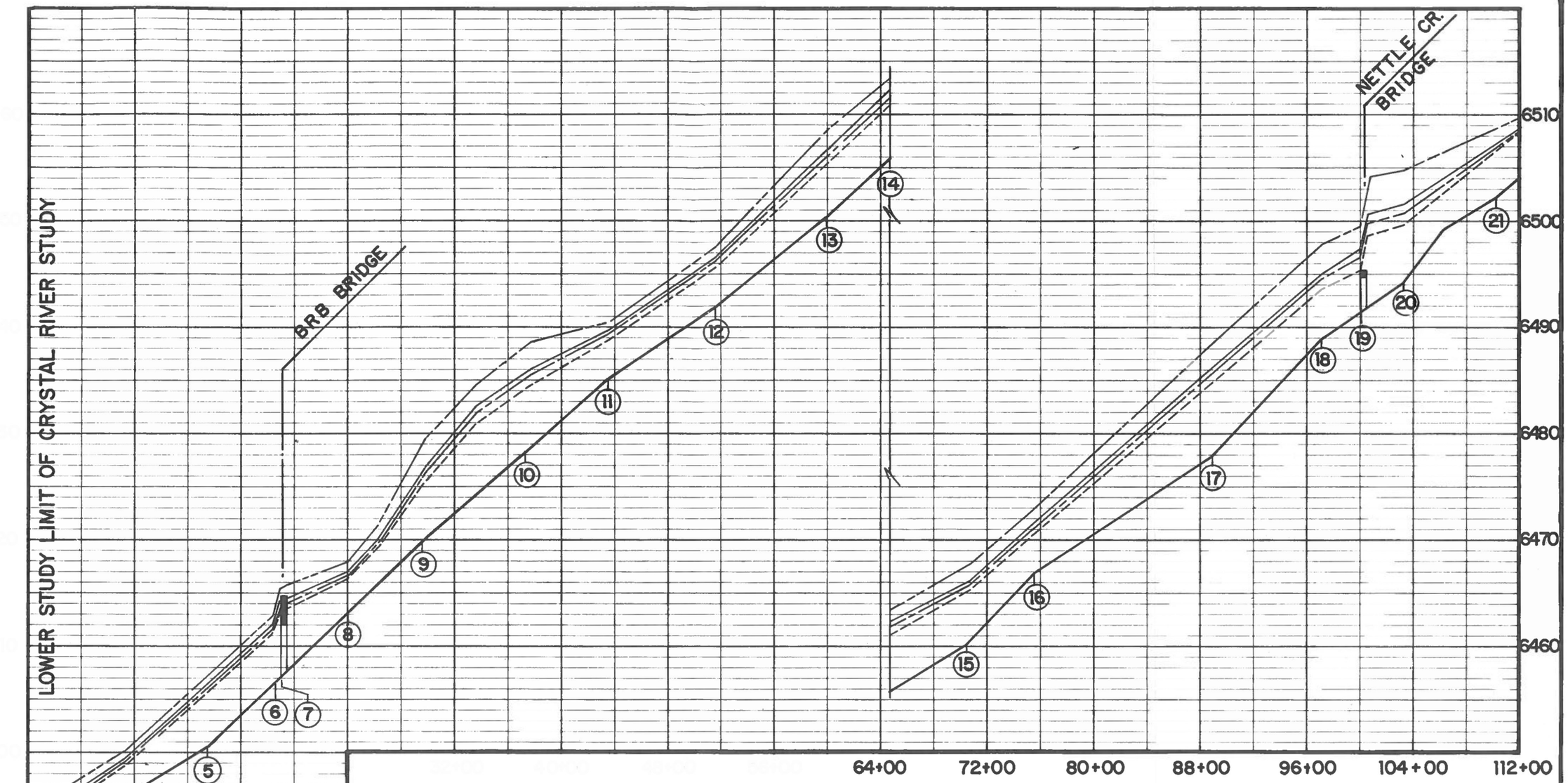


COLORADO WATER CONSERVATION BOARD
PITKIN COUNTY, COLORADO

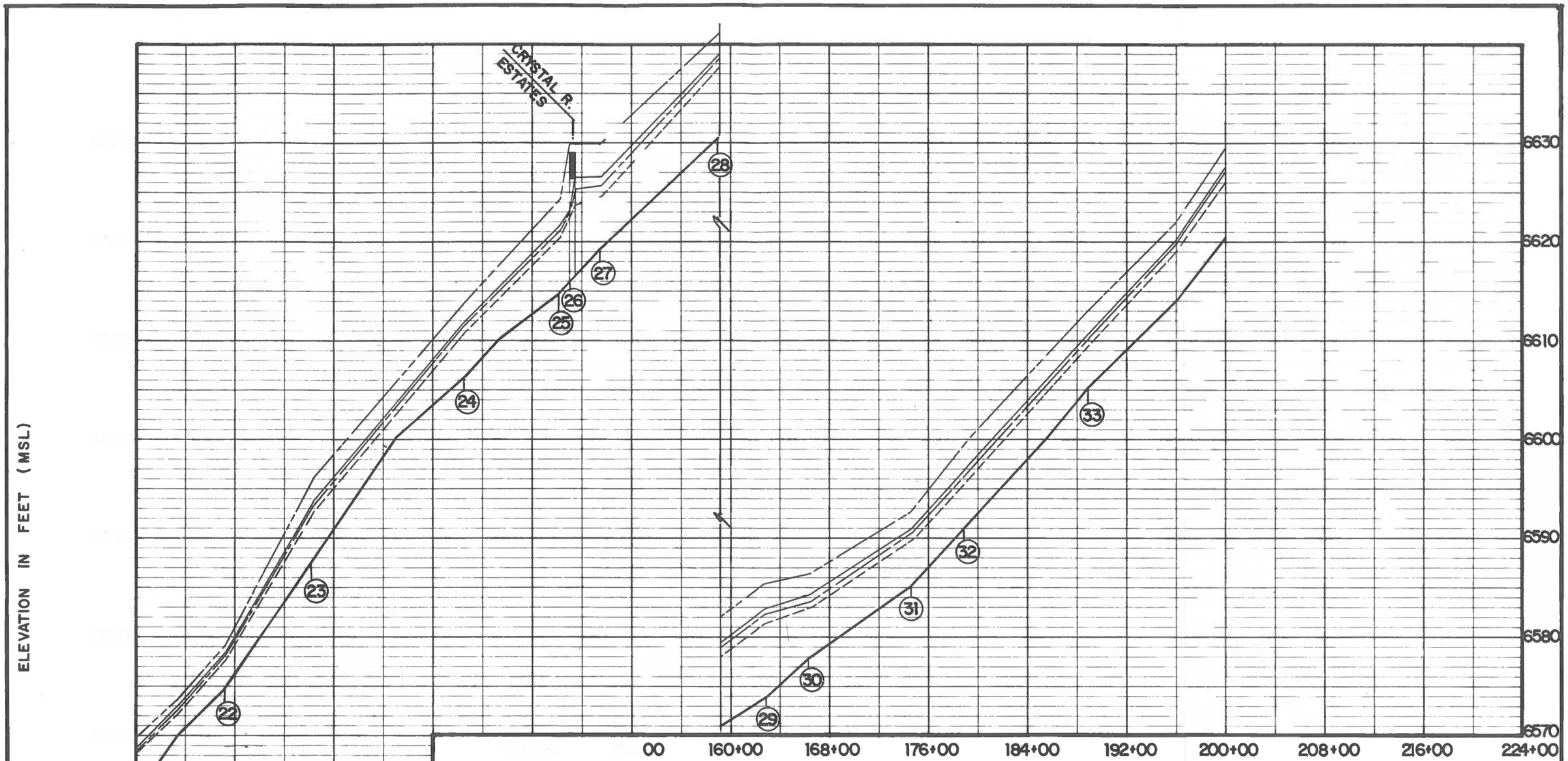
CRYSTAL RIVER FLOOD PROFILES

NOTES
1. FOR LOCATION OF CROSS SECTIONS, SEE PLATE
2. FOR ILLUSTRATED CROSS SECTIONS, SEE PLATE
3. FOR FLOOD ELEVATIONS AT THE REFERENCE POINTS SEE TABLE

REVISION	DATE	BY

500 YEAR FLOOD
100 YEAR FLOOD
50 YEAR FLOOD
10 YEAR FLOOD
STREAM BED
2 REFERENCE POINT

PLATE 1



COLORADO WATER CONSERVATION BOARD
PITKIN COUNTY, COLORADO

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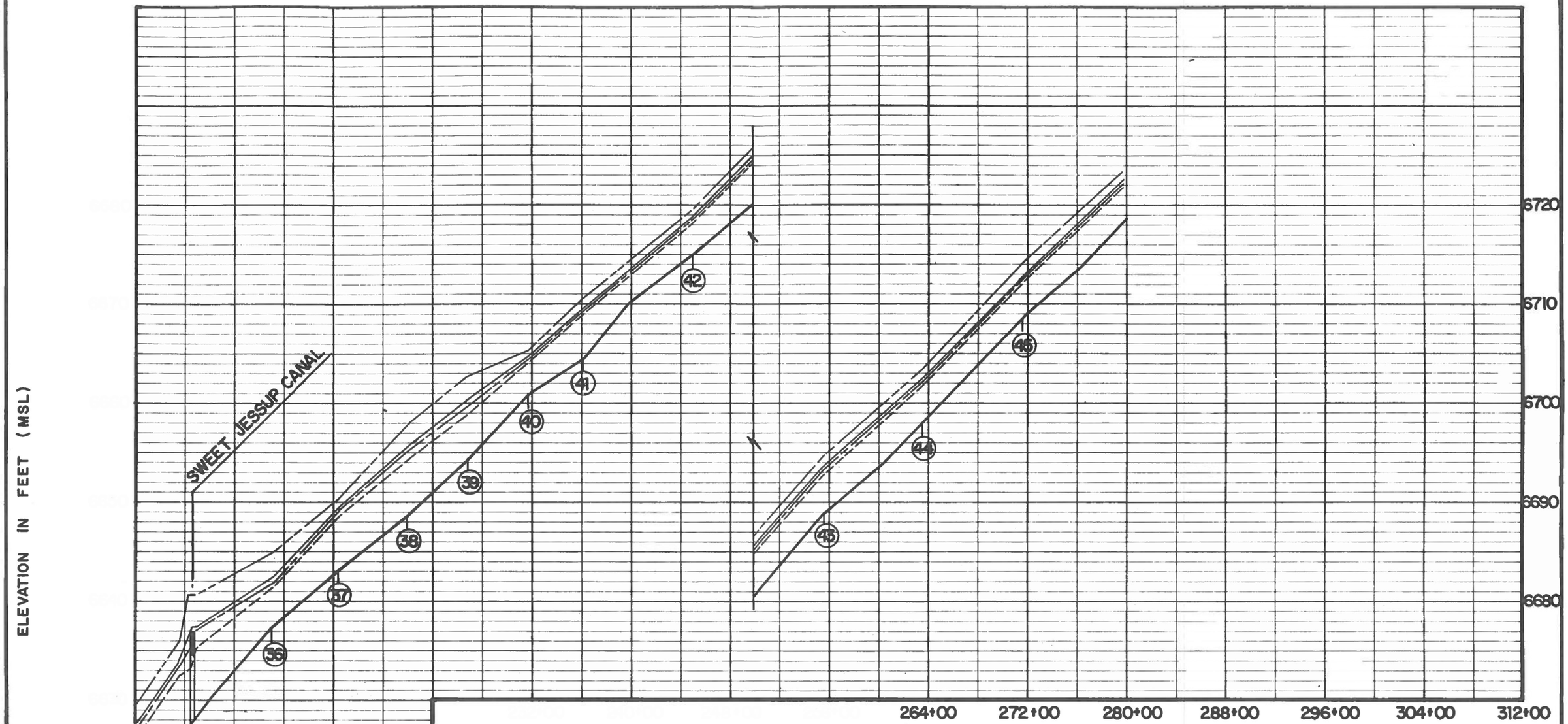
- 100 YEAR FLOOD
- 50 YEAR FLOOD
- 10 YEAR FLOOD
- STREAM BED
- 2 REFERENCE POINT

PLATE 2



COLORADO WATER CONSERVATION BOARD
PITKIN COUNTY, COLORADO

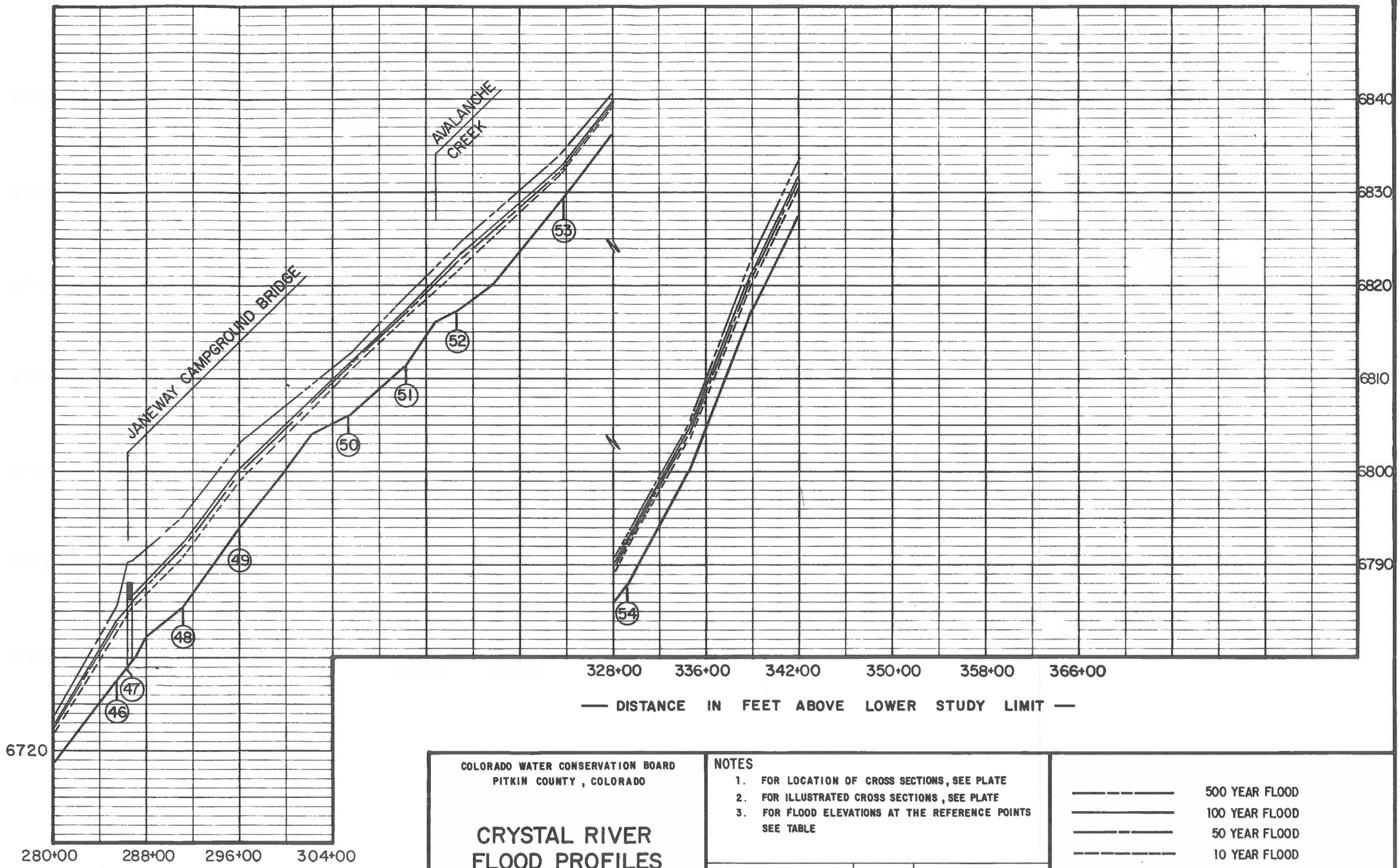
CRYSTAL RIVER FLOOD PROFILES

OR LOCATION OF CROSS SECTIONS, SEE PLATE
FOR ILLUSTRATED CROSS SECTIONS, SEE PLATE
OR FLOOD ELEVATIONS AT THE REFERENCE POINTS
EE TABLE

REVISION	DATE	BY

——— 500 YEAR FLOOD
——— 100 YEAR FLOOD
——— 50 YEAR FLOOD
——— 10 YEAR FLOOD
——— STREAM BED
2 REFERENCE POINT

PLATE 3



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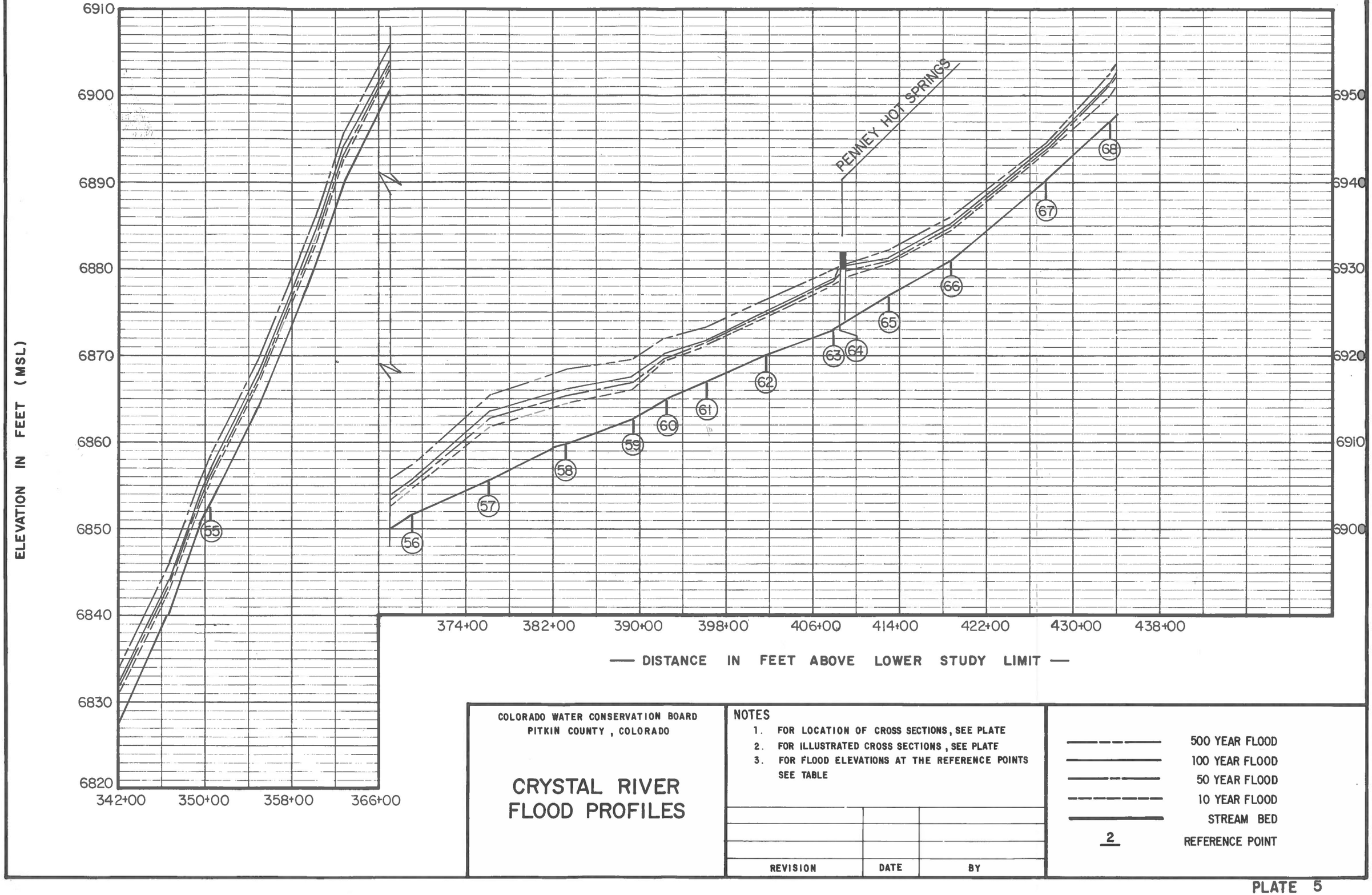

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PITKIN COUNTY, COLORADO

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STREAM BED
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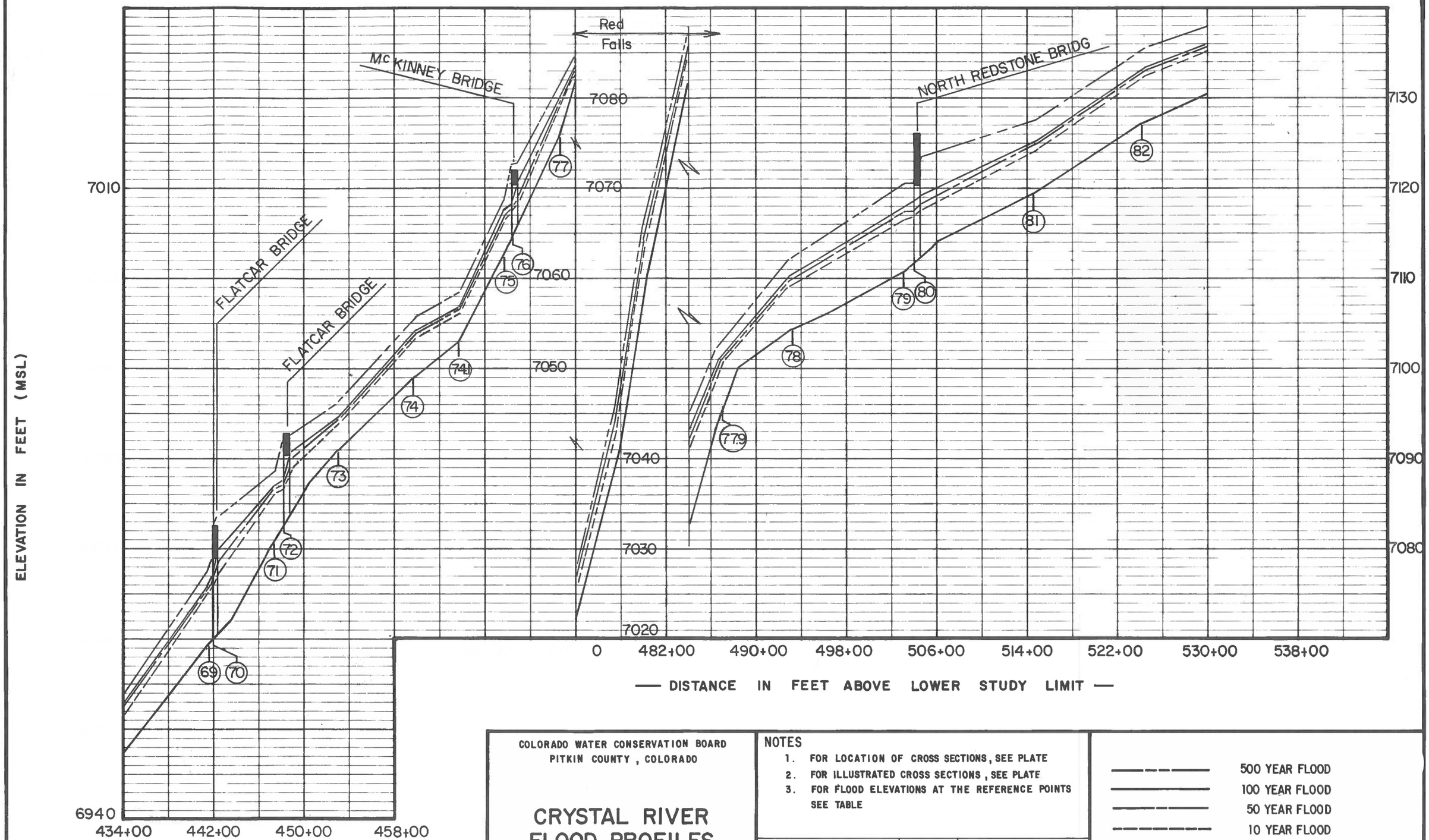

COLORADO WATER CONSERVATION BOARD
PITKIN COUNTY, COLORADO

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REVISION	DATE	BY

500 YEAR FLOOD
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STREAM BED
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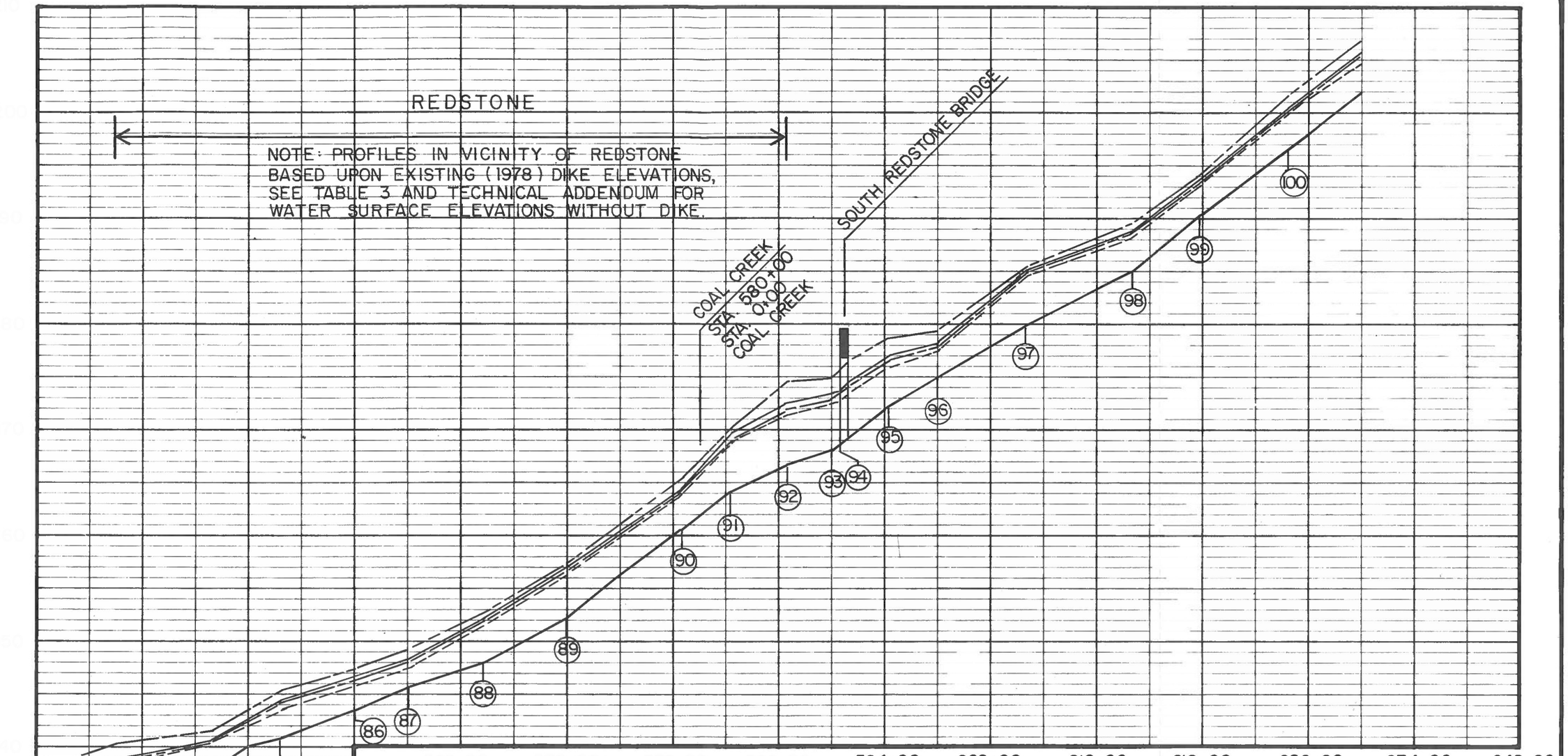
PLATE 6



COLORADO WATER CONSERVATION BOARD
PITKIN COUNTY, COLORADO

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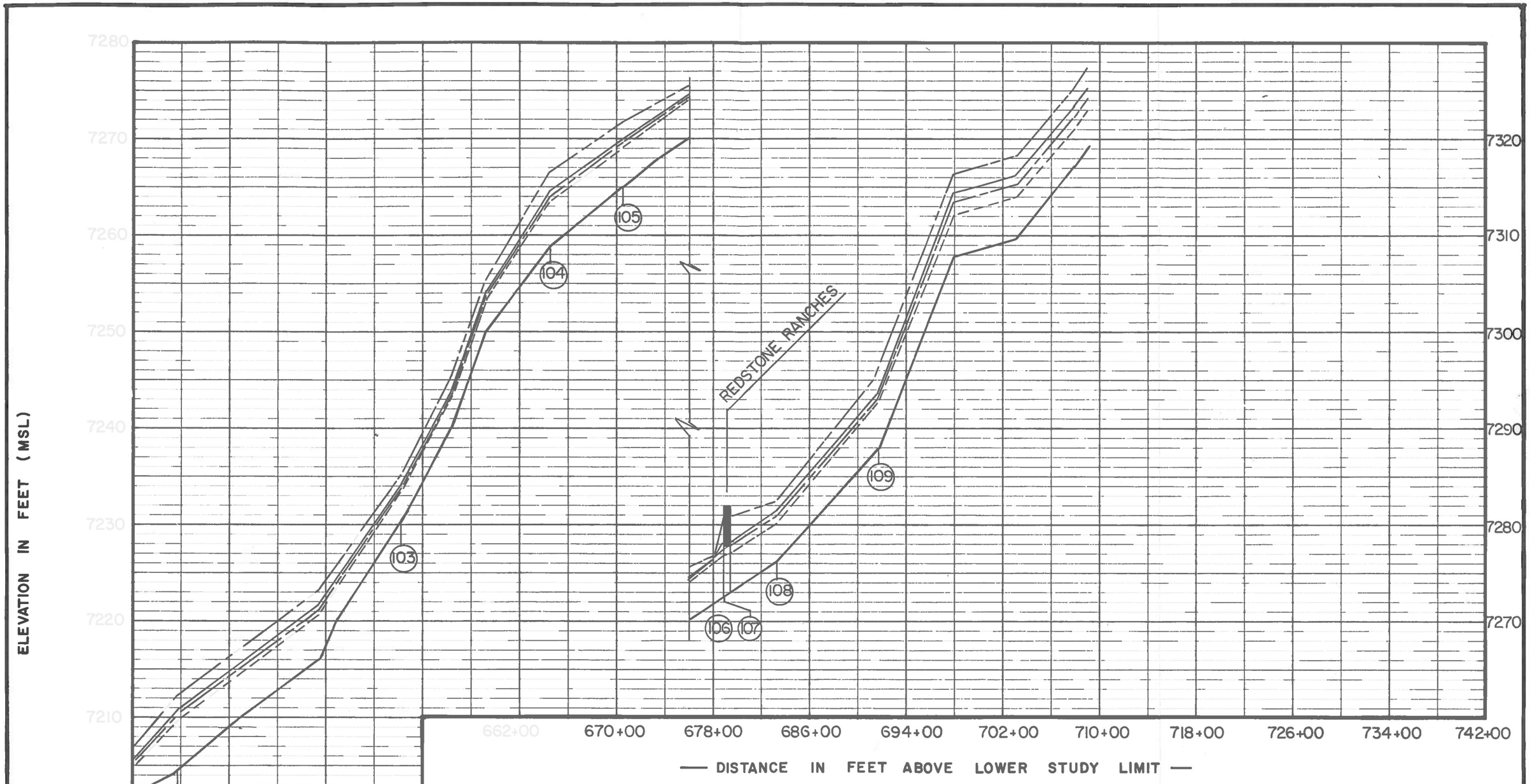
500 YEAR FLOOD
100 YEAR FLOOD
50 YEAR FLOOD
10 YEAR FLOOD
STREAM BED
2 REFERENCE POINT

PLATE 7



COLORADO WATER CONSERVATION BOARD
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CRYSTAL RIVER FLOOD PROFILES

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REVISION	DATE	BY

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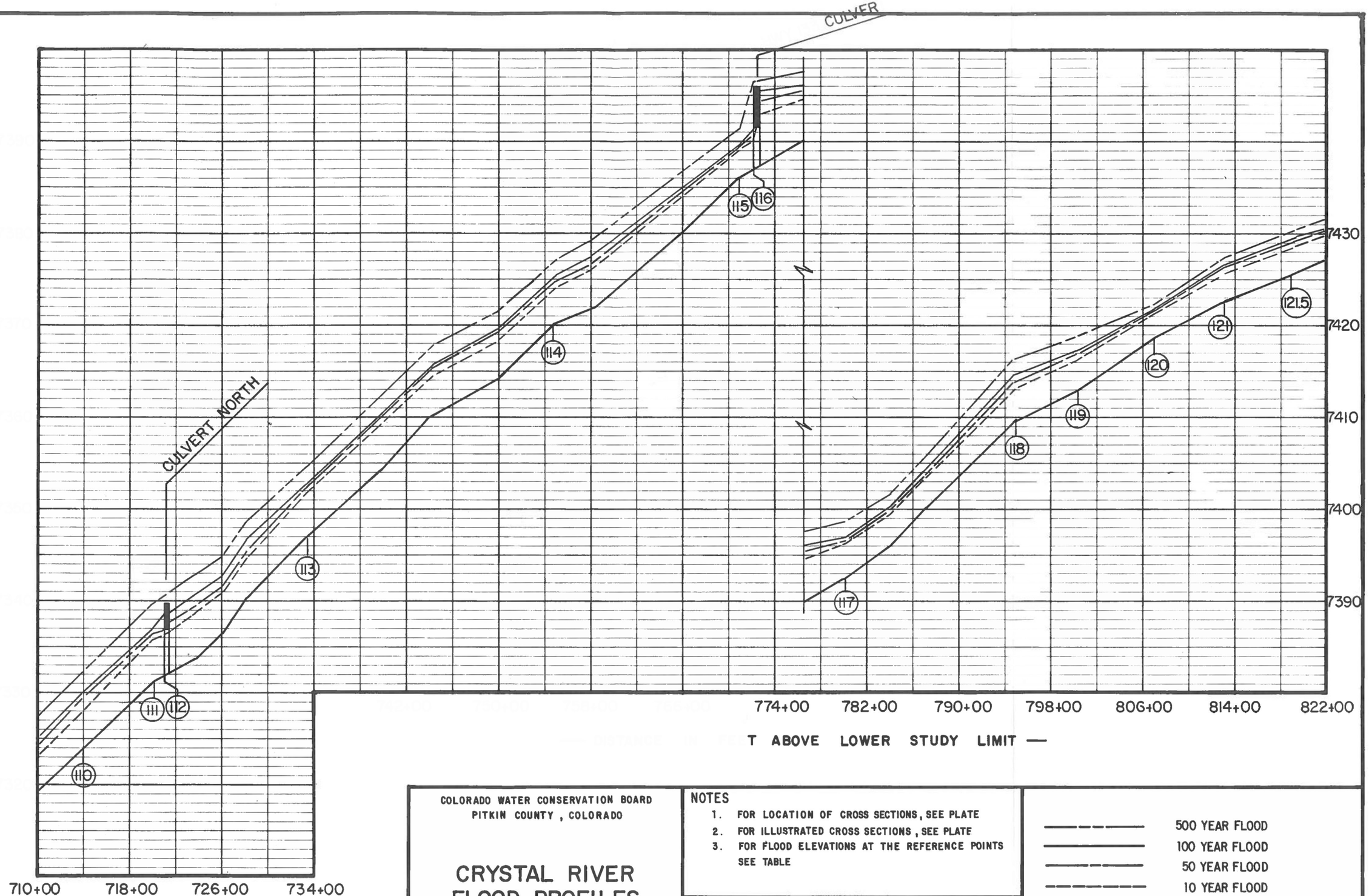
100 YEAR FLOOD
50 YEAR FLOOD
10 YEAR FLOOD
STREAM BED
2 REFERENCE POINT

PLATE 8



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PITKIN COUNTY, COLORADO

CRYSTAL RIVER FLOOD PROFILES

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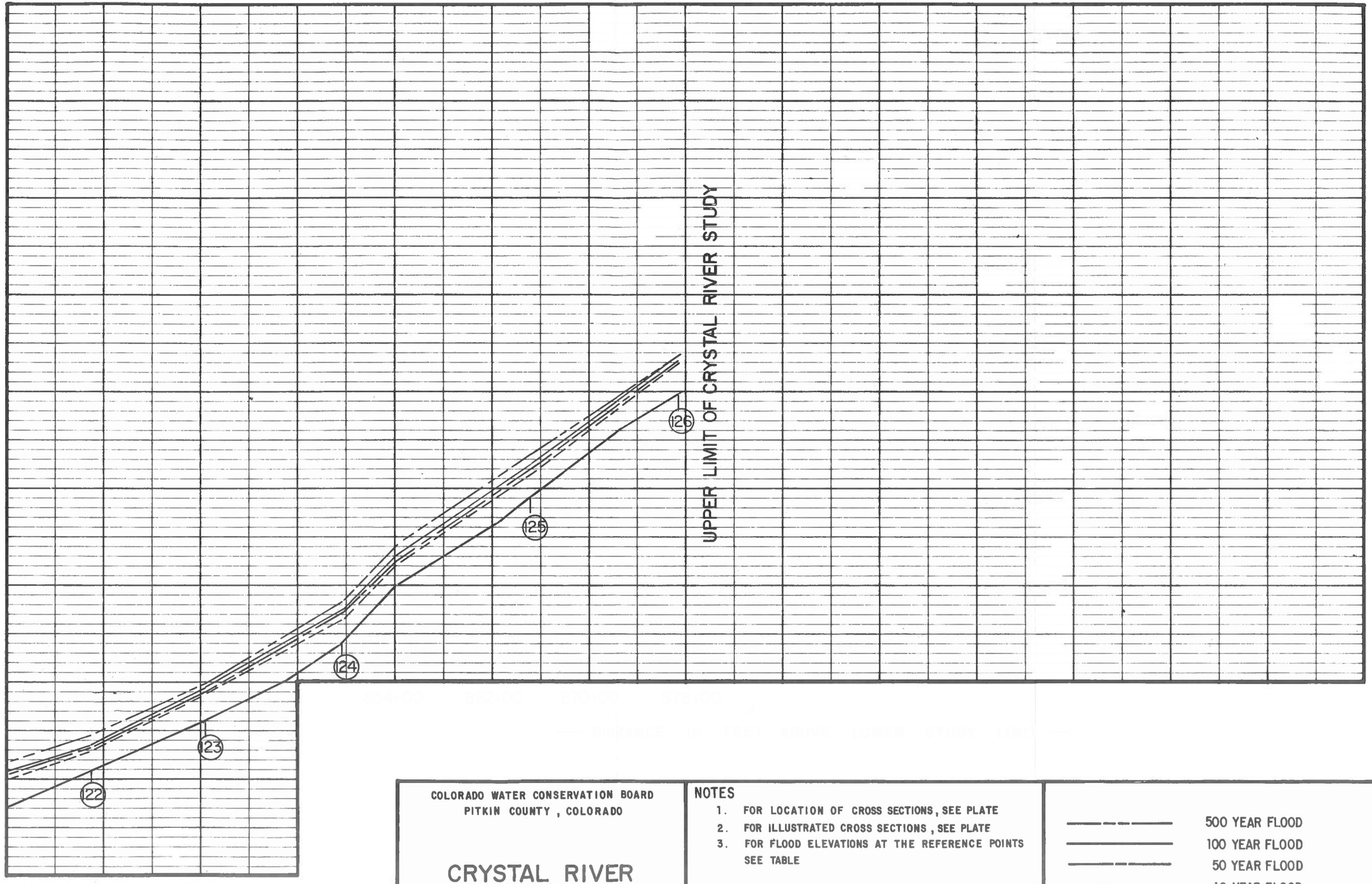
10 YEAR FLOOD
STREAM BED
2 REFERENCE POINT

PLATE 9



COLORADO WATER CONSERVATION BOARD
PITKIN COUNTY, COLORADO

CRYSTAL RIVER FLOOD PROFILES

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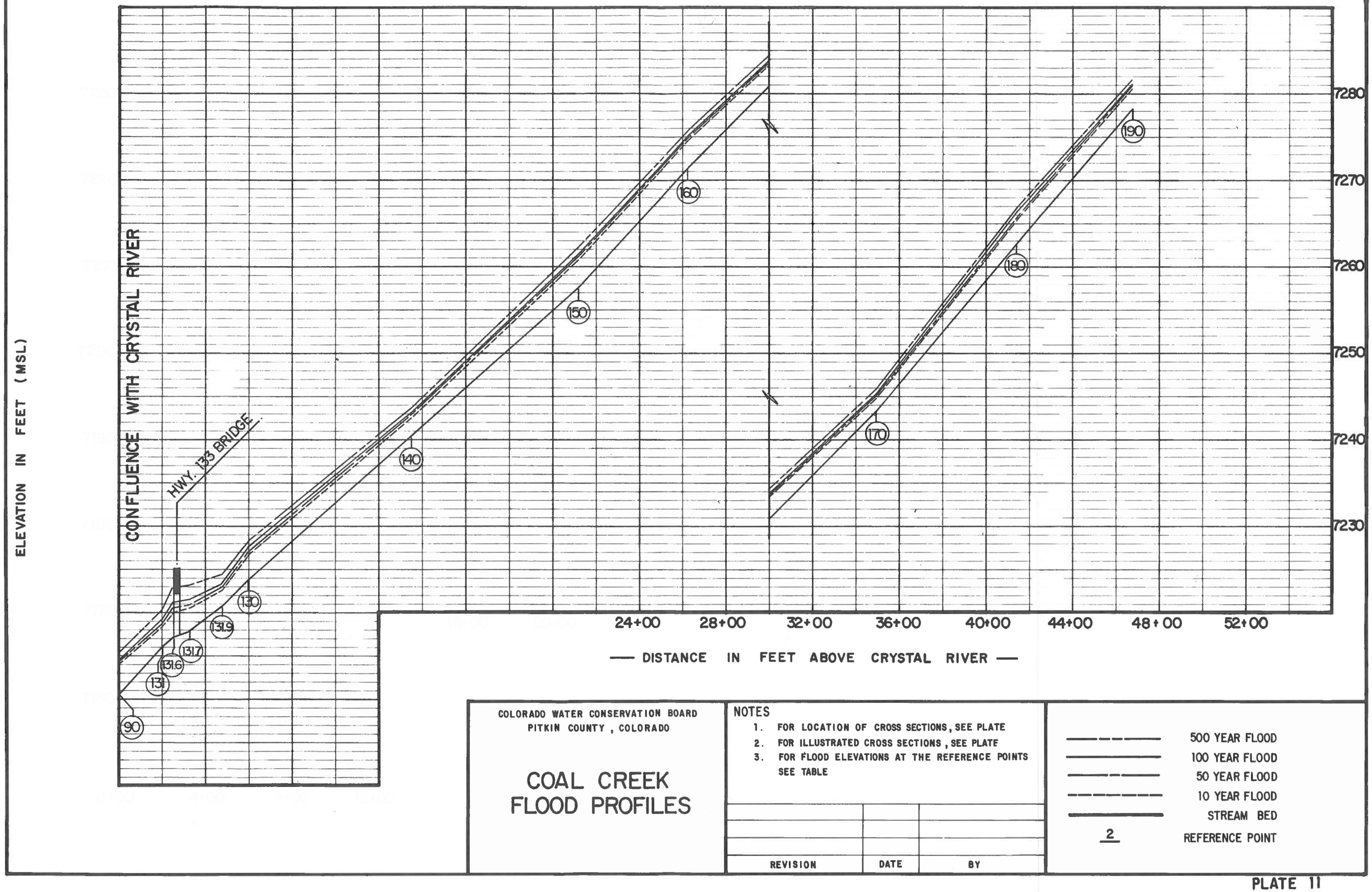

COLORADO WATER CONSERVATION BOARD
PITKIN COUNTY, COLORADO

COAL CREEK FLOOD PROFILES

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REVISION	DATE	BY

500 YEAR FLOOD
100 YEAR FLOOD
50 YEAR FLOOD
10 YEAR FLOOD
STREAM BED
2 REFERENCE POINT

PLATE 11

TYPICAL CROSS SECTIONS

Legend

———--—— 500 YEAR FLOOD

———————— 100 YEAR FLOOD

—-———————-— 50 YEAR FLOOD

———————— 10 YEAR FLOOD

PLATE 12

CRYSTAL RIVER FIS,PITKIN COUNTY,COLORADO. FOR CWCB

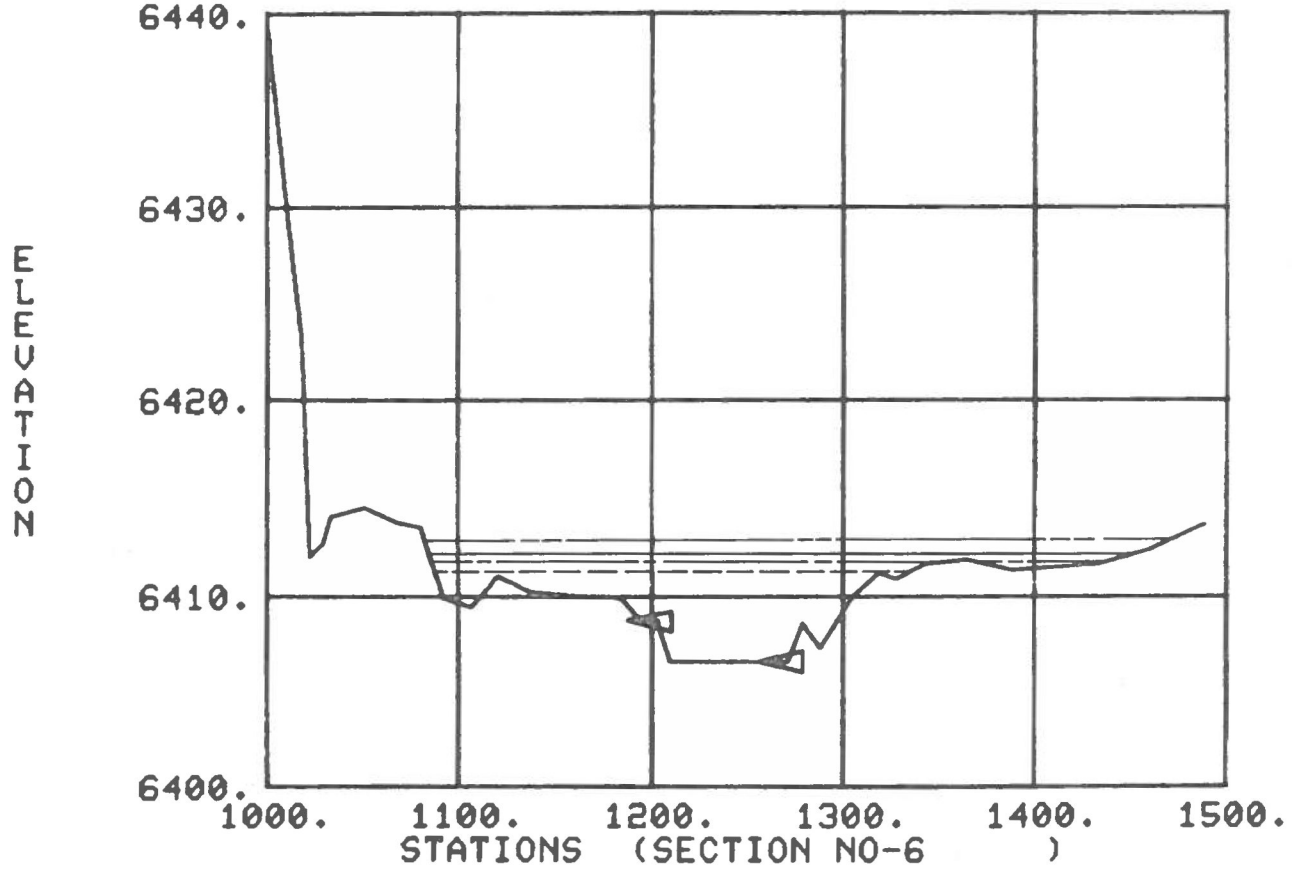

PLATE 13

CRYSTAL RIVER FIS,PITKIN COUNTY,COLORADO. FOR CWCB

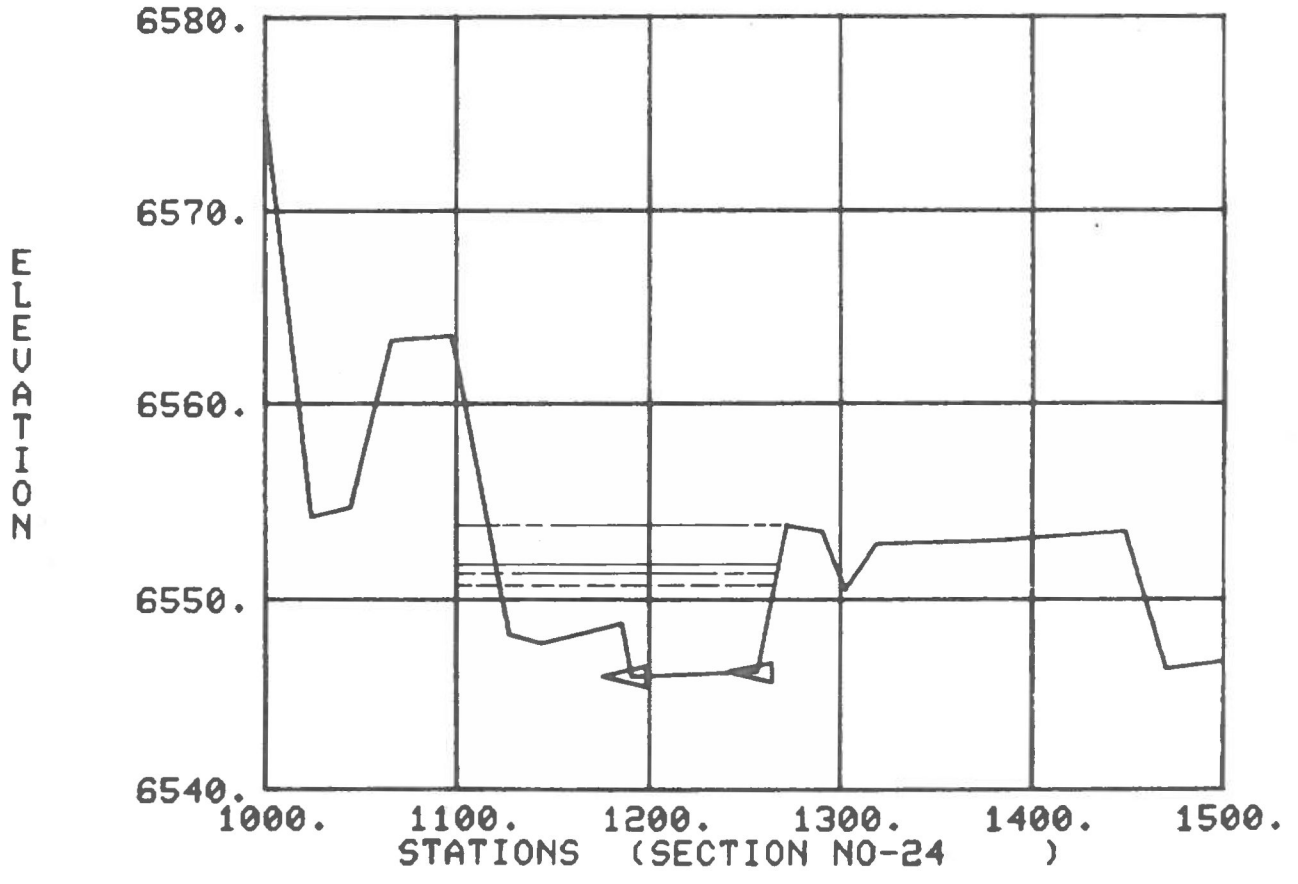

PLATE 14

CRYSTAL RIVER FIS,PITKIN COUNTY,COLORADO. FOR CWCB

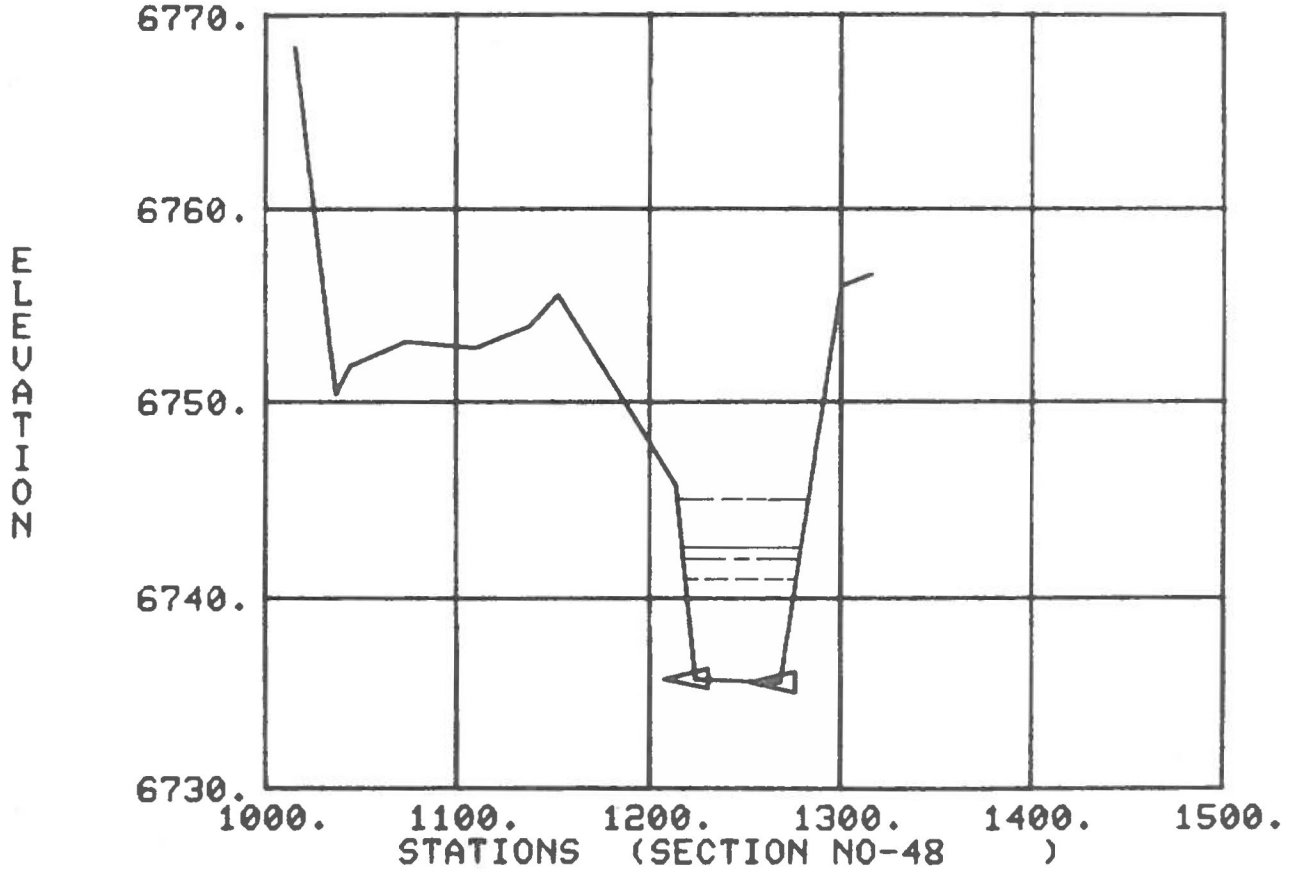

PLATE 15

CRYSTAL RIVER FIS,PITKIN COUNTY,COLORADO. FOR CWCB

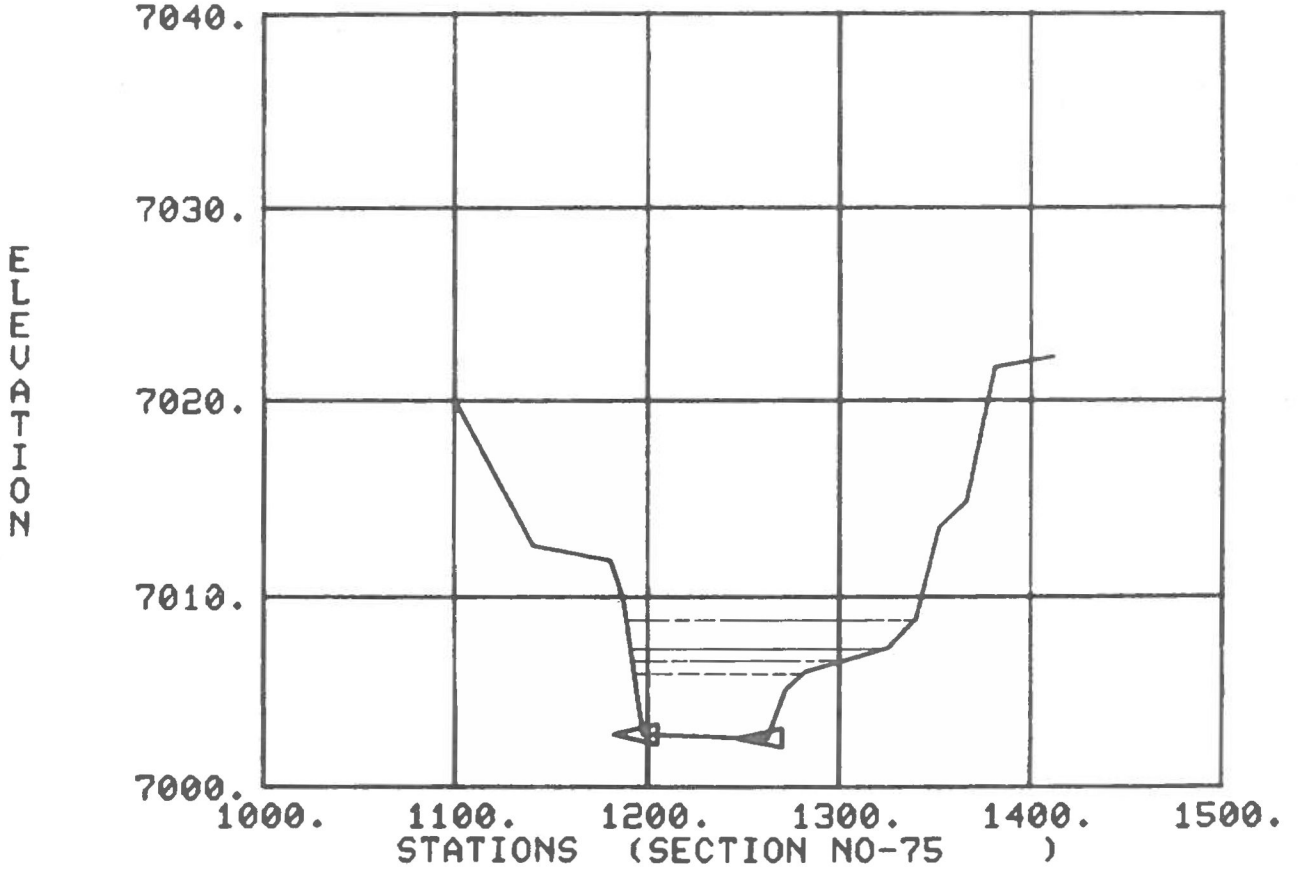

PLATE 16

CRYSTAL RIVER FIS,PITKIN COUNTY,COLORADO. FOR CWCB

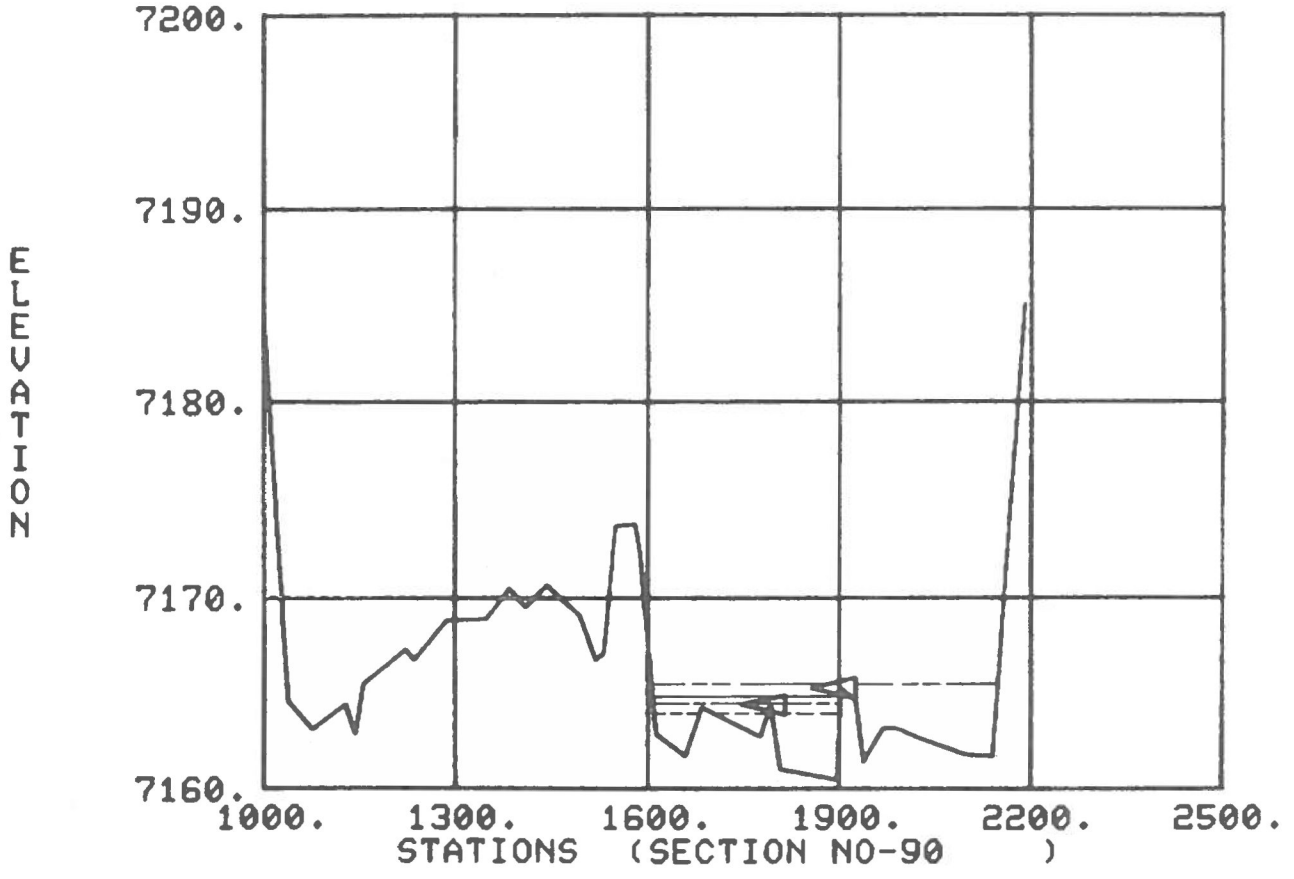

PLATE 17

CRYSTAL RIVER FIS,PITKIN COUNTY,COLORADO. FOR CWCB

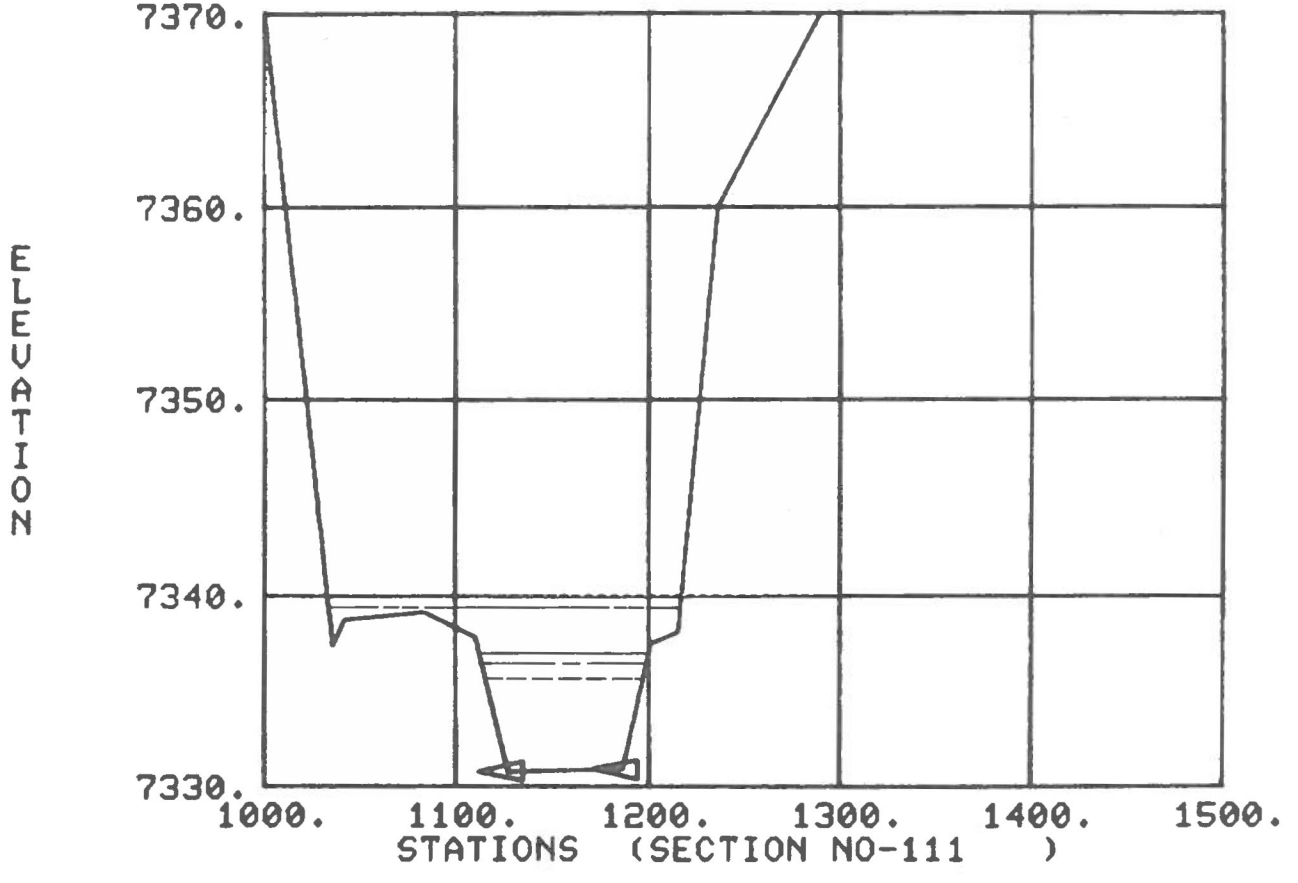

PLATE 18

CRYSTAL RIVER FIS,PITKIN COUNTY,COLORADO. FOR CWCB

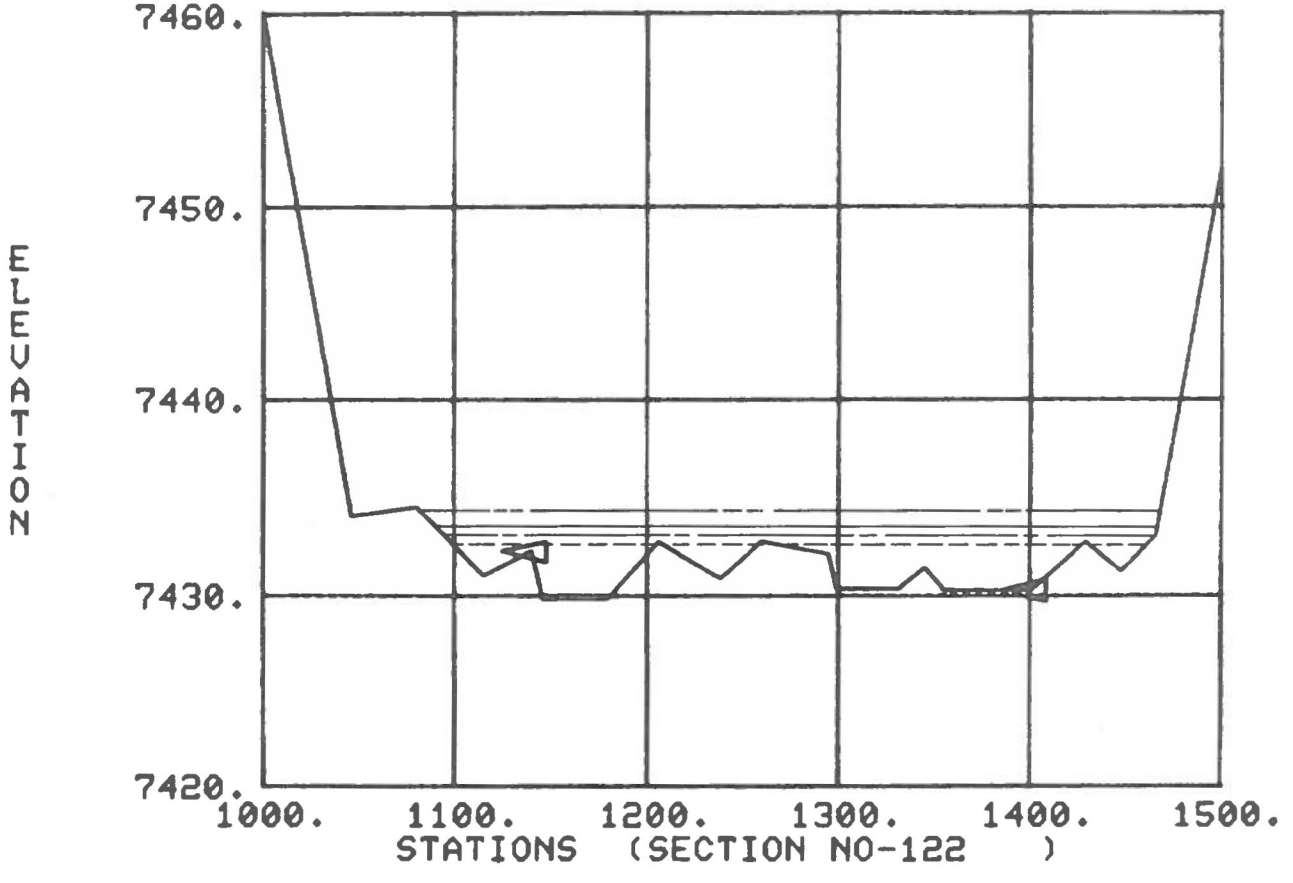

PLATE 19