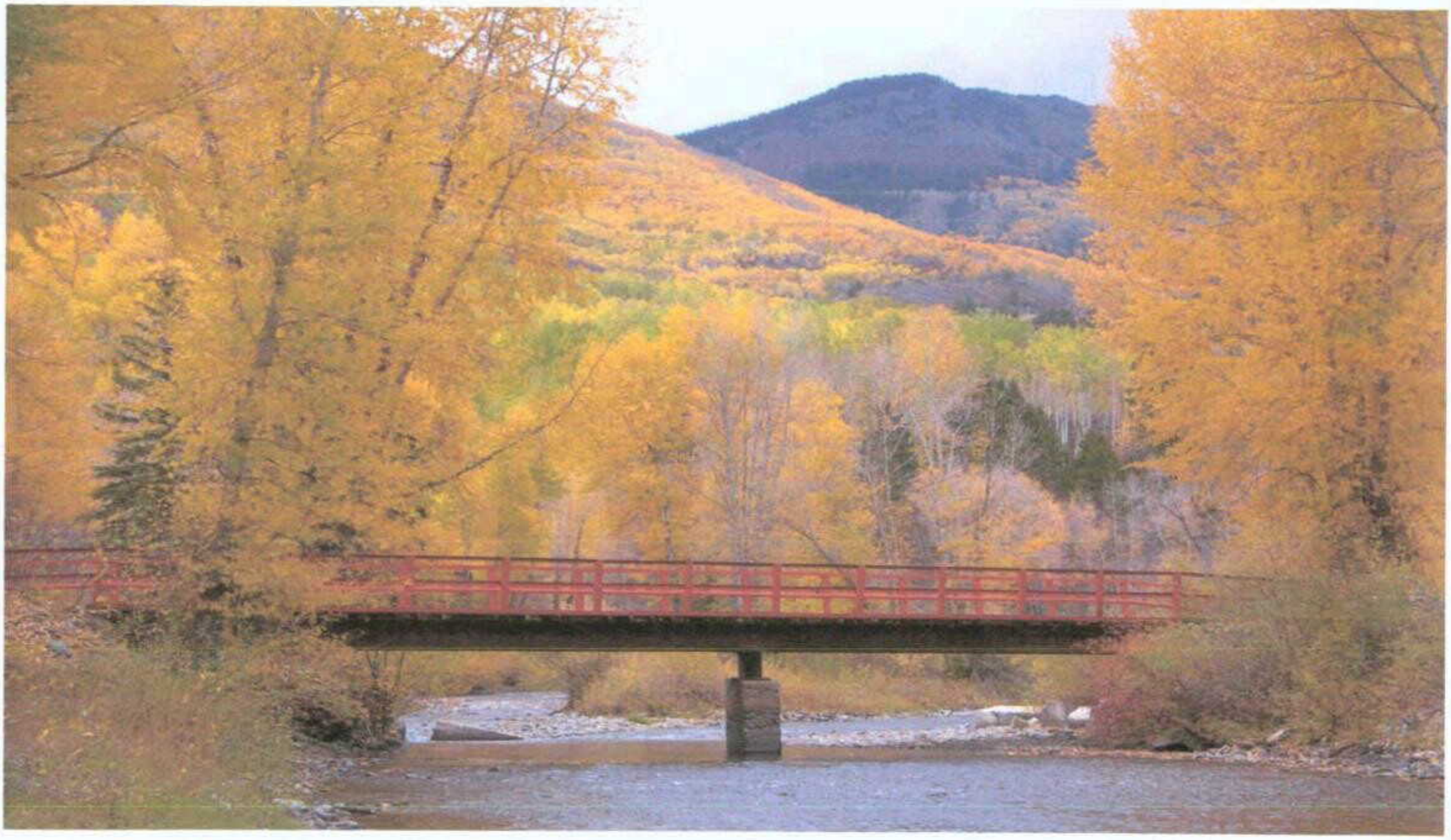
FLOODPLAIN INFORMATION REPORT:
CRYSTAL RIVER
TOWN OF MARBLE & VICINITY
GUNNISON COUNTY, COLORADO



Prepared for:
Department of
Natural Resources
Colorado Water
Conservation Board
1313 Sherman Street, Room 721
Denver, Colorado 80203

COLORADO WATER CONSERVATION BOARD
STATE OF COLORADO
1876
1937
1973 2003
Thirty Years of Stream and Lake Protection

Prepared by:
ICON Engineering, Inc.
8100 S. Akron Street
Suite 300
Centennial, Colorado 80112
303.221.0802

ICON
ENGINEERING, INC.

August 2004

TABLE OF CONTENTS

TABLES

FIGURES

PLATES

Cover Photo: Snowshoe Ranch Bridge over the Crystal River, Brian LeDoux, September 2003

1.0 INTRODUCTION

1.1 Purpose of Study

This Floodplain Information Report provides new and revised information on the existence and severity of flood hazards along the Crystal River, in the geographic area of the Town of Marble and in unincorporated portions of Gunnison County, Colorado (Plate 1). This study has developed flood risk data that will be used to assist the County and the Town of Marble in its efforts to promote sound land use management and regulation of floodplain development. This report may also be used by FEMA as an existing data study (XDS) for future Flood Insurance Study revisions.

1.2 Authority and Acknowledgments

The source of authority for this Floodplain Information Report is the Colorado Water Conservation Board under Contract Numbers C153924 and C153986 with ICON Engineering Inc. to perform hydrologic and hydraulic analysis to complete a floodplain delineation study on the Crystal River within Gunnison County, Colorado. According to Section 37-60-106(1)(c) of the Colorado Revised Statutes, the Colorado Water Conservation Board has the power and duty "...to devise and formulate methods, means and plans for bringing about the greater utilization of the waters of the state and the prevention of flood damages therefrom...."

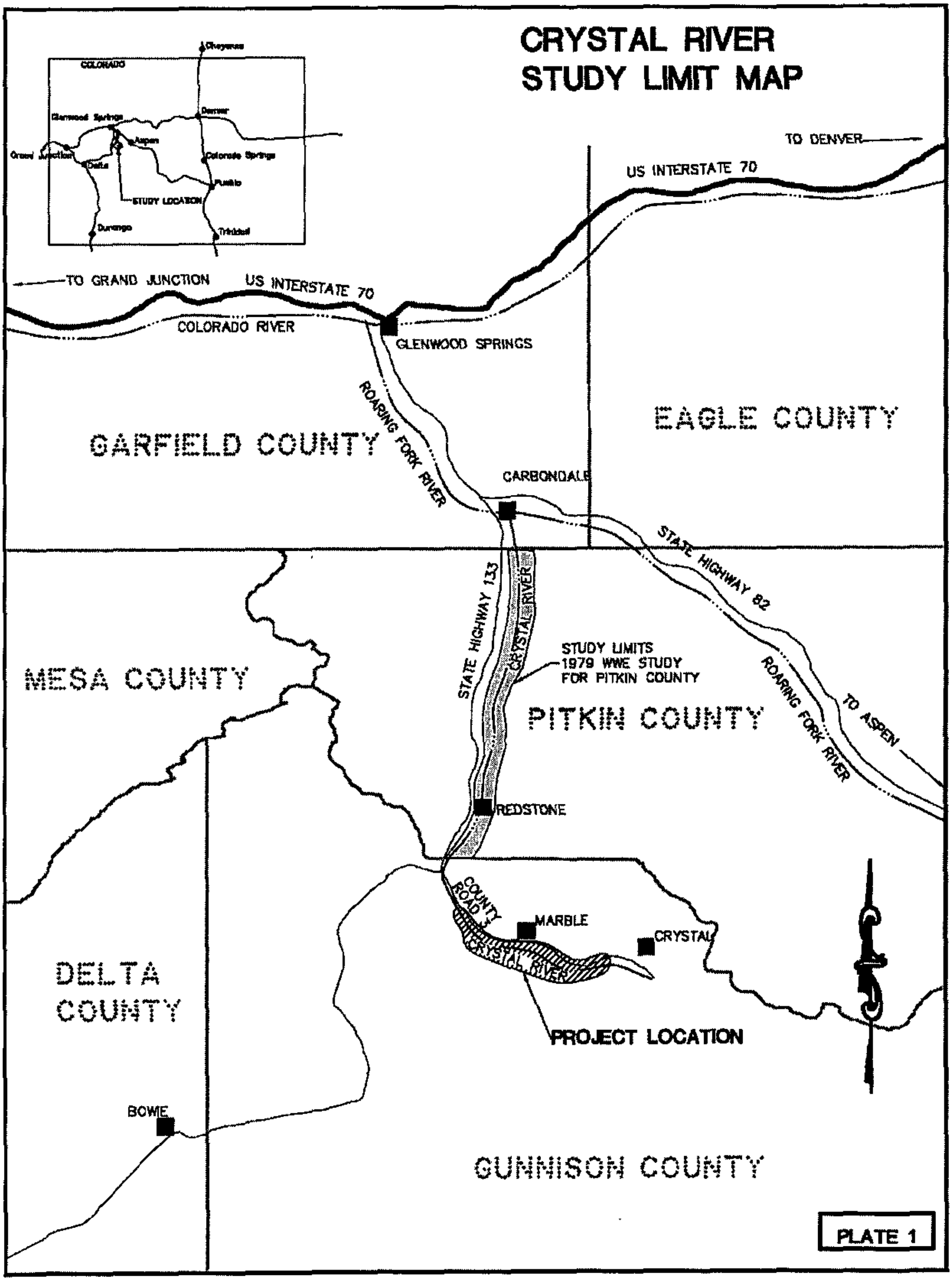
1.3 Coordination

During the preparation of this Floodplain Information Report for Gunnison County and the Town of Marble, the following public and private entities were contacted and were instrumental in the preparation of this report; Colorado Water Conservation Board (CWCB); Gunnison County; Town of Carbondale; U.S. Geological Survey (USGS); Marble Historical Society and Museum; ICON Engineering, Inc.; and Kucera International, Inc. Specifically, the CWCB, USGS, and Gunnison County supplied information used in the preparation of this report.

A general historical information search was coordinated with the Marble Historical Society and Museum for historical background information, available publications, and photographs of past floods. Much of the information presented in this study was obtained from the Town of Marble website (Reference 1).

The USGS was contacted to obtain historic stream gage data. Additionally, the flood frequency analysis program PEAKFQ (Reference 2) was obtained from the USGS and used for developing flood discharges for this study.

The Gunnison County Planning Department provided mapping of the Crystal River study reach (Reference 3).


CRYSTAL RIVER
STUDY LIMIT MAP
TO DENVER
US INTERSTATE 70
TO GRAND JUNCTION
US INTERSTATE 70
COLORADO RIVER
GLENWOOD SPRINGS
ROARING FORK RIVER
GARFIELD COUNTY
EAGLE COUNTY
CARBONDALE
STATE HIGHWAY 82
STATE HIGHWAY 133
CRYSTAL RIVER
STUDY LIMITS
1979 WWE STUDY
FOR PITKIN COUNTY
MESA COUNTY
PITKIN COUNTY
ROARING FORK RIVER
TO ASPEN
REDSTONE
COUNTY ROAD 3
MARBLE
CRYSTAL
CRYSTAL RIVER
DELTA
COUNTY
PROJECT LOCATION
BOWIE
GUNNISON COUNTY
PLATE 1

Supplemental background information and assistance in project coordination was supplied by the CWCB.

1.4 Previous Studies

One detailed floodplain study was previously completed for the Crystal River in the vicinity of the Town of Marble, Colorado. In 1979, Wright Water Engineers, under contract to Pitkin County and the Colorado Water Conservation Board, completed a report entitled "Floodplain Information Report, Crystal River and Coal Creek, Pitkin County, Colorado" (Reference 4). This report included detailed hydrologic and hydraulic analyses for the Crystal River in Pitkin County. The upstream limit of the 1979 study is approximately six miles downstream of the Town of Marble and approximately three miles downstream of the downstream limit of this study at the County Road 3 bridge.

A Flood Hazard Boundary Map (FHBM), dated June 17, 1977, was previously developed for the Town of Marble and Gunnison County by the U.S. Department of Housing and Urban Development, Federal Insurance Administration (Reference 5).

2.0 AREA STUDIED

2.1 Scope of Study

This Floodplain Information Report covers a reach of the Crystal River within the Town of Marble and portions of unincorporated Gunnison County, Colorado. For this report, the Crystal River has been studied using detailed methods for a reach of approximately 4.5 miles in length. The study reach extends from just downstream of the Gunnison County Road 3 bridge to upstream of the Beaver Lake State Fishing Area.

2.2 Community Description

Gunnison County is located in central-western Colorado, approximately 130 miles south of the Colorado-Wyoming state line. The Town of Marble is located in northwestern Gunnison County. The Town of Marble was founded in 1881 by settlers and prospectors and was officially incorporated in 1899. The peak population of Marble occurred from 1912 to 1917, when the town supported a population of around 1,400 people. Currently, the population of Marble is around 300 people. One of the world's largest concentrations of marble is located in the mountains immediately to the south of the Town which was the source of the town's name and growing economy in the early 1900's.

2.3 Watershed Description

The Crystal River watershed is within the Colorado River Basin and extends high into the Elk Mountain Range in the Rocky Mountains. The watershed also encompasses area from the White River National Forest and Maroon-Bells Snowmass Wilderness. The elevation of the watershed approaches 14,200 feet at the top of Maroon Peak, located within the famous mountain group, the Maroon Bells. The watershed elevation drops to around 6,100 feet where the Crystal River discharges into the Roaring Fork River near Carbondale, Colorado.

The Crystal River mainstem is approximately 30 miles long, extending from the Town of Crystal, located approximately 5 miles upstream of Marble, to the Town of Carbondale. The channel gradient is very steep, with slopes ranging from 3.8% near Crystal to 1.4% upstream of Carbondale.

Vegetation within the Crystal River watershed reflects a sparsely developed mountain climatology. Between Marble and Carbondale, the watershed is densely vegetated with evergreen and aspen trees along with other natural mountain vegetation. Above Marble and up to about 11,200 feet, the watershed reflects a high alpine environment with woody vegetation along with rock outcroppings. Rock talus and steep mountains are prevalent above 11,200 feet.

The Crystal River basin is a semiarid mountain environment with cool summers and long winters. Runoff is attributed to intense localized thunderstorm rainfall events during the summer months and snow melt during the spring and early summer months. The following table provides climatological data for Aspen, Colorado, located approximately 20-miles northeast of Marble and for Crested Butte, Colorado, located approximately 41 miles southeast of Marble. Aspen and Crested Butte are the closest National Weather Service Station locations to Marble.

Table 1: Crystal River Vicinity Climatology Data[1]

LOCATION	Mean Annual Precipitation (Inches)	July Mean Temperature (° F)	January Mean Temperature (° F)
Aspen, Colorado	23.3	61.7	20.7
Crested Butte, Colorado	23.9	56.0	8.4

[1]This data was compiled from National Weather Service records from year 1971 to 2000.

2.4 Flooding History

The history of flooding in the vicinity of the Town of Marble and the Crystal River has been best documented by the 1979 Floodplain Information Report for the Crystal River and Coal Creek, prepared for Pitkin County by Wright Water Engineers, Inc. This report documents historic floods from interviews with local residents and a Corps of Engineers hydrologic study on the Crystal River (Reference 6). This report indicates that the largest flows recorded on the Crystal River occur as a result of snowmelt during the spring and early summer months. Flooding during the late summer and fall months results from rainstorms. Often these storms will also initiate large mud debris flows on tributaries to the Crystal River. Local residents recall that Highway 133 has been closed many times by mud slides in the summer months. The largest recorded snowmelt and rain floods in the Crystal River basin have been tabulated in Table 2. This table was compiled from data presented by the U.S. Geological Survey Water Supply Records (References 7, 8, 9).

Table 2: Historic Floods – Crystal River

Date	Location	Drainage Area (sq. mi.)	Source*	Peak Discharge (cfs)
06/25/17	Crystal River at Marble	74.3	S	2,980
06/21/38	Crystal River near Redstone	229	S	4,400
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	3,960
06/15/52	Crystal River near Redstone	229	S	3,960
06/14/53	Crystal River near Redstone	229	S	4,110
07/01/57	Crystal River above Avalanche Creek	167	S	3,980
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	2,780
06/24/71	Crystal River at Placita	107	S	1,940
07/12/73	Crystal River above Avalanche Creek	167	R	1,780
07/24/77	Dutch Creek (Trib. of Coal Creek)	2.7	R	1,000**

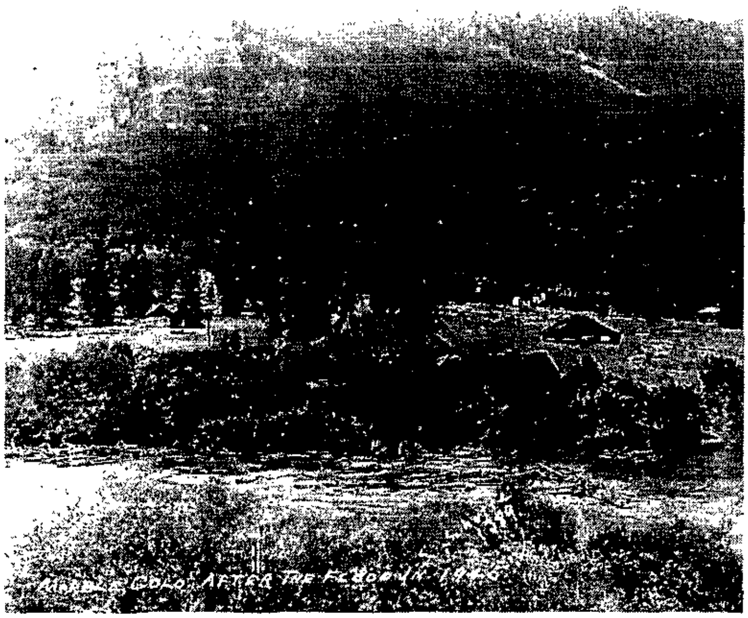
*S = Snow; *R = Rain
** Indirect flow estimate
? Flooding source or discharge unknown

Carbonate Creek, located near the Town of Marble, has a history of rainstorm floods and large mud debris flows. During the August 8, 1941 flood event, a structure, the Horace Williams House, was documented to have moved over 30 feet off of its original foundation as a result of the flooding. Additionally, high water from the July 31, 1945 storm took out several bridges along the Crystal River from Marble to Carbondale. Photographs of the flood in 1945 are shown in Figure 1 and Figure 2.

Flooding along the Crystal River and in the Town of Marble has been best documented in 1941 and 1945. However, as indicated by Table 2, historic flood events along the Crystal River have also occurred in 1917, 1938, 1949, 1952, 1953, 1957, 1965, 1971, and 1973.

Figure 1: 1945 Flood Event - Marble, Colorado (Schutte 1945)

Figure 2: 1945 Flood Event - Marble, Colorado (Schutte 1945)



3.0 ENGINEERING METHODS

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for the Crystal River in the vicinity of the Town of Marble, Colorado.

Discharges along the Crystal River were calculated using the PEAKFQ computer program (Reference 2) which performs statistical flood frequency analyses of annual peak discharges following procedures recommended in Bulletin 17-B of the Interagency Advisory Committee on Water Data (1982). The analysis for the Crystal River incorporates USGS gage information with over 46 years of record along the Crystal River (1956 to 2001). Peak flood discharges were determined using annual peak flow data from the Placita and Avalanche Creek gages, located just downstream of the Town of Marble. The calculated peak flood discharges were adjusted at various locations along the study reach based on the guidelines provided in the Manual for Estimating Characteristics of Natural-Flow Streams in Colorado, Technical Manual No. 1 (Reference 10).

Peak discharge-drainage area relationships for the Crystal River are shown in Table 3.

Table 3: Summary of Discharges for the Crystal River

Flooding Source and Location	Drainage Area	Peak Discharge (cfs)			
Along Crystal River	(Square Miles)	10-Year	50-Year	100-Year	500-Year
Confluence with Rapid Creek	93.05	1,994	2,445	2,625	3,028
Confluence with Milton Creek	83.65	1,833	2,248	2,413	2,783
Town of Marble	73.59	1,657	2,031	2,181	2,515
Upstream Limit of Study	53.32	1,284	1,575	1,691	1,950

Peak flood discharges presented in Table 3 compare well with those presented in the 1979 Floodplain Information Report for the Crystal River and Coal Creek, prepared for Pitkin County by Wright Water Engineers, Inc. This 1979 report indicates a 100-year peak discharge of 2,400-cfs at the Town of Marble. This compares within 10% of the peak flood discharge presented in Table 3 at the Town of Marble (2,181-cfs). The hydrologic analysis for this study incorporates an additional 22 years of gage records beyond the 1979 study.

3.2 Hydraulic Analysis

Analysis of the hydraulic characteristics of flooding from the Crystal River were carried out to provide estimates of the flood elevations for the 10-, 50-, 100- and 500-year storm events. Water surface elevations (WSELs) were computed using the U.S Army Corps of Engineers HEC-RAS step backwater program (Reference 11). Cross-sections for the backwater program were taken from project topographic mapping. Hydraulic structures, such as bridges along the project reach were field surveyed in 2003.

A map index for the floodplain boundary maps is shown on Plate 4. Floodplain boundaries for the 100- and 500-year flood events are delineated on Plates 5 through 12. The corresponding flood profiles on plates 13 through 22 present the water surface elevations and water depths for the 10-, 50-, 100-, and 500-year flood events relative to the river stream bed. Representative cross-sections are shown on Plate 23.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

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. The 100-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using the best available topographic mapping at the time of this study.

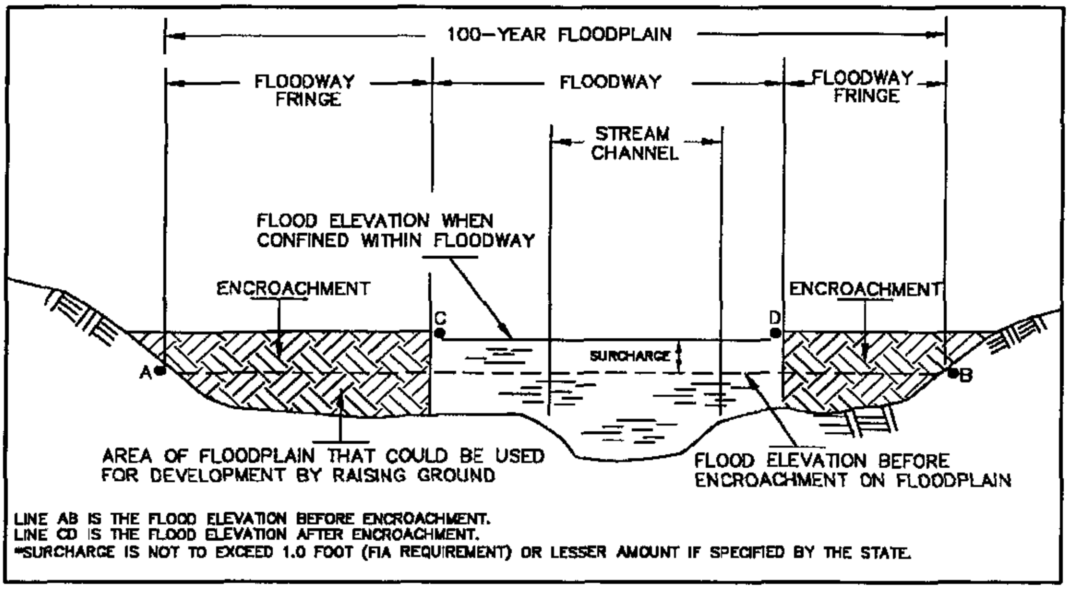
4.2 Floodways

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 National Flood Insurance Program (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 water surface increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodway presented in this study was computed 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, as shown on Plates 2 and 3. 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 WSEL 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 below.

Figure 3: Floodway Schematic



5.0 LOCATION OF DATA

Information pertinent in the preparation of this study can be obtained by contacting the Colorado Water Conservation Board, 1313 Sherman Street, Room 721, Denver, Colorado 80203. This study may also be viewed and printed online at the CWCB's digital Water Resource Information Center. Visit us at www.cwcb.state.co.us.

6.0 BIBLIOGRAPHY AND REFERENCES

1. Town of Marble Website, www.marblecolorado.org, March 2003.

2. U.S. Geological Survey. PEAKFQ – Flood Frequency Analysis Based on Bulletin 17B, Version 4.0, December 1, 2000.

3. Kucera International, Inc. Topographic Map, Crystal River, Datum NAVD 88, Contour Interval 2 feet, December 2003.

4. Wright Water Engineers, Inc. Floodplain Information Report, Crystal River and Coal Creek, Pitkin County, Colorado, Colorado Water Conservation Board and Pitkin County, Colorado, 1979.

5. U.S. Department of Housing and Urban Development, Federal Insurance Administration. Flood Hazard Boundary Map, Town of Marble, Colorado, Scale 1:400; June 17, 1977.

6. U.S. Army Corps of Engineers. Crystal River, Colorado Hydrology, Internal Office Report, Sacramento District, Corps of Engineers, Sacramento, California, February 1979.

7. U.S. Geological Survey. Compilation of Records of Surface Waters of the United States, October 1950 to September 1960, Part 9, Colorado River Basin. Water Supply Paper 1733, U.S. Government Printing Office, Washington, D.C., 1964.

8. U.S. Geological Survey. Compilation of Records of Surface Waters of the United States through September 1950, Part 9, Colorado River Basin. Water Supply Paper 1313, U.S. Government Printing Office, Washington, D.C., 1964.

9. U.S. Geological Survey. Water Resources Data for Colorado, Part 1, Surface Water Records. Denver Federal Center, Lakewood, Colorado 1961-1976.

10. Colorado Water Conservation Board / U.S. Geological Survey, Manual for Estimation Flood Characteristics of Natural-Flow Streams in Colorado, Technical Manual No. 1, Denver Colorado, 1976.

11. U.S. Army Corps of Engineers, HEC-RAS 3.1.1 Computer Program, Davis California, May 2003.

FLOODING SOURCE	FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NGVD)			
CROSS SECTION LOCATION[1]	WIDTH[2] (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
0	38	207	12.7	7,689.0	7,689.0	7,689.5	0.5
329	55	279	9.4	7,692.5	7,692.5	7,693.4	1.0
505	36	202	13.0	7,694.2	7,694.2	7,694.2	0.0
547	47	258	10.3	7,695.9	7,695.9	7,695.9	0.0
746	55	316	8.3	7,697.7	7,697.7	7,697.8	0.1
1,241	80	304	7.9	7,700.9	7,700.9	7,701.3	0.4
1,750	50	208	11.6	7,705.8	7,705.8	7,706.1	0.3
2,242	46	216	11.2	7,711.8	7,711.8	7,712.3	0.6
2,755	72	254	9.5	7,718.4	7,718.4	7,718.4	0.0
3,258	65	238	10.1	7,725.8	7,725.8	7,725.8	0.0
3,790	60	230	10.5	7,733.8	7,733.8	7,733.8	0.0
4,242	77	259	9.3	7,744.2	7,744.2	7,744.2	0.0
4,728	68	234	10.3	7,751.3	7,751.3	7,751.3	0.0
5,216	57	219	11.0	7,761.3	7,761.3	7,761.4	0.1
5,720	61	239	10.1	7,767.2	7,767.2	7,767.2	0.0
6,179	68	328	7.4	7,771.5	7,771.5	7,771.7	0.3
6,674	81	344	7.0	7,773.8	7,773.8	7,774.6	0.9
7,123	63	278	8.7	7,776.7	7,776.7	7,777.4	0.7
7,560	55	270	8.9	7,780.0	7,780.0	7,780.1	0.2
8,048	59	535	8.6	7,782.3	7,782.3	7,783.3	1.0
8,077	64	336	7.2	7,783.9	7,783.9	7,783.9	0.0
8,612	110	345	6.3	7,786.0	7,786.0	7,786.0	0.0
9,086	91	329	6.6	7,787.5	7,787.5	7,788.4	1.0
9,536	140	398	5.5	7,790.0	7,790.0	7,790.4	0.4
10,063	140	399	5.5	7,792.4	7,792.4	7,793.0	0.6
10,584	80	268	8.1	7,797.0	7,797.0	7,797.1	0.1

[1] Feet Above Downstream Limits of Study

[2] Encroachment Limited to Channel Banks; Encroachment may be Less than 1.0 Foot

COLORADO WATER CONSERVATION BOARD

TOWN OF MARBLE & VICINITY
GUNNISON COUNTY, CO

FLOODWAY DATA

CRYSTAL RIVER

PLATE 2

FLOODING SOURCE	FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NGVD)			
CROSS SECTION LOCATION[1]	WIDTH[2] (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
11,147	187	465	4.7	7,800.9	4,800.9	7,801.4	0.5
11,815	110	326	6.7	7,809.2	7,809.2	7,810.1	0.9
12,347	82	232	9.4	7,815.7	7,815.7	7,816.4	0.7
12,820	46	191	11.4	7,823.9	7,823.9	7,824.3	0.4
13,314	78	274	8.6	7,832.1	7,832.1	7,832.1	0.0
13,779	63	226	9.7	7,839.6	7,839.6	7,839.6	0.0
14,378	44	194	11.3	7,852.6	7,852.6	7,853.6	1.0
14,921	87	249	8.8	7,865.4	7,865.4	7,865.6	0.2
15,423	66	238	9.2	7,880.5	7,880.5	7,880.5	0.0
15,909	59	237	9.2	7,893.0	7,893.0	7,893.0	0.0
16,407	60	216	10.1	7,900.9	7,900.9	7,900.9	0.0
16,883	86	258	8.4	7,906.5	7,906.5	7,906.5	0.0
17,475	65	235	9.3	7,912.4	7,912.4	7,912.4	0.0
18,067	70	228	9.6	7,918.9	7,918.9	7,918.9	0.0
18,542	41	195	11.2	7,926.6	7,926.6	7,926.6	0.0
18,578	47	251	8.7	7,929.2	7,929.2	7,929.2	0.0
18,783	95	687	3.2	7,931.1	7,931.1	7,931.1	0.0
19,361	103	570	3.8	7,931.2	7,931.2	7,931.5	0.3
19,905	89	476	3.6	7,931.3	7,931.3	7,932.3	1.0
20,771	91	374	4.5	7,932.8	7,932.8	7,933.7	0.9
21,304	175	482	3.5	7,934.3	7,934.3	7,935.2	0.9
21,874	185	475	3.6	7,936.1	7,936.1	7,936.7	0.6
22,724	129	247	7.1	7,941.7	7,941.7	7,941.7	0.0
23,204	55	319	5.3	7,944.0	7,944.0	7,944.2	0.2
23,230	52	290	5.8	7,944.1	7,944.1	7,944.2	0.1
23,576	99	244	6.9	7,948.1	7,948.1	7,948.2	0.1
24,407	64	208	8.2	7,958.7	7,958.7	7,958.7	0.0

[1] Feet Above Downstream Limits of Study

[2] Encroachment Limited to Channel Banks; Encroachment may be Less than 1.0 Foot

COLORADO WATER CONSERVATION BOARD

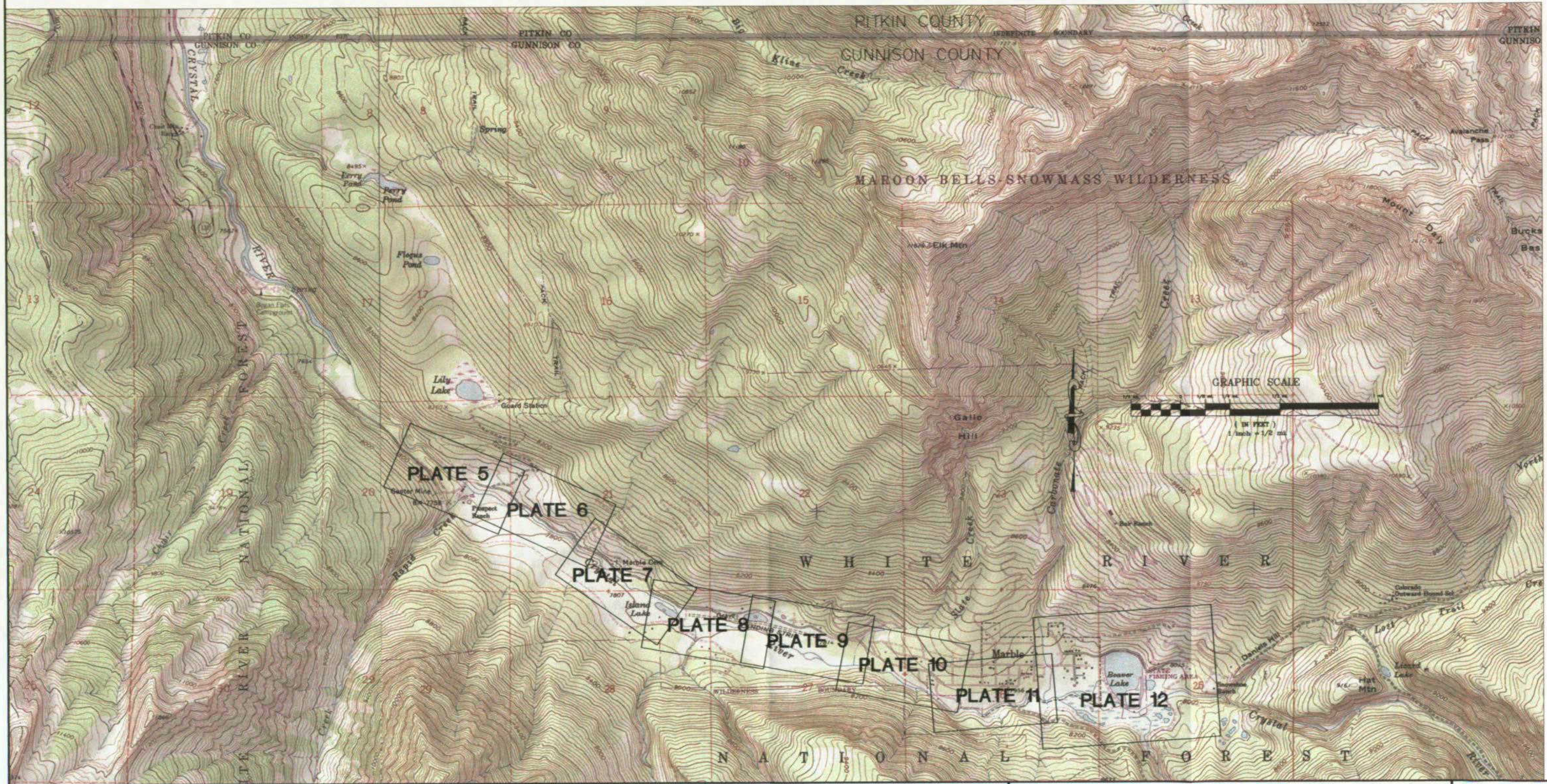
TOWN OF MARBLE & VICINITY
GUNNISON COUNTY, CO

FLOODWAY DATA

CRYSTAL RIVER

CRYSTAL RIVER - FLOODPLAIN INFORMATION REPORT
TOWN OF MARBLE & VICINITY, GUNNISON COUNTY, COLORADO

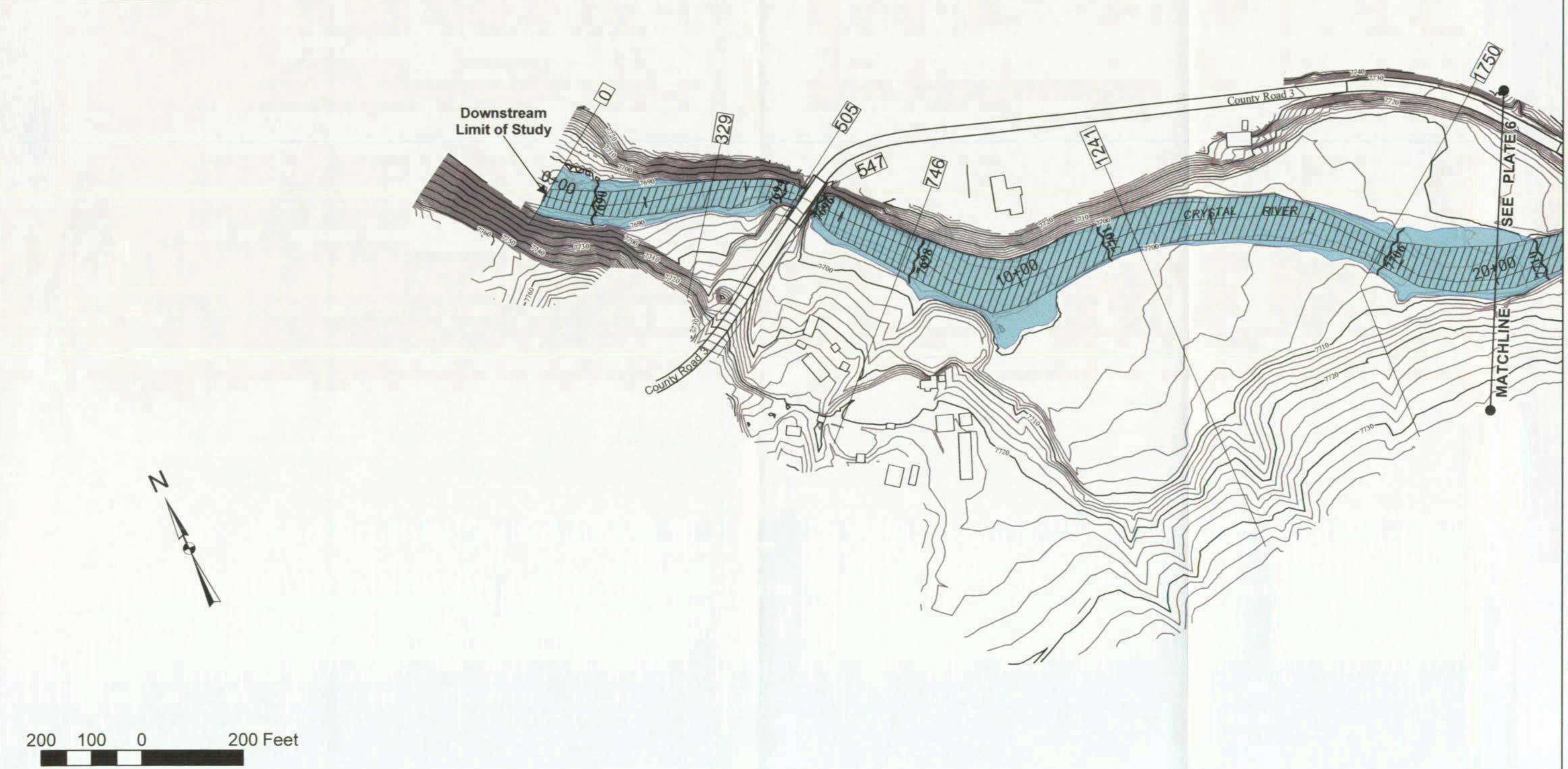
PLATE INDEX MAP



AERIAL MAPPING PROVIDED BY: KUCERA INTERNATIONAL, INC. MAP DATUM: NAVD1988 DATE OF FLIGHT: 2003 CONTOUR INTERVAL: 2 FOOT	ICON PROJECT NO. 03-023-CRY-415	Department of Natural Resources Colorado Water Conservation Board Flood Protection Program 1313 Sherman Street, Room 721 Denver, Colorado 80203 ICON ENGINEERING, INC.	FLOOD PLAIN INFORMATION REPORT CRYSTAL RIVER TOWN OF MARBLE & VICINITY PLATE INDEX MAP	PLATE 4 MAY 2004

LEGEND

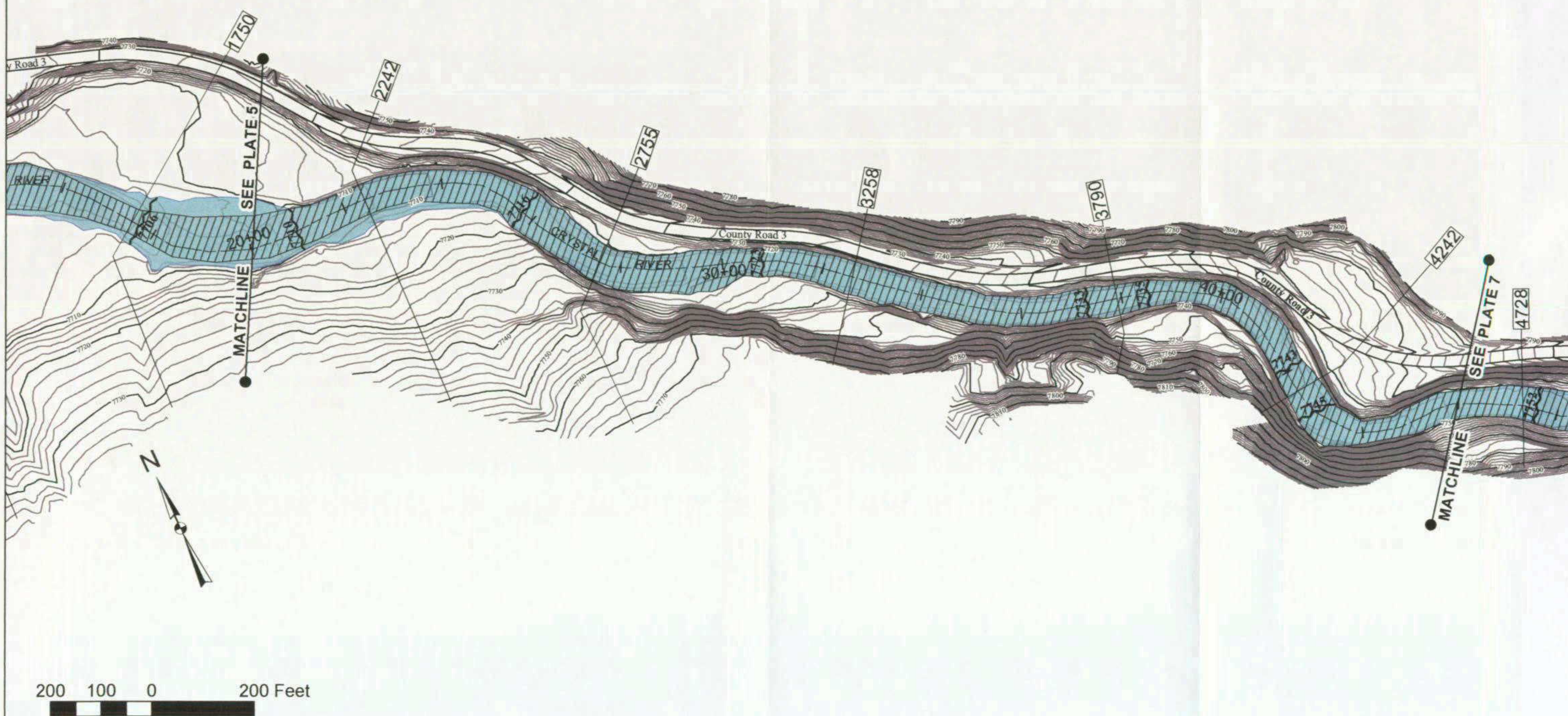
- 2076 Cross Section Location
- 7700 Base Flood Elevation
- Floodway
- 100 Year Floodplain
- 7700 Index Contour
- Intermediate Contour



Aerial Mapping Provided by: Kucera International, Inc. Map Datum NAVD 1988 Date of Flight: 2003 Contour Interval = 2 foot	ICON PROJECT # 03-023-CRY-415	**Department of Natural Resources** **Colorado Water Conservation Board** Flood Protection Program 1313 Sherman Street, Room 721 Denver, Colorado 80203	ICON ENGINEERING, INC.	**FLOOD PLAIN INFORMATION REPORT** **CRYSTAL RIVER** **TOWN OF MARBLE & VICINITY** **STATION 0+00 TO STATION 20+00**
				PLATE 5 **August 2004**

LEGEND

- 2076 — Cross Section Location
- 7700 — Base Flood Elevation
- Floodway
- 100 Year Floodplain
- 7700 — Index Contour
- Intermediate Contour



Aerial Mapping Provided by: Kucera International, Inc.
Map Datum NAVD 1988
Date of Flight: 2003
Contour Interval = 2 foot

ICON PROJECT # 03-023-CRY-415

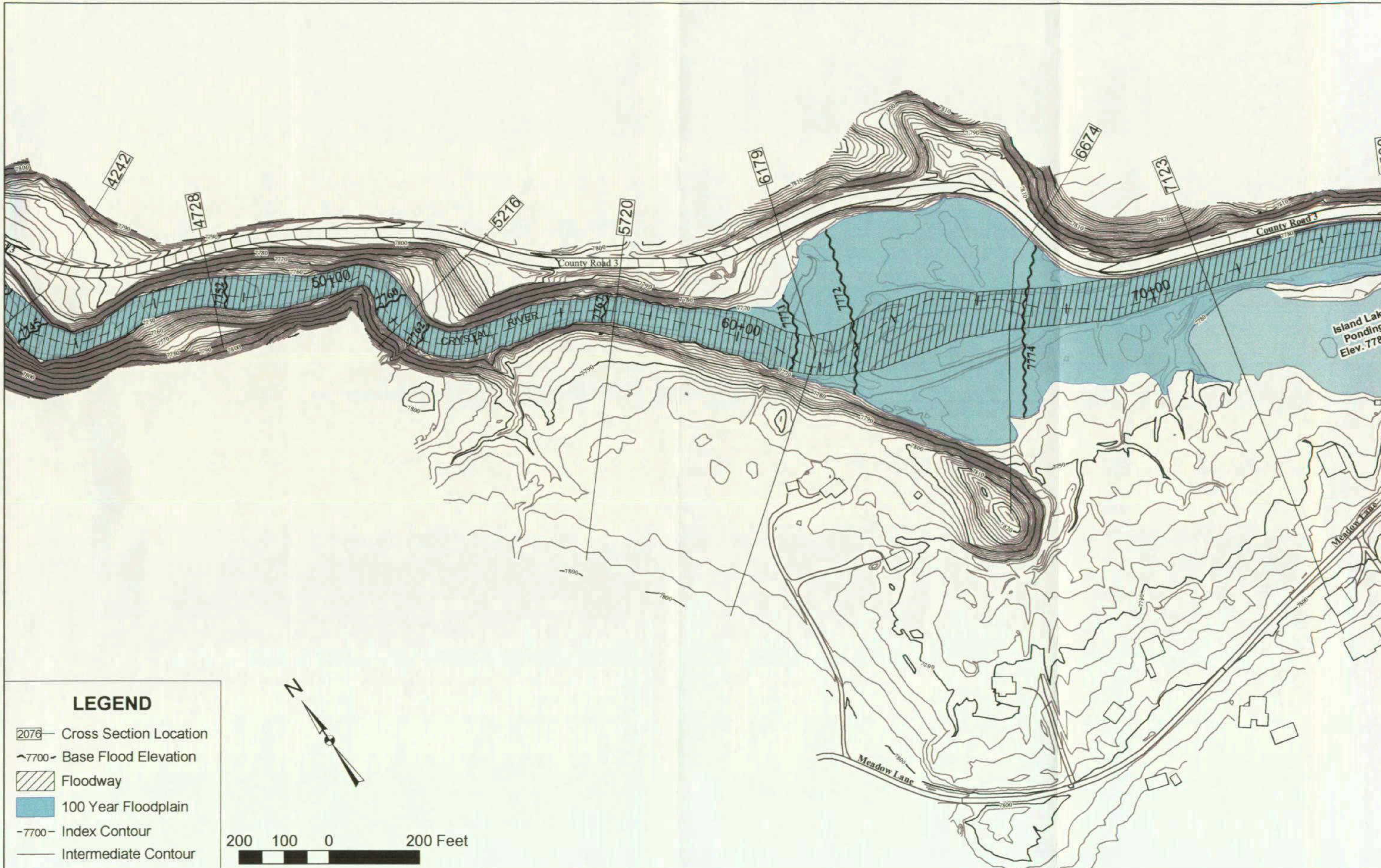
Department of Natural Resources
Colorado Water Conservation Board
Flood Protection Program
1313 Sherman Street, Room 721
Denver, Colorado 80203

ICON ENGINEERING, INC

FLOOD PLAIN INFORMATION REPORT
CRYSTAL RIVER
TOWN OF MARBLE & VICINITY
STATION 20+00 TO STATION 46+00

PLATE 6

AUGUST 2004



Aerial Mapping Provided by: Kucera International, Inc.
Map Datum NAVD 1988
Date of Flight: 2003
Contour Interval = 2 foot

ICON PROJECT # 03-023-CRY-415

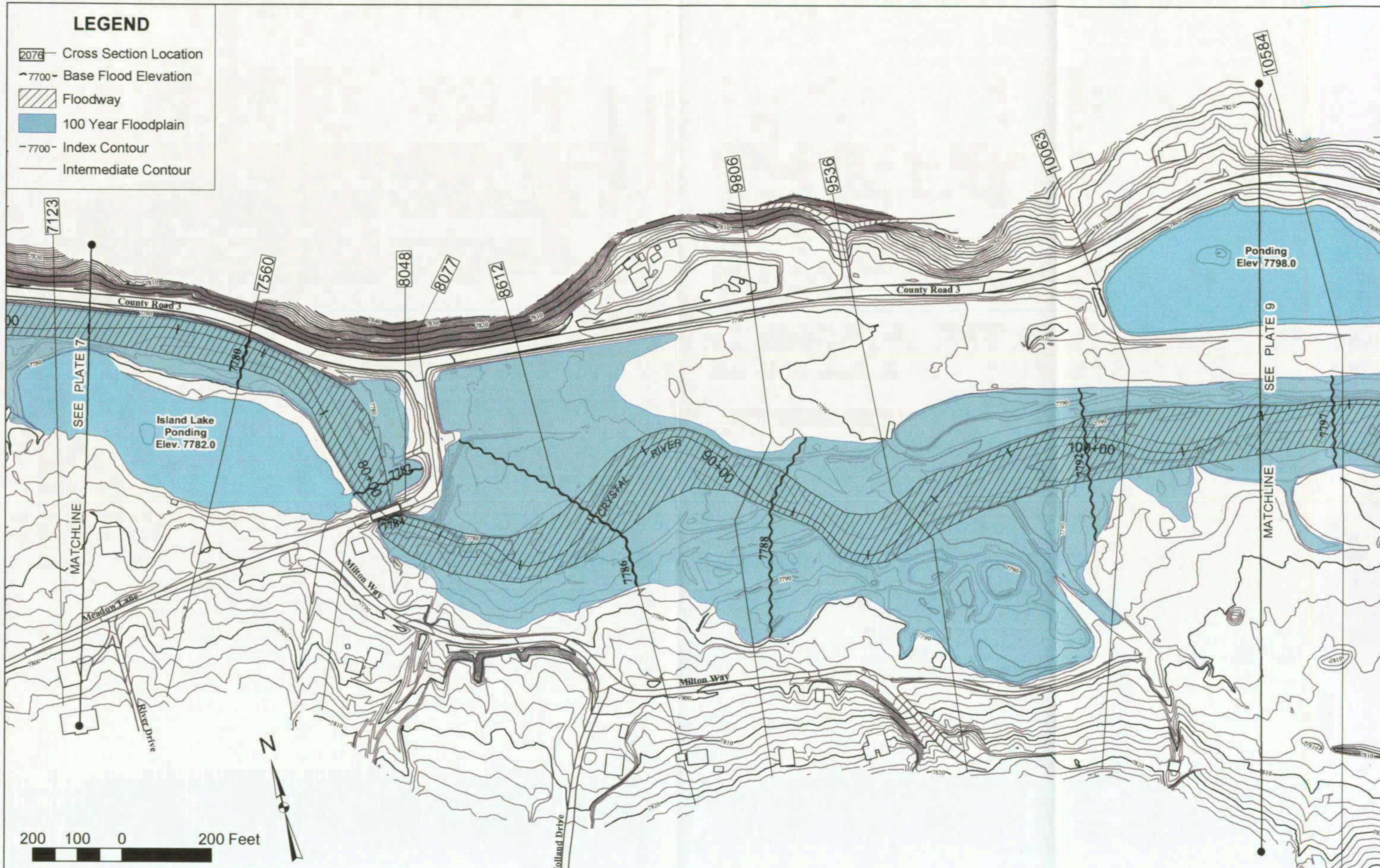
Department of Natural Resources
Colorado Water Conservation Board
Flood Protection Program
1313 Sherman Street, Room 721
Denver, Colorado 80203

ICON ENGINEERING, INC

FLOOD PLAIN INFORMATION REPORT
CRYSTAL RIVER
TOWN OF MARBLE & VICINITY
STATION 46+00 TO STATION 72+00

PLATE 7

AUGUST 2004



Aerial mapping provided by: Kucera International Inc.
Map Datum: NAVD 1988
Date of Flight: 2003
Contour Interval = 2 foot

ICON PROJECT # 03-023-CRY-415

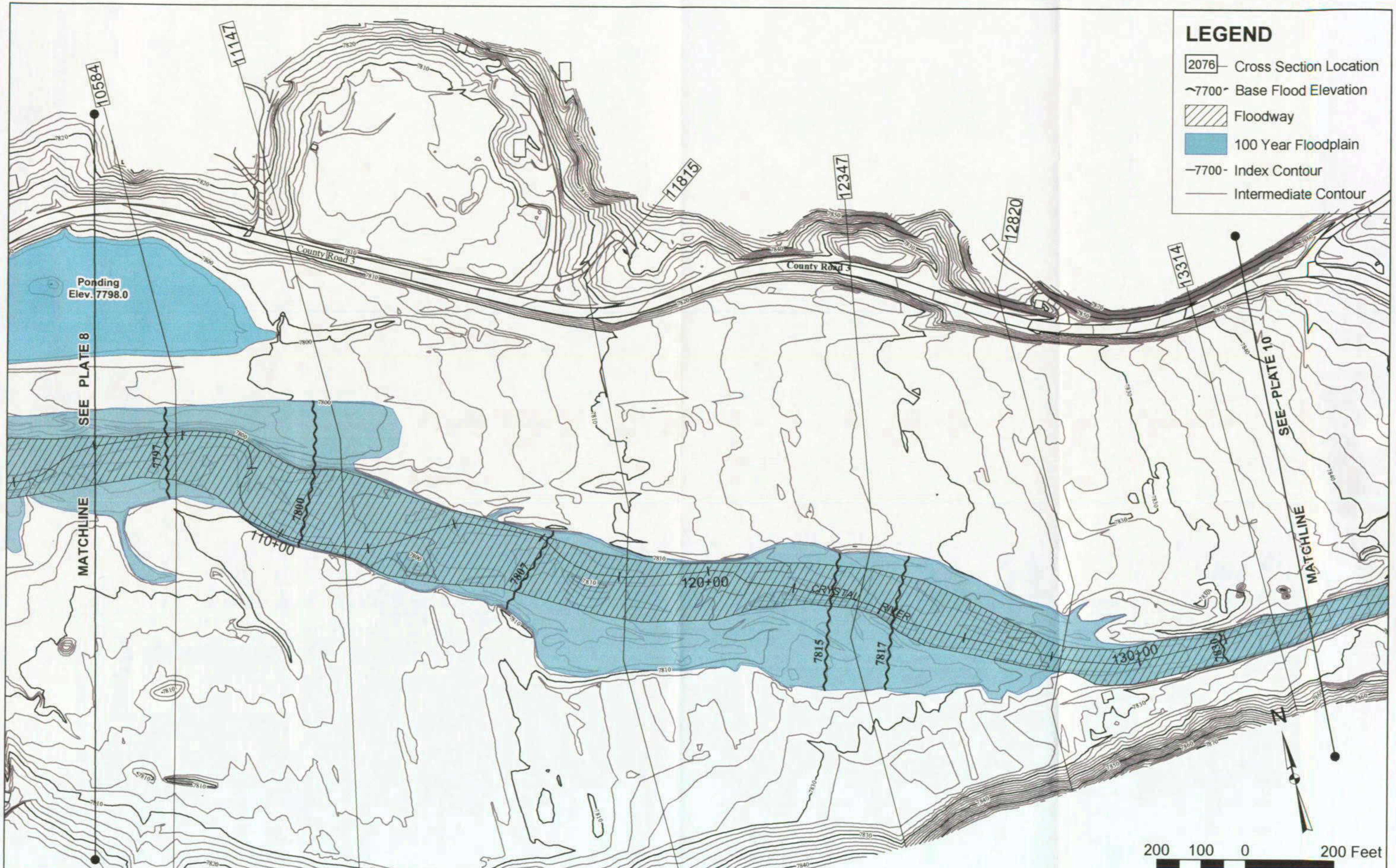
Department of Natural Resources
Colorado Water Conservation Board
Flood Protection Program
1313 Sherman Street, Room 721
Denver, Colorado 80203

ICON ENGINEERING, INC

FLOOD PLAIN INFORMATION REPORT
CRYSTAL RIVER
TOWN OF MARBLE & VICINITY
STATION 72+00 TO STATION 104+00

PLATE 8

AUGUST 2004



Aerial mapping provided by: Kucera International, Inc.
Map Datum NAVD 1988
Date of Flight: 2003
Contour Interval = 2 foot

ICON PROJECT # 03-023-CRY-415

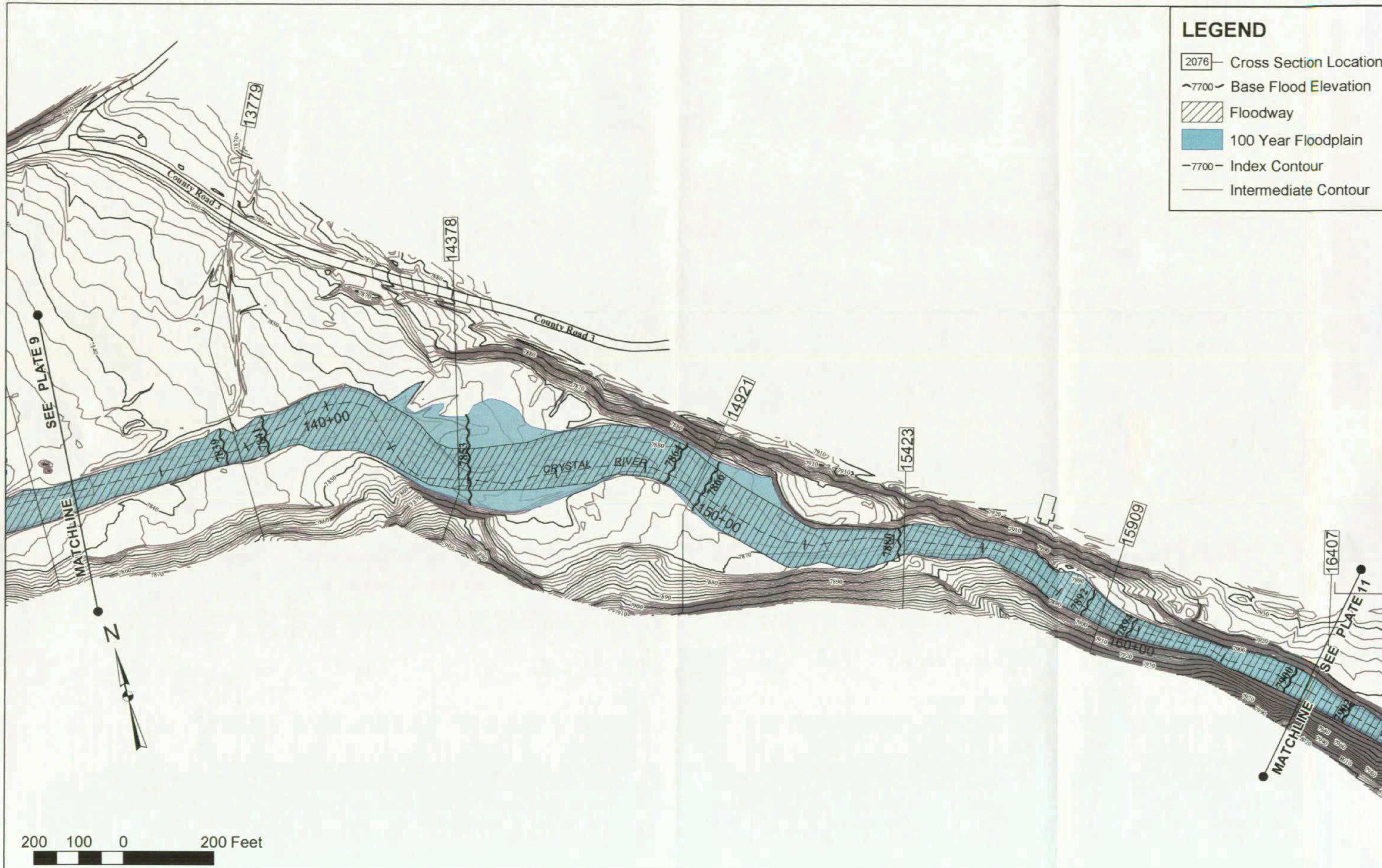
Department of Natural Resources
Colorado Water Conservation Board
Flood Protection Program
1313 Sherman Street, Room 721
Denver, Colorado 80203

ICON ENGINEERING, INC

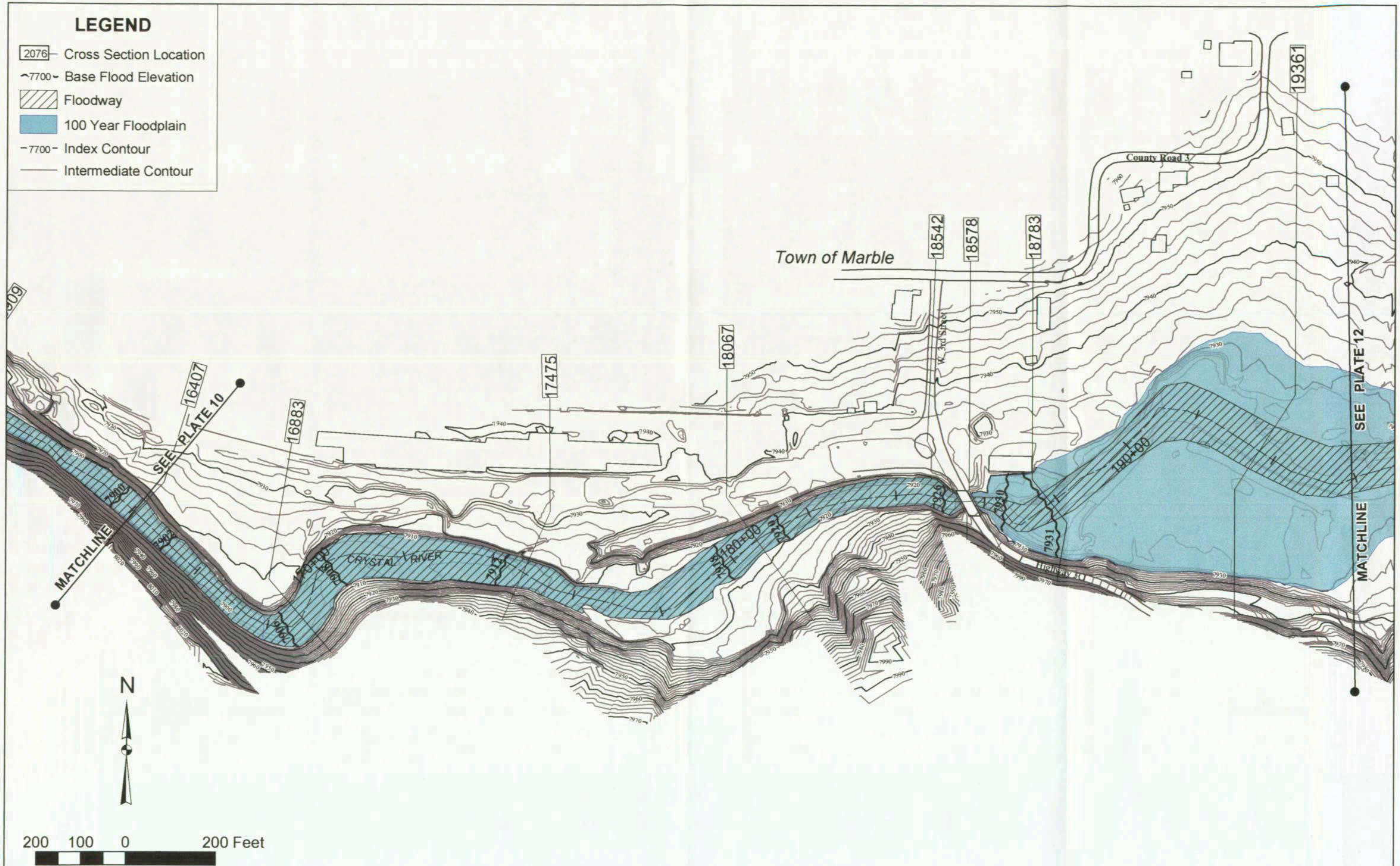
FLOOD PLAIN INFORMATION REPORT
CRYSTAL RIVER
TOWN OF MARBLE & VICINITY
STATION 104+00 TO STATION 134+00

PLATE 9

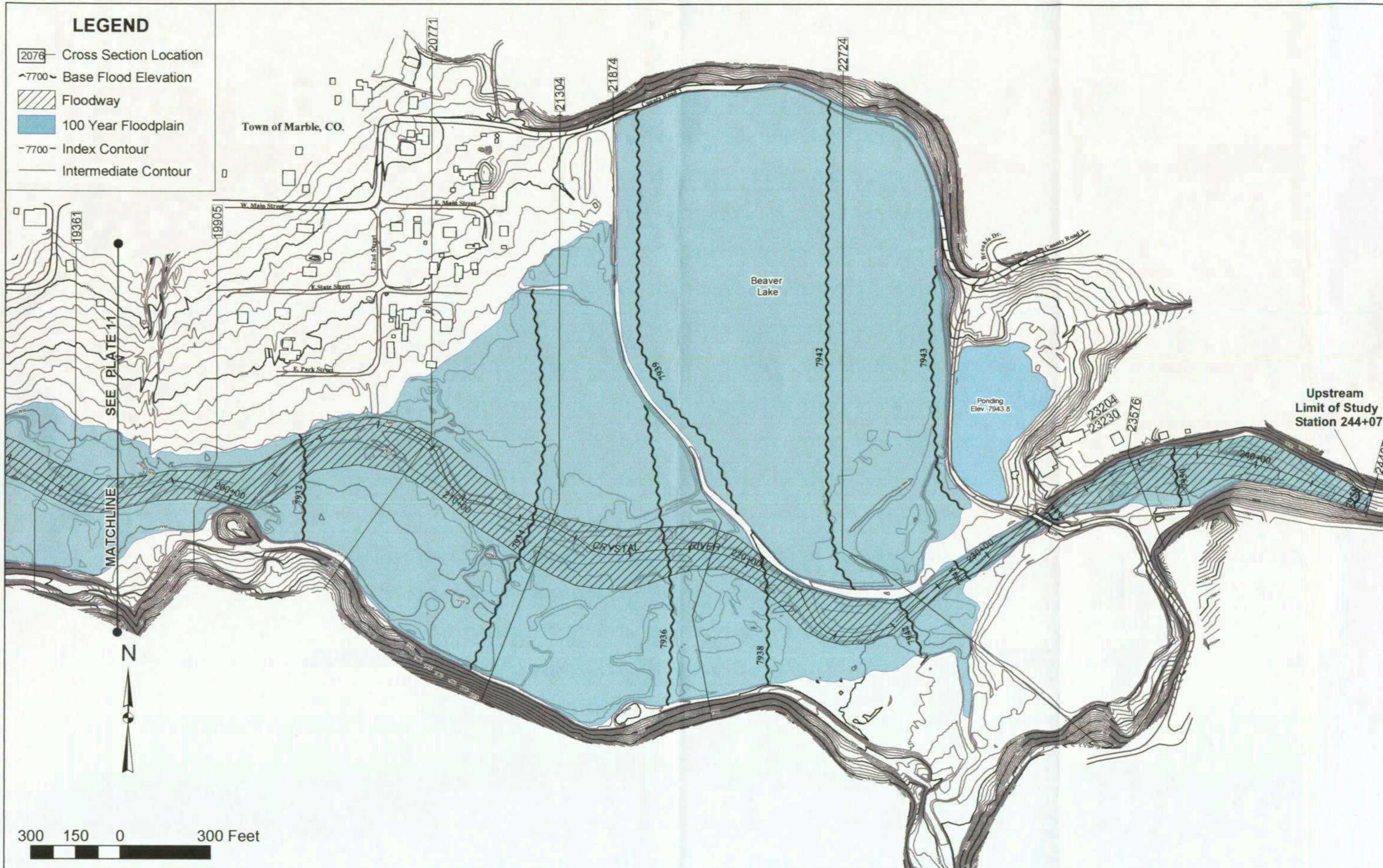
AUGUST 2004



Aerial mapping provided by: Kucera Internation, Inc. Map Datum NAVD 1988 Date of Flight: 2003 Contour Interval = 2 foot	ICON PROJECT # 03-023-CRY-415	**Department of Natural Resources** **Colorado Water Conservation Board** Flood Protection Program 1313 Sherman Street, Room 721 Denver, Colorado 80203	ICON ENGINEERING, INC	**FLOOD PLAIN INFORMATION REPORT** **CRYSTAL RIVER** **TOWN OF MARBLE & VICINITY** **STATION 134+00 TO STATION 164+00**	**PLATE 10** **AUGUST 2004**



Aerial mapping provided by: Kucera International, Inc. Map Datum NAVD 1988 Date of Flight: 2003 Contour Interval = 2 foot	ICON PROJECT # 03-023-CRY-415	**Department of Natural Resources** **Colorado Water Conservation Board** Flood Protection Program 1313 Sherman Street, Room 721 Denver, Colorado 80203	ICON ENGINEERING, INC	**FLOOD PLAIN INFORMATION REPORT** **CRYSTAL RIVER** **TOWN OF MARBLE & VICINITY** **STATION 164+00 TO STATION 196+00**	**PLATE 11** **AUGUST 2004**



Aerial mapping provided by: Kucera International, Inc.
Map Datum: NAVD 1988
Date of Flight: 2003
Contour Interval = 2 foot

ICON PROJECT # 03-023-CRY-415

Department of Natural Resources
Colorado Water Conservation Board
Flood Protection Program
1313 Sherman Street, Room 721
Denver, Colorado 80203

ICON ENGINEERING, INC

FLOOD PLAIN INFORMATION REPORT
CRYSTAL RIVER
TOWN OF MARBLE & VICINITY
STATION 196+00 TO STATION 244+07

PLATE 12

MAY 2004

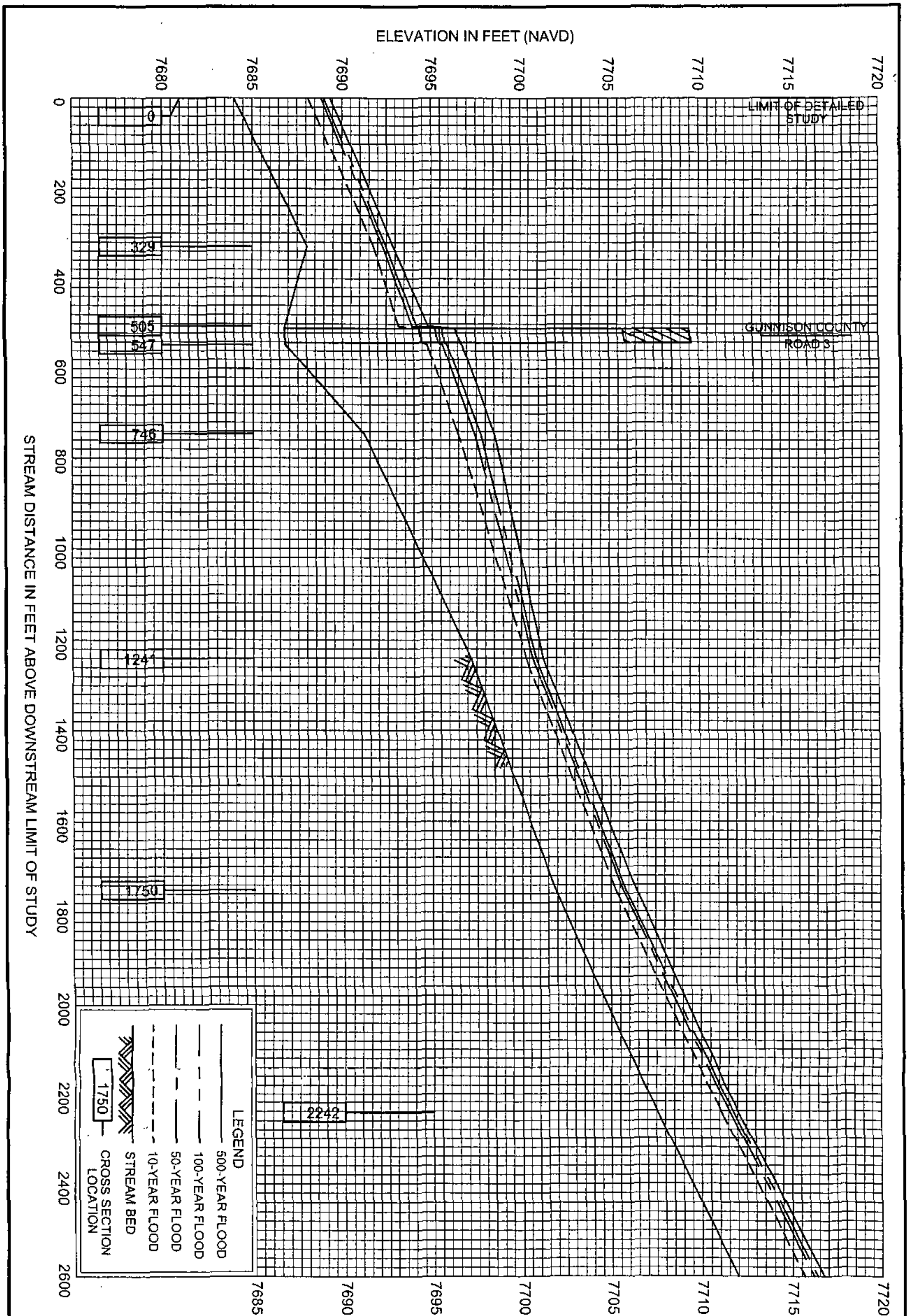


PLATE 13

COLORADO WATER CONSERVATION BOARD

TOWN OF MARBLE AND VICINITY
GUNNISON COUNTY, CO.

FLOOD PROFILES

CRYSTAL RIVER

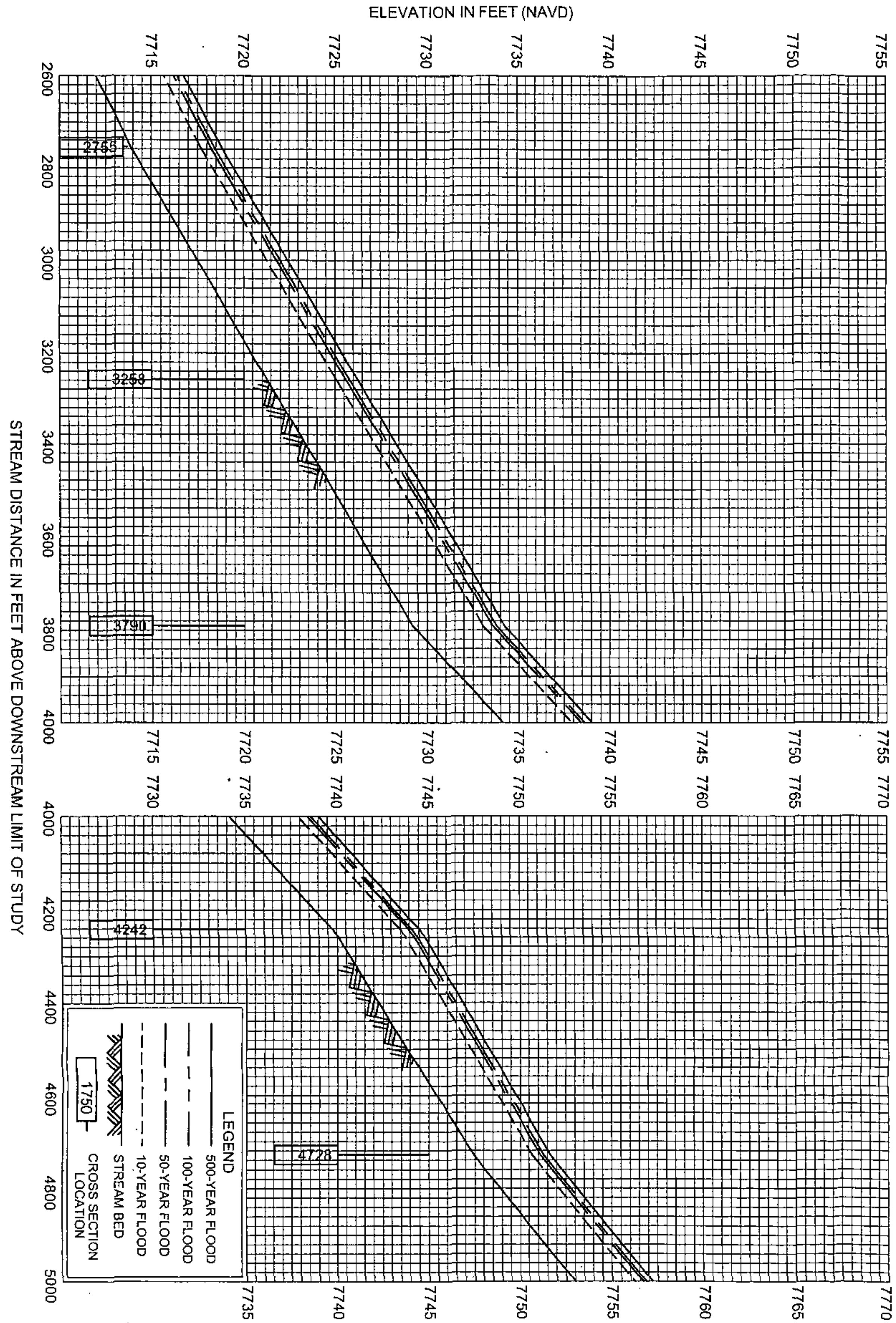


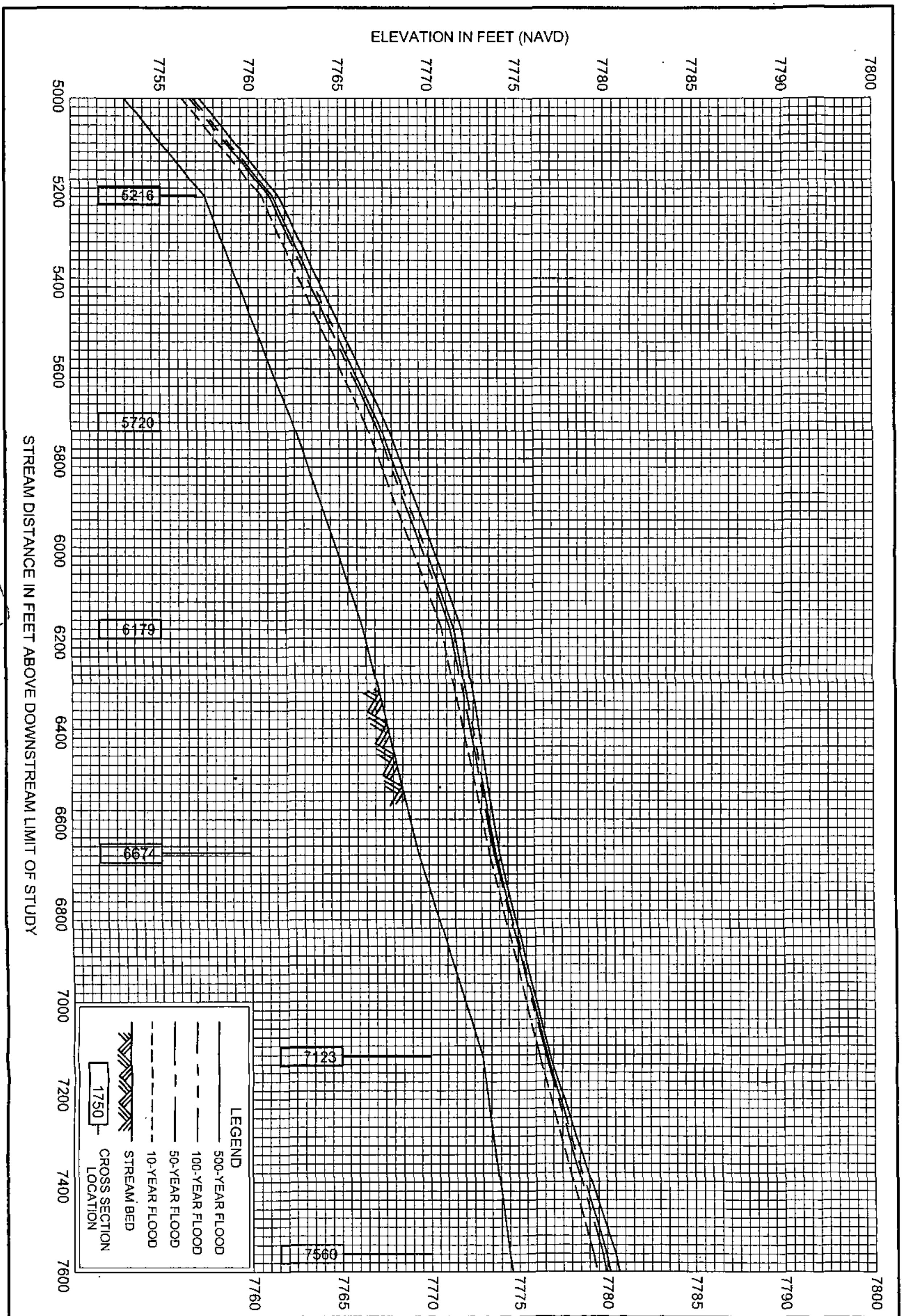
PLATE 14

COLORADO WATER CONSERVATION BOARD

TOWN OF MARBLE AND VICINITY
GUNNISON COUNTY, CO.

FLOOD PROFILES

CRYSTAL RIVER



COLORADO WATER CONSERVATION BOARD	FLOOD PROFILES
TOWN OF MARBLE AND VICINITY GUNNISON COUNTY, CO.	CRYSTAL RIVER

PLATE 15

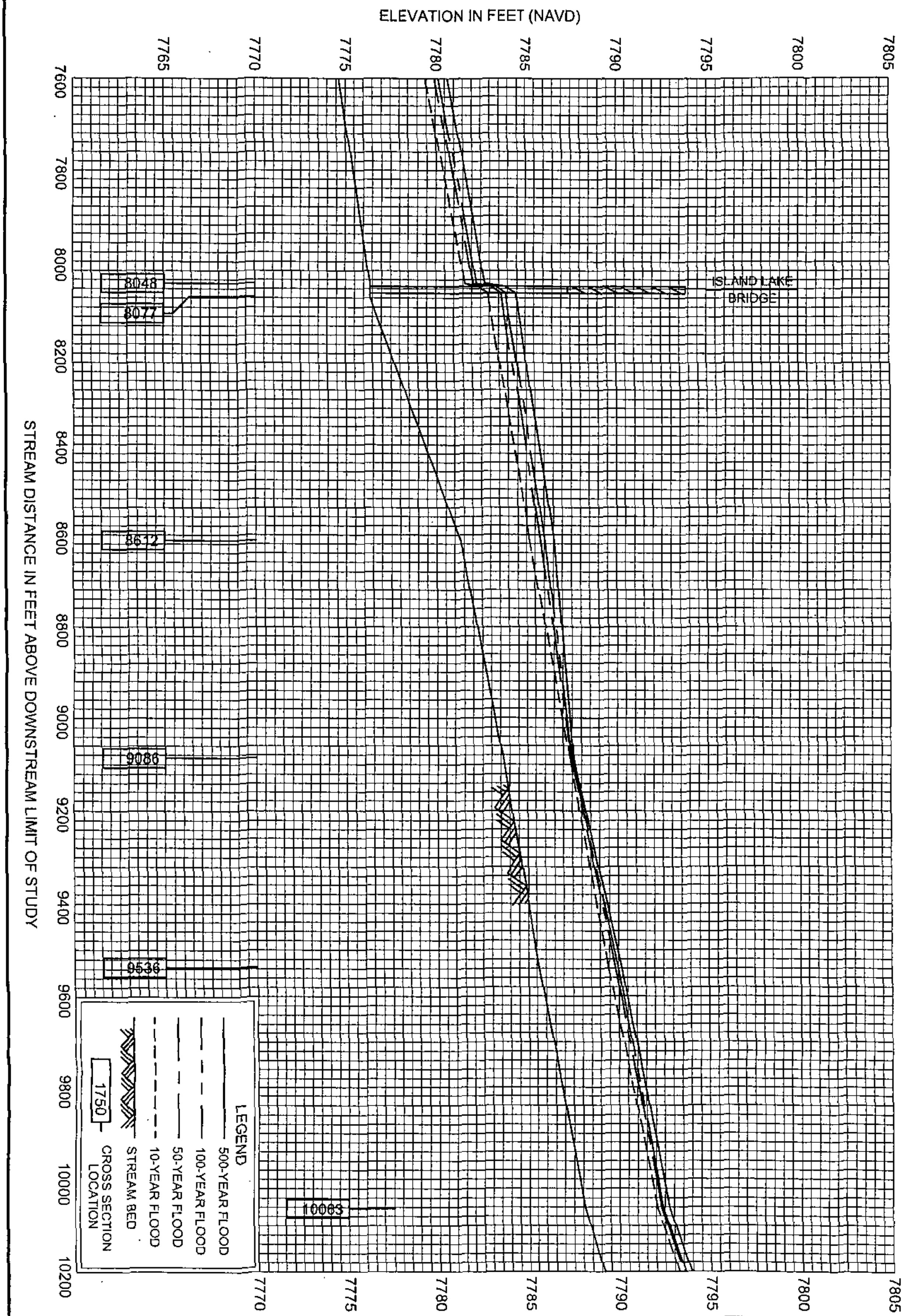


PLATE 16

COLORADO WATER CONSERVATION BOARD

TOWN OF MARBLE AND VICINITY
GUNNISON COUNTY, CO.

FLOOD PROFILES

CRYSTAL RIVER

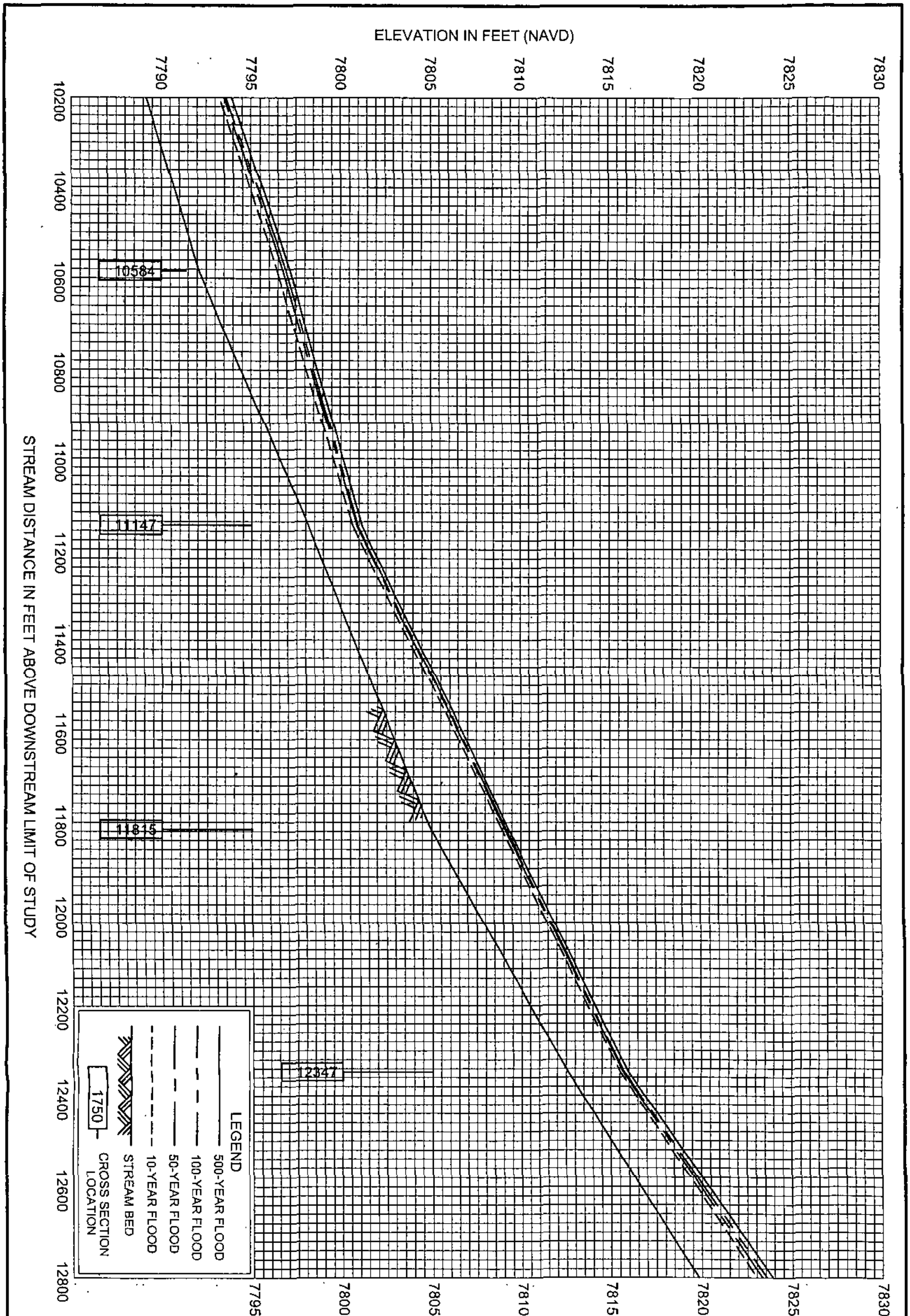


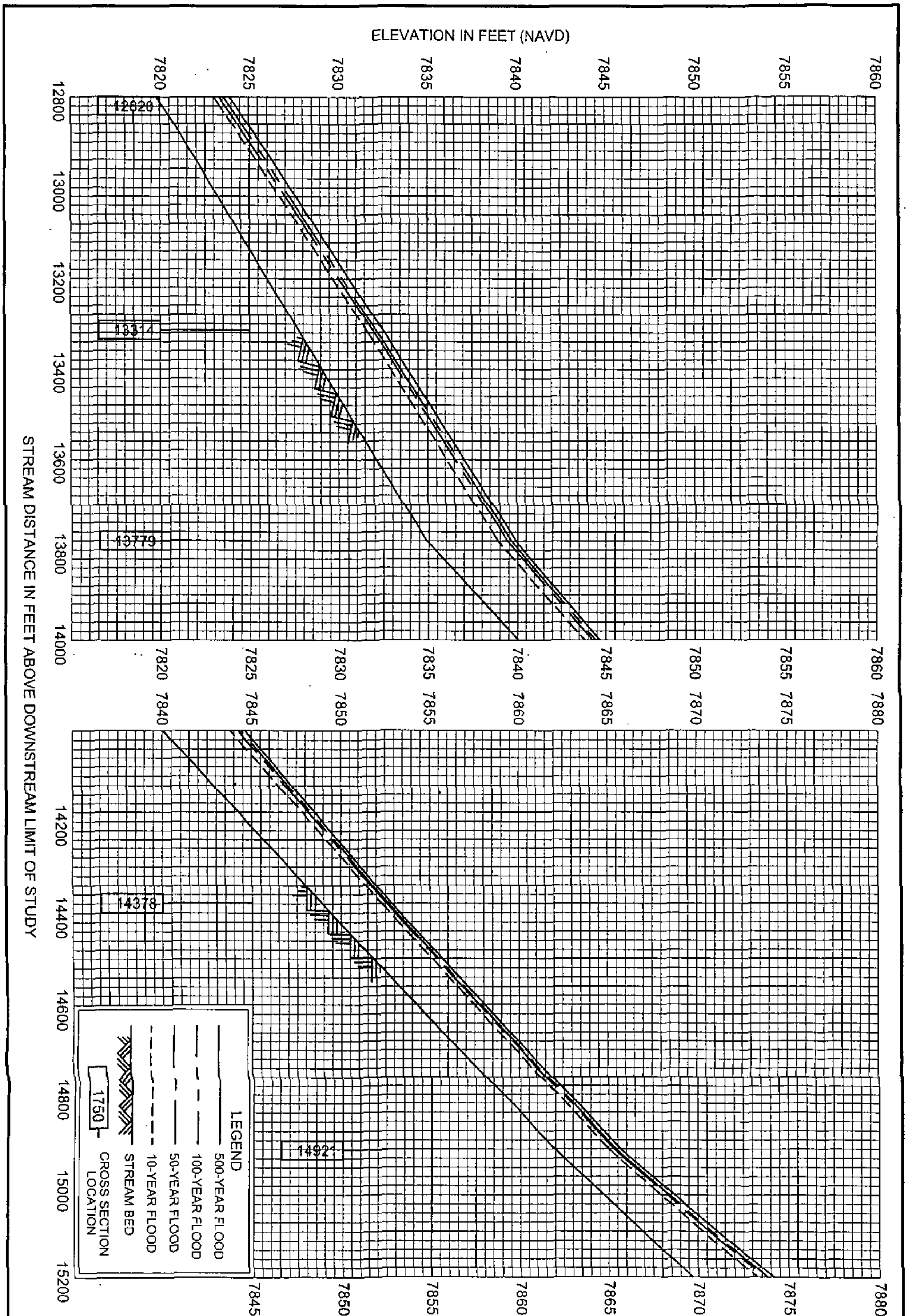
PLATE 17

COLORADO WATER CONSERVATION BOARD

TOWN OF MARBLE AND VICINITY
GUNNISON COUNTY, CO.

FLOOD PROFILES

CRYSTAL RIVER



COLORADO WATER CONSERVATION BOARD	FLOOD PROFILES
TOWN OF MARBLE AND VICINITY GUNNISON COUNTY, CO.	CRYSTAL RIVER

PLATE 18

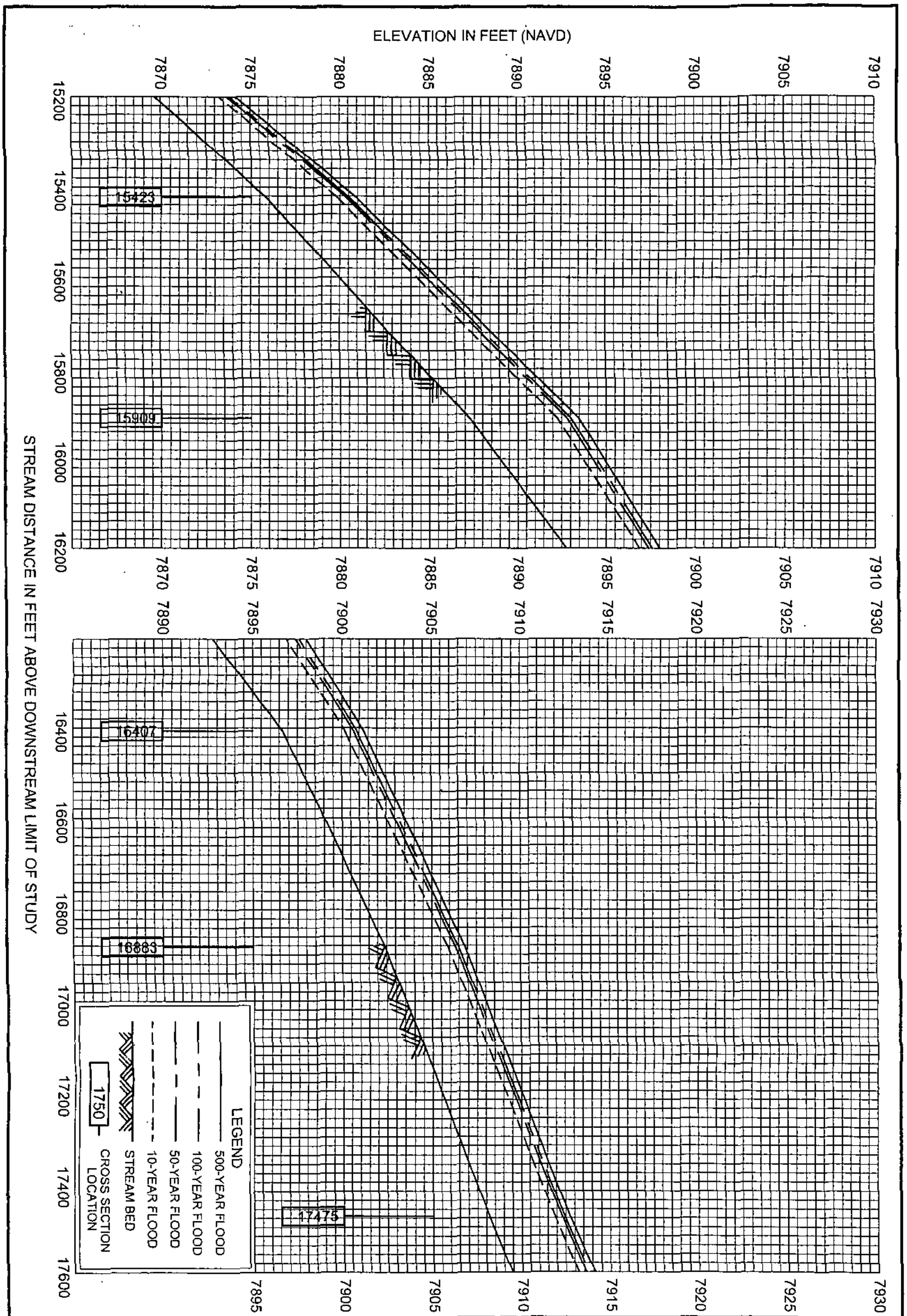


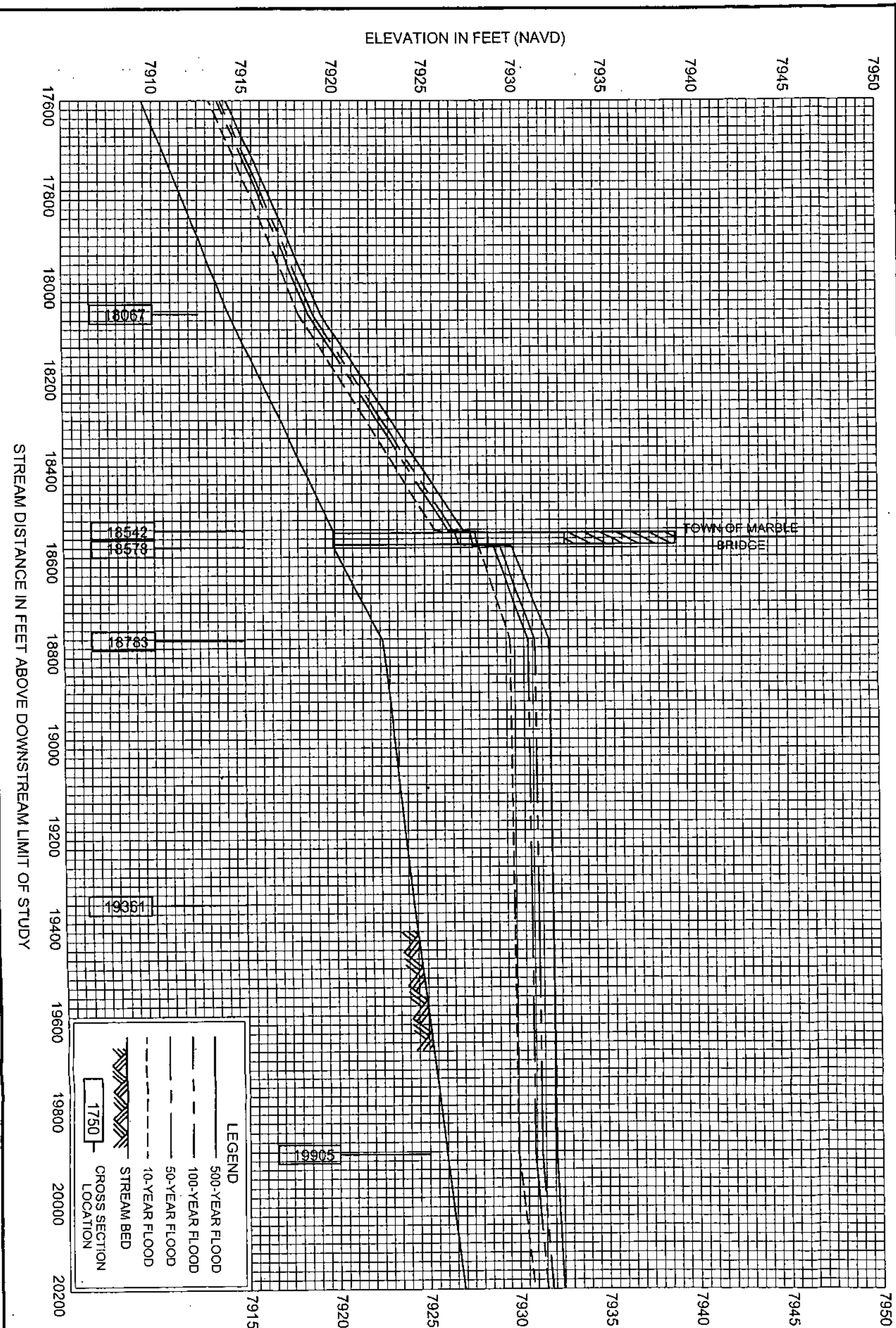
PLATE 19

COLORADO WATER CONSERVATION BOARD

TOWN OF MARBLE AND VICINITY
GUNNISON COUNTY, CO.

FLOOD PROFILES

CRYSTAL RIVER



COLORADO WATER CONSERVATION BOARD TOWN OF MARBLE AND VICINITY GUNNISON COUNTY, CO.	FLOOD PROFILES CRYSTAL RIVER

PLATE 20

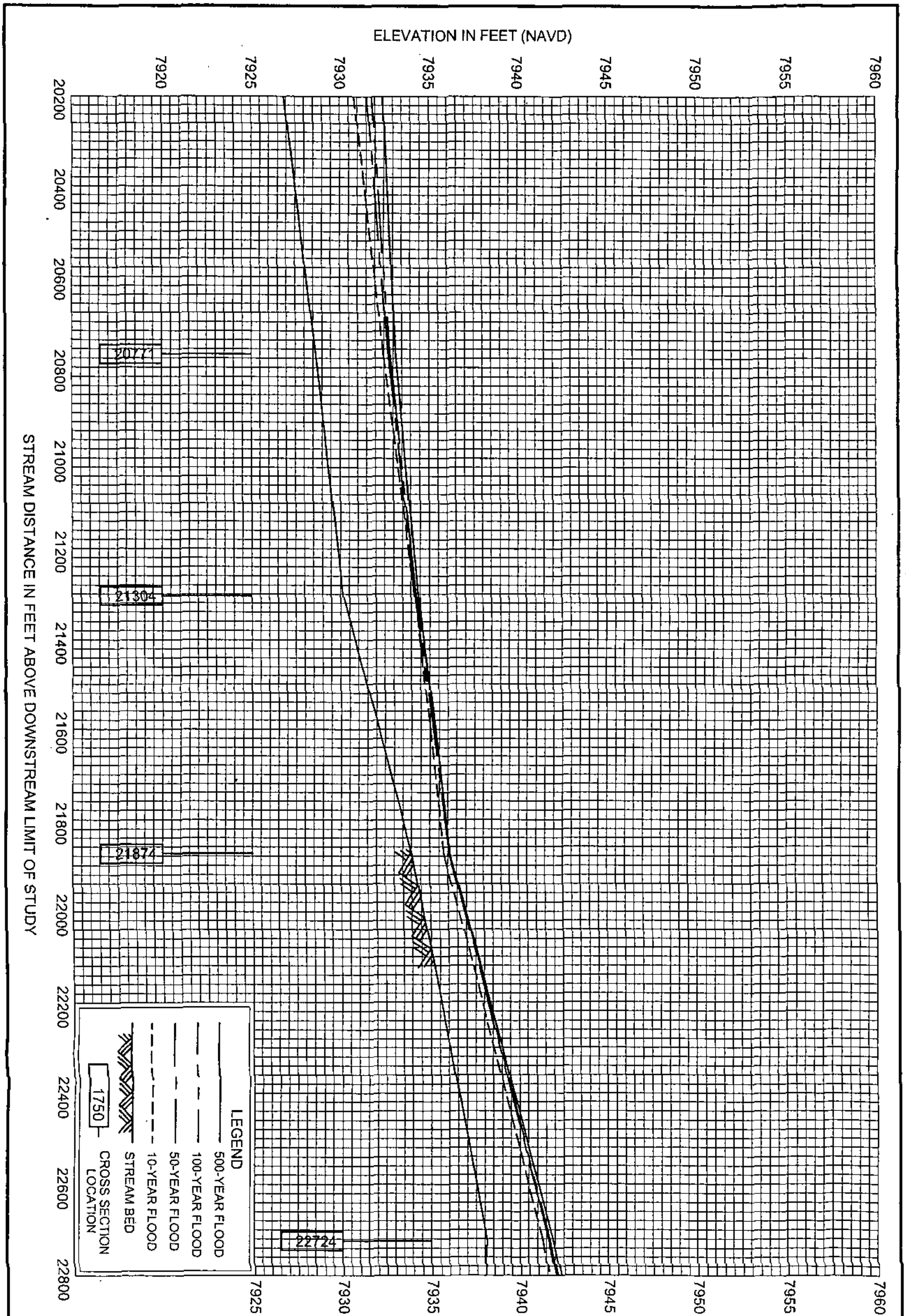


PLATE 21

COLORADO WATER CONSERVATION BOARD

TOWN OF MARBLE AND VICINITY
GUNNISON COUNTY, CO.

FLOOD PROFILES

CRYSTAL RIVER

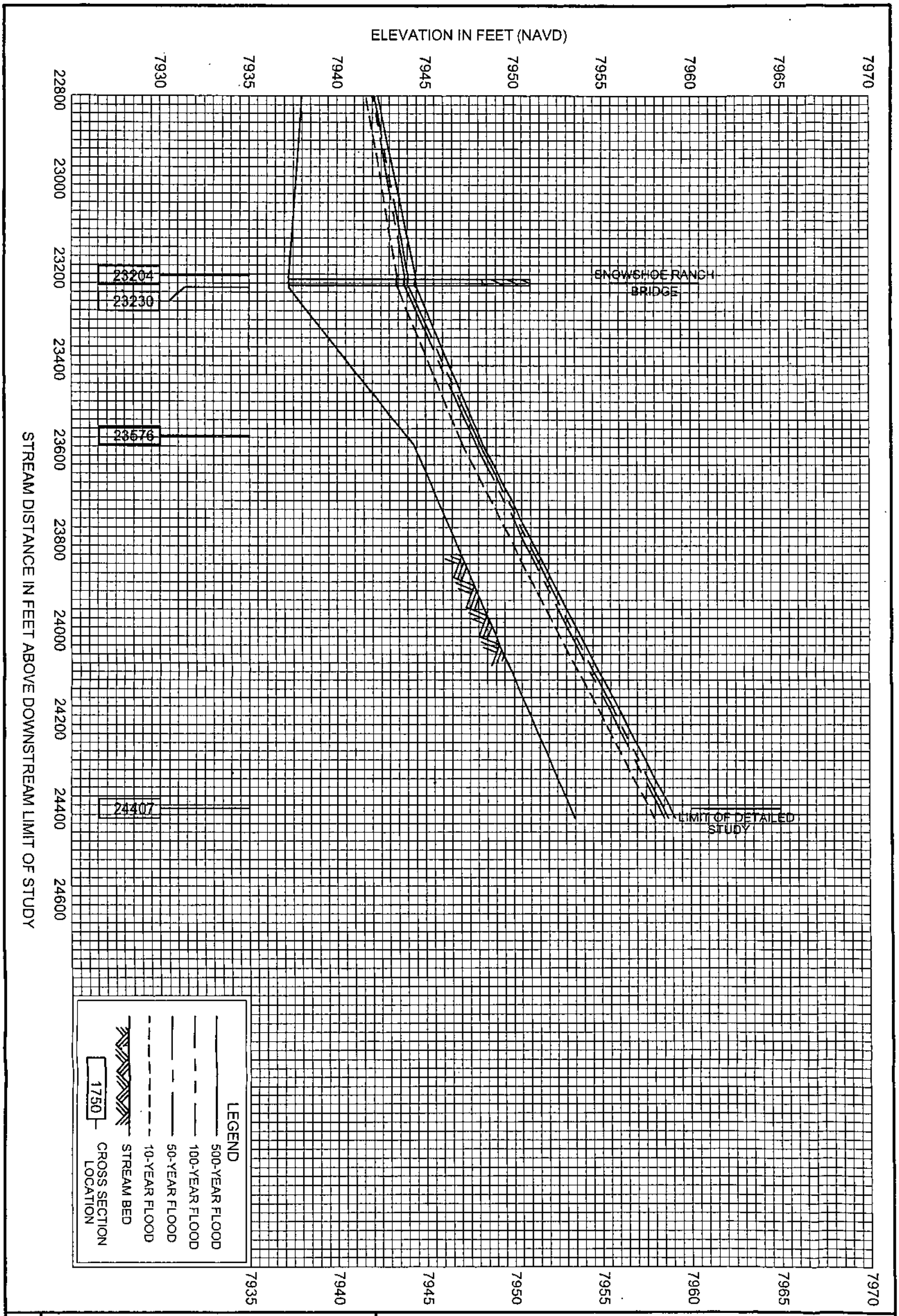
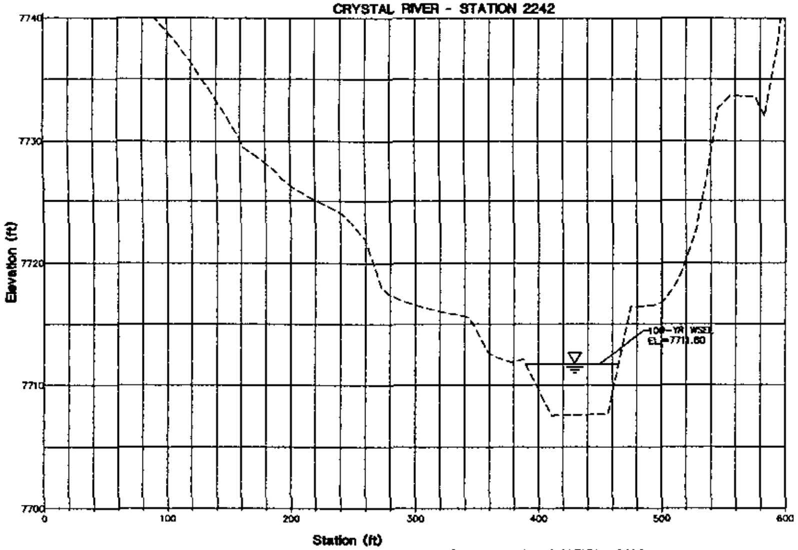
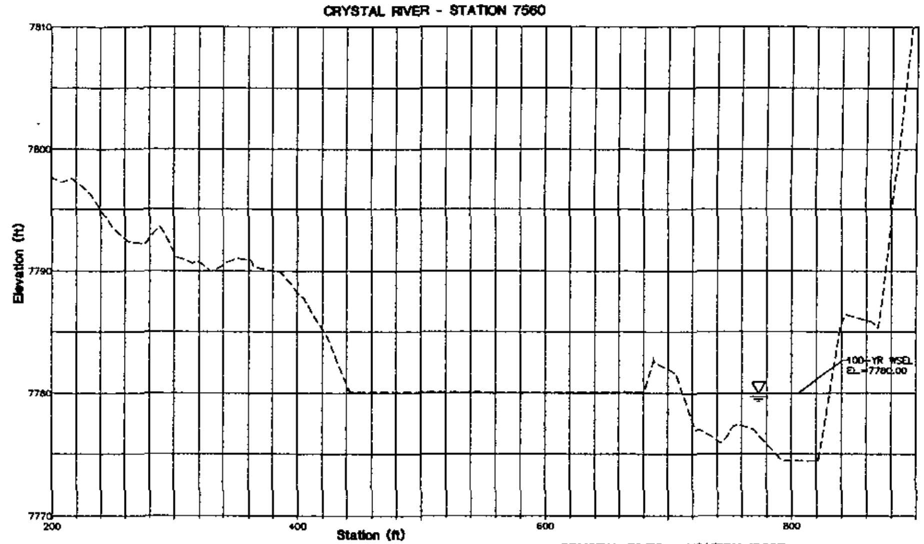
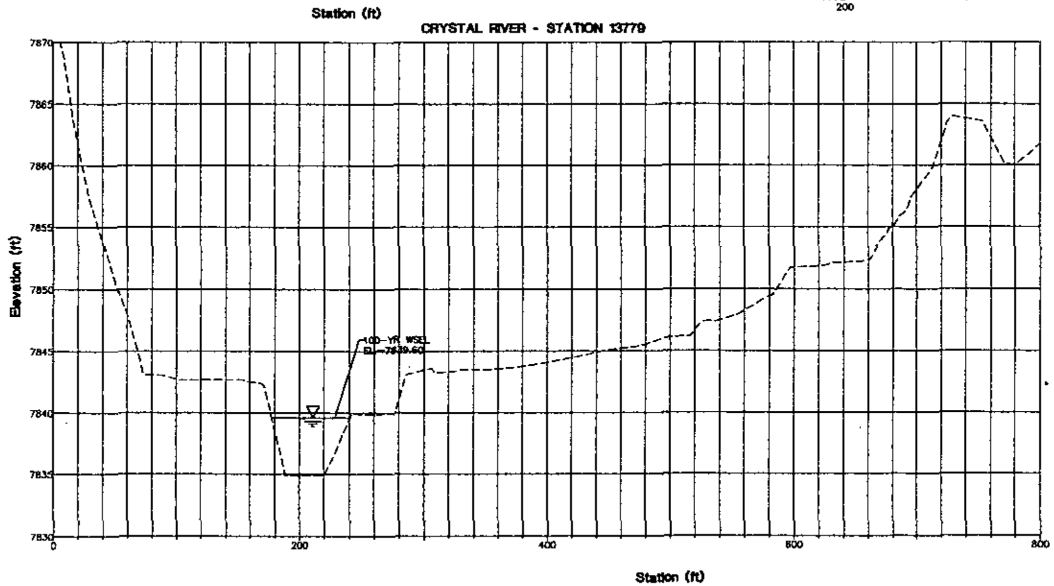
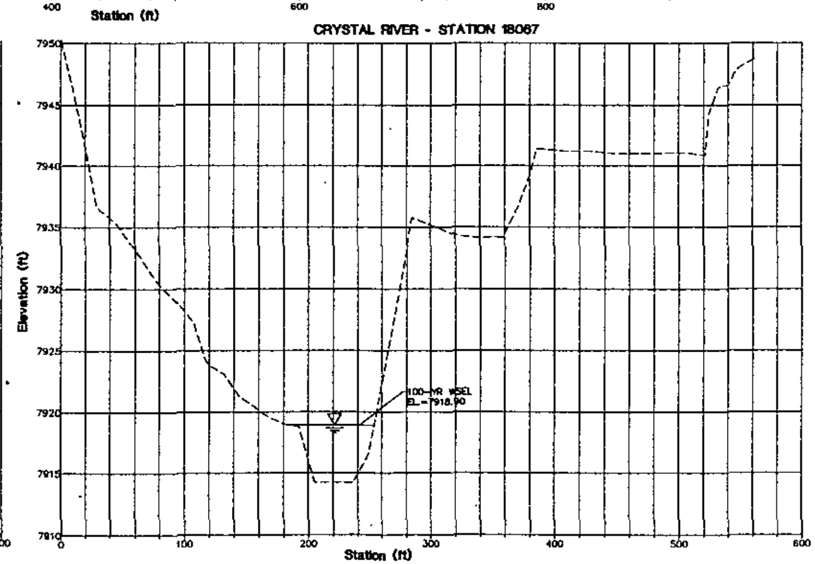


PLATE 22	COLORADO WATER CONSERVATION BOARD TOWN OF MARBLE AND VICINITY GUNNISON COUNTY, CO.	FLOOD PROFILES CRYSTAL RIVER









AERIAL MAPPING PROVIDED BY:
KUCERA INTERNATIONAL, INC.
MAP DATUM: NAVD1988
DATE OF FLIGHT: 2003
CONTOUR INTERVAL: 2 FOOT

ICON PROJECT NO. 03-023-CRY-415

Department of Natural Resources
Colorado Water Conservation Board
Flood Protection Program
1313 Sherman Street, Room 721
Denver, Colorado 80203

ICON ENGINEERING, INC.

FLOOD PLAIN INFORMATION REPORT
CRYSTAL RIVER
TOWN OF MARBLE AND VICINITY
TYPICAL CROSS-SECTIONS

PLATE 23

AUG 2004