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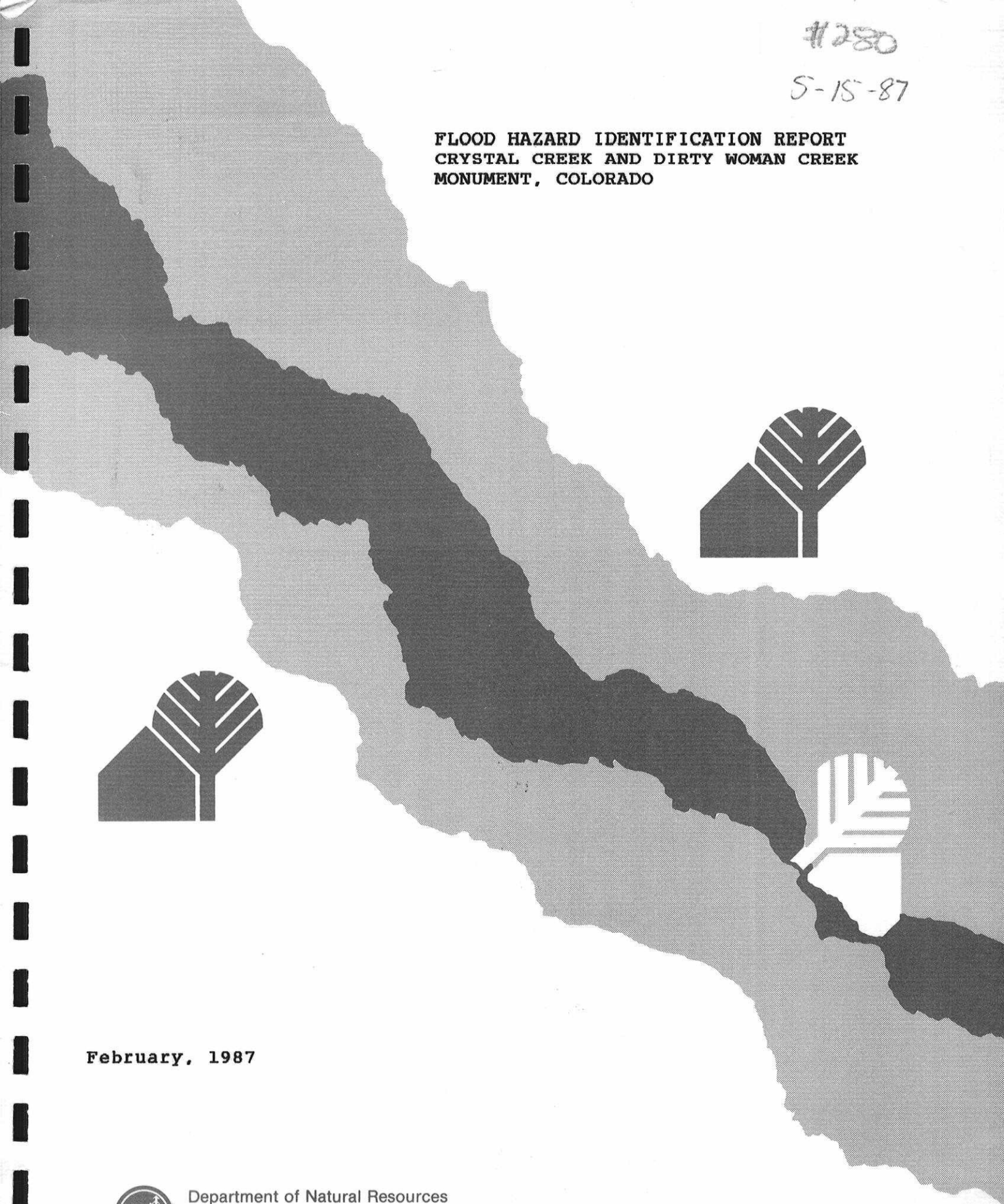
FLOOD HAZARD IDENTIFICATION REPORT
CRYSTAL CREEK AND DIRTY WOMAN CREEK
MONUMENT, COLORADO



February, 1987

Department of Natural Resources
Colorado Water Conservation Board
J. William McDonald, Director

FLOOD HAZARD IDENTIFICATION REPORT

CRYSTAL CREEK AND DIRTY WOMAN CREEK

MONUMENT, COLORADO

Prepared for the

Town of Monument

by the

Colorado Water Conservation Board

February, 1987

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PREFACE

This floodplain information report presents the results of a study of the floodplain along Crystal Creek and Dirty Woman Creek in the Town of Monument, Colorado. It was prepared by William J. Mullen, P.E. under the direction of Larry Lang, Chief, Flood Control and Floodplain Management Section of the Colorado Water Conservation Board at the request of the Town of Monument.

Copies of this report are available for public distribution, for a nominal fee, at the offices listed below.

Town of Monument
166 Second Street, P.O. Box U
Monument, Colorado 80132-0325

Flood Control and Floodplain
Management Section
Colorado Water Conservation Board
721 State Centennial Building
1313 Sherman Street
Denver, Colorado 80203

INTRODUCTION

Authorization

The Colorado Water Conservation Board received funding from the 1985 legislature to implement a "flood hazard identification program". Through this program, the Board is providing Colorado communities with the flood hazard data and information to administer a floodplain management program.

This report was authorized by the Colorado Water Conservation Board in joint sponsorship with the Town of Monument, Colorado.

As stated in Section 37-60-106(1)(c) of the Colorado Revised Statutes, the 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 and to designate and approve storm or floodway 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"...

The Town of Monument requested this flood study by letter of February 11, 1986 from Mr. James Underwood, the (then) Mayor of the Town of Monument (see Exhibit 1).

Purpose and Scope

This report was prepared to guide local officials in planning and administration of floodplain areas such that flood hazards and future flood damages are minimized.

The report data includes flooded area maps delineating the 100-year flood boundary, 10- and 100-year flood profiles and floodplain cross sections showing the high water elevations for the 100-year flood at selected reference points. The report also includes supporting engineering and hydrologic data which may also be used in the location and design of roads, bridges and channel modifications.

Acknowledgements

The assistance and cooperation of Ralph Gelvin, P.E. of Gelvin Engineering, Denver and Dwight Whitney of Land Use Design, Colorado Springs is appreciated.

Related Flood Studies

The Federal Emergency Management Agency published a Flood Insurance Rate Map for unincorporated El Paso County dated December 18, 1986 which shows a floodplain for Crystal and Dirty Woman Creeks in the Town of Monument. No flood water surface elevations were given for these creeks since the information for these creeks was based on an approximate study. The floodplain for nearby Monument Creek is also shown in this study, however it was determined that flooding from Monument Creek does not affect any land within the Town of Monument's corporate limits. In addition, Tri-Consultants of Lakewood has performed a floodplain analysis for the reach of Crystal Creek along Casey's Subdivision. Casey's Subdivision is located between Interstate I-25 and Beacon Light Road.

STUDY AREA DESCRIPTION

Drainage Basin Characteristics

Crystal Creek is an ephemeral stream with significant flows only during or after a rainstorm. Headwaters of Crystal Creek are located at approximately elevation 7,280 feet above mean sea level. The highest point in the basin is at 7,500 feet. The mouth of Crystal Creek is its confluence with Monument Lake at elevation 6915 feet. The creek begins by heading south-southwesterly and then southwesterly after it crosses Interstate I-25 to its mouth. The length of Crystal Creek from its headwaters to its confluence with Monument Lake is approximately 2.5 miles. The drainage area of Crystal Creek to just above its confluence with a small tributary (approximately 600 feet downstream from the D&RG railroad tracks) is 0.75 square miles. (See Basin Map, Plate 1).

Headwaters of Dirty Woman Creek are located at approximately 7430 feet above mean sea level with the highest point in the basin at elevation 7510 feet. The creek travels predominantly west until it crosses Interstate I-25 where it begins flowing southwest. The length of Dirty Woman Creek from its confluence with Monument Creek is approximately 4.3 miles. The drainage area of Dirty Woman Creek to its intersection with Mitchell Road (at the Town of Monument's western limit) is 5.0 square miles.

Study Reach Description

The study reach along Crystal Creek extends from just downstream from interstate I-25 to Monument Lake. Study limits are shown on Figure 2, the Plate Index. This reach covers a length of 1.0 mile of which approximately 0.6 mile is within the Town of Monument's corporate limit. The land is predominantly undeveloped in the portion of the creek downstream from I-25. There is no distinct channel in the most downstream reach.

The study reach along Dirty Woman Creek extends from the southbound interstate I-25 access ramp (from route 105) to Mitchell Road (Monument's downstream corporate limit). No detailed contour mapping exists for the length of the creek downstream from Mitchell Road; thus this portion was not studied. Study limits are shown on Plate 2, the Plate Index. This reach covers a length of 1.0 mile of which approximately 0.1 mile is in the current corporate limit for Monument. The land is undeveloped with the exception of Dirty Woman Creek Park, which encompasses all of the land adjacent to Dirty Woman Creek within the Town's corporate limits. There is no distinct channel through most of the reach.

The study reaches were included in the Federal Emergency Management Agency's Flood Insurance Rate Map (FIRM) for unincorporated El Paso County, dated December 18, 1986. The FIRM is shown in Exhibit 2. The flood boundary shown on this map was derived using approximate methods.

Flood History

No information exists documenting flood history of either Crystal or Dirty Woman Creeks. Documentation of flooding on nearby Monument Creek does exist, however (Ref. 2).

Flood Characteristics

"Typical" flooding along Crystal and Dirty Woman Creeks is caused by rainstorm runoff.

Hydrologic Analysis

Hydrology for both Crystal and Dirty Woman Creeks was obtained through the Colorado Urban Hydrograph Procedure (CUHP), developed by the Urban Drainage and Flood Control District. This is the method specified for ungaged drainage areas greater than 160 acres in the (preliminary) Storm Drainage Criteria Manual for the Town of Monument. Major parameters used in the hydrologic calculations are rainfall values of 1.90", 2.65", and 3.02" for the 10-, 50-, and 100-year 1 hour rainfalls, respectively. Soil Conservation Service soil type for each basin is 50% B and 50% C. Each basin was presumed to have about 15% impervious area. The 500-year peak flow for each basin was derived by an extrapolation of a plotting of the 10-, 50-, and 100-year peak flows for each creek on log-probability paper (see Figure 1).

Results of the CUHP analysis and the extrapolation of the 500-year peak flow lead to the following results:

Recurrence Interval (years)	Crystal Creek Peak Flow (cfs)	Dirty Woman Creek Peak Flow (cfs)
10	240	1230
50	510	2620
100	640	3360
500	1050	5800

Hydrology for Crystal Creek was consistent with a hydrologic analysis of the 100-year peak flow performed by Tri-Consultants for Casey's Subdivision located along Crystal Creek between I-25 and Beacon Light Road. Tri-Consultants used the Soil Conservation Service method to determine the 100-year peak flow.

Two of the road crossings examined will back flood waters up significantly due to the undersized culverts running under them. Beacon Light Road on Crystal Creek and the Denver Road on Dirty Woman Creek will both serve as temporary storage reservoirs for the flood waters. A standard reservoir routing was performed on each of these two "reservoirs". Through this analysis, it was determined that even at the 10-year peak flow, flood waters would overtop the roads and the peak flows downstream from the roads would be virtually the same as that upstream from the roads. Like-wise the 100-year peak flows would not be reduced downstream from the roads.

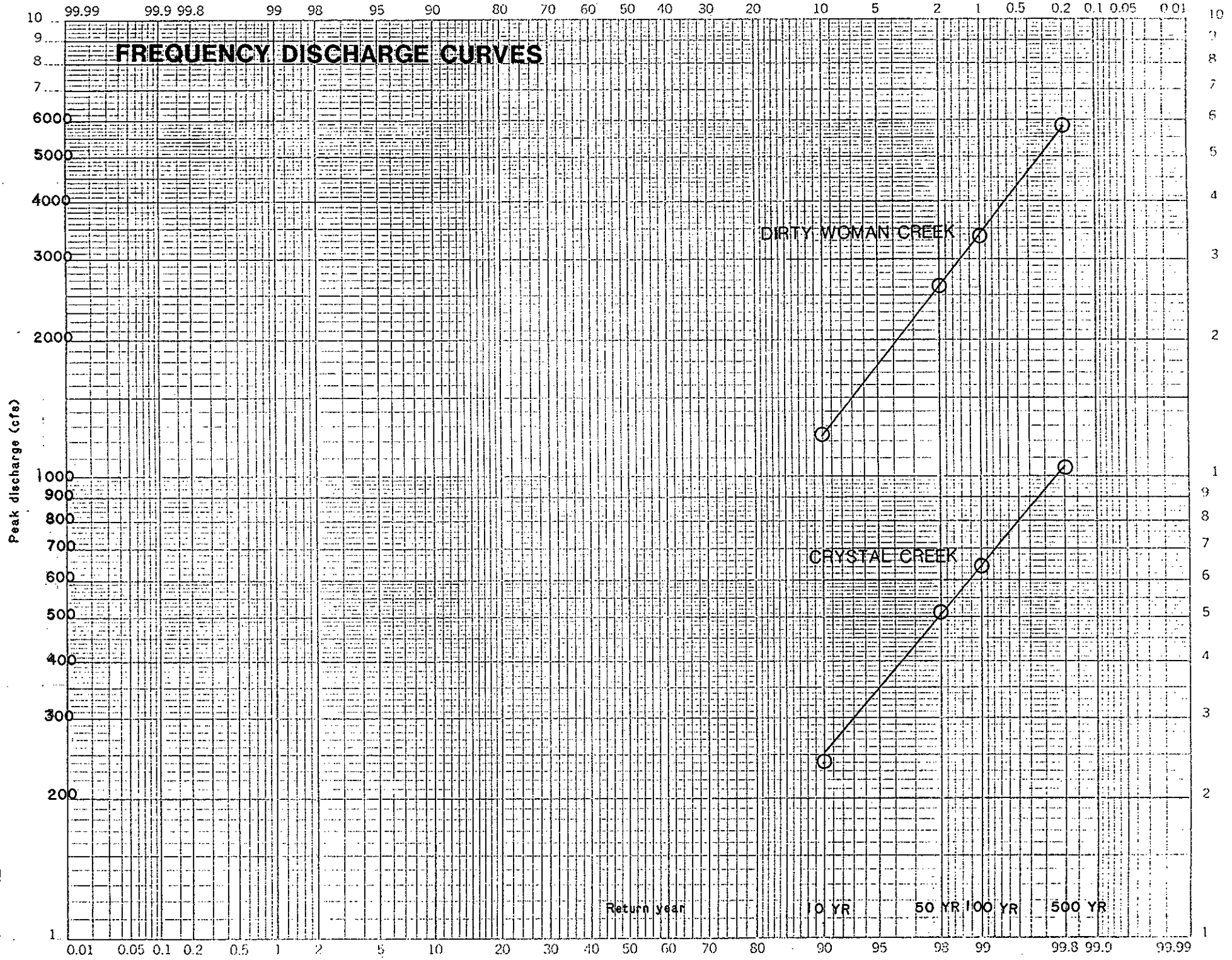

FREQUENCY DISCHARGE CURVES
DIRTY WOMAN CREEK
CRYSTAL CREEK
Peak discharge (cfs)
Return year
10 YR
50 YR
100 YR
500 YR
99.99 99.9 99.8 99 98 95 90 80 70 60 50 40 30 20 10 5 2 1 0.5 0.2 0.1 0.05 0.01
0.01 0.05 0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9 99.99
10000 9000 8000 7000 6000 5000 4000 3000 2000 1000 900 800 700 600 500 400 300 200 100

Figure 1

Hydraulic Analysis

An analysis of the hydraulic characteristics of Crystal Creek and Dirty Woman Creek was performed in order to determine water surface elevations for the 100-year flood on each stream. Bridge elevations and sizes of openings were surveyed and measured in the field on March 3 and 4, 1986. This data was combined with cross-section data taken from a 5' contour mapping of the Town of Monument (Ref. 5). This cross-section data became the input data in the U.S. Army Corps of Engineers HEC-2 step-backwater computer program.

The locations of the cross-sections are shown on the "Flooded Area Maps" (see Plates 2 to 5) and the hydraulic data for the cross-sections is displayed in Tables 1 and 2.

Roughness coefficients (Manning's "n" values) were also used as HEC-2 input. Roughness values for Crystal Creek varied from 0.020 (concrete portion) to 0.040 for the channel and from 0.025 to 0.045 for the overbank areas. Roughness values for Dirty Woman Creek varied from 0.025 to 0.050 for the channel and from 0.025 to 0.050 for the overbank areas.

The starting water surface elevations for the Crystal Creek analysis were the elevations given for Monument Lake on Monument Creek in the Flood Insurance Study for unincorporated El Paso County (Ref. 2) since this is the starting point of the Crystal Creek study. The starting water surface elevations for Dirty Woman Creek was critical depth since the first cross-section is immediately downstream from a bridge which would be overtopped during a flood.

The computed 100-year flood is outlined on the "Flooded Area Maps", plotted on the "Flood Profile" sheets, and tabulated in the "Cross-section and Water Surface Elevation Data" tables (Tables 1 and 2).

Culvert capacities are sufficient to pass the 100-year flow at all but two stream crossings. Both Beacon Light Road over Crystal Creek and the Denver Road over Dirty Woman Creek are inadequately sized. This is believed to be intentional as the backed up water temporarily floods only unused barren land and the peak flows downstream from these roads are attenuated to a certain degree during high frequency flooding events (i.e. common flood events). Should the land upstream from either road be developed, then attention would have to be paid to the area that would be flooded and culvert size perhaps should be increased.

Flooded Areas

The areas covered by the 100-year flood are shown on Plates 2 through 5. Further information with regards to flood elevations at various locations is given in the following sections of this report. Currently there are no buildings in the 100-year floodplains of either stream.

An examination of the Flood Insurance Rate Map for unincorporated El Paso County (Exhibit 2) shows that flooded areas along Monument Creek do not include any lands within the present boundaries of the Town of Monument.

INTERPRETATION AND USE OF REPORT

Flood Frequency and Discharge

Discharges listed in "Hydrologic Analysis" in this report are given for the 10-, 50-, 100-, and 500-year frequencies. This discharge information can be used for planning and engineering of floodplain improvements as well as for floodplain regulations upon official designation by the Colorado Water Conservation Board.

The 100-year flood can be expected to occur at any time in a given area. Based upon recorded historical precipitation, land runoff characteristics and other data, ther is a one percent chance that the 100-year flood will be equalled or exceeded in any one year. The 100-year flood is considered by CWCB and the Federal Insurance Administration as the flood magnitude for which floodplains should be designated for regulatory and improvement purposes. In Colorado, the 100-year floodplain is an area of state interest as defined in House Bill 1041 - Section 24-60-101 of the Colorado Revised Statutes.

Flood events rarer than the 100-year flood event can and will occur. Plans for land improvement adjacent to the 100-year floodplain should consider the probability of flood damage.

Flood Elevations

Plates 6 through 13 show the 10-year and 100-year flood profiles for Crystal and Dirty Woman Creeks.

Plates 14 and 15 show a graphical display of some of the cross-sections and the computed 100-year flood elevations at these cross-sections. Tables 1 and 2 give a summary of pertinent data at each cross-section. The actual HEC-2 computer output is in the files of the Colorado Water Conservation Board. In case of any question regarding 100-year flood elevations, the flood profiles should be consulted.

Flood Insurance

The National Flood Insurance Program (NFIP) is a Federal program that enables property owners to buy flood insurance at a reasonable, subsidized cost. In return, communities are required to carry out floodplain management measures to protect lives and new construction from future flooding. Exhibit 3 gives some NFIP rate information. Additional information on the NFIP is available as follows:

COMMUNITY INFORMATION:

Federal Emergency Management Agency
Natural & Technological Hazards Division
Bldg. 710, Denver Federal Center
Box 25267
Denver, CO. 80225-0267
(tel. no. 235-4830)

AGENT AND BROKER INFORMATION:

Mr. Jim Quinn
Computer Sciences Corp.
2801 Youngfield, suite 320
Golden, CO. 80401

(tel. no. 231-9911)

TABLE 1. CROSS-SECTION AND WATER SURFACE ELEVATION DATA FOR CRYSTAL CREEK

X-sec number	Comments	Location* (Station)	Channel bottom elev. (ft,msl)	100-yr flood elev. (ft,msl)	10-yr flood elev. (ft,msl)
0.5		0+55	6914.0	6919.5	6919.5
1		1+52	6916.0	6919.5	6917.8
1.5		3+70	6920.0	6922.6	6921.8
2	d/s N. Mon. Lake Rd.	5+41	6927.0	6931.1	6929.1
3	u/s N. Mon. Lake Rd.	6+21	6928.4	6934.1	6932.5
3.1		8+50	6932.1	6935.7	6933.5
4		12+00	6938.4	6940.2	6939.6
5		19+00	6952.4	6953.9	6953.4
6	d/s D&RG railroad	24+15	6969.8	6973.5	6971.7
7	u/s D&RG railroad	25+08	6972.0	6976.0	6974.1
8	d/s Washington St.	27+87	6976.3	6979.8	6978.2
9	u/s Washington St.	28+70	6977.1	6983.5	6980.9
10	d/s Route 105	31+30	6980.8	6985.7	6984.0
11	u/s Route 105	31+88	6982.1	6986.2	6984.4
12	d/s abandoned RR	33+68	6988.3	6994.2	6991.8
13	u/s abandoned RR	34+82	6992.0	6998.4	6995.8
14		39+00	6998.5	7001.8	7000.4
15	d/s Beacon Light Rd	42+68	7008.6	7011.2	7010.3
15.1	d/s Beacon Light Rd	42+70	7009.8	7012.4	7011.5
16	u/s Beacon Light Rd	45+00	7013.2	7031.9	7031.2
17		46+47	7018.0	7031.9	7031.2
18		50+35	7028.8	7031.9	7031.2
19		54+00	7041.5	7043.8	7043.1
20	I-25 culvert outlet	55+75	7049.8	7051.7**	-

* Distance in hundreds of feet upstream from Monument Lake tailwater.

** from Tri-Consultants report

TABLE 2. CROSS-SECTION AND WATER SURFACE ELEVATION DATA FOR DIRTY WOMAN CREEK

X-sec number	Comments	Location* (Station)	Channel bottom elev. (ft,msl)	100-yr flood elev. (ft,msl)	10-yr flood elev. (ft,msl)
1	d/s Mitchell Rd	10+42	6874.5	6878.6	6877.3
2	u/s Mitchell Rd	11+57	6875.0	6886.1	6884.9
3		14+70	6878.2	6885.7	6884.8
4	d/s D&RG railroad	17+70	6880.8	6892.4	6887.4
5	u/s D&RG railroad	18+62	6881.1	6894.3	6888.4
6		23+30	6886.0	6898.6	6891.6
7		29+20	6894.1	6902.1	6898.9
8	d/s Denver Rd	32+68	6900.8	6906.4	6904.6
9	u/s Denver Rd	33+55	6903.7	6925.7	6924.2
10	d/s abandoned RR	34+30	6904.7	6925.7	6924.2
11	u/s abandoned RR	36+10	6907.7	6925.7	6924.2
12		40+72	6912.9	6926.2	6924.3
13		50+00	6922.4	6931.0	6928.0
14		60+00	6934.5	6940.8	6938.4
15		65+00	6943.8	6950.3	6947.7

* Distance in hundreds of feet upstream from confluence with Monument Creek.

RECOMMENDATIONS

The findings of the hydrologic and hydraulic investigations can be used for a number of floodplain management activities. These activities include:

Implementation of floodplain zoning.
Floodproofing structures.
Sizing stream crossings and bridges.
Preparation of a flood control feasibility analysis.
Public awareness of flood problems.

By authority vested in Section 30-28-111 of the Colorado Revised Statutes for county governments and Section 31-23-201 for municipal governments, the cities, towns, and counties within the study area may enact certain flood-related controls and regulations ...

> "...to establish, regulate, restrict, and limit such uses on or along any storm or floodwater runoff 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 ..."

Therefore, upon official approval of this report by the Colorado Water Conservation Board, the areas described as being innundated by the 100-year flood can be designated as flood hazard areas and their use regulated accordingly by the local agencies. It is recommended that such regulation be enacted upon such designation.

Following acceptance of this study, the Town of Monument may request to be converted from the Emergency Phase of the National Flood Insurance Program (NFIP) to the Regular Phase through the "special conversion provision" of the program. It is recommended that the results of this study be incorporated into any new Flood Insurance Rate Maps (FIRM's) put out by the Federal Emergency Management Agency for this area. Specifically, the flood boundary shown in the "Flooded Area Maps" in this report could be used to replace the flood boundary as shown in the Federal Emergency Management Agency's FIRM of December 18, 1986 (see Exhibit 2). Upon Monument's conversion to the regular phase of the National Flood Insurance Program, additional amounts of flood insurance coverage will be available to dwellings within the 100-year floodplain. Exhibit 3 gives some information on National Flood Insurance Program coverage available.

EXHIBIT 1

Town of Monument
166 Second St., P.O. Box U
Monument, CO 80132-0325

James A. Underwood
Mayor

Shirley A. Mumm
Administrator/Clerk/Treasurer

RECEIVED
FEB 13 1986
COLORADO WATER
CONSERVATION BOARD

February 11, 1986

Mr. Larry Lang
P.E. Section Chief
Colorado Water Conservation Board
1313 Sherman Street, Room 721
Denver, CO. 80203

Dear Mr. Lang:

This letter is to request your section's assistance in the preparation of updated Flood Plain maps for the Town of Monument to replace the existing Flood Hazard Boundary maps which are currently in use. The Town of Monument has recently prepared a Master Drainage study for the town which strongly discourages any usage of areas within the 100-year flood plain, therefore, accurate mapping of these areas in quite essential for the proper enforcement of the restrictions.

While the town has limited resources, we will provide whatever existing data is available and to whatever extent possible, assistance to your field crew in either obtaining field data or reviewing past and present potential flooding conditions. The Town Engineer has expressed that his office will make available whatever files would be of assistance during your study.

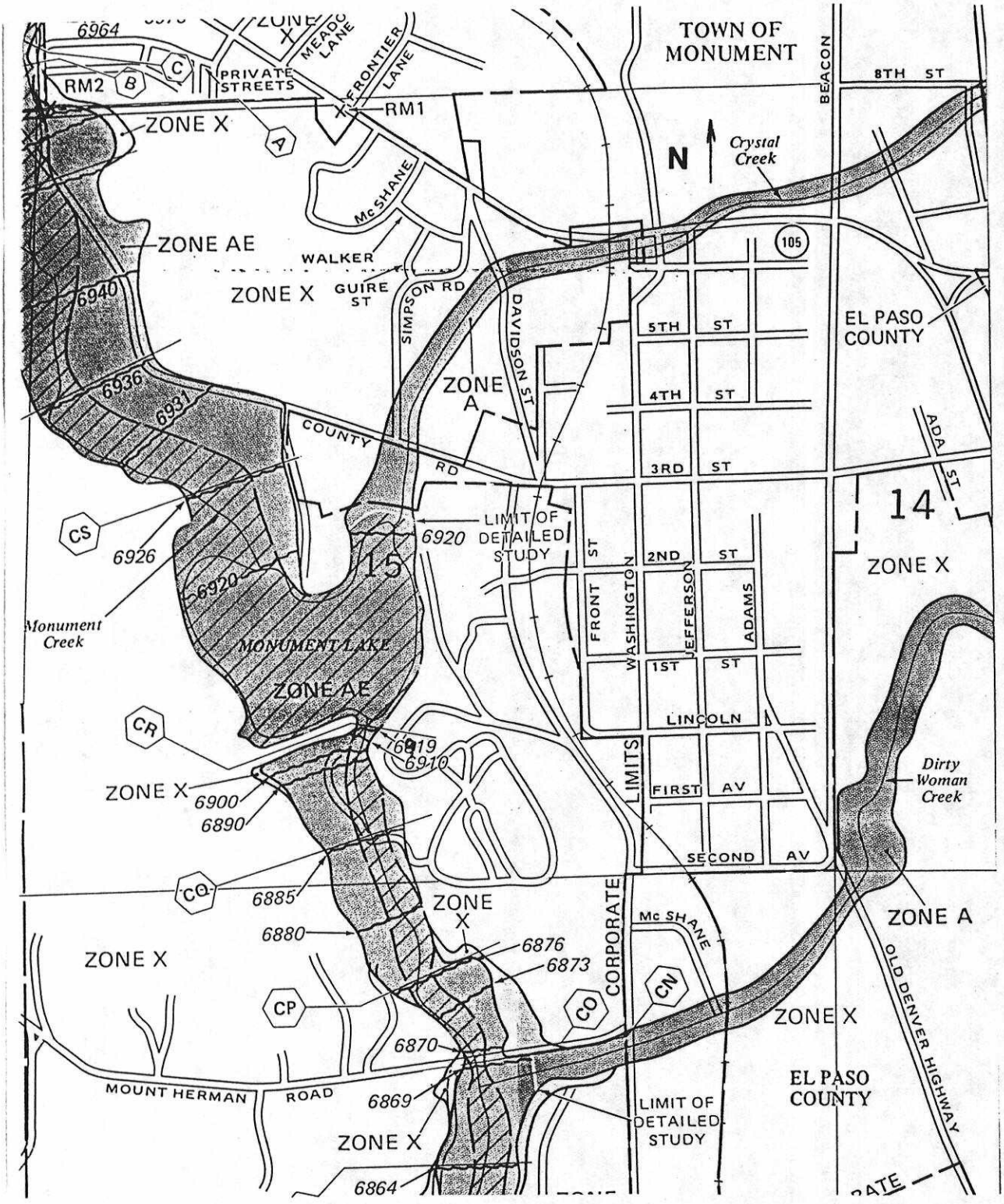
If we can provide you with further information or assistance to begin this project, please contact the Town at your earliest convenience.

Sincerely,

James A. Underwood
Mayor

JAU/sm

EXHIBIT 2



FLOOD INSURANCE RATE MAP (county-wide format)

EXHIBIT 3

NATIONAL FLOOD INSURANCE PROGRAM

Some Examples of Insurance Rates for Existing Structures*

Rates per year per $100 coverage

EMERGENCY PHASE

	Structure	Contents
(1) Residential	$0.45	$0.55
(2) All others (including hotels and motels)	.55	1.10

REGULAR PHASE** - Zones A, AO, AH, D, A1-A30

	1st $35,000	Addt'l Coverage	1st $35,000	Addt'l Coverage
(1) Single Family Residential No Basement	$0.45	$0.17	$0.55	$0.28
Finished and Unfinished Basement	0.50	0.35	0.55	0.55
Mobile Home	0.45	0.17	0.55	0.38
(2) All other residential (including hotels and motels)	0.45	0.33	***	***
No Basement	0.50	0.40	0.55	0.55
(3) Non-Residential W/Basement	0.60	0.40	1.10	0.95
No Basement	0.55	0.30	1.10	0.25
Mobile Home	0.55	0.30	1.10	0.25

*As of 1/8/96

**For the Emergency Phase Only "First Layer coverage "(up to $35,000 is available; For the Regular Phase "Second Layer Coverage" (up to an additional $150,000) is also available

***Rated on a case-by-case basis.

BIBLIOGRAPHY

1. Colorado Water Conservation Board, field survey of March 3 and 4, 1986.

2. Federal Emergency Management Agency, Flood Insurance Study, unincorporated El Paso County, December 18, 1986.

3. Federal Insurance Administration, Flood Hazard Boundary Map, Town of Monument, Community No. 080064A, revised Oct. 22, 1976

4. Gelvin Engineering, Zoning map, February, 1986

5. Landmark Mapping, 5-foot contour map, 1977

6. Town of Monument, letter of request to Larry Lang, Chief, Flood Control and Floodplain Management Section, Colorado Water Conservation Board, dated February 11, 1986

7. Town of Monument, Storm Drainage Criteria Manual, December, 1985 (preliminary)

8. Tri-Consultants, Inc., Casey's Subdivision, 100-Year Historic Floodplain, February, 1984

9. Urban Drainage and Flood Control District, Colorado Urban Hydrograph Procedure, computer program / PC version, Jan., 1985

10. U. S. Army Corps of Engineers: HEC-2 Water Surface Profiles, Computer Program, The Hydrologic Engineering Center, Davis, California

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12. U.S. Department of Agriculture, Soil Conservation Service, Soil Survey, El Paso County

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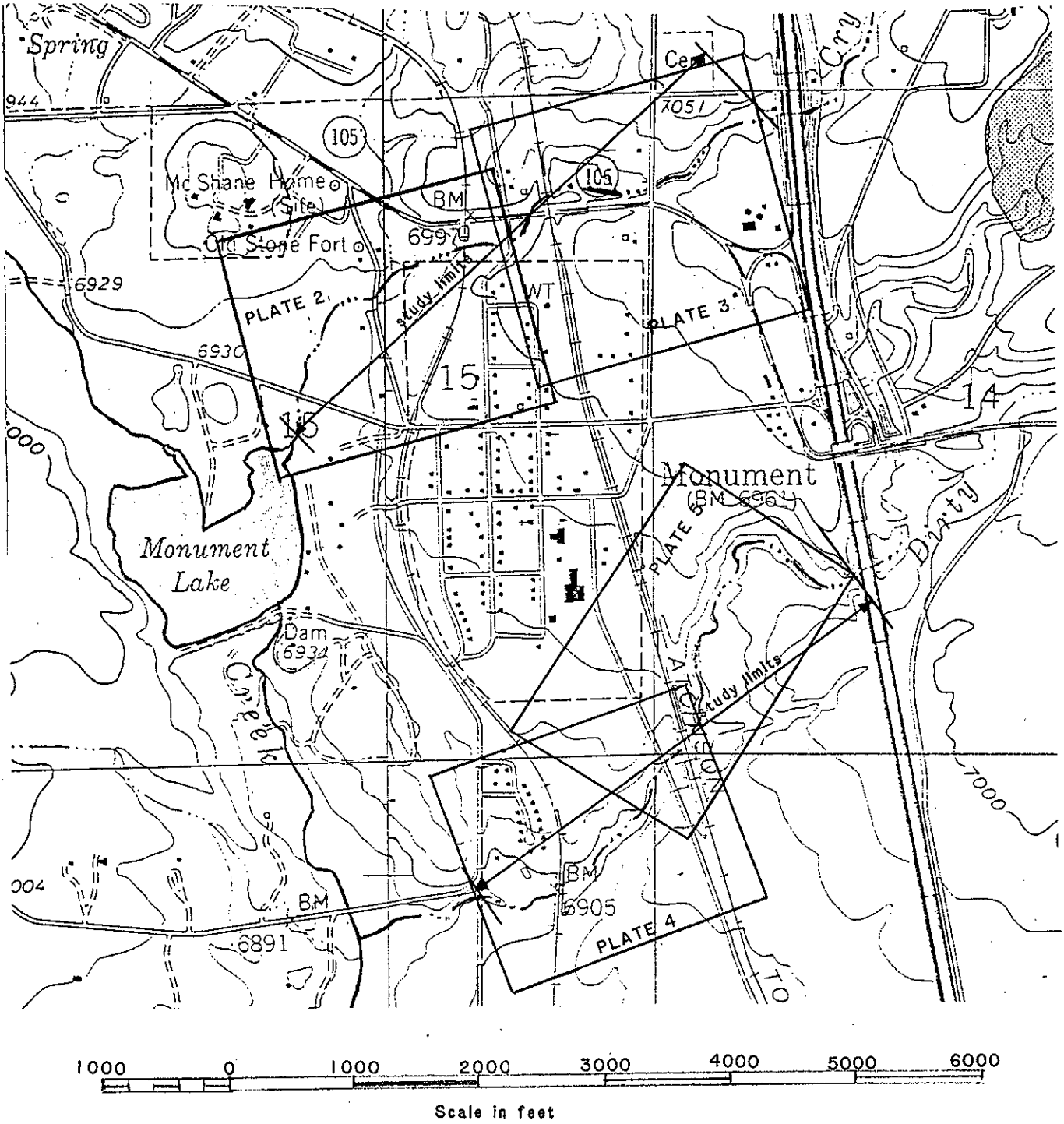
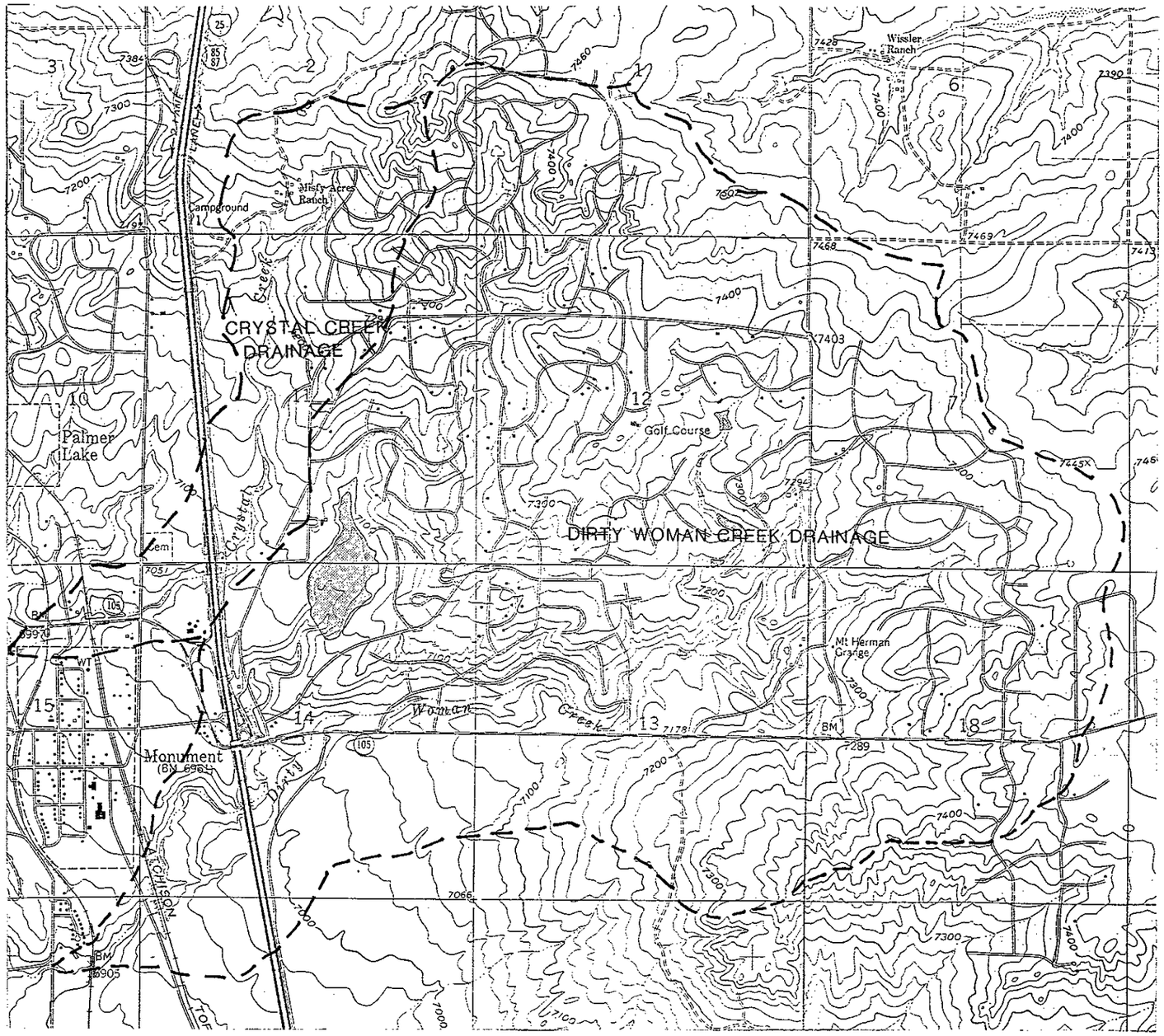


FIGURE 2 : PLATE INDEX



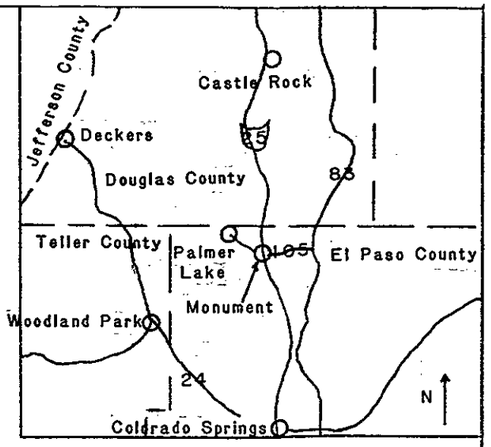
N

LEGEND

- Drainage basin boundary
- 25 Interstate highway
- 105 State highway

contour interval = 20'

study area is that portion west of I-25



VICINITY MAP

Scale in miles

5 0 5 10 15 20

Scale in feet

1000 0 1000 2000 3000 4000 5000

El Paso County

Town of Monument

DIRTY WOMAN CREEK

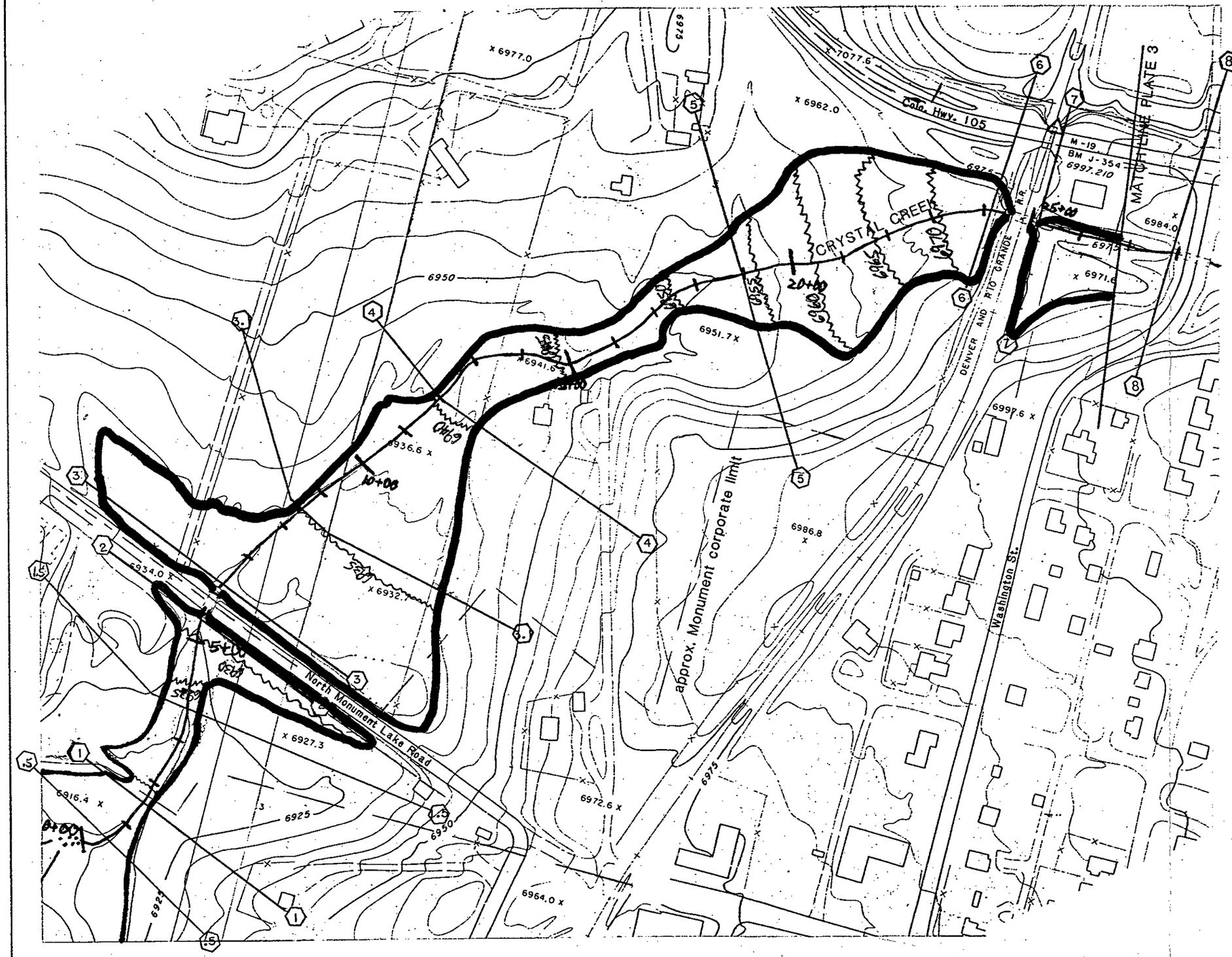
CRYSTAL CREEK

BASIN MAP

Prepared by

Flood Control and Floodplain Management Section

Colorado Water Conservation Board



LEGEND

100-year flood limits

10+00 Stationing from Monument Lake (hundreds of feet)

Cross-section

Benchmark

NOTES

Elevations in feet above mean sea level.
contour interval=5'

Scale in feet

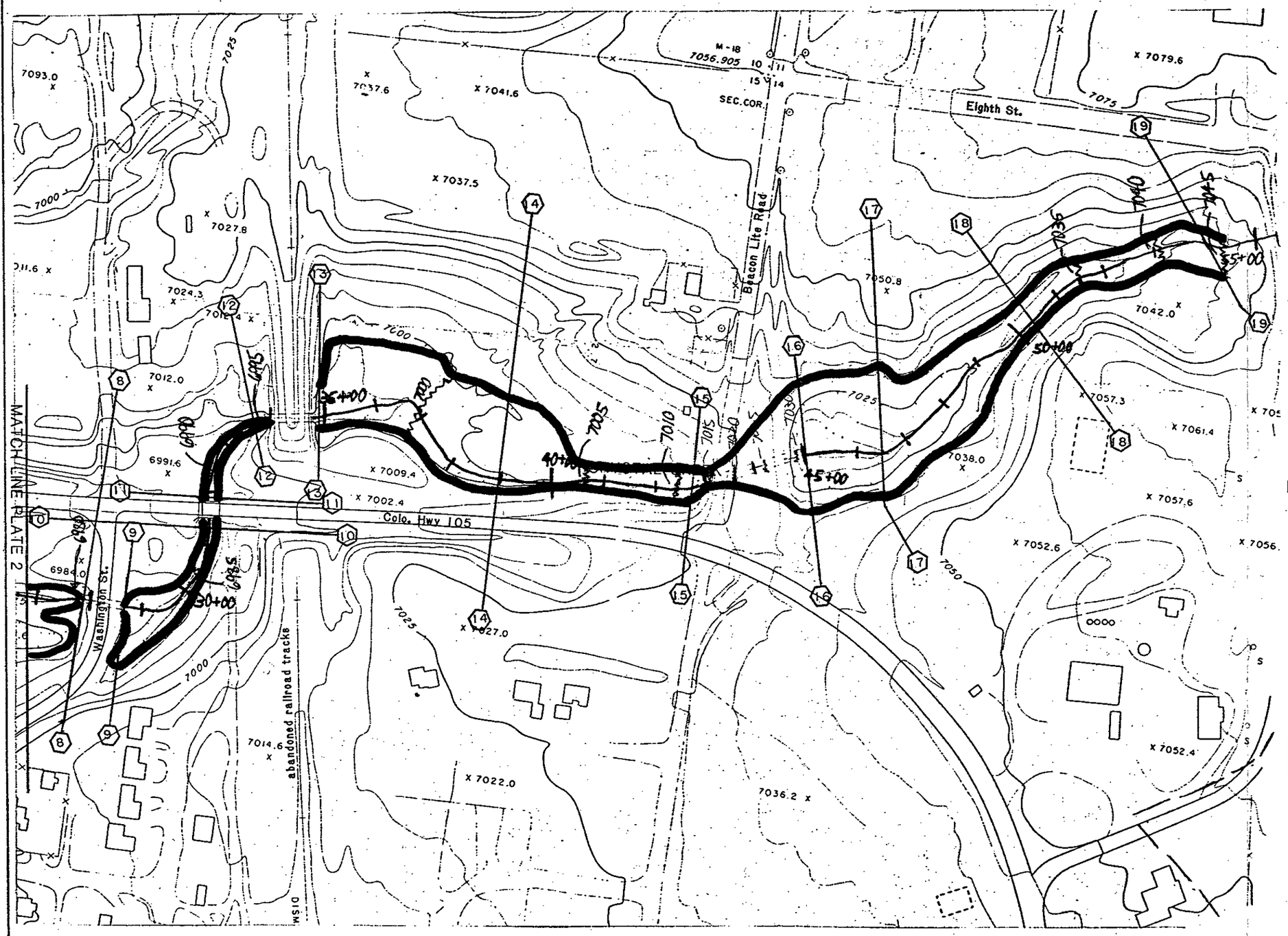
0 100 200 300 400 500

FLOODED AREA MAP

CRYSTAL CREEK

FEBRUARY 1987

MONUMENT, COLORADO



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LEGEND

100-year flood limits

10+00 Stationing from Monument Lake (hundreds of feet)

Cross-section

Benchmark

NOTES

Elevations in feet above mean sea level. contour interval=5'

Scale in feet

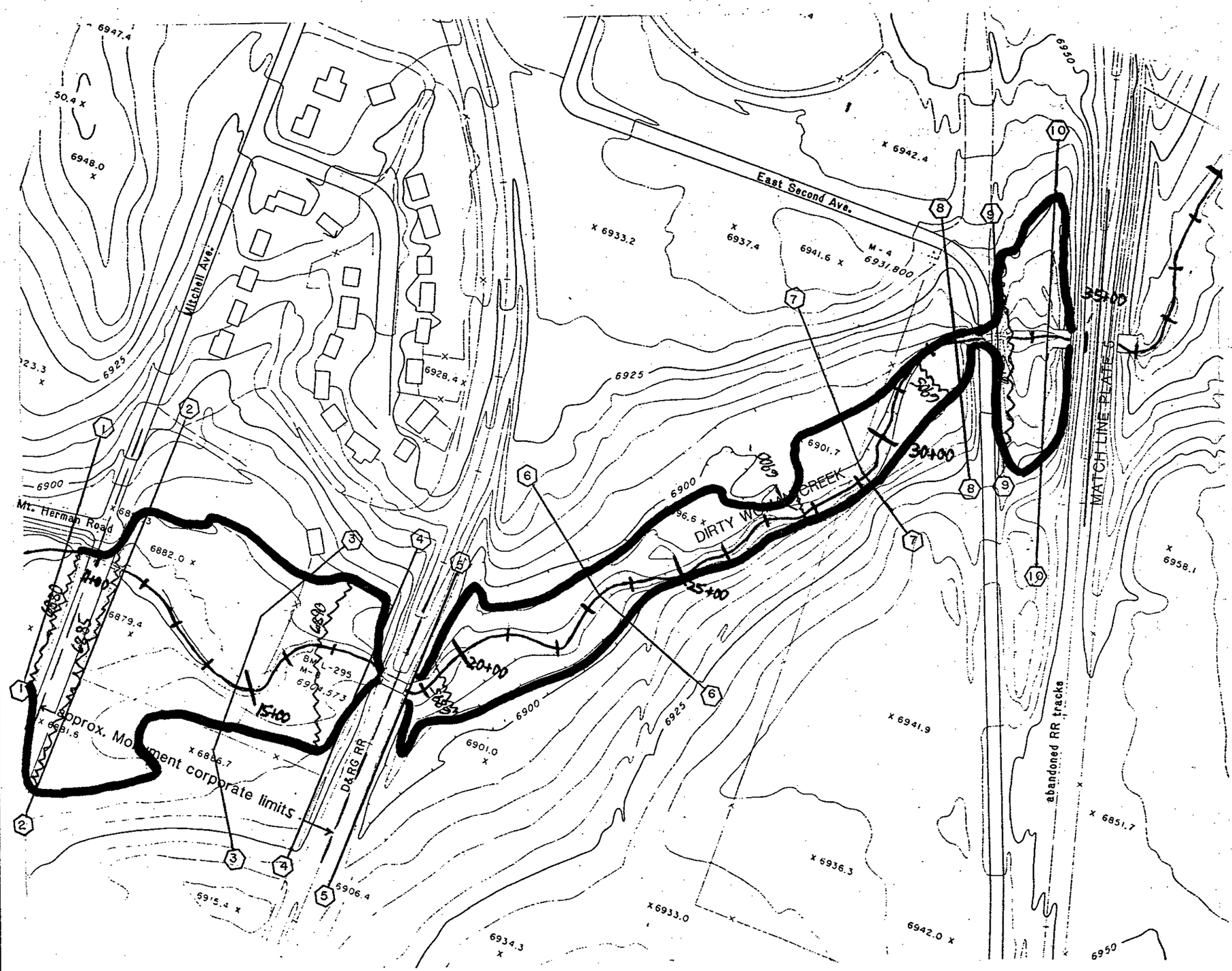
0 100 200 300 400 500

FLOODED AREA MAP

CRYSTAL CREEK

FEBRUARY 1987

MONUMENT, COLORADO



N

LEGEND

100-year flood limits

10+00 Stationing from confluence with Monument Creek (hundreds of feet)

9—9 Cross-section

△ Benchmark

NOTES

Elevations in feet above mean sea level.
contour interval=5'

Scale in feet

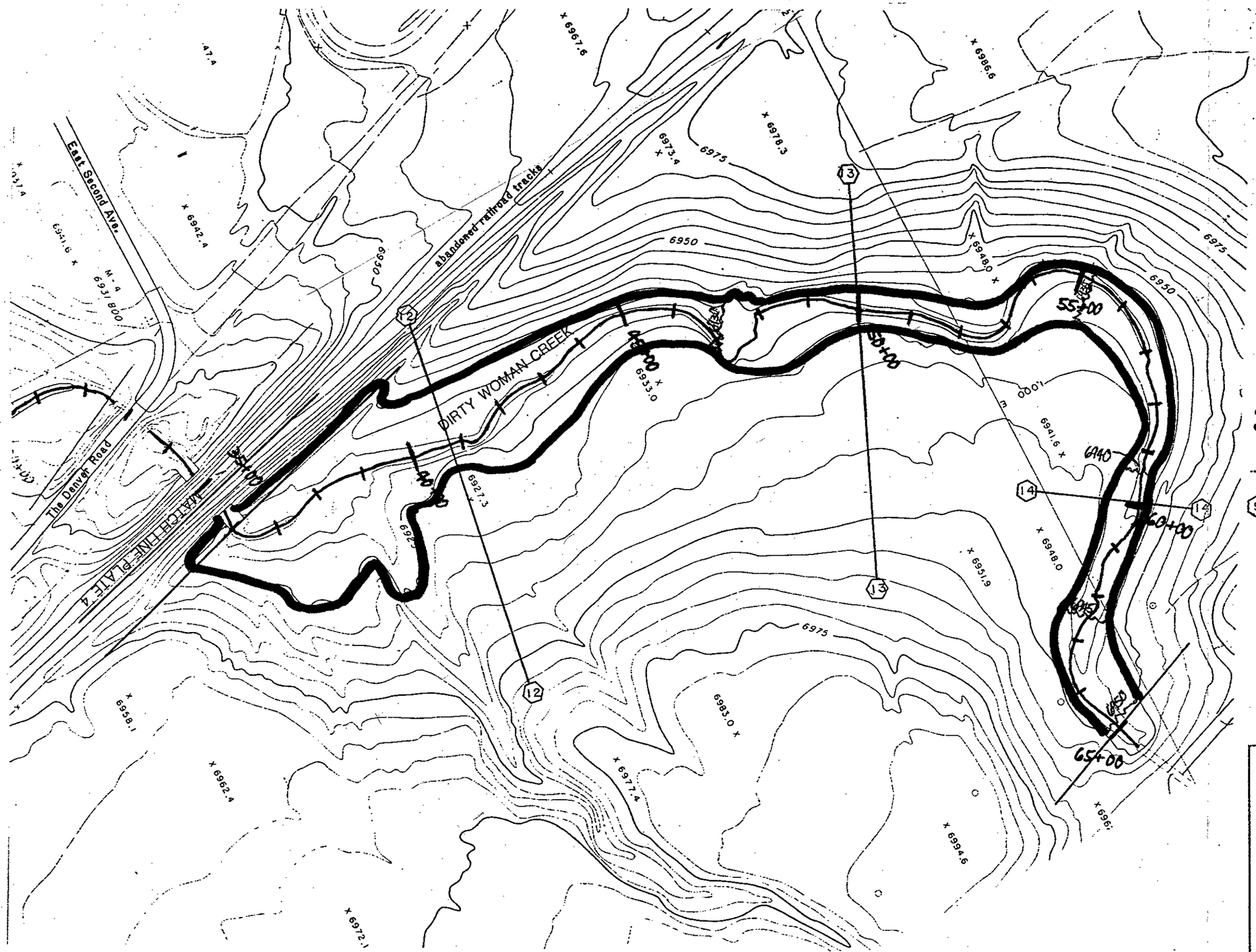
0 100 200 300 400 500

FLOODED AREA MAP

DIRTY WOMAN CREEK

FEBRUARY 1987

MONUMENT, COLORADO



LEGEND

100-year flood limits

10+00 Stationing from confluence with Monument Creek (hundreds of feet)

9—9 Cross-section

△ Benchmark

NOTES

Elevations in feet above mean sea level.
contour interval=5'

Scale in feet

0 100 200 300 400 500

FLOODED AREA MAP

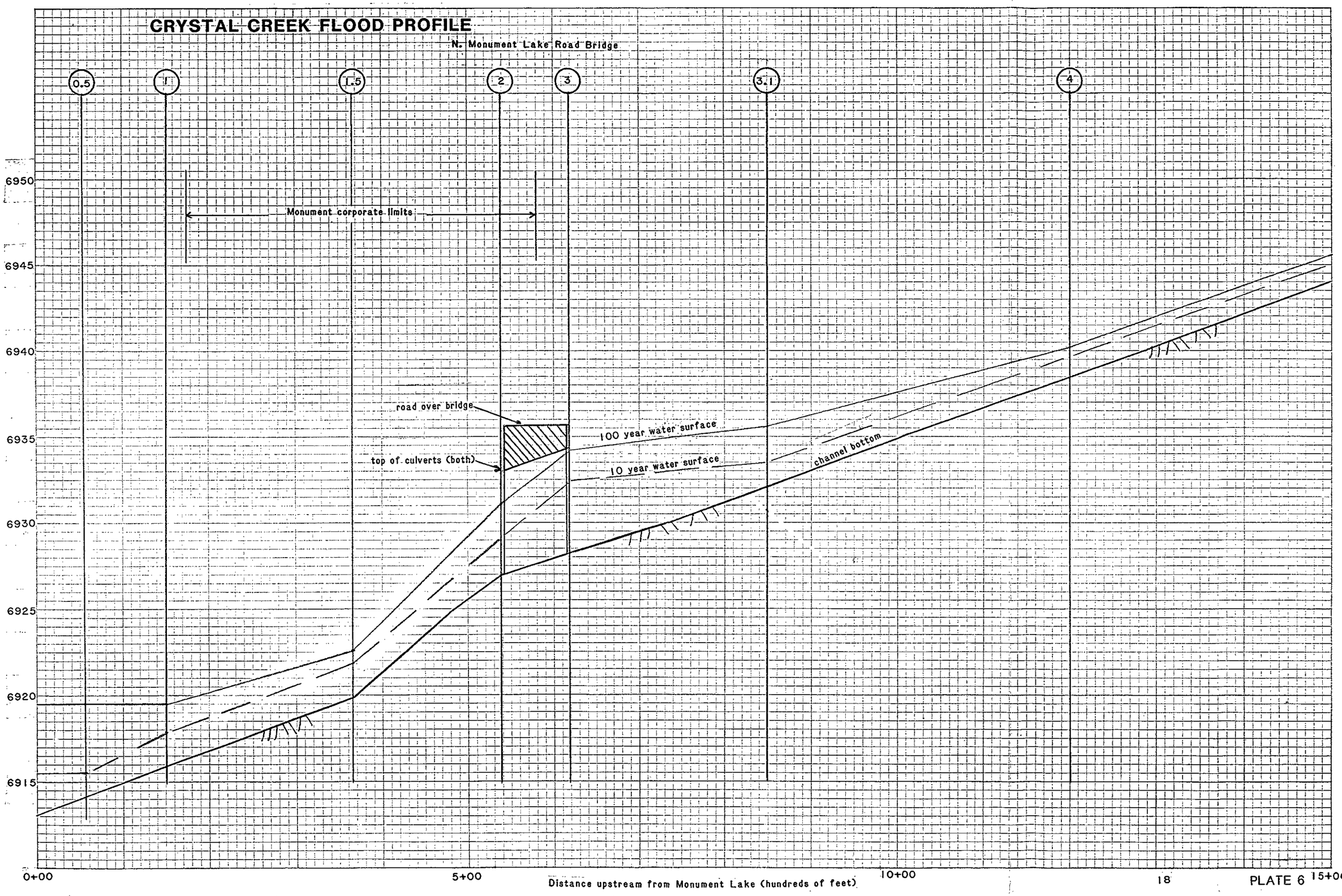
DIRTY WOMAN CREEK

FEBRUARY 1987
MONUMENT, COLORADO

PLATE 5

092-9274 STATE OF COLORADO WATER CONSERVATION BOARD --- ENGINEERING DEPARTMENT PLOTTED_____ CHECKED_____

CRYSTAL CREEK FLOOD PROFILE



092-9274 STATE OF COLORADO WATER CONSERVATION BOARD --- ENGINEERING DEPARTMENT PLOTTED_____ CHECKED_____

CRYSTAL CREEK FLOOD PROFILE

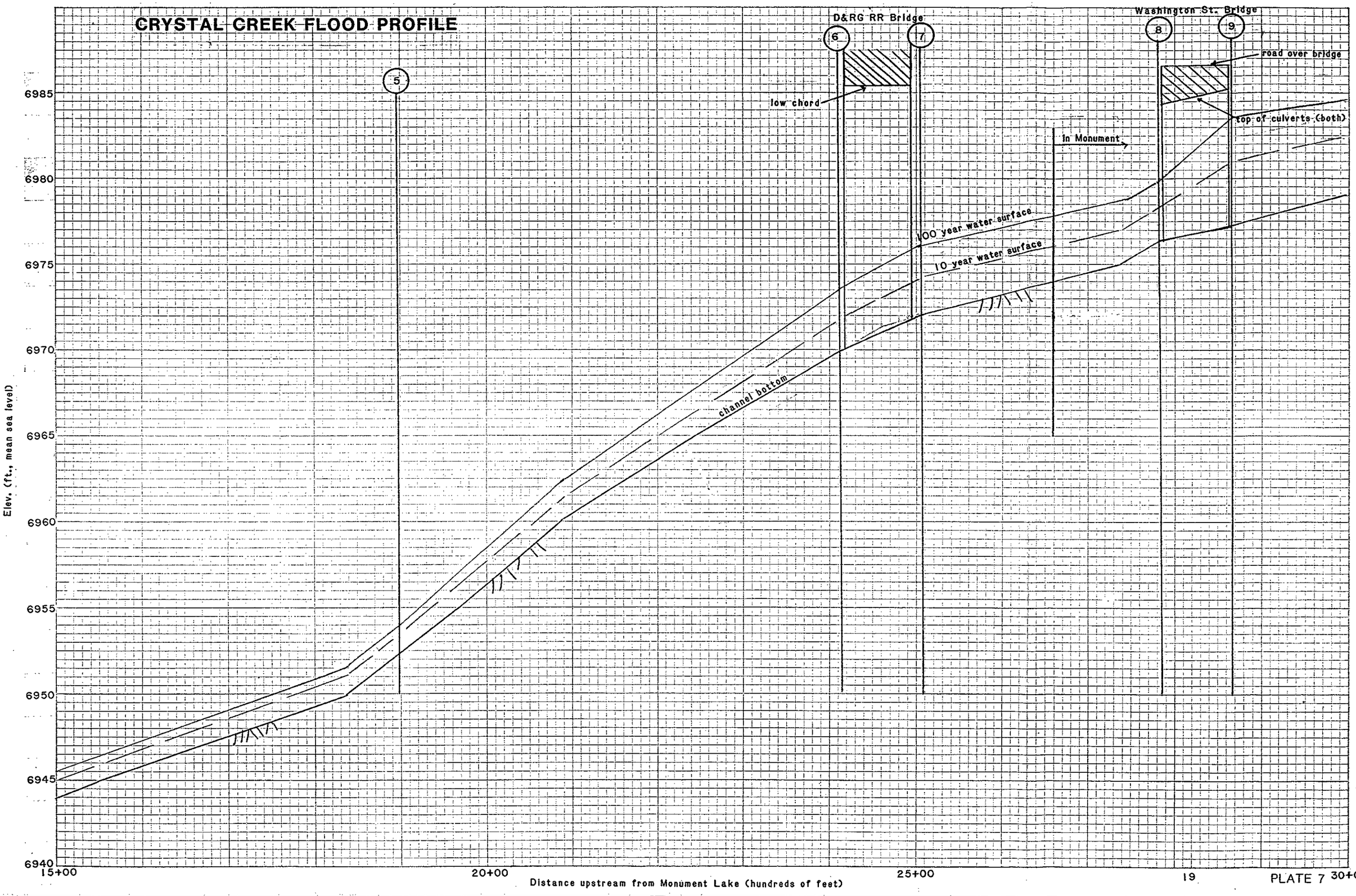


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PLATE 7

092-9274 STATE OF COLORADO WATER CONSERVATION BOARD --- ENGINEERING DEPARTMENT

PLOTTED _____ CHECKED _____

CRYSTAL CREEK FLOOD PROFILE

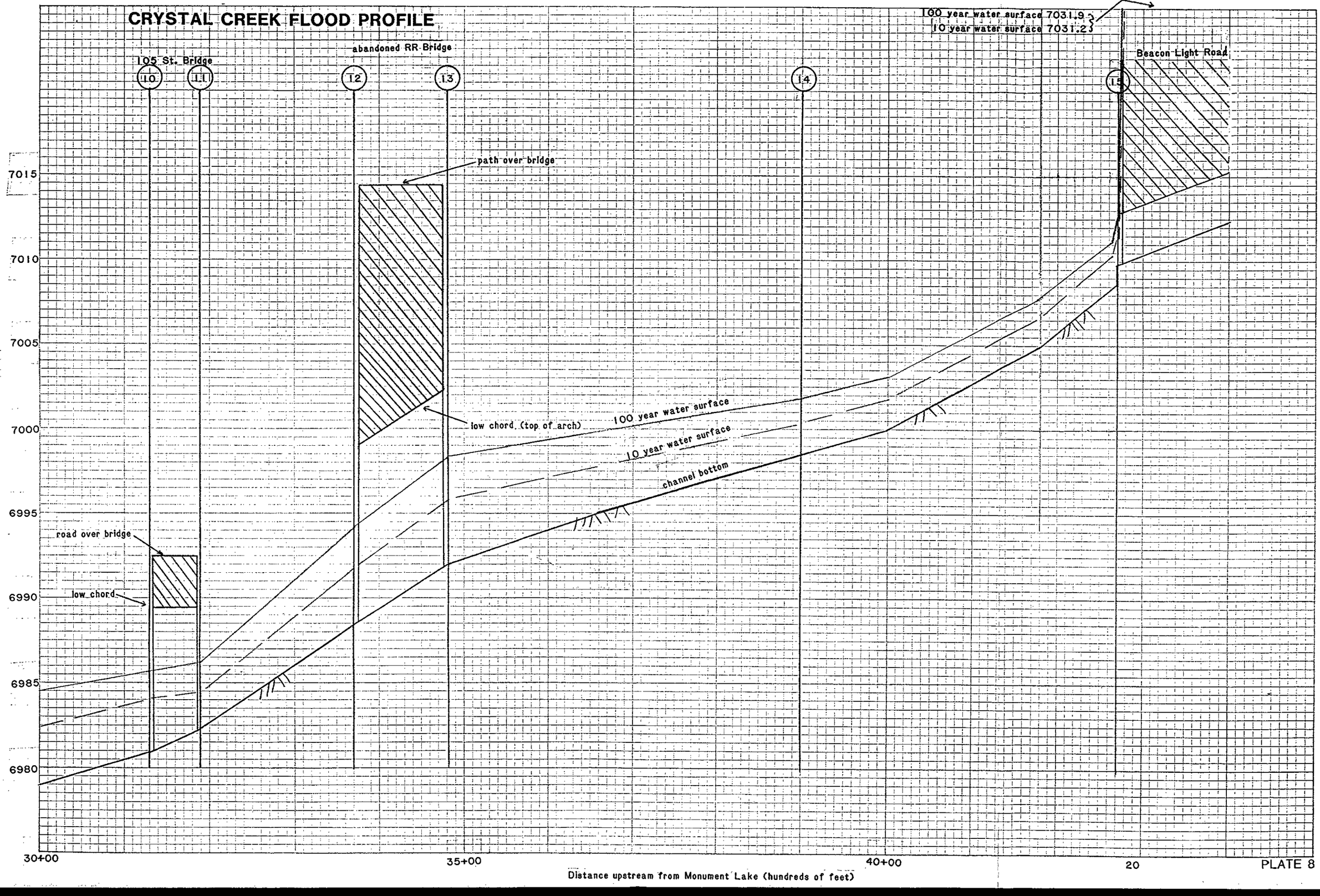
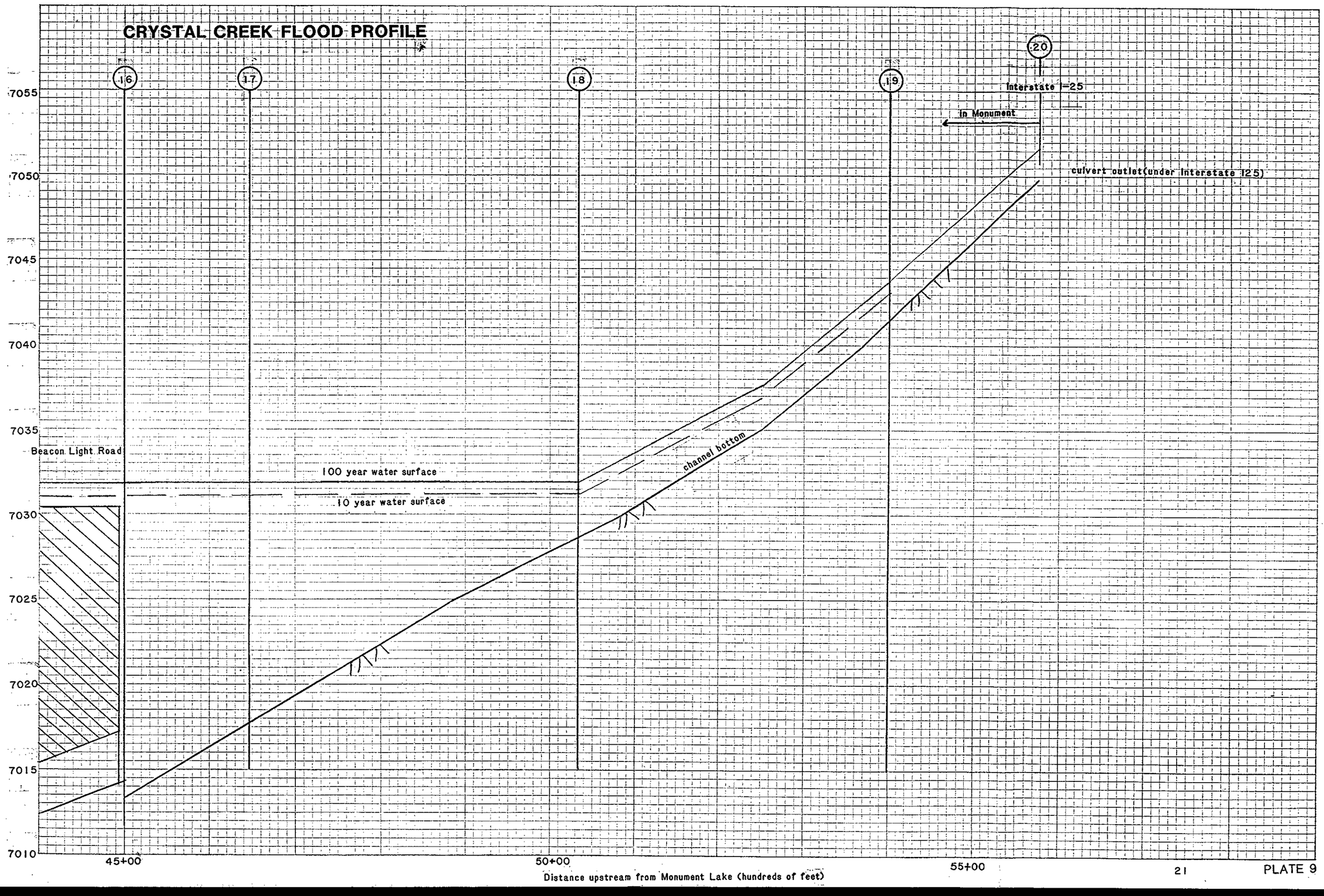


PLATE 8

092-9274 STATE OF COLORADO WATER CONSERVATION BOARD --- ENGINEERING DEPARTMENT PLOTTED_____ CHECKED_____

CRYSTAL CREEK FLOOD PROFILE



092-9274 STATE OF COLORADO WATER CONSERVATION BOARD --- ENGINEERING DEPARTMENT PLOTTED_____ CHECKED_____

DIRTY WOMAN CREEK FLOOD PROFILE

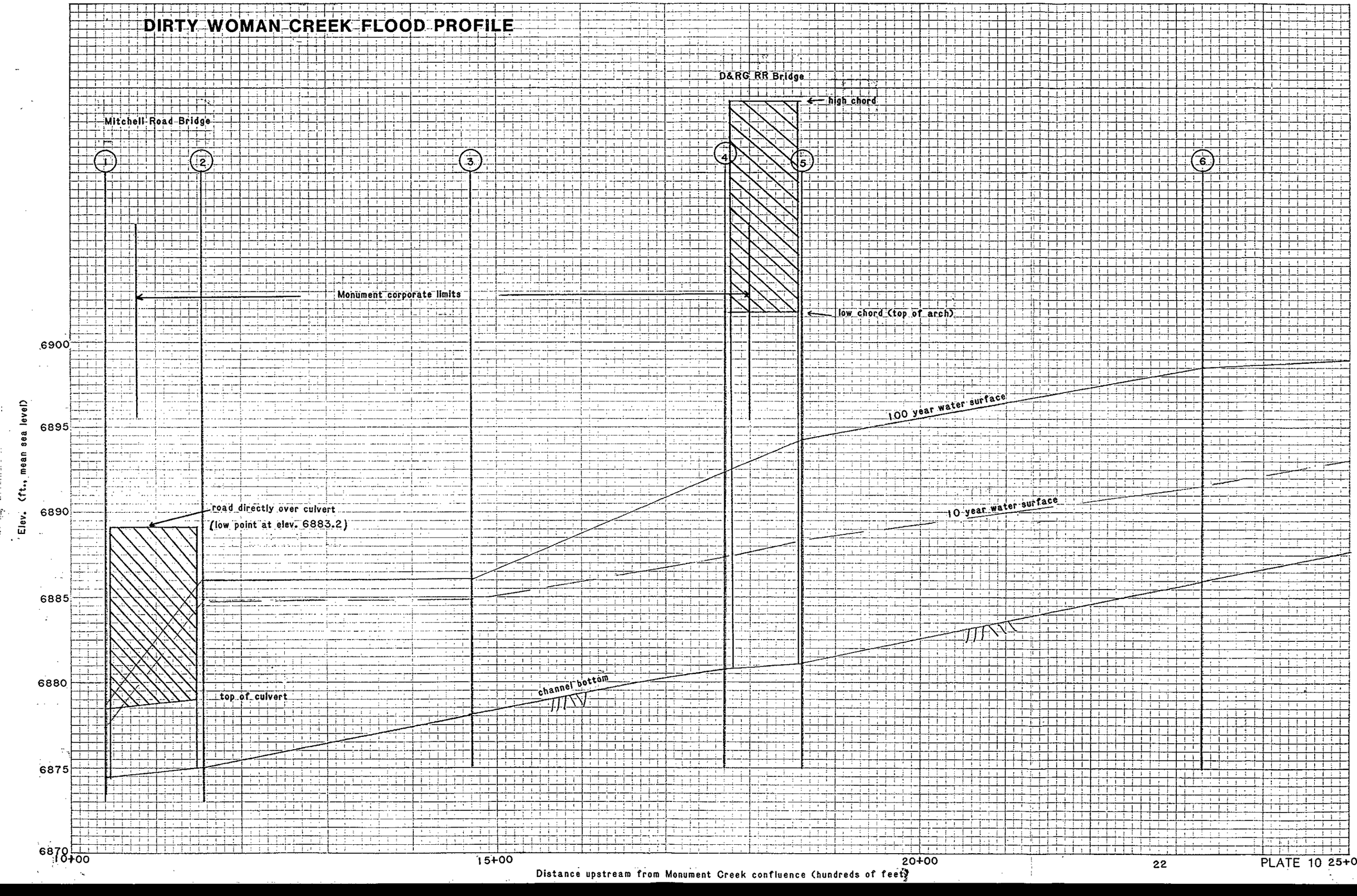
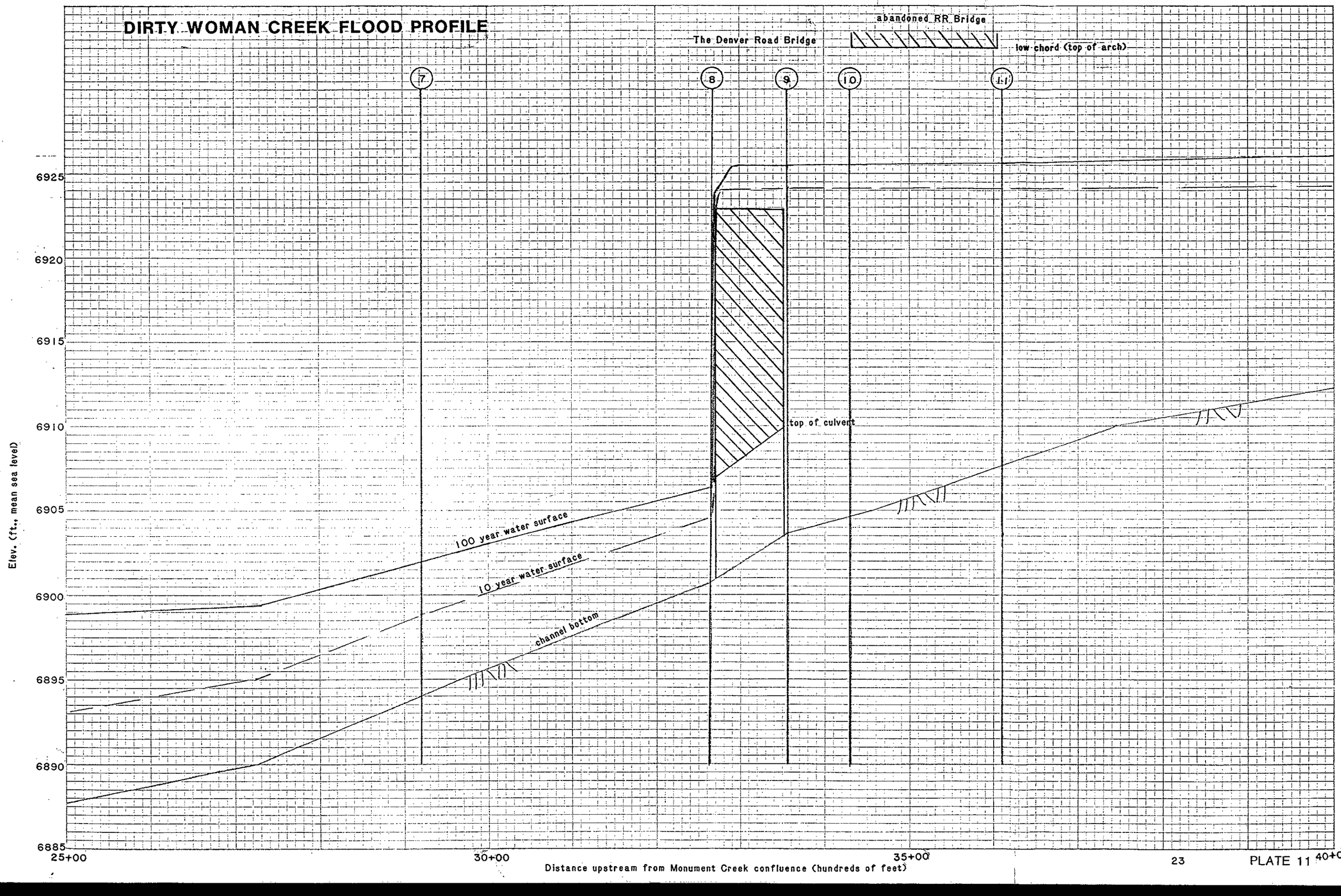


PLATE 10

092-9274 STATE OF COLORADO WATER CONSERVATION BOARD --- ENGINEERING DEPARTMENT PLOTTED_____ CHECKED_____

DIRTY WOMAN CREEK FLOOD PROFILE



052-9274 STATE OF COLORADO WATER CONSERVATION BOARD --- ENGINEERING DEPARTMENT PLOTTED _____ CHECKED _____

DIRTY WOMAN CREEK FLOOD PROFILE

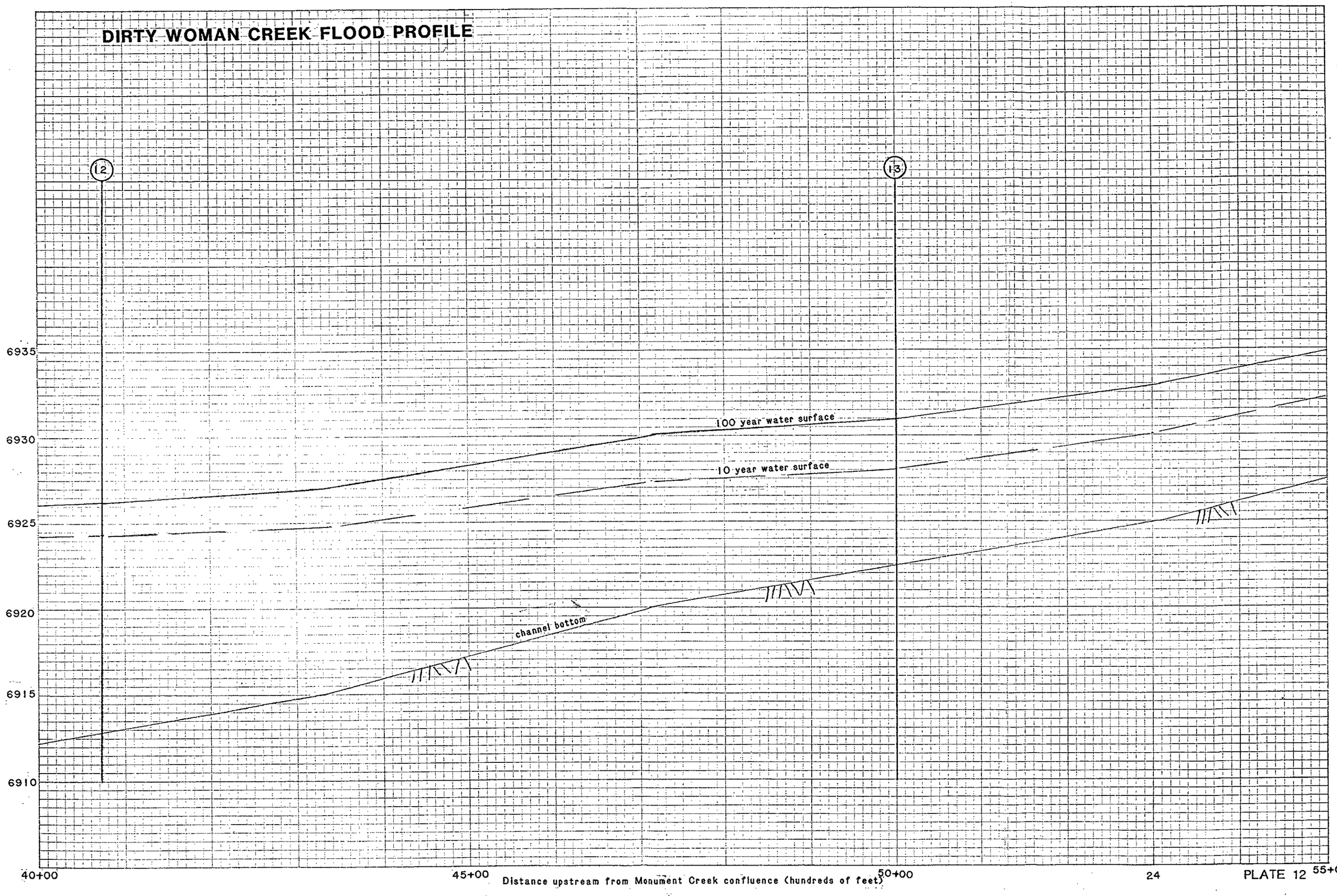


PLATE 12

092-9274 STATE OF COLORADO WATER CONSERVATION BOARD --- ENGINEERING DEPARTMENT PLOTTED_____ CHECKED_____

DIRTY WOMAN CREEK FLOOD PROFILE

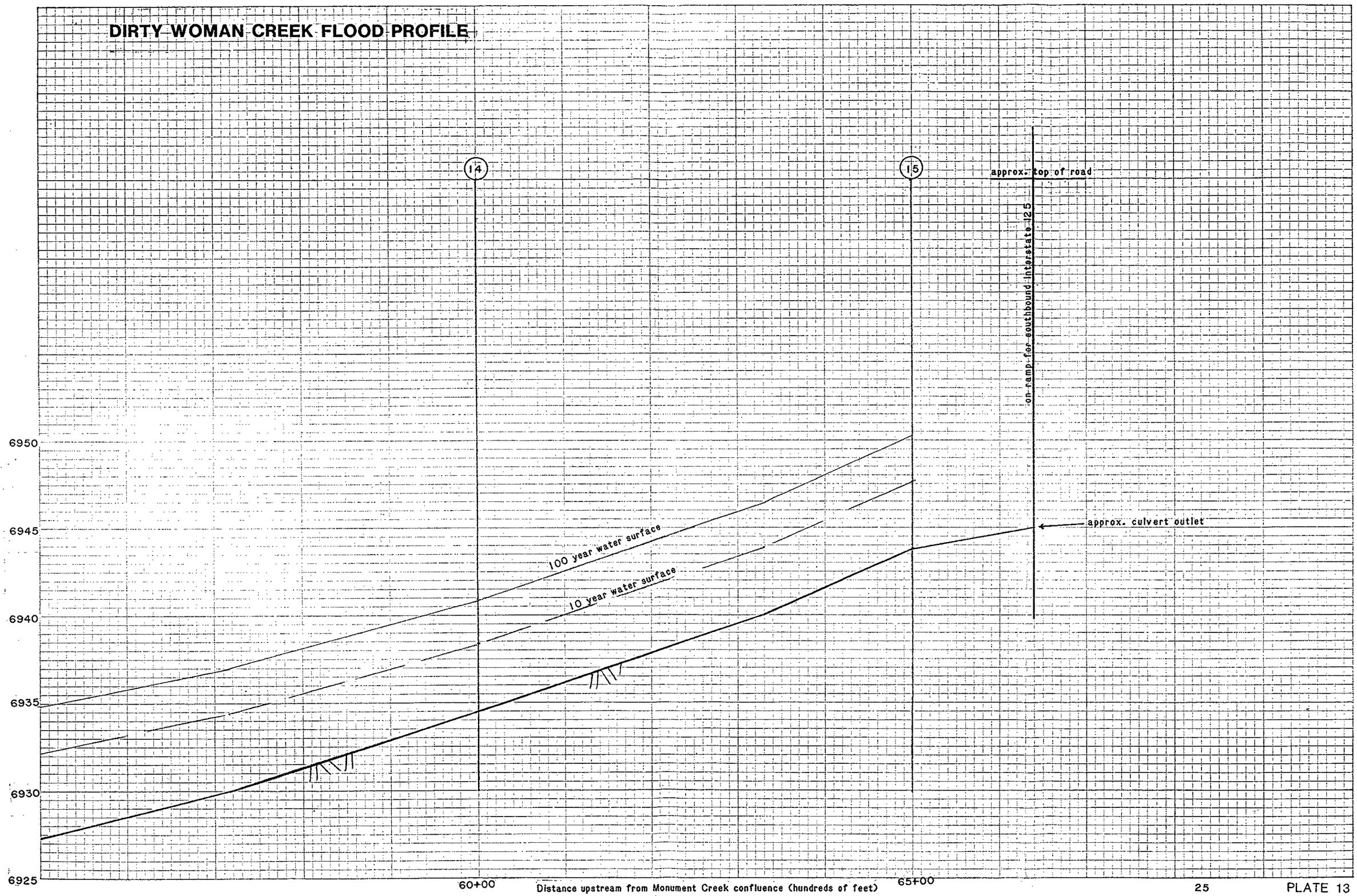


PLATE 13

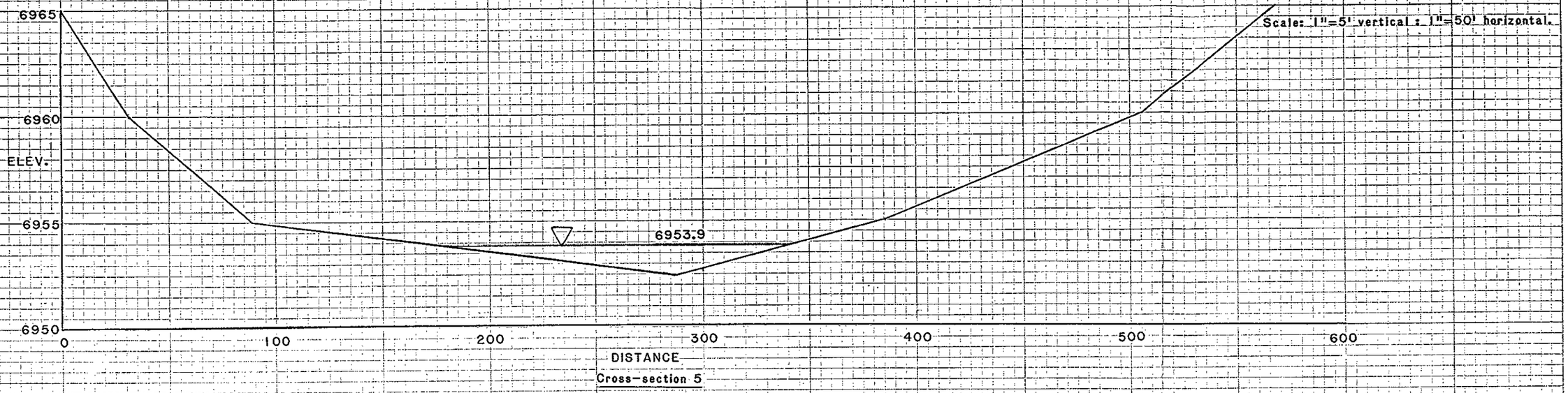
CROSS-SECTIONS - CRYSTAL CREEK

All cross-sections from 5' contour map.

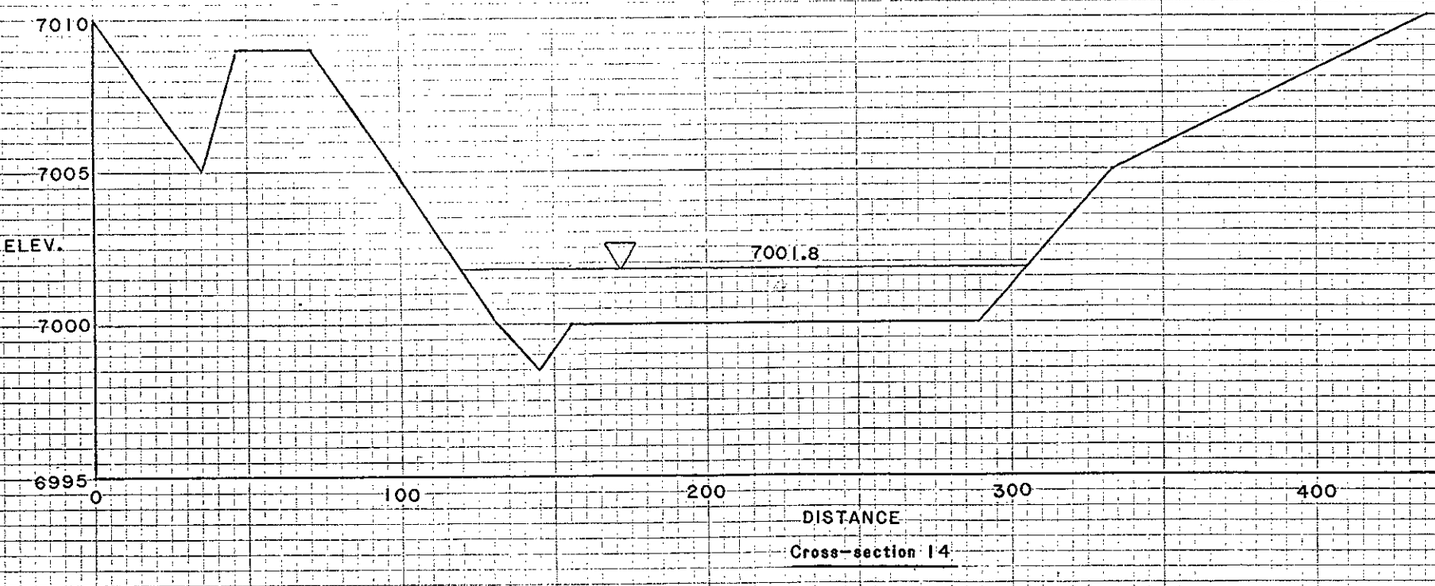
All elevations in feet above mean sea level.

Cross-sections looking downstream.

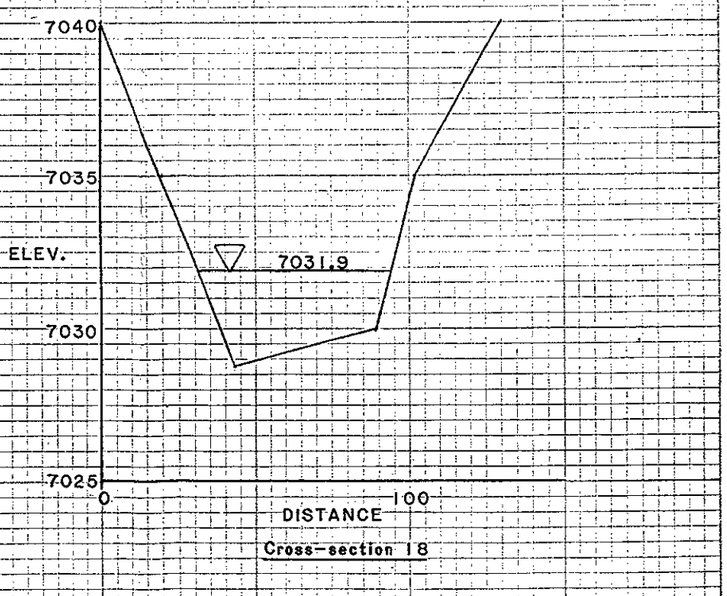
Scale: 1"=5' vertical : 1"=50' horizontal.



Cross-section 5



Cross-section 14

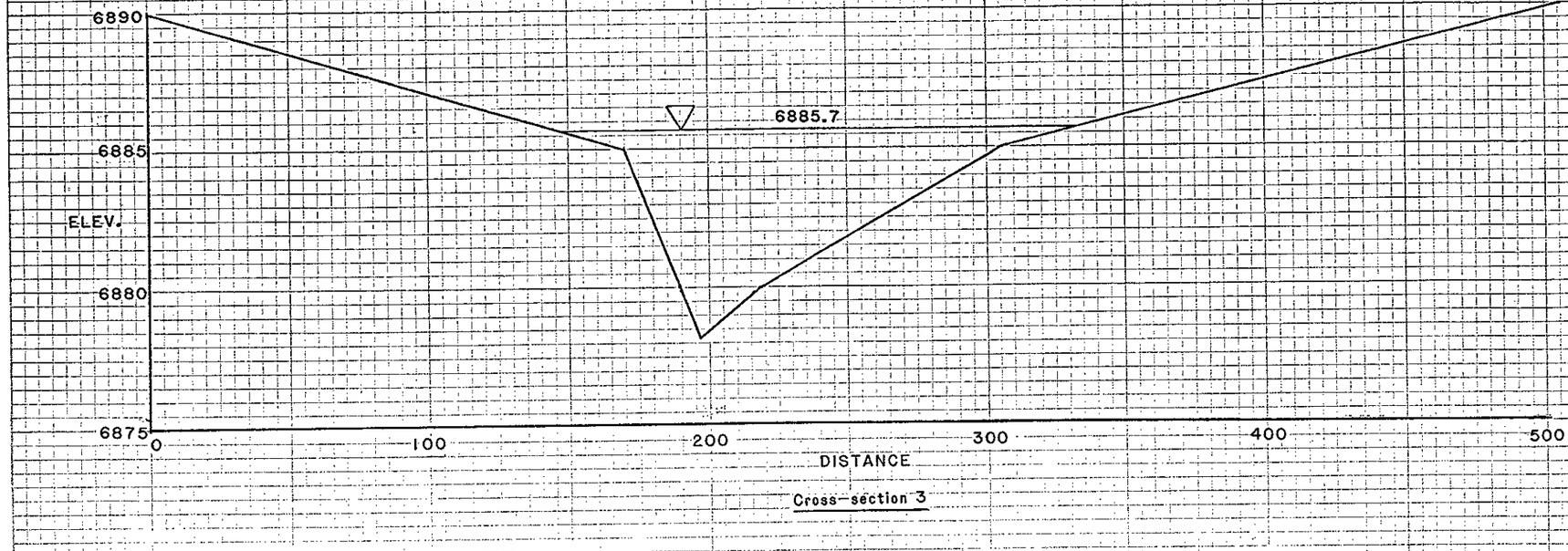


Cross-section 18

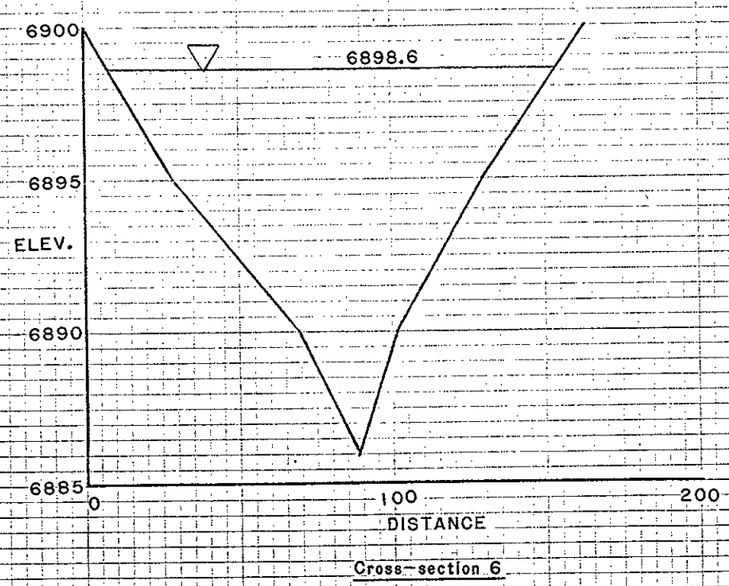
CROSS-SECTIONS - DIRTY WOMAN CREEK

All cross-sections from 5' contour map. All elevations in feet above mean sea level. Cross-sections looking downstream.

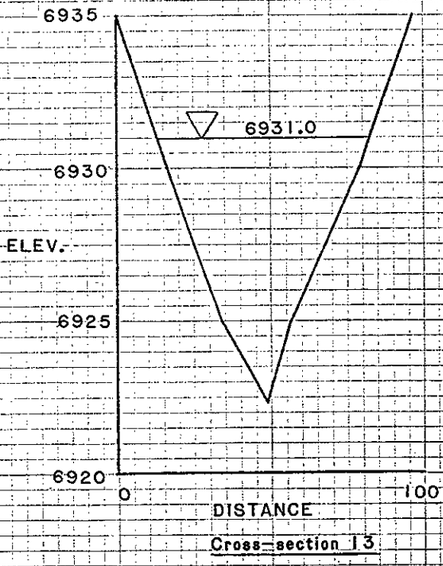
Scale: 1"=5' vertical ; 1"=50' horizontal.



Cross-section 3



Cross-section 6



Cross-section 13