ENGINEERING TECHNICAL REPORT

Colorado Flood Documentation
Significant Floods of June 1997

Department of Natural Resources
Colorado Water Conservation Board
Flood Control and Floodplain Management Section
1313 Sherman Street, Room 721
Denver, Colorado 80203

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Prepared By:
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Department of Natural Resources
Colorado Water Conservation Board
Flood Control and Floodplain Management Section
1313 Sherman Street, Room 721
Denver, Colorado 80203

June 1997

Weld County Flood Event
June 2, 1997

MEMORANDUM

COLORADO WATER CONSERVATION BOARD
DARIES C. LILE
DIRECTOR

DATE: June 13, 1997

TO: File

FROM: Tom Browning

RE: **Weld County flood of June 2, 1997**

On June 11, 1997 Larry Lang and I performed field investigations in Weld County north of the Greeley area. A significant rainstorm occurred on Monday, June 2 which caused flooding in portions of the county. As part of the field work, we conducted rainfall bucket surveys and estimated peak discharges for several streams using indirect flow measurements. Following is a summary of our findings :

STORM DESCRIPTION

- The storm developed in the late evening of June 2, and flooding occurred into the early morning hours of June 3. The NWS issued a flash flood warning at 3:00 am on June 3 for central Weld County, and specifically for Crow Creek in the Barnesville area.
- Most or all of the rain fell within a 30 to 45 minute time period.
- Very little hail was produced by this storm.

RAINFALL ESTIMATES

Rainfall estimates were obtained through bucket surveys, interviews with local officials and residents, and field observations. Rainfall estimates are shown (in inches) on the attached map. These amounts generally occurred within a 30 to 45 minute time period.

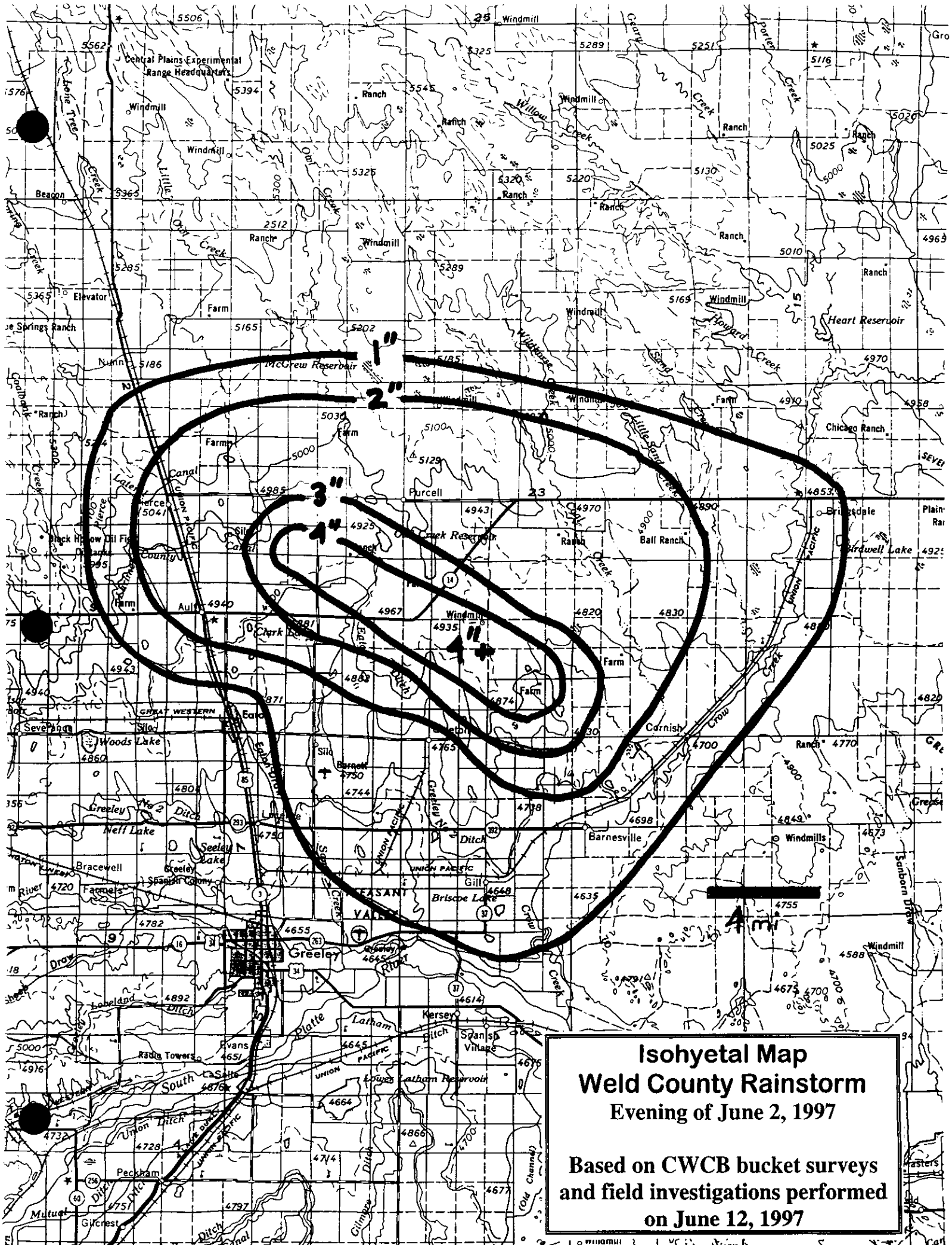
FLOOD DAMAGES

A flood damage survey was not performed by CWCB staff. However, flood damages were noted during the field visit which included basement flooding in numerous homes, erosion/washout/overtopping damage to several county roads, damage to crops and fields, and debris accumulations.

RUNOFF ESTIMATE

Runoff estimates were obtained for several streams using indirect flow measurement techniques. Channel cross-sections were estimated in the field using a hand level and a 100' tape. High water marks were good to excellent at all locations. The flow estimates are presented below:

Location	Est. Peak flow
Crow Creek at Cornish	150-250 cfs
Crow Creek at Barnesville	900-1,200 cfs
Willow Creek at Galeton	30-50 cfs
Owl Creek at Rd 90, u/s of Owl Creek Res.	600-900 cfs
Lone Tree Creek at Hwy 14	150-250 cfs
Lone Tree Creek near intersection of Rd 43/74	400-600 cfs


1"
2"
3"
1"
4"
4 mi
Isohyetal Map
Weld County Rainstorm
Evening of June 2, 1997
Based on CWCB bucket surveys and field investigations performed on June 12, 1997

Weld County Flood Event
June 13, 1997

MEMORANDUM

COLORADO WATER CONSERVATION BOARD
DARIES C. LILE
DIRECTOR

DATE: June 25, 1997

TO: File

FROM: Tom Browning

RE: **Weld County/Sheep Draw flood of June 13, 1997**

On June 24 Larry Lang and I performed field investigations in Weld County west of Greeley. A significant rainstorm occurred on the evening of Friday, June 13 which caused flooding in the Sheep Draw basin. As part of the field work, we conducted rainfall bucket surveys and estimated peak discharges in Sheep Draw using indirect flow measurements. Following is a summary of our findings :

STORM DESCRIPTION

- The storm developed on the evening of June 13 and generally moved from northwest to southeast.
- Rainfall began in Weld County west of Greeley around 5:00 pm.
- Most or all of the rain fell within a one hour time period.
- Hail was produced by this storm, but the amount and size of the hail was spatially quite variable.

RAINFALL ESTIMATES

Rainfall estimates were obtained through bucket surveys, interviews with local officials and residents, and field observations. Rainfall estimates are shown (in inches) on the attached map. These amounts are for the storm total (about 1 hour).

FLOOD DAMAGES

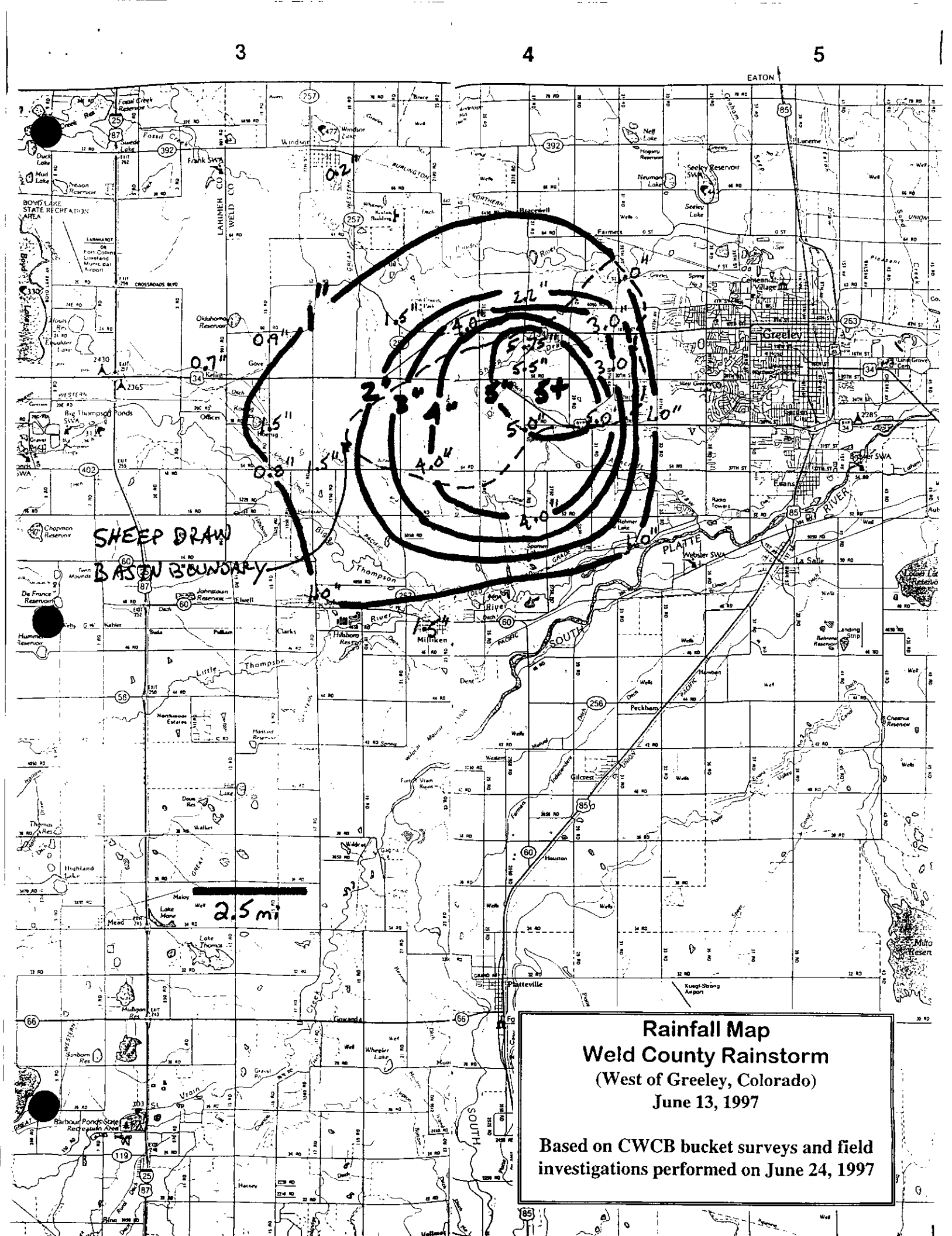
A flood damage survey was not performed by CWCB staff. However, flood damages were noted during the field visit which included basement flooding in numerous homes, damage or overtopping of several county road bridges, erosion/washout damage to several county roads, damage to crops and fields, and significant debris accumulations.

RUNOFF ESTIMATE

A runoff estimate was obtained for Sheep Draw using indirect flow measurement techniques. A channel cross-section was obtained by using a survey instrument, survey rod, and a 100' tape. High water marks were excellent on both the left and right overbanks. A channel slope was surveyed in the field, and "n" values were estimated for the overbanks and main channel. The normal depth flow estimate is presented below:

Location	Est. Peak flow	50-year flow*
Sheep Draw, approx. 300' d/s of Highway 34	3,200 cfs	3,100 cfs

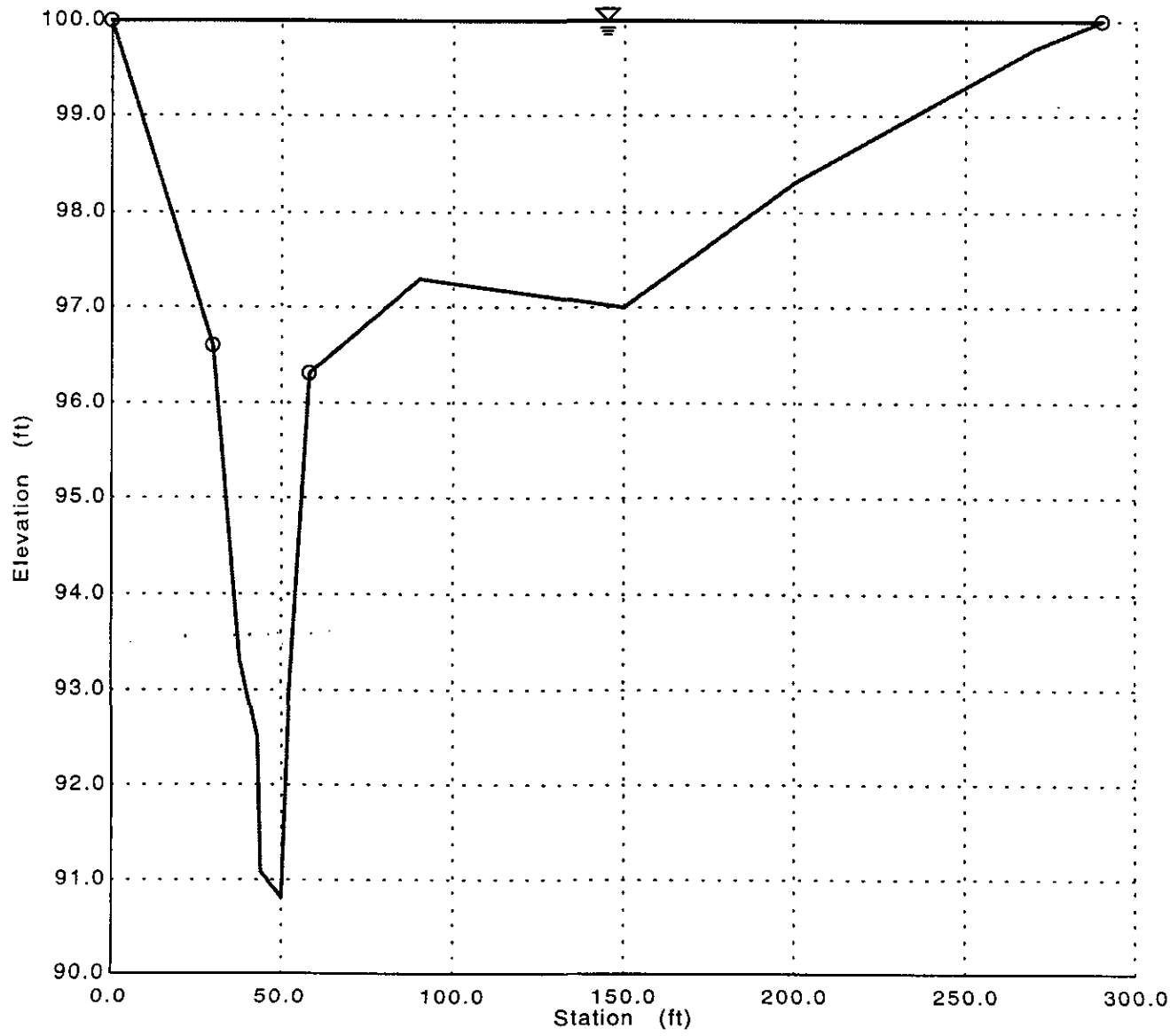
* Based on hydrology values published in "Special Study, Cache La Poudre River Basin, Larimer-Weld Counties, Colorado, Floodplain Analysis, Sheep Draw" (October 1981).


3
4
5
EATON
SHEEP DRAW
BASIN BOUNDARY
2.5 mi
Rainfall Map
Weld County Rainstorm
(West of Greeley, Colorado)
June 13, 1997
Based on CWCB bucket surveys and field investigations performed on June 24, 1997

Sheep Draw d/s of Hwy 34 near Greeley
Cross Section for Irregular Channel

Project Description	
Project File	c:\seca\flood\flud-doc\shp-drw.fm2
Worksheet	Sheep Draw d/s of Hwy 34 near Greeley
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data		
Wtd. Mannings Coefficient	0.032	
Channel Slope	0.003000	ft/ft
Water Surface Elevation	100.00	ft
Discharge	3,213.54	cfs



Holyoke / Phillips County Flood Event
June 15, 1997

MEMORANDUM

COLORADO WATER CONSERVATION BOARD
DARIES C. LILE
DIRECTOR

DATE: June 19, 1997

TO: File

FROM: Tom Browning TB

RE: **Phillips County/Holyoke flood of June 15, 1997**

On June 17 and 18, 1997 I performed field investigations in Phillips County in the vicinity of Holyoke, Colorado. A major rainstorm occurred late June 14 and early June 15 which caused flooding in the Frenchman Creek basin on the morning of June 15. As part of the field work, I conducted rainfall bucket surveys, estimated peak streamflows for various streams using indirect flow measurements, delineated the approximate floodplain limits within Holyoke, and obtained photographs. Following is a summary of findings :

STORM DESCRIPTION

- Storm developed on the evening of June 14 and generally moved from west to east.
- Rainfall began in Phillips County west of Holyoke around 9:45 pm on June 14 and ended around 12:30 or 1:00 am on June 15.
- Most of the rain fell in less than 2 hours in the beginning part of the storm
- Very little hail was produced by this storm. Small pockets of hail were reported to the south and west of Holyoke.

RAINFALL ESTIMATES

Rainfall estimates were obtained through bucket surveys, interviews with local officials and residents, and field observations. Rainfall estimates are shown (in inches) on the attached map. These amounts are for the storm total (about 3 hours).

FLOOD DAMAGES

Phillips County, the Town of Holyoke, The American Red Cross, and the Colorado OEM have performed damage surveys and have reported the following flood damages (to date) within Phillips County, Holyoke, and Amherst:

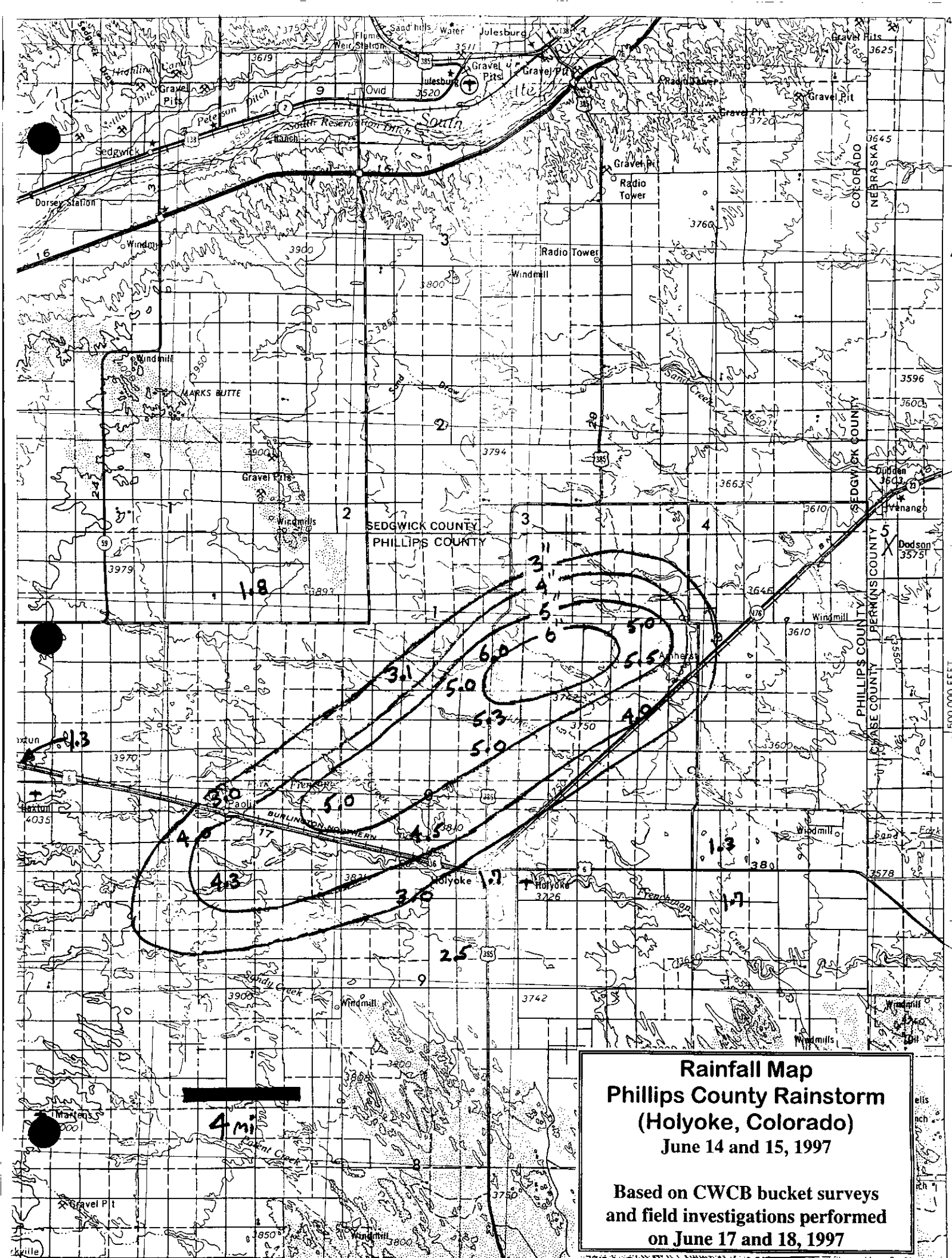
- 31 homes (7 are uninhabitable)
- 3 businesses
- 3 County road bridges
- At least 15-20 major washouts on County Roads (including low water crossings, culverts, etc.)
- Nearly 100 minor washouts on County Roads
- Severe damage to railroad line along Hwy 23
- Damage to the airport runway and washout of the culverts at the end of the runway
- Substantial damage to crops and fields
- Major debris accumulations

RUNOFF ESTIMATES

Runoff estimates were obtained for various streams using indirect flow measurement techniques. Channel cross-sections were obtained by using a hand level, survey rod, and a 100' tape. High water marks were good to excellent in all locations. Normal depth calculations were done using Manning's equation. Channel slopes were obtained from USGS Quad maps, and "n" values were estimated in the field. A range of flow values is presented to account for various uncertainties in estimating the peak flows.

Location	Est. Peak flow (cfs)	Est. Flow Frequency*
N. Fork Frenchman Creek near Hwy 6, just west of Paoli	250 to 350	N/A
N. Fork Frenchman Creek d/s of Rd 37, just west of Holyoke	1,600 to 2,000	10-year
S. Fork Frenchman Creek near Rd 33, 3 mi west of Holyoke	1,800 to 2,200	25-year
S. Fork Frenchman Creek near Rd 35, 2 mi west of Holyoke	1,800 to 2,200	25-year
Frenchman Creek d/s of Hwy 6 in Holyoke	3,600 to 4,000	25-year
Frenchman Creek at golf course in Holyoke	3,600 to 4,000	25-year
Left bank trib to Frenchman Creek 1.5 mi northeast of Holyoke, near Hwy 23 and Rd 41	600 to 800	50-100-year
Left Bank trib to Wildhorse Creek at Amherst, near Hwy 23 and Rd 51.	1,800 to 2,200	100-year

* Based on hydrology values published in "Floodplain Information Report, Frenchman Creek, Holyoke, Colorado" (June 1980) where available. Other frequency estimates based on regional regression equations for the Republican River basin.



Rainfall Map
Phillips County Rainstorm
(Holyoke, Colorado)
June 14 and 15, 1997

Based on CWCB bucket surveys and field investigations performed on June 17 and 18, 1997

COMMERCIAL / FARM BUILDINGS FLOODED

SEVERAL (6) BLDGS FLOODED

(5) SEVERAL HOMES / OUTBUILDINGS FLOODED

APPROX FLOODPLAIN LIMITS (TYP.) FOR JUNE 15, 1997 EVENT (PEAK ≈ 7am)

3 BUSINESSES RCVD DAMAGE

SEVERAL MOBILE HOMES FLOODED

GARAGE FLOODING (2 to 3 HOMES)

FIRST FLOOR FLOODING

SCALE: 1" = 400'

HOLYOKE, COLORADO
Flood of June 15, 1997

BASE MAP: FEMA Flood Insurance Rate Map

BUSINESSES / HOMES BASEMENT & F.F. FLOODING (ROADSIDE DITCH OVERFLOW)

NEW HOUSE NOT FLOODED (ISLAND) (6" TO FIRST FLOOR)

2-3 BLDGS FLOODED

BRIDGE NOT OVERTOPPED

NO FLOODING IN THIS AREA

ZONE X

ZONE AE

3727

3724

BIG NELL STREET

CARNAHAN ST.

DENVER STREET

US ROUTE 6

EMERSON

FURRY

GORDON

HALE

JOHNSON

KELLOG

INTERSTATE OCEAN RM1

BOWMAN AVE

BELFORD AVE

JULES BAXTER AVE

CAMBELL AVE

PHELAN AVE

MORLAN AVE

HIGHSCHOOL AVE

REYNOLDS AVE

COLEMAN AVE

WORLEY AVE

US RTE 385

ST.

RD 41

Frenchman Creek

AIRPORT HANGERS (FLOODED)