FLOOD HAZARD ANALYSES

COAL CREEK AND ROCK CREEK
BOULDER AND WELD COUNTIES
COLORADO

Prepared by the

U.S. Department of Agriculture
Soil Conservation Service
Denver, Colorado

in cooperation with the

Colorado Water Conservation Board
Urban Drainage and Flood Control District
Coal Creek Water Users Association
Boulder County
Weld County

October 1976

USDA-SCS PORTLAND, OR 1976

PREFACE

This report includes information on the flood hazard area adjacent to Coal Creek and Rock Creek in Boulder and Weld Counties, Colorado.

Because of damages resulting from past flooding, detailed flood hazard studies have been recognized as an essential item in guiding the use of flood plains. The purpose of this report is to provide adequate mapping and data for implementing flood plain management programs.

Included in the report are information on past floods, flood potential, maps, profiles, cross sections, discharge data, and recommendations for reducing potential flood damages on the Coal Creek and Rock Creek study area.

The Soil Conservation Service conducted the technical studies and prepared the report. These services were carried out in accordance with the Plan of Study of May 1974.

The assistance and cooperation provided by the Colorado Water Conservation Board, the Urban Drainage and Flood Control District, the Coal Creek Water-Users Association, Boulder and Weld Counties, are appreciated and gratefully acknowledged. Financial assistance provided by these organizations and units of government included funds for aerial photography, survey crew assistance, and printing the final report.

The survey, hydrologic, hydraulic, and other pertinent data and computations are on file with the U.S. Department of Agriculture, Soil Conservation Service, 2490 West 26th Avenue, Denver, Colorado 80217.

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FLOOD HAZARD ANALYSES

COAL CREEK AND ROCK CREEK
BOULDER AND WELD COUNTIES, COLORADO

This flood hazard analyses report presents the results of a study on the flood plain lands of Coal Creek and Rock Creek in Colorado. It was prepared by the U. S. Department of Agriculture, Soil Conservation Service, in cooperation with the Colorado Water Conservation Board, the Urban Drainage and Flood Control District, the Coal Creek Water Users Association, Boulder and Weld Counties.

Primary purpose of this report is to provide large scale detailed mapping of the flood hazard areas and to update flood hazard studies which were conducted previously. Without detailed mapping, it is very difficult to implement a workable flood plain management program which will minimize potential flood losses. Detailed flood hazard maps are needed to administer flood plain management regulations. Included in the report are engineering and hydrologic data which will facilitate the use of the maps. The data should be useful in developing a master drainage plan, in road and bridge plans and design, and in the planning of channel modification, and flood control structures - if needed. The report contains interpretations of the flood hazard analyses and recommendations to reduce flood damages. However, it is beyond the scope of this study to provide specific proposals or plans to rectify the flooding problems.

This study was requested by Boulder and Weld Counties, and the Urban and Drainage Flood Control District through the Colorado Water Conservation Board (CWCB). As coordinator for all water studies in the

state, the CWCB establishes priorities and schedules these studies on a priority basis. The CWCB and the Soil Conservation Service entered into a joint coordination agreement for flood hazard analyses in January 1972. The plan of study for the Coal Creek and Rock Creek study was prepared in May 1974.

Flood hazard analyses are carried out by the Soil Conservation Service as an outgrowth of the recommendations in *A Report by the Task Force on Federal Flood Control Policy*, House Document No. 465 (89th Congress, August 10, 1966), especially Recommendation 9(c), *Regulation of Land Use*, which recommended the preparation of preliminary reports for guidance in those areas where asistance is needed before a full flood hazard information report can be prepared or where a full report is not scheduled.

Authority for funding flood hazard analyses is provided by Section 6 of Public Law 83-566, which authorizes the U. S. Department of Agriculture to cooperate with other federal, state, and local agencies to make investigations and surveys of the watersheds of rivers and other waterways as a basis for the development of coordinated programs.

In carrying out flood hazard analyses, the Soil Conservation Service is being responsive to Executive Order 11296, dated August 10, 1966, especially to Section 1(4), which directs that *all executive agencies responsible for programs which entail land use planning shall take flood hazards into account when evaluating plans and shall encourage land use appropriate to the degree of hazard involved.*

In the 1974 legislative session, the Colorado General Assembly directly attacked the flood-plain problem by describing it as a natural hazard of State interest relating to the use of land in House Bill 1041 (Title 24, Articles 65.1, 32 and 65 CRS 1973, as amended). Colorado Revised Statutes 1973, Section 3760106(c) authorizes the Colorado Water Conservation Board to designate and approve storm flood-water runoff channels and to make such designations available to legislative bodies of local jurisdictions. The Board is actively engaged in assisting local governments develop and adopt effective flood plain ordinances. In addition, the Board assists and provides financial assistance to flood plain information studies in Colorado.

In the Denver region, the Urban Drainage and Flood Control District is actively engaged in coordinating multijurisdictional urban drainage activities as authorized by the 1969 Colorado State Legislature. The District has the power to plan, design, construct, or acquire, equip, maintain, and operate drainage facilities and can promulgate flood plain regulations. The District area includes Denver and portions of Adams, Arapahoe, Boulder, Douglas, and Jefferson Counties.

The requests by Boulder and Weld Counties to conduct flood hazard studies are in accordance with State Legislature House Bill 1041 which requires local governments to identify and designate areas, such as flood plains, that are of state interest.

DESCRIPTION OF THE STUDY AREA

Located primarily in the southeastern portion of Boulder County, the Coal Creek and Rock Creek Watershed drains about 79 square miles. Parts of the drainage area lie within Jefferson, Adams, and Weld Counties. The length of the watershed is about 28 miles and average in width of a little less than 3 miles. Upper reaches of the watershed begin at 10,500 feet mean sea level elevation. The lower end of the watershed joins Boulder Creek at about the 4,954 feet elevation.

The upstream drainage area originates in the foothills east of the Rocky Mountains and the geology is characterized by a series of folded and faulted sedimentary strata. For the most part, the strata are classified as the Fox Hills Sandstone and Laramie formation. The soils are shallow, very gravelly and stony, and are in the rock outcrop-Juget-Baller association. The ground cover consists of native grass and woodland. Except for a narrow fringe of Rocky Mountain juniper, Ponderosa pine makes up the bulk of the woodland cover. The woodlands are very picturesque and most of the area is used for grazing and homesites. Both year-around homes and summer homes are growing in popularity. Average annual precipitation is about 18.5 inches and the normal mean temperature is 51.8 degrees. Extremes of annual precipitation have varied from a maximum of 29.09 inches in 1938 to a minimum of 10.91 inches in 1954. The mean maximum and minimum temperatures in July are 85.3 and 59.0 degrees, respectively.

In the late 1800's, coal mining led to the development of several small communities along the banks of Coal Creek. Those communities are: Erie, Lafayette, Louisville, and Superior. The coal reserves have diminished and most of the mines have been shut down. Major land use is for agriculture; however, new industries and more home seekers in the Boulder-Denver metropolitan area have brought additional residents into the watershed. In 1970 the total community population was about 7,200 people. Demographic projections for the year 1990 show the population, for the same area, to be over 52,000 people. There are no communities in the Rock Creek portion of the Watershed.

The study area begins at the Coal Creek confluence with Boulder Creek and extends upstream for a distance of 14 miles to a point about 0.4 mile above the town of Superior. Coal Creek flows in a northeasterly direction until it enters Weld County and then flows north past the town of Erie where it crosses back into Boulder County and runs into Boulder Creek. Boulder Creek flows into St. Vrain Creek, a major tributary to the South Platte River. These drainages are in the South Platte subregion of the Missouri River Water Resources Region, as designated by the Water Resources Council.

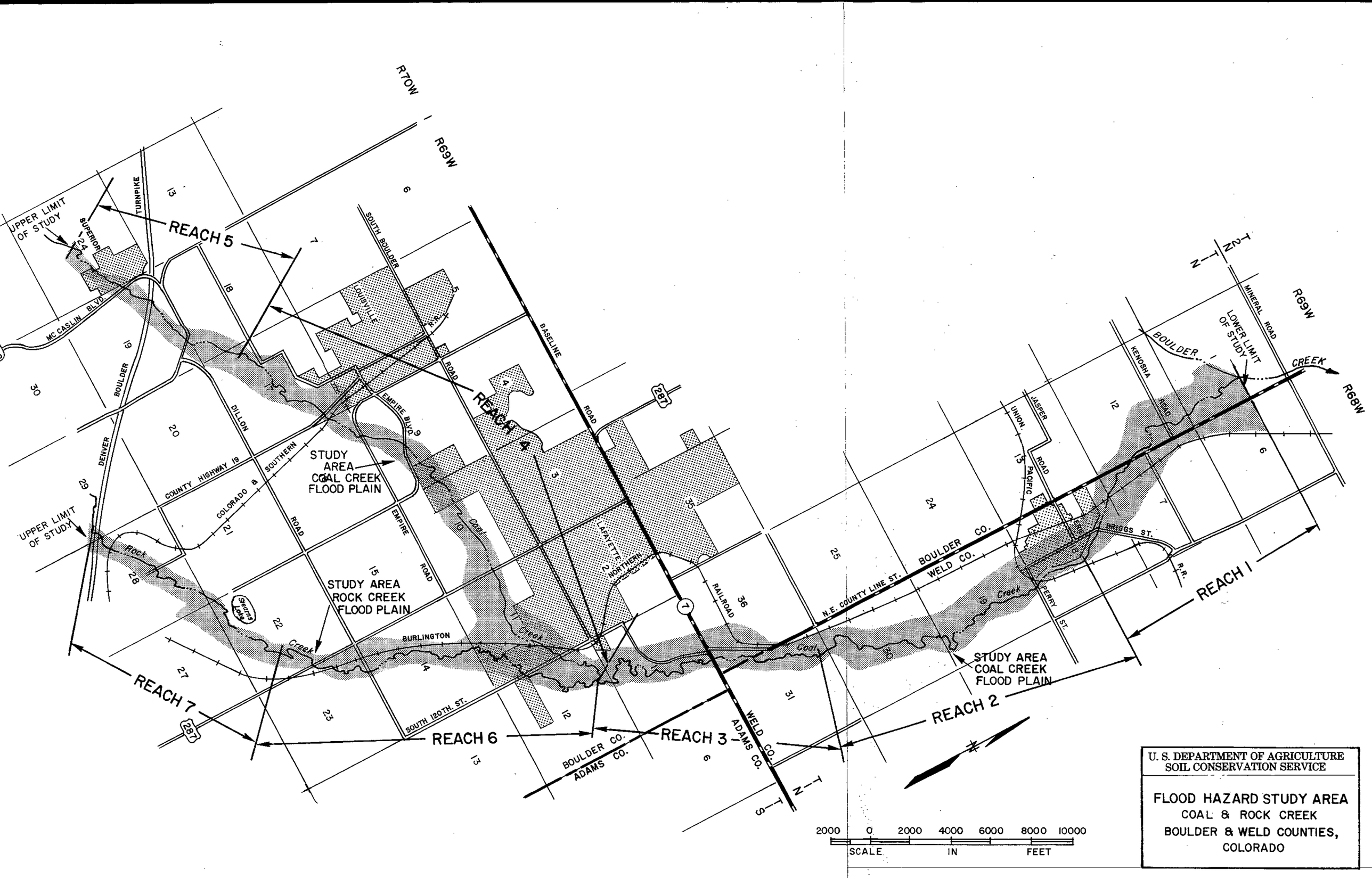
Rock Creek is a tributary to Coal Creek, and the study area extends from its mouth upstream about 5.4 miles to the Denver-Boulder turnpike. Total distance of study area on Coal Creek and Rock Creek is 19.4 miles. A map showing the flood hazard study area follows Page 6.

Most of the flood plain on Coal Creek and Rock Creek is used for agricultural purposes; however, the flood plain does extend into the communities of Superior, Louisville, Lafayette, and Erie. The flood plain varies in width from about 300 - 600 feet in the steeper areas, to over 2000 feet in the flatter areas.

FLOOD HISTORY

Storms which produce floodwater occur during May through September. During this period, warm, moist air masses from the Gulf of Mexico combine with cold and comparatively dry air from the polar regions to cause thunderstorms. The storms are usually characterized by high rainfall intensities of short duration, producing high peak flows and moderate volumes of water. Frequently, the thunderstorms are severe and occur over rather limited areas. Floods are especially severe if the thunderstorms follow a period of high snowmelt or prolonged rainy weather.

Historical documentation of flood damage is meager. This is probably due to the small size of the streams and the lack of extensive urbanization. Major flood damages in the watershed are to roads, bridges, irrigation structures and agricultural land. Duration of flooding is brief due to the steep slopes and small size of drainage area. In general, peak flows last from 1 to 4 hours during a flooding period of from 6 to 24 hours.



U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

FLOOD HAZARD STUDY AREA
COAL & ROCK CREEK
BOULDER & WELD COUNTIES,
COLORADO

There are no stream gages on Coal Creek nor Rock Creek for determining discharge measurements. However, the following floods have been reported. The floods of 1876; 1891, June 3, 1921; and May 26, 1935, were caused by rapid snowmelt in the mountains and heavy general rains. A flood occurred in June 1896 which was reported as the highest of record in the part of the valley near Louisville. The flood of September 2, 1938, was caused by cloudbursts in the mountains and foothills, which resulted in a flood slightly higher than in 1935. Using slope-area measurements, the Corps of Engineers estimated the flood discharges on Coal Creek near Erie to be 13,200, 7,800, and 3,500 second-feet in 1876, 1921, and 1938, respectively.

The 1876 flood is the largest reported at Erie and approximates the 100-year frequency occurrences as determined by the Soil Conservation Service using synthetic methods for flood routing. The most recent floods in the watershed occurred on June 9, 1949; May 9, 1957; and May 1969.

The following are recorded accounts of flood damage on Coal Creek and Rock Creek:

Sept. 2, 1938 — Parts of the residential area in Louisville were under several inches of water. The business district was not damaged. One person was killed in an automobile accident on the flooded highway east of Louisville. The bridge at Empire Dr. and State

Highway 42 was on the verge of failure, but was saved.

June 9, 1949 — Bridge at Junction of Coal Creek and Rock Creek, 3 miles north and 1/4 mile west of Erie was threatened and closed to traffic. Bridge over Coal Creek 3/4 mile east of Superior went out.

May 1969

Flood Damages

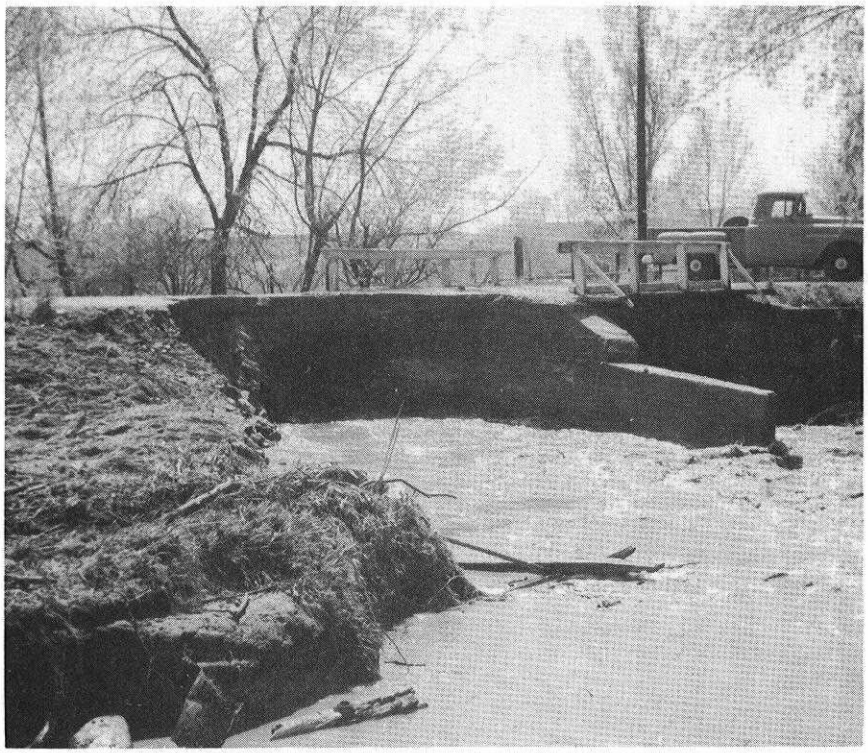
	Land	Irrigation Structures	Agriculture	Roads & Bridges	Other
Coal Cr.	$28,750	$24,500	$13,535	$700	$6,300
Rock Cr.	200	-	340	200	140

FLOOD POTENTIAL (Present Conditions)

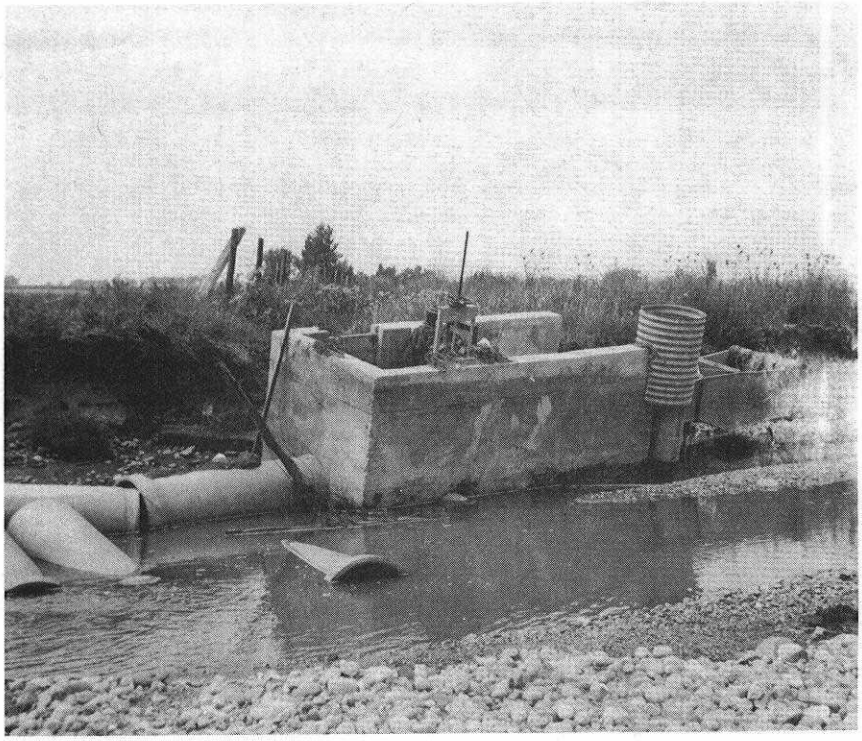
Amount of damages and hazardous conditions caused by any flood are dependent upon: Developments in the flood plains, topography of the flooded area, depths and velocities of flow, and rates of rise and duration of flooding.

In respect to the total flood plain, the largest area subject to flooding is used for agricultural purposes. Potential floods of the 100- and 500-year frequency magnitude would inundate portions of the residential and commercial developments in the communities of Erie, Lafayette, Louisville, and Superior.

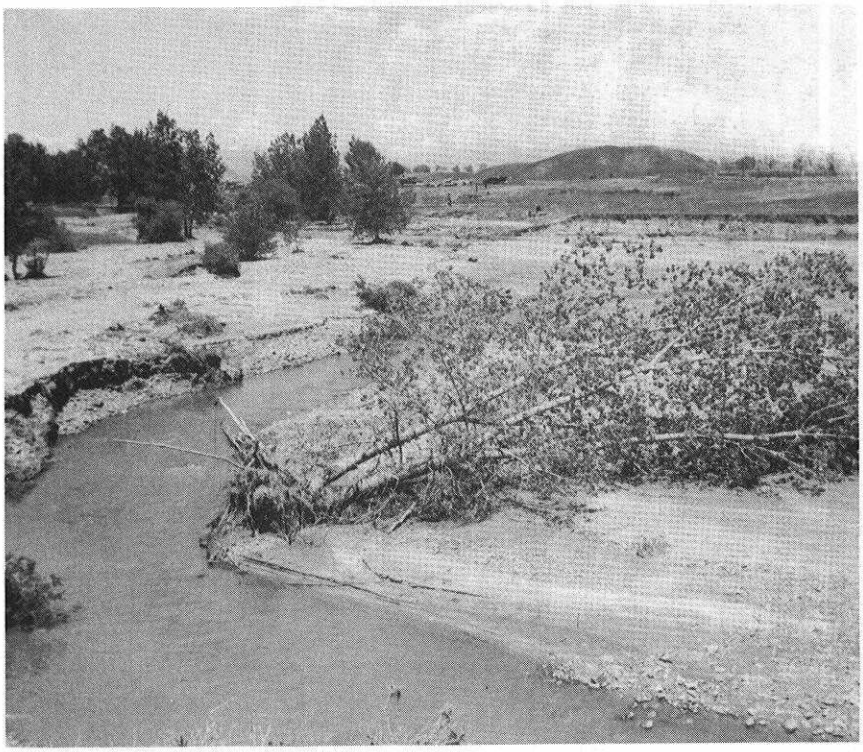
County Bridge at Dillon Road, washed out.



Bridge approach in town of Superior, damaged.



Irrigation Structures on Howell Ditch, damaged.



Erosion and Sediment damage to Louisville Sanitation District Property.

Road crossings with inadequate culvert and/or bridge openings often cause channel constrictions and obstruction to flood flows. Elevated roads in the flood plain act as barriers which raise the water surface at some locations. Other road crossings are lower than the flood plain and are over topped during flood stage. Sediment deposition and debris are other factors which influence channel hydraulic characteristics and subsequently affect the flood line location.

Velocities exceeding 3 feet per second combined with depths of 2 feet or more are generally considered hazardous. These conditions would exist at various locations on Coal Creek and Rock Creek during large floods. Rapidly rising streams with associated deep flows are also hazardous to an unsuspecting public, especially at road crossings. On Coal and Rock Creek a 100-year frequency flood will peak between 6 and 10 hours during a 24 hour storm. Duration of flooding will vary, depending on the season in which flooding occurs. In the spring when the streams are high with runoff from snowmelt, coupled with spring rains, high water could persist for several days. During the late summer months when the streams are normally low, runoff from thunderstorms will recede in a few hours.

There are 2,466 acres of land in the study area subject to inundation by the 100-year flood. Of this amount, 1,807 acres and 659 acres are in the respective flood plains of Coal Creek and Rock Creek. This includes 1,591 acres in Boulder County and 875 acres in Weld County.

FLOOD POTENTIAL (Future Conditions)

The effects of watershed land use changes anticipated by county planners within the next 10 to 15 years were analyzed in relation to future flood heights. Projected land use maps with designated residential, commercial, industrial, and open space developments were used in this study. This information is especially useful for the areas in and surrounding the communities of Erie, Lafayette, Louisville, and Superior. Flood hazard data developed in this report are based on existing channel and flood plain conditions with runoff factors adjusted to reflect future developments. Comparison of present and future runoff data showed insignificant differences from projected changes in land use. Rationale for these results are: (1) Potential developments are located in the lower reaches of the watershed where a slight amount of additional runoff has a minor effect on the magnitude of flood flows which create the heights of the 100-year frequency flood, and (2) the major portion of runoff originates in the upper watershed where a small amount of land use change is anticipated.

Of upmost importance is the possibility of encroachment on the existing flood plains. Developments within the flood plain could obstruct the flow of flood water, raising the flood elevations, and create hazardous velocities. Encroachment is a far more significant factor than the additional runoff created by proposed developments.

All of the communities in this flood hazard study area are participating in HUD's National Flood Insurance Program. Erie, Lafayette, and Superior are in the emergency program and Louisville is in the regular program. These communities have adopted acceptable flood plain management regulations and flood insurance coverage is available for all types of walled and roofed buildings, mobile homes, and their contents throughout the entire community. The unincorporated areas of Boulder County and Weld County are eligible for flood insurance under the emergency program.

INTERPRETATION AND USE OF REPORT DATA

Flood hazard exhibits for Coal Creek and Rock Creek are in the Appendix following the text of this report. Included in the Appendix are: Mosiac sheet index (for flood hazard area photomaps), flood hazard area photomaps, water surface profiles, typical valley cross-sections, and tabulations for the flood frequency-elevation and discharge data. The following are descriptions and suggested uses of the exhibits.

Maps

For planning and flood zone regulation purposes, the 100-year flood is used locally as the base flood. Larger floods, such as the 500-year flood are also considered in the planning and management of flood-prone areas. The 100-year and 500-year events are outlined on the Flood

Hazard Area Photomaps. In many instances the outerlimits of the 100- and 500-year floods will appear as one line on the maps. This is due to the topographic relief and slight difference in elevation between the two flood events. Maps, drawings, and other technical data labeled Existing Conditions are valid as of July 1974.

The Mosaic Sheet Index is useful in respect to location of the various flood hazard exhibits in the study area. Technical studies were conducted on 7 reach lengths. The locations of the study reaches and photomap designations are illustrated on the Mosaic Sheet Index.

Water Surface Profiles

In addition to the 100- and 500-year frequency floods, hydraulic studies were made on the 10-, 25-, and 50-year events. Information regarding these smaller floods is especially useful for engineering design purposes related to roads, storm sewers, channels, and appurtenant structures. Water surface profiles for the various frequency floods are included in this report as Exhibit A. Because of the close proximity to either the 25- or 100-year event, the 50-year line was not drafted on the water surface profiles. For information regarding flood line elevations at a specific location, the water surface profile data can be used in conjunction with the flood hazard photomaps. The cross-section locations which appear on both the profiles and maps can be used

as reference points. Photomap index sheet numbers, compatible with cross-section locations, are shown on each water surface profile exhibit.

As a general guide for orientation purposes, the following designations are assigned to stream names, photomap, reach, and cross-section numbers.

Stream Name	Photomap Numbers	Reach Number	Cross Section Number
Coal Creek	1-3	1	5-19
Coal Creek	3-6	2	19-35
Coal Creek	6-8	3	35-46
Coal Creek	8-13	4	46-85
Coal Creek	13-15	5	85-100
Rock Creek	8-9, 16-17	6	46-120
Rock Creek	17-20	7	120-138

Typical Valley Cross Sections

Exhibit B is a selection of typical valley cross sections illustrating the configuration of stream channels and adjoining flood plain areas. Shown on the cross sections are the elevations and lateral extent for the 100- and 500-year flood events.

Flood Frequency-Elevation and Discharge Data

Tables 1 through 7 include flood crest elevations and peak discharges for the 10-, 25-, 100-, and 500-year floods. Tabulated information is intended for use in conjunction with the water surface profiles and flood hazard area photomaps. The information is compatible with reach numbers and cross section designations.

FLOOD PLAIN MANAGEMENT

The need for adequate floodways to carry the flows of Coal Creek and Rock Creek has been recognized by city and county planners. Subdividers and developers are required to submit proposed storm drainage plans to the county planning commission for approval. In the past, drainage plans have been prepared singularly or on a plat-by-plat basis. Information contained in this report will be useful in developing a master drainage plan for the entire Coal and Rock Creek study area. Primary purpose of this report is to provide the outline of flood hazard areas on large scale photomaps and to update flood hazard studies which were conducted previously.

Flood Plain Regulations

This study has been conducted in accordance with state technical requirements as required for review and approval by the Colorado Water Conservation Board. Section 37-60-106, Colorado Revised Statutes 1973 authorizes the Colorado Water Conservation Board "to designate and approve storm or floodwater 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 the state." Coal and Rock Creeks are located in the Urban Drainage and Flood Control District.

Activities of the District were authorized by the 1969 Colorado State Legislature. The District has the authority to plan, design, construct, or acquire, equip, maintain, and operate drainage facilities and can promulgate flood plain regulations.

A resolution adopting land use zoning districts within unincorporated areas of Boulder County was officially adopted by the Board of County Commissioners in October 1965. Under Section XVIII of the resolution, regarding floodplains, the county's jurisdiction includes all lands adjacent to any creek, river, or stream within the county that would be inundated by the 100-year flood for that river or stream. The flood regulatory area covers the 100-year flood plain and is defined by computing the 100-year flood plain limits under existing channel and flood plain conditions. Where deemed to be in public interest by the county, and to promote wise use of the flood plain, the Flood Regulatory Area may be subdivided into the Floodway Area and the Flood Storage Area. Subdivision of Flood Regulatory Area into the Floodway Area and the Flood Storage Area must not cause a 100-year flood water surface profile rise of more than one foot above that for the Flood Regulatory Area, (in light of the uses of the subdivided area which are reasonably anticipated and will be permissible after the subdivision is accomplished).

Computations for a theoretical floodway are included in an appendix separate to the main report of this Flood Hazard Analyses. Data are in tabular form and include floodway widths, cross sectional flow area, and

average velocities. Computations are for an increase in rise of water surface elevations in 0.5' increments from 0.0' to 2.0' above the 100-year frequency.

Developmental Policies

Boulder and Weld Counties have comprehensive plans with projected land use information which were especially helpful in the preparation of this study. County and community areas have been mapped and illustrate the projected land use for residential, commercial, industrial, and agricultural purposes. Recognizing the need for natural water course corridors, much of the projected land use in the Coal and Rock Creek flood plains have been mapped for public open space uses.

Flood Insurance

The communities of Erie, Lafayette, Louisville, and Superior, and the unicorporated areas in Boulder and Weld Counties are participating in HUD's National Flood Insurance Program. Flood insurance coverage is available to owners and occupiers of all buildings and mobile homes, and their contents, located in the flood hazard study area of Coal Creek and Rock Creek in Boulder and Weld Counties.

Structural Flood Control Measures

In the past, several studies have been made regarding the feasibility of constructing flood control structures on the Coal and Rock

Creek drainages. Because of the lack of funds and high costs for easements needed for structural control, none of the proposals have been implemented.

Recommendations

The following recommendations are included for consideration in reducing potential flood damages on the Coal and Rock Creek study area.

1. Boulder and Weld Counties, and the Urban-Drainage and Flood Control District should submit this Flood Hazard Analyses to the Colorado Water Conservation Board for designation and approval.

2. Boulder and Weld Counties, and the Urban Drainage and Flood Control District should develop a master drainage plan for the entire Coal Creek and Rock Creek Watershed.

3. Several existing road crossings obstruct flows during flood stage. Remedial measures to existing obstructions, and future road crossing design and locations should be compatible with the master drainage plan.

4. Review and update comprehensive plans so that projected land use will be in conformance with permissible uses within the Flood Regulatory Area.

5. Conduct periodic inspections of the Flood Regulatory Area to assure conformance with permissible uses.

6. Implement floodway maintenance program to remove debris and repair damaged channels.

Potential flood damages to existing developments and possible loss of life can be alleviated or lessened through several nonstructural and structural methods. Nonstructural methods include: flood warning and forecasting systems, flood fighting, and emergency evacuation.

The National Oceanic and Atmospheric Administration (NOAA) through its National Weather Service (NWS), maintains year-around surveillance of weather and flood conditions. Daily weather forecasts are issued through the NWS and disseminated by the local news media. A general alert to the danger of flash flooding is one of the services provided by the National Weather Service.

An "Emergency Evacuation and Operation Plan" should be developed by Boulder and Weld Counties. Implementation of this plan would provide for alerting the public of potential flooding and coordinating community and county services during an emergency.

Plan implementation during the time of an emergency requires cooperation of the general public as well as local officials. This is especially important for flood fighting, evacuation, and rescue operations.

Too often, an uninformed public becomes a detriment to emergency operations. It is recommended that public information and education program on "Flood Hazards" be disseminated through the news media and be a part of the total community effort towards lessening the losses caused by flooding.

Portions of the Flood Regulatory Area could be protected by structures including: floodwater retarding structures, floodways, and storm drains. Implementing structural protection requires detailed engineering and feasibility studies, funding arrangements, and agreed upon actions by governing bodies.


LEGEND
SECTION LINE
SECTION NUMBER 2
IMPROVED ROAD
REACH NUMBER ← REACH 3 →
SHEET NUMBER 5
100-YEAR FLOOD-PRONE AREA
R70W
R69W
R68W
T1N
T2N
T1S
REACH 1
REACH 2
REACH 3
REACH 4
REACH 5
REACH 6
REACH 7
BOULDER CREEK
Coal Creek
Rock Creek
LOUISVILLE
SUPERIOR
MC CASLIN BLVD
TURNPIKE
DENVER BOULDER
DILLON ROAD
SOUTH BOULDER ROAD
COUNTY HIGHWAY 19
COLORADO & SOUTHERN
EMPIRE DR.
EMPIRE ROAD
BASELINE ROAD
LAFAYETTE
NORTHERN
BURLINGTON
SOUTH 120TH ST.
RAILROAD
N.E. COUNTY LINE ST.
BOULDER CO.
WELD CO.
ADAMS CO.
UNION PACIFIC
JASPER ROAD
KENOSHA ROAD
MINERAL ROAD
BRIGGS ST.
PERRY ST.
ERIE
R.R.
2000 0 2000 4000 6000 8000 10000
SCALE IN FEET
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
MOSAIC SHEET INDEX
COAL & ROCK CREEK
BOULDER & WELD COUNTIES,
COLORADO

LEGEND

FLOOD PLAIN LIMITS

100 YEAR FLOOD

500 YEAR FLOOD

GROUND ELEVATION IN FEET MEAN SEA LEVEL DATUM — 5300

CONTOUR, Index 4.0'

CONTOUR, Interpolated 2.0'

CROSS SECTION — 007 — 007

CROSS SECTION CONTINUED — 010 — 010

INTERMITTENT STREAM

PANEL

AERIAL PHOTOGRAPHY, FLOOD HAZARD AREAS, AND TOPOGRAPHY ARE FOR EXISTING CONDITIONS —— JULY 1974.

FLOOD AREA OUTLINES WERE DETERMINED BY MATCHING WATER SURFACE PROFILE ELEVATIONS WITH TOPOGRAPHY.

NOTE: TOPOGRAPHIC DETAIL WAS COMPILED BY PHOTOGRAMMETRIC METHODS TO MEET NATIONAL MAP ACCURACY STANDARDS. THE PHOTOGRAPHIC IMAGE CONTAINS DISPLACEMENTS DUE TO RELIEF AND IT DOES NOT MATCH THE TOPOGRAPHIC DETAIL IN ALL AREAS.

REVISION	DATE	BY

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

FLOOD HAZARD AREAS
COAL & ROCK CREEK
BOULDER & WELD COUNTIES, COLORADO

200 0 200 400 600
APPROXIMATE SCALE IN FEET

OCTOBER 1975 SHEET 1 OF 20

LEGEND

FLOOD PLAIN LIMITS

100 YEAR FLOOD

500 YEAR FLOOD

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FLOOD HAZARD AREAS
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BOULDER & WELD COUNTIES, COLORADO

200 0 200 400 600
APPROXIMATE SCALE IN FEET

OCTOBER 1975 SHEET 3 OF 20

LEGEND

FLOOD PLAIN LIMITS

100 YEAR FLOOD

500 YEAR FLOOD

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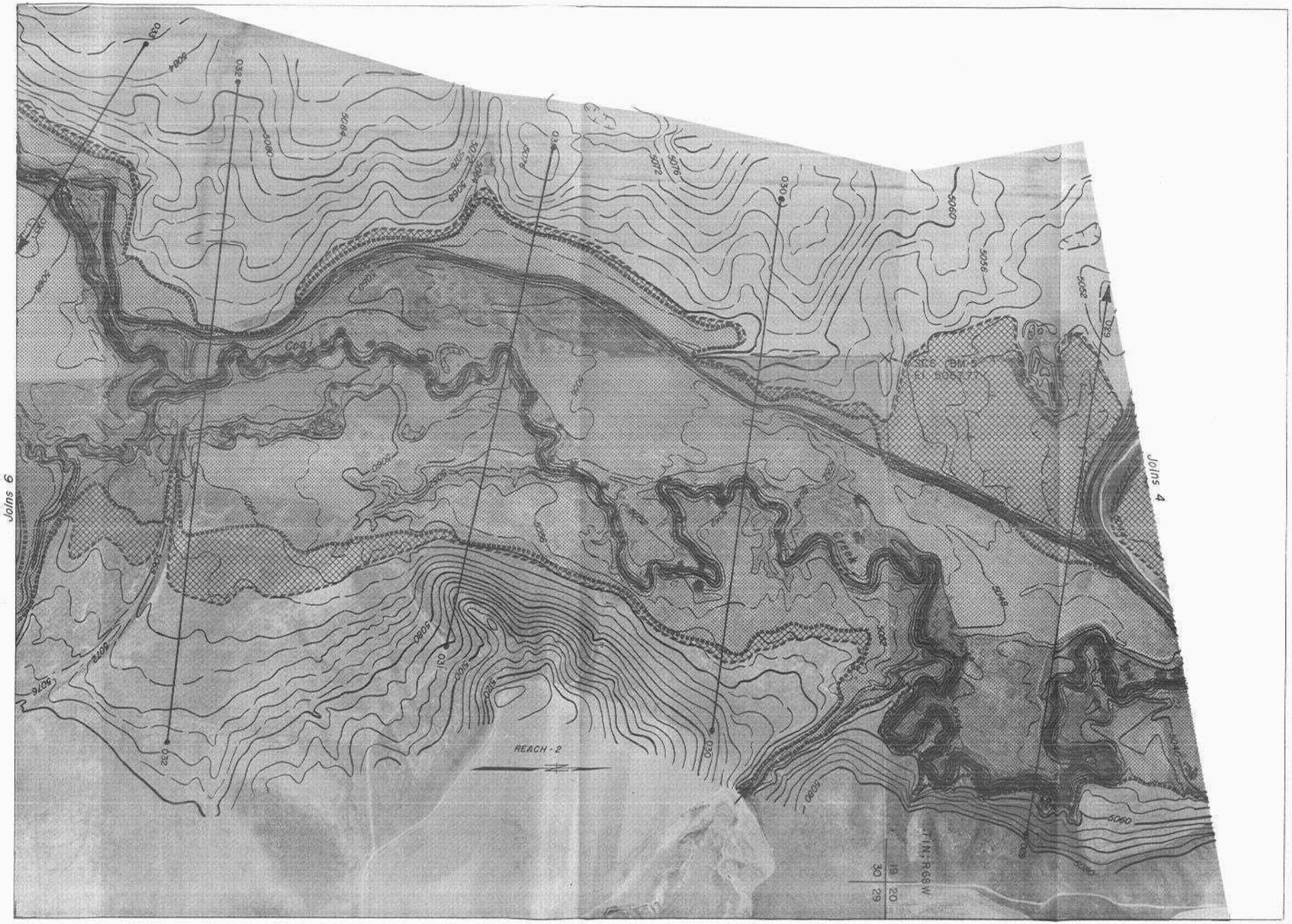
200 0 200 400 600
APPROXIMATE SCALE IN FEET

OCTOBER 1975 SHEET 4 OF 20



LEGEND

FLOOD PLAIN LIMITS

100 YEAR FLOOD

500 YEAR FLOOD

GROUND ELEVATION IN FEET MEAN SEA LEVEL DATUM — 5300

CONTOUR, Index 4.0'

CONTOUR, Interpolated 2.0'

CROSS SECTION — 007 — 007

CROSS SECTION CONTINUED — 010 — 010

INTERMITTENT STREAM

PANEL

AERIAL PHOTOGRAPHY, FLOOD HAZARD AREAS, AND TOPOGRAPHY ARE FOR EXISTING CONDITIONS — JULY 1974.

FLOOD AREA OUTLINES WERE DETERMINED BY MATCHING WATER SURFACE PROFILE ELEVATIONS WITH TOPOGRAPHY.

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REVISION	DATE	BY

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

FLOOD HAZARD AREAS
COAL & ROCK CREEK
BOULDER & WELD COUNTIES, COLORADO

200 0 200 400 600
APPROXIMATE SCALE IN FEET

OCTOBER 1975 SHEET 5 OF 20

LEGEND

FLOOD PLAIN LIMITS

100 YEAR FLOOD

500 YEAR FLOOD

GROUND ELEVATION IN FEET MEAN SEA LEVEL DATUM — 5300

CONTOUR, Index 4.0'

CONTOUR, Interpolated 2.0'

CROSS SECTION 007 — 007

CROSS SECTION CONTINUED 010 — 010

INTERMITTENT STREAM

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FLOOD HAZARD AREAS
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BOULDER & WELD COUNTIES, COLORADO

200 0 200 400 600
APPROXIMATE SCALE IN FEET

OCTOBER 1975 SHEET 6 OF 20

LEGEND

FLOOD PLAIN LIMITS

100 YEAR FLOOD

500 YEAR FLOOD

GROUND ELEVATION IN FEET MEAN SEA LEVEL DATUM — 5300

CONTOUR, Index 4.0'

CONTOUR, Interpolated 2.0'

CROSS SECTION — 007 — 007

CROSS SECTION CONTINUED — 010 — 010

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SOIL CONSERVATION SERVICE

FLOOD HAZARD AREAS
COAL & ROCK CREEK
BOULDER & WELD COUNTIES, COLORADO

200 0 200 400 600
APPROXIMATE SCALE IN FEET

OCTOBER 1975 SHEET 7 OF 20

LEGEND

FLOOD PLAIN LIMITS

100 YEAR FLOOD

500 YEAR FLOOD

GROUND ELEVATION IN FEET MEAN SEA LEVEL DATUM — 5300

CONTOUR, Index 4.0'

CONTOUR, Interpolated 2.0'

CROSS SECTION 007 — 007

CROSS SECTION CONTINUED 010 — 010

INTERMITTENT STREAM

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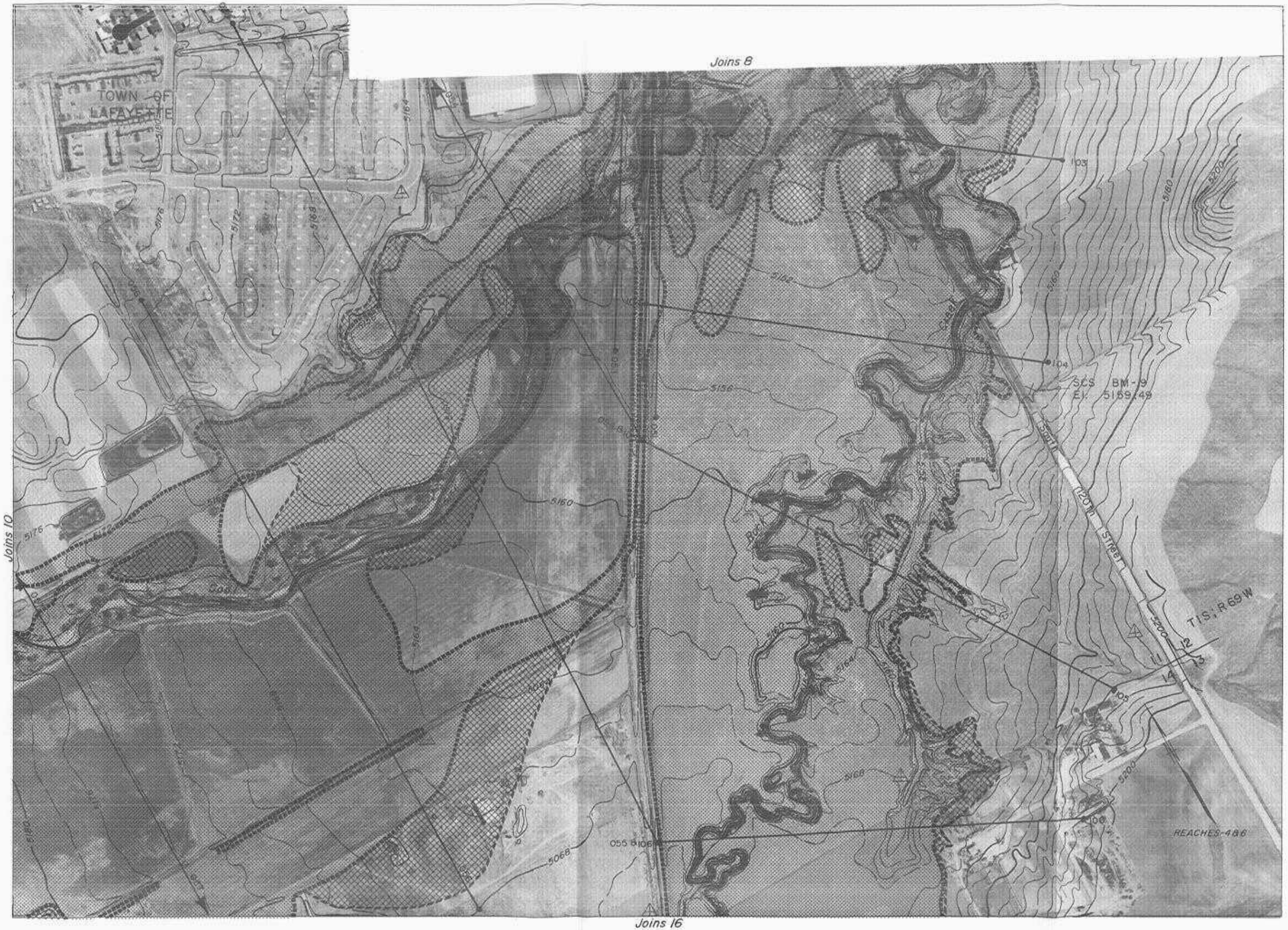
SOIL CONSERVATION SERVICE

FLOOD HAZARD AREAS
COAL & ROCK CREEK
BOULDER & WELD COUNTIES, COLORADO

200 0 200 400 600
APPROXIMATE SCALE IN FEET

OCTOBER 1975 SHEET 8 OF 20



LEGEND

FLOOD PLAIN LIMITS

100 YEAR FLOOD

500 YEAR FLOOD

GROUND ELEVATION IN FEET MEAN SEA LEVEL DATUM — 5300

CONTOUR, Index 4.0'

CONTOUR, Interpolated 2.0'

CROSS SECTION — 007 — 007

CROSS SECTION CONTINUED — 010 — 010

INTERMITTENT STREAM

PANEL

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FLOOD HAZARD AREAS
COAL & ROCK CREEK
BOULDER & WELD COUNTIES, COLORADO

200 0 200 400 600
APPROXIMATE SCALE IN FEET

OCTOBER 1975 SHEET 9 OF 20

LEGEND

FLOOD PLAIN LIMITS

▨ 100 YEAR FLOOD
▨ 500 YEAR FLOOD

GROUND ELEVATION IN FEET MEAN SEA LEVEL DATUM —— 5300 ——
CONTOUR, Index 4.0' ——
CONTOUR, interpolated 2.0' — — —
CROSS SECTION ●007 —— 007●
CROSS SECTION CONTINUED ●010 —— 010 →
INTERMITTENT STREAM —— ··· ——
PANEL △

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SOIL CONSERVATION SERVICE

FLOOD HAZARD AREAS
COAL & ROCK CREEK
BOULDER & WELD COUNTIES, COLORADO

200 0 200 400 600
APPROXIMATE SCALE IN FEET

OCTOBER 1975

SHEET 10 OF 20

LEGEND

FLOOD PLAIN LIMITS

100 YEAR FLOOD

500 YEAR FLOOD

GROUND ELEVATION IN FEET MEAN SEA LEVEL DATUM — 5300

CONTOUR, Index 4.0'

CONTOUR, Interpolated 2.0'

CROSS SECTION — 007 — 007

CROSS SECTION CONTINUED — 010 — 010

INTERMITTENT STREAM

PANEL

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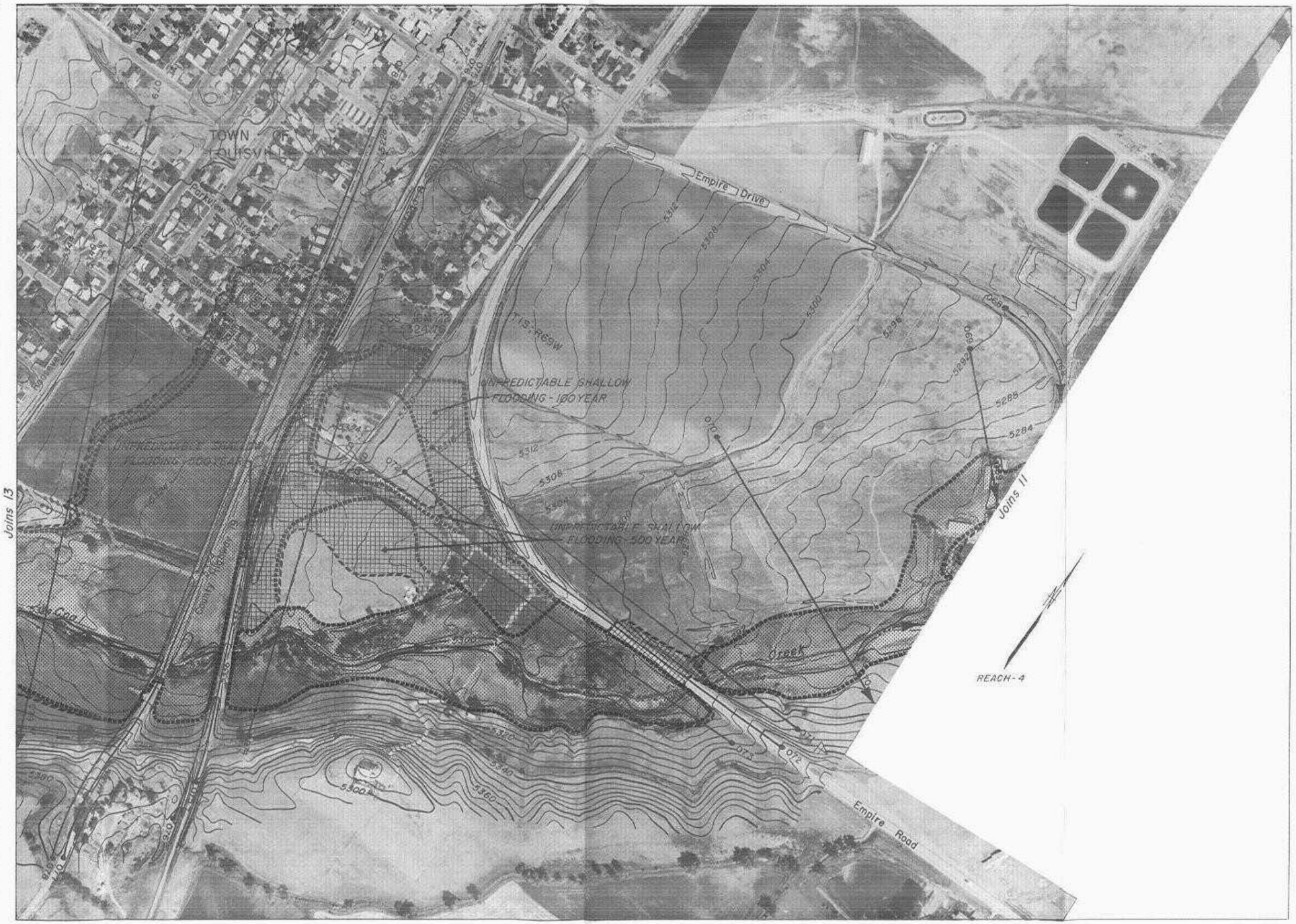
FLOOD HAZARD AREAS
COAL & ROCK CREEK
BOULDER & WELD COUNTIES, COLORADO

200 0 200 400 600
APPROXIMATE SCALE IN FEET

OCTOBER 1975 SHEET 11 OF 20



LEGEND

FLOOD PLAIN LIMITS

100 YEAR FLOOD
500 YEAR FLOOD

GROUND ELEVATION IN FEET MEAN SEA LEVEL DATUM — 5300
CONTOUR, Index 4.0'
CONTOUR, Interpolated 2.0'
CROSS SECTION — 007 007
CROSS SECTION CONTINUED — 010 010
INTERMITTENT STREAM
PANEL — △

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COAL & ROCK CREEK
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200 0 200 400 600
APPROXIMATE SCALE IN FEET

OCTOBER 1975 SHEET 12 OF 20

LEGEND

FLOOD PLAIN LIMITS

▨ 100 YEAR FLOOD
▨ 500 YEAR FLOOD

GROUND ELEVATION IN FEET MEAN SEA LEVEL DATUM —— 5300 ——
CONTOUR, Index 4.0'
CONTOUR, Interpolated 2.0'
CROSS SECTION ● 007 —— 007 ●
CROSS SECTION CONTINUED ● 010 —— 010 →
INTERMITTENT STREAM
PANEL

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FLOOD HAZARD AREAS
COAL & ROCK CREEK
BOULDER & WELD COUNTIES, COLORADO

200 0 200 400 600
APPROXIMATE SCALE IN FEET

OCTOBER 1975 SHEET 13 OF 20

LEGEND

FLOOD PLAIN LIMITS

▨ 100 YEAR FLOOD

▨ 500 YEAR FLOOD

GROUND ELEVATION IN FEET MEAN SEA LEVEL DATUM	5300
CONTOUR, Index 4.0'	——
CONTOUR, Interpolated 2.0'	— —
CROSS SECTION	007 ● —— ● 007
CROSS SECTION CONTINUED	010 ● —— ➤ 010
INTERMITTENT STREAM	—— ··· ——
PANEL	△

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COAL & ROCK CREEK
BOULDER & WELD COUNTIES, COLORADO

200 0 200 400 600
APPROXIMATE SCALE IN FEET

OCTOBER 1975 SHEET 14 OF 20

LEGEND

FLOOD PLAIN LIMITS

100 YEAR FLOOD

500 YEAR FLOOD

GROUND ELEVATION IN FEET MEAN SEA LEVEL DATUM — 5300

CONTOUR, Index 4.0'

CONTOUR, Interpolated 2.0'

CROSS SECTION — 007 — 007

CROSS SECTION CONTINUED — 010 — 010

INTERMITTENT STREAM

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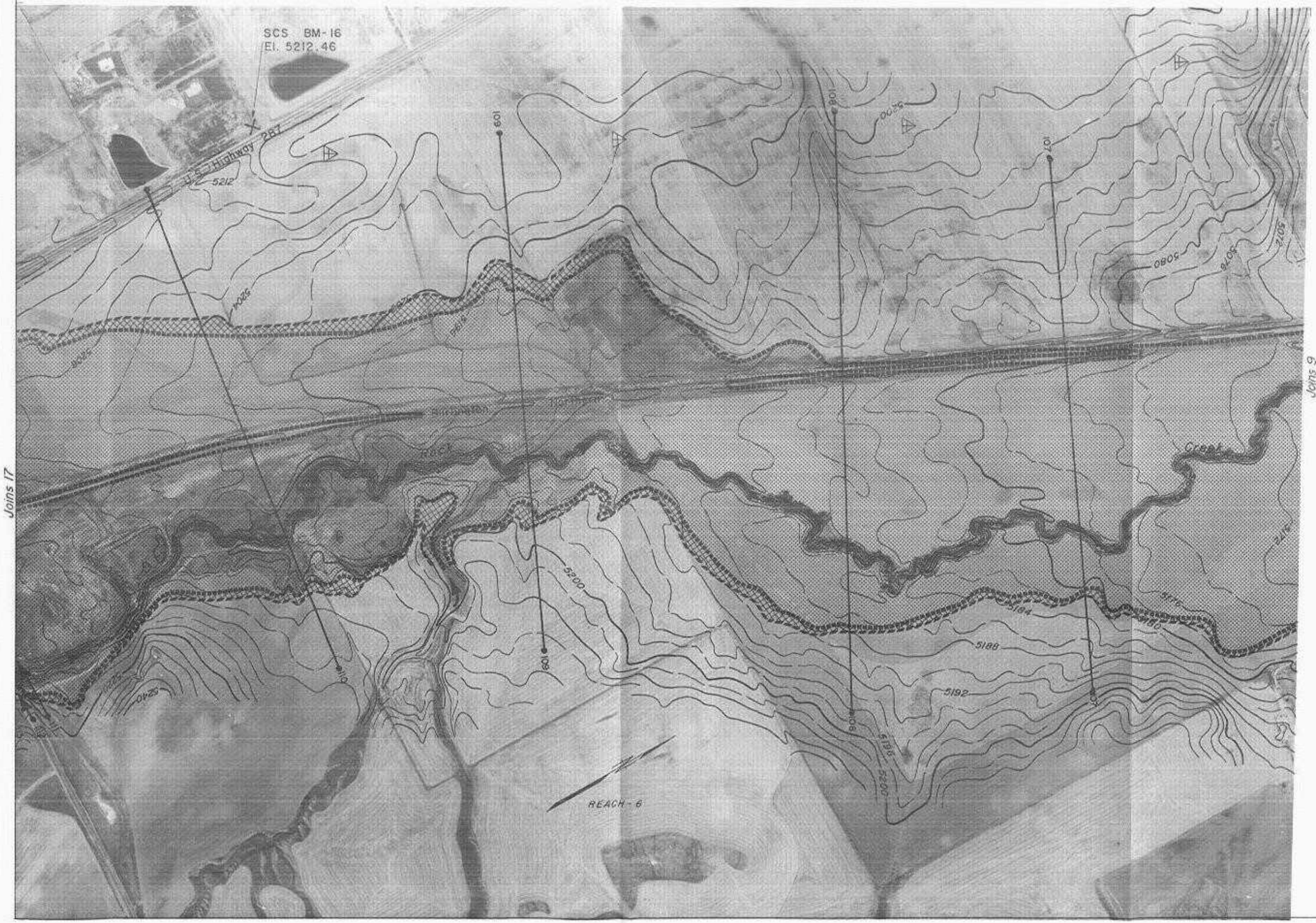
200 0 200 400 600
APPROXIMATE SCALE IN FEET

OCTOBER 1975 SHEET 15 OF 20



LEGEND

FLOOD PLAIN LIMITS

▨	100 YEAR FLOOD
▨	500 YEAR FLOOD

GROUND ELEVATION IN FEET MEAN SEA LEVEL DATUM	5300
CONTOUR, Index 4.0'	
CONTOUR, Interpolated 2.0'	
CROSS SECTION	007 ● 007
CROSS SECTION CONTINUED	010 ● 010 →
INTERMITTENT STREAM	
PANEL	

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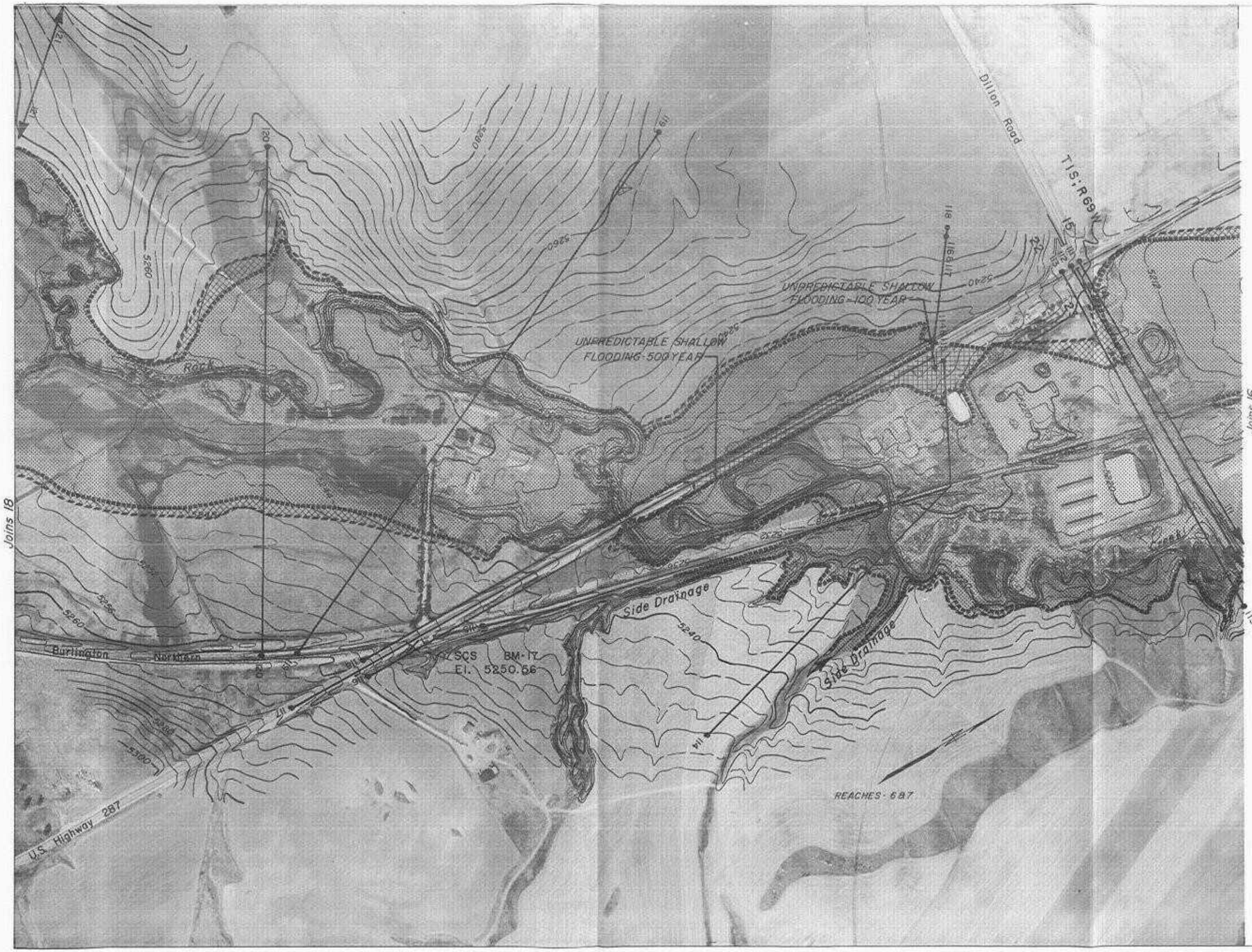
COAL & ROCK CREEK
BOULDER & WELD COUNTIES, COLORADO

200 0 200 400 600
APPROXIMATE SCALE IN FEET

OCTOBER 1975 SHEET 16 OF 20



LEGEND

FLOOD PLAIN LIMITS

100 YEAR FLOOD

500 YEAR FLOOD

GROUND ELEVATION IN FEET MEAN SEA LEVEL DATUM — 5300

CONTOUR, Index 4.0'

CONTOUR, Interpolated 2.0'

CROSS SECTION 007 — 007

CROSS SECTION CONTINUED 010 — 010

INTERMITTENT STREAM

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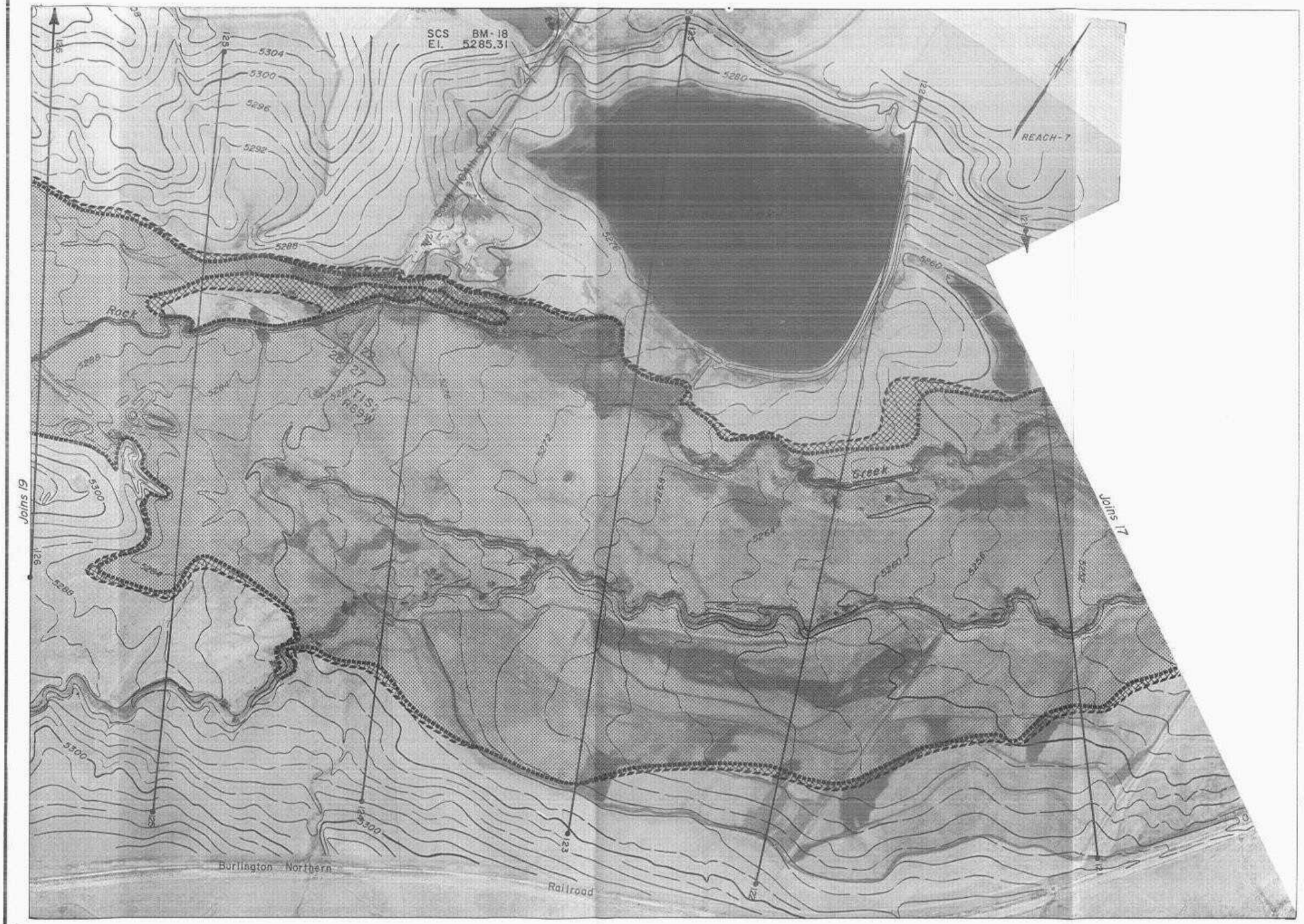
APPROXIMATE SCALE IN FEET

OCTOBER 1975 SHEET 17 OF 20



LEGEND

FLOOD PLAIN LIMITS

100 YEAR FLOOD

500 YEAR FLOOD

GROUND ELEVATION IN FEET MEAN SEA LEVEL DATUM — 5300

CONTOUR, Index 4.0'

CONTOUR, Interpolated 2.0'

CROSS SECTION — 007 — 007

CROSS SECTION CONTINUED — 010 — 010

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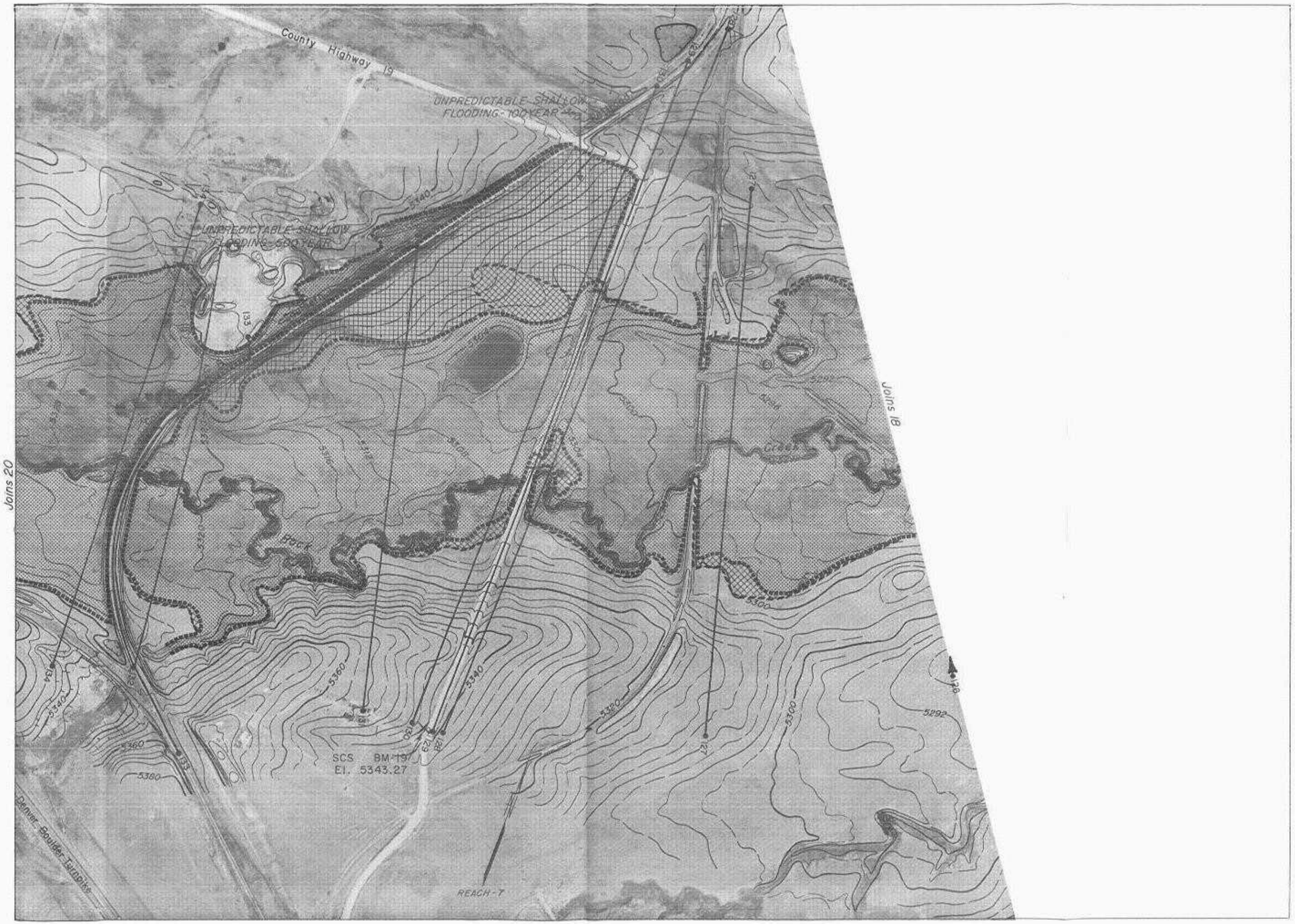
COAL & ROCK CREEK
BOULDER & WELD COUNTIES, COLORADO

200 0 200 400 600
APPROXIMATE SCALE IN FEET

OCTOBER 1975 SHEET 18 OF 20



LEGEND

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100 YEAR FLOOD

500 YEAR FLOOD

GROUND ELEVATION IN FEET MEAN SEA LEVEL DATUM — 5300

CONTOUR, Index 4.0'

CONTOUR, Interpolated 2.0'

CROSS SECTION — 007 — 007

CROSS SECTION CONTINUED — 010 — 010

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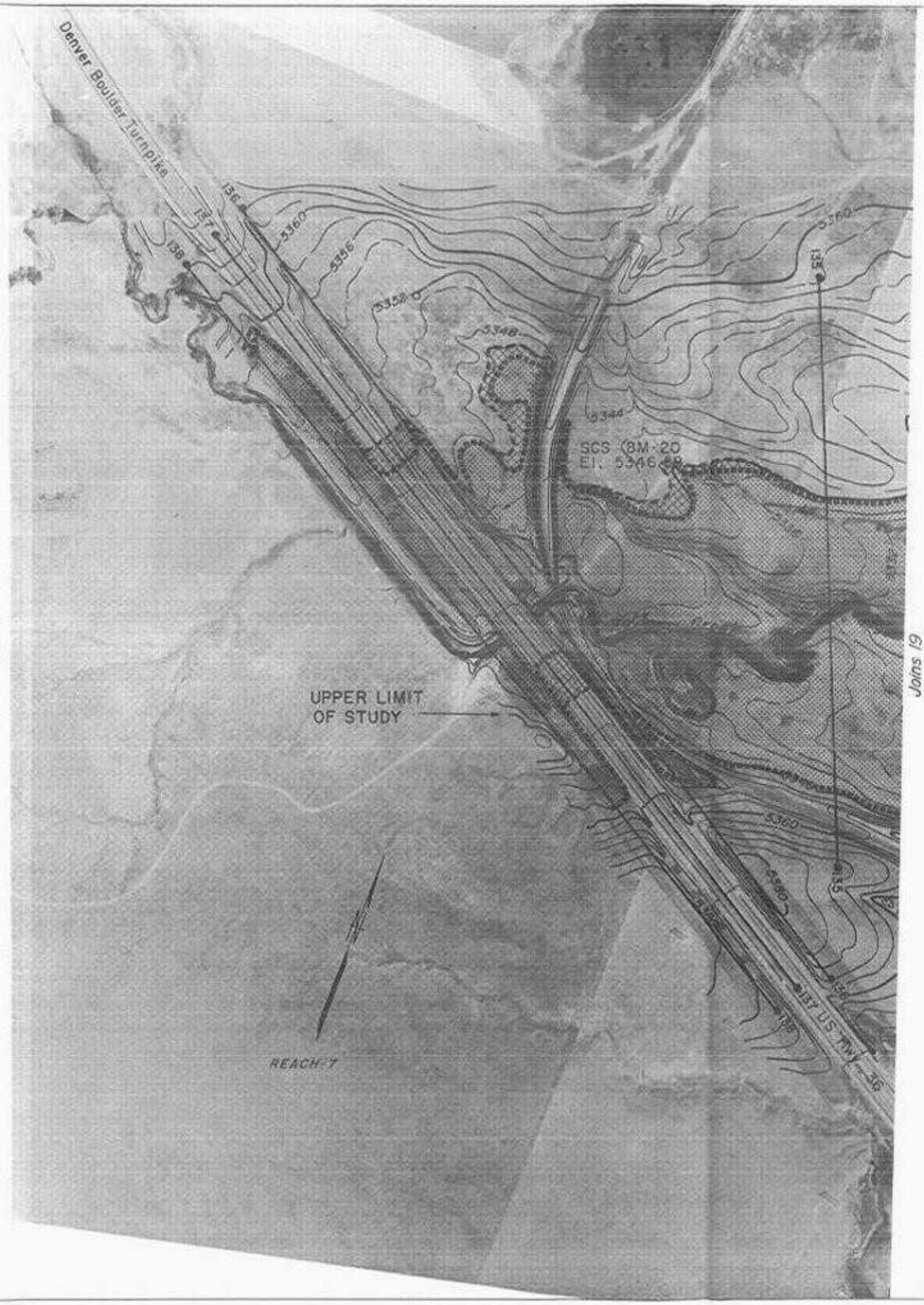
COAL & ROCK CREEK
BOULDER & WELD COUNTIES, COLORADO

200 0 200 400 600
APPROXIMATE SCALE IN FEET

OCTOBER 1975 SHEET 19 OF 20

29 28

T1S; R69W



John's Gl

LEGEND

FLOOD PLAIN LIMITS

100 YEAR FLOOD

500 YEAR FLOOD

GROUND ELEVATION IN FEET MEAN SEA LEVEL DATUM — 5300

CONTOUR, Index 4.0'

CONTOUR, Interpolated 2.0'

CROSS SECTION 007 — 007

CROSS SECTION CONTINUED 010 — 010

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COAL & ROCK CREEK
BOULDER & WELD COUNTIES, COLORADO

200 0 200 400 600
APPROXIMATE SCALE IN FEET

OCTOBER 1975

SHEET 20 OF 20

LEGEND

500 YEAR FLOOD

100 YEAR FLOOD

25 YEAR FLOOD

10 YEAR FLOOD

STREAM BED

PHOTO INDEX
SHEET 1

PHOTO INDEX
SHEET 2

PHOTO INDEX
SHEET 3

ELEVATION IN FEET (M.S.L.)

5000

4990

4980

4970

4960

4950

CONFLUENCE WITH BOULDER CREEK

005

006

007

008

009 - KENOSHA ROAD

010

011

012

013

014

009 - KENOSHA ROAD
Deck El. 4987.2
Bridge
Top of Waterway El. 4975.3

0+00

20+00

40+00

60+00

80+00

100+00

120+00

FEET ABOVE MOUTH

EXHIBIT A-1
WATER SURFACE PROFILES
REACH 1 - COAL CREEK
STA 0+00 to 116+80
FLOOD HAZARD ANALYSES
COAL & ROCK CREEK
BOULDER & WELD COUNTIES,
COLORADO
EXISTING CONDITIONS, JULY 1974
USDA - SCS

LEGEND

500 YEAR FLOOD

100 YEAR FLOOD

25 YEAR FLOOD

10 YEAR FLOOD

STREAM BED

PHOTO INDEX
SHEET 3

ELEVATION IN FEET (M.S.L.)

5030

5020

5010

5000

4990

4980

014

015

016

017 - BRIGGS STREET

018

019 - CHEESMAN STREET

017 - BRIGGS STREET
Deck El. 5012.9
Bridge
Top of Waterway El. 4999.2

110+00 120+00 140+00 160+00 180+00 200+00

FEET ABOVE MOUTH

EXHIBIT A-1a
WATER SURFACE PROFILES
REACH I - COAL CREEK
STA 116+80 to 156+90
FLOOD HAZARD ANALYSES
COAL & ROCK CREEK
BOULDER & WELD COUNTIES,
COLORADO
EXISTING CONDITIONS, JULY 1974
USDA-SCS

LEGEND

500 YEAR FLOOD

100 YEAR FLOOD

25 YEAR FLOOD

10 YEAR FLOOD

STREAM BED

PHOTO INDEX SHEET 3

PHOTO INDEX SHEET 4

PHOTO INDEX SHEET 5

ELEVATION IN FEET (M.S.L.)

5050

5040

5030

5020

5010

5000

019-CHEESMAN STREET

020-MOFFAT STREET

021-ANDERSON STREET

022

023-UNION PACIFIC RAILROAD

024

025-PERRY STREET

026

027

028

029

023-UNION PACIFIC RAILROAD
Deck El. 5025.6
Bridge
Top of Waterway El. 5009.6

025-PERRY STREET
Deck El. 5026.0
Bridge
Top of Waterway El. 5011.4

150+00 160+00 180+00 200+00 220+00 240+00 260+00 280+00

FEET ABOVE MOUTH

EXHIBIT A-2
WATER SURFACE PROFILES
REACH 2 - COAL CREEK
STA 156+90 to 272+80
FLOOD HAZARD ANALYSES
COAL & ROCK CREEK
BOULDER & WELD COUNTIES,
COLORADO
EXISTING CONDITIONS, JULY 1974
USDA-SCS

LEGEND

500 YEAR FLOOD

100 YEAR FLOOD

25 YEAR FLOOD

10 YEAR FLOOD

STREAM BED

PHOTO INDEX
SHEET 5

PHOTO INDEX
SHEET 6

ELEVATION IN FEET (M.S.L.)

5080
5070
5060
5050
5040
5030
5020

029
030
031
032
033
034

270+00
280+00
300+00
320+00
340+00
360+00
380+00
400+00

FEET ABOVE MOUTH

EXHIBIT A-2a
WATER SURFACE PROFILES
REACH 2 - COAL CREEK
STA 272+80 to 388+70
FLOOD HAZARD ANALYSES
COAL & ROCK CREEK
BOULDER & WELD COUNTIES,
COLORADO
EXISTING CONDITIONS, JULY 1974
USDA-SCS

LEGEND

500 YEAR FLOOD

100 YEAR FLOOD

25 YEAR FLOOD

10 YEAR FLOOD

STREAM BED

PHOTO INDEX
SHEET 6

ELEVATION IN FEET (M.S.L.)

5090

5080

5070

5060

5050

380+00

400+00

420+00

FEET ABOVE MOUTH

034

035

EXHIBIT A-2b
WATER SURFACE PROFILES
REACH 2 - COAL CREEK
STA 388+70 to 409+40
FLOOD HAZARD ANALYSES
COAL & ROCK CREEK
BOULDER & WELD COUNTIES,
COLORADO
EXISTING CONDITIONS, JULY 1974
USDA-SCS

LEGEND

500 YEAR FLOOD

100 YEAR FLOOD

25 YEAR FLOOD

10 YEAR FLOOD

STREAM BED

PHOTO INDEX
SHEET 6

PHOTO INDEX
SHEET 7

ELEVATION IN FEET (M.S.L.)

5110

5100

5090

5080

5070

5060

035

036

037

038

039

040

041 - BASELINE ROAD STATE HWY. 7

042

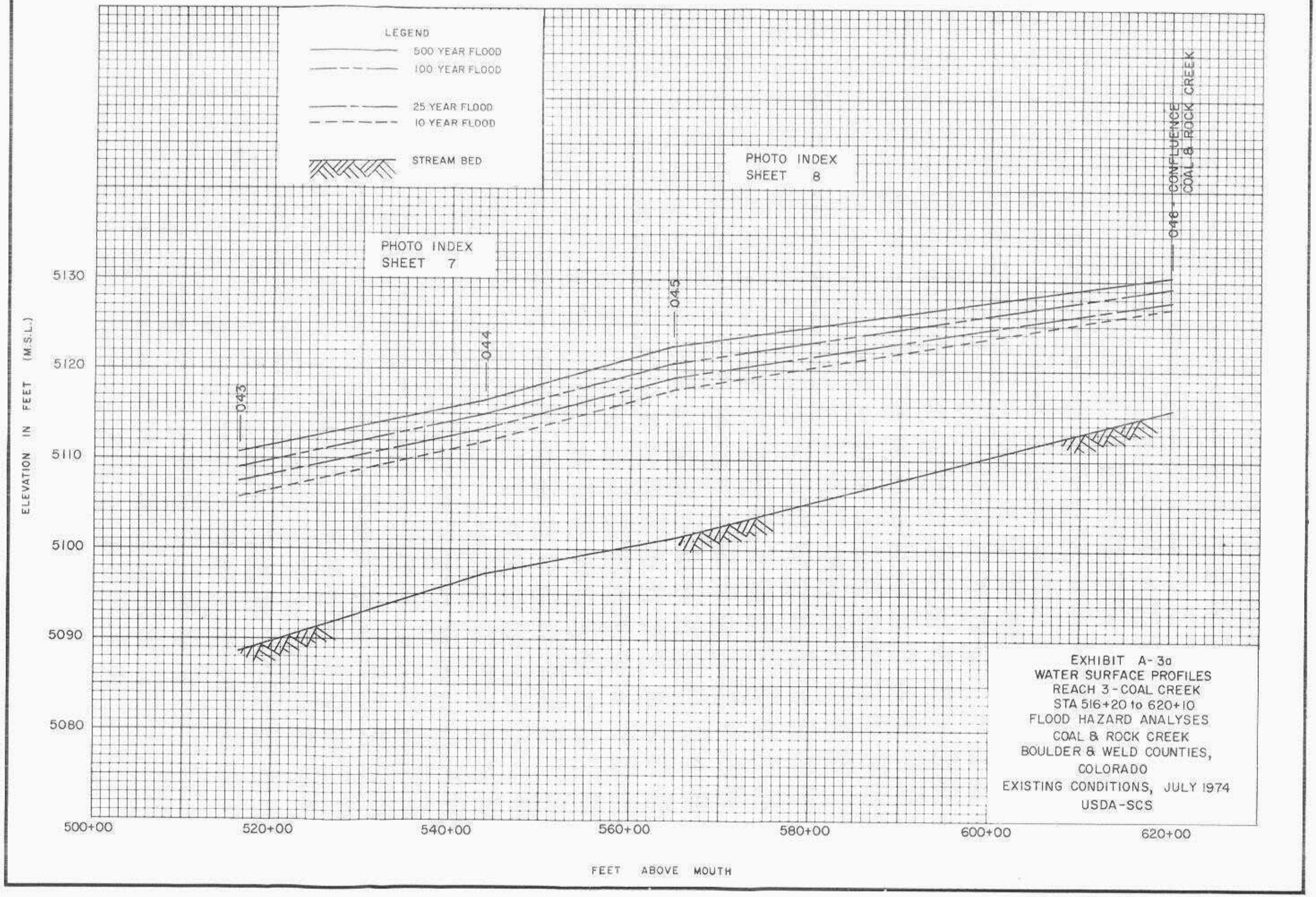
043

BASELINE ROAD STATE HWY. 7
Deck El. 5104.7
Bridge
Top of Waterway El. 5082.3

400+00 420+00 440+00 460+00 480+00 500+00 520+00

FEET ABOVE MOUTH

EXHIBIT A-3
WATER SURFACE PROFILES
REACH 3 - COAL CREEK
STA 409+40 to 516+20
FLOOD HAZARD ANALYSES
COAL & ROCK CREEK
BOULDER & WELD COUNTIES,
COLORADO
EXISTING CONDITIONS, JULY 1974
USDA - SCS


LEGEND
500 YEAR FLOOD
100 YEAR FLOOD
25 YEAR FLOOD
10 YEAR FLOOD
STREAM BED
PHOTO INDEX
SHEET 7
PHOTO INDEX
SHEET 8
043
044
045
046 - CONFLUENCE
COAL & ROCK CREEK
ELEVATION IN FEET (M.S.L.)
5130
5120
5110
5100
5090
5080
500+00
520+00
540+00
560+00
580+00
600+00
620+00
FEET ABOVE MOUTH
EXHIBIT A-3a
WATER SURFACE PROFILES
REACH 3 - COAL CREEK
STA 516+20 to 620+10
FLOOD HAZARD ANALYSES
COAL & ROCK CREEK
BOULDER & WELD COUNTIES,
COLORADO
EXISTING CONDITIONS, JULY 1974
USDA-SCS

LEGEND

500 YEAR FLOOD

100 YEAR FLOOD

25 YEAR FLOOD

10 YEAR FLOOD

STREAM BED

PHOTO INDEX
SHEET 8

PHOTO INDEX
SHEET 9

ELEVATION IN FEET (M.S.L.)

5170
5160
5150
5140
5130
5120
5110

046-CONFLUENCE COAL & ROCK CREEK
047
048
049- SOUTH 120TH STREET
050
051
052-BURLINGTON NORTHERN RAILROAD
053
054
055

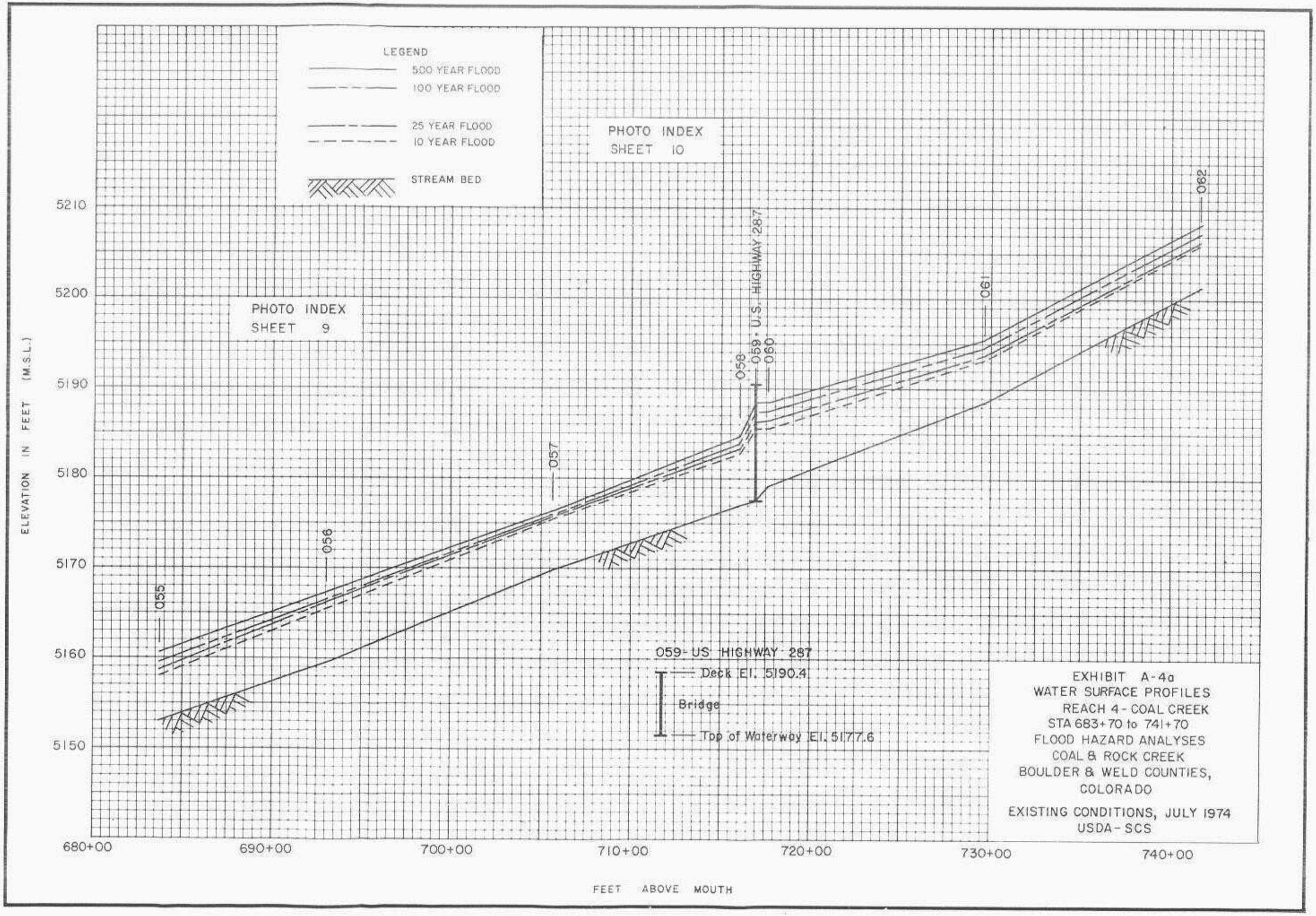
049 SOUTH 120TH STREET
Deck El. 5141.4
Bridge
Top of Waterway El. 5133.4

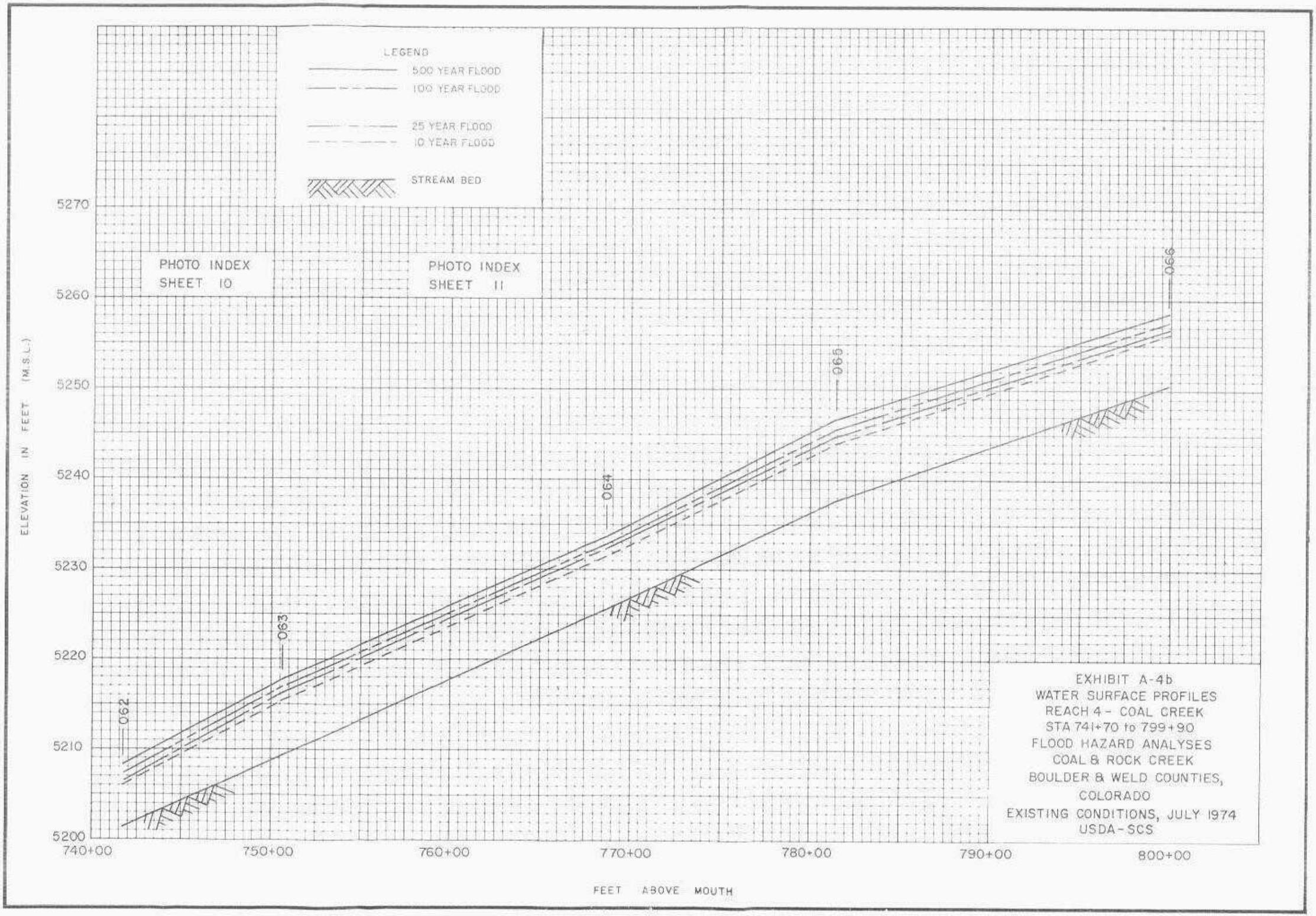
052-BURLINGTON NORTHERN RAILROAD
Deck El. 5152.8
Bridge
Top of Waterway El. 5137.8

620+00 630+00 640+00 650+00 660+00 670+00 680+00

FEET ABOVE MOUTH

EXHIBIT A-4
WATER SURFACE PROFILES
REACH 4 - COAL CREEK
STA 620+00 to 683+70
FLOOD HAZARD ANALYSES
COAL & ROCK CREEK
BOULDER & WELD COUNTIES,
COLORADO
EXISTING CONDITIONS, JULY 1974
USDA-SCS


LEGEND
500 YEAR FLOOD
100 YEAR FLOOD
25 YEAR FLOOD
10 YEAR FLOOD
STREAM BED
PHOTO INDEX
SHEET 9
PHOTO INDEX
SHEET 10
ELEVATION IN FEET (M.S.L.)
5210
5200
5190
5180
5170
5160
5150
055
056
057
058
059 · U.S. HIGHWAY 287
060
061
062
059- US HIGHWAY 287
Deck El. 5190.4
Bridge
Top of Waterway El. 5177.6
680+00
690+00
700+00
710+00
720+00
730+00
740+00
FEET ABOVE MOUTH
EXHIBIT A-4a
WATER SURFACE PROFILES
REACH 4 - COAL CREEK
STA 683+70 to 741+70
FLOOD HAZARD ANALYSES
COAL & ROCK CREEK
BOULDER & WELD COUNTIES,
COLORADO
EXISTING CONDITIONS, JULY 1974
USDA - SCS


LEGEND
500 YEAR FLOOD
100 YEAR FLOOD
25 YEAR FLOOD
10 YEAR FLOOD
STREAM BED
PHOTO INDEX SHEET 10
PHOTO INDEX SHEET 11
062
063
064
066
ELEVATION IN FEET (M.S.L.)
5270
5260
5250
5240
5230
5220
5210
5200
740+00
750+00
760+00
770+00
780+00
790+00
800+00
FEET ABOVE MOUTH
EXHIBIT A-4b
WATER SURFACE PROFILES
REACH 4 - COAL CREEK
STA 741+70 to 799+90
FLOOD HAZARD ANALYSES
COAL & ROCK CREEK
BOULDER & WELD COUNTIES,
COLORADO
EXISTING CONDITIONS, JULY 1974
USDA-SCS

LEGEND

500 YEAR FLOOD

100 YEAR FLOOD

25 YEAR FLOOD

10 YEAR FLOOD

STREAM BED

PHOTO INDEX
SHEET 11

PHOTO INDEX
SHEET 12

ELEVATION IN FEET (M.S.L.)

5330
5320
5310
5300
5290
5280
5270
5260
5250

795+00
800+00
810+00
820+00
830+00
840+00
850+00
860+00

FEET ABOVE MOUTH

066
067
068 EMPIRE DRIVE
069
070
071
072 EMPIRE ROAD
073
074
075
076

COLORADO & SOUTHERN R.R.

068- EMPIRE DRIVE
Deck El. 5276.3
Bridge
Top of Waterway El. 5264.0

072 - EMPIRE ROAD
Deck El. 5306.0
Bridge
Top of Waterway El. 5286.5

075- COLORADO & SOUTHERN R.R.
Deck El. 5336.4
Bridge
Top of Waterway El. 5311.7

EXHIBIT A-4c
WATER SURFACE PROFILES
REACH 4- COAL CREEK
STA 799+90 to 857+40
FLOOD HAZARD ANALYSES
COAL & ROCK CREEK
BOULDER & WELD COUNTIES,
COLORADO
EXISTING CONDITIONS, JULY 1974
USDA-SCS

LEGEND

500 YEAR FLOOD

100 YEAR FLOOD

25 YEAR FLOOD

10 YEAR FLOOD

STREAM BED

PHOTO INDEX SHEET 12

PHOTO INDEX SHEET 13

ELEVATION IN FEET (M.S.L.)

5380
5370
5360
5350
5340
5330
5320
5310

076
077 - COUNTY HIGHWAY 19
078
079
080
081
082
083
084

077 - COUNTY HIGHWAY 19
Deck El. 5328.3
Bridge
Top of Waterway El. 5318.4

855+00
860+00
870+00
880+00
890+00
900+00
910+00
920+00

FEET ABOVE MOUTH

EXHIBIT A-4d
WATER SURFACE PROFILES
REACH 4 - COAL CREEK
STA 857+40 to 919+10
FLOOD HAZARD ANALYSES
COAL & ROCK CREEK
BOULDER & WELD COUNTIES,
COLORADO
EXISTING CONDITIONS, JULY 1974
USDA-SCS

LEGEND

500 YEAR FLOOD

100 YEAR FLOOD

25 YEAR FLOOD

10 YEAR FLOOD

STREAM BED

PHOTO INDEX
SHEET 13

ELEVATION IN FEET (M.S.L.)

5390

5380

5370

084

085

910+00

920+00

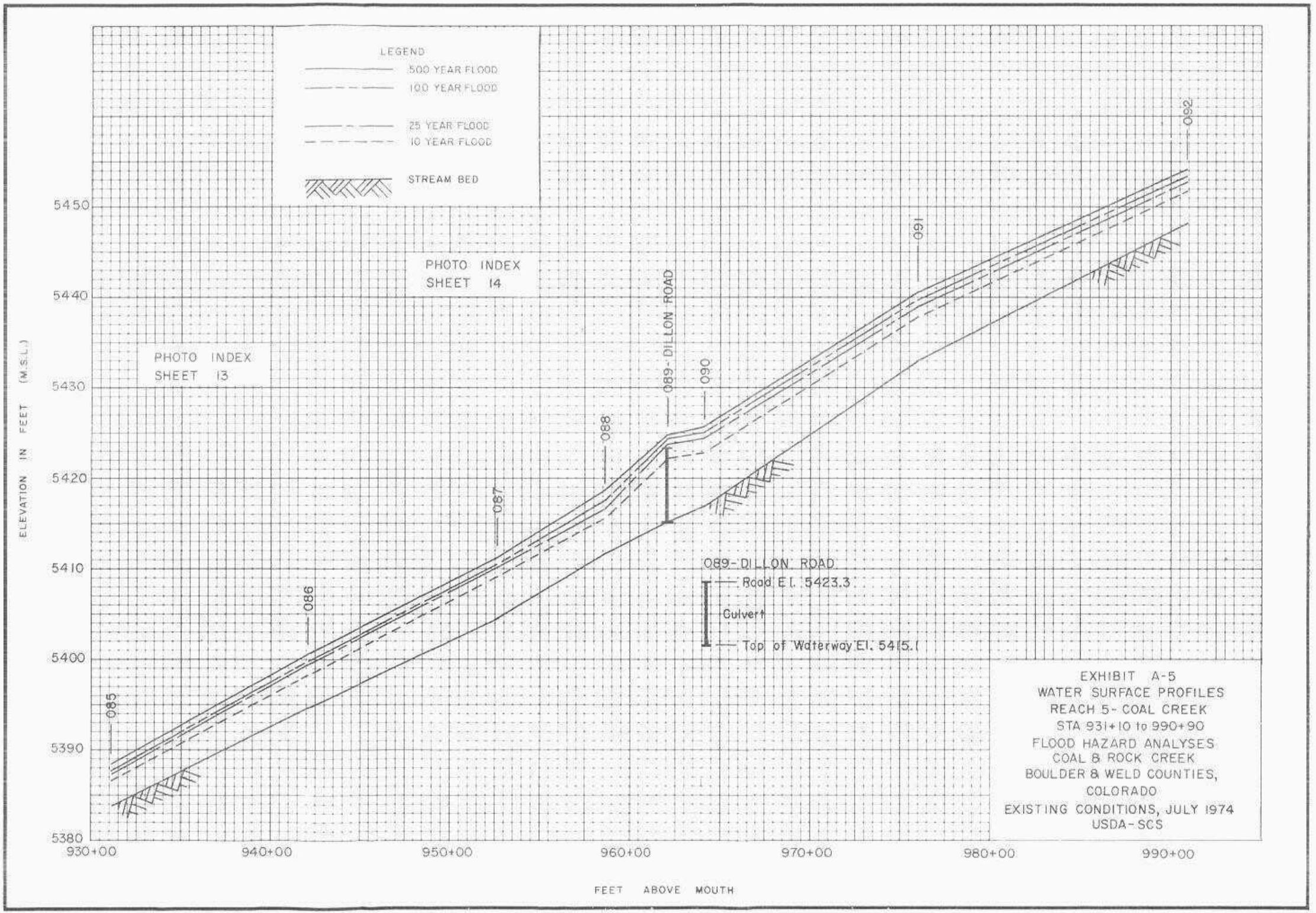
930+00

940+00

FEET ABOVE MOUTH

EXHIBIT A-4e

WATER SURFACE PROFILES
REACH 4 - COAL CREEK
STA 919+10 to 931+10
FLOOD HAZARD ANALYSES
COAL & ROCK CREEK
BOULDER & WELD COUNTIES,
COLORADO
EXISTING CONDITIONS, JULY 1974
USDA-SCS


LEGEND
500 YEAR FLOOD
100 YEAR FLOOD
25 YEAR FLOOD
10 YEAR FLOOD
STREAM BED
PHOTO INDEX
SHEET 14
PHOTO INDEX
SHEET 13
ELEVATION IN FEET (M.S.L.)
5450
5440
5430
5420
5410
5400
5390
5380
085
086
087
088
089-DILLON ROAD
090
091
092
089-DILLON ROAD
Road El. 5423.3
Culvert
Top of Waterway El. 5415.(
930+00
940+00
950+00
960+00
970+00
980+00
990+00
FEET ABOVE MOUTH
EXHIBIT A-5
WATER SURFACE PROFILES
REACH 5- COAL CREEK
STA 931+10 to 990+90
FLOOD HAZARD ANALYSES
COAL & ROCK CREEK
BOULDER & WELD COUNTIES,
COLORADO
EXISTING CONDITIONS, JULY 1974
USDA-SCS

LEGEND

500 YEAR FLOOD

100 YEAR FLOOD

25 YEAR FLOOD

10 YEAR FLOOD

STREAM BED

PHOTO INDEX
SHEET 14

PHOTO INDEX
SHEET 15

ELEVATION IN FEET (M.S.L.)

5500
5490
5480
5470
5460
5450
5440

092
093 - DENVER BOULDER TURNPIKE
094
095
096 - MC CASLIN BLVD.
097
098
099

093 - DENVER BOULDER TURNPIKE
Deck El. 5462.0
Bridge
Top of Waterway El. 5450.1

096 - MC CASLIN BLVD.
Deck El. 5482.8
Bridge
Top of Waterway El. 5468.8

990+00
1000+00
1010+00
1020+00
1030+00
1040+00

FEET ABOVE MOUTH

EXHIBIT A-5a
WATER SURFACE PROFILES
REACH 5 - COAL CREEK
STA 990+90 to 1037+70
FLOOD HAZARD ANALYSES
COAL & ROCK CREEK
BOULDER & WELD COUNTIES,
COLORADO
EXISTING CONDITIONS, JULY 1974
USDA-SCS

LEGEND

500 YEAR FLOOD

100 YEAR FLOOD

25 YEAR FLOOD

10 YEAR FLOOD

STREAM BED

PHOTO INDEX
SHEET 15

ELEVATION IN FEET (M.S.L.)

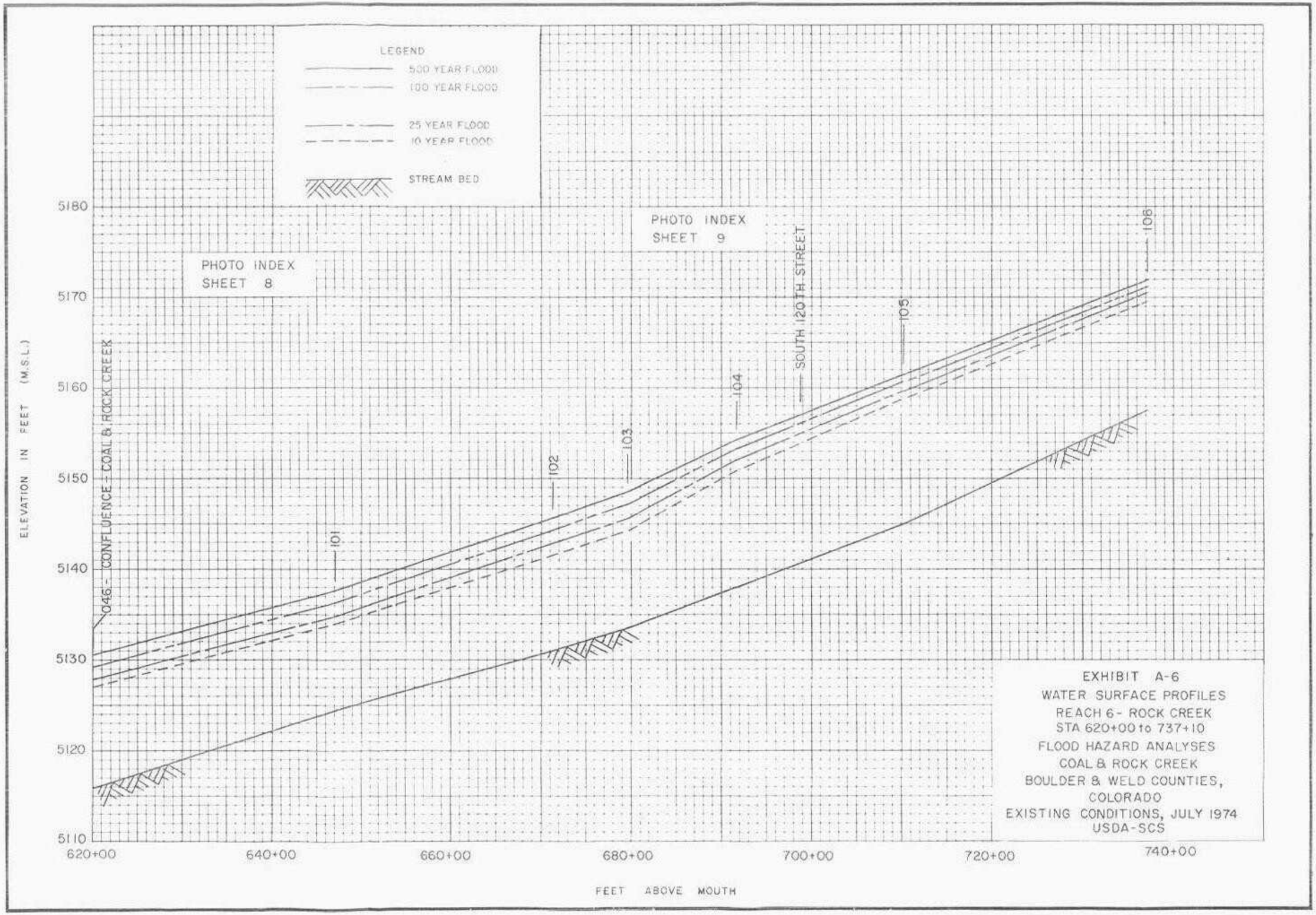
5550
5540
5530
5520
5510
5500

100
099
010

1030+00
1040+00
1050+00
1060+00

FEET ABOVE MOUTH

EXHIBIT A-5b
WATER SURFACE PROFILES
REACH 5 - COAL CREEK
STA 1037+70 to 1059+00
FLOOD HAZARD ANALYSES
COAL & ROCK CREEK
BOULDER & WELD COUNTIES,
COLORADO
EXISTING CONDITIONS, JULY 1974
USDA-SCS


LEGEND
500 YEAR FLOOD
100 YEAR FLOOD
25 YEAR FLOOD
10 YEAR FLOOD
STREAM BED
PHOTO INDEX
SHEET 8
PHOTO INDEX
SHEET 9
ELEVATION IN FEET (M.S.L.)
5180
5170
5160
5150
5140
5130
5120
5110
046 - CONFLUENCE - COAL & ROCK CREEK
101
102
103
104
105
106
SOUTH 120TH STREET
620+00
640+00
660+00
680+00
700+00
720+00
740+00
FEET ABOVE MOUTH
EXHIBIT A-6
WATER SURFACE PROFILES
REACH 6 - ROCK CREEK
STA 620+00 to 737+10
FLOOD HAZARD ANALYSES
COAL & ROCK CREEK
BOULDER & WELD COUNTIES,
COLORADO
EXISTING CONDITIONS, JULY 1974
USDA-SCS

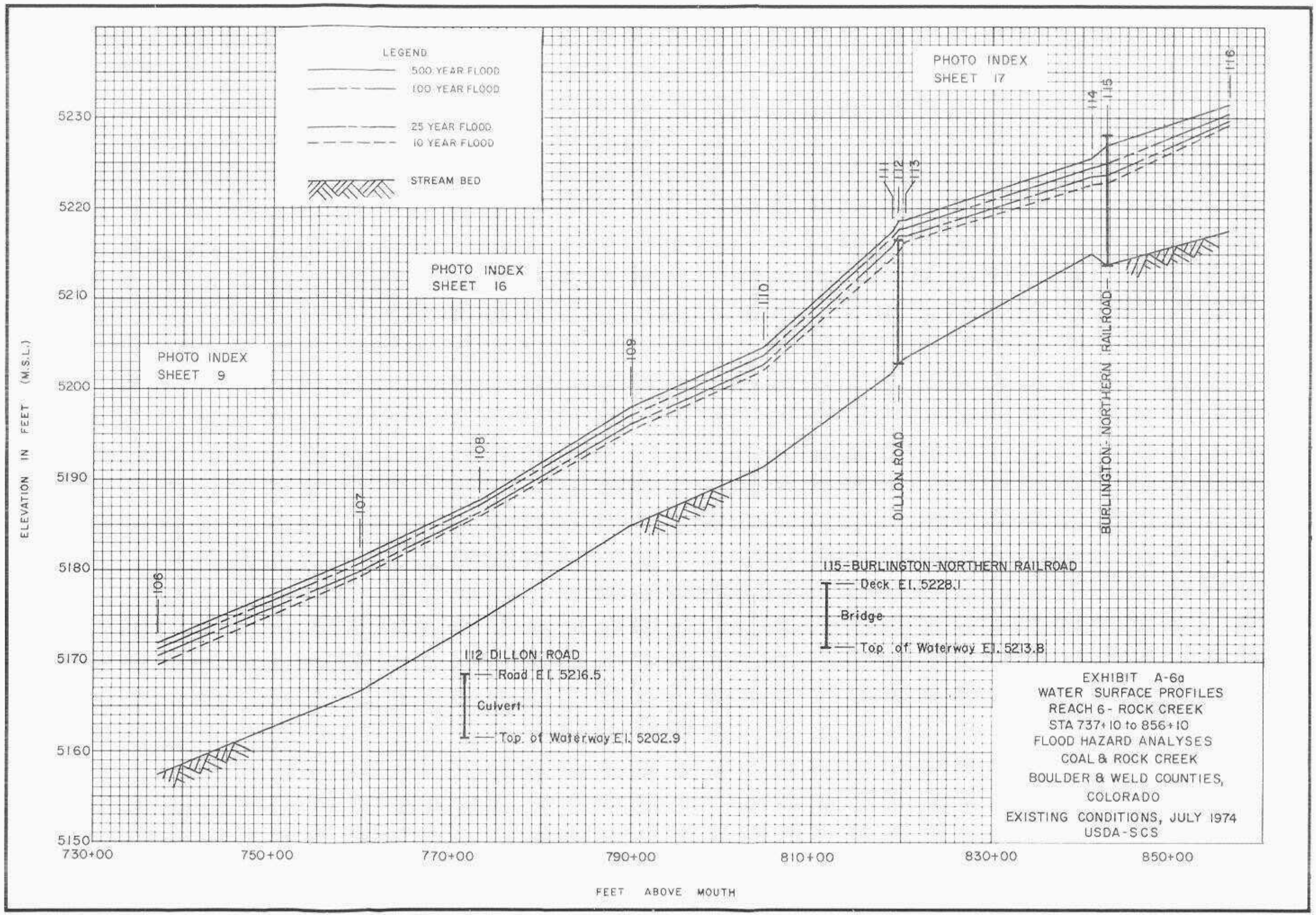


EXHIBIT A-6a
WATER SURFACE PROFILES
REACH 6 - ROCK CREEK
STA 737+10 to 856+10
FLOOD HAZARD ANALYSES
COAL & ROCK CREEK
BOULDER & WELD COUNTIES,
COLORADO
EXISTING CONDITIONS, JULY 1974
USDA-SCS

LEGEND

500 YEAR FLOOD

100 YEAR FLOOD

25 YEAR FLOOD

10 YEAR FLOOD

STREAM BED

PHOTO INDEX
SHEET 17

ELEVATION IN FEET (M.S.L.)

5270
5260
5250
5240
5230
5220
5210

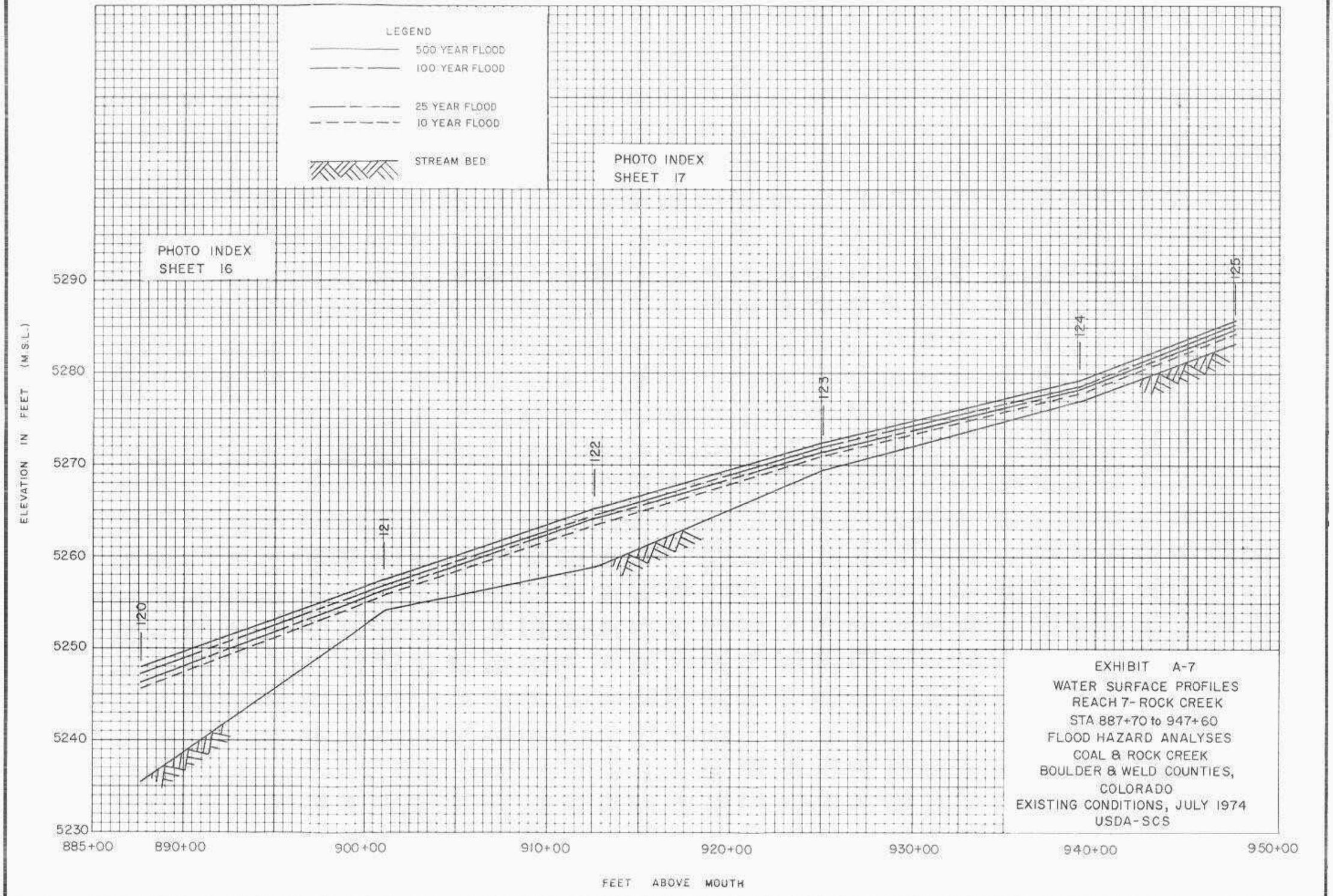
850+00
870+00
890+00

FEET ABOVE MOUTH

116
117 - U.S. HIGHWAY 287
118
119
120

117 - U.S. HIGHWAY 287
Deck El. 5234.8
Bridge
Top of Waterwdy El. 5216.4

EXHIBIT A-6b
WATER SURFACE PROFILES
REACH 6- ROCK CREEK
STA 856+10 to 887+70
FLOOD HAZARD ANALYSES
COAL & ROCK CREEK
BOULDER & WELD COUNTIES,
COLORADO
EXISTING CONDITIONS, JULY 1974
USDA-SCS


LEGEND
500 YEAR FLOOD
100 YEAR FLOOD
25 YEAR FLOOD
10 YEAR FLOOD
STREAM BED
PHOTO INDEX
SHEET 16
PHOTO INDEX
SHEET 17
ELEVATION IN FEET (M.S.L.)
5290
5280
5270
5260
5250
5240
5230
120
121
122
123
124
125
885+00
890+00
900+00
910+00
920+00
930+00
940+00
950+00
FEET ABOVE MOUTH
EXHIBIT A-7
WATER SURFACE PROFILES
REACH 7- ROCK CREEK
STA 887+70 to 947+60
FLOOD HAZARD ANALYSES
COAL & ROCK CREEK
BOULDER & WELD COUNTIES,
COLORADO
EXISTING CONDITIONS, JULY 1974
USDA-SCS

LEGEND

500 YEAR FLOOD

100 YEAR FLOOD

25 YEAR FLOOD

10 YEAR FLOOD

STREAM BED

PHOTO INDEX
SHEET 18

PHOTO INDEX
SHEET 19

ELEVATION IN FEET (M.S.L.)

5350
5340
5330
5320
5310
5300
5290
5280

945+00
950+00
960+00
970+00
980+00
990+00
1000+00

FEET ABOVE MOUTH

125
126
127
128
129 COUNTY ROAD 19
130
131

129 COUNTY ROAD 19
Road El. 5308.4
Culvert
Top of Waterway El. 5302.8

EXHIBIT A-7a
WATER SURFACE PROFILES
REACH 7- ROCK CREEK
STA 947+60 to 995+80
FLOOD HAZARD ANALYSES
COAL & ROCK CREEK
BOULDER & WELD COUNTIES,
COLORADO
EXISTING CONDITIONS, JULY 1974
USDA-SCS

LEGEND

500 YEAR FLOOD

100 YEAR FLOOD

25 YEAR FLOOD

10 YEAR FLOOD

STREAM BED

PHOTO INDEX
SHEET 19

PHOTO INDEX
SHEET 20

ELEVATION IN FEET (M.S.L.)

5360
5350
5340
5330
5320
5310
5300

995+00
1000+00
1010+00
1020+00
1030+00
1040+00
1050+00

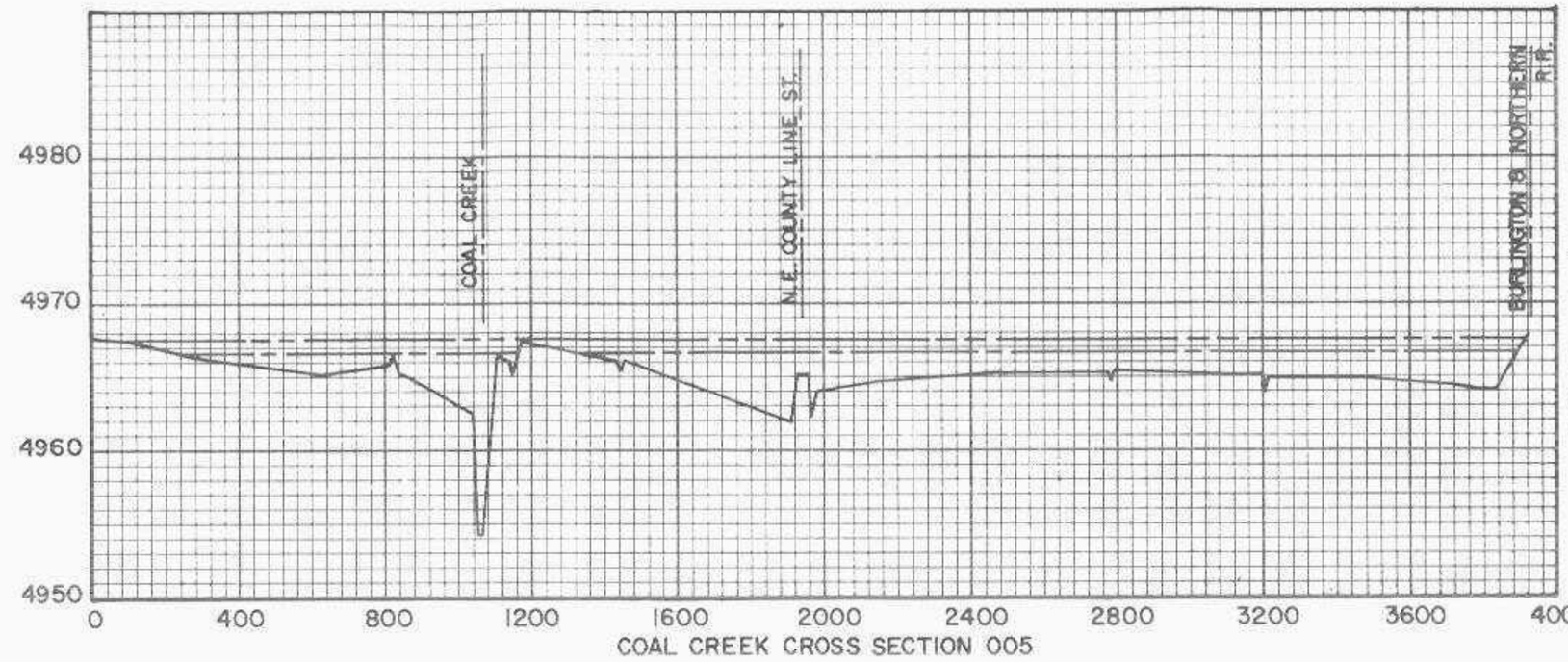
FEET ABOVE MOUTH

131
132
133 - COLORADO & SOUTHERN R.R.
134
135
136
137 - DENVER - BOULDER TURNPIKE
138

133 - COLORADO & SOUTHERN R.R.
Deck El. 5332.5
Bridge
Top of Waterway El. 5318.5

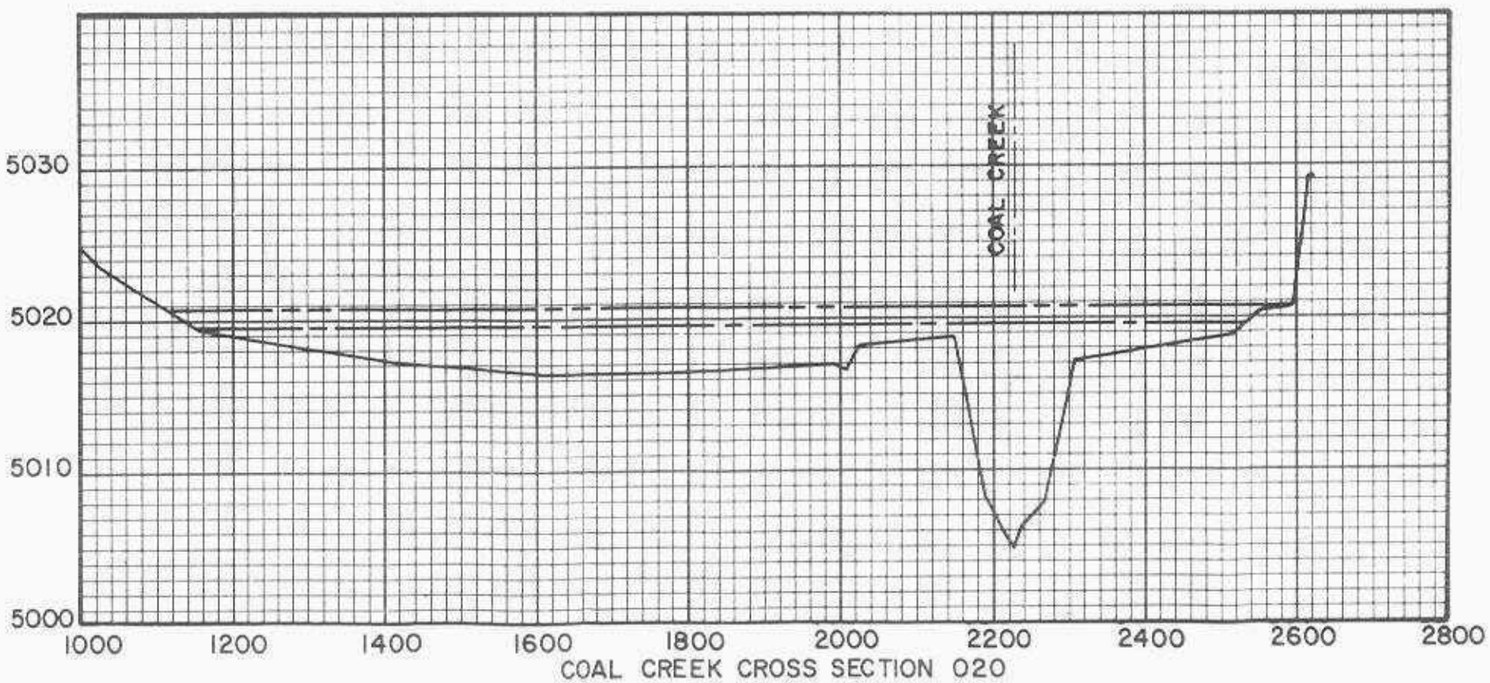
137 - DENVER - BOULDER TURNPIKE
Deck El. 5356.1
Bridge
Top of Waterway El. 5336.0

EXHIBIT A-7b
WATER SURFACE PROFILES
REACH 7 - ROCK CREEK
STA 995+80 to 1042+00
FLOOD HAZARD ANALYSES
COAL & ROCK CREEK
BOULDER & WELD COUNTIES,
COLORADO
EXISTING CONDITIONS, JULY 1974
USDA-SCS



COAL CREEK CROSS SECTION 005

APPROXIMATELY 1280 FEET UPSTREAM OF CONFLUENCE WITH BOULDER CREEK



COAL CREEK CROSS SECTION 020

℄ OF MOFFAT STREET IN ERIE

HORIZONTAL DISTANCE IN FEET

LEGEND

——— — — ——— 500 Year Flood

——— — — ——— 100 Year Flood

——————— Approximate Ground Line

NOTE

Cross Sections are viewed in direction of flow.

EXHIBIT B-1

TYPICAL VALLEY CROSS SECTIONS

COAL & ROCK CREEK

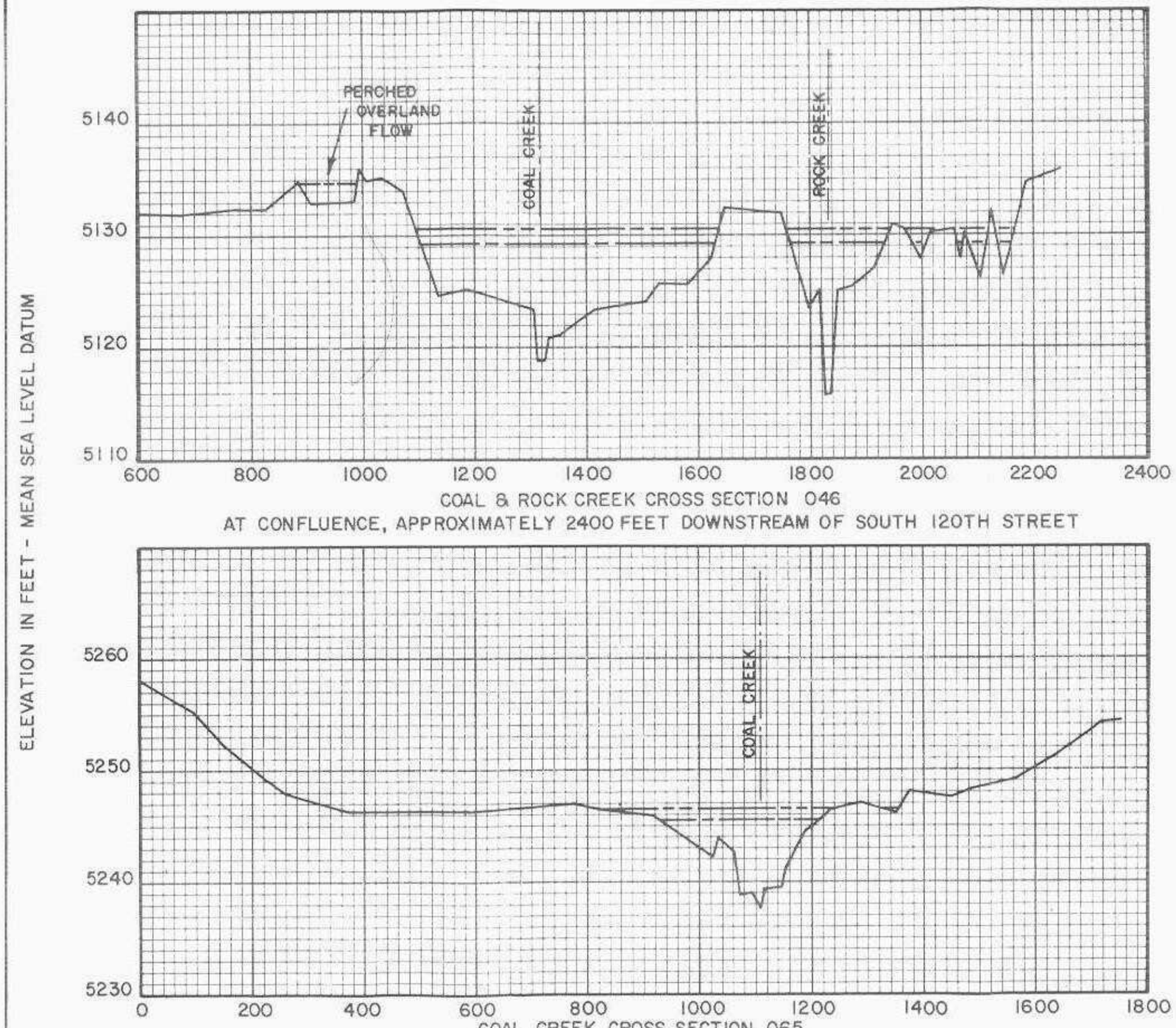
FLOOD HAZARD ANALYSES

COAL CREEK

BOULDER & WELD COUNTIES, COLORADO

EXISTING CONDITIONS, JULY 1974

USDA-SCS



COAL & ROCK CREEK CROSS SECTION 046
AT CONFLUENCE, APPROXIMATELY 2400 FEET DOWNSTREAM OF SOUTH 120TH STREET

COAL CREEK CROSS SECTION 065
APPROXIMATELY ON SECTION LINE 9 & 10; T 2 N; R 69 W.
HORIZONTAL DISTANCE IN FEET

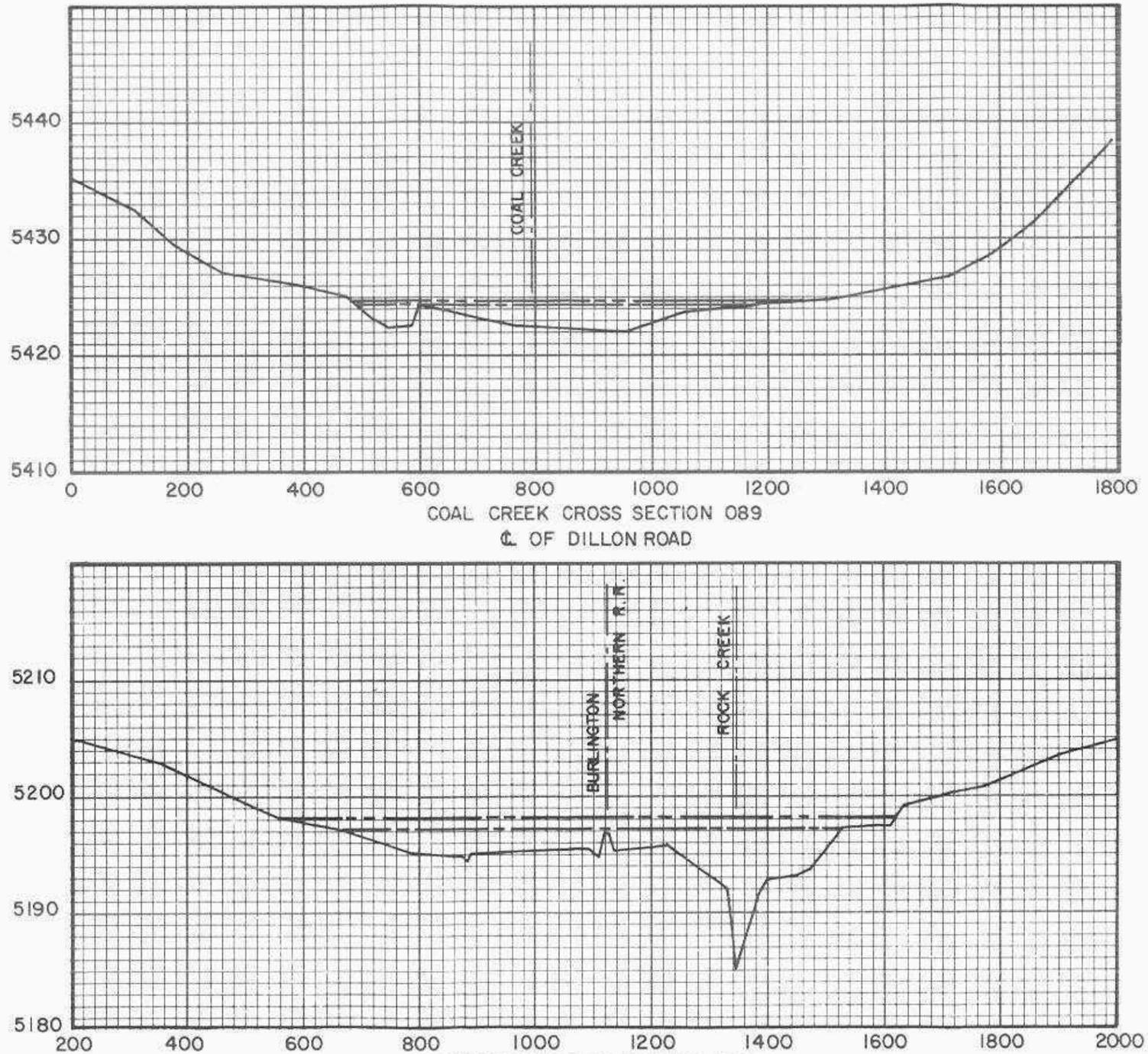
LEGEND

——— — — ——— 500 Year Flood
——— — — ——— 100 Year Flood
——————— Approximate Ground Line

NOTE

Cross Sections are viewed in direction of flow.

EXHIBIT B-2
TYPICAL VALLEY CROSS SECTIONS
COAL & ROCK CREEK
FLOOD HAZARD ANALYSES
COAL & ROCK CREEK
BOULDER & WELD COUNTIES,
COLORADO
EXISTING CONDITIONS, JULY 1974
USDA - SCS



LEGEND

500 Year Flood

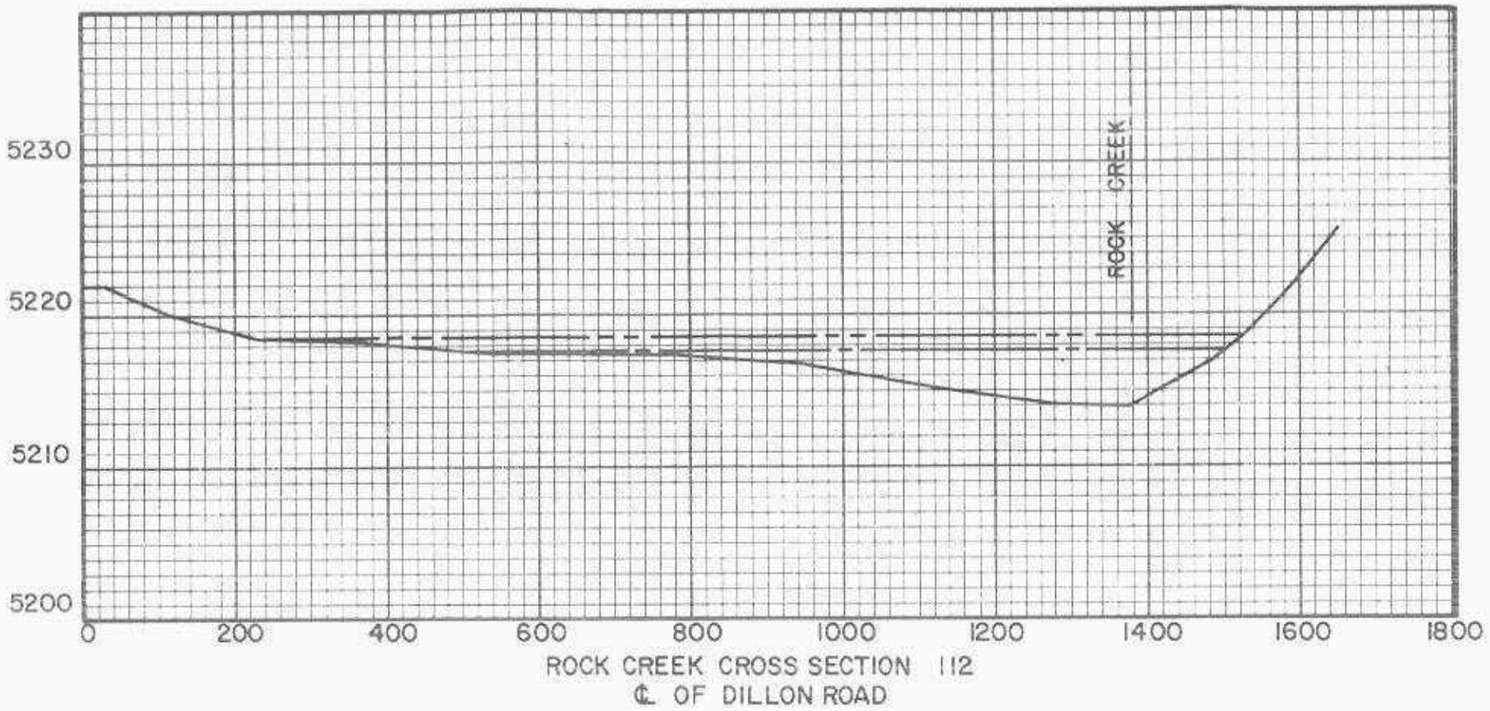
100 Year Flood

Approximate Ground Line

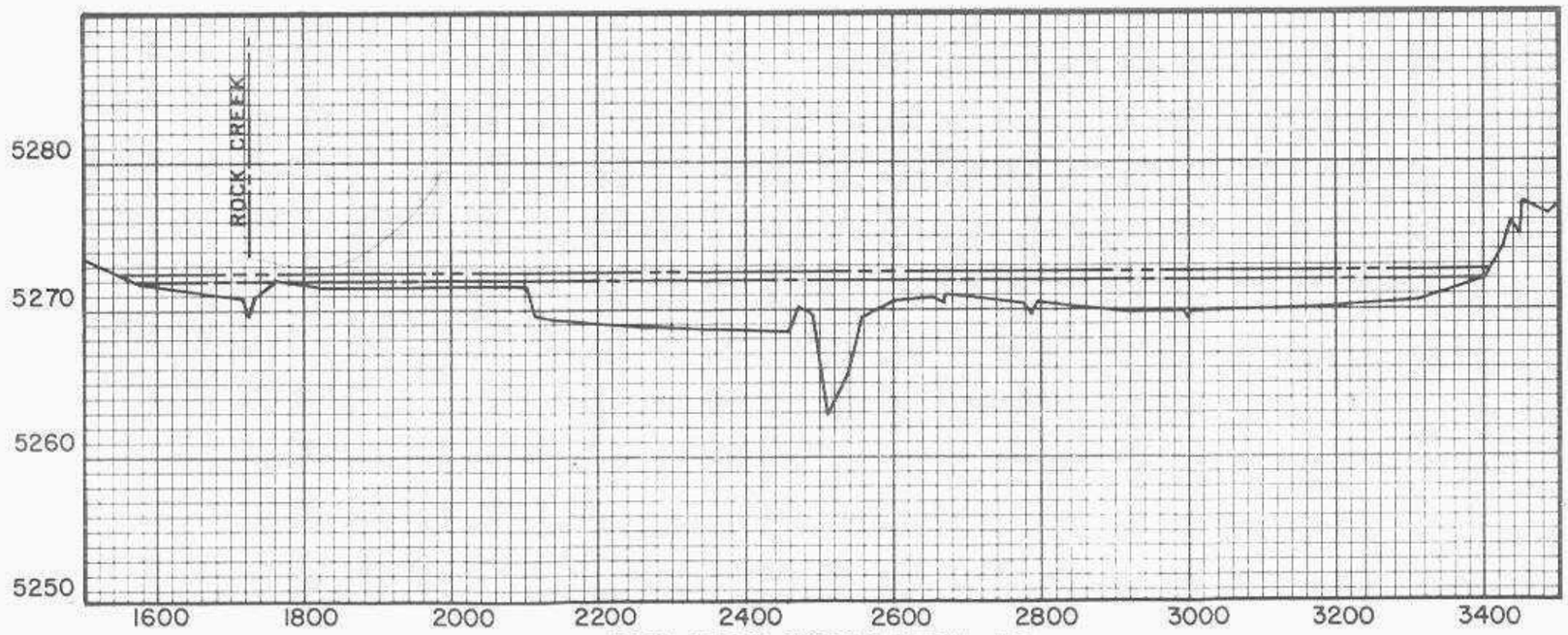
NOTE

Cross Sections are viewed in direction of flow.

EXHIBIT B-3
TYPICAL VALLEY CROSS SECTIONS
COAL & ROCK CREEK
FLOOD HAZARD ANALYSES
COAL & ROCK CREEK
BOULDER & WELD COUNTIES, COLORADO
EXISTING CONDITIONS, JULY 1974
USDA-SCS



ROCK CREEK CROSS SECTION 112
℄ OF DILLON ROAD



ROCK CREEK CROSS SECTION 123
APPROXIMATELY 1400 FEET DOWNSTREAM OF SW CORNER SECTION 22; T2N; R69W & SOUTH OF STEARNS LAKE

ELEVATION IN FEET - MEAN SEA LEVEL DATUM

HORIZONTAL DISTANCE IN FEET

LEGEND

——— — — ——— 500 Year Flood
——— — — ——— 100 Year Flood
——————— Approximate Ground Line

NOTE

Cross Sections are viewed in direction of flow.

EXHIBIT B-4
TYPICAL VALLEY CROSS SECTIONS
COAL & ROCK CREEK
FLOOD HAZARD ANALYSES
ROCK CREEK
BOULDER & WELD COUNTIES, COLORADO
EXISTING CONDITIONS, JULY 1974
USDA-SCS

TABLE 1

FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Coal Creek, Reach 1

Cross Section Number	Stationing from Mouth Feet	Identification	Stream Bed Elevation ft. M.S.L.	Crest-Elevation ft. M.S.L., and Peak Discharge c.f.s.				
				10-Year Flood	25-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
	0+00	Confluence Boulder Creek	4950.9	4957.7 6,050	4958.3 8,100	4958.5 9,940	4958.9 12,200	4959.8 18,350
005	12+80		4954.3	4965.8 6,050	4966.0 8,100	4966.3 9.940	4966.7 12,200	4967.5 18,350
006	23+80		4962.6	4971.7 6,050	4972.0 8,090	4972.3 9,970	4972.6 12,240	4973.2 18,330
007	43+00		4972.0	4980.5 6,080	4981.0 8,130	4981.2 10,010	4981.6 12,230	4982.4 18,340
008	53+40		4973.1	4985.1 6,090	4985.5 8,150	4985.8 9,990	4986.1 12,230	5986.9 18,340
009	54+40	Kenosha Road	4975.3	4986.7 6,100	4987.2 8,150	4987.4 9,990	4987.6 12,230	4988.5 18,340
010	55+30		4973.6	4986.8 6,100	4987.3 8,150	4987.6 9,990	4987.9 12,230	4988.7 18,340
011	77+80		4979.1	4991.1 6,120	4991.7 8,160	4992.0 10,010	4992.4 12,240	4993.4 18,320

1/ Flood elevations pertain only to streamflow in the main channel segment for existing conditions July 1974.

TABLE 1

FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Coal Creek, Reach 1

Cross Section Number	Stationing from Mouth Feet	Identification	Stream Bed Elevation ft. M.S.L.	Crest-Elevation ft. M.S.L., and Peak Discharge c.f.s.				
				10-Year Flood	25-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
012	95+80		4983.5	4994.0 6,120	4994.7 8,170	4995.1 10,000	4995.6 12,230	4996.6 18,360
013	106+80		4988.2	4997.8 6,120	4998.4 8,160	4998.8 10,000	4999.2 12,220	5000.2 18,360
014	116+80		4991.3	5001.4 6,120	5001.9 8,160	5002.2 10,020	5002.5 12,250	5003.5 18,400
015	131+00		4995.4	5006.6 6,140	5007.0 8,180	5007.3 10,040	5007.7 12,270	5008.5 18,400
016	137+40		4996.9	5008.3 6,160	5008.7 8,190	5009.1 10,040	5009.5 12,270	5010.4 18,400
017	139+80	Briggs Street	4999.2	5010.1 6,160	5010.6 8,210	5010.9 10,040	5011.3 12,280	5012.1 18,380
018	144+00		4999.3	5012.0 6,160	5012.5 8,210	5012.8 10,040	5013.1 12,280	5013.9 18,380
019	156+90		5002.3	5014.5 6,160	5015.1 8,200	5015.5 10,030	5016.0 12,260	5017.0 18,390

1/ Flood elevations pertain only to streamflow in the main channel segment for existing conditions July 1974.

TABLE 2

FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Coal Creek, Reach 2

Cross Section Number	Stationing from Mouth Feet	Identification	Stream Bed Elevation ft. M.S.L.	Crest-Elevation ft. M.S.L., and Peak Discharge c.f.s.				
				10-Year Flood	25-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
019	156+90	Erie Cheesman St.	5002.3	5014.5 6,160	5015.1 8,200	5015.5 10,030	5016.0 12,260	5017.0 18,390
020	166+70	Erie Moffat Street	5004.9	5017.7 6,170	5018.6 8,210	5019.1 10,040	5019.7 12,270	5020.8 18,400
021	176+20	Erie Anderson Street	5008.8	5020.6 6,170	5021.7 8,210	5022.1 10,030	5022.7 12,260	5023.8 18,390
022	181+60		5009.2	5022.2 6,170	5023.4 8,210	5024.0 10,030	5024.6 12,260	5025.7 18,390
023	183+80	Union Pacific Railroad	5009.6	5024.1 6,160	5026.3 8,190	5026.9 10,020	5027.6 12,250	5028.5 18,340
024	188+00		5010.7	5025.8 6,160	5027.4 8,190	5028.0 10,020	5028.8 12,250	5029.9 18,340
025	189+10	Erie Perry Street	5011.4	5027.7 6,160	5028.7 8,190	5029.1 10,020	5029.6 12,250	5030.7 18,350
026	191+70		5012.1	5027.9 6,160	5028.9 8,190	5029.3 10,020	5029.9 12,250	5031.0 18,350

1/ Flood elevations pertain only to streamflow in the main channel segment for existing conditions July 1974.

TABLE 2

FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Coal Creek, Reach 2

Cross Section Number	Stationing from Mouth Feet	Identification	Stream Bed Elevation ft. M.S.L.	Crest-Elevation ft. M.S.L., and Peak Discharge c.f.s.				
				10-Year Flood	25-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
027	212+00		5015.1	5033.6 6,150	5034.3 8,200	5034.7 10,030	5035.2 12,260	5036.2 18,400
028	228+00		5019.8	5038.6 6,170	5039.6 8,220	5040.2 10,030	5040.9 12,260	5042.6 18,400
029	272+80		5029.8	5044.5 6,150	5045.5 8,190	5046.3 10,000	5047.1 12,230	5048.2 18,320
030	310+40		5038.6	5054.4 6,130	5055.2 8,160	5055.7 9,960	5056.3 12,190	5057.5 18,320
031	337+20		5043.1	5058.3 6,140	5059.0 8,170	5059.4 9,970	5059.9 12,200	5061.1 18,340
032	354+90		5044.8	5063.6 6,160	5064.6 8,190	5065.1 9,980	5065.7 12,220	5067.0 18,350
033	371+10		5057.1	5068.7 5,980	5069.3 7,950	5069.7 9,700	5070.2 11,890	5071.3 17,920
034	388+70		5060.1	5073.3 5,980	5073.9 7,950	5074.2 9,700	5074.6 11,890	5075.8 17,920

1/ Flood elevations pertain only to streamflow in the main channel segment for existing conditions July 1974.

TABLE 2

FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Coal Creek, Reach 2

Cross Section Number	Stationing from Mouth Feet	Identification	Stream Bed Elevation ft. M.S.L.	Crest-Elevation ft. M.S.L., and Peak Discharge c.f.s.				
				10-Year Flood	25-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
035	409+40		5062.6	5078.9 5,970	5079.6 7,930	5080.1 9,670	5080.6 11,850	5081.6 17,860

1/ Flood elevations pertain only to streamflow in the main channel segment for existing conditions July 1974.

TABLE 3

FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Coal Creek, Reach 3

Cross Section Number	Stationing from Mouth Feet	Identification	Stream Bed Elevation ft. M.S.L.	Crest-Elevation ft. M.S.L., and Peak Discharge c.f.s.				
				10-Year Flood	25-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
035	409+40		5062.6	5078.9 5,970	5079.6 7,930	5080.1 9,670	5080.6 11,850	5081.6 17,860
036	421+80		5065.5	5083.4 5,97	5084.4 7,940	5085.0 9,670	5085.7 11,850	5087.0 17,860
037	446+20		5070.0	5087.6 5,770	5089.0 7,690	5089.6 9,390	5090.3 11,530	5091.6 17,440
038	468+10		5074.1	5091.6 5,770	5093.1 7,680	5093.9 9,370	5094.7 11,510	5096.3 17,400
039	478+80		5076.8	5093.0 5,750	5094.5 7,660	5095.4 9,340	5096.4 11,470	5098.3 17,400
040	493+80		5081.3	5095.6 5,570	5097.0 7,430	5097.9 9,080	5098.9 11,170	5100.8 16,960
041	496+10	Baseline Road State Hghwy #7	5082.3	5096.2 5,57	5097.5 7,440	5098.4 9,090	5099.4 11,180	5105.1 16,970
042	497+70		5081.6	5097.7 5,570	5099.2 7,440	5100.2 9,090	5101.3 11,180	5105.5 16,970

1/ Flood elevations pertain only to streamflow in the main channel segment for existing conditions July 1974.

TABLE 3

FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Coal Creek, Reach 3

Cross Section Number	Stationing from Mouth Feet	Identification	Stream Bed Elevation ft. M.S.L.	Crest-Elevation ft. M.S.L., and Peak Discharge c.f.s.				
				10-Year Flood	25-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
043	516+20		5088.7	5105.8 5,560	5107.5 7,420	5108.2 9,070	5109.0 11,160	5110.8 16,960
044	543+80		5097.3	5112.0 5,560	5113.4 7,430	5114.2 9,080	5115.0 11,180	5116.6 16,990
045	564+70		5101.3	5117.8 5,560	5119.1 7,440	5119.9 9,100	5120.8 11,180	5122.7 17,010
046	620+10	Confluence Coal & Rock Creek	5115.8	5127.0 5,120	5127.9 7,160	5128.5 8,740	5129.2 10,640	5130.6 15,920

1/ Flood elevations pertain only to streamflow in the main channel segment for existing conditions July 1974.

TABLE 4

FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Coal Creek, Reach 4

Cross Section Number	Stationing from Mouth Feet	Identification	Stream Bed Elevation ft. M.S.L.	Crest-Elevation ft. M.S.L., and Peak Discharge c.f.s.				
				10-Year Flood	25-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
046	620+10	Confluence Coal & Rock Creek	5115.8	5127.0 5,120	5127.9 7,160	5128.5 8,740	5129.2 10,640	5130.6 15,920
047	638+10		5124.8	5132.9 2,780	5133.1 3,230	5133.3 3,540	5133.6 4,180	5134.6 6,270
048	650+10		5132.3	5138.3 2,840	5138.6 3,300	5138.8 3,610	5139.2 4,240	5140.1 6,260
049	651+50	South 120th St.	5133.4	5140.8 2,860	5141.1 3,310	5141.4 3,620	5141.9 4,250	5142.9 6,260
050	652+90		5133.7	5141.3 2,860	5141.7 3,310	5142.0 3,620	5142.5 4,250	5143.7 6,260
051	662+10		5139.0	5143.7 2,300	5144.4 2,940	5144.8 3,490	5145.3 4,120	5146.5 6,170
052	662+60	Burlington Northern Railroad	5137.8	5144.8 2,330	5145.6 2,940	5146.1 3,490	5146.7 4,120	5147.9 6,170
053	666+00		5141.7	5146.5 2,330	5147.1 2,940	5147.5 3,490	5147.9 4,120	5148.8 6,170

1/ Flood elevations pertain only to streamflow in the main channel segment for existing conditions July 1974.

TABLE 4

FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Coal Creek, Reach 4

Cross Section Number	Stationing from Mouth Feet	Identification	Stream Bed Elevation ft. M.S.L.	Crest-Elevation ft. M.S.L., and Peak Discharge c.f.s.				
				10-Year Flood	25-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
054	672+20		5147.3	5151.5 2,330	5152.0 2,940	5152.3 3,490	5152.6 4,110	5153.4 6,170
055	683+70		5153.0	5158.0 2,350	5158.7 2,950	5159.1 3,480	5159.6 4,100	5160.7 6,160
056	693+10		5159.7	5165.7 2,350	5166.2 2,950	5166.4 3,470	5166.7 4,100	5167.3 6,140
057	705+70		5169.9	5175.3 2.370	5175.6 2,950	5175.8 3,480	5175.9 4,100	5176.3 6,150
058	716+00		5177.0	5182.8 2,370	5183.3 2,950	5183.6 3,480	5183.9 4,100	5184.6 6,150
059	716+90	U.S. Hghwy #287	5177.6	5185.5 2,370	5186.2 2,950	5186.7 3,480	5187.3 4,110	5188.4 6,160
060	717+70		5179.1	5185.7 2,370	5186.4 2,950	5186.8 3,480	5187.4 4,110	5188.4 6,160
061	729+70		5188.5	5193.1 2,290	5193.8 2,980	5194.1 3,610	5194.6 4,310	5195.4 6,190

1/ Flood elevations pertain only to streamflow in the main channel segment for existing conditions July 1974.

TABLE 4

FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Coal Creek, Reach 4

Cross Section Number	Stationing from Mouth Feet	Identification	Stream Bed Elevation ft. M.S.L.	Crest-Elevation ft. M.S.L., and Peak Discharge c.f.s.				
				10-Year Flood	25-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
062	741+70		5201.3	5206.0 2,350	5206.5 3,110	5206.9 3,770	5207.3 4,490	5208.2 6,390
063	750+70		5209.3	5215.5 2,270	5216.2 2,940	5216.5 3,480	5216.9 4,110	5217.8 6,160
064	768+60		5225.5	5231.5 2,230	5232.2 2,890	5232.5 3,420	5232.9 4,030	5233.7 6,060
065	781+40		5237.7	5244.0 2,230	5244.8 2,890	5245.1 3,420	5245.6 4,040	5246.6 6,060
066	799+90		5250.5	5256.1 2,230	5256.8 2,880	5257.1 3,420	5257.5 4,030	5258.5 6,050
067	808+90		5259.5	5264.8 2,100	5265.6 2,750	5265.9 3,260	5266.3 3,850	5267.4 5,860
068	813+50	Empire Drive	5264.0	5275.3 2,100	5276.6 2,750	5276.8 3,260	5277.1 3,850	5277.8 5,860
069	818+50		5271.9	5277.3 2,100	5278.1 2,750	5278.5 3,260	5278.9 3,850	5279.9 5,860

1/ Flood elevations pertain only to streamflow in the main channel segment for existing conditions July 1974.

TABLE 4

FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Coal Creek, Reach 4

Cross Section Number	Stationing from Mouth Feet	Identification	Stream Bed Elevation ft. M.S.L.	Crest-Elevation ft. M.S.L., and Peak Discharge c.f.s.				
				10-Year Flood	25-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
070	826+60		5280.5	5285.2 2,090	5285.9 2,750	5286.2 3,250	5286.6 3,830	5287.6 5,850
071	832+60		5283.9	5289.5 2,090	5290.4 2,740	5290.9 3,250	5291.5 3,820	5292.9 5,850
072	833+90	Empire Road	5286.5	5293.9 2,090	5296.2 2,740	5298.1 3,250	5300.1 3,830	5303.6 5,850
073	835+20		5286.9	5294.3 2,090	5296.6 2,740	5298.3 3,250	5300.3 3,830	5303.6 5,850
074	854+40		5309.6	5315.3 2,120	5316.0 2,760	5316.3 3,290	5316.6 3,900	5317.7 6,310
075	856+80	Colorado & Southern R.R.	5311.7	5328.4 2,120	5329.8 2,760	5330.1 3,290	5330.3 3,900	5331.0 6,320
076	857+40		5313.1	5328.5 2,120	5329.8 2,760	5330.1 3,290	5330.3 3,900	5331.0 6,320
077	859+60	County Hghwy #19	5318.4	5329.7 2,280	5330.0 3,070	5330.3 3,630	5330.6 4,340	5331.3 6,840

1/ Flood elevations pertain only to streamflow in the main channel segment for existing conditions July 1974.

TABLE 4

FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Coal Creek, Reach 4

Cross Section Number	Stationing from Mouth Feet	Identification	Stream Bed Elevation ft. M.S.L.	Crest-Elevation ft. M.S.L., and Peak Discharge c.f.s.				
				10-Year Flood	25-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
078	860+80		5316.8	5329.7 2,280	5330.0 3,070	5330.3 3,630	5330.6 4,340	5331.3 6,840
079	865+40		5322.4	5330.5 2,980	5330.9 3,900	5331.3 4,560	5331.6 5,330	5332.5 7,990
080	871+00		5328.2	5334.6 3,130	5335.2 4,070	5335.6 4,690	5336.0 5,440	5337.1 8,070
081	886+40		5342.4	5347.4 3,180	5347.9 4,120	5348.2 4,740	5348.5 5,500	5349.3 8,150
082	896+60		5351.6	5358.7 2,530	5359.1 3,290	5359.3 3,660	5359.6 4,170	5360.9 6,260
083	910+40		5363.6	5368.1 2,540	5368.4 3,310	5368.5 3,670	5368.7 4,190	5369.5 6,470
084	919+10		5371.0	5375.3 2,660	5375.8 3,470	5376.0 3,860	5376.4 4,410	5377.2 6,580
085	931+10		5383.9	5386.7 1,910	5387.2 2,520	5387.4 3,060	5387.7 3,780	5388.4 5,960

1/ Flood elevations pertain only to streamflow in the main channel segment for existing conditions July 1974.

TABLE 5

FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Coal Creek, Reach 5

Cross Section Number	Stationing from Mouth Feet	Identification	Stream Bed Elevation ft. M.S.L.	Crest-Elevation ft. M.S.L., and Peak Discharge c.f.s.				
				10-Year Flood	25-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
085	931+10		5383.9	5386.7 1,910	5387.2 2,520	5387.4 3,060	5387.7 3,780	5388.4 5,960
086	942+10		5394.8	5398.2 1,700	5399.3 2,360	5399.6 3,020	5399.8 3,740	5400.5 5,910
087	952+70		5405.6	5409.1 1,700	5410.1 2,360	5410.3 3,030	5410.6 3,760	5411.1 5,930
088	958+70		5411.8	5415.6 1,710	5416.7 2,380	5417.1 3,030	5417.6 3,760	5418.6 5,950
089	962+10	Dillon Road	5415.1	5422.2 1,720	5423.8 2,400	5424.1 3,040	5424.3 3,770	5424.8 5,960
090	964+20		5416.9	5422.9 1,720	5424.4 2,400	5424.7 3,040	5425.0 3,770	5425.7 5,960
091	976+00		5433.0	5437.9 1,750	5439.0 2,390	5439.3 3,070	5439.7 3,820	5440.6 6,010
092	990+90		5448.2	5451.8 1,710	5452.8 2,420	5453.1 3,070	5453.4 3,820	5454.1 6,020

1/ Flood elevations pertain only to streamflow in the main channel segment for existing flood conditions July 1976.

TABLE 5

FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Coal Creek, Reach 5

Cross Section Number	Stationing from Mouth Feet	Identification	Stream Bed Elevation ft. M.S.L.	Crest-Elevation ft. M.S.L., and Peak Discharge c.f.s.				
				10-Year Flood	25-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
093	992+50	Denver-Boulder Turnpike	5450.1	5455.8 1,740	5457.4 2,460	5457.9 3,070	5458.5 3,820	5460.7 6,030
094	994+60		5451.7	5456.8 1,740	5458.1 2,460	5458.5 3,070	5459.1 3,820	5461.0 6,030
095	1010+30		5469.8	5473.2 1,400	5474.9 2,260	5475.4 2,980	5475.9 3,760	5476.8 5,980
096	1011+80	McCaslin Blvd.	5468.8	5473.6 1,400	5476.2 2,260	5477.3 2,980	5478.6 3,770	5482.7 5,990
097	1012+80		5472.2	5476.6 1,400	5478.8 2,260	5479.4 2,980	5480.1 3,770	5483.0 5,990
098	1021+70		5482.3	5487.4 1,400	5489.9 2,260	5490.4 2,990	5491.0 3,780	5492.2 6,010
099	1037+70		5505.3	5510.0 1,390	5512.3 2,250	5512.8 2,980	5513.4 3,770	5514.1 6,020
100	1059+00		5532.1	5534.2 1,380	5535.5 2,250	5535.9 3,000	5536.3 3,810	5537.0 6,080

1/ Flood elevations pertain only to streamflow in the main channel segment for existing conditions July 1974.

TABLE 6

FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Rock Creek, Reach 6

Cross Section Number	Stationing from Mouth Feet	Identification	Stream Bed Elevation ft. M.S.L.	Crest-Elevation ft. M.S.L., and Peak Discharge c.f.s.				
				10-Year Flood	25-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
046	620+10	Confluence Coal and Rock Creek	5115.8	5127.0 5,120	5127.9 7,160	5128.5 8,740	5129.2 10,640	5130.6 15,920
101	647+10		5124.5	5134.0 2,890	5134.9 4,230	5135.5 5,370	5136.2 6,710	5137.8 10,270
102	671+30		5131.0	5141.6 2,900	5142.9 4,240	5143.6 5,400	5144.2 6,720	5145.6 10.290
103	679+70		5133.5	5144.2 2,910	5145.6 4,240	5146.4 5,400	5147.1 6,730	5148.6 10,290
104	691+70		5138.0	5150.9 2,910	5152.0 4,260	5152.8 5,410	5153.3 6,740	5154.3 10,310
105	710+10		5145.0	5158.8 2,920	5159.7 4,270	5160.3 5,420	5160.7 6,750	5161.6 10,310
106	737+10		5157.5	5169.6 2,940	5170.5 4,290	5170.9 5,450	5171.2 6,790	5172.0 10,440
107	759+90		5166.8	5179.4 2,970	5180.0 4,360	5180.4 5,620	5180.8 7,000	5181.5 10,830

1/ Flood elevations pertain only to streamflow in the main channel segment for existing conditions July 1974.

TABLE 6

FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Rock Creek, Reach 6

Cross Section Number	Stationing from Mouth Feet	Identification	Stream Bed Elevation ft. M.S.L.	Crest-Elevation ft. M.S.L., and Peak Discharge c.f.s.				
				10-Year Flood	25-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
108	773+10		5174.5	5186.0 2,860	5186.4 4,180	5186.7 5,310	5187.1 6,580	5187.8 10,000
109	789+90		5185.0	5195.6 2,900	5196.2 4,230	5196.6 5,360	5197.1 6,640	5198.1 10,050
110	804+50		5191.5	5202.0 2,860	5202.8 4,180	5203.4 5,300	5203.8 6,590	5204.7 9,980
111	818+90		5201.9	5214.7 2,820	5215.9 4,120	5216.4 5,230	5216.9 6,490	5217.7 9,840
112	819+50	Dillon Road	5202.9	5216.3 2,820	5217.0 4,120	5217.4 5,240	5217.8 6,500	5218.7 9,840
113	820+30		5203.5	5216.3 2,820	5217.0 4,120	5217.5 5,240	5217.9 6,500	5218.8 9,840
114	841+00		5215.0	5222.7 2,990	5223.6 4,290	5224.1 5,400	5224.6 6,690	5225.6 10,050
115	842+70	Burlington Northern Railroad	5213.8	5222.9 3,010	5223.8 4,300	5224.4 5,430	5225.0 6,710	5227.0 10,130

1/ Flood elevations pertain only to streamflow in the main channel segment for existing conditions July 1974.

TABLE 6

FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Rock Creek, Reach 6

Cross Section Number	Stationing from Mouth Feet	Identification	Stream Bed Elevation ft. M.S.L.	Crest-Elevation ft. M.S.L., and Peak Discharge c.f.s.				
				10-Year Flood	25-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
116	856+10		5217.6	5229.1 3,010	5229.7 4,300	5230.1 5,430	5230.5 6,710	5231.5 10,130
117	856+40	U. S. Highway 287	5216.4	5231.0 2,990	5232.4 4,280	5232.5 5,410	5232.7 6,680	5233.6 10,100
118	856+80		5219.2	5231.0 2,990	5232.4 4,280	5232.5 5,410	5232.7 6,680	5233.6 10,100
119	868+90		5223.6	5239.6 3,070	5240.6 4,460	5241.2 5,630	5241.6 6,900	5242.6 10,340
120	887+70		5235.5	5245.7 3,100	5246.3 4,490	5246.7 5,660	5247.1 6,941	5248.0 10,423

1/ Flood elevations pertain only to streamflow in the main channel segment for existing conditions July 1974.

TABLE 7

FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Rock Creek, Reach 7

Cross Section Number	Stationing from Mouth Feet	Identification	Stream Bed Elevation ft. M.S.L.	Crest-Elevation ft. M.S.L., and Peak Discharge c.f.s.				
				10-Year Flood	25-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
120	887+70		5235.5	5245.7 3,100	5246.3 4,490	5246.7 5,660	5247.1 6,940	5248.0 10,420
121	901+20		5254.1	5255.9 3,150	5256.3 4,590	5256.6 5,790	5256.9 7,090	5257.5 10,590
122	912+60		5258.9	5263.6 3,230	5264.1 4,680	5264.4 5,930	5264.6 7,250	5265.2 10,720
123	925+20		5269.5	5271.0 3,310	5271.5 4,800	5271.8 6,030	5272.0 7,360	5272.5 10,860
124	939+20		5277.0	5277.9 2,850	5278.2 4,080	5278.4 5,070	5278.7 6,130	5279.2 8,910
125	947+60		5283.3	5284.4 3,020	5284.8 4,300	5285.1 5,310	5285.4 6,390	5285.9 9,220
126	956+60		5285.5	5291.6 2,390	5291.9 3,580	5292.1 4,520	5292.4 5,540	5292.9 8,120
127	970+60		5294.3	5298.7 2,400	5299.0 3,600	5299.3 4,540	5299.5 5,570	5300.2 8,150

1/ Flood elevations pertain only to streamflow in the main channel segment for existing conditions July 1974.

TABLE 7

FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Rock Creek, Reach 7

Cross Section Number	Stationing from Mouth Feet	Identification	Stream Bed Elevation ft. M.S.L.	Crest-Elevation ft. M.S.L., and Peak Discharge c.f.s.				
				10-Year Flood	25-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
128	985+80		5301.1	5303.6 2,410	5304.1 3,620	5304.5 4,570	5304.9 5,600	5305.6 8,200
129	986+70	County Road 19	5302.8	5306.2 2,410	5306.6 3,620	5306.9 4,570	5307.2 5,610	5307.8 8,200
130	987+80		5301.7	5306.3 2,410	5306.8 3,620	5307.2 4,570	5307.5 5,610	5308.2 8,200
131	995+80		5306.2	5311.0 2,420	5311.5 3,630	5311.9 4,570	5312.3 5,600	5313.0 8,210
132	1015+60		5317.3	5323.1 2,440	5323.5 3,650	5323.7 4,600	5323.9 5,630	5324.4 8,250
133	1018+00	Colorado and Southern Railroad	5318.5	5333.2 2,370	5336.7 3,550	5337.8 4,480	5338.4 5,500	5339.3 8,060
134	1019+00		5318.5	5333.2 2,370	5336.7 3,550	5337.8 4,480	5338.4 5,500	5339.3 8,060
135	1027+70		5326.0	5336.8 3,340	5338.2 4,590	5338.8 5,570	5339.2 6,570	5340.0 9,140

1/ Flood elevations pertain only to streamflow in the main channel segment for existing conditions July 1974.

TABLE 7

FLOOD FREQUENCY-ELEVATION AND DISCHARGE DATA 1/

Rock Creek, Reach 7

Cross Section Number	Stationing from Mouth Feet	Identification	Stream Bed Elevation ft. M.S.L.	Crest-Elevation ft. M.S.L., and Peak Discharge c.f.s.				
				10-Year Flood	25-Year Flood	50-Year Flood	100-Year Flood	500-Year Flood
136	1039+70		5336.2	5345.1 3,620	5345.6 4,870	5346.0 5,810	5346.4 6,800	5347.1 9,340
137	1040+80	Denver-Boulder Turnpike	5336.0	5350.6 3,630	5355.0 4,860	5356.2 5,820	5356.7 6,810	5357.3 9,350
138	1042+00		5337.9	5350.9 3,630	5355.0 4,860	5356.2 5,820	5356.7 6,810	5357.3 9,350

1/ Flood elevations pertain only to streamflow in the main channel segment for existing conditions July 1974.

INVESTIGATIONS, ANALYSES, AND TECHNICAL DATA

Maps

Base maps were developed from U.S. Geological Survey topographic maps (scale 1:24,000). Flood hazard areas are plotted on aerial photo-maps prepared especially for this study. The low level aerial photography was provided by the Urban Drainage and Flood Control District and was flown in July 1974. Detailed topographic mapping and cross section data were produced photogrammetrically by the Soil Conservation Service. This data was used to compute water surface profiles and the flood hazard area outlines. The photos were reproduced on a scale of 1" = 400' with a 4-foot contour interval and 2-foot supplementary contours in the flatter areas. Map topography complies with national map accuracy requirements. The photographic image contains minor displacements due to relief and it does not match the topographic detail in all areas.

Surveys

Engineering field surveys for vertical and horizontal control, and cross-sections at road and bridge crossings were conducted by the Soil Conservation Service. Ingress and egress rights for the survey were provided by Boulder County. Survey crew assistance was provide by Weld County. The vertical control was tied to mean sea level elevations using U.S. Geological Survey and U.S. Coast and Geodetic Survey bench-marks. The following are locations and descriptions of the elevation reference points established and used for this study.

Tabulation of Elevation Reference Marks

Photomap Number	Elevation		Description
1	4954.69	SCS-BM-1	Cap & Rebar, 1' south of fence corner post, 4' N. of Conc. Irr. ditch; 95' S.E. of intersection of Hwy 52 and county line road; 7' S.E. of power pole.
2	4985.37	SCS-BM-2	Cap and Rebar, N. side of Kenosha Rd. 47; N.W. of intersection of County line Rd. and Kenosha Rd.; 7' S. of Conc. Irr. stru.; 2' W. of Tel. pole.
3	5010.71	SCS-BM-3	Cap and Rebar, 2' S. of fence post; 14' north of N. rail over irr. canal; 26' N. of centerline of gravel road.
4	5024.95	SCS-BM-4	Cap and rebar, 2' S. of street sign (Pierce and Perry Street); 13' S.W. of red fire hyd; 37' N.W. of intersection of Pierce and Perry St.; 176' N. of N. railroad track.
4	5024.96	USC&GS	At Erie, near S.E. corner of city limits; 0.2 mi. E. of Kuner Pickle Plant; 44 ft. N. and 1 ft. lower than Colorado State Highway 240; 37 ft. E. and 1 ft. lower than center of track; in concrete post; standard tablet stamped "JR-53-1948 5026".
5	5057.77	SCS-BM-5	Cap and rebar, 1' N.W. of Conc. fence corner post, E.W.-N.S. fence line. Approx. 500' S. of old coal mine pit; 10' E. of centerline of N.-S. lane.
6	51022.22	SCS-BM-6	Cap and rebar 2' S.W. of Power pole; 1 ' east of fence corner post. 43' S.W. of intersection of county line Rd. and Arapahoe Rd.
7	5104.75	SCS-BM-7	Cap and rebar 6" N. of E. gate post, S. side of Hwy. 7, 110' S.W. of intersection of Hwy. 7 and county line rd.; 22' W. of buried gas line.

Tabulation of Elevation Reference Marks

Photomap Number	Elevation		Description
East of Map No. 7	5132.83	USC & GS	T. 1N., R. 68 W., 550 ft. E. of 1/4 corner; on S. side of section 31; 31 ft. N. of E.-W. rd. and 7 ft. E. of T-rd. S. extended, just N. of probably quarter corner on N. side of section section 6, T.1 S., R. 68 W., in concrete post; standard tablet stamped "TT 18 J, 1936". (Recovered as described; MLR, 1956).
8	5142.65	SCS-BM-8	Cap and rebar 1' S. of power pole; 1' W. of fence line, 20' E. of 120th St., 92' S. of railroad track.
9	5159.49	SCS-BM-9	Cap and rebar 1' W. of fence corner post, 2' S. of city limits sign; 26' W. of 129th St.
10	5210.45	SCS-BM-10	Cap and rebar 1' S. of fence corner post; 14' S. of farm lane; 30' E. of centerline of Hwy 287.
11	5236.64	SCS-BM-11	Cap and rebar 1' N. of fence corner post. 30' E. of lane to south, approx. 200' E. of Centaur Development.
12	5324.76	SCS-BM-12	Cap and rebar 1' N. of fence corner post; 29' S. of centerline of farm lane 41' E. of centerline of railroad track.
13	5382.13	SCS-BM-13	Cap and rebar 1' S.W. of S. gate post; 4' N.E. of inlet of conc. ditch; 11' S. of centerline of farm lane; 43' E. of centerline of Delaney Rd. (County 64).
14	5425.82	SCS-BM-14	Cap and rebar 6" N. of fence corner post T type fence. 23' S. of centerline of Dillon Rd.; 20' W. of E. gate post.
15	5481.80	SCS-BM-15	Cap and rebar 6" N. of fence corner post; 330' S. of south approach R. Boulder turnpike; 220' E. of Hwy. 128.
16	5212.46	SCS-BM-16	Cap and rebar, 2' W. of fence corner post; 82' S.W. of intersection of Hwy. 287 and Maple Road.

Tabulation of Elevation Reference Marks

Photomap Number	Elevation		Description
17	5250.56	SCS-BM-17	Cap and rebar, 6" W. of fence post; 18' N.E. of power pole. 43' E. of intersection of railroad track and Hwy. 287.
18	5285.31	SCS-BM-18	Cap and rebar, 6" E. of S. gate post; 9' S. of centerline of farm lane, 22' W. of centerline 104th Street.
19	5343.27	SCS-BM-19	Cap and rebar, 6" E. of fence corner post; 2' N.E. of power pole, 24' W. of centerline of road.
20	5346.58	SCS-BM-20	Cap and rebar, 3" N. of E.-W. fence line, 13' S. of S. Power pole. (South pole of a triple pole set).

Hydrology and Hydraulics

There are no streamflow records for Coal Creek and Rock Creek. Synthetic rainfall-runoff procedures were used in determining the flows for various frequency storms. These procedures are described in the SCS National Engineering Handbook, Section 4.

Hydrologic studies were conducted using runoff computations based on land use changes in the watershed, anticipated by county planners to occur within the next 10 to 15 years. Information regarding the type and location of existing and projected land use were provided by the Boulder County Planning Department. Hydrologic and hydraulic data developed in this report are based on existing (July 1974) channel and flood plain conditions with runoff factors adjusted to reflect future developments. Typical "n" values (coefficient of roughness) for existing channel and flood plain conditions range from 0.085 to 0.120. Comparision of potential flood line elevations, using runoff data for existing and future developments, showed insignificant differences. Soils and cover data pertinent to the watershed were extracted from SCS reports and field checked for use in the hydrologic studies.

The WSP-2 and TR-20 computer programs were used in the water surface profile and flood routing analyses. Through the use of these programs the peak discharges and flood crest elevations for the 10-, 25-, 50-, 100-, and 500-year floods were determined. These floods have an average occurrence of once in the number of years as indicated. For example, the 100-year frequency flood occurs once in 100 years on the average, and has a one percent chance of being equaled or exceeded in any given year.

Output data from the computer programs were used in developing: the water surface profile drawings, flood outlines on the photomaps, and the data for the flood frequency-elevation and discharge tables.

Flood outlines for the 100- and 500-year floods were located on flood hazard area photomaps using water surface elevations, cross-section data, and by interpolation between the cross sections. The location of flood lines at road crossings were computed using the normal openings of bridges and culverts. Because of the multitude of possible events in which sediment and debris could cause blockage of bridges and culverts, these considerations were not included in the study. In some locations, flooding occurs as shallow overland flow in transit from perched channels to the main channel. At these locations, the water surface elevations may not be level across the flood plain as in the normal situation.

Soil Surveys

The Soil Survey for Boulder County was published by the USDA-Soil Conservation Service in January 1975. It contains information that can be applied in managing farms, ranches, and woodlands; in selecting sites for roads, ponds, buildings, or other structures; and in appraising the value of tracts of land for agriculture, industry, or recreation. A similar soil survey for Weld County is in progress and will be published in the near future. Information regarding the soil surveys can be obtained by contacting the Soil Conservation Service, 2490 West 26th Avenue, Denver, Colorado 80217, or the SCD Field Office, 1228 N. Main St., Longmont, Colo., 80501.

GLOSSARY OF TERMS

Channel - A natural or artificial water course of perceptible extent with definite banks to confine and conduct continuously or periodically flowing water. Channel flow is that water which is flowing within the limits of the defined channel.

Flood - Water from a river, stream, water course, lake or other body of standing water, that temporarily overflows the boundaries within which it is ordinarily confined.

Flood Crest - The maximum stage or elevation reached by the waters of a flood at a given location.

Flood Frequency - A means of expressing the probability of flood occurrences as determined from a statistical analysis of representative stream flow or rainfall and runoff records. The frequency of a particular stage or discharge is usually expressed as occurring once in a specified number of years. The 10-, 25-, 50-, 100-, and 500-year frequency floods have an average frequency of occurrence in the order of once in the number of years as indicated.

10-Year Flood - A flood having an average frequency of occurrence of once in 10 years. It has a 10 percent chance of being equalled or exceeded in any given year.

100-Year Flood - A flood having an average frequency of occurrence of once in 100 years. It has a 1 percent chance of being equalled or exceeded in any given year.

Flood Peak - The highest stage or discharge attained during a flood event; also referred to as peak stage or peak discharge.

Flood Plain - The relatively flat or low land area adjoining a river, stream, watercourse, lake, or other body of standing water which has been or may be covered temporarily by flood water. For administrative purposes the flood plain may be defined as the area that would be inundated by the 100-year flood.

Flood Regulatory Area - That portion of the flood plain subject to inundation by the 100-year flood. Its width is determined by the 100-year flood. Its length or reach is determined by natural bounds such as a lake, or by structures such as a dam or bridge, or by political or legal bounds.

Flood Storage Area - That portion of the regulatory area that may serve as a temporary storage area for flood waters from the 100-Year flood that lies landward of the floodway.

Floodway Area - That portion of the regulatory area required for the reasonable passage or conveyance of the 100-Year flood. This is the area of significant depths and velocities and due consideration should be given to effects of fill, loss of cross sectional flow area, and resulting increased water surface elevations.

Reach - A hydraulic engineering term used to describe longitudinal segments of a stream or river.

Runoff - That part of precipitation, as well as any other flow contributions, which appears in surface streams of either perennial or intermittent form.

Structure - Anything constructed or erected, the use of which requires a more or less permanent location on or in the ground. Includes but is not limited to bridges, buildings, canals, dams, ditches, diversions, irrigation systems, pumps, pipelines, pumps, railroads, roads, sewage disposal systems, underground conduits, water supply systems, and wells.

Typical Valley Cross Section - An engineering drawing of a vertical section of a stream channel and adjoining landscape as viewed in a downstream direction. The drawing represents a specified location within a designated stream reach.

Water Surface Profile - (This term is synonymous with - Flood Profile) - a graph showing the relationship of the water surface elevation of a flood event to location along a stream or river.

Watersheds - A drainage basin or area which collects runoff and transmits it usually by means of streams and tributaries to the outlet of the basin.

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