Colorado Flood Hazard Mitigation Plan 1999

Flood Hazard Mitigation Plan for Colorado

December 1999

Prepared Pursuant to
Section 409, PL 93-288

and the following
Federal/State Disaster Assistance Agreements

FEMA-DR-665-CO (Estes Park Dam-Break Flood 1982)
FEMA-DR-719-CO (Western-Slope Flooding 1984)
FEMA-DR-1186-CO (Flood Disaster in Colorado)
FEMA-DR-1276-CO (Flood Disaster in Colorado)

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Prepared for
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Department of Natural Resources

in Cooperation with
The Department of Local Affairs
Division of Local Government
Office of Emergency Management

PREFACE

The State of Colorado, its political subdivisions, and our citizens are confronted daily with the possibility of flooding and related hazards. Floods have the potential for inflicting tremendous damages with significant losses of life and property, as well as posing a threat to the health, safety, and welfare of Colorado's citizens.

Current growth and population migration require a heightened awareness that the impact of flooding likely will increase over time. Mitigation begins with effective hazard assessments and comprehensive disaster preparedness programs. Mitigation builds upon the foundation of disaster preparedness by implementing strategies that are part of an overall plan to effectively reduce losses from disasters.

The Colorado Office of Emergency Management (OEM) is designated by law as the coordinating agency for disaster preparedness, response, recovery, and mitigation. The Colorado Water Conservation Board (CWCB) is the lead state agency for flood mitigation. These two offices assist other state agencies, local governments, Native American Tribes, and the private sector in addressing hazard identification and mitigation actions.

This flood mitigation plan represents a commitment to mitigate potential losses and damages by isolating the primary causes and recommending courses of action. The intent of the information, ideas and recommendations contained herein is to make a concerted effort to reduce or limit flooding impact on the people of Colorado.

This plan reflects the state's priorities for flood hazard mitigation. These priorities were developed through a private/local/state/federal team process. In order to implement this plan, a number of agencies, entities, and others need to work together to successfully mitigate damages caused by flooding. The goals and objectives outlined in the plan and within the appendices support this effort. Accomplishments can be realized only by joint efforts, dedication, and commitment to mitigation.

This plan was prepared in accordance with the Stafford Act and FEMA/State Agreement for Presidential Disaster Declaration DR-1276-CO.

Table of Contents

Chapter 1 - Introduction

1.0 Introduction

1.1 Purpose

In addition to fulfilling the legal obligation under the Stafford Act, this mitigation plan serves to:

- Recognize and describe flood hazards and their impacts upon the state.
- Identify federal, state, and local agencies, identify capabilities and shortfalls, and assign responsibilities to: (1) develop programs, activities, strategies, and recommendations for mitigation; and (2) monitor and implement pre-disaster and post-disaster mitigation measures.
- Document existing federal, state, and local government programs that relate to flood hazard mitigation.
- Identify and discuss critical issues which, if resolved, would enhance mitigation efforts.
- Identify and establish mitigation goals, objectives, and priorities for governmental actions to reduce flood damages.
- Offer mitigation strategies and measures for the state and local government jurisdictions to use in their planning efforts.
- Guide the State of Colorado and its local jurisdictions in taking action as may be reasonably expected to reduce flood damages.
- Document the flood event and recovery process resulting from presidential disaster declarations.

For More Information

Appendix A - Includes definitions, acronyms, and references used in the preparation of this plan.

Appendix B - Includes information on financial assistance programs.

Appendix C - Includes tips to minimize loss of life & property in the event of a flood.

Appendix D - Includes mitigation strategies and measures.

Appendix E - Includes mitigation planning examples.

1. 2 Scope

The scope of the plan is statewide. It is not necessarily limited to the declared disaster area because all streams in Colorado have the potential to flood and cause damages, regardless of the cause. Both short-term and long-term opportunities for flood hazard mitigation are considered. Furthermore, ideas for mitigation measures that go beyond existing federal, state or local funding frameworks have been evaluated.

The plan does not attempt to consider mitigation opportunities for some of Colorado's other natural hazards, such as drought, winter storms, avalanches, tornadoes, earthquakes, and wildfires. A Wildfire Mitigation Plan, Landslide Mitigation Plan, and Drought Plan have been developed and complement this Flood Hazard Mitigation Plan. Future floods in Colorado are inevitable, and this plan should be reviewed and updated annually or as necessary following each major disaster.

The Flood Hazard Mitigation Plan is not a manual on what state agencies should do when the next flood or dam break occurs. Such response procedures are covered in the Colorado State Emergency Operations Plan prepared and updated by the Colorado Office of Emergency Management (see ***Appendix A*** - References).

1.3 Authority & Responsibilities

1.3.1 Federal

The requirement for state governments to prepare a Flood Hazard Mitigation Plan following a Presidential Disaster Declaration is stated in Section 409 of Public Law 93-288, Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) as amended by Public Law 100-707, 42 U.S.C. 5121 et seq. and the Hazard Mitigation and Relocation Assistance Act of 1993. It establishes the prerequisites for state receipt of federal disaster assistance. The act requires the identification, evaluation, and mitigation of significant hazardous conditions attributed to the most recent disaster. Additional authority is derived from the following:

- Presidential Executive Order 11988, Floodplain Management
- Presidential Executive Order 11990, Protection of Wetlands

- FEMA Regulation, 44 CFR, Part 13, administrative requirements
- FEMA Regulations, 44 CFR, Part 17, Subpart F, drug-free work place
- FEMA Regulations, 44 CFR, Part 206, Subparts M & N
- Final Report of the Interagency Floodplain Management Review Committee - June 1994
- FEMA - 1186-DR-CO Hazard Mitigation Team Report - October 1997
- FEMA - 1276-DR-CO Hazard Mitigation Team Report - July 30, 1999

1.3.2 State

Presidentially declared disasters include a stipulation that the state must initiate the mitigation process. This condition is required by Section 409 of the Stafford Act (as amended) and is also stated in the FEMA-State Agreement for 1276-DR-CO Flood Disaster in Colorado, declared May 17, 1999. The governor, through his executive power, directs specific agencies to participate in post-disaster mitigation activities. Additional authority is derived from the

Governor's Office - "Colorado Disaster Emergency Act of 1992" (Part 21 of Article 32, Title 24, Colorado Revised Statute, 1988 as amended) states the governor, as the executive head of state, has the inherent responsibility, as well as constitutional and statutory authority, to commit state and local resources (personnel, equipment, and finances) for the purpose of ***... meeting the dangers to the state and its people presented by disasters ....*** This responsibility is exercised through the director, Office of Emergency Management (OEM), Department of Local Affairs (DOLA). The Governor's Disaster Emergency Council serves as an advisory council to the governor and the director of the Office of Emergency Management on all matters pertaining to Declarations of State Disaster Emergencies, and on the response and recovery activities of state government.

1.3.2.1 State Mitigation Planning

The first Flood Hazard Mitigation Plan was prepared as a result of the presidential declaration of disaster for Larimer County on July 22, 1982 (FEMA-665-DR-CO). The following are additions and revisions to the original plan:

- Status report No. 1 prepared December 1983.
- Second review prepared January 1985 following declaration of 10 western slope counties as a major disaster area eligible for public assistance on July 27, 1984 (FEMA-719-DR-CO).
- In 1988, the Colorado Geological Survey prepared the Colorado Landslide Hazard Mitigation Plan in response to flooding and mudslides on the western slope.
- In 1995, the Colorado State Forest Service prepared the Colorado Wildfire Hazard Mitigation Plan in response to wildfires in the state (FEMA-CO-2098-FSA; FEMA-CO-2099-FSA; and FEMA-CO-2102-FSA).
- In 1998, the Colorado Flood Hazard Mitigation Plan was updated due to declaration DR-1186-CO.
- In 1999, the Colorado Flood Hazard Mitigation Plan was updated due to declaration DR-1276-CO.

1.3.3 Local Government

Local governments play an essential role in implementing effective mitigation, both before and after disaster events. In a post-disaster environment, locally affected areas also are expected to participate in mitigation evaluation. Local government participation with federal and state agencies in the Colorado Hazard Mitigation Team process is crucial. Recommendations on alleviating or eliminating a repetitive problem often focus on local assessment as to the cause of damage and depend on a local applicant for implementation.

Both OEM and the Colorado Water Conservation Board (CWCB) have suggested that communities prepare a flood hazard mitigation plan for their jurisdictions. This is a logical extension of the mitigation planning process initiated on a national scale by the federal government. A carefully drafted plan can be an extremely valuable resource to formulate annual work programs, budgets, and policy positions.

1.4 Goals and Objectives

The 1999 Colorado Flood Hazard Mitigation Plan is the cornerstone for establishing and guiding a statewide effort to reduce or eliminate the impact on life, property, and the environment from the flood hazard. The costs of responding to and recovering from repetitive flooding increases with each event. However, it is possible to break the cycle of recurring damage by evaluating the root cause and choosing a logical and realistic course of action from among potential alternative solutions to eliminate or reduce either the cause or its impact.

The implementation of mitigation measures is challenging due to additional costs and assuring cost effectiveness of the measures. Mitigation measures can be difficult to initiate because of social/economic

and/or political oppositions. Perceptions of benefit vs. threat diminish greatly as an event fades from thought. However, mitigation successes can be accomplished by: (1) preparing accurate assessment information regarding hazards; and (2) when mitigation is supported by strong leadership and a commitment for positive change.

Government officials at all levels must understand that without proactive mitigation by all applicable government agencies, the costs associated with a natural disaster will increase. If no mitigation is undertaken, the accumulated costs of future disasters will far exceed the cost of mitigation efforts applied now.

1.5 Methodology Used in Data Collection

Generally speaking, the methodology in the development of this plan and data collection progressed from the general, non-specific to the detailed and the particular. Many avenues for data collection were used. Personal interviews, along with technical research into pertinent publications are just a few of the examples. The plan looks at general ideas and issues relating to recent flood events. The Interagency Hazard Mitigation Team (IHMT) and the State Hazard Mitigation Team (SHMT) efforts in defining specific recommendations for mitigation of the flood hazard were invaluable. The specific recommendations located in Chapter 5 are a result of a team effort of many individuals from federal, state, local, and private organizations.

1.6 Definitions

The following definitions are offered as a guide toward better understanding the similarities and subtle differences between the major concepts discussed in this plan, all developed to reduce flood damages (additional definitions and acronyms are listed in ***Appendix A***).

Hazard Mitigation - A plan to alleviate by softening and making less severe the effects of a major disaster or emergency and of future disasters in the affected areas, including reduction or avoidance. Hazard mitigation can reduce the severity of the effects of flood emergency on people and property by reducing the cause or occurrence of the hazard; reducing exposure to the hazard; or reducing the effects through preparedness, response, and recovery measures. Hazard mitigation is a management strategy in which current actions and expenditures to reduce the occurrence or severity of potential flood disasters are balanced with potential losses from future floods.

Floodplain Management - A comprehensive approach to reduce the damaging effects of floods, preserve and enhance natural values, and provide for optimal use of land and water resources within the floodplain. Its goal is to strike a balance between the benefits obtainable from the use of floodplains and the potential losses to individuals and society arising from such use. Various floodplain management strategies are organized in ***Appendix D***.

Dam Safety - A program to inventory, classify and inspect dams to identify hazardous conditions and ensure proper maintenance through corrective orders for the purpose of protecting human life and property. A dam (including the waters impounded by such dam) constitutes a threat to human life or property if it might be endangered by overtopping, seepage, settlement, erosion, sediment, cracking, earth movement, earthquakes, failure of bulkheads, flashboards, gates on conduits, or other conditions.

Emergency Preparedness - A program to reduce vulnerability of people and communities of this state to damage, injury, and loss of life and property resulting from natural or man-made catastrophes (see ***Appendix D).***

Geologic Hazard Management - A program to recognize hazardous geologic processes and conditions and their potential adverse effects on existing or proposed works of man. Upon identification of such geologic hazard constraints, a second phase of management requires effective statutory and administrative procedures and actions to minimize loss of life and property through prudent controls and mitigation.

Chapter 2 - Hazard Identification and Evaluation

2.1 People and Hazards

The relationship between flood hazards and population identifies patterns of risk, as shown in Figure 2.1. Relationships between patterns of risk and steps taken toward preparedness explain degrees of vulnerability to which various Coloradans are exposed.

Such relationships are not new to Colorado. The natural phenomena involved have occurred here long before people settled near them and were impacted by them. Risk grows from the increasingly close association between natural phenomena and a growing population.

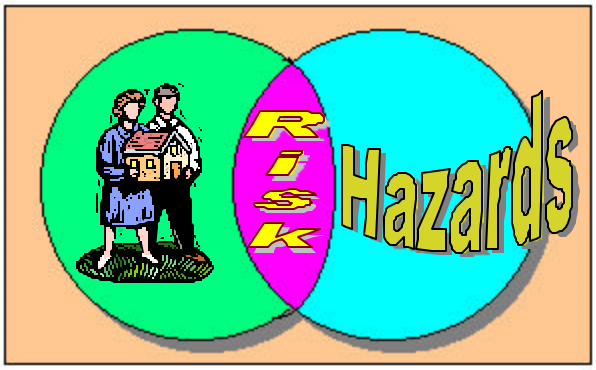

Figure 2.1—Relationships to Risk

People become vulnerable to hazards when they choose (knowingly or unknowingly) to live near the areas where these extreme events occur. Vulnerability is also related to preparedness. People who prepare for the occurrence of an extreme event are less vulnerable to it than those who do not. The vulnerability of Colorado's population is rooted in a relationship between the occurrences of extreme events, the proximity of people to these occurrences, and the degree to which these people are prepared to cope with these extremes of nature.

Today, flood prone areas have been identified in 268 cities and towns and in all of the 63 counties in Colorado. Using information supplied from local units of government, there are estimated to be approximately 250,000 people now living in Colorado's floodplains. The Colorado Water Conservation Board (CWCB) estimates that approximately 65,000 homes and 15,000 commercial and industrial business structures are located in Colorado's floodplains. **Note:** One of the recommendations of this plan is to begin to inventory the structures and people in Colorado's floodplain. This inventory, when completed, will enable planners at the state and local level of governments to plan and mitigate the flood hazard. The total value of property, including structures and contents, exposed to the 100-year flood in Colorado is estimated to be over $11 billion dollars. Cumulative flood losses from the turn of the century to 1999 from the state's most damaging floods are $4.4 billion (1999 dollars).

2.2 Types of Hazards

2.2.1 Floods

Floods in Colorado occur on "riverine" systems consisting of a basin (or watershed) and a hierarchical order of stream channels that convey the normal flow of water through the watershed. The area adjacent to the channel is the floodplain. Flooding results when the flow of water is greater than the normal carrying capacity of the stream channel. Rate of rise, magnitude (or peak discharge), duration, and frequency of floods are a function of specific physiographic characteristics. Generally the rise in water surface elevation is quite

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Webster's Definitions

Flood: **a temporary condition of inundation of normally dry land areas**

Hazard: **a source of danger**

Mitigate: **to cause to become less harsh or hostile, to make less severe**

rapid on small (and steep gradient) streams and slow in large (and flat sloped) streams.

The causes of floods relate directly to the accumulation of water from precipitation or the failure of man-made structures, such as dams or levees. Floods caused by precipitation are further classified as coming from:

- ***Rain in a general storm system***
- ***Rain in a localized intense thunderstorm***
- ***Melting snow***
- ***Rain on melting snow***
- ***Ice jams***

Rainfall and melting snow in Colorado's seven river basins feed four major river systems of the western United States. These river systems are the Missouri, Arkansas, Rio Grande, and Colorado river basins. These basins encompass many small streams and rivers as shown in ***Figure 2.2***.

Note: One of the recommendations of this plan is to inventory the structures and people in Colorado's floodplain. This inventory, when completed, will enable planners at the state and local level of governments to plan and mitigate the flood hazard.

Precipitation in each basin is related to the seasons and two major sources of moisture. Summer showers and thunderstorms that occur from June through September primarily are caused by moisture from the Gulf of Mexico or the Pacific Ocean. During the fall, occasional general rainstorms and thunderstorms occur from wet and warm cyclonic air masses That move in from the southern Pacific Ocean. Winter and spring

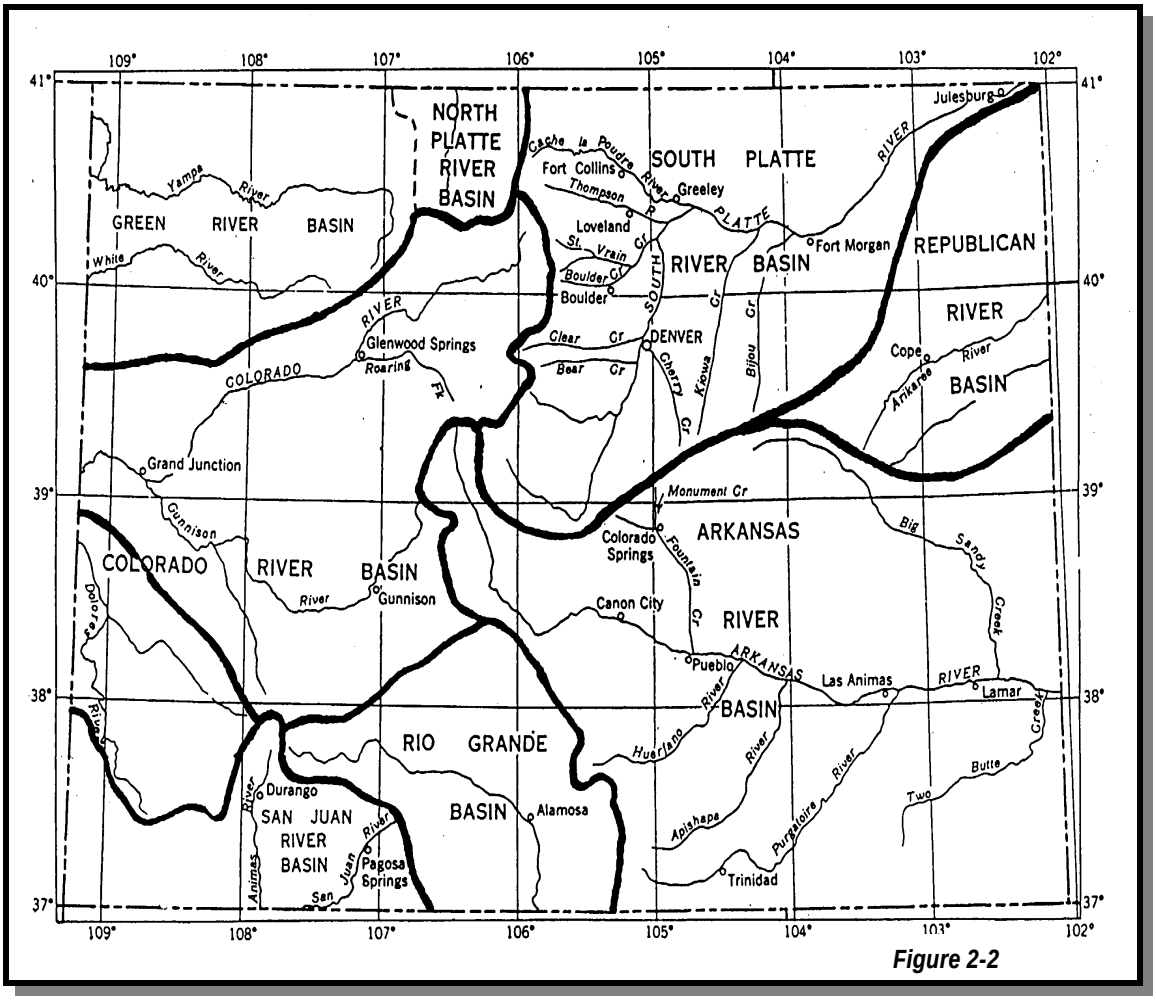


Figure 2-2

rain and snow storms are generally a result of moist air masses which originate in the cooler northern Pacific Ocean and move inland across the Pacific Northwest.

Floods caused by failure of man-made structures are a result of:

- ***Hydrologic deficiencies***
- ***Structural deficiencies***
- ***Improper Operation or Sabotage*** *(1 case in CO)*

Each of these causes results in floods that have distinct characteristics relative to rate of rise, volume, duration, and flood season.

2.2.1.1 General Rain Floods

General rain floods can result from moderate to heavy rainfall occurring over a wide geographic area lasting several days. They are characterized by a slow steady rise in stream stage and a peak flood of long duration. As various minor streams empty into larger and larger channels, the peak discharge on the mainstream channel may progress upstream or downstream (or remain stationary) over a considerable length of river.

General rain floods can result in considerably large volumes of water. The general rain flood season is historically from the beginning of May through October. Because the rate of rise is slow and the time available for warning is great, few lives are usually lost, but millions of dollars in valuable public and private property are at risk.

The October 5, 1911, floods in Pagosa Springs and Durango were a result of a general rain system over tributaries of the San Juan River Basin in southwestern Colorado. The June 3, 1921, flood in Pueblo was a result of a general rain system in the Upper Arkansas River Basin. The damaging floods of June 1965 in the Denver-metro area were a result of heavy to torrential rainfall over large portions of the South Platte River Basin that lasted several days.

2.2.1.2 Thunderstorm Floods

Damaging thunderstorm floods are caused by intense rain over basins of relatively small area. They are characterized by a sudden rise in stream level, short duration, and a relatively small volume of runoff. Because there is little or no warning time, the term “flash flood" is often used to describe thunderstorm floods. The average number of thunderstorm days per year in Colorado varies from less than 40 near the western

May 1999 Flooding in Otero County, Colorado - La Junta Middle School, Built in 1901, on the State Historic Registry.

boundary to over 70 in the mountains along the Front Range. The thunderstorm flood season in Colorado is from the middle of July through October.

Big Thompson Flood (1976) **-** The widely publicized Big Thompson Canyon flood disaster of July 31, 1976, was a result of an intense thunderstorm cell that dropped up to 10 inches of rain in a few hours over the basin.

1993 Floods **-** On May 15-16, 1993, a thunderstorm-induced flood event occurred at Rifle on Rifle and Government creeks. As is usually the case, the highest flows in the shortest period of time occurred when an estimated 125-year flood discharge impacted Rifle. Structures and vehicles in harm's way suffered damages in excess of $200,000.

On June 17, 1993, a flash flood occurred on Shooks Run in Colorado Springs. Damages were confined to a mobile home park on the creek's edge with losses estimated at $1 Million.

In July 1993, the Town of Otis and the unincorporated area of Cope in Washington County and the City of Yuma in Yuma County experienced a weekend flood event as a result of three consecutive days of thunderstorms. Several homes suffered damages and roadways were inundated with loss in excess of $650,000. In Otis, a flood control and storm drainage project protecting the northern half of town worked.

On August 10, 1993, flash floods occurred on several creeks in Delta County. Two roads were washed out and a flood fight was conducted with sandbags on Robideaux Creek near the Department of Corrections Detention Facility.

On August 26-29, 1993, general rainstorms caused flooding in Archuleta and La Plata counties. A subdivision in Archuleta County was threatened and roads damaged as the Rio Blanco overflowed its banks south of Pagosa Springs. In Durango, the Fire Department had their emergency operations plan in effect and came very close to evacuating residents of a mobile home park on the Animas River.

1995 Floods - In the spring and early summer of 1995, the lower South Platte, the lower Arkansas and the Roaring Fork Rivers were impacted by significant flooding. Most damages were experienced by agricultural landowners.

1997 Floods **-** On July 24-28, 1997, the City of Fort Collins and most of eastern Colorado received soaking and/or drenching rains, adding to soil moisture in some locations. As the cold front arrived in the late afternoon of July 27th, strong thunderstorms developed just north and west of Fort Collins. Later that night, steady rains developed along the eastern base of the foothills in Larimer County and continued until about noon on July 28th. Several inches of new rain were reported just west and northwest of Fort Collins totally saturating the ground, producing major flooding in Laporte, and setting the stage for the evening flood event.

On the evening of July 28, 1997, intense rains began around 6:30 p.m. in the foothills west of Fort Collins. Winds from the east and southeast continued to pump moisture into the storm system throughout the evening. The core of the storm was very small but remained nearly stationary over the headwaters of Spring Creek, the Fairbrooke Channel, Clearview Channel, the CSU Drainage Basin, and the West Vine Drainage Basin. Rainfall intensity increased and reached a maximum between 8.30 p.m. and 10:00 p.m. before ending abruptly. A subsequent analysis of rainfall conducted by CSU showed a maximum of 10.2 inches of rainfall in less than five hours near the intersection of Drake Rd. and Overland Trail.

On July 29, 1997, slow-moving thunderstorms dumped large amounts of rainfall over the Pawnee Creek Basin

Colorado Flood Facts

Counties/Cities/Towns with Flood Prone Areas	**268**
Population of 100-Year Floodplain	**250,000**
Homes in 100-Year Floodplain	**65,000**
Commercial/Industrial/Businesses in 100-year Floodplain	**15,000**
Total Value of Property in 100-Year Floodplain	**$11 Billion**
Cumulative Flood Losses from Turn of Century to 1999	**$ 4.4 Billion**

Source: CWCB **Figure 2.3**

in Weld and Logan counties and over the Schaefer Draw Basin in Morgan County north of Weldona. Floodwaters from Schaefer Draw entered the unincorporated Town of Weldona on the evening of July 29 while similar damaging floodwaters from Pawnee Creek entered the unincorporated Town of Atwood early July 30th (west of Sterling and north of U.S. Hwy 6). Additionally, floodwaters flowing east from Atwood entered the City of Sterling.

During the Presidential Declaration Incident Period (July 28 - August 12, 1997) storm systems drenched other areas in northeastern Colorado, as well as several counties in southeastern Colorado. In addition, the Denver Metro Area received flooding rains as did the Clear Creek County area to the west of Denver.

Larimer, Logan, Weld, Morgan, and Clear Creek counties have drainage tributaries to the South Platte River. In addition, portions of Elbert and Lincoln counties have tributaries to the South Platte River. The river basin has a drainage area of about 24,300 square miles and is located in three states: Colorado (79 percent of the basin); Nebraska (15 percent of the basin); and Wyoming (6 percent of the basin).

The basin has a continental climate modified by topography, in which there are large temperature ranges and irregular seasonal and annual precipitation. Mean temperatures increase from west to east and on the plains from north to south. Areas along the Continental Divide average 30 inches or more of precipitation annually, which includes snowfall in excess of 300 inches. In con-

22 Most Damaging Floods in Colorado

Date	Major Stream or Location	Deaths	Damages (In 1999 $)
May 1864	Cherry Creek at Denver	?	$ 6,000,000
July 1896	Bear Creek at Morrison	27	6,000,000
Oct. 1911	San Juan River near Pagosa Springs	2	6,000,000
July 1912	Cherry Creek at Denver	2	120,000,000
June 1921	Arkansas River at Pueblo	78	760,000,000
May 1935	Monument Creek at Colorado Springs	18	52,000,000
May 1935	Kiowa Creek near Kiowa	9	15,000,000
May 1942	South Platte River Basin	?	8,500,000
May 1955	Purgatorie River at Trinidad	2	36,000,000
June 1957	Western Colorado	?	18,000,000
June 1965	South Platte River at Denver	8	2,200,000,000
June 1965	Arkansas River Basin	16	205,480,000
May 1969	South Platte River Basin	0	21,500,000
Sept. 1970	Southwest Colorado	0	13,200,000
May 1973	South Platte River at Denver	10	388,800,000
July 1976	Big Thompson River in Larimer County	144	85,200,000
July 1982	Fall River at Estes Park	3	49,080,000
June 1983	North Central Counties	10	26,250,000
May-June 1984	Western and Northwestern Counties	2	46,500,000
May-June 1993	Western Slope	0	2,140,000
July 1997	Fort Collins & 13 Eastern Counties	6	169,367,000
May-June 1999	Colorado Springs & 12 Eastern Counties	0	100,000,000 (est.)
TOTALS		**352**	**$ 4,486,577,000**

Source: CWCB and Colorado OEM Figure 2.4

trast, annual precipitation on the plains east of Denver, Colorado, and in the South Park area in the southwest part of the basin, ranges from 5 to 7 inches. Most of the precipitation on the plains occurs as rain, which falls between April and September.

Rangeland is present across all areas of the basin except over the high mountain forests. Agricultural land is restricted mostly to the plains. Urban or built-up land is present primarily along the Front Range urban corridor in Colorado.

Phillips County and parts of Lincoln and Elbert Counties have drainage tributaries to the Republican River. The Republican River is, in turn, a tributary to the Kansas River in Kansas. The Republican River Basin in Colorado consists primarily of rangeland with some farming and ranching communities scattered throughout the basin.

The Arkansas River Basin is very similar to the South Platte River Basin in topography, geology, and hydrology. Annual mean temperatures are slightly higher than the Platte River Basin. Annual rainfall amounts average between 7 and 15 inches, except in the mountainous areas of the Basin. Land use is similar as well and consists mainly of agriculture.

Crowley, Kiowa, Otero, and Prowers counties are drainage tributaries to the Arkansas River. In addition, portions of Elbert, Lincoln, and Baca counties are within the Arkansas River Basin.

A very small part of the incident area lies within the Cimmaron River Basin. The southern portion of Baca County has drainage tributaries to the Cimmaron River. The Cimmaron River flows from Colorado into Kansas and then into Oklahoma where it ultimately joins the Arkansas River in Tulsa. The Cimmaron River Basin is similar in topography and climate to the Arkansas River Basin.

1999 - Flood Event Description - The three-day rainfall event occurred on April 29-May 1, 1999. Heavy rain and saturated soil caused flooding in two major areas along the Front Range: Northeastern Colorado along the South Platte River and some of its tributaries; and Southeastern Colorado along the Arkansas River and some its tributaries.

Rainfall totals of up to 13 inches were recorded in the Cheyenne Mountain region of Colorado Springs. The La Junta region recorded approximately 8 inches over the same three-day period The Arkansas River broke the dikes near North La Junta, flooding approximately 200 residence and businesses. The stormwater runoff from the three-day general rain resulted in large flood inundation and erosion in the Arkansas River and Fountain Creek watersheds.

These rainfall totals are large, but not extreme in comparison to the largest storms experienced in Colorado. What made this storm so interesting (and the flood flows so large) was the fact that rainfall was so widespread that most of the affected basins were receiving heavy rainfall basinwide. This is not the "norm" for Colorado. Also, rain on snow is generally not a great problem in Colorado, but sizeable areas of the Front Range foothills did receive heavy rain on top of several inches of saturated snowpack. The melt rate of this snowpack was low, but additional water was added to the runoff.

The flooding that occurred along Fountain Creek and the Arkansas River was significant and will likely be considered the worst flooding event since *1965.* However, the storm affected Bent, Crowley, Custer, Elbert, El Paso, Fremont, Kiowa, Larimer, Las Animas, Otero,

1999 Flood Event Greatest Impact Areas Fig. 2.5

La Junta Otero County

- **Weather reports indicated that eight inches of rain occurred over a three-day period.**
- **The Arkansas River broke the dikes near North La Junta, flooding 200 residences and businesses.**

El Paso and Pueblo Counties

- **The flooding that occurred along Fountain Creek and the Arkansas River was significant and will be considered the worst flooding event since 1965.**

The Storm Affected these Additional Areas

Bent, Crowley, Custer, Elbert, Fremont, Kiowa, Las Animas, Otero, and Weld counties.

1999 Flood Damages Figure 2.6

Public Assistance	**$ 6,345,302**
Individual Assistance	**892,366**
Small Business Administration	
Home	**5,726,200**
Business	**701,200**
EIDL	**161,500**
Total Damage	**$ 13,826,568**

Source: Colorado Office of Emergency Management as of September 22, 1999
(note: the above damages represent the federal programs as listed)

Pueblo, and Weld Counties. These counties sustained damage to roads, bridges, culverts, homes, and business from overtopping, dike breaches, erosion, mudslides, and rockslides.

2.2.1.3 Snowmelt Floods

Snowmelt floods result from the melting of the winter snowpack in the high mountain areas. Snowmelt floods typically begin as spring runoff appears, after the first spring warming trend. If the trend continues up to 8-10 consecutive days in a basin where the snowpack has a water content more than about 150% of average, serious flooding can develop. The total duration of snowmelt floods is usually over a period of weeks rather than days. They yield a larger total volume in comparison to other varieties of floods in Colorado. Peak flows, however, are generally not as high as flows for the other types. A single cold day or cold front can interrupt a melting cycle causing the rising water to decline and stabilize until the cycle can begin again. Once snowmelt floods have peaked, the daily decreases are moderate, but fairly constant. Snowmelt flooding usually occurs in May, June, and early July.

Floods in June 1983, along the Cache la Poudre River in Fort Collins and Greeley; along Clear Creek and its tributaries in Silver Plume and Georgetown; and along the Arkansas River in Fremont and Chaffee counties, were principally due to melting snow. The 1984 floods on the western slope were primarily snowmelt flooding.

2.2.1.4 Rain on Snowmelt Floods

Rain on snow flooding occurs most often in Colorado during the month of May. It is at this time of year that large general rainstorms occur over western Colorado. These rainstorms are most often caused when warm moist air from the Gulf of Mexico begins pushing far enough north that it begins to affect western weather. In combination with this movement of air mass is the continued possibility of cold fronts moving into Colorado from the Pacific Northwest. When these weather phenomena collide, long lasting general rainstorms can often occur. Rain on snowmelt exacerbates an already tenuous situation as snowmelt waters rush down heavily incised stream channels. Any abnormal increase in flow from other sources usually causes streams to leave their banks.

During the spring months of May and June when rivers are running high, there is a potential for flooding due to rain falling on melting snow. Usually such rain is over a small part of a basin, and the resulting flood is of short duration and may often go unnoticed in the lower reaches of a large drainage basin. To some extent, the cloud cover associated with the rain system can slow the melting cycle and offset the compound effect. In some cases, however, rainfall may be heavy and widespread enough to noticeably affect peak flows throughout the basin.

Flooding along the Colorado River in Grand Junction in July 1884, along Clear Creek at Georgetown in June 1965, and along the Gunnison and Colorado rivers at Grand Junction in June 1983, are examples of flooding from rain on melting snow. The effect of rain on melting snow in the Colorado River Basin in 1983 was felt as far downstream as Mexico. In 1984, rain or melting snow caused severe flooding conditions at Paonia.

On May 28, 1993, rain on snowmelt flooding occurred at Paonia on the North Fork of the Gunnison River. The rainfall occurred over a five-hour period during the evening. This caused the North Fork of the Gunnison River to reach its highest level since the 1984 flood season. Many miles of agriculture land experienced severe bank erosion in unincorporated Delta County.

2.2.1.5 Ice Jam Floods

Ice jam floods can occur by two phenomena. In the mountain floodplains during extended cold periods of 20 to 40 degrees below zero, the streams ice over. The channels are frozen solid and overbank flow occurs, which results in ice inundation in the floodplains. Ice jam floods can occur when frozen water in the upper reaches of a stream abruptly begins to melt due to warm Chinook winds. Blocks of ice floating downstream can become lodged at constrictions and form a jam. The jam can force water to be diverted from the

1998 Colorado Dam Failure (Figure 2.7)

The Carl Smith Reservoir failed on the evening of May 2, 1998. Carl Smith Dam is an 850 acre-foot, Class 1 off-channel reservoir in Leroux Creek Basin north of Hotchkiss, Colorado. The failure was a result of a large slide on the downstream slope that extended across the crest and into the upstream slope. The releasing water swiftly eroded down through the top half of the remaining embankment and quickly released about 500 acre-feet of storage. The peak discharge just below the dam was determined to be around 3,300 cfs. Several residences were evacuated. The only loss of life was livestock. The high water washed out numerous bridges, and diversion structures were quickly rebuilt to restore water to irrigators.

stream channel causing a flood. An ice jam can also break up, suddenly causing a surge of water as the "reservoir" that was formed behind it is suddenly released. Ice jamming occurs in slow moving streams where prolonged periods of cold weather are experienced. Sometimes the ice jams are dynamited, allowing a controlled release of the backed up water to flow downstream. In 1955, 1962, and 1983, flooding in Rangely resulted from ice jams, as did 1973 flooding in Meeker.

2.2.1.6 Dam Failure Floods

Dam failure floods are primarily a result of hydrologic or structural deficiencies. The operation of a reservoir can also influence the safety of the structure.

Dam failure by hydrologic deficiency is a result of inadequate spillway capacity, which can cause a dam to be overtopped during large flows into the reservoir. Dam failure by hydrologic deficiency occurs from excessive runoff after unusually heavy precipitation in the basin. Large waves generated from landslides into a reservoir or the sudden inflow from upstream dam failures are other causes of dam failure by overtopping. Overtopping is especially dangerous for an earth dam because the down-rush of water over the crest will erode the dam face and, if continued long enough, will breach the dam embankment and release all the stored water suddenly into the downstream floodplain.

Examples of structural deficiencies include seepage through the embankment, piping along internal conduits, erosion, cracking, sliding, overturning rodent tunneling, or other weakness in the structure. Old age is often at the root of structural deficiencies. Seismic activity in Colorado has recently been recognized as a potential source of structural problems due to liquefaction of sand layers in the embankment of a dam.

The mechanics of a structural failure depends on the type of dam and the mode of failure. Dam failure floods due to structural deficiencies are characterized by a sudden rise in stream level and relatively short duration similar to a thunderstorm flood. They can occur at any time, but earthen dams appear to be most susceptible to structural failure during the fall and spring freezing and thawing cycles.

There are about 27,000 dams in Colorado, the majority of them being livestock water tanks, which are small, low hazard dams located in rural areas. This number includes 1,829 jurisdictional-sized reservoir dams that are greater than 10 feet in vertical height, or have a reservoir whose surface area exceeds 20 acres, or its capacity exceeds 100 acre-feet. In addition there are several non-jurisdictional sized (NJ) reservoir dams that have been rated as Significant Hazard because of their potential impact on improved properties. The construction and repair of these non-jurisdictional sized dams must be approved by the State Engineer, and all the reservoir dams, including the Significant Hazard NJ dams, receive safety inspections periodically to assure they are being operated and maintained in a safe manner.

Although few lives have been lost from dam failures, property damage has been high. There have been at least 130 known dam failures and incidents in Colorado since 1890. The failure of the Lower Latham Reservoir Dam in 1973 and subsequent flooding in the Town of Kersey, Weld County, Colorado, resulted in a Presidential Major Disaster Declaration.

The earliest recorded dam failure flood in the Estes Park region occurred on May 25, 1951, when Lilly Lake Dam failed, sending flood waters down Fish Creek and into Lake Estes.

In June 1965, a flood occurred on Clay Creek in Prowers County, which overtopped an earthen dam being constructed by the Colorado Game, Fish, and Parks Commission. Although the dam did not fail, it did divert flood water into an adjacent drainage. The subsequent damage and death from this flood resulted in an important legal controversy known as the Barr Case.

This case was finally decided in 1972 by the Colorado Supreme Court, which recognized the concept of probable maximum flood as a predictable and foreseeable standard for spillway design purposes.

The Lawn Lake Disaster of 1982 resulted form the failure of a privately-owned dam on Forest Service property, and $31 million of damage was sustained in Larimer County and Estes Park. A lawsuit awarded $480,000 to one of the four persons killed in the disaster. The most unusual flood from the failure of a man-made structure in Colorado is probably the complete draining of Lake Emma, a natural lake located high in the San Juan Mountains above Silverton, Colorado. On June 4, 1979, flood water flowed through a network of tunnels in an abandoned mine that extended under the lake.

2.2.2 Geologic Hazards Closely Associated with Flooding

Most geologic hazards are related one way or another to water. However, those selected for specific attention in the Flood Hazard Mitigation Plan for 1999 are only those most often or directly associated with flooding, heavy runoff, or dam failures (either as a cause or an effect).

2.2.2.1 Mud and Debris Flows

Mudflows and debris flows, as defined in Colorado Statutes, are essentially synonymous with "mudslides" as used by FEMA and other federal agencies. These are common events in mountainous areas of Colorado where they most often occur in steep ravines of first or second order streams. Events occurring in larger stream basins are usually less frequent but can affect much larger areas. Factors predisposing an area to mud and debris flow occurrences include basin size, geometry, and geology, combined with high antecedent soil moisture. The actual events are initiated by heavy runoff from either intense rainfall (cloud bursts) or sudden heavy snowmelt. Rainstorm initiated events tend to involve smaller areas and shorter duration, as they are limited to the basin(s) affected by a single thunderstorm cell. Those caused by snowmelt can be more extensive in area and can continue as a threat for several weeks since they are influenced by more general snowpack conditions temperature fluctuations.

Mud and debris flow events result in plugs of high velocity, high density mud, rock, and woody debris that scour the middle and lower channel reaches and move considerable distances across the depositional area known as a "debris fan."

A debris fan is a sloping wedge-shaped heterogeneous deposit of rock, soil, and woody debris at the junction of a smaller stream with the valley of a larger one. The fan is created by periodic high-velocity mud and debris flows (mudslides) that come down the stream channel and are deposited on the fan.

During a given event, one or several successive plugs can form and descend upon the fan. Each plug is followed by a pulse of heavily sediment-laden flood water. Any works of man encountered on the fan surface can be destroyed or seriously damaged. Within the fan area the plugs or resulting streams of mud, rock, and debris can shift position quite unpredictably during a single event or from one event to the next.

Colorado's vulnerability to the hazard results from the fact that our climate, geology, and terrain combine to make many areas of the state subject to mud and debris flow hazards. The high potential for damage is due to the fact that dozens of existing Colorado communities are in hazard locations. In addition, numerous, attractive, but potentially hazardous, development sites remain throughout Colorado.

2.2.2.2 Catastrophic Landslides

Catastrophic landslides are herein defined as those landslides that have the potential to affect valley lands, populations, and facilities on a far greater scale than the event itself. The mechanisms by which the widespread effects can occur include:

- Damming and backwater effects from the landslide deposits
- Breaching by erosion of such a landslide-formed dam with consequent downstream flooding
- Massive landslide deposits that enter and displace water of an existing reservoir, thereby producing downstream flooding by dam failure or overtopping

A prototype incident of the catastrophic landslide type was the Thistle, Utah, slide of 1983. Several different types of landslides common in Colorado have demonstrated the potential for blocking of major streams with resulting backwater and other serious effects. These include large rock fall sheets, rock slides, earthflows, and complex landslides. The most common characteristics are the large volume of slide material and the ability to move considerable distances. An exception to this generalization is the rock slide, which is sometimes capable of blocking a canyon location without moving an unusual distance from its site of origin.

The most serious threat of large and catastrophic landslide events in Colorado is probably from accelerated movement of marginally stable old slides. There are hundreds of large old slides in Colorado and 30 or more that show evidence of current activity.

A typical catastrophic landslide scenario for a reactivated old landslide is as follows: 1) A large landslide/ earthflow complex occupied the wide tributary valley

seen in the right middle ground at some time in the past few thousand years; 2) Man has developed the valley floor with transportation and utility facilities and town sites; 3) Slide movement is reactivated as a result of disruptions by construction and increased soil moisture from "normal" climatic fluctuations; 4) Millions of cubic yards of slide materials move continuously into the valley despite efforts to stop or divert the flow; 5) Movement continues until it is stopped by piling up against the opposite valley side; 6) By this time the valley is blocked to a height of several hundred feet, all utility and transportation facilities are severed and the stream in the main valley is dammed; 7) Emergency response officials are faced with immediate decisions relating to backwater flooding, downstream flooding when the slide is overtopped, restoration of essential services, and evacuation of people from affected homes and townsites.

2.3 Historic Damages

2.3.1 Flood Damages

Compilations of exact data on the history of floods in Colorado since settlement began are lacking. The earliest known floods are reported to have occurred in 1826 in the Arkansas River and Republican River basins. Between 20 and 30 large magnitude floods (in terms of peak discharge) occur somewhere in Colorado every year.

The 22 most damaging floods in Colorado recorded history are listed in **Figure 2.4.** The most lives lost due to a single flood event occurred in the Big Thompson canyon on July 31, 1976, when 144 people were killed.

The most damaging flood in Colorado occurred in June 1965 on the South Platte River when almost $2.2 billion in damages (1999 dollars) was sustained in the Denver-metro area. Since the turn of the century, 352 people have been killed and over $4.4 billion (1999 dollars) in property damages have resulted from the 22 most damaging floods in Colorado. A study completed in 1983 of the largest known floods in various front range drainage basins indicated over 352 people have died since the 1800s as the result of flooding. Using the consumer price index to adjust past flood damages at the time of each event to present worth, total flood damages are estimated at over $4.4 billion.

All streams, regardless of size, have the potential to flood. In many parts of Colorado, spring brings the greatest threat of flooding because of additional water from melting snowpack.

1976 - big thompson canyon - lives lost 144

The average annual loss in Colorado due to floods is $16 million. Between 1965 and 1999 the president declared nine major disasters in Colorado as a result of floods in the past 30 years. Most of these disasters were caused by precipitation, but two were caused by dam failure. A summary of these Presidentially declared disasters is shown in ***Figure 2-8***.

2.3.2 Mud and Debris Flow Damages

Mud and debris flow damages have been common throughout the history of modern man in Colorado.

Colorado's Recent Major Presidential Disaster Declarations

	Location	Cause
1965	Front Range 33 Counties	Sustained Rainfall
1969	Front Range 15 Counties	Sustained Rainfall
1970	Southwest	Sustained Rainfall
1973	(1) Kersey (2) Front Range 13 Counties (3) Southwest 13 Counties	Dam Failure Sustained Rainfall Sustained Rainfall
1976	Big Thompson Front Range 2 Counties	Flash Flooding, Heavy Rainfall Over Short Duration
1982	Lawn Lake Front Range 1 County (Larimer)	Dam Failure
1984	Western Slope 15 Counties	Snowmelt Floods and Mudslides
1997	Front Range 13 Counties	Sustained Rainfall
1999	Front Range 12 Counties	Sustained Rainfall

Figure 2.8

Many of the older mountain communities were built in part or entirely on the sides of major mountain valleys which are the usual location of the debris fans of smaller tributary streams. A debris fan is the depositional land form produced by successive mud and debris flow deposits. The towns of Glenwood Springs, Ouray, Telluride, and Idaho Springs have a long history of damaging debris and mudflows. The Town of Marble in Gunnison County was nearly destroyed by severe flows in the 1930s and 1940s, and the mining community of Brownville (near Silver Plume in Clear Creek County) was engulfed and destroyed by a series of flows in June 1912.

Much of the damage and loss of life during the Big Thompson storm and flood of 1976 was caused by multiple debris flows from smaller tributary streams. The 1965, 1969, and 1973 storm and flood events of the Front Range area produced extensive debris avalanching that originated on steep mesa side slopes of Douglas County. During the abnormally heavy spring snowmelt runoff of 1984 in Eagle County, the communities of Vail, Beaver Creek, and Redcliff were impacted by numerous debris flow events. In addition to threats to life and residential properties, the mud and debris flow events produce even more widespread effects on transportation and other public facilities, requiring extensive and costly clean-up and repair annually throughout Colorado.

Renewed development in mountainous areas of Colorado has increased dramatically in the past 30 years, driven by the demand for new resort communities and second homes. This pressure has led to a tremendous increase in development of lands vulnerable to severe to moderate mud and debris flow hazards. Identification and mitigation of existing hazards and future recognition of hazards in advance of land use decisions could save many lives and millions of dollars in property losses in the years ahead.

Damages in Colorado from debris flows and landslides are known to have amounted to several millions of dollars.

2.3.3 Catastrophic Landslide Damages

Catastrophic landslides capable of damming major streams have been relatively rare in Colorado during the historic period. The most serious example is probably the DeBeque Canyon slide of June 1924, which temporarily blocked the Colorado River and resulted in forced relocation of a small community, highway, and railroad.

Several other slides have or are encroaching on a stream but have not as yet advanced rapidly enough to cause serious backwater effects. However, there are hundreds of somewhat older inactive or semi-active slides in many areas of the state that could be reactivated or accelerated by increased ground moisture, stream erosion, man-made excavations or nearby earthquakes. There is particular concern that continued increase in soil moisture and snowmelt runoff as experienced in 1983 and 1984 could lead to reactivation of some of these slides, such as the one that occurred at Thistle, Utah, in 1983 with serious consequences.

Buffalo Creek Flood Event (1996) - In May 1996, a wildland fire burned about 12,000 acres of forested area in the Buffalo Creek vicinity. The fire burned intensely and quickly, leaving behind charred timber and a barren landscape devoid of vegetation and ground cover. The burned soils exhibited hydrophobic (water repelling) properties, and the burned area's natural erosion control and runoff inhibiting characteristics were altered by the fire. Those conditions, in conjunction with a heavy rainstorm on July 12, were the recipe for disaster in Buffalo Creek.

On the night of July 12, 1996, a thunderstorm occurred in the area of the community of Buffalo Creek, Colorado. The storm produced heavy precipitation over a short period of time. A flash flood occurred along Buffalo Creek, Sand Draw, Spring Gulch, the North Fork of the South Platte River (North Fork) below its conflu-

1999 Flood Disaster Stream Data

River	Date	Flood Stage	Crest
Fountain Creek @ Colorado Springs	April 30, 1999	8 Feet	11.7 Feet
Fountain Creek @ Fountain	April 30, 1999	7 Feet	11.8 Feet
Fountain Creek @ Pueblo	May 1, 1999	10 Feet	12.5 Feet
Arkansas River @ Avondale	April 30, 1999	7 Feet	10.5 Feet
Arkansas River @ Fowler	May 1, 1999	9 Feet	11.3 Feet
Arkansas River @ La Junta	May 2, 1999	10 Feet	15.6 Feet
Arkansas River @ Las Animas	May 2, 1999	10 Feet	13.9 Feet

Source: FEMA Interagency Hazard Mitigation Team Report July 1999 Figure 2.9

ence with Buffalo Creek, and several other tributary streams in the area. Two lives were lost as a direct result of the flooding. Roads, bridges, water lines, and other utility lines were damaged or destroyed. Numerous homes, outbuildings, and vehicles were damaged or destroyed, as well. A large quantity of sediment and debris was carried from the watershed and deposited along the affected stream reaches.

Although the geographic area affected was smaller than in some other floods, the July 12 Buffalo Creek flood event was truly a disaster. Other smaller scale floods have occurred in Buffalo Creek between June and September 1996, as well.

Peak discharges for the July 12 event for the North Fork, Buffalo Creek, Sand Draw, and other tributaries were estimated by the Colorado Water Conservation Board (CWCB) and the USGS. The CWCB obtained detailed surveyed cross-sections on the North Fork of the South Platte River, Sand Draw, and Buffalo Creek. The preliminary discharge estimates, along with published FEMA 100-year flow values, are shown in **Figure 2.9**. The estimated flow rates on July 12 range from 4 to 25 times the published FEMA 100-year flow values. Obviously, the Buffalo Creek flash flood produced enormous flow magnitudes and was extremely dangerous.

1999 Landslide Events **-** Landslides occurred in several locations throughout the state due to heavy rains. El Paso County, and the cities within suffered damages from land movement. One project application for DR-1276-CO includes acquisition of structures damaged from land movement (Manitou Springs). In July 1999, several locations along Interstate 70 (I-70) were closed briefly due to land movements.

2.4 Risk Information

To reduce the community's vulnerability to hazards, some knowledge of the risk/threat must exist. Thus, hazards assessment has two important components:

1. ***Hazard Identification*** - What are the hazards that pose a threat to the community or a particular segment of the population? What is their expected magnitude? How frequently could they be expected to occur? Where are they likely to occur?
2. ***Vulnerability Analysis*** - What is the risk from the threat? What are the likely impacts? What are the economic, social, and political ramifications of these impacts?

In most Colorado communities, substantial work has already been completed on a hazards assessment, and maps portraying these risks are readily available. This is an integral step in the emergency planning process. Hazards assessment is the foundation upon which the local Emergency Operations Plan (EOP) is built. It is also the foundation for hazard mitigation planning. As mentioned earlier in this chapter, one of the recommendations of this plan is to begin to inventory the structures and people in Colorado's floodplain. This inventory, when completed, will enable planners at the state and local level of governments to plan and mitigate the flood hazard.

A hazards assessment provides the information that identifies the need to mitigate, as well as the ability to accurately focus mitigation efforts on a particular problem area. However, simply identifying vulnerability from an identified risk does not guarantee that any action will be undertaken to mitigate that situation. Thus, a critical component necessary to mitigate the impacts of hazards is a determination of acceptable ***risk.*** When vulnerability to a hazard risk is determined to be at an acceptable level, mitigation activities are not pursued. However, when communities determine that the vulnerability to a given risk is too great to chance (a determination of unacceptable risk), mitigation is pursued.

This concept of acceptable risk is central to the community's determination as to whether mitigation is undertaken or not. This determination is typically answered based on community values being combined with technical information. Hazards assessments allow communities to focus on hazard mitigation planning needs. However, implementation of mitigation measures will only occur following the public's acceptance of both the problem and the solution. This requires a determination that there is unacceptable risk.

To sum up, the hazard mitigation planning process begins with the five preliminary steps relating to hazards assessment. First, the hazards affecting the jurisdiction must be identified. Second, the community's vulnerability to those hazards must be determined. Third, a determination of whether that vulnerability constitutes an ***unacceptable risk*** must be made. Fourth, if an unacceptable risk exists, it must be communicated to those who are in the position to effect its change. Fifth, the people receiving this risk information must agree that the risk is unacceptable, that there are viable solutions to the problem, and that mitigation ought to be undertaken as a means of bringing about these solutions.

The term "hazard vulnerability" implies a relationship between human population concentrations and their respective potential for experiencing a hazard occurrence. Population expansion by its very nature decreases available land area. The result, then, is a likely increase in the probability of some Colorado community during its history sustaining an impact from a haz-

ard occurrence.

Hazard vulnerability is not new to the Colorado state and local emergency management organizations. The risk of living in close proximity to potential hazards is well understood. While such risk is generally accepted to be uncontrollable, vulnerability to a hazard or multi-hazards can be reduced according to the degree of preparedness practiced and enjoyed by a community. Hazard mitigation is a process in which aspects of the natural and technological hazards on the population are reduced or eliminated.

2.4.1 Loss Potential

Loss potential in Colorado exists in 268 cities and towns. All 63 Colorado counties have floodplains. Over 250,000 people now live in Colorado's floodplain. Flood loss potential is estimated that 65,000 homes and 15,000 commercial, industrial and business structures are in identified floodplains.

Total value of property, structure and contents at risk from the 100-year flood is now $11 billion (in 1999 dollars). Cumulative flood losses from the turn of the century damaging floods exceed $4.4 billion (1999 dollars).

In 1994, there were 9,893 flood insurance policies. In 1997, there were 14,058 policies in force. In July 1999, there were 15,203 flood insurance policies statewide with an insured value of $1,784,587,400.

2.4.2 Colorado Floodplain Management

Colorado is taking a proactive approach to floodplain management and loss reduction. Only a few communities are not enrolled in the National Flood Insurance Program. Floods in Colorado are occurring on an annual basis, impacting many communities. Flood losses each year are mounting due to existing development in the floodplain. Several Colorado communities subscribing to Project Impact are making a difference and will see the results of their efforts during future flood events.

Colorado Flood Insurance Facts

Total Premium	Total Policies	Coverage Total	Number of Claims Since	Claims Paid Since 1978
$ 7,142,251	15,203	$1,784,587,400	1,429	$4,927,098

Source: FEMA Region 8 Flood Insurance Program—July 20, 1999 Figure 2.10

Chapter 3 - State Capability Assessment

3.1 Legal Framework

Critical aspects of flood hazard mitigation relevant to this plan are floodplain management, geologic hazard management, and emergency preparedness.

State enabling legislation, executive orders and memorandums adopted and currently in force for each of these critical aspects are listed in the following paragraphs, and selected authorities are reproduced in the ***Appendix A***.

3.1.1 Floodplain Management

The Colorado Revised Statutes dealing with floodplain management date back to 1937 with the creation of the Colorado Water Conservation Board. The Colorado Water Conservation Board (CWCB) in the Department of Natural Resources is the principal state agency responsible for water resource planning and development. A role in floodplain management has evolved over many years, starting with flood control as an economically justifiable benefit of reservoir construction. Major flood legislation was further enacted in 1966 by House Bill 1007--State approval and designation of storm runoff channels and basins; in 1973 by Senate Bill 35-subdivision regulations including delineation of 100-year floodplains; in 1974 by House Bill 1041--Land Use Act; and in 1977 by Senate Bill 126--State to establish criteria and requirements for performing floodplain studies by local, state and federal governments.

In 1977, the governor reinforced a concern for sound floodplain management by issuing two executive orders concerning the evaluation of flood hazards in locating state facilities and state participation in the National Flood Insurance Program.

The flood control and floodplain management section of the board has developed several programs directed toward the identification of floodplains and providing technical services to Colorado communities.

3.1.2 Geologic Hazard Management

The Colorado Geological Survey (CGS) has both general and specific statutory authority in the area of geologic hazards. These include:

- **Title 34, Article 1, Colorado Revised Statutes, Colorado Geological Survey, and Objectives of the Survey-Duties of State Geologist.**
- **Title 24, Article 65.1, Colorado Revised Statutes, Government-State, Areas and Activities of State Interest.**

Under these statutes, the CGS has in the past provided advice and technical assistance to state and local agencies, completed geologic hazard mapping, and prepared numerous technical publications. Current budget constraints preclude such work unless cash funding can be arranged in advance.

House Bill 1041 of 1974, CRS 24-65-101 et seq., included comprehensive treatment of geologic hazards and charged local governments with legal responsibility for designation and administration of geologic hazard areas. The CGS was designated as lead agency for geologic hazards mapping (identification) and for providing technical assistance to local governments in designation and administration of geologic hazard areas. The CGS was also charged with preparing and publishing a set of guidelines and model geologic hazard regulations and is also assisting local governments in the full process of geologic hazard management. In 1988, following the landslides and flooding on the western slope, the CGS prepared the Colorado Landslide Hazard Mitigation Plan.

3.2 Government Organizations & Roles of Different Levels and Internal Organization

3.2.1 State Departments

State departments are responsible, within their statutory authorities, to provide assistance and support to local jurisdictions when they are unable to cope with a disaster emergency situation. Upon implementation of the State Emergency Operations Plan (SEOP) they are responsible for the implementation of assigned State Emergency Functions (SEFs). The operational roles, responsibilities and intra-organizational relationships of

For More Information

Appendix A -	Includes definitions, acronyms, and references used in the preparation of this plan.
Appendix B -	Includes information on financial assistance programs.
Appendix C -	Includes tips to minimize loss of life & property in the event of a flood.
Appendix D -	Includes mitigation strategies and measures.
Appendix E -	Includes mitigation planning examples.

state departments are described in detail in the assigned State Emergency Function Annexes to the plan.

3.2.1.1 Governor's Office

136 State Capitol
Denver, CO 80203-1792
(303) 866-2471
E-mail: governorowens@state.co.us

Governor's Office - "Colorado Disaster Emergency Act of 1992" (Part 21 of Article 32, Title 24, Colorado Revised Statute, 1988 as amended) states the governor, as the executive head of state, has the inherent responsibility, constitutional and statutory authority, to commit state and local resources (personnel, equipment, and finances) for the purpose of ***.... meeting the dangers to the state and its people presented by disasters.*** This responsibility is exercised through the director, Office of Emergency Management (OEM), Department of Local Affairs (DOLA). The Governor's Disaster Emergency Council serves as an advisory council to the governor and the director of Office of Emergency Management on all matters pertaining to Declarations of State Disaster Emergencies, and on the response and recovery activities of state government. The Governor's Office is responsible for making state disaster declarations, usually at the recommendation of the Office of Emergency Management, and for the request to the president for a major disaster declaration, as necessary.

3.2.1.2 Department of Natural Resources

1313 Sherman St., Room 718
Denver, CO 80203
(303) 866-3311
http://www.dnr.state.co.us/edo/edo.html

The Department of Natural Resources has the mandate to conserve, protect, promote the development and regulate the use and enjoyment of the state's natural resources. The duties of the agencies in DNR are related to water, minerals, mineral fuels, soil conservation, reclamation of mined land, management of state lands, wildlife, parks, outdoor recreation, geological features and mine safety.

3.2.1.2.1 Colorado Water Conservation Board

1313 Sherman St., Room 720
Denver, CO 80203
(303) 866-3441
http://www.dnr.state.co.us/cwcb

The Colorado Water Conservation Board (CWCB) was created by the Colorado State Legislature in 1937 for the expressed general purpose ***" . . . to promote the conservation of the waters of the State of Colorado in order to secure the greatest utilization of such waters and the utmost prevention of floods . . . ."***

The Colorado Water Conservation Board provides engineering and technical assistance to local governments in the development of floodplain information studies. The board is the state coordinator of all floodplain management activities within the State of Colorado. The Colorado Water Conservation Board has developed a computerized database showing the availability of floodplain information in Colorado. The database should be available online at the Department of Natural Resources (DNR) homepage. The board also maintains a library of completed floodplain information studies.

Through its designation and approval function, the Colorado Water Conservation Board certifies the technical accuracy and appropriateness of floodplain information to county and municipal governments. It is then up to these local governments to make wise land use decisions based on that information. Since 1967, over 500 studies prepared by various government agencies for a total of approximately 8,000 stream miles have been designated by the board.

The board's flood control and floodplain management programs are listed below:

a. Prescribe standards for flood hazard, flood control, drainage, flood mitigation, and flood insurance studies.

b. Assist, review, and perform studies for approval and designation as required by 24-65.1-403(3)(b) and 37-60-106(l)(c), CRS, as amended and to ensure compliance with the board's rules and regulations for delineating 100-year floodplains;

c. Prepare technical manuals of procedures and engineering methodologies in support of a and b above.

d. Collect data and documentation of flood events.

e. Provide coordination on federal studies and flood control projects when seeking Congressional authorization and funding, including study and project reviews, as well as directing study efforts to ensure compliance with state standards and requirements.

f. Provide general information and coordination to communities concerning participation in the National Flood Insurance Program (NFIP) and the wise use of floodplains, in general. Also, provide assistance to communities to enter the NFIP's Community Rating System and participate in the FEMA-funded and CWCB-administered Flood Mitigation Assistance (FMA) program, which provides annual funding to develop local flood hazard mitigation plans and implement flood mitigation measures.

g. Respond to state or federal flood disaster declarations, including preparation of required post-disaster flood hazard mitigation plans, advanced measures, flood fight activities, and post-flood recovery operations. Activities that implement program objectives include: 1) chairing the Colorado Flood Task Force; 2) conducting an annual spring snowmelt review and issuing pre-flood forecasts, as applicable; 3) preparing news releases; and 4) issuing an annual flood report.

h. Provide general guidance, including preparation of ***"Scopes of Services,"*** to communities performing floodplain studies or preparing grant applications for studies.

i. Oversee and manage floodplain and major drainage studies, including assistance in negotiation of professional service contracts, study management, engineering work, etc.

j. Assist local governments to prepare floodplain regulations or ordinances or amendments to flood insurance rate maps.

k. Perform hydrologic and hydraulic investigations.

l. Assist (technically and financially) in constructing flood mitigation projects, which will reduce the exposure of Colorado citizens and their property to flood damages.

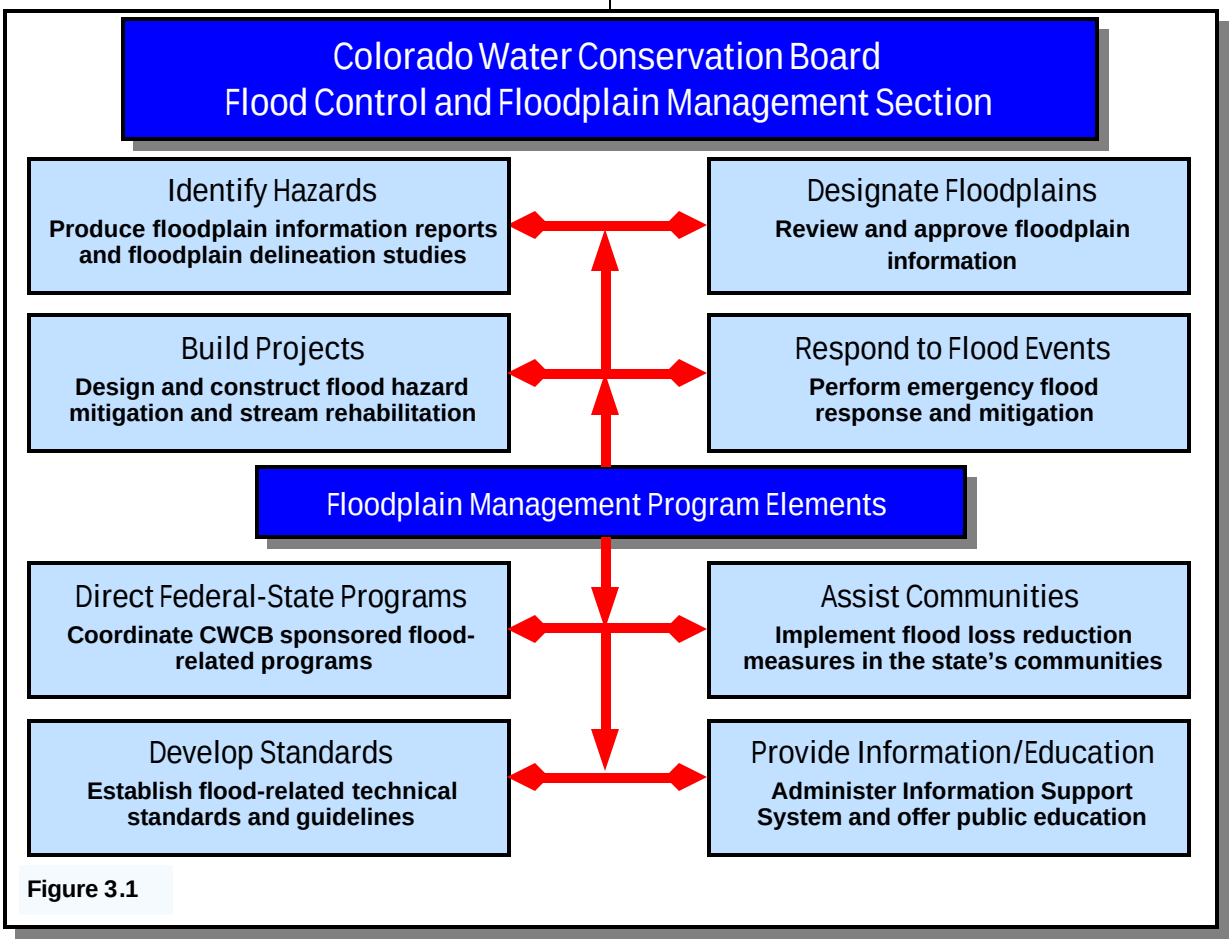


Figure 3.1

Due to the limits on the staff, the CWCB no longer provides site specific engineering and technical assistance required by individuals, local communities, and private entities (e.g., bankers, realtors, insurance agents, appraisers, etc.) on matters for which they are responsible in the flood, stormwater, and drainage areas.

In FY 81-82 at the request of the Colorado Water Conservation Board, the state engineer identified 34 high priority (unsafe) dams in need of rehabilitation. They were included in the governor's proposal for a five-year Capital Investment Plan. The owner of each facility listed was notified that dam rehabilitation funds may be available.

The Colorado Water Conservation Board, and later the Legislature, set a goal of using about one-third of the CWCB Construction Fund for dam rehabilitation. Funds for the rehabilitation of unsafe dams could be advanced to dam owners from the CWCB Construction Fund upon the Board's recommendation to the Legislature. The general rules for obtaining funds from this source are:

1. The state will only advance 50% of the estimated project cost to the owners. The remaining 50% have to be obtained by the owner from another source.
2. The current interest charge for state funds is a minimum of 5%.
3. The maximum payback period for these funds is 40 years.

In 1995, the Colorado Water Conservation Board directed staff to utilize and make available to eligible applicants. 5% of the annual revenue to the construction fund for flood control projects and associated activities. The 5% loan funding is subject to the standard requirements of the construction fund. In 1995 and 1996 the total funding available was $600,000 each year. Both years, the City of Fort Collins borrowed a total of $900,000 ($400,000 and $500,000, respectively) for proposed flood control activities. In 1998, the City of Sterling requested a loan for flood control improvements.

The board also responds to state or federal flood disasters at the request of the Colorado Office of Emergency Management and local governments including preparation of required post-disaster drainage surveys and flood hazard mitigation plans. A minimal amount of funding is available each year for planning grants to develop local flood hazard mitigation plans. The funding is made available from the Federal Emergency Management Agency through the CWCB-administered Flood Mitigation Assistance (FMA) program. The board is also the primary planning agency for flood hazard mitigation activities. By Executive Order 8504 dated October 1, 1977, the board is the designated state agency for the coordination of the National Flood Insurance Program.

In recent years, the staff of the Colorado Water Conservation Board has met periodically with selected state agencies whose work included aspects of flood hazard mitigation. One purpose of those meetings is to determine how these state agencies are implementing the Governor's Executive Orders on floodplain management and on the National Flood Insurance Program.

As Colorado state government moves toward the 21st Century, the CWCB is taking a leadership role in flood hazard mitigation. Such leadership is embodied by current initiatives to: 1) develop a statewide stream corridor stewardship program; 2) develop hydrology guidelines for estimating 100-year flood flows for approximate floodplains; 3) integrate multi-objective management and watershed approaches to flood-related activities; and 4) formulate policy and direction for flood hazard mitigation through involvement in several state and national professional organizations such as the Association of State Floodplain Managers and the Colorado Association of Stormwater and Floodplain Managers.

3.2.1.2.1.1 Colorado Water Conservation Board (CWCB) - FMA Eligible Project(s) Grants

Pre-disaster flood mitigation planning and implementation funds are now available under the FEMA-funded Flood Mitigation Assistance (FMA) program. The Colorado Water Conservation Board (CWCB) administers the program. In Federal FY99 (October 1, 1998 - September 30, 1999), the program provided: (1) $110,270 in project funds to implement measures to reduce flood losses; and (2) $11,900 in planning funds for developing or updating local flood hazard mitigation plans.

In Federal FY99, the fund provided $9,900 to the Town of Wellington and $2,000 to the Town of Basalt for the development of local flood hazard mitigation plans. Also, in 1999, 110, 270 in project funds were allocated to Georgetown for a channel improvement project. Additionally in 1999, project funds were allocated to North La Junta for the flood recovery and property acquisition efforts. These amounts represent the 75 percent federal share. Interested entities must provide a 25 percent match. One-half of the 25% (12.5%) must be cash. The other half may be in-kind. Any city, town, or county that participates, ***in good standing,*** in the National Flood Insurance Program (NFIP) is eligible to compete for these funds.

In Federal FY-98, the fund provided $11,900 to Prowers County for the development of a local flood hazard mitigation plan. In addition, Prowers County received $54,000 in project funds for a band stabilization and channel improvement project at the City of Lamar sewer lagoons. Also, the City of Ft. Collins received $52,000 in project funds to assist in the implementation of the Dry Creek Flood Control Project.

Examples of eligible projects include: 1) elevation of insured structures; 2) acquisition of insured structures and real property; 3) relocation or demolition of insured structures; 4) dry floodproofing of insured structures; 5) minor, localized structural projects that are not fundable by state or other federal programs; and 6) other activities that bring an insured structure into compliance with floodplain management requirements in 44 CFR 60.3 *(NFIP Regulations).*

3.2.1.2.2 Colorado Geological Survey

1313 Sherman St., Rm. 715
Denver, CO 80203
(303) 866-2611
http://www.dnr.state.co.us/geosurvey/

The Colorado Geological Survey (CGS) completed the Colorado Landslide Hazard Mitigation Plan in 1988. The CGS continues to respond within existing programs to floodplain and geologic hazard management goals. Salient points of continuing activities, as well as those that have been eliminated or curtailed, are described below.

Block grant requests are now screened by the CGS by title and location. Only those thought to have serious potential geologic hazard or floodplain problems are reviewed in detail.

The CGS continues to review some State Building Division activities and all Colorado Department of Health referrals for review of sewage treatment plant sites. Because sewage treatment plants are frequently located on or near floodplains, careful location and engineered protection are frequently needed. These reviews are a powerful tool for implementation of hazard management.

The CGS also reviews all subdivision applications from unincorporated areas. This is a requirement of SB 35 and it is now operated under a cash-funded fee system. These reviews provide an excellent opportunity for hazard review and recommendations for local governments. When geologic hazard problems are identified CGS staff recommend plat changes and/or mitigation measures. If probable floodplain problems are identified CGS staff recommend delineations of the 100-year floodplain for review by the CWCB and any necessary changes in the plat or other initiation.

The CGS has assisted local governments and their staffs on education goals. There is a continuing need for such in-service training because of the relatively high turnover of local government officials and staff. The CGS recognizes the authority of local governments to regulate land use within their jurisdiction, but if serious problems are evident, CGS will inform the local government of the situation to be sure they are aware of it and the need to address it.

3.2.1.2.3 Division of Water Resources

1313 Sherman St., Rm. 8
Denver, CO 80203
(303) 866-2611
http://www.dnr.state.co.us/water/div_search/query.asp

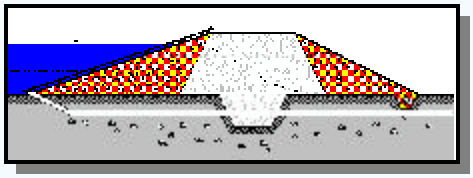
Colorado's Dam Safety Program is managed by the state engineer in accordance with Title 37, Article 87, of the Colorado Revised Statutes. The mission of the program is to prevent loss of life and property damage, and protect the state's water supplies from the failure of dams. The Rules and Regulations for Dam Safety and Dam Construction establishes the standards for the program.

The reservoir dams have been assigned hazard classifications based upon their potential for causing loss of life or property damage. High Hazard dams receive safety inspections annually, Significant Hazard dams bi-annually, and Low Hazard dams every six years. If a safety inspection finds a dam unsafe for full use, it is restricted in storage to ensure safety. The standards for High Hazard dams are greater than Low Hazard ones.

Dam Ownership in Colorado

Federal	**141**
Non Federal	**1,688**
Total	**1,829**

Figure 3.3



Office of the State Engineer
Rules & Regulations for Dam Safety
2 CCR 402-1 - Effective 9/30/88

Rule 16. Emergency Preparedness Plans (EPP)

16.A. Owners of Class I and Class II dams shall prepare, maintain, and exercise Emergency Preparedness Plans (EPP) for immediate defensive action to prevent failure of the dam. An EPP shall contain as a minimum the following:

16.A.(1) the identification of equipment, manpower, and material available for implementation of the plan;

16.A.(2) A notification procedure for informing the local emergency agencies (e.g., emergency coordinator or county sheriff), and the state engineer of the problem;

16.A.(3) A dam inundation map for Class I dams;

16.A.(4) A topographic map for Class II dams showing the streams which will be flooded; and,

16.A.(5) A procedure for warning nearby local residents if failure of the dam is imminent.

16.B. The owner shall use the state engineer's model EPP, which is available at no cost, or equivalent, for guidance in preparing the details of the components above.

16.C. The owner shall submit a copy of the proposed EPP to the Colorado Office of Emergency Management (OEM) and all local emergency coordinators involved in the plan for review. The owner shall incorporate reasonable recommendations from the above, if received within 60 days of the submittal.

16.D. The owner shall review and update the EPP as necessary annually.

Figure 3.2

All High and Significant Hazard dams require that an Emergency Preparedness Plan (EPP) be prepared for incidents or failures at the dam. The EPP includes actions to prevent the failure of the dam, as well as procedures for notifying emergency officials of the incident in order for them to implement their LEOP. A model EPP is available from the state engineer's office.

For the dam owners to be able to inspect their dams, and to learn how to operate them safely, the state engineer provides a Dam Owner's Manual for the care, inspection, and maintenance of dams in order to prolong the dam's useful life and to provide for its safe operation. A Guide to Construction and Administration of Dams in Colorado is also available and provides general information related to the requirement for the construction and administration of dams. The division also reviews subdivision proposals, etc.

3.2.1.2.4 Colorado Soil Conservation Board

1313 Sherman St., Rm. 219
Denver, CO 80203
Office (303) 866-3351
http://www.dnr.state.co.us/edo/soil.html

This board provides administrative and fiscal oversight, in addition to technical assistance, to Colorado's 78 soil conservation districts. It also coordinates various programs with federal agencies on natural resource issues, oversees the state's living snow fence program, provides guidance on streambank erosion and riparian concerns, assists farmers and ranchers on various water and energy-efficiency programs, and helps sponsor **Camp Rocky**, an Outdoor Environmental Adventure.

Soil Conservation Districts (SCDs) provide soil information needed for sound land use planning. Soil information is essential for building location, septic tank design, road design and construction, erosion control measures, property purchases and many other activities.

Colorado's SCDs represent private and public landowners; bring together state, federal and private sector dollars and resources to solve Colorado's natural resource problems; work to prevent soil erosion, conserve and develop water resources; improve water quality; control flooding; preserve wildlife habitat; and improved croplands; rangelands and forests provide thousands of hours of volunteer service to Colorado. The conservation efforts evolved out of the **"Dust Bowl"** to function as today's grass root leadership for conservation of environmental issues.

SCDs have sponsored numerous riparian area workshops to promote the protection and restoration of riparian areas along Colorado's streams and rivers.

Streambank protection will be provided through the work of various SCDs with willow and cottonwood pole plantings.

The State Soil Conservation Board approves or disapproves watershed protection and flood prevention applications to the federal government under PL-566 (watershed protection). Although the most important purpose of these projects is the saving of lives and the reduction of property damage and crop loss through flood prevention, there are additional benefits through irrigation, recreation, and other purposes.

In cooperation with the USDA Soil Conservation Service, conservation of the land in Colorado through this program has resulted in over 352 erosion control dams, and 1,826,000 miles of terraces, which control runoff in 14 drainage basins.

3.2.1.2.5 Division of Wildlife

DOW Headquarters
6060 Broadway, Denver, CO 80216
(303)-297-1192
http://www.dow.state.co.us

The Division of Wildlife (DOW) owns and controls a number of properties throughout the state. It has an ongoing inspection and maintenance program for all of its 74 lakes, 215 wildlife areas, and 14 fish hatcheries. It has prepared an emergency action plan to be used in case of dam failure, which considers four potential flooding scenarios. The primary involvement of the Division of Wildlife in floodplain management decisions is in the administration and protection of wildlife habitat areas that happen to be in floodplains.

There are other cases where wildlife values and floodplain management values can coincide. In some urban or urbanizing areas, protection of undeveloped riparian lands for wildlife areas can also serve to preserve those lands in their undeveloped state and eliminate flood hazards by keeping out structures that would be subject to such hazards. Obviously there would still be a balance between preserving riparian vegetation and maintaining adequate channel capacity, but the opportunity exists to preserve the same area for two purposes. Fountain Creek in Pueblo is an example. One limitation on the Division of Wildlife's role is that they have to justify the acquisition of lands on the basis or current wildlife values, not potential values. Where those current values indicate its appropriateness, the division can act to work with communities on the condemnation or other means of acquisition of floodplains or on their management for wildlife values.

3.2.1.2.6 Division of Minerals and Geology

1313 Sherman Street
Denver, CO 80202
(303) 866-3437
http://www.dnr.state.co/edo/parks.html

The Division of Minerals and Geology (DMG) is concerned with flooding as it relates to successful operation and reclamation of mining operations. The interaction of the mining and reclamation operations with surface drainage is considered during the review of mine permit applications, inspections of ongoing operations, and evaluation of final reclamation. The major floodplain problems and potential hazards associated with mining are located primarily in urban areas where gravel is mined along major drainages. Adverse effects of mining on flooding occur less frequently in rural and mountainous areas, due to the sparse population. The DMG, however, is concerned with the re-establishment of stable geomorphic landforms and drainage regimes in all areas of mining.

3.2.1.2.7 State Board of Land Commissioners

1313 Sherman Street
Denver, CO 80202
(303) 866-3437
http://www.dnr.state.co/edo/soil.html

The State Board of Land Commissioners manages three million acres of surface land and four million acres of mineral rights that were given to Colorado at statehood by the federal government. State trust lands are leased for a variety of activities, including grazing and crop production, mining, and oil and gas production, and recreation, such as hunting. In 1996, board income totaled around $23 million -- most of which went to support public education in Colorado.

The land board also leases some land in urban or urbanizing areas. Clearly some of this land will include floodplain areas. The most likely places for such development will be the Front Range area and the Western Slope energy and recreation development areas. The leases on these properties are long-term leases where homeowners would own their homes and lease the land on which they sit.

3.2.1.3 Department of Local Affairs

1313 Sherman Street
Denver, CO 80202
(303) 866-2771
http://www.dola.state.co

The Executive Director's Office of the Department of Local Affairs (DOLA) provides budgetary and policy direction and supervision to the various divisions and operational units within the department.

3.2.1.3.1 Field Services

1313 Sherman Street
Denver, CO 80202
(303) 866-2156
http://www.dola.state.co

Field Services coordinates the work of the DOLA field representatives and administers five programs. The field representatives work with local clients to identify their needs; develop response capacity; coordinate delivery of department services, including financial assistance program services; provide follow-up with evaluation of services and project effectiveness; and serve as advocates for both local government clients and for department agencies. Primary clients include counties, municipalities and special districts. The following programs may be used:

The Energy/Mineral Impact Assistance Program provides grants and loans for planning, construction, and maintenance of public facilities and the provision of public services. Eligible recipients are municipalities, counties, school districts, special districts, and other political subdivisions socially or economically impacted by the development, processing, or energy conversion

of minerals and mineral fuels.

The **"Small Cities"** Community Development Block Grant (CDBG) program provides grants and loans for housing, public facilities, and business assistance projects that primarily benefit low/moderate income persons or eliminate slums or blight. Eligible recipients are all municipalities and counties, except those larger jurisdictions that receive CDBG funding on an "entitlement" basis directly from the U.S. Department of Housing and Urban Development.

The Contiguous Counties Limited Gaming Impact Program provides grants to finance planning, construction, and maintenance of public facilities and for the provision of public services related to the impact of gaming. Grants may only be provided to counties that are geographically contiguous to the two gaming counties and the tribal lands.

The State Search and Rescue Fund reimburses county sheriffs for elgible costs associated with local search and rescue efforts. It also is a source of grant financing for search and rescue equipment and training. The State Search and Rescue Advisory Committee provides policy guidance for administration of the fund.

3.2.1.3.2 Division of Local Government

1313 Sherman Street
Denver, CO 80202
(303) 866-2156

The Division of Local Government (DLG) builds independent local government capacity through general government, community development, and information services.

DLG provides technical assistance, training, written materials, and data to enhance service capabilities of local governments. Services include assistance with a variety of local government responsibilities, including budgeting and financial management; planning for capital improvements; special district elections and administration; purchasing; land use and environmental matters; water and sewer financing and operations; and financial capacity research and analysis.

Within DLG is the Office of Emergency Management (OEM). Services are made available through local emergency managers supported by OEM staff assigned to specific geographic areas of the state. In the event of an actual disaster, OEM provides for coordinated state response and recovery activities in support of local governments (***see OEM below***).

3.2.1.3.2.1 Office of Emergency Management

15075 S. Golden Road
Golden, Colorado 80401-3979
(303) 273-1622
http://www.dlg.oem2.state.co.us/oem/oemindex.htm

The governor has delegated the Office of Emergency Management, through its director, with the responsibility of managing and coordinating emergency operations that involve state and, when necessary, federal resources. OEM is charged with preparing and maintaining the Colorado State Emergency Operations Plan (The Plan) and for the expeditious and efficient manner in which The Plan is implemented. It is responsible for the organization and operations of the State Emergency Operations Center (SEOC) for both emergency and non-emergency operations. Further, the Office of Emergency Management is responsible for assisting local government emergency management in the development and maintenance of emergency operations plans, procedures, and checklists. In the event of a major emergency or disaster, or the threat thereof, the director of Office of Emergency Management, makes recommendations to the governor and Disaster Emergency Council on matters pertaining to State Declarations of a Disaster Emergency, requests for federal assistance, and ongoing state disaster response and recovery activities.

OEM coordinates the work of other state agencies in these preparedness, response, recovery, and mitigation activities. These authorities have been strengthened in recent years through Executive Orders. OEM has prepared the Colorado State Emergency Operations Plan (mentioned above), which details response activities of state agencies during emergencies.

The means by which OEM encourages or requires local governments to improve their floodplain management programs include:

(1) Federal pass-through funding

(2) State funding to help local governments recover from a state-declared disaster;

(3) State statutes that require local emergency preparedness plans

Cartography/GIS provides and exchanges cartographic information and a range of cartographic products and geographic information services to local governments, other state agencies, and private firms.

3.2.1.3.3 Division of Housing

1313 Sherman Street
Denver, CO 80202
(303) 866-2771
http://www.state.co.us/gov_dir/loc_affairs_dir/doh.htm

The Division of Housing (DOH) assists Colorado communities in providing safe, decent, and affordable housing. Services include providing federal and state funds to finance the construction of new housing, rehabilitation of existing housing, down payment, and rental assistance. DOH aids communities in manufactured housing safety standards enforcement and serves as the building department in 20 counties for the construction of motels, hotels, and multifamily housing. In addition, the DOH acts as an information source by compiling statewide information and resources. The governor-appointed State Housing Board serves as an advisory unit to the DOH in recommending funding awards. DOH staff provide technical assistance, which includes helping communities identify housing needs, securing private/public financing to develop a project, assistance in building, marketing, leasing, and qualifying eligible families for affordable housing.

During a natural disaster, like a flood or tornado, where homes are uninhabitable or in major need of repair, the DOH works with the American Red Cross, Federal Emergency Management Agency, Office of Emergency Management, housing authorities, rehab agencies, and the local county building department to provide assistance and funds to families whose homes have been destroyed or are in need of major repair. DOH building inspectors have provided various levels of damage assessment for homes/buildings effected by a disaster. These assessments concern the level of damage on a building and can range from extensive (unsafe for occupancy) to minor (safe for occupancy but in need of some repair). The results of the assessments are made available to occupants of the homes/buildings and to the local government officials. DOH staff have provided assistance to the local building officials to determine the feasibility of repair of the units and enabled the local jurisdiction to make informed decisions as to the disposition of the homes in question.

Additional DOH disaster assistance includes:

- Aiding in the set-up of a community disaster response center
- Assistance in locating suitable housing for the victims
- Rehabilitation, repair, and replacement of single family, owner-occupied properties
- Temporary rental assistance while the family is waiting for their home to be repaired or replaced,
- Temporary rental expenses for those renters whose incomes are less than 80% of the area median income.

DOH funds will not be used in the rehabilitation of residential properties located within the 100-year floodplain unless the site can be safely removed from the floodplain or unless flood proofing to the 100-year flood elevation plus one foot of freeboard can be achieved. The purchase of flood insurance by the owner of a property located in the 100-year floodplain does not justify the use of DOH funds for the rehabilitation of the property. The CWCB staff assist DOH staff and local program managers in determining whether a specific property is located within the floodplain and in determining what, if any, limited repairs may be justified in the event that the property is located within the floodplain.

3.2.1.4 Colorado Department of Transportation

4201 East Arkansas
Denver, CO 80222
(303) 757-9011
Http://www.dot.state.co.us

The Colorado Department of Transportation (CDOT) is involved in the design and construction of highways throughout the state, frequently in river valleys, so it is one state agency that is familiar with floodplain issues. Additionally, federal requirements tied to federal funding of highway projects have dictated that floodplain considerations enter into the highway design process.

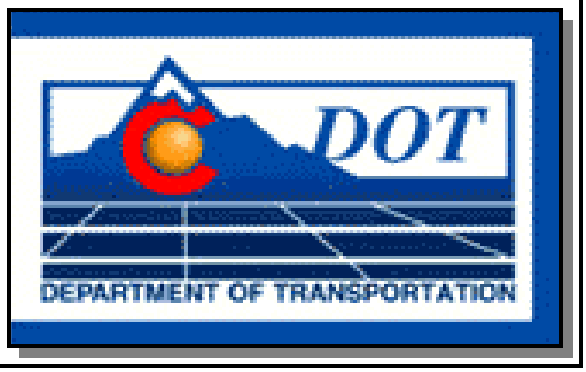
Criteria, policies, and methodologies used by the CDOT to design highways in floodplains are discussed below.

For interstate highways, U.S. highways, and Colorado highways in urban areas, the 100-year flood is the design standard. For interstate highways outside of urban areas, the 50-year flood is the design standard. For U.S. highways and Colorado highways in rural areas, design is based on the 25-year flood or less. What discharge is used depends on a benefit/cost analysis, which considers two major factors:

(a) Interruption of highway service

(b) Safety to users during a flood event

In addition, the consequences of the 100-year flood are



analyzed. All of the above enter into the design of bridges, culverts, and the highways themselves. The methodologies, including computer models, used to calculate flows are all described in the Department's Design Standards. These include Natural Resources Conservation Services (NRCS) methodology, USGS Methodology for small basins, and others. CDOT uses flood histories as available. When floods occur, photographs are taken and report forms are filled out.

The Hydraulic Unit in Denver signs off on all projects throughout Colorado. They review any existing work by other agencies, such as the Colorado Water Conservation Board floodplain studies, and perform any additional work necessary to design structures in the floodplain, which minimize damages. The analysis is a two-step process. First, a location analysis is done. This includes public involvement and is intended as a general analysis to assure basic compliance with state and federal requirements. The second step is a hydraulic analysis, where specific design criteria are followed. These specific studies may be sent to the Colorado Water Conservation Board to assure communication on common concerns.

3.2.1.5 Department of Public Health and Environment (CDPHE)

4300 Cherry Creek Blvd.
Denver 80246-1530
(303) 692-1000
Http://www.cdphe.state.co.us

3.2.1.5.1 Water Quality Control Division

The role of the Colorado Department of Public Health and Environment, Division of Water Quality Control, in floodplain management relating to wastewater facilities includes three areas of involvement. First are site applications; an applicant requests approval to build a specific wastewater treatment facility in a specific location. Second are construction grant applications; an applicant requests federal financial assistance in building a wastewater treatment facility, either concurrent with or after a site application. Third is discharge permit applications; anyone who wishes to discharge pollutants (including treated waste) into a body of water in Colorado must hold a discharge permit. All three of these processes have the potential to include flood hazard mitigation opportunities.

Drinking Water Program **-** The Drinking Water Section of the Water Quality Control Division reviews applications for domestic water supply facilities. All portions of the water supply system as far as the plant outlet, with the exception of intake structures, must be located outside the 100-year floodplain. Typically, parties building water supply facilities locate the intakes in the floodplain, for obvious reasons, and then divert the water to a high place for treatment and storage. By locating the facilities above the floodplain, increased pressure is applied to the distribution system, and locating the facilities above the floodplain reduces pumping costs. Therefore, floodplains are evaluated at the time plans and specifications are reviewed prior to construction of water treatment plants.

3.2.1.6 Colorado Commission on Higher Education (CCHE)

3.2.1.6.1 Office of Archaeology and Historic Preservation

1300 Broadway
Denver, CO 80203
(303) 866-3395
http://history.state.co.us/oahp/

The Office of Archaeology and Historic Preservation (OAHP) helps individuals, communities, and organizations identify, protect, and preserve the state's cultural resources and to foster widespread appreciation of and respect for Colorado's cultural heritage. The State Historic Preservation Officer (SHPO) is responsible for administering the program as defined in the National Historic Preservation Act of 1966. The SHPO also administers state historic preservation laws.

3.2.1.7 Colorado Natural Hazards Mitigation Council (CNHMC)

For the past two decades, Colorado has experienced rapid population and business growth. Pressures have increased to build structures in floodplains, on steep slopes, in wildfire areas, and other locations previously considered unsafe or too costly to develop. Recognizing these issues, the governor signed an executive order establishing the Colorado Natural Hazards Mitigation Council (CNHMC) in March 1989. The council was created as an interdisciplinary forum for exchanging information and promoting ways to reduce and manage impacts from natural hazards.

The council is composed of almost 200 volunteer committee members in the State of Colorado. The council is organized into technical and hazard specific committees. The technical committees are Public Affairs and the Steering Committee. Hazard specific committees include Severe Weather, Dam Safety, Fire Management and Mitigation, Drought, Geologic Hazards, and Flood. A recently formed Policy Advisory Group will guide overall strategy. The primary duties of the council are to:

- Prioritize natural hazards in the state and review existing mitigation plans.
- Develop a mitigation management strategy involving various levels of government.
- Provide information and technical assistance to local governments and individuals.

Through its volunteer committees, the council has

supported over 100 mitigation projects since its inception (for a comprehensive list see Chapter 4).

3.2.2 Local Governments

The chief executive officer of each political subdivision (county and municipality) is responsible for reducing the vulnerability of people and property to the effects of emergency and disasters. Local governments disaster emergency responsibilities include the following: (a) Ensure that local government agencies are capable of efficient and responsive mobilization of resources to protect lives, minimize property loss, and expedite recovery efforts; (b) Ensure that an Emergency Management Office serves the jurisdiction; (c) Ensure that a Local Emergency Operations Plan is prepared and based on valid hazards and risk analysis; and (d) Ensure that the local plan is exercised and kept current. (Reference: Title 24, Article 32, Part 2107, Colorado Revised Statute, as amended) Local government retains command of an incident unless it is relinquished to another authority.

3.2.2.1 Local Government Hazard Mitigation Plans

Several Colorado local governments have prepared hazard mitigation plans:

- **City of Manitou Springs**
- **Montrose County**
- **City of Boulder**
- **City of Arvada**
- **San Luis Valley**
- **Town of Lyons**
- **Town of Jamestown**
- **City of Canon City**
- **City of Rifle**
- **City of Fort Collins**
- **City and County of Pueblo**
- **Town of Silver Plume**
- **Town of Georgetown**
- **Town of DeBeque**
- **Town of Wattenburg**

3.2.3 Regional Government

3.2.3.1 Urban Drainage and Flood Control District

2480 West 26th Avenue,
Suite 156-B, Denver, CO 80211
(303)-455-6277
http://www.udfcd.org

The Urban Drainage and Flood Control District was established by the Colorado Legislature in 1969 for the purpose of assisting local governments in the Denver metropolitan area with multi-jurisdictional drainage and flood control problems. The district covers an area of 1,608 square miles and includes Denver, parts of the five surrounding counties, and all or parts of 33 incorporated cities and towns. There are about 1,600 miles of "major drainageways," which are defined as draining at least 1,000 acres. The current population of the district is approximately two million people.

3.2.4 Federal Government

3.2.4.1 Federal Emergency Management Agency (FEMA)

FEMA Region 8 in Denver is responsible for administering the Hazard Mitigation Program, such as:

- **The Hazard Mitigation Grant Program (HMGP)**
- **Flood Mitigation Assistance Program (FMA)**
- **Project Impact**
- **National Flood Insurance Program**
- **Leadership of Hazard Mitigation Survey Teams and Interagency Hazard Mitigation Teams**
- **Planning activities conducted under Section 409**

In keeping with the National Mitigation Strategy, FEMA identifies mitigation measures and successful mitigation activities, and it reinforces the traditional long-term goal to reduce loss of life and property damage, by eliminating or reducing the impacts of natural or manmade hazards. FEMA's mitigation programs are listed in **Appendix B**.

3.2.4.2 U.S. Department of Agriculture

3.2.4.2.1 U.S. Forest Service

During emergencies, the Forest Service may install emergency measures on National Forest land for runoff retardation and soil erosion prevention to safeguard life and property on the downstream from watershed lands suddenly damaged by fire, flood, and other natural disasters. Where natural disasters cover National Forest, as well as state and/or private lands, the Forest Service works closely with the NRCS, state, and local government entities in coordination of mitigation activities.

3.2.4.2.2 U.S. Natural Resources Conservation Service (NRCS)

The Natural Resources Conservation Service (NRCS) can provide technical assistance in the conservation development and productive use of soil and water resources. Its activities in Colorado include watershed protection and flood protection projects, floodplain management studies, resource conservation and development, emergency watershed protection, conservation technical assistance, soil surveys, snow surveys, and water supply forecasting.

3.2.4.3 U.S. Department of Defense

3.2.4.3.1 U.S. Army Corps of Engineers

The Corps of Engineers is involved in developing and implementing plans for flood control, navigation, hydropower, recreation, and water supply. The corps also has authority for emergency operations, bank protection, permit administration, and technical assistance. Corps programs in Colorado can be lumped into five different authorities: 1) Feasibility Studies and Projects; 2) Continuing Authority Projects; 3) Emergency Operations; 4) Floodplain Management Services; and 5) Permit Issuance.

3.2.4.4 U.S. Department of Commerce

3.2.4.4.1 National Weather Service

The National Weather Service is responsible for 36-48 hour weather forecasting, issuing severe weather warnings and watches, flash flood warnings and watches, and flood warnings.

3.2.4.5 U.S. Department of Transportation

3.2.4.5.1 Federal Highway Administration

The Federal Highway Administration provides highway construction grants to the states and directs federal highway construction appropriations. It ensures that the construction and maintenance of highways built with federal aid comply with existing regulations and directives. These regulations provide for the flooding of roadway embankments and bridge structures located in floodplains. This agency is also concerned with stream channel changes in rural areas and detention facilities in urban areas, which affect highway routes. The design of its bridge projects occasionally involves reshaping channels for short distances upstream and downstream

3.2.4.6 U.S. Department of the Interior

3.2.4.6.1 U.S. Bureau of Reclamation

The U.S. Bureau of Reclamation administers the federal program in western states for water resource development and use, which provides multiple purpose projects furnishing fish and wildlife protection and recreation opportunities, water for farm irrigation, municipal, and industrial use, hydroelectric power, flood control, and other natural resource conservation benefits.

3.2.4.6.2 U.S. Geological Survey

Congress established the U.S. Geological Survey on March 3, 1879, to classify public lands and examine the geological structure, mineral resources, and products of the country. Over the years, other Congressional acts have enlarged its duties and functions to include making geological and topographic maps, gauging streams, and determining water supplies of the United States. The survey can assist communities and state agencies in collecting, developing, and computing basic data and information for floodplain engineering studies and investigations.

Information available from the U.S. Geological Survey includes records of water gauge heights, discharge runoff, times of travel, sediment discharge, historic flood peaks, and inundated areas. Reports of magnitude, frequency, and duration of flood flows are also kept. Flood prone areas subject to inundation by floods of approximately the 100-year frequency have been delineated on topographic maps for selected areas within Colorado and can be obtained through this agency.

3.2.4.6.3 U.S. Bureau of Land Management

The Bureau of Land Management has district offices located in the 11 western states and Alaska, which are involved in land use planning for public lands. Each district office maintains a file of floodplain maps that are available for public inspection.

Chapter 4 - Mitigation Activities Underway and Proposed

4.1 Existing Mitigation Plans, Programs, and Structures

4.1.1 Federal Government

The Federal Emergency Management Agency (FEMA) is an independent agency of the federal government, reporting to the President. Since its founding in 1979, FEMA's mission has been clear:

"To reduce loss of life and property and protect our nation's critical infrastructure from all types of hazards through a comprehensive, risk-based, emergency management program of mitigation, preparedness, response and recovery. "

4.1.2 State Government

4.1.2.1 Colorado Natural Hazards Mitigation Council (CNHMC)

The council is described in detail in Chapter 2. Through its volunteer committees, the council has supported over 100 mitigation projects since its inception. A comprehensive list of accomplishements is displayed in Figure 4.2 in this Chapter. A partial list of council accomplishments are:

- Pre and post-disaster mitigation workshops for homeowners and businesses in Canon City, Pueblo, Colorado Springs, Fort Collins, Rifle and Lyons.
- Major flood mitigation activities in Lyons and the San Luis Valley.
- Publication of "The Mitigation Siren" newsletter.
- GIS familiarization workshops.
- A hazard awareness contest for children.
- Dam Safety and Emergency Planning brochures.
- Publication of a Citizens Emergency Preparedness Guide.

(For a comprehensive list of activities since 1997 see Figure 4.2 in this chapter.)

4.1.2.2 Colorado Water Conservation Board (CWCB) - Flood Mitigation Assistance (FMA) Eligible Project(s) Grants

Pre-disaster flood mitigation planning and implementation funds are now available under the FEMA-funded Flood Mitigation Assistance (FMA) program. The Colorado Water Conservation Board (CWCB) administers the program. Chapter 3.2.1.2.1.1 includes more details about the FMA program.

4.1.3.1 Local Government Hazard Mitigation Plans

The Colorado Water Conservation Board (CWCB) is bringing the flood mitigation process to the local level where it has the greatest benefit. Each applicant for disaster relief assistance is asked to develop a flood

For More Information

Appendix A - Includes definitions, acronyms, and references used in the preparation of this plan.

Appendix B - Includes information on financial assistance programs.

Appendix C - Includes tips to minimize loss of life & property in the event of a flood.

Appendix D - Includes mitigation strategies and measures.

Appendix E - Includes mitigation planning examples.

Local Government Hazard Mitigation Plans

- **City of Manitou Springs**
- **Montrose County**
- **City of Boulder**
- **City of Arvada**
- **San Luis Valley**
- **Town of Lyons**
- **Town of Jamestown**
- **City of Canon City**
- **City of Rifle**
- **City of Fort Collins**
- **City and County of Pueblo**
- **Town of Silver Plume**
- **Town of Georgetown**
- **Town of DeBeque**
- **Town of Wattenburg**

Figure 4.1

hazard mitigation plan tailored specially to the community. A suggested plan outline and a detailed questionnaire were developed by the CWCB to assist in this process.

The purpose of such a plan is to articulate those specific local issues which, if resolved, would help reduce future flood damages which will have an impact on the community. Those local issues, in turn, could also provide the basis for input to the statewide annual mitigation program review.

Several Colorado local governments have prepared hazard mitigation plans before and after flood events. (see **Figure 4.1** for a list of communities that have prepared plans.)

Colorado Mitigation Accomplishments Since 1997 Figure 4.2

Governor's Conference on Flood and Drought: Conducted on December 2-3, 1999. This conference included local and national experts in drought and flood topics.

Colorado Mitigation & Wildfire Conference: Sponsored by West. Metro, Boulder Fire Districts, CO OEM, Jefferson County, and State Forest Service. More than *550* participants in three years. This 1999 activity was held September 17, 18, 19 at Denver West Marriott. This is the only mitigation focused wildfire conference in the U.S.

Colorado Wildfire Risk Assessment Mapping Project:. FEMA funded this project along with OEM Cartography and the State Forest Service. This project is being used by local governments, Fire Districts, and Local Emergency Managers.

Colorado State Drought Task Force: The task force meets on a quarterly or "as needed basis." It is Important to monitor the evolving nature of drought on a regular basis. The task force uses federal science agencies, state climatologist, and state engineers office data. Task force participation includes local, state, federal, and the private sector.

Western Drought Coordination Council: The Response Working Group (RWG) prepared a Catalog of Federal Disaster Programs and a Historical Drought Impacts Survey.

Colorado Earthquake Project: Using FEMA funds, the Colorado School of Mines student project teams carry out the project workload. Projects are solicited from local governments and state agencies. At least nine projects are completed annually.

Colorado Flood Task Force: Is chaired by the Colorado Water Conservation Board. The task force usually gears up in April and is active through "run off" season. It provides accurate technical information to local governments. The task force includes participation by local, state, federal, and the private sector.

Annual Conference: Each year the CO Natural Hazards Mitigation Council (CNHC) conducts a one-day workshop with presentations by committee members. The council has been used as a guide by several states including Iowa, Hawaii, Nevada, and Michigan.

Safer Tomorrow Workshop: This is a partnership with the insurance industry and the Rocky Mountain Insurance Council. In 1999, OEM participated with the National Flood Insurance conference in Denver and a citizen/homeowner mitigation activity in El Paso county.

State Hazard Mitigation Grant Program: (SHMP)

Beginning in 1997 and continuing through 1999, The Colorado Office of Emergency Management (OEM) and the Colorado Natural Hazards Council funded *25* locally generated mitigation projects. Some examples of funded projects include: GIS data purchases for Wildfire (Garfield County) and Flood (Routt County) mitigation in local areas, a wildfire slash/mulch program (Douglas), a historical drought hazard compilation (Colorado State University), a hail impact study (CSU), thousands of copies of hazard awareness publications, (NE CO Emergency Manager's & new Family Preparedness Guide) a seismic reference library (Colorado Geological Survey), and an ice jam drainage study (San Miguel County).

OEM/FS County Plan Initiative: In 1998, Colorado initiated a unique program designed to tie certain mitigation concepts to local comprehensive and master plans and revisions. OEM works with the Department of Local Affairs (DOLA), Field Services section to identify appropriate work items. DOLA grants state energy and mineral extraction funds to these jurisdictions for revisions of such plans. At the option of the requesting jurisdiction, OEM may provide a Disaster Preparedness Improvement Grant ($4,000 to $9,000) specifically tied to a hazard analysis and subsequent addressing of these in the local land use plan and policies. OEM is using the "Hazard Element' jointly produced by the American Planning Association and FEMA's mitigation directorate as a model for the local jurisdictions.

Community & Flood Mitigation Assistance Programs: Using FEMA funds, the Colorado Water Conservation Board (CWCB) manages the Community Assistance Program (CAP); statewide National Flood Insurance and Floodplain Management program; and Flood Mitigation Assistance (FMA) funding for projects to reduce losses on insured properties (elevate, buyout, relocate).

Colorado Mitigation Accomplishments Since 1997 Figure 4..3

Project IMPACT: The goal of the FEMA Project Impact is to build disaster resistant communities. At the Project Impact Summit held in Washington, D.C., in December 1998, two Colorado counties (Clear Creek and Morgan Counties) were designated as Project Impact communities for FY99. The City of Fort Collins received the FEMA Project Impact funding for 1998. In Colorado for the year 2000, the Project Impact communities are the San Luis Valley and the City of Delta/Delta County. Local mentors in Colorado communities will provide leadership to other communities.

Hazard Mitigation Grant Program (HMGP)

HMGP Projects DR-1186-CO :

1. **Fort Collins:** Has completed the Stream Gauge/ Warning system. The flood proofing grant program is still in progress.
2. **Sterling/Logan County**: A flood control project has received approval.
3. **Canon City:** This project includes debris detention basin construction.
4. **Wiley/Prowers County**: This is a bridge replacement project and has been approved.
5. **Larimer County:** Construction has started on a drainage/detention system in the West Vine area.

Hazard Mitigation Grant Program (HMGP)

HMGP Projects DR-1276-CO:

1. The Notice of Interest (NOI) was mailed by Colorado to local governments on June 25th 1999.
2. Fifteen NOIs were returned by the deadline date of July 16th, 1999.
3. In September 1999, the State Hazard Mitigation Team convened and adopted HMGP project evaluation criteria.
4. The HMGP subcommittee convened to review and prioritize the eligible projects.
5. In October of 1999, Governor Owens approved the subcommittee's recommendations.
6. The following are proposed projects under HMGP. As HMGP and **"Unmet Needs"** (see below) money becomes available, projects will be funded on a priority basis. The HMGP DR-1276-CO Projects for 1999 are:
   - Otero County Acquisition Project
   - Manitou Springs Acquisition Project
   - La Junta Lift Station
   - Ft. Collins Early Warning System
   - Ft. Collins Flood Proofing
   - Pueblo Early Warning System
   - Colorado Natural Hazards Mitigation Council's Elevation Project
7. The State of Colorado has applied for **"Unmet Needs Funding"** from the Federal Emergency Management Agency (FEMA) This money (when approved) will be used for projects not funded by the Hazard Mitigation Grant Program.

Chapter 5 - Implementation Strategies

5.1 Mitigation Opportunities

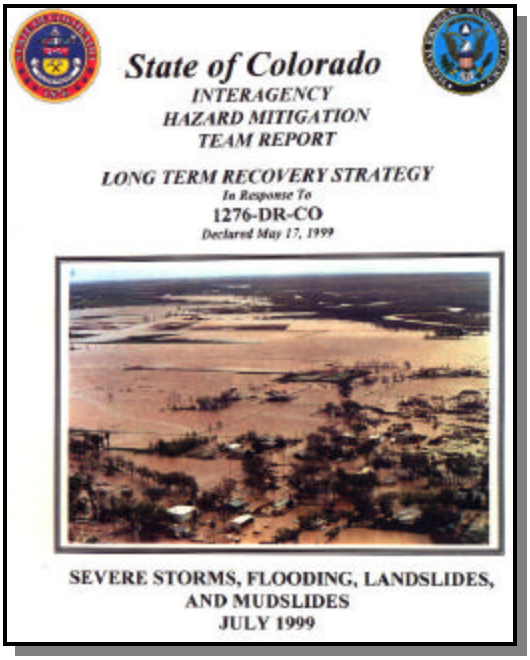
While similarities exist among the concepts of hazard mitigation, strong differences also exist among many of the strategies available to carry out these concepts. Warnings and land use application, such as floodplain regulations and acquisition of open space, are particularly cost-effective mitigation activities especially when compared to other available strategies, such as relief and insurance. Effective land use, for example, can provide very high net benefits and can significantly lower future catastrophic loss potentials in a given community. Other adjustments, except warnings, generally cost more and yield the possibility for repeated catastrophic loss.

Although land use decisions are often controversial, when they are carefully planned and implemented, enormous savings in life and property can be generated over a relatively few years. In Colorado, flood warning systems and effective land use decisions are controlled mainly by action at the local level. Therefore, this plan emphasizes mitigation activities that will essentially support local efforts.

5.2 Mitigation Strategies and Actions

5.2.1 Interagency Hazard Mitigation Team (IHMT)

To reduce damages associated with future floods or other natural hazards, the federal government has adopted a comprehensive coordinated strategy to address these concerns. An Office of Management and Budget (OMB) directive, dated July 10, 1980, established the basis for Regional Interagency and Intergovernmental Hazard Mitigation Teams. These teams are comprised of federal, state, and local representatives



in an effort to incorporate the background and expertise necessary to promote a comprehensive approach to hazard mitigation.

The Interagency Hazard Mitigation Team (IHMT) prepares mitigation recommendations for implementation during the post-disaster recovery phase, and presents the recommendations to the governor in a report format. The authority for the IHMT derives from an interagency agreement entered into by 12 federal agencies, coordinated by the Federal Emergency Management Agency (FEMA). The agreement established a common policy statement and implemented guidelines with respect to flood disaster planning and post disaster recovery practices. An IHMT meeting was held at the FEMA offices in Lakewood, CO, on June 24, 1999, with participants from federal, state, local, and private organizations. FEMA staff members prepared the Long Term Recovery Strategy in response to DR-1276-CO based on the efforts of the IHMT.

5.2.2 State Hazard Mitigation Team

The State Hazard Mitigation Team is a subset of the Colorado Natural Hazards Mitigation Council and its subcommittee members are based on the immediate hazard that team members will address. The team convened several times to develop recommendations and review revisions to the Flood Hazard Mitigation Plan (see Figure 5.1).

For More Information

Appendix A - Includes definitions, acronyms, and references used in the preparation of this plan.

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Appendix D - Includes mitigation strategies and measures.

Appendix E - Includes mitigation planning examples.

5.2.3 Actions Organized by Lead Agency

The recommendations listed in this chapter are the State of Colorado's agency goals for hazard mitigation (see Figure 5.1). These goals came from a local/state/federal team process.

5.2.4 Actions Organized by Goal

The following recommendations represent the collaborative efforts of Interagency Hazard Mitigation Team members and the Colorado State Hazard Mitigation Team, and they are intended to help achieve the goal of reducing future damage from hazards. Many of the recommendations can be implemented immediately; others must be viewed as long term measures. Recommendations are summarized and then more detailed recommendations follow.

Summary tables listing the recommendations according to lead agency are provided for quick reference purposes. Finally, following the summary tables is a concise explanation of the format used for the recommendations.

Colorado Hazard Mitigation Team Members

Ron Cattany, Colorado Department of Natural Resources
Tom Grier, Colorado Office of Emergency Management
Mark Matulik, Colorado Water Conservation Board
Tom Browning, Colorado Water Conservation Board
Brian Hyde, Colorado Water Conservation Board
Carolyn Fritz, Colorado Water Conservation Board
Len Boulas, Colorado Office of Emergency Management
Marilyn Gally, Colorado Office of Emergency Management
Kaaren K. Hardy, Colorado Historical Society
Jim Soule, Colorado Geological Survey
Robin Kissell, Colorado Department of Transportation
Kevin Stewart, Urban Drainage and Flood Control District
Kevin Gingrich, Colorado Association of Storm Water and Floodplain Managers
Jack Byers, State Engineer's Office
Wade Nofziger, FEMA Region 8, Mitigation Division
Jeanine Petterson, FEMA Region 8, Mitigation Division
Donna Fair, City of Colorado Springs
Jim Wiegner, Consultant
John Himmelreich, Private Geologic Consultant
Bob Kistner, Kistner & Associates

Colorado Hazard Mitigation Team Members

The Colorado Hazard Mitigation Team is the steering committee comprised of state and federal agencies, local government staff, and private sector individuals that is providing guidance on the development of Colorado's mitigation needs and priorities. The team has four subcommittees, as follows.

Planning and Implementation Development Subcommittee

The P&I Subcommittee developed and prioritized the mitigation goals and recommendations that are included in the Colorado Flood Hazard Mitigation Plan. It also assisted in the development of the mitigation implementation strategy for the goals and recommendations.

Hazard Mitigation Grant Program (HMGP) Review Subcommittee

The HMGP Review Subcommittee developed the application review criteria for the Colorado HMGP applications which result from DR-1276-CO. It also evaluated and prioritized the HMGP applications.

Project Impact Review Subcommittee

The Project Impact (PI) Review Subcommittee assisted the State Project Impact coordinator in finalizing the FY 2000 Project Impact applicants. The subcommittee also prioritized the PI project applications.

409 Plan Review Subcommittee

The 409 Plan Review Subcommittee assisted the state's contractor (Kistner and Associates) in revising the 1999 Colorado Flood Hazard Mitigation Plan.

FIGURE 5.1 SUMMARY LISTING OF RECOMMENDATIONS ACCORDING TO LEAD AGENCY

The following listing is a quick reference, by lead agency, of the recommendations section. The lead agencies are listed as private organizations, local, state, and federal government.

State Government

Lead Agency	Description
Office of Emergency Management (OEM)	• **G1(1)99** - Develop Memoranda of Agreement between the governor and responsible state agencies to implement/accomplish the 1999 flood hazard mitigation recommendations. • **G2(1)99** - Promote awareness of existing State Executive Orders 8504, 8491 and legislation such as House Bill 1041. • **G2(2)99)** - Identify long-term safe affordable housing outside hazard areas using manufactured housing where applicable and volunteer agency construction. • **G2(4)99 -** Work with the state Real Estate Services Division and State Buildings to ensure that facilities proposals and infrastructure . . . . • **G3(5)99** - Research potential state and federal funding sources to support mitigation initiatives which are part of the Colorado Flood Hazard Mitigation Plan. • **G4(2)99** - Provide flood hazard mitigation education for entities such as . . . • **G4(5)99** - Develop a hazard mitigation education program for public officials . . . • **G4(6)99** - Through the SHMT, create a hazard mitigation network in state government . . . • **G4(9)99 -** Provide newsletter articles, other relevant information on flood hazard mitigation and natural hazard reduction and other forms of information exchange to professional organizations . . • **G4(11)99 -** Promote the concept of people accepting fiscal responsibility for the consequences of living in floodprone areas. • **G6(5)99 -** Coordinate the efforts of local emergency planners and floodplain administrators to identify critical infrastructure . . .
Colorado Water Conservation Board (CWCB)	• **G2(3)99 -** When rehabilitating structures in historic districts located in floodplains or other associated hazard areas, consider floodproofing . . . • **G2(4)99 -** Work with the state Real Estate Services Division and State Buildings to ensure that facilities proposals and infrastructure . . . . • **G2(5)99 -** In floodplains that have already been urbanized, encourage and support a combination of structural and non-structural elements to reduce the risks from floods and other hazards. • **G3(1)99 -** Provide technical comments and recommendations through the State Hazard Mitigation Team on proposed state and federal legislation related to growth management. • **G3(2)99 -** Support improvements, such as digitization, to floodplain maps, showing the 100-year frequency, and other frequencies, as appropriate. • **G3(3)99 -** Develop guidance and criteria for mapping and regulating mudflow/debris-flow areas. • **G3(5)99** - Research potential state and federal funding sources to support mitigation initiatives which are part of the Colorado Flood Hazard Mitigation Plan. • **G3(6)99** - Encourage use of watershed-based GIS maps in future land use planning and development review. • **G4(2)99** - Provide flood hazard mitigation education for entities such as . . . • **G4(3)99** - Promote regional intergovernmental cooperation concerning watershed-based planning . . . • **G4(4)99** - Improve access to information regarding floodplain management . . .

FIGURE 5.1 SUMMARY LISTING OF RECOMMENDATIONS ACCORDING TO LEAD AGENCY

The following listing is a quick reference, by lead agency, of the recommendations section. The lead agencies are listed as private organizations, local, state, and federal government.

State Government

Lead Agency	Description
Colorado Water Conservation Board (CWCB) (continued)	• **G4(5)99** - Develop a hazard mitigation education program for public officials . . . • **G4(9)99 -** Provide newsletter articles, other relevant information on flood hazard mitigation and natural hazard reduction and other forms of information exchange to professional organizations . . . • **G4(11)99 -** Promote the concept of people accepting fiscal responsibility for the consequences of living in floodprone areas. • **G6(1)99 -** Promote the design and operation of canals, ditches, and other related infrastructure to convey floodwaters safely. • **G6(2)99 -** Promote mitigation of critical infrastructure. • **G6(3)99 -** Encourage improvements to local emergency warning systems . . . • **G7(4)99 -** Review the adequacy of existing stream gauge networks and make recommenda-
Department of Natural Resources DNR	• **G1(1)99** - Develop Memoranda of Agreement between the Governor and responsible state agencies to implement/accomplish the 1999 flood hazard mitigation recommendations. • **G2(1)99** - Promote awareness of existing State Executive Orders 8504, 8491 and legislation such as House Bill 1041. • **G4(8)99** - Invite representatives such as Public Service, Rocky Mountain Insurance Information Association (RMIIA), AT&T (TCI), the real estate industry, the insurance industry, the mortgage lending industry, and the Colorado Association of Commerce and Industry (CACI) to join the
Division of Wildlife (DOW)	• **G3(4)99 -** Research and support the use of conservation easements, transferable development rights, cluster development, recreational uses, wildlife areas, and open space uses as tools when undertaking mitigation initiatives. • **G4(1)99 -** Enhance the natural and beneficial functions of floodplains by promoting an increased awareness of wetland and habitat resources and their benefits to flood hazard mitigation.
Colorado Department of Transportation (CDOT)	• **G4(4)99 -** ***(Joint action with DNR and DOLA)*** Improve access to information regarding floodplain management, flood hazard mitigation, and flood insurance through approaches such as the use of hyper-links between state agency Websites, bibliographies of available materials, etc. • **G6(2)99 -** Promote mitigation of critical infrastructure.
Colorado Geological Survey (CGS)	• **G4(7)99 -** Through flood hazard reduction workshops, promote the use of a "hazard overlay" concept for GIS mapping using information developed by the Colorado Geological Survey (CGS) for Garfield County, as a model.
Division of Housing	• **G2(2)99)** - Identify long-term safe affordable housing outside hazard areas using manufactured
Department of Education (DOE)	• **G4(10)99** - Develop or integrate natural hazards awareness and education program into K-12 schools utilizing programs already in place.
Colorado Department Higher Education (CDHE)	• **G7(3)99** - Promote development of master drainage plans for state colleges, institutions, cultural facilities and other large public facilities. Develop inventory . . . • **G7(5)99** - Encourage the continued advancement of rainfall-runoff modeling research.

FIGURE 5.1 SUMMARY LISTING OF RECOMMENDATIONS ACCORDING TO LEAD AGENCY (CONTINUED)

The following listing is a quick reference, by lead agency, of the recommendations section. The lead agencies are listed as private organizations, local, state, and federal government

State Government

Lead Agency	Description
Colorado Department Of Public Health Environment (CDPHE)	• **G5(1)99** - Promote the development of: 1) contingency plans for household hazardous materials; 2) anchoring/locating containers of hazardous materials; and 3) safely transporting these materials during flood events. • **G5(2)99** - Encourage small communities to develop centralized sewer and water systems in areas that will not be impacted by flooding and relocate or floodproof existing treatment plants and/or lagoons, where possible. • **G6(4)99** - Encourage the elevation for critical components of water and wastewater treatment
Colorado Department Of Regulatory Affairs (CDRA)	• **G7(2)99** - Support compliance of existing statutes, rules of conduct and procedures, and policy statements that apply to natural hazard risk disclosure.

Federal Government

Federal Emergency Management Agency (FEMA)	• **G4(11)99 -** Promote the concept of people accepting fiscal responsibility for the consequences of living in floodprone areas.

Figure 5.2 Recommendations Format Key

This section is the "heart" of Colorado's mitigation program. The following recommendations are for changes in existing programs or development of new programs that are intended to permanently eliminate or reduce the long-term risk to life and property from floods. The recommendations are derived from the efforts of the Colorado State Hazard Mitigation Team to formulate achievable mitigation actions that result in the elimination or reduction of future flood damages. Each of the recommendations are arranged in the following format:

Goal	The result or achievement toward which effort is directed.
Recommendation	A short statement suggesting certain actions be taken to reduce or eliminate a problem.
Lead Agency/ Partner Agency	These are the suggested state agencies to lead, coordinate, develop, and implement the recommendation.
Time Frame/ Immediate Steps	Describes when the Recommendation should be initiated.
Progress	When reports are due by the various responsible agencies.
Funding	Possible sources that would provide financial support for the implementation of the recommendation.

Number	Recommendation	Lead/ Partner Agencies	Time Frame/ Immediate Steps	Progress	Funding
Goal 1: Implement the recommendations of the Colorado Flood Hazard Mitigation Plan in a timely manner.					
G1(1)99	Develop Memoranda of Understanding between the Governor and responsible state agencies to implement/accomplish the 1999 flood hazard mitigation recommendations through a process of workplans, budgets and annual reports. The annual reporting should be developed as a one or two-page checklist to facilitate more effective coordination. Among other requirements, the MOU will contain a requirement that each responsible state agency inventory and list its facilities located in flood hazard areas.	**OEM** DNR	**3/31/2000** • Confirm governor's agreement • Contact by Governor's office with responsible state agencies • Begin drafting MOA's with state agencies	First status report due **1/10/2000**	Lead agency budget, as applicable
Goal 2 - Restrict the Expenditure of Public Funds by State and Local Governments for Housing and Public Buildings in Hazardous Areas (Part 1 of 2)					
G2(1)99	Seek legislative support or adopt administrative guidelines to adopt the policy (above) building on existing State Executive Orders 8504, 8491 and legislation such as H.B. 1041. In addition promulgate rules and regulations to administer the legislation if necessary.	**OEM** DNR	**5/31/2000** • Confirm governor's agreement • Contact by Governor's office with responsible state agencies with legislative sponsor and begin drafting bill	First status report due **1/10/2000**	Lead agency budget, as applicable
G2(2)99	Identify long-term safe affordable housing outside hazard areas using manufactured housing where applicable and volunteer agency construction.	**DOLA** OEM	**5/31/2000** • Contact local emergency managers to solicit involvement utilizing risk analysis in 1999 409 Plan, identify flood-safe areas in Colorado's NFIP communities	First status report due **3/31/2000**	Lead agency budget, as applicable

Goal 2 - Restrict the Expenditure of Public Funds by State and Local Governments for Housing and Public Buildings in Hazardous Areas (Part 1 of 2)

Number	Recommendation	Lead/ Partner Agencies	Time Frame/Immediate Steps	Progress	Funding
G2(3)99	When rehabilitating structures in historic districts located in floodplains or other associated hazard areas, consider floodproofing, elevation, channelization or other techniques. Improve the approval process for such mitigation approaches through the development of a programmatic agreement between FEMA and the State Historic Preservation Officer (SHPO).	**CWCB** FEMA	**6/30/2000** • Contact Colorado communities with historic districts and inform about mitigation grant programs and their opportunities • Also inform communities of progress to develop programmatic agreement between FEMA and	First status report due **3/31/2000**	Lead agency budget
G2(4)99	Work with the state Real Estate Services Division and State Buildings to ensure that facilities proposals and infrastructure take natural hazards into account when projects are in the approval process and have a staff member of the division join the SHMT.	**OEM** CWCB	**6/30/2000** • Extend invitation to join the State Hazard Mitigation Team • Provide available hazard data to	First status report due **3/31/2000**	Lead agency budget
G2(5)99	Work with the state Real Estate Services Division and State Buildings to ensure that facilities proposals and infrastructure take natural hazards into account when projects are in the approval process and have a staff member of the division join the SHMT.	**CWCB** CWCB	**6/30/2000** • Include Executive Orders (EO) 8504 and 8491 in 1999 Colorado Flood Hazard Mitigation Plan (see Appendix A) • Review EO's 8504 and 8491 for needed improvements	First status report due **3/31/2000**	Lead agency budget
G2(6)99	Review and recommend appropriate updates, to the Governor, of Executive Orders 8504 and 8491 and incorporate into the Colorado Flood Hazard Mitigation Plan .	**CWCB** OEM	**9/30/2000** • Begin formulating workshops at which this message is delivered	First status report due **3/31/2000**	Lead agency budget
G2(7)99	In floodplains that have already been urbanized, encourage and support a combination of structural and non-structural elements to reduce the risks from floods and other hazards.	**CWCB** OEM	**9/30/2000** • Begin formulating workshops at which this message is delivered	First status report due **3/31/2000**	Lead agency budget

Goal 3: Promote appropriate land use decisions to minimize the vulnerability of new development to floods and other natural hazards. Natural hazards include hazards such as floods, tornadoes, landslides, wildfires, mudflows, debris-flows, winter storms, ice storms, seismic events, avalanches and blizzards (Part 2 of 2)

Number	Recommendation	Lead/ Partner Agencies	Time Frame/ Immediate Steps	Progress	Funding
G3(1)99	Provide technical comments and recommendations through the State Hazard Mitigation Team on proposed state and federal legislation related to growth management.	**CWCB** **OEM**	**Ongoing** • Establish State Hazard Mitigation Team's technical expertise with legislative & congressional Bodies	First status report due **3/31/2000**	Lead agency budget
G3(2)99	Support improvements, such as digitization, to floodplain maps, showing the 100-year frequency, and other frequencies, as appropriate.	**CWCB** **DOLA** **DWR** **CDOT**	**Ongoing** • Re-contact state and federal mapping entities to establish working relationships	First status report due **3/31/2000**	Lead agency budget
G3(3)99	Develop guidance and criteria for mapping and regulating mudflow/debris-flow areas.	**CWCB**	**12/31/1999** • Review CWCB guidance & criteria for traditional floodplain mapping • Establish work schedule to undertake mudflow/ debris-flow guidance & criteria	First status report due **3/31/2000**	Lead agency budget
G3(4)99	Research and support the use of conservation easements, transferable development rights, cluster development, recreational uses, wildlife areas and open space uses as tools when undertaking mitigation initiatives.	**DOW** **CWCB**	**10/31/2000** • Gather information materials • Solicit input from states with similar programs/ initiatives • Set schedule to develop guidance document	First status report due **3/31/2000**	Lead agency budget
G3(5)99	Research potential state and federal funding sources to support mitigation initiatives which are part of the Colorado Flood Hazard Mitigation Plan.	**DOLA** **OEM**	**4/30/2000** • Begin process to revise Colorado grant program guide. • Begin research process for developing federal grant program document by contacting individual federal agencies involved with natural hazard	First status report due **2/1/2000**	Lead agency budget

Goal 3: Promote appropriate land use decisions to minimize the vulnerability of new development to floods and other natural hazards. Natural hazards include hazards such as floods, tornadoes, landslides, wildfires, mudflows, debris-flows, winter storms, ice storms, seismic events, avalanches and blizzards (Part 2 of 2)					
Number	**Recommendation**	**Lead/Partner Agencies**	**Time Frame/Immediate Steps**	**Progress**	**Funding**
G3(6)99	Encourage use of watershed-based GIS maps in future land use planning and development review.	**DOLA** **CDOT** **DNR** **DWR**	**Ongoing** • Compile a current and sufficient volume of watershed-based GIS mapping information • Solicit input from states with similar initiatives	First status report due **7/31/2000**	Lead agency budget
Goal 4: Educate the public and governmental officials and their staffs about natural hazards and mitigation (part 1 of 2).					
G4(1)99	Enhance the natural and beneficial functions of floodplains by promoting an increased awareness of wetland and habitat resources and their benefits to flood hazard mitigation.	**DOW** **CWCB** **DWR**	**10/31/2000** • Gather information materials • Set schedule to develop guidance document • Solicit input from states with similar initiatives	First status report due **4/1/2000**	Lead agency budget, as applicable
G4(2)99	Provide flood hazard mitigation education for entities such as local water and wastewater management officials, local building officials, and road and bridge officials through state programs such as the FEMA-funded Community Assistance Program and other educational programs within state agencies such as the Division of Local Government (DLG).	**CWCB** DLG	**9/30/2000** • Gather information materials • Set schedule to deliver workshops	First status report due **2/1/2000**	Lead agency budget, as applicable
G4(3)99	Promote regional intergovernmental cooperation concerning watershed-based planning and floodplain management using a strategic planning process with goals and recommendations.	**DOLA** CWCB OEM DWR	**Ongoing** • Contact local governments and determine level of interest • Gather informational materials • Set schedule to deliver strategic planning	First status report due **5/01/2000**	Lead agency budget, as applicable

Goal 4: Educate the public and governmental officials and their staffs about natural hazards and mitigation (part 2 of 2).

Number	Recommendation	Lead/ Partner Agencies	Time Frame/ Immediate Steps	Progress	Funding
G4(4)99	Improve access to information regarding floodplain management, flood hazard mitigation and flood insurance through approaches such as the use of hyper-links between state agency websites, bibliographies of available materials, etc..	**DOLA** **DNR** **CDOT** **CWCB** **OEM** **DWR**	**Ongoing** • Establish webmaster duties • Assign duties • Gather informational materials	First status report due **5/01/2000**	Lead agency budget
G4(5)99	Develop a hazard mitigation education program for public officials and disseminate it at annual conferences and workshops conducted by the Colorado Natural Hazards Mitigation Council (CNHMC), Colorado Municipal League (CML), Colorado Counties Inc. (CCI), the Colorado Association of Stormwater and Floodplain Managers (CASFM), the International Council of Building Officials (ICBO), and the Colorado Emergency Management Association (CEMA), the American Planning Association (APA), and the American Society of Civil Engineers (ASCE). Promote awareness of tools such as the "prudent line" concept being considered by the City of Colorado Springs. Use examples of mitigation successes in other Colorado communities as an education tool, as well.	**DOLA** **DNR** **CDOT**	**Ongoing** • Establish webmaster duties • Assign duties • Gather informational materials	First status report due **5/01/2000**	Lead agency budget
G4(6)99	Through the SHMT, create a hazard mitigation network in state government utilizing the existing disaster/emergency coordinators already in place at the division and department level. Develop goals and a workplan for the network, if appropriate, and meet periodically to accomplish objectives such as updates to the Colorado Flood Hazard Mitigation Plan.	**DOLA** **All state Departments** **OEM** **DWR** **DNR**	**Ongoing** • Contact agencies to set initial meeting • Develop and draft goals	First status report due **5/01/2000**	Lead agency budget

Goal 4: Educate the public and governmental officials and their staffs about natural hazards and mitigation (part 2of 2).

Number	Recommendation	Lead/Partner Agencies	Time Frame/Immediate Steps	Progress	Funding
G4(7)99	Through flood hazard reduction workshops, promote the use of a "hazard overlay" concept for GIS mapping using information developed by the Colorado Geological Survey (CGS) for Garfield County, as a model.	**CGS** **CWCB** **DWR** **CDOT** **OEM**	**Ongoing** • Contact agencies to set initial meeting • Develop draft goals	First status report due **5/01/2000**	Lead agency budget
G4(8)99	Invite representatives such as Public Service, WIIS, AT&T (TCI), the real estate industry, the insurance industry, the mortgage lending industry, and the Colorado Association of Commerce and Industry (CACI) to join the State Hazard Mitigation Team.	**DNR** **OEM**	**Ongoing** • Contact agencies to set initial meeting • Provide written materials about	First status report due **01/10/2000**	Lead agency budget
G4(9)99	Provide newsletter articles, other relevant information on flood hazard mitigation and natural hazard reduction and other forms of information exchange to professional organizations such as the American Planning Association, the American Society of Civil Engineers, Colorado Professional Engineers Council, etc.	**DNR, OEM** **DWR, DOW, DPOR, CGS, DOLA, CDOT** **DNR**	**Ongoing** • Obtain agencies/entities PIO information	First status report due **04/01/2000**	Lead agency budget
G4(10)99	Develop a natural hazards awareness and education program in K-12 schools utilizing programs already in place.	**DOE** **DWR, OEM, DOW, DPOR, CGS, DOLA, CDOT, CWCB** **DNR**	**Ongoing** • Contact school district's by survey to determine existence of programs and levels of need • Solicit input from other states that have developed similar programs • Begin formulation of education pro-	First status report due **07/01/2000**	Lead agency budget
G4(11)99	Promote the concept of people accepting fiscal responsibility for the consequences of living in floodprone areas.	**OEM, CWCB** **DNR** **DOLA**	**10/01/2000** • Confirm Governor's agreement • Begin development of educational	First status report due **04/01/2000**	Lead agency budget

Number	Recommendation	Lead/Partner Agencies	Time Frame/Immediate Steps	Progress	Funding
Goal 5: Identify adverse impacts to Public Health and the Environment and encourage the mitigation of these impacts when considering the expenditure of public funds					
G5(1)99	Promote the development of 1) contingency plans for household hazardous materials, 2) anchoring/locating containers of hazardous materials, and 3) safely transporting these materials during flood events.	**CDPHE** **OEM**	**10/01/2000** • Solicit input from states with similar programs • Begin development of educa-	First status report due **4/01/2000**	Lead agency budget
G5(2)99	Encourage small communities to develop centralized sewer and water systems in areas that will not be impacted by flooding and relocate or floodproof existing treatment plants and/or lagoons, where possible.	**OEM** **CWCB** **DWR** **CDOT** **DOLA**	**8/01/2000** • Solicit input from states with similar programs • Begin development of educa-	First status report due **6/01/2000**	Lead agency budget
Goal 6: Encourage the design and engineering of public infrastructure to take into consideration the mitigation of potential natural hazard impacts (part 1 of 2)					
G6(1)99	Promote the design and operation of canals, ditches and other related infrastructure to convey floodwaters safely.	**DWR** **CWCB**	**Ongoing** • Solicit input from states with similar programs • Begin development of educa-	First status report due **6/01/2000**	Lead agency budget
G6(2)99	Promote the design and operation of canals, ditches and other related infrastructure to convey floodwaters safely.	**OEM** **CWCB** **DWR** **CDOT** **DOLA**	**Ongoing** • Solicit input from states with similar programs • Begin development of educational outreach program	First status report due **5/01/2000**	Lead agency budget
G6(3)99	Promote the sustainability and access of critical infrastructure during disaster events.	**OEM** **CWCB** **DWR** **CDOT** **DOLA**	**Ongoing** • Solicit input from states with similar programs • Begin outreach to interested lo-	First status report due **5/01/2000**	Lead agency budget

Goal 6: Encourage the design and engineering of public infrastructure to take into consideration the mitigation of potential natural hazard impacts (part 2 of 2)					
Number	**Recommendation**	**Lead/Partner Agencies**	**Time Frame/Immediate Steps**	**Progress**	**Funding**
G6(4)99	Improve emergency warning systems and encourage the installation of additional sensors and reporting devices to improve high flow measurement capabilities along floodprone streams in high risk areas.	**OEM** **CWCB** **DWR** **CDOT** **DOLA**	**Ongoing** • Solicit input from states with similar programs • Begin outreach to interested local gov-	First status report due **7/01/2000**	Lead agency budget
G6(5)99	Work with local emergency planners and floodplain administrators to identify critical infrastructure, housing, businesses and all other structures in the floodplains in their communities. Incorporate the information into local emergency response plans.	**OEM** **CWCB** **DWR** **CDOT** **DOLA**	**Ongoing** • Solicit input from states with similar programs • Begin outreach to interested local gov-	First status report due **5/01/2000**	Lead agency budget
Goal 7: Promote the adoption of model codes and standards (such as the UBC and IBC) that emphasize hazard mitigation and reduced use of hazardous areas for development.					
G7(1)99	Support the concept of disaster-resistant communities using land use or construction permitting processes consistent with hazard reduction principles.	**OEM** **CWCB** **DOLA**	**Ongoing** • Solicit input from states with similar programs • Work with existing communities that have undertaken disaster resistant initiatives to continue improvements • Begin outreach to other interested local	First status report due **8/01/2000**	Lead agency budget
G7(2)99	Improve and support enforcement of existing statutes, rules of conduct and procedures, and policy statements that apply to natural hazard risk disclosure.	**CDRA** **OEM**	**01/01/2001** • Solicit input from states with similar programs • Contact Colorado Realtors Association and Colorado Association of Mortgage Lenders to build support and begin de-	First status report due **09/01/2000**	Lead agency budget

Goal 7: Promote the adoption of model codes and standards (such as the UBC and IBC) that emphasize hazard mitigation and reduced use of hazardous areas for development.

Number	Recommendation	Lead/Partner Agencies	Time Frame/Immediate Steps	Progress	Funding
G7(3)99	Promote development of master drainage plans for state colleges, institutions, cultural facilities and other large public facilities.	**CDHE** **CWCB** **OEM**	**Ongoing** • Solicit input from states with similar initiatives • Survey state institutions of higher ; earning to determine level of risk and existing programs to address	First status report due **5/01/2000**	Lead agency budget
G7(4)99	Review the adequacy of existing stream gage networks and make recommendations for future maintenance and improvements.	**OEM** **CWCB** **DWR**	**09/30/2000** • Inventory existing stream gage network and produce report	First status report due **7/01/2000**	Lead agency budget
G7(5)99	Work with IBHS and NIBS to assure that new code development takes natural hazards into account.	**OEM** **CWCB**	**01/01/2001** • Contact IBHS and NIBS to solicit interest	First status report due **07/01/2000**	Lead agency budget
G7(6)99	Encourage the continued advancement of rainfall-runoff modeling research.	**CDHE** **CWCB**	**Ongoing** • Strengthen the existing working relationship between CDHE and scien-	First status report due 0**8/01/2000**	Lead agency budget

Chapter 6 - Plan Implementation & Monitoring

6.1 Implementation and Monitoring

Successful implementation of Colorado's Flood Hazard Mitigation Plan is the next step in the plan process. Both state and local involvement continue to be the foundation during the implementation and monitoring phases. The local emergency management offices, the State Hazard Mitigation Team (SHMT), and other state level agencies will also play key roles in effective implementation and monitoring.

6.1.1 Governor's Office

The Governor's Office or the Governor's Authorized Representative (GAR) in coordination with OEM, DNR, SHMT, CNHMC, CWCB, and other responsible state agencies, will initiate a memoranda of agreement with designated state agencies identified in the recommendation section of this plan to accomplish mitigation inmitiatives in Colorado.

6.1.2 Role of Office of Emergency Management (OEM) and Colorado Water Conservation Board (CWCB)

The Colorado Office of Emergency Management (OEM) and the Colorado Water Conservation Board (CWCB) will be responsible for coordinating the implementation and monitoring activities developed through the planning process and detailed in this plan document. They will involve the SHMT, other state agencies, county emergency management coordinators (EMCs), and other state and local level organizations. OEM and CWCB will work closely with the Colorado Natural Hazards Mitigation Council to get feedback and assistance in monitoring the progress during this phase.

For More Information

- ***Appendix A*** - Includes definitions, acronyms, and references used in the preparation of this plan.
- ***Appendix B*** - Includes information on financial assistance programs.
- ***Appendix C*** - Includes tips to minimize loss of life & property in the event of a flood.
- ***Appendix D*** - Includes mitigation strategies and measures.
- ***Appendix E*** - Includes mitigation planning examples.

In addition to the coordinator role, OEM and CWCB will develop and conduct education and outreach activities to introduce the plan to Coloradans. Activities will be targeted to specialized audiences: local level officials, state agencies, and policymakers. These audiences have been a part of the plan development and they will continue their participation through expanded awareness of their stake in its successful implementation. The purpose of this outreach is not to provide technical assistance, but rather to build a widespread understanding of the plan and the importance of mitigation.

State Hazard Mitigation Officer (SHMO) Duties/Activities In Hazard Mitigation

- Activates the State Hazard Mitigation Team (SHMT) and serves as its chair.
- Coordinates with CWCB to implement mitigation recommendations as determined in this plan.
- Develops a report concerning the progress of state agencies.
- Develops training materials about mitigation.

Figure 6.1

The OEM State Hazard Mitigation Officer (SHMO) will conduct coordination activities which will result in the implemention of this plan.

6.1.3 Role of Colorado Natural Hazards Mitigation Council (CNHMC)

The council is described in detail in Chapter 3 section 3.2.1.7. The State Hazard Mitigation Team (SHMT) is a subgroup of the Colorado Natural Hazards Mitigation Council. The SHMT is afforded a great opportunity to identify and mitigate hazards prior, during, and after major disasters. State, federal, and local governments, as well as the private and academic sectors, are working together as a dynamic coalition to address these significant issues in a systematic and timely fashion. Subcommittees follow severe weather conditions and stand ready to make hazard mitigation recommendations to the council following events.

Role(s) of Colorado Water Conservation Board (CWCB) in Hazard Mitigation
• Develop and support a statewide organization or association of local floodplain managers
• Work with other agencies in approving mitigation
• Assist in exploring and developing a state funding pool exclusively for hazard mitigation
• Serve as communication liaison with regional
• Assist in the implementation of cost-effective and environmentally-acceptable flood mitigation
• Provide technical assistance to county EMCs.
• Visit each of the 63 counties on a five-year cycle, monitoring local project progress, as well as monitoring annual maintenance activities for
• Develop training materials about mitigation.
Figure 6.2

OEM Local Services Activities In Hazard Mitigation	
1	Effectively communicate to local government officials and emergency managers a clear understanding of their roles and responsibilities regarding mitigation.
2	Improve their level of understanding of the concepts and realities of delivering mitigation successfully to Colorado's local governments.
3	Coordinate mitigation activities and initiatives with state agency field offices.
4	Assist the Public Assistance Officer in response and recovery operations following flood events.
5	Conduct training workshops on preparedness, response, recovery and mitigation including the delivery and promotion of the Colorado Flood Hazard Mitigation Plan to local government officials
6	Attend mitigation training opportunities, as available.
7	Assist local emergency managers in identifying critical facilities, infrastructure, residential, nonresidential, and commercial structures in Colorado's floodprone communities.
Figure 6.3	

6.1.4 Role of Local Government Emergency Managers and Floodplain Coordinbators

Local government emergency management and floodplain coordinators are frequently forced by multiple roles and job demands to deal with mitigation issues and projects. Throughout the mitigation planning process, the county EMCs and floodplain coordinators have played an important role. They are the local level contact and the coordinator of mitigation implementation, programs and activities. In that role, the county EMC is the key communication point between the state and local level and between local community agencies and organizations.

Local government emergency management coordinators and floodplain managers will assist in implementing this plan at the local level. Among their suggested actions are:

- Working closely and communicating with the OEM Local Services staff and the SHMO to implement mitigation recommendations
- Conducting public awareness and education activities on mitigation, its importance and methods
- Conducting education activities for community organizations
- Developing and implementing the mitigation recommendations appropriate for the county
- Working with other community organizations and agencies on local mitigation projects
- Participating in regional and statewide cooperative mitigation efforts
- Identifying critical facilities and infrastructure at risk from hazards
- Monitoring progress in recommendation implementation through participation on a regional team

As the link between the Local Services staff, SHMO, and other community agencies and organizations, the county emergency management coordinator and floodplain manager is the recognized focal point for implementation and monitoring of mitigation activities at the local government level.

6.1.5 Other State Agencies

Designated state agencies serve on the SHMT and selected state agencies will be asked to participate in appropriate mitigation activities.

This plan designates a lead and partner agency for each recommendation. A designated lead agency will develop an action plan. It is expected that this action will involve other appropriate state agencies and organizations at the state and local levels. In essence, the lead agency will coordinate the state/local team designed to most effectively implement the recommendation. In that capacity, the lead agency is responsible for communication and reporting progress toward implementation.

6.2 Monitoring & Reporting Activities

A simplified one-to-two page reporting form will be used by the designated lead agency to report to the Office of Emergency Management. OEM will monitor the implementation process as a whole at all levels to ensure that progress is being made.

6.2.1 Site Visits

The Office of Emergency Management and Colorado Water Conservation Board will participate in onsite visits with a goal of reaching each of the Colorado counties over a five-year period. Not only will this give the state a first-hand look at the progress of mitigation implementation in the counties, but it will provide an opportunity for local level officials and the county EMCs to address needs, barriers, problems, and successes in their local mitigation efforts. The visits will be structured so that county EMCs and floodplain administrators are able to demonstrate their mitigation progress. This may also involve meeting with other local mitigation participants, such as the local utilities, county highway officials, or community organizations.

6.2.2 Written Reporting

Each lead agency will be responsible for providing periodic written progress reports to OEM. The format for these reports will be developed by OEM to capture the information necessary to monitor progress in implementing mitigation recommendations.

6.2.3 Survey and Evaluation

The public, including local officials, will be surveyed to monitor increases in awareness, understanding, and acceptance of hazard mitigation as a valid issue. Policymakers will be surveyed to monitor changes in their awareness, understanding, and priority ranking of mitigation as it relates to policy development.

State agencies will be surveyed to monitor their departmental mitigation activities and their participation on the State Hazard Mitigation Team.

Finally, county EMCs will be surveyed to monitor community progress in implementing specific local level recommendations.

Future surveys can be built upon this process to continue to measure effectiveness based on data collected regularly.

This plan is designed to be a changing document. Regular scrutiny and evaluation is the critical portion of the plan process that keeps the plan current and usable as a tool for mitigation activities. The State Hazard Mitigation Plan will be evaluated annually by the SHMT or more frequently if deemed necessary to ensure its ongoing relevance to the state's mitigation needs.

Evaluation of the plan will be coordinated and conducted by the State Hazard Mitigation Team (SHMT). Each year the goals and objectives will be reviewed by the SHMT to determine their continued appropriateness. The state's progress in hazard mitigation, developments in hazard identification and analysis, mitigation opportunities, and mitigation policy developments are some of the issues to be considered in evaluating the plan's goals and objectives. The SHMT will develop the specific activities to accomplish the evaluation.

Local viewpoints and information will be sought to facilitate this evaluation process. Community meetings, focus groups or other outreach activities will be held to access local ideas. County and city officials and organizations have indicated their interest in ongoing participation in the evaluation of the plan in this manner. Lead agencies and state agencies will be asked for their views on the goals as they relate to the recommendations with which they are involved.

Mitigation recommendations will also be evaluated as they relate to the goals. Each recommendation will be measured against the expected outcomes stated in the plan. Surveys of lead agencies, state agencies and local government emergency management coordinators, together with information gathered during the monitoring process, will provide much of the basis for evaluation. Those outcomes will be reviewed to see if the expected outcomes were attained, the reasonableness of the progress, the effectiveness of the process of implementation, and the need for modification of the expected outcomes.

Selected success stories or problem areas will be studied in depth to highlight and illustrate issues needing further focus. These case studies will be utilized in suggesting models for mitigation for other Colorado communities and for analysis of process effectiveness.

This information documenting progress toward outcomes will be presented to the SHMT by the SHMO for evaluation. The SHMT will assist in analyzing the

information and suggesting steps to modify the plan.

Overall the SHMT, the Office of Emergency Management Office, and Colorado Water Conservation Board, will complete scrutiny of the plan process. Special problem areas, such as implementation, coordination, support and policy focus, will be explored. The process evaluation will report which implementation processes worked well, what barriers were discovered, how the communication and coordination efforts performed, and which processes need to be revisited or strengthened. These findings will be incorporated into the updated plan.

6.2.4 Update and Modification

Following the annual review and evaluation of this plan, updates and modifications will be developed by the State Hazard Mitigation Team (SHMT) annually. This part of the plan process involves bringing all of the information together from all of the previous phases, measuring that information against the plan and initiating appropriate changes to the plan.

Updating the plan is much like developing the initial plan in that without local and state agency support, the plan will be difficult to implement. Consequently, results of the outreach activities conducted in the monitoring and evaluation stages must be the foundation for the suggested plan modifications.

The Colorado Natural Hazards Mitigation Council (CNHMC) will be best suited to introduce the modified plan to the state agencies and secure their support in implementing the changes. The CNHMC will also work with the SHMO in educating and taking the modifications to the county EMCs and other local officials and organizations. Many of the same community outreach activities will be held as were conducted when the plan was first developed and introduced. In this manner the cycle of implementation, monitoring, evaluation, and modification will be again set in motion.

Since Colorado's Flood Hazard Mitigation Plan focuses heavily upon policy issues, options for ongoing funding, and developing a high priority for mitigation, it is expected that as progress is made in these areas, some of the goals will shift to keep pace with the state's progress and current needs. This plan is intended to be the launching point for the state commitment to mitigation. To remain a useful tool for the long term, it is critical that we stretch our system and remain flexible to reach current goals while forming new goals that will prepare us for the future.

6.2.5 Future Enhancements

Other updates and modifications will be undertaken as new hazards are defined or in the event of a federally declared disaster in the state. In these events, the process will continue to solicit and include the contributions of those at the local and state levels to best define mitigation needs for the current situation and for the comprehensive long-term plan.

Appendix A - Definitions, Acronyms, References

44-CFR PART 9: Floodplain Management and Protection of Wetlands; regulations to implement and enforce Executive Order 11988, Floodplain Management, and Executive Order 11990, Protection of Wetlands.

44-CFR PART 10: Environmental Considerations; regulations for compliance with the National Environmental Policy Act.

44-CFR PART 13: Uniform Administrative Requirements for Grants and Cooperative Agreements to States and local Governments; establishes administrative requirements for Federal grants and subgrants.

44-CFR PART 14: Administration of Grants: Audits of State and Local Governments; requirements for non-Federal audits of recipients of financial assistance from FEMA.

44-CFR PART 206: Federal Disaster Assistance for Disasters Declared On or After November 23, 1988; regulations for implementing the Stafford Act.

100-Year Discharge: is the volume rate of streamflow (usually expressed in cubic feet per second) having a 100-year frequency of recurrence. This discharge magnitude is based on statistical analysis of stream flow records and analysis of rainfall and runoff characteristics in a particular watershed.

100-Year Flood: (also called the Base Flood) is the flood having a one- percent chance of being equaled or exceeded in magnitude in any given year. Contrary to popular belief, it is not a flood occurring once every 100 years.

100-Year Floodplain: The area adjoining a river, stream, or watercourse covered by water in the event of a 100-year flood. (see 100-year Floodplain Schematic)

100-Year Frequency: means a recurrence interval averaging 100 years. It can also be stated as having a one- percent probability of occurring in any given year.

Applicant: A state agency, local government, eligible private nonprofit organization, or Indian tribe, as identfied in Subpart N of 44-CFR Part 206, submitting an application to the Governor's Authorized Representative for assistance under the State's grant.

Appurtenant Structure: shall mean a structure on the same parcel of property as the principal structure, the use of which is incidental to the use of the principal structure.

Assistance: Any form of Federal grant under section 404 to implement cost effective mitigation measures that will reduce the risk of future damage, hardship, loss, or suffering as a result of major disasters.

Base Flood: shall mean the flood having a one-percent chance of being equaled or exceeded in magnitude in any given year. (Also knows as the 100-Year Flood). This is the flooding event that is used to calculate flood risk for the National Flood Insurance Program (NFIP) and the Federal Emergency Management Agency (FEMA).

Base Flood Elevation: means the height (above sea-level) that flood waters will reach at a given location in the event of the Base (100-year) flooding event.

Basement: shall mean any area of the building having its floor subgrade (below ground level) on all sides.

Bench Mark: means a permanent marker or monument of known elevation and horizontal location used for surveying.

Building: means a walled and roofed structure, other than a gas or liquid storage tank, that is principally above ground and affixed to a permanent site, including a manufactured (i.e., mobile) home on a permanent foundation. (See Structure).

Community: Any state or area or political subdivision thereof, or any Indian tribe or authorized tribal organization, or authorized native organization which has authority to adopt and enforce floodplain management regulations for the areas within its jurisdiction.

Conveyance: is a measure of the water carrying capacity of a stream reach.

Cross Section (XSEC): means surveyed ground points along a line that shows the geometry of the floodplain and channel.

Damage Assessment: The systematic process of determining and appraising the nature and extent of the loss, suffering, or harm to a community resulting from an emergency/disaster.

Damage Survey Report (DSR): A report of damages caused by a major disaster or emergency including location, description, and estimate of required work.

Dam Safety - A program to inventory, classify and inspect dams to identify hazardous conditions and insure proper maintenance through corrective orders for the purpose of protecting human life and property. A dam (including the waters impounded by such dam) constitutes a threat to human life or property if it might be endangered by overtopping, seepage, settlement, erosion,

For More Information

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Appendix E - Includes mitigation planning examples.

sediment, cracking, earth movement, earthquakes, failure of bulkheads, flashboards, gates on conduits, or other conditions.

Development: Means any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations or storage of equipment or materials.

Disaster Field Office: (DFO): The location established within the disaster area which functions as the joint Federal-state center for all response and recovery activities.

Disaster Preparedness Improvement Grant Program: A program authorized under Section 201 of the Stafford Act which provides matching awards not to exceed *$50,000* to states to improve or update their disaster assistance plans and capabilities.

Drainageway: shall mean a depression two feet or more below the land which serves to give direction to a current of water less than nine months of the year, and which has a bed and well-defined banks ***(see Watercourse).***

Dry Flood-proofing: Any combination of adjustments and/or additions to structures that are intended to eliminate or reduce the potential for flood damage by preventing water from entering the structure. Examples: (waterproof walls and floors; permanently or semi-permanently seal doors, windows, or other openings; build a berm higher than the floor level.)

Emergency: - Any occasion or instance which, in the determination of the President, Federal assistance is needed to supplement state and local efforts and capabilities to save lives and protect property and public health and safety, or to lessen or avert the threat of a catastrophe in any part of the United States.

Emergency Management - A program to "reduce vulnerability of people and communities of this state to damage, injury, and loss of life and property resulting from natural or man made catastrophes".

Emergency Program (NFIP): is typically the first phase under which a community participates in the NFIP. It is intended to provide a first layer amount of insurance at subsidized rates to all insurable structures in that community before the effective date of the initial Flood Insurance Rate Map (FIRM).

Encroachment: is any man-made obstruction in the floodplain, which displaces the natural passage of floodwaters.

Environmental Assessment: A document that is prepared when a project does not qualify as a categorical exclusion and serves to determine whether an Environmental Impact Statement is needed.

Environmental Impact Statement: A document that is prepared for all actions significantly affecting the environment.

Existing Construction: means (for the purposes of determining flood insurance rates) structures for which the "start of construction" commenced before the effective date of the FIRM or before January 1, 1975, for FIRM's effective before that date. ***"Existing construction"*** may also be referred to as ***"existing structures."***

Existing Manufactured Home Park or Sub-Division: means a manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is complete before the effective date of the floodplain management regulations adopted by a community.

Expansion of Existing Manufactured Home Park or Sub-Division: means the preparation of additional sites by the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads).

Executive Orders 11988 and 11990: The requirements to avoid direct or indirect support of floodplain development and to minimize harm to floodplains and wetlands. Federal decision-makers are obligated to comply with these orders, accomplished through an eight-step decision-making process.

Facility: Any publicly or privately owned building, works, system, or equipment, built or manufactured, or an improved and maintained natural feature. Land used for agricultural purposes is not a facility.

Federal Agency: Any department, independent establishment, government corporation, or other agency of the executive branch of the Federal government including the U.S. Postal Service. Does not include the American Red Cross.

Federal Coordinating Officer (FCO): The person appointed by the President to manage all Federal response to a major disaster or emergency.

Federal Emergency Management Agency (FEMA): is an independent federal agency established to respond to emergencies beyond the scope of local and state resources. FEMA administers the US Fire Administration, Office of Strategic Communication and the Federal Insurance Administration which includes the National Flood Insurance Program and the Federal Crime Insurance Program. FEMA operates through ten regional offices that work in partnership with various state and local agencies. FEMA's "Mission" is to provide leadership and support to reduce the loss of life and property and protect the nations institutions from all types of hazards through a comprehensive, risk-based, all-hazards emergency management program of mitigation, preparedness, response and recovery. FEMA has been delegated primary responsibility for administering the President's Disaster Relief Program, which includes the Hazard Mitigation Grant Program.

Flood: means a general and temporary condition of partial or complete inundation of normally dry land ar-

eas from: (1) The overflow of inland or tidal waters. (2) The unusual and rapid accumulation of runoff of surface water from any source.

Flood Boundary and Floodway Map: is a floodplain management map issued by FEMA that shows, based on detailed and approximate analyses, the boundaries of the 100-year and 500-year floodplains and the 100-year floodway.

Federal-State Agreement: The document that states the understandings, commitments, and conditions for assistance under which FEMA disaster assistance shall be provided. This agreement imposes binding obligations on FEMA, the State, and local governments in the form of conditions for assistance, which are legally enforceable.

Finding of no Significant Impact: A determination that an action will have no significant impact on the environment.

Flood Fringe: means that portion of the 100-year floodplain outside the floodway in which total encroachment is permissible.

Flood Hazard Boundary Map (FHBM): is the initial insurance map issued by FEMA that identifies approximate areas of 100-year flood hazard in a community.

Flood Insurance Rate Map (FIRM): is the insurance and floodplain management map issued by FEMA that identifies areas of 100-year flood hazard in a community. In some areas, the map also shows base flood elevations and 500-year floodplain boundaries and occasionally, regulatory floodway boundaries.

Flood Insurance Study (FIS): is an engineering study performed by FEMA to identify flood hazard areas, flood insurance risk zones, and other flood data in a community.

Flood Mitigation Assistance Program: A program created under the National Flood Insurance Reform Act of 1994 to provide mitigation planning and project grants to states and communities. The program is funded through flood insurance policy fees. A maximum of $20 million in grant money is available annually.

Floodplain: The lowland and relatively flat areas adjoining inland or coastal waters including, at a minimum, that area subject to a one percent or greater chance of flooding in any given year.

Floodplain Management: - A comprehensive approach "to reduce the damaging effects of floods, preserve and enhance natural values and provide for optimal use of land and water resources within the floodplain. Its goal is to strike a balance between the values obtainable from the use of floodplains and the potential losses to individuals and society arising from such use". The operation of an overall program of corrective and preventive measures for reducing flood damage, including but not limited to, emergency preparedness plans, flood control work, and floodplain management regulations.

Flood-proofing: Permanent or contingent measures applied to a structure and/or its contents that automatically prevent or provide resistance to damage from flooding by intentionally allowing water to enter the structure. Examples: Move all electrical outlets above expected flood levels; install floodwalls and protection closets around equipment, and secure furnace and water heater that cannot be relocated.

Floodway: means the channel of a river or watercourse and the adjacent land areas that must be reserved in order to discharge the 100-year flood without cumulatively increasing the water surface elevation more than one foot. Federal Hazard Mitigation Officer (FHMO): The FEMA employee responsible for representing the agency for each declaration in carrying out the overall responsibilities for hazard mitigation and for Subpart M, including coordinating post-disaster hazard mitigation actions with other agencies of government at all levels.

Force Account: An applicant's own labor forces and equipment.

Gauging Station: is a particular site on a stream, river, canal, lake or reservoir where systematic observations of gage height or discharge are collected.

Geologic Hazard Management: - A program to recognize hazardous geologic processes and conditions and their potential adverse effects on existing or proposed works of man. Upon identification of such geologic hazard constraints, a second phase of management requires effective statutory and administrative procedures and actions to minimize loss of life and property through prudent controls and mitigation.

Governor's Authorized Representative (GAR): The individual, designated by the Governor, who serves as the grant administrator for all funds provided under the Hazard Mitigation Grant Program.

Grant: An award of financial assistance. Under the Hazard Mitigation Grant Program, the total grant award shall not exceed ten percent of the estimated Federal assistance provided under Section 406 of the Stafford Act for permanent restorative work and associated administrative costs.

Grantee: The government to which a grant is awarded and which is accountable for the use of the funds provided. Under the Hazard Mitigation Grant Program, the State is the grantee.

Hazard Mitigation - A plan "to alleviate by softening and making less severe the effects of a major disaster or emergency and of future disasters in the affected areas, including reduction or avoidance". "Hazard mitigation can reduce the severity of the effects of flood emergency on people and property by reducing the cause or occurrence of the hazard; reducing exposure to the hazard; or reducing the effects through preparedness, response and recovery measures. Hazard mitigation is a management strategy in which current actions and expenditures to reduce the occurrence or severity of potential flood disasters are balanced with potential losses from future floods".

Hazard Mitigation Assistance Program: A FEMA pro-

gram that provides a limited amount of funding to states to cover or to assist in covering the cost of preparing a pre-disaster hazard mitigation plan, one or more components of such a plan, or a related activity which will contribute to reducing vulnerability to hazards either throughout the state or for a selected area within the state.

Hazard Mitigation Grant Program: A program authorized under Section 404 of the Stafford Act that provides funding for hazard mitigation projects that are cost effective and complement existing post-disaster mitigation programs and activities by providing funding for beneficial mitigation measures that are not funded through other programs.

Hazard Mitigation Plan: The plan resulting from a systematic evaluation of the nature and extent of vulnerability to the effects of natural hazards in a given area, that includes the actions needed to minimize future vulnerability to hazards. Section 409 of the Stafford Act requires that a hazard mitigation plan be developed (or an existing plan be updated) as a condition of receiving Federal disaster assistance.

Hazard Mitigation State Administrative Plan: The plan developed by the State to describe the procedures for administration of the Hazard Mitigation Grant Program.

Hazard Mitigation Survey Team (HMST): The FEMA/state/local team that is activated following disasters to identify immediate mitigation opportunities and issues to be addressed in the Section 409 hazard mitigation plan. The Hazard Mitigation Survey Team may include representatives of other Federal agencies, as appropriate.

Hazard Mitigation Survey Team Report: The report developed by the Hazard Mitigation Survey Team, similar in format to the Interagency Hazard Mitigation Team Report, that identifies mitigation measures for implementation and recommends issues to be addressed in the State Hazard Mitigation Plan, including those measures recommended for funding under the Hazard Mitigation Grant Program.

Historic Structure: means any structure that is: (a) Listed individually in the National Register of Historic Places (a listing maintained by the Department of Interior) or preliminarily determined by the Secretary of the Interior as meeting the requirements for individual listing on the National Register; (b) Certified or preliminarily determined by the Secretary of the Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the Secretary to qualify as a registered historic district; (c) Individually listed on a state inventory of historic places in states with historic preservation programs which have been approved by the Secretary of the Interior; or (d) Individually listed on a local inventory of historic places in communities with historic preservation programs that have been certified either: (1) By an approved state program as determined by the Secretary of the Interior or (2) Directly by the Secretary of the Interior in states without approved programs.

Hydraulics: is a branch of engineering dealing primarily with the flow of water and the application of fluid mechanics principles.

Hydrology: is a science dealing with the properties, distribution and circulation of water on the surface, below the ground and in the atmosphere.

Immediate Threat: The threat of additional damage or destruction from an event, which can reasonably be expected to occur within one year.

Interagency Hazard Mitigation Team (IHMT): The mitigation team that is activated following flood-related disasters pursuant to the Office of Management and Budget directive on Nonstructural Flood Protection Measure and Flood Disaster Recovery, and the subsequent December *15,* 1980 Interagency Agreement for Nonstructural Damage Reduction.

Interagency Hazard Mitigation Team Report: The report developed, within 15 days following any Presidential-declared flood disaster, by an interagency, intergovernmental, and interdisciplinary team representing each of the signatory agencies of the Interagency Agreement for Post-Flood Hazard Mitigation. The report identifies post-flood mitigation opportunities and common post-flood recovery policies.

Local Emergency Management Coordinator: The person appointed to coordinate emergency management activities for a county or municipal emergency management program.

Local Hazard Mitigation Officer: The representative of local government who serves on the Hazard Mitigation Survey Team or the Interagency Hazard Mitigation Team, and who is the primary point of contact with FEMA, other Federal agencies, and the State in the planning and implementation of post-disaster hazard mitigation activities. In many instances, the local Emergency Management Coordinator may fill this role.

Letter of Map Amendment (LOMA): is the result of an administrative procedure in which the Federal Insurance Administrator reviews scientific or technical data submitted by the owner or lessee of property who believes the property has incorrectly been included in a designated special flood hazard area (SFHA). A LOMA amends the currently effective FEMA map and establishes that a property is not located in a SFHA.

Letter of Map Revision (LOMR): is an official revision to the currently effective FEMA map. It is used to change flood zones, floodplain and floodway delineations, flood elevations, and planimetric features. All requests for LOMRs must be made to FEMA through the chief executive officer of the community, since it is the community that must adopt any changes and revisions to the map.

Letter of Map Revision Based on Fill (LOMR-F): is an official revision to a currently effective FEMA map to remove a parcel of land from the floodplain by the placement of compacted fill to elevate the surface of the ground to or above the base flood elevation at that loca-

tion. (See ***Letter of Map Revision***)

Lowest Floor: shall mean the lowest floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, usable solely for parking of vehicles, building access or storage, in an area other than a basement area, is not considered a building's lowest floor, provided that such enclosure is not built so as to render the structure in violation of the applicable non-elevation design requirements of the State of Colorado Minimum Standards for Floodplain Management.

Major Disaster: Any natural catastrophe (including any hurricane, tornado, storm, high-water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, or drought), or, regardless of cause, any flood, fire, or explosion, in any part of the United States which in the determination of the President cause damage of sufficient severity and magnitude to warrant major disaster assistance under the Stafford Act to supplement the efforts and available resources of states, local governments, and disaster relief organizations in alleviating the damage, loss, hardship, or suffering caused thereby.

Mandatory Purchase: means under the provisions of the Flood Disaster Protection Act of 1973, individuals, businesses, and others buying, building, or improving property located in identified areas of special flood hazards within participating communities are required to purchase flood insurance as a prerequisite for receiving any type of direct or indirect federal financial assistance (e.g., any loan, grant, guaranty, insurance, payment, subsidy, or disaster assistance) when the building or personal property is the subject of or security for such assistance.

Manufactured Home: shall mean a structure, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when attached to the required utilities. The term "manufactured home" does not include a "RECREATIONAL VEHICLE."

Manufactured Home Park or Subdivision: shall mean a parcel (or contiguous parcels) of land divided into two or more manufactured home lots for rent or sale.

Measure: Any mitigation measure, project, or action proposed to reduce risk of future damage, hardship, loss, or suffering from disasters.

National Environmental Policy Act (NEPA): P. L. 91-190, as amended, which requires that actions affecting the environment comply with specific policies and procedures. NEPA requires that environmental information be available to public officials and citizens before decisions are made and actions are taken.

National Flood Insurance Program (NFIP): The program established in 1968 under the National Flood Insurance Act to provide property owners in floodplains with Federally subsidized flood insurance in those communities that implement ordinances to reduce future flood losses. The National Flood Insurance Reform Act of 1994 revised and strengthened many aspects of the program.

National Geodetic Vertical Datum (NGVD): is the National standard reference datum for elevations, formerly referred to as Mean Sea Level (MSL) of 1929. NGVD is used as the reference datum on most FIRMs.

Natural Grade: means the grade unaffected by construction techniques such as fill, landscaping, or berming.

New Construction: shall mean obstructions for which the "start of construction" commenced on or after the effective date of the floodplain management regulation adopted by a community and includes any subsequent improvements to such obstructions.

Non-Residential: includes, but is not limited to: small business concerns, churches, schools, nursing homes, farm buildings (including grain bins and silos), pool houses, clubhouses, recreational buildings, government buildings, mercantile structures, agricultural and industrial structures, warehouses, and hotels or motels with normal room rentals for less than 6 months' duration.

Obstruction: shall mean any wall, wharf, embankment, levee, dike, pile, abutment, projection, excavation (including the alteration or relocation of a watercourse or drainageway), channel rectification, bridge, conduit, culvert, building, stored equipment or material, wire, fence, rock, gravel, refuse, fill, or other analogous structure or matter which may impede, retard, or change the direction of flow of water, either in itself or by catching or collecting debris carried by such water, or that is placed where the natural flow of the water would carry such structure or matter downstream to the damage or detriment of either life or property. Dams designed to store or divert water are not obstructions if permission for the construction thereof is obtained from the Colorado State Engineer's Office.

Other Residential: means hotels or motels where the normal occupancy of a guest is 6 months or more; a tourist home or rooming house which has more than 4 roomers. A residential building (excluding hotels and motels with normal room rentals for less than 6 months' duration and containing more than 4 dwelling units) is permitted incidental office, professional private school, or studio occupancy, provided that the total area of such occupancy is limited to less than 25 percent of the total floor area within the building.

Overbank, Left and Right: is the floodplain that lies to the left and right, respectively, of the watercourse, as one looks downstream.

Physical Map Revision: is an official republication of a map to effect changes to flood insurance zones, floodplain delineations, flood elevations, floodways and planimetric features. These changes typically occur as a result of structural works or improvements, annexations resulting in additional flood hazard areas, or corrections of base flood elevations or flood insurance risk zones.

Post-Firm Construction: is construction or substantial improvement, which started on or whichever, is later.

Pre-Firm Construction: is construction or substantial improvement which started on or before December 31, 1974, or before the effective date of the initial Flood Insurance Rate Map (FIRM) of the community, whichever is later.

Principally Above Ground: shall mean that at least 51 percent of the actual cash value of the structure is above ground.

Private Nonprofit Facility: Any private nonprofit educational, utility, emergency, medical, or custodial Care facility for the aged or disabled, and other facility providing essential governmental type services to the general public, and such facilities on Indian reservations. Further definition is as follows:

a. Educational Facility: Classrooms plus related supplies, equipment, machinery, and utilities of an educational institution necessary or appropriate for instructional, administrative, and support purposes, but does not include buildings, structures and related items used primarily for religious purposes or instruction

b. Utility: Buildings, structures, or systems of energy, communication, water supply, sewage collection and treatment, or other similar public service facilities.

c. Emergency Facility: Those buildings, structures, equipment, or systems used to provide emergency services, such as fire protection, ambulance, or rescue, to the general public, including the administration and support facilities essential to the operation of such emergency facilities even if not contiguous.

d. Medical Facility: Any hospital, outpatient facility, a rehabilitation facility, or facility for long term care as such terms are defined in section 645 of the Public Health Service Act (42 U.S.C. 2910) and any similar facility offering diagnosis of or treatment of mental or physical injury or disease, including the administrative and support facilities essential to the operation of such medical facilities even if not contiguous.

e. Custodial Care Facility: Those buildings, structures, or systems including those for essential administration and support, which are used to provide institutional care for persons who require close Supervision and some physical constraints on their daily activities for their self-protection, but do not require day-to-day medical care.

f. Other Essential Governmental Services Facilities: Facilities such as museums, zoos, community centers, libraries, homeless shelters, senior citizen centers, rehabilitation facilities, shelter workshops, and facilities which provide health and safety services of a governmental nature. All such facilities must be open to the general public.

Private Nonprofit Organization: Any non-governmental agency or entity that currently has:

a. An effective ruling letter from the U.S. Internal Revenue Service, granting tax exemption under section *501(c),* (d), or (e) of the Internal Revenue Code of 1954, or

b. Satisfactory evidence from the State that the non-revenue producing organization or entity is a non-profit one organized or doing business under State law.

Probation: is the means of formally notifying participating communities of violations and deficiencies in the administration and enforcement of the local floodplain management regulations. A community is placed on probation for one year (may be extended) during which time a surcharge is applied to all NFIP policies issued on or after the Probation Surcharge effective date. Probation is terminated if deficiencies are corrected. If a community does not take remedial or corrective measures while on probation, it can be suspended.

Project: All work performed at a single site or multiple sites as described on a project summary.

Public Assistance: Federal financial assistance provided through the Public Assistance Grant Program (PAGP) to state and local governments or to eligible private nonprofit organizations for disaster-related requirements.

Public Assistance Permanent Work: The restorative work that must be done, through repairs or replacement, to restore an eligible facility on the basis of its pre-disaster design and in conformity with current applicable codes, specifications, and standards.

Public Entity: An organization formed for a public purpose whose direction and funding are provided by one or more political subdivisions of the state.

Reach: a continuous segment of a watercourse.

Recreational Vehicle: shall mean a vehicle which is (i) built on a single chassis; (ii) 400 square feet or less when measured at the largest horizontal projections; (iii) designed to be self-propelled or permanently towed by a light duty truck; and (iv) designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel, or seasonal use.

Regular Program (NFIP): is the phase of a community's participation in the NFIP where more comprehensive floodplain management requirements are imposed and higher amounts of insurance are available based upon risk zones and elevations determined in a flood insurance study. The Flood Insurance Rate Map is the map used in this phase of the NFIP.

Regulatory Flood Elevation: in Colorado means the Base Flood Elevation plus one foot of freeboard which is required to meet the Minimum Standards for Floodplain Management in the State of Colorado.

Replacement Cost: means the cost to replace property with the same kind of material and construction without deduction for depreciation.

Roughness Coefficient (Manning's): is a measure of ground surface roughness used in flow equations.

Section 404: The section of the Stafford Act, which authorizes the Hazard Mitigation Grant Program (HMGP). The HMGP provides funding for cost-effective hazard

mitigation measures.

Section 406: The section of the Stafford Act which authorities the Public Assistance Grant Program (PAGP). This program provides grants to repair, restore, or replace damaged facilities belonging to public and private non-profit entities, and other associated expenses, including emergency protective measures and debris removal.

Section 409: The section of the Stafford Act, which requires the identification and evaluation of mitigation opportunities as a condition of receiving Federal disaster assistance.

Section 409 Hazard Mitigation Plan: The hazard mitigation plan required under Section 409 as a condition of receiving federal disaster assistance.

SF 424: Standard Form 424: Application for Federal Assistance, which is part of the State Hazard Mitigation Application.

Sheet Flood Hazard: is a type of flood hazard with flooding depths of 1 to 3 feet that occurs in areas of sloping land. The sheet flow hazard is represented by the zone designation AO on the Flood Insurance Rate Map (FIRM).

Special Flood Hazard Area: is the darkly shaded area on the Flood Hazard Boundary Map (FHBM) or Flood Insurance Rate Map (FIRM) which identifies an area that has a one percent chance of being flooded in any given year (100-year floodplain). The FIRM identifies these shaded areas as FIRM Zones A, AO, AH, A1-A30, AE, A99, V, V1-30, and VE.

Stafford Act: The Robert T. Stafford Disaster Relief and Emergency Assistance Act, P. L. 100-707, signed into law November 23, 1988; amended the Disaster Relief Act of 1974, P. L. 93-288.

Stage: is the elevation of surface water above a reference datum, that datum usually being near the streambed.

Standards: Codes, specifications or standards for the construction of facilities to include legal requirements for additional features.

Start of Construction: shall mean the date the building permit was issued, provided the actual start of construction, repair, reconstruction, rehabilitation, addition, placement, or other improvement was within 180 days of the permit date. "Start of construction" includes substantial improvements. The actual start means the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings. The installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of a manufactured home on a foundation. Permanent construction does not include land preparation, such as clearing, grading and filling; nor does it include the installation of streets and/or walkways; nor does it include excavation for a basement, footings, piers, or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds nor occupied as dwelling units or not part of the main structure. For a substantial improvement, the actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not the alteration affects the external dimensions of the building.

Structure: shall mean a walled and roofed building that is principally above ground, as well as a manufactured home, and a gas or liquid storage tank that is principally above ground (see ***Building***).

State Coordinating Officer (SCO): The person appointed by the Governor to manage all aspects of a disaster, in cooperation with the Federal Coordinating Officer (FCO).

State Hazard Mitigation Officer (SHMO): The representative of state government who serves on the Hazard Mitigation Survey Team and/or Interagency Hazard Mitigation Team, and who is the primary point of contact with FEMA, other Federal agencies, and local units of government in the planning and implementation of post-disaster mitigation activities.

State Hazard Mitigation Team: The team composed of key state agency representatives and, as appropriate, local units of government and other public or private sector agencies, which is responsible for evaluating hazards, identifying strategies, coordinating resources, and implementing measures that will reduce the vulnerability of people and property to damage from hazards.

State Public Assistance Officer (SPAO): The person appointed by the Governor's Authorized Representative to assist in the management of assessment and recovery operations in response to a disaster.

Statutory Administrative Costs: Under the Stafford Act, administrative costs for the preparation of applications, progress reports, audits, etc., are reimbursable based on a percentage of financial assistance received.

Subgrant: An award of financial assistance under a grant by a grantee to an eligible subgrantee.

Subgrantee: The government or other legal entity to which a subgrant is awarded and which is accountable to the grantee for the use of the fluids provided.

Subgrant M. Hazard Mitigation Planning: 44 CFR Part 206 Subpart M prescribes the actions and Procedures for implementing Section 409 of the Stafford Act.

Subpart N. Hazard Mitigation Grant Program: 44 CFR Part 206, Subpart N, provides guidance on the administration of hazard mitigation grants made under provisions of Section 404 of the Stafford Act.

Substantial Damage: shall mean a damage of any origin sustained by an obstruction whereby the cost of restoring the obstruction to its before-damage condition would equal or exceed 50 percent of the market value of the obstruction before the damage occurred.

Substantial Improvement: shall mean any reconstruction, rehabilitation, addition, or other improvement of an obstruction, the cost of which equal or exceed 50 per-

cent of the market value of the obstruction before "start of construction" of the improvement. This includes obstructions, which have incurred "substantial damage," regardless of the actual repair work performed. The term does not, however, include either (1) any project for improvement of a structure or other obstruction to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions, or (2) any alteration of a "historic structure," provided that the alteration will not preclude the structure's continued designation as a "historic structure."

Supplement: An amendment to the hazard mitigation application to add or modify one or more mitigation measures.

Surcharge: means an increase in flood elevation due to destruction of the floodplain that reduces its conveyance capacity.

Suspension: means the removal of a participating community from the National Flood Insurance Program (NFIP) because the community has not enacted and/or enforced the proper floodplain management regulations required for participation in the National Flood Insurance Program (NFIP).

Variance: is a grant of relief to a person from the requirements of Floodplain Management Standards, which permits construction in a manner otherwise, prohibited by ordinance where specific enforcement would result in unnecessary hardship. The granting of a variance does not remove the requirements for flood insurance, which lending institutions will require if the structure is the collateral of a loan. Flood insurance rates will be much higher for structures built below the Base Flood Elevation.

Violation: means a failure of a structure or other development to be fully compliant with the community's floodplain management regulations.

Watercourse: shall mean any depression two feet or more below the surrounding land which serves to give direction to a current of water at least nine months of the year and which has a bed and well-defined banks. (See Drainageway)

Watershed: (also called a Drainage Basin). It is that area of land, which may contribute flow from runoff to a particular watercourse.

Water Surface Profile: (also referred to as Flood Elevation Profile) means a graph showing the relationship of water surface elevation to location, the latter generally expressed as a distance upstream from some reference point.

Wetlands: Those areas which are inundated or saturated by surface or ground water with a frequency sufficient to support, or that under normal hydrologic conditions does or would support, a prevalence of vegetation or aquatic life typically adapted for life in saturated or seasonally saturated soil conditions.

Write Your Own (WYO) Program: is a cooperative undertaking of the insurance industry and the Federal Insurance Administration begun in October 1983. The WYO Program operates within the context of the NFIP and involves private insurance carriers who issue and service National Flood Insurance Program policies.

Colorado Emergency Management Plan: The plan which is developed and continuously maintained by the Director of the Office of Emergency Management Agency (OEM) for the purpose of coordinating the emergency management activities of mitigation, preparedness, response and recovery within the state.

Zone A (Unnumbered): are Special Flood Hazard Areas subject to inundation from the 100-Year flood. Because detailed hydraulic analyses have not been performed, no base flood elevation or depths are shown. Mandatory flood insurance purchase requirements apply.

Zone AE and A1-30: are Special Flood Hazard Areas subject to inundation by the 100-Year flood determined in a Flood Insurance Study by detailed methods. Base flood elevations are shown within these zones. Mandatory flood insurance purchase requirements apply. (Zone AE is used on new and revised maps in place of Zones A1-30.)

Zone AH: are Special Flood Hazard Areas subject to inundation by 100-Year shallow flooding (usually areas of ponding) where average depths are between one and three feet. Base flood elevations derived from detailed hydraulic analyses are shown in this zone. Mandatory flood insurance purchase requirements apply.

Zone AO: are Special Flood Hazard Areas subject to inundation by 100-Year shallow flooding (usually sheet flow on sloping terrain) where average depths are between one and three feet. Average flood depths derived from detailed hydraulic analyses are shown within this zone. Mandatory flood insurance purchase requirements apply.

Zone B, C, and X: are areas that have been identified in the community flood insurance study as areas of moderate or minimal hazard from principal source flood in the area. However, buildings in these zones could be flooded by severe, concentrated rainfall coupled with inadequate local drainage systems. Flood Insurance is available in participating communities but is not required by regulation in these zones. (Zone X is used on new and revised maps in place of Zones B and C.)

Zone D: are unstudied areas where flood hazards are undetermined by flooding is possible. No mandatory flood insurance purchase requirements apply, but coverage is available in participating communities.

Acronyms

The following explanations are for those abbreviations that are used extensively throughout this plan

APA	American Planning Association
ASCS	Agricultural Stabilization and Conservation Service
BFE	Base Flood Elevation
BLM	Bureau of Land Management
BOR	Bureau of Reclamation
CAP	Community Assistance Program
CAV	Community Assessment Visit
CCA	Comprehensive Cooperative Agreement
CDBG	Community Development Block Grants
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cfs	Cubic feet per second
COE	Corps of Engineers (Same as USACE)
CRS	Community Rating System
DFO	Disaster Field Office
DFS	Department of Family Services
DH	Department of Health
DOT	Department of Transportation
DSR	Damage Survey Reports
EDA	Economic Development Administration
E.O.	Executive Order
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
EPA	Environmental Protection Agency
FBFM	Flood Boundary and Floodway Map
FCO	Federal Coordinating Officer
FCIC	Federal Crop Insurance Corporation
FEMA	Federal Emergency Management Agency
FHBM	Flood Hazard Boundary Map
FHWA	Federal Highway Administration
FIA	Flood Insurance Administration
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FLB	Farm Loan Board
FPM	Floodplain Management
FSA	Farm Service Agency
HAZMAT	Hazardous Materials
HMA	Hazard Mitigation Assistance
MCSAP	Motor Carrier Safety Assistance Program
MM	Modified Mercalli
NAD	North American Datum
NFIP	National Flood Insurance Program
NIIMS	National Interagency Incident Management System
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
NWS	National Weather Service
OCE	Office, Corps of Engineer's
OSC	On-scene Coordinator
P.L.	Public Law
PEA	Public Education and Awareness
PSC	Public Service Commission
RCRA	Resource Conservation and Recovery Act
SALEC	State Law Enforcement Communications System
SAP	State Assistance Program
SBA	Small Business Administration
SCS	Soil Conservation Service
SELS	Severe Local Storms
SFHA	Special Flood Hazard Areas
sq. ml.	square miles
SHMO	State Hazard Mitigation Officer
SHPO	State Historic Preservation Officer
TSD	Treatment, storage and disposal
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USF&WS	United States Fish & Wildlife Service
USGS	United States Geological Survey, U.S. Department of Interior
WAPA	Western Area Power Authority
WRDS	Water Resources Data System
WSFO	Weather Service Forecast Office
WYO	Write Your Own

Executive Order 8504 (page 1 of 5)

State of Colorado
EXECUTIVE CHAMBERS
DENVER

RECEIVED
NOV 17 1977
COLO. WATER CONSERVATION BOARD

RICHARD D. LAMM
Governor

MEMORANDUM

TO: Department Heads

FROM: Governor Richard D. Lamm

SUBJECT: Executive Order Concerning Flood Insurance Program

DATE: November 4, 1977

Attached is my Executive Order dated October 1, 1977, entitled "Requirements and Criteria for State Participation In the National Flood Insurance Program." This Order provides criteria and management standards, together with designation of a responsible agency, for the State of Colorado to meet the requirements of the Flood Insurance Administration (FIA).

With this Executive Order the State Government meets the legal requirements for participation in the benefits of the Federal Flood Insurance Program for its various properties. The FIA notified me on October 28, 1977, of its acceptance of this document for this purpose.

Executive Order No. 8491 of August 1, 1977, entitled "Evaluation of Flood Hazard in Locating State Building, Roads, and Other Facilities, and In Reviewing and Approving Sewage and Water Facilities, and Subdivisions" supplements and parallels the attached Order. Executive Order No. 8491 provides policy and general criteria for management of floodplains while the October 1, 1977, Order provides specific criteria for participation in the Federal Flood Insurance Program.

This Order of October 1, 1977, should be reviewed in detail and distributed to staff members who might be involved in the implementation of this Order.

If any questions arise, please contact the Colorado Water Conservation Board staff. The CWCB is the designated state agency for the coordination of the Flood Insurance Program.

Executive Order 8504 (page 2 of 5)

State of Colorado

EXECUTIVE CHAMBERS

DENVER

RICHARD D. LAMM
Governor

EXECUTIVE ORDER - 8504

REQUIREMENTS AND CRITERIA
FOR STATE PARTICIPATION
IN THE NATIONAL FLOOD INSURANCE PROGRAM

WHEREAS, on August 1, 1977, Executive Order Number 8491, entitled "Evaluation of Flood Hazard in Locating State Buildings, Roads, and Other Facilities, and in Reviewing and Approving Sewage and Water Facilities, and Subdivisions," was issued regarding State policy on the occupation and modification of Colorado floodplains by State agencies; and

WHEREAS, additional State procedures are to be established to meet the requirements of the National Flood Insurance Program; and

WHEREAS, the availability of programs for Federal loans and mortgage insurance, State financial assistance, and land use planning are determining factors in the utilization of lands; and

WHEREAS, the availability of flood insurance under the National Flood Insurance Program for state-owned properties as provided by the National Flood Insurance Act of 1968, as amended, and the Flood Disaster Protection Act of 1973 is dependent upon State coordination of Federal, State, and local aspects of floodplain, mudslide (i.e., mudflow) area, and flood-related erosion area management activities in the State; and

WHEREAS, the Colorado Water Conservation Board is the State agency responsible for state-wide programs for flood prevention, flood control, flood protection, and flood hazard study criteria, as provided by Section 37-60-106(1), Colorado revised Statutes 1973, and Section 24-65.1-403, Colorado Revised Statutes 1973, as amended, (S.B. 126) L. 77.; and

WHEREAS, the Colorado Water Conservation Board is the State agency designated to coordinate the National Flood Insurance Act of 1968, as amended, and the Flood Disaster Protection Act of 1973; and

WHEREAS, the Division of Disaster Emergency Services is the agency responsible for the coordination of Federal, State, and local disaster activities, and

WHEREAS, the primary concerns of the Colorado Land Use Commission are the protection, utility, value, and future of lands within the State; and

Executive Order 8504 (page 3 of 5)

WHEREAS, the availability of flood insurance for stateowned properties is conditioned upon the State's compliance with minimum floodplain management criteria of the National Flood Insurance Program regulations (24 CFR 1909, et. seg.);

NOW, THEREFORE, by virtue of the authority vested in me as the Governor of Colorado, it is hereby ordered as follows:

1. The Colorado Land Use Commission is hereby designated as the State agency to provide implementation of Section 1910.12, Rules and Regulations of the Federal Insurance Administration.

2. Each State agency has a responsibility to evaluate the potential effects of any actions it may take in a floodplain, to ensure that its planning programs and budget requests reflect consideration of flood hazards and floodplain management.

3. Before taking action, each State agency shall determine whether the proposed action will occur in a floodplain. This determination shall be based on a Department of Housing and Urban Development flood hazard boundary map (FHBM) or, if available, on more detailed floodplain delineation maps of the area on file with the Colorado Water Conservation Board. If flood hazard information and data are not available, the Colorado Water Conservation Board shall assist in the determination and the evaluation of any flood hazard to the proposed facilities or structures.

4. For state-owned properties in Federal Insurance Administration designated "Special Hazard Areas," the State shall, as a minimum, comply with the floodplain management criteria set forth in Sections 1910.3, 1910.4, and 1910.5 of the National Flood Insurance Regulations.

5. If a State agency has determined that no feasible alternative exists to avoid siting a proposed structure or facility within a floodplain, the agency shall (a) prepare and transmit to the Colorado Land Use Commission a notice containing an explanation of why the development is proposed to be located in the floodplain; (b) require the structure to be designed (or modified) and adequately anchored to prevent flotation, collapse, or lateral movement; (c) require the structure to be constructed with materials and utility equipment resistant to flood damage; (d) site the lowest floor of any structure not less than one foot above the base flood, unless such structure has been adequately flood-proofed to one foot above said base water elevation; and (e) elevate residential dwellings to not less than one foot above the maximum water elevation of the computed base flood.

6. The Colorado Land Use Commission and the Colorado Water Conservation Board shall assist State agencies in carrying out the floodplain management criteria set forth in Sections 1910.3, 1910.4, and 1910.5 of the National Flood Insurance Regulations with the following provisions:

Executive Order 8504 (page 4 of 5)

a. Subdivision proposals shall be consistent with the criteria established by Title 30, Article 28, Colorado Revised Statutes 1973, as amended.

b. Policy on floodplain management shall follow the directives of Executive Order 8491 of August 1, 1977.

c. Disaster Preparedness Activities shall be consistent with the criteria established by Title 28, Article 2, Colorado Disaster Emergency Act, Colorado Revised Statutes 1973, as amended, within the scope of their applicability to the Executive Order and to Executive Order 8491, dated August 1, 1977, and as administered by the Colorado Division of Disaster Emergency Services. Provided further, nothing in this order or in Executive Order 8491 shall apply to assistance provided for emergency work to save lives, protect property, and public health and safety, performed pursuant to the Colorado Disaster Emergency Act.

d. The floodway (high-hazard zone) limits shall be consistent with the criteria established by the Colorado Water Conservation Board's Model Floodplain Regulation, dated February 26, 1975, which was prepared under the authority of Title 24, Article 65.1, Colorado Revised Statutes 1973, as amended.

7. All State agencies responsible for the disposal of lands or properties shall evaluate flood hazards in connection with lands or properties which are proposed for disposal to other public instrumentalities or private interests and, in order to minimize future State expenditures for flood protection and flood disaster relief, shall attach appropriate restrictions with respect to uses of the lands or properties from disposal.

8. When State property in floodplains is proposed for lease, easement, right-of-way, or disposal to non-state public or private parties, the State agency shall (a) reference in the conveyance those uses that are restricted under identified Federal, State or local floodplain regulations; and (b) attach other appropriate restrictions to the uses of properties by the grantee or purchaser and any successors, except where prohibited by law; or (c) withhold such properties from conveyance.

9. As used in this Order:

a. "State agency" means any department, board, commission, or division; however, the directives as contained in this Order are meant to apply to those agencies which perform or regulate activities that are located in, or affect, floodplains.

Executive Order 8504 (page 5 of 5)

b. "base flood" means the flood that has a one percent chance of being equalled or exceeded in any given year.

c. "floodplain" means an area in, and adjacent to, a stream, which area is subject to being inundated by the base flood in any given year.

d. "Flood-proofing" means a combination of structural provisions, changes, or adjustments to lands, properties, and structures subject to flooding, primarily for the reduction or elimination of flood damages to lands, properties, structures, and contents of buildings in a flood-hazard area.

10. As may be permitted by law, the head of each State agency shall issue appropriate rules and regulations to govern the carrying out of the provisions of this order in consultation with the Colorado Land Use Commission.

11. This Order shall take effect on October 1, 1977.

GIVEN under my hand and the Executive Seal of the State of Colorado, this 1st day of October, A.D., 1977.

Richard D. Lamm
Governor

Executive Order 8491 (page 1 of 3)

State of Colorado

EXECUTIVE CHAMBERS

DENVER

RICHARD D. LAMM
Governor

EXECUTIVE ORDER No. 8491

EVALUATION OF FLOOD HAZARD IN LOCATING STATE BUILDINGS, ROADS, AND OTHER FACILITIES, AND IN REVIEWING AND APPROVING SEWAGE AND WATER FACILITIES, AND SUBDIVISIONS

WHEREAS, hazardous uses of Colorado flood plains are occurring and potential flood losses and loss of life are increasing despite substantial efforts to control floods; and

WHEREAS, economic losses due to floods in Colorado during the last twelve years place Colorado near the top of the Nation's list for per capita losses; and

WHEREAS, past inadequate land use policy and controls led to the major disaster in the Big Thompson Canyon on July 31, 1976; and

WHEREAS, minimum flood plain and floodway regulation criteria have been promulgated by the Colorado Water Conservation Board and the Colorado Land Use Commission on the premise that wise use of our State's flood plains is the key to controlling and minimizing future economic losses and suffering of our citizens; and

WHEREAS, wise use of our flood plains will promote public health, safety and welfare, reduce future public costs for relief and rehabilitation and contribute to the State's economy; and

WHEREAS, the State of Colorado has extensive and continuing programs for the construction of buildings, roads, and other facilities and further, State Agencies are involved in the review and approval of water and sewer treatment plants, subdivisions, trailer parks, campgrounds, and many other facilities throughout the State of Colorado; and

WHEREAS, both Federal and State Agencies have compiled significant data and studies concerning the frequency of floods and the location of flood plains and are expert at estimating flood hazards;

NOW, THEREFORE, by virtue of the authority vested in me as Governor of Colorado, it is hereby ordered as follows:

Executive Order 8491 (page 2 of 3)

1. The heads of State agencies shall provide leadership in encouraging a broad and unified effort to prevent uneconomic uses and development of Colorado flood plains and in particular, to promote the public health, safety and welfare and to reduce the risk of flood losses in connection with Colorado lands and installations and State financed or supported improvements.

2. All State agencies directly responsible for the construction of State buildings, structures, roads, overnight campgrounds, or other facilities shall evaluate flood hazards when planning the location for new facilities and as far as practicable shall preclude the uneconomic, hazardous, or unnecessary use of flood plains in connection with such facilities.

3. Whenever practical and economically feasible, flood proofing measures shall be applied to existing facilities to reduce flood damage potential.

4. The Colorado Water Conservation Board and the Land Use Commission in cooperation with the appropriate state and federal agencies shall continue to undertake the evaluation of hazardous flood plain uses in the State of Colorado, proceed with the identification of flood plains, and prepare suitable flood disaster preparedness plans in cooperation with affected cities and counties, including an effective flood insurance information program, early warning system, and related steps to protect against future loss of life and unnecessary economic losses. Priority shall be given to the numerous hazardous canyons in the State of Colorado.

5. All State agencies responsible for the review and/or approval of sewage treatment plants, water treatment plants, interceptor sewers, subdivisions, trailer parks, and other facilities within the State of Colorado shall evaluate flood hazards in writing in connection with such review and approval of facilties and take measures to minimize the exposure of facilities, and development which they may induce, to potential flood damage and the need for future State expenditures for flood protection and flood disaster relief.

6. All State agencies responsible for programs which entail land use planning shall take flood hazards into account when evaluating applications for planning grants, when reviewing water and wastewater facility plans, and area-wide wastewater management plans.

7. Requests for flood hazard information and hazard assessment may be addressed to the Colorado Water Conservation Board or the Land Use Commission.

8. Any requests for appropriations for State construction of new buildings, structures, roads, or other facilities by State agencies shall be accompanied by a statement on the findings of the agency's evaluation and consideration of flood hazards in development of such requests.

9. As used in this Order, the term "State agency" includes any department, commission, division, or other organizational entity of the executive branch of State Government.

Executive Order 8491 (page 3 of 3)

10. The State agencies shall proceed immediately to develop such procedures, regulations, and information as are provided for in, or may be necessary to carry out, the provisions of this Executive Order.

GIVEN under my hand and the Executive Seal of the State of Colorado, this first day August, A.D., 1977.

Richard D. Lamm
Governor

Appendix B - Hazard Mitigation Financial Assistance Programs

B.1 Hazard Mitigation Grant Program (HMGP or 404)

Administered by: Colorado Office of Emergency Management (OEM), 273-1622

Purpose: To support post-disaster mitigation programs

Type of assistance: 75% federal funding available for mitigation measures. Total federal funding available is limited to 15% of Federal funding provided under Public Assistance and Individual Assistance Grants.

Amount available: Federal share: 15% of FEMA disaster assistance grants

Who qualifies: All communities in Colorado may apply.

Application: The community applies to the state and establishes its own procedures for disbursing the funds

B.2 Flood Mitigation Assistance ((FMA) Program

Funded by: Federal Emergency Management Agency

Administered by: Colorado Water Conservation Board

Type of Assistance: 75% federal 25%(state or local) grant funding

Purpose: Develop local pre-disaster flood mitigation plans and implement mitigation measures identified in the plans. Provide technical assistance to local governments to adopt plans and implement mitigation measures.

Amount available: $100,000 (minimum) annually for projects; $11,900 for plans; $10,800 for technical assistance.

Who qualifies: Local and state government

Application: Annually. Contact the Colorado Water Conservation Board

Appendix C - Mapping Tips in the Event of a Flood

Mapping

1. **What is the role of the local community in its flood hazard study and mapping process?**

   Before the flood hazard study is initiated, FEMA considers all available existing information for use in the study. Public meetings may be conducted allowing interested parties to present relevant facts to help ensure accurate results. FEMA also works closely with each community's officials before and during the study to describe the technical procedures and to obtain community input before publication of the Flood Insurance Study (FIS) and Flood Insurance Rate Map (FIRM). Before the FIS is started, community officials, FEMA representatives, and the study contractor meet to discuss the areas in the community that need to be studied. This is called the time and cost estimate meeting.

2. **How are the flood hazard areas and flood levels determined?**

   Flood hazard areas are determined using statistical analyses of records of river flow, storm tides, and rainfall; information obtained through consultation with the community; floodplain topographic surveys; and hydrologic and hydraulic analysis. The detailed FIS covers those areas subject to flooding from rivers and streams, along coastal areas and lakeshores, or in shallow flooding areas, but do not include areas of less than one square mile.

   Although FEMA may issue a LOMA, it is the lending institution's prerogative to require flood insurance as a condition of its own beyond the provisions of the Flood Disaster Protection Act of 1973 before granting a loan or mortgage. Those seeking a LOMA should first confer with the affected lending institution to determine whether the institution will waive the requirements for flood insurance if a LOMA is issued. If the lender accepts the LOMA, the policyholder may cancel the flood insurance coverage and obtain a premium refund.

Appendix D - Mitigation Strategies and Measures

D.1 Mitigation Strategies

There are basic strategies that may be applied to mitigate flood hazards. Each strategy has different measures that are appropriate for different conditions. In many communities, a different person may be responsible for each strategy. The strategies are described briefly below (see ***figure D-2)***.

Planning:

Through prevention, flood problems are kept from getting worse. The use and development of flood-prone areas is limited through planning, land acquisition, or regulation. Building, zoning, planning, and/or code enforcement offices usually administer preventive measures.

Property protection:

Property owners on a building-by-building or parcel basis usually undertake property protection. Government agencies can provide information and technical or financial assistance to owners who want to elevate, floodproof, insure, or otherwise protect their property.

Emergency services:

Emergency measures are taken during a flood to minimize its impact These measures are the responsibility of city or county emergency management staff and the owners or operators of critical facilities.

Flood control:

Keeping floodwaters away from an area with a levee, reservoir or other structural project is the goal of flood control. Flood control activities are usually designed by engineers and managed or maintained by public works staff.

Prevention

Prevention measures are designed to keep the problem from occurring or getting worse. They ensure that future development does not increase flood damage or they maintain the drainage system's capacity to carry away floodwaters.

D.1.1 Planning

Comprehensive plans and land use plans identify how a community should be developed. Generally, a plan has limited authority. It reflects what the community would like to see happen. Its utility is that it guides other local measures, such as capital improvement programs, zoning ordinances, and subdivision ordinances. The ordinances are covered in later sections.

A community's capital improvement program identifies where major public expenditures will be made over the next 5 to 20 years. Capital expenditures may include acquisition of land for public uses, such as parkland, and extension or improvement of roads and utilities.

If the community's long range plan calls for preserving the floodplain as open space, then the capital improvement program should support the plan by acquiring floodprone areas for parks and by not improving or extending roads into the floodplain.

Where appropriate: All communities that expect growth and are willing to guide it are prime candidates for developing land use plans.

Limitations: Plans are only as strong as the local authorities want them to be. To be effective, they must be implemented, which may require additional legal measures, such as a zoning ordinance.

For more information: Technical advice can be found at the county planning agencies.

D.1.2 Zoning

A zoning ordinance regulates development by dividing the community into zones or districts and setting development criteria for each district: There are two approaches that can prevent inappropriate floodprone development: separate districts and overlay zoning.

Separate districts: The floodplain can be designated as one or more separate zoning districts that only allow development that is not susceptible to damage by flooding. Appropriate districts include public use, conservation, agriculture, and cluster or planned unit developments that keep buildings out of the floodplain, wetlands, and other areas that are not appropriate for intensive development.

For More Information

Appendix A - Includes definitions, acronyms, and references used in the preparation of this plan.

Appendix B - Includes information on financial assistance programs.

Appendix C - Includes tips to minimize loss of life & property in the event of a flood.

Appendix D - Includes mitigation strategies and measures.

Appendix E - Includes mitigation planning examples.

Overlay zoning adds special requirements in areas subject to flooding. The areas can be developed in accordance with the underlying zone, provided the flood protection requirements are met. As illustrated on the next page, there may also be setbacks or buffers to protect stream banks and shorelines or to preserve the natural functions of the channels and adjacent areas.

Where appropriate: Communities that expect development or redevelopment should adopt zoning ordinances.

Flood Hazard Mitigation Measures

Prevention
- Planning
- Zoning
- Open space preservation
- Floodplain regulations
- Wetland regulations
- Stormwater management
- Watershed measures
- Soil erosion and sediment control
- Channel maintenance
- Drainage protection
- Real estate disclosure

Property Protection
- Building relocation
- Acquisition
- Building elevation
- Barriers
- Dry floodproofing
- Wet floodproofing
- Sewer backup protection
- Sewer backup protection
- Insurance
- Community programs

Emergency Services
- Flood threat recognition
- Flood warning
- Flood response
- Critical facilities
- Health and safety maintenance

Flood Control
- Reservoirs
- Levees and floodwalls
- Diversions
- Conveyance improvements
- Drainage/sewer improvements

Figure D-2

Limitations: Some zoning regulations have been nullified because they placed too many restrictions on the use of private property and those restrictions could not be justified as needed for public health, safety or welfare. Some zoning requirements have been nullified when the community did not develop the technical data to support them.

D.1.3 Open Space Preservation

Keeping the floodplain open - free from development - is the best approach to preventing flood damage. Preserving open space is beneficial to the public in several ways. By preserving floodplains and natural sites for water storage, such as wetlands and low-lying areas, important recreational areas are secured while habitats for local flora and fauna are similarly protected.

Floodplains are excellent sites for scenic recreation areas and greenways. Local governments have prevented millions of dollars in flood damage through their open space preservation programs of floodprone areas. Open space preservation should not be limited to floodplains, as some sites in the watershed may be key to controlling runoff that adds to the flood problem.

Land use and capital improvement plans should identify areas to be preserved by acquisition and other means. Purchasing property with an easement, enables the land owner freedom to develop and use private property in the floodplain. If the owner agrees to not build on the floodprone parcel taxes are reduced. In some cases, the owner is allowed to develop the area for low hazard uses or to transfer the right to develop other flood-free parcels (known as **"TDR"** or transfer of development rights).

Easements do not always have to be purchased. Flood flow, drainage, or maintenance easements can be required of developers as a condition for approving the development. These are usually linear parcels along property lines or channels.

Streamside property owners in return for a community channel maintenance program also can provide maintenance easements.

Where appropriate: Open space preservation is encouraged in undeveloped areas in floodplains, wetlands, other watershed storage areas, natural areas, and along streams and drainageways.

Limitations: Reaching agreement on an easement can be complicated. Enforcing it requires vigilance by the community.

For more information: Technical advice can be found at the county planning agencies and OEM. There may be funding programs to help acquire open space for recreational use or to preserve natural areas,

D.1.4 Floodplain Regulations

In addition to zoning ordinances, regulations on construction in floodplains are usually found in one or more of three locations: subdivision ordinance, building code, and/or a separate ***"stand alone"*** floodplain ordinance.

If the zoning for a site allows a structure to be built, then the applicable subdivision and building regulations will

impose construction standards to protect buildings from flood damage and prevent the development from aggravating the flood problem.

Subdivision regulations: Subdivision regulations govern how land will be subdivided into individual lots, often requiring that every lot have a buildable area above flood level.

These regulations set construction and location standards for the infrastructure provided by the developer, including roads, sidewalks, utility lines, storm sewers and drainage-ways. *(Storm sewer and drainage standards are discussed* in the *section on Stormwater management)*

Building codes: The building code should establish flood protection standards for all construction. These should include criteria to ensure that the foundation will withstand flood forces and that all portions of the building subject to damage are above, or otherwise protected from, flooding.

Some Colorado communities have adopted the Building Officials and Code Administrators' (BOCA) National Building Code. The 1997 edition sets standards for protecting foundations against flood damage, including requirements for soil testing and prepared fill.

Minimum regulatory requirements: Most communities with a flood problem in Colorado participate in the National Flood Insurance Program (NHP). The NFIP sets minimum requirements for participating communities' subdivision regulations and building codes. Communities are encouraged to adopt local ordinances, which are more stringent than the state or federal criteria. This is especially important in areas with older maps that

Minimum Floodplain Regulation Requirements

The National Flood Insurance Program (NFIP) is administered by the Federal Emergency Management Agency (FEMA). As a condition of making flood insurance available for their residents, Colorado communities agree to regulate new construction in the 100-year floodplain. To reduce confusion, the 100-year floodplain is called the "base floodplain" and the elevation of the 100-year flood is known as the base flood elevation."

The base floodplain is shown as the 'Special Flood Hazard Area" on the Flood Insurance Rate Map (FIRM) provided by FEMA. The base floodplain is designated as an "A" Zone. The 500-year floodplain is shown as a "B" Zone and areas above the 500-year flood level are shown as "C" Zones. On newer maps, the B and C zones are called 'X' zones. The designation as B, C, or X Zone does not mean that the area is not subject to local drainage problems or overbank flooding from streams or ditches smaller than the FEMA mapping criteria.

Additional floodplain regulatory requirements are set by state law. These are the minimum floodplain requirements. Cities and counties often have additional or more restrictive regulations.

1. All development must have a permit from the community. Development is defined as any man-made change to the land, including new buildings, improvements to buildings, filling, grading, mining, dredging, etc.

2. Only "appropriate uses" are allowed in the floodway. The floodway is the channel and central portion of floodplain that is needed to convey the base flood. Appropriate uses include flood control structures, recreational facilities, detached garages and accessory structures, floodproofing activities, and other minor alterations. They do not include buildings, building additions, fences, or storage of materials. The result of this requirement is that vacant floodways will essentially remain as open space, free of insurable buildings or other obstructions.

3. New buildings are allowed outside the floodway, but they must be protected from damage by the base base flood. Residences must be elevated above the base flood elevation. Nonresidential buildings must be elevated or floodproofed.

4. When an addition, improvement or repair to an existing building is valued at more than 50% of the value value of the original building, then it is considered a substantial improvement. A substantial improvement is treated as a new building.

5. Any filling, building or other obstruction placed in the floodplain reduces the amount of floodwater that can be stored. Developers must remove an equal or greater volume of fill to compensate for the loss of storage.

Figure D-3

may not reflect the current hazard. These could include prohibiting damage-prone uses (such as garages, sheds, parking lots and roadways) from the floodway or requiring structures to be elevated one or more feet above the base flood elevation.

Where appropriate: Any area with surface flooding is appropriate for floodplain regulations.

Limitations: As with any regulatory program, property owners may not be aware of the need for permits, or may resist getting permits, especially after a flood.

Because many existing floodplain maps are out of date, caution should be exercised when utilizing them for regulations. Conservative safety factors are highly recommended. Some of the requirements, such as floodway construction criteria or substantial improvement rules, can be technically complicated. However, assistance is available from FEMA, CWCB and OEM.

For more Information: Technical assistance can be found at the county planning agencies.

D.1.5 Wetland Protection Regulations

Wetlands are usually found in floodplains or depressional areas. They provide numerous natural and beneficial functions that warrant protection. Many wetlands in Colorado are subject to the Corps of Engineers' Section 404 regulations. Corps permits are required for projects that will place fill or dredged materials in a wetland. Before a permit is issued, the plans are reviewed by several agencies, including the US Fish and Wildlife Service and the US Environmental Protection Agency. Some communities also have their own wetland protection programs. Local programs are important for addressing gaps in the federal regulations, particularly for smaller wetlands and unregulated activities.

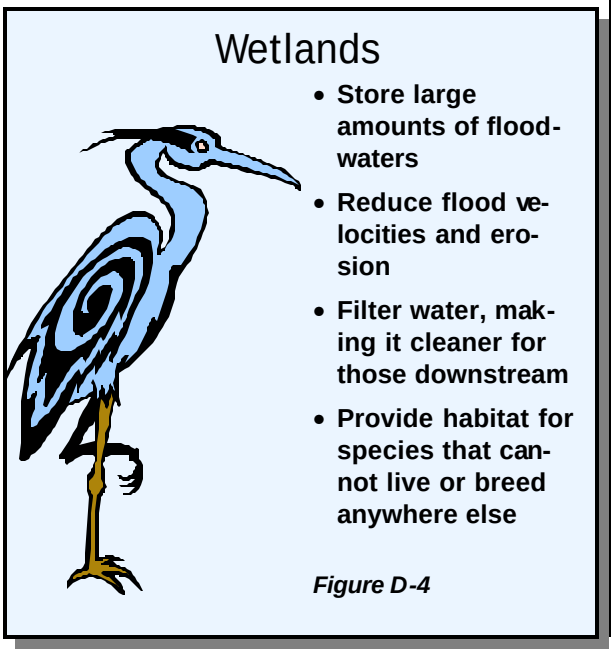


Figure D-4

Where appropriate: Any community that seeks to preserve the natural and beneficial functions of wetlands should consider instituting wetland regulations.

Limitations: In many areas, smaller wetlands are not mapped, so projects may be built by owners who don't know the area should be protected. The Corps' authority is generally limited to filling wetlands. They can be impounded or otherwise damaged without a 404 permit being required. Therefore, communities should consider their own more comprehensive regulations.

For more Information: Technical advice can be found at the county stormwater planning agencies, the US Army Corps of Engineers, the US Fish and Wildlife Service, and the US Environmental Protection Agency.

D.1.6 Stormwater Management

Development outside a floodplain can contribute significantly to flooding problems. Runoff is increased when natural ground cover is replaced by urban development.

Unconstrained watershed development often will aggravate downstream flooding and overload tile community's drainage system. Effective stormwater management policies require developers to build detention basins and utilize other "best management practices" ("BMPs") to minimize increases in runoff rates and volumes in comparison to pre-development conditions.

Many developments utilize wet basins as landscaping amenities and for water quality BMPs. In some cases, watershed planners identify the most effective location for a basin. Communities then require developers to contribute funds for a regional basin in lieu of constructing on-site detention. Since detention only controls runoff rates, and not runoff volumes, there is a need for other BMPs to enhance the infiltration of stormwater. Swales, infiltration trenches, vegetative filter strips, and permeable paving blocks are recommended additions to the standard detention requirements. Stormwater management requirements are generally found in subdivision ordinances.

Where appropriate: Stormwater management requirements are encouraged for all new developments.

Limitations: The community must bear the cost of maintaining detention features after the developer leaves. Even with the best BMPs, development will increase runoff volumes.

For more information: Technical advice can be found at the county planning agencies, CWCB, OEM, and the Association of Flood and Stormwater Managers.

D.1.7 Watershed Measures

Agricultural practices also can cause stormwater problems. Subsurface drainage and row cropping can speed

the runoff onto downstream properties. Because farmland is usually bare, stormwater runoff can carry large amounts of sediment that can fill in downstream drainage facilities.

Ultimately, flood prevention must be viewed from a watershed perspective. Watershed measures should emphasize approaches that reduce runoff volumes and storing surface runoff naturally.

The runoff can be slowed down by watershed measures, such as vegetation, terraces, contour plowing and no-till farm practices. Slowing runoff on the way to a drainage channel increases infiltration into the soil and controls the loss of topsoil from erosion and the resulting sedimentation.

Protecting areas that naturally hold water is another effective type of watershed measure. Most watersheds have wetlands, depressions and other natural storage areas, which, if preserved from development, help reduce the impact of urbanization.

Where appropriate: Modifications to farming practices and urban development are most effective on steeper slopes where the most runoff and erosion occurs. Preserving storage areas is most effective in flat areas with natural depressions.

Limitations: These measures are usually implemented in areas beyond a municipality's jurisdiction. It can be hard to convince owners of property who are not near the flood problem to modify their drainage practices at their own expense.

For more information: Soil and Water Conservation Districts and their Natural Resources Conservation Service staff have both the expertise in watershed measures and the contacts with watershed landowners.

D.1.8 Soil Erosion and Sediment Control

As rain hits the ground - especially where there is bare dirt, as on farm fields and at construction sites - soil is picked up and washed downstream. This erosion of soil produces sedimentation in waterways that may be far from the eroded area. Sediment tends to settle where the river slows down and will gradually fill in the channel. Erosion and sediment control has two principal components: minimize erosion with vegetation and capture sediment before it leaves the site. Specific measures can be taken on farms and construction sites.

Farm practices such as contour plowing, terracing and no-till help reduce agricultural erosion and keep topsoil where it is needed. Soil loss can be cut at construction sites with techniques such as mulching, seeding, and erosion blankets. Silt fences and sediment traps slow runoff so sediment is dropped on-site before it gets to a watercourse. The key is to get these measures used, particularly on construction sites or at the downstream end of plowed fields.

Where appropriate: All watersheds are candidates for erosion and sediment control measures.

Limitations: As with any regulatory program. the community must have trained staff to educate developers and property owners, to monitor compliance, and to enforce the requirements.

For more information: Soil and Water Conservation Districts and their Natural Resources Conservation Service staff have both the expertise in watershed measures and the contacts with watershed landowners.

D.1.9 Channel Maintenance

Channel maintenance is an ongoing program to clean out blockages caused by overgrowth or debris. Public works or drainage districts crew usually does this work. Channel maintenance addresses vegetative growth and debris that can block flows. Channel maintenance activities normally do not affect the shape of the channel, but they do affect how well the channel can do its job.

Where appropriate: Smaller streams in all watersheds should be the targets of channel maintenance programs. Annual cleanup campaigns should be conducted in late fall through winter, before spring flows and when there are no leaves restricting visibility.

Limitations: If done improperly, channel clearing can allow bank erosion and destroy natural habitats. Channel inspection and maintenance must be conducted year-round. Property owners must consent to the maintenance program, in many cases, which may require legal negotiations to obtain maintenance easements.

For more information: Soil and Water Conservation Districts and their Natural Resources Conservation Service staff have both the expertise in watershed measures and the contacts with watershed landowners.

D.1.10 Drainage Protection

Small amounts of debris can accumulate or be accidentally or intentionally dumped into channels and detention basins. They obstruct low flows or accumulate to become major blockages. Stream dumping regulations are one approach to preventing intentional placement of trash or debris in watercourses.

Many communities have nuisance regulations that prohibit dumping garbage or other "objectionable waste" on public or private property. Some prohibit the discharge of polluted waters into natural outlets or storm sewers. Waterway dumping regulations need to also apply to "non-objectionable" materials, such as grass clippings or tree branches, which can kill ground cover or cause obstructions.

Many people do not realize the consequences of their actions. They may, for example, fill in the ditch in their front yard not realizing that it is needed to drain street runoff. Similarly, they may not understand how regrad-

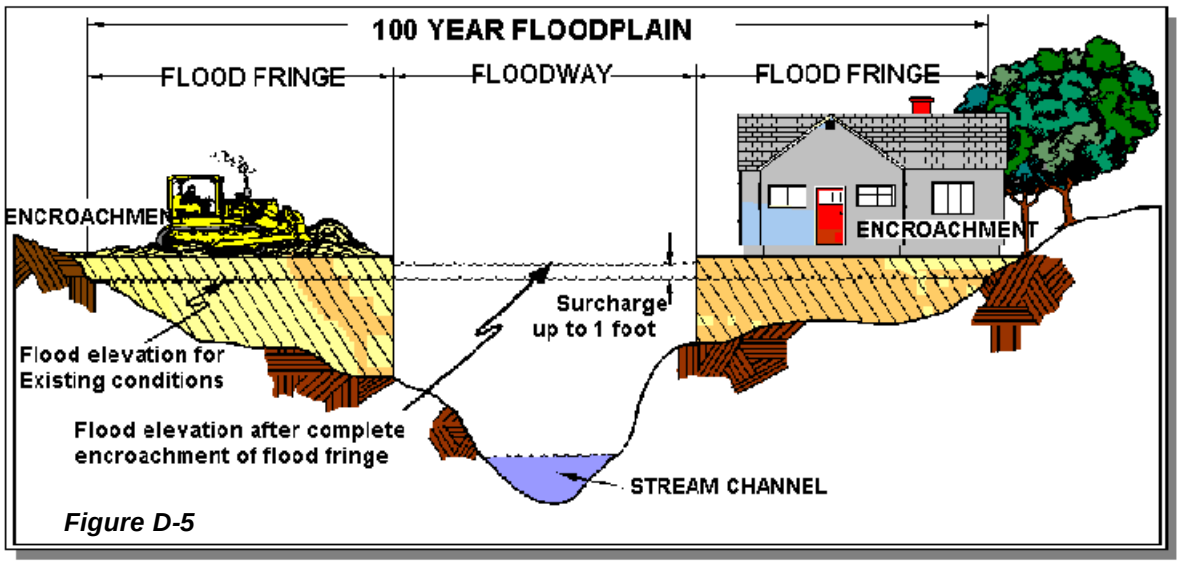


Figure D-5

ing their yard, or discarding leaves or branches in a watercourse can cause a problem.

Therefore, a drainage protection program should include public information materials that explain the reasons for the rules as well as the penalties. Regular inspections to catch violations also should be scheduled.

Where appropriate: All waterways, including street ditches, should be placed under stream dumping regulations. Obstructions have their greatest impact in smaller streams and ditches, so an anti-dumping program has its greatest effect there.

Limitations: Finding dumped materials is easy; locating the source of the refuse is hard. Usually the owner of property adjacent to a stream is responsible for keeping the stream clean. This may not be fair for sites near bridges and other public access points

For more Information: Example dumping ordinance language can be found in the NFIP Community Rating System - ***CRS Credit for Drainage System Maintenance***. Public information examples are in ***CRS Credit for Outreach Projects.***

D.1.11 Real Estate Disclosure

Many times after a flood, people say they would have taken steps to protect them-selves if only they had known they had purchased a floodprone property. Federal law requires that a potential purchaser of a parcel be told of any flood hazard.

Federal Law: Federally regulated lending institutions must advise applicants for a mortgage or other loan that is to be secured by an insurable building that the property is in a floodplain as shown on the Flood Insurance Rate Map. Because this requirement has to be met only five days before dosing, often the applicant is already committed to purchasing the property when he or she first learns of the flood hazard.

This requirement does not affect renters or instances where properties are purchased without mortgages from federally regulated lenders. Enforcement of this law is up to the federal agencies that regulate lending institutions, such as the FDIC.

Where appropriate: Real estate disclosure can help everywhere.

Limitations: Enforcement of these regulations can be difficult. Compliance with the federal lending requirements has been spotty, but has been improving in recent years. The best approach for a community is to work with the local real estate agencies to encourage them to use the latest maps and provide assistance to them as needed.

For more Information: Information on the federal lending requirements can be obtained from the FEMA Region 8 Mitigation Division. The basic reference is ***Mandatory Purchase of Flood Insurance Guidelines.***

D.2 Property Protection

Property protection measures are used to modify buildings subject to flood damage rather than to keep floodwaters away. A community may find these to be inexpensive measures because often they are implemented by or cost shared with property owners. Many of the measures do not affect the buildings' appearance or use, making them particularly appropriates for historical sites and landmarks.

D.2.1 Building Relocation

Moving a building to higher ground is the surest and safest way to protect it from flooding. While almost any building can be moved, the cost goes up for heavier

structures, such as those made of brick, and for large or irregularly shaped buildings. There are many experienced house movers in Colorado who know how to handle any job.

Where appropriate: Communities with areas subject to flash flooding, deep waters or other high hazard where the only safe approach is to remove the building should consider a relocation program.

Smaller, wood frame buildings on crawlspaces or basements are easier to move because they are lighter and it is easier to place jacking and moving equipment underneath the floor.

Relocation is also preferred for large lots with portions outside the floodplain or where the owner has a new flood-free lot available.

Limitations: Relocation can be expensive. The cost can average $25,000 and exceed *$50,000* depending on the type, weight and size of the house, whether it has to be cut and moved in parts, and the cost of a new lot However, there are some government loans or grants available Buildings that have suffered frequent flooding may be contaminated or structurally weakened and should be demolished.

For more Information: The following information is available from The Hazards Center in Boulder. ***Elevating or Relocating a House to Reduce Flood Damage, Design Manual for Retrofitting Flood-prone Residential Structures,*** **and** ***Protect Your Home from Flood Damage.***

D.2.2 Acquisition

Like relocation, acquisition ensures that buildings in a floodprone area will cease to be subject to damage. The major difference is that acquisition is undertaken by a government agency, so the cost is not borne by the property owner, and the land is converted to public use, such as a park.

Acquiring and clearing buildings from the floodplain is not only the best flood protection measure available, it is also a way to convert a problem area into a community asset and obtain environmental benefits.

Occasionally acquisition and relocation projects are undertaken jointly. The purchasing agency sells the building for salvage and the new owner relocates the structure rather than demolishes it.

Sometimes arrangements are made to allow the previous owner to buy back the building at the salvage value. This way, the owner gets to keep the house but have enough money from the sale to pay for a new lot and moving expenses.

Where appropriate: While acquisition works against any type of flood hazard, it is more cost-effective in areas subject to flash flooding, deep waters, or other severe flood hazards where other property protection measures are not feasible.

Communities that want to clear floodprone areas, or redevelop them for other uses, such as recreation or riparian habitat, will find acquisition to be necessary. Acquisition, followed by demolition, is most appropriate for buildings that are too expensive to move -- such as larger, slab foundation, or masonry structures -- and for dilapidated structures that are not worth protecting.

Limitations: Cost is the number one concern with acquisition. An acquisition budget should be based on the median price of similar properties in the community, plus $10,000 to $20,000 for appraisals, abstracts, title opinions, relocation benefits and demolition.

Cost may be lower following a flood. For example, the community may have to pay only the difference between the full price of a property and the amount of the flood insurance claim received by the owner.

Communities should avoid creating a ***"checkerboard"*** acquisition pattern in which nonadjacent properties are acquired. This can occur when some owners, especially those who have and prefer a waterfront location, prove reluctant to leave. Creation of a checkerboard in a community simply adds to maintenance costs that taxpayers must support.

Smaller towns may be concerned if a large area is affected, for they may risk losing residents, businesses and/or revenue from property taxes and utility fees.

For more Information: The following information is available from The Hazards Center in Boulder. ***Elevating or Relocating a House to Reduce Flood Damage, Design Manual for Retrofitting Flood-prone Residential Structures,*** **and** ***Protect Your Home from Flood Damage.***

D.2.3 Building Elevation

Raising a house above the flood level is the best way to protect a structure that cannot be removed from the floodplain. Water flows under the building, causing no damage to the structure or its contents.

Raising a building above the flood level is cheaper than moving it, and can be less disruptive to a neighborhood. Commonly practiced in flood-prone areas nationwide, this protection technique is required by law for new and substantially damaged residences located in a floodplain. House moving contractors know the techniques to elevate a building.

Elevating a structure will change its appearance. If the needed degree of flood protection is low, the result is similar to putting a house on a two or three foot crawlspace. If the house is raised two feet, the front door would be three steps higher than before. If the house is

raised eight feet, the lower area can be wet flood-proofed for use as a garage and for storage of items not subject to flood damage.

Where appropriate: Smaller, wood frame buildings on crawlspaces are the cheapest to elevate. Use of this technique is safest where flood depths do not exceed six feet and velocities are slow.

Limitations: Elevation can be expensive. The price to raise a wood frame building on a crawlspace has run as low as $5,000 when the owner does much of the work. Otherwise, the cost averages $15,000 to $25,000. Raising a structure with brick walls resting on a slab foundation can cost *$25,000* to *$50,000.*

During flooding, the building may be isolated and without utilities, and therefore unusable. Newly created lower stories may be occupied or used for storage, putting household goods at risk for flood damage.

Some owners object to the change in appearance and are concerned that their home will stand out and affect property values.

For more Information: The following information is available from The Hazards Center in Boulder. ***Elevating or Relocating a House to Reduce Flood Damage, Design Manual for Retrofitting Flood-prone Residential Structures,*** **and** ***Protect Your Home from Flood Damage.***

D.2.4 Barriers

Barriers - levees, floodwalls and berms - keep floodwaters from reaching a building. Plans for using these structures must include ways to handle leaks, water seepage under the barrier and rainwater that accumulates inside the barrier. Therefore, they need a sump and/or drain tile to collect the internal ground and surface water, a pump to remove the water, and a pipe to send it over the barrier. Berms are commonly used in areas subject to shallow flooding. Not considered engineered structures, berms are made by regrading or filling an area.

Low floodwalls may be built around stairwells to protect the basement and lower floor of a split-level home. By keeping water away from the building walls, the problems of seepage and hydrostatic pressure are reduced.

The cost can range from practically nothing, when the homeowner re-grades the yard or builds a berm with local fill, to $10,000 for a concrete floodwall with drain tiles and sump pump.

Where appropriate: Barriers are recommended where the depth of flooding is three feet or less. Barriers may be used to protect any type of building, although buildings with basements wall be more susceptible to underseepage. Floodwalls are more appropriate on small lots where there is little room for a levee. Care must be taken in locating barriers. They must be placed so as not to create flooding and/or drainage problems on neighboring properties. All barriers must be kept out of regulatory floodways.

Limitations: Private levees, floodwalls and berms are more susceptible to deterioration than publicly-held structures, as maintaining them falls to the property owner, not a public agency.

Private barriers do not eliminate the need for flood insurance, as they normally address only smaller, more frequent floods. They often have to rely on human inter-

Mitigation - Elevated House in the Floodplain

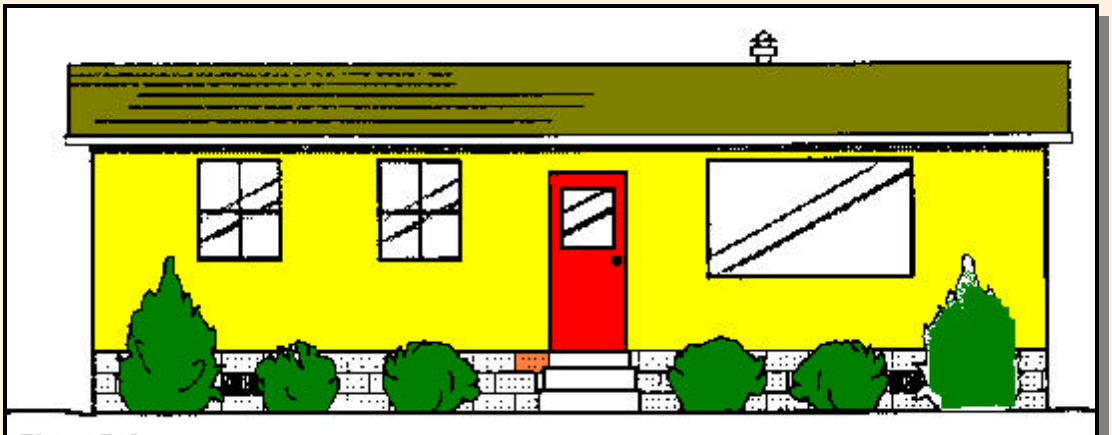


Figure D-6

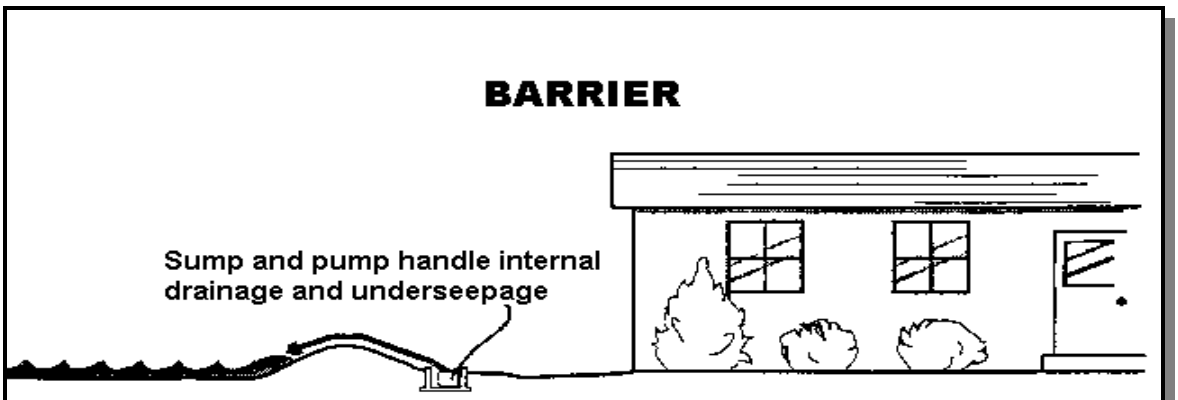


Figure D-7

vention to close openings or operate pumps. Insurance is needed for those times when there is no one present who knows what to do when the flood arrives.

For more Information: The following information is available from The Hazards Center in Boulder. ***Design Manual for Retrofitting Flood-prone Residential Structures,*** **and** ***Protect Your Home from Flood Damage.***

D.2.5 Dry Floodproofing

Through dry floodproofing, a building is sealed against floodwaters. Buildings with crawlspaces generally are not dry floodproofed because water can seep under walls into the crawlspace. However, two kinds of structures can benefit from dry floodproofing.

Buildings on slab: All areas below the flood protection level are made watertight. Walls are coated with waterproofing compounds or plastic sheeting. Openings, such as doors, windows, sewer lines and vents, are closed either permanently, with removable shields, or with sandbags. Many dry floodproofed buildings cannot be distinguished from those that have not been modified.

Where appropriate: Dry floodproofing should be used only where the flood depth is less than three feet, and floodwaters will have little velocity. Most building walls and floors are not strong enough to withstand the hydrostatic pressure from more than three feet of water.

Buildings with basements: Houses with basements or other floors below grade can be protected with a backfill approach. A waterproofing compound is applied to the walls and fill is placed against the side of the house. The goal is to protect the house against contact with surface water or saturated ground. Such contact will greatly increase the amount of pressure against the basement walls, which may result in structural failure. Therefore, installation of a subsurface drain tile and one or two sump pumps is a must. Properly sized drains and pumps can handle any water that will naturally seep through the fill to reach the house.

Where appropriate: Buildings with basements or floors below grade may be dry floodproofed only with the waterproofing berm approach shown above and only where the flood protection level is lower than the first floor. In such a situation, the basement area should not be used as a bedroom where the occupants could be caught by surprise if water comes in.

Limitations: Dry floodproofing may involve closing openings and turning on pumps. These actions are dependent on adequate warning and the presence of someone who knows what to do.

As with barriers, flood insurance is highly recommended for those occasions when the protection level is overtopped or when there is no one available to take the proper steps.

An owner may be tempted to try to keep out floodwaters deeper than the design flood protection level. This can result in collapsed walls, buckled floors and danger to the occupants. It should be noted that floodplain management regulations do not allow new buildings to be dry floodproofed.

For more Information: The following information is available from The Hazards Center in Boulder ***- Design Manual for Retrofitting Flood-prone Residential Structures, and Protect Your Home from Flood Damage.*** Also, the Stormwater Floodplain Managers Association, CWCB, and OEM can offer technical assistance.

D.2.6 Wet Floodproofing

"Wet floodproofing" includes protection measures that deal with floodwaters in the building. Wet floodproofing approaches range from moving a few valuable items to rebuilding the flood prone area (see ***Figure D-9***).

Water standing on the ground outside a basement will quickly build up pressure against the basement walls, putting the equivalent pressure of six to seven feet of

water on the walls and floor. Most wails and floors are not built to withstand hydrostatic pressure of more than three feet of water. As a result, sometimes basement walls and floors that have been waterproofed may be cracked, buckled or broken by the pressure of floodwater.

Wet floodproofing has one advantage over the other approaches: No matter how little is done, flood damage will be reduced. Simply moving furniture and electrical appliances out of the floodprone area can prevent thousands of dollars in damage.

Where appropriate: Wet floodproofing will work wherever there is an area above the flood protection level to which items can be relocated or temporarily stored.

Wet floodproofing works best in buildings with unfinished basements, garages, sheds, commercial and industrial facilities, and buildings with contents that are either water-resistant or easily moved. One-story houses are not appropriate for wet floodproofing because the likely flooded zone comprises living areas.

Many wet floodproofing techniques can be incorporated during repairs, reconstruction or remodeling. For example, damaged wallboard in a basement can be removed and the concrete wails can be covered with water-resistant paint. Wet floodproofing is sometimes the only way to protect a historic building that cannot be moved or elevated.

Limitations: Owners are often reluctant to "abandon" large areas of their buildings in anticipation of a flood. A plan to move contents relies on adequate warning and the presence of someone who knows what to do. Flood insurance is highly recommended for those occasions when the protection level is overtopped or when there is no one available to take the proper steps. There will still be a need for clean up, with its accompanying potential for health problems.

For more Information: The following information is available from The Hazards Center in Boulder. ***Design Manual for Retrofitting Flood-prone Residential Structures, and Protect Your Home from Flood Damage.*** Also, **CWCB and OEM can offer technical assistance.**

D.2.7 Sewer Backup Protection

In areas where sanitary and storm sewers are combined, basement flooding can be caused by stormwater overloading the system and backing up into the basement through the sanitary sewer line.

In areas where sanitary and storm waters are carried in separate pipes, the same thing can happen when there are cross connections between the storm and sanitary sewers or infiltration or inflow problems in the lines.

Houses which have downspouts, footing drain tile, and/or the sump pump connected to the sanitary sewer service may be inundated when heavy rains overload the system. If allowed by the local code, these should be disconnected. Rain and ground water should be directed out onto the ground, away from the building.

Four other approaches may be used to protect a structure against sewer backup: floor drain plug, floor drain standpipe, overhead sewer, and backup valve.

The first two devices keep water from flowing out of the lowest opening in the house, which is the floor drain. They cost less than $25. However, if the water gets deep enough in the sewer system, it can flow out of the next lowest opening in the basement, such as a toilet or laundry tub.

The latter two devices are more secure, but more expensive ($3,000 to $4,000). An overhead sewer, as illustrated on the next page, keeps water in the sewer line during a backup. A backup valve allows sewage to flow out while preventing backups from flowing into the house.

In one city when flooding is imminent, firemen knock on the residents doors and say: "It is time to fill your basement" - The firemen lower the fire hose through the basement window and the homeowner turns on the nozzle and fills the basement with water to prevent hydrostatic pressure from collapsing the walls. Similar situations can occur in Colorado.

Figure D-8

Where appropriate: All four approaches are appropriate for split levels, basements, and other locations where water in the sewer lines can back up into a building. Plugs and standpipes are only useful where the backup causes shallow flooding (lower than the next lower opening).

Limitations: Plugs and standpipes need to be carefully installed, as a little debris may prevent a good seal. In older houses, sewer lines under a basement floor may be clay tiles; a buildup of pressure may break them. Sewer lines in newer houses usually are cast iron, making breakage unlikely.

For more Information: The following information is available from The Hazards Center in Boulder. ***Design Manual for Retrofitting Flood-prone Residential Structures, and Protect Your Home from Flood Damage.*** Also, **OEM can offer technical assistance.**

D.2.8 Community Programs

Property owners usually implement their own property protection measures. Therefore, a community mitigation program should include measures to encourage and assist owners. A community's plan may provide three kinds of help: pertinent information, technical advice and financial assistance.

Information: A community has passive and active ways to inform residents about flood hazards and damage mitigation.

Passive ways to provide information, such as through references in the public library may not bring immediate reductions in flood damage. However, they can have a long-term effect when people make construction or land use decisions later.

In addition to the library, many elementary and high schools have geography or science classes that are appropriate for sessions on flooding, natural hazards, and preserving the natural functions of floodplains and wetlands. The ***"Internet"*** is another source of information.

Active approaches include outreach projects, such as notices to floodprone property owners, to introduce the idea of property protection and identify sources of assistance. Other approaches, such as cable television shows, notices in public buildings, or booths at shopping centers, help but are not as effective as notices specifically directed to the owners of properties that should be protected.

More intensive efforts include distribution of handbooks and videos on property protection, public meetings with neighborhood groups, and "open houses." The last is a variation on the public meeting that includes exhibits by local contractors, insurance agents, building officials, the Red Cross, and others expert in flood protection who display their wares and answer questions.

Technical Assistance: In one-on-one sessions with property owners, community officials can provide advice and information on matters such as identifying flood hazards at the site, correcting local drainage problems, floodproofing, dealing with contractors, and funding.

Technical assistance can be given in telephone conversations, as complimentary critiques of the owner's plans or ideas, and in visits to the building. A more intensive effort is a written "flood audit," which provides the owner with a written description of the flood hazard at the site and specific recommendations to protect the site or building.

Where appropriate: Providing information and technical assistance can help every property owner, and is one of the least expensive measures a community can undertake. Every step taken by a property owner can reduce flood damages.

Low Cost Steps to Wet Floodproof a Structure

- Sewer openings, such as floor drains, must be plugged.
- Everything subject to damage by water or sediment must be moved to a higher level or out of the building. For example, the electrical panel and the furnace could be relocated to an upper floor.
- Where flooding is not expected to be deep, items needing protection may be placed on platforms or blocks.
- Owners should be prepared to move lighter items, such as lawn furniture or bicycles, after a flood warning is issued.

Figure D-9

Limitations: Some community staff members are hesitant to provide advice due to a lack of knowledge about property protection measures or concern about liability should a recommended measure fail. Both of these concerns can be overcome through training using manuals, technical assistance, and courses available from FEMA and the Corps of Engineers.

For more information: Guidance on establishing a community program to provide information and technical assistance to property owners can be found in *Flood Proofing Techniques, Programs* and *References, Local Flood Proofing Programs,* and *CRS* ***Credit for Public Information Programs.***

Appendix E - Mitigation Planning & Examples

E.1 Post-Flood Recovery and Mitigation

After a flood, a window of opportunity opens for hazard mitigation. It can be an excellent time to tap into the public's high level of interest in recovery and call upon the technical and financial assistance programs that can become available to design and implement mitigation measures.

Once the immediate response efforts and damage assessments are completed, the community should prepare a post-flood plan that addresses clearing, redeveloping, and/or rebuilding the flooded area. 'There are five reasons why this period can be so productive:

1. ***Resources*** - A flood can bring experts from various federal, state, and regional agencies and fields together to focus their attention on the community and its flood problems.
2. ***Involvement*** - The residents and elected officials will be more willing to spend time on the community's flood problems - and to try some new solutions.
3. ***Protection*** - Incorporating some property protection measures is easier during repairs and reconstruction.
4. ***Acquisition*** - It may be relatively easy to acquire and clear heavily damaged structures and start anew.
5. ***Money*** - *If* a major disaster declaration is made, several sources will make money available *to* protect or buy properties.

E.2 The Post-Flood Setting

Returning to normal will be the community's highest priority aster a flood. A number of things will impede this effort:

- The community's expenses will be increasing while its income may fall off sharply.
- Implementing emergency plans under county, state and federal rules will require participation in many unfamiliar activities. This will leave little time to assess the situation and make decisions.
- The public, and elected officials, may seek to waive building permit procedures and regulations in order to help people return too normal as fast as possible.
- Community officials will be hard-pressed to take care of their own personal needs, do their regular jobs, and at the same time assume disaster recovery and mitigation responsibilities.

For More Information

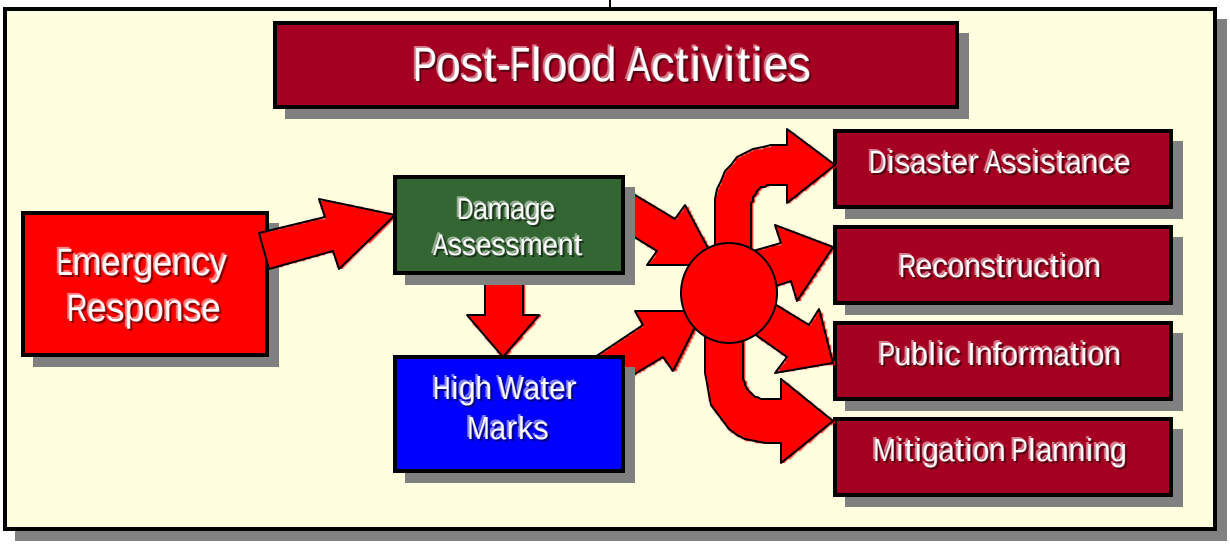
Appendix A - Includes definitions, acronyms, and references used in the preparation of this plan.

Appendix B - Includes information on financial assistance programs.

Appendix C - Includes tips to minimize loss of life & property in the event of a flood.

Appendix D - Includes mitigation strategies and measures.

Appendix E - Includes mitigation planning examples.



In short, stress will be high, patience, and the working environment unfamiliar - and there won't be enough time or money to meet everyone's expectations.

With these limitations in mind, this section covers the activities that a community should implement immediately after a flood or other disaster in the floodplain. This is only an overview of the post-flood setting. The emergency manager should know the details of emergency response, damage assessment and disaster assistance activities. The mitigation coordinator should become familiar with the reconstruction, public information, and mitigation aspects of the post-flood scene.

E.2.1 Disaster Assistance

If damage is severe enough, the governor will issue a disaster declaration and may request a similar declaration from the president. The request is sent through emergency management channels to FEMA. Several state and federal agencies provide disaster assistance, but the major ones are implemented by FEMA as authorized by the Stafford Act (see Appendix A for details). The state cooperates in the administration of the programs and shares the costs of some of them. In Colorado, the current statute authorizing FEMA's disaster assistance programs is the Stafford Act Several of the programs are known by their section numbers in the Act:

E.2.1.1 Hazard Mitigation Planning Requirements

FEMA widely publicizes the assistance programs that are made available after a disaster declaration. Three main types of assistance are available:

1. ***Public/infrastructure assistance*** provides technical and financial assistance to public agencies and certain private nonprofit organizations for the repair or replacement of damaged facilities. (This was formerly known as the Public Assistance Program.)
2. ***Human services programs*** provide resources to assist residents and business owners, such as temporary housing, unemployment aid, food stamps, grants and loans. (Many of these were formerly called the Individual Assistance Program.)
3. ***Hazard mitigation programs*** provide technical and financial resources to help reduce susceptibility to damage from a future disaster.

Each of these programs can fund mitigation measures, so the mitigation coordinator should be sure to obtain the latest information from OEM, or FEMA staff on what is covered, who is eligible, and how funds are disbursed.

E.2.1.2 Disaster Service Center Mitigation Tables

After a disaster declaration, the federal government may establish a Disaster Service Center (DSC) where people can file initial requests for aid. In the DSC, state and federal officials may set up "mitigation tables" where properly owners can sit down with mitigation experts (such as floodplain managers or code officials) to review how the flood affected their property and what they can do about it. If a DSC mitigation table is set up, the building department should either staff the table or provide materials about the community's building code requirements and permit procedures. Disaster Service Centers will not be established after every disaster. Applications for assistance may be handled through telephone hotlines or other methods. The community should determine if the method selected could be used to communicate mitigation information to residents.

E.2.1.3 Interagency Hazard Mitigation Team

After the President issues the disaster declaration, FEMA will formed an Interagency Hazard Mitigation Team within a few days of the flood. Its mission is to prepare a mitigation report.

Team members are drawn from state and federal agencies that have mitigation programs or can provide guidance on recovery and reconstruction. Many communities are represented in order to keep abreast of mitigation funding opportunities and to help ensure that the report reflects local needs.

E.2.1.4 409 Planning

After a Presidential disaster declaration was issued, Colorado is required to update this hazard mitigation plan as a condition for receiving federal disaster aid, immediately and in the future. This document often is referred to as the "409" plan, after the section in the Stafford Act that requires it.

This plan evaluates the hazard that caused the disaster, and identifies strategies for reducing the impact of similar future events. Post-disaster mitigation projects will not be eligible for funding unless they are in conformance with this plan. Also, future federal disaster assistance may be limited if the intent of the planning requirement is not met.

E.2.1.5 Public infrastructure Assistance Program

Under Section 406 of the Stafford Act, FEMA provides 75 percent of the cost of repairing or restoring facilities owned by public agencies and certain private nonprofit organizations. If an applicant prefers to relocate a facility out of the floodplain rather than replace it, FEMA will still provide funds, but at a reduced share.

The Stafford Act

404 Hazard Mitigation Grants

406 Public Infrastructure Assistance

FEMA takes the first step in obtaining Public infrastructure Assistance funding by completing a Project Worksheet ([PW) for each facility. The community should have a representative on each PW team to provide local input into the repair or replacement design for damaged facilities.

The local DSR representative should be aware that this program provides an opportunity to incorporate hazard mitigation features while replacing some damaged property. FEMA can provide funding above and beyond the cost of repairing or replacing a public facility, if a state or local regulation can demonstrate cost effective mitigation measures.

E.2.1.6 Post-Disaster Hazard Mitigation Grant Program

Section 404 of the Stafford Act makes money available to assist eligible applicants after a presidential disaster declaration. Section 404's Hazard Mitigation Grant Program will pay for 75 percent of the cost of such mitigation projects.

To be eligible, the projects should be consistent with the recommendations of the Interagency Hazard Mitigation Team's report and the Colorado 409 plan. Such projects must be shown to be cost-effective, and they may mitigate hazards other than the one that caused the disaster. If the community applies for funds to support projects on private properties, the property owner can help pay the local cost-share.

E.2.2 Local Responsibilities

Most emergency response plans do not include mitigation activities. Therefore, while the community's emergency manager will be responsible for the "normal" post-disaster operations, such as restoring services and debris removal, the mitigation coordinator should be aware of the following post-disaster responsibilities of the community.

E.2.2.1 High Water Marks

High water marks should be marked and recorded throughout the flooded area. Setting high water marks can be as simple as spray-painting lines on telephone poles or as involved as recording exact elevations. The community should check with the local stormwater agency before initiating this work, as they often send teams out to record high water marks.

The water depth data can be used to improve floodplain mapping, to relate the flood to the base flood, and to correlate the flood with an expected return frequency. Determining the return frequency of the flood - in other words, was it a 10-year flood or a 25-year flood? - is needed to evaluate the performance of existing flood control facilities and to help justify future flood mitigation measures.

The return frequency can be linked to the dollar value of the damage. That information, when compared to the cost of a proposed mitigation measure, will help determine the benefit/cost relationship of a proposed mitigation project.

E.2.2.2 Reconstruction Regulations

Not only is enforcing reconstruction regulations important to the immediate safety of the building occupants, it is an effective method of reducing future flood damage. A community in the National Flood Insurance Program must enforce its floodplain regulations in order to maintain its eligibility in the NFIP. The floodplain development permit office must ensure that substantially damaged buildings are treated as new buildings and must be elevated or otherwise protected from damage by the base flood.

E.3 Organizing for Post-Flood Mitigation

After a flood, three mitigation tasks must be undertaken simultaneously:

1. ***Monitor and regulate reconstruction*** to gather information on building conditions, ensure that the community's ordinances are being enforced and buildings are safe to reoccupy, and incorporate mitigation measures in reconstruction projects.
2. ***Inform the public*** about recovery matters and mitigation opportunities.
3. ***Prepare a mitigation plan*** *to* coordinate mitigation efforts and identify needs for post-disaster funding.

E.3.1 Staff Resources

As with pre-flood planning, the first step is to make one person responsible for coordinating all mitigation activities. Ideally, a mitigation coordinator is appointed before a disaster, allowing the person time to attend training sessions and otherwise prepare for the job. Outside assistance to the busy community staff can come from consulting engineers and planners. Other communities may be able to loan building officials to help with the heavy reconstruction permit workload.

E.3.2 Public Involvement

Involving the public in mitigation activities after a disaster is difficult, but very important. While residents of the affected area will be busy cleaning up, they will also be very interested in knowing what will happen next. Accordingly, frequent public information releases are needed just to keep residents abreast of what is happening. Residents also need to be involved in mitigation planning. As with pre-flood planning, a committee is a key element of the planning process. Resident membership is especially important following a disaster that destroyed homes or caused substantial damage. Because in such cases it is likely the mitigation plan will recommend acquisition or elevation of properties, activities that are potentially disruptive to people and neighborhoods, it is vital that residents have input in planning and decision-making.

E.3.3 Technical Assistance

The same agencies that provide technical assistance for pre-flood planning can help on post-flood mitigation planning. Additional help on post-disaster aspects and disaster assistance programs should be available from FEMA's Mitigation Division and FEMA's Mitigation Coordinator *(see Appendix A). So*metimes federal financial assistance is made available to fund regional planning commission or other staff to help the community's mitigation planning effort

Other sources of counsel include mitigation coordinators from other communities that have been flooded in recent years, and private consultants who are experienced in post-disaster operations and mitigation programs.

E.4 Post-Flood Mitigation Planning

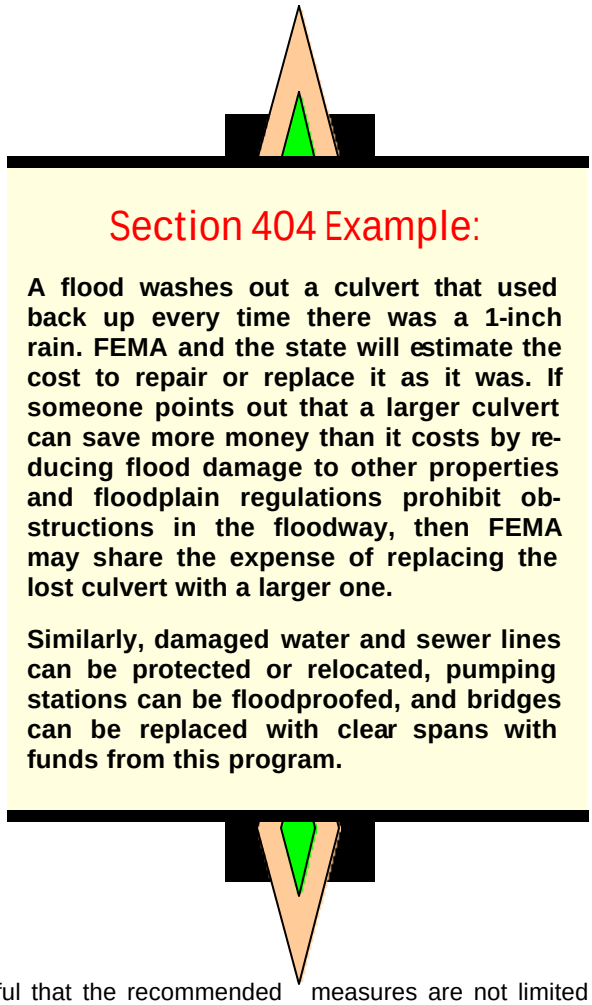
The first task after a flood is to ensure that the flooded area, and the buildings in it, is safe to enter. Repairs and reconstruction can begin after the needed permits are obtained, property protection measures are explained and encouraged, and substantially damaged buildings are tentatively identified for acquisition. Once these immediate concerns are satisfied, the community can devote time to longer-range mitigation activities. At this point, the mitigation coordinator can begin to undertake the job's third responsibility: prepare a mitigation plan to coordinate future efforts and identity needs for post-disaster funding.

E.4.1 The Planning Process

The local mitigation planning effort should be coordinated with FEMA and OEM. After the Presidential disaster declaration, the Interagency Hazard Mitigation Team will visit the impacted communities to assess mitigation opportunities. In the best situation, the community already will have prepared a pre-flood mitigation plan with a post-flood section. If the mitigation coordinator has proposals ready when state and federal people come to town, they should be able to advise the coordinator as to how feasible the ideas are, and whether funds or assistance are likely to be provided under their programs.

E.4.1.1 Area Flooded

Attention will likely focus on the flooded area, which may not include all of the community's floodplains and therefore may not encompass all of the potential sources of flooding. For this reason, the planners need to be careful that the recommended measures are not limited to protecting property only to the level of the last flood unless it was found to be greater than the base (100-year) flood.



Section 404 Example:

A flood washes out a culvert that used back up every time there was a 1-inch rain. FEMA and the state will estimate the cost to repair or replace it as it was. If someone points out that a larger culvert can save more money than it costs by reducing flood damage to other properties and floodplain regulations prohibit obstructions in the floodway, then FEMA may share the expense of replacing the lost culvert with a larger one.

Similarly, damaged water and sewer lines can be protected or relocated, pumping stations can be floodproofed, and bridges can be replaced with clear spans with funds from this program.

E.4.1.2 Funding Support

Attentions will likely focus on mitigation measures eligible for funding support from FEMA or other outside sources. The big-ticket item attracting the most interest may be an acquisition program funded by a hazard mitigation grant however; a good plan should still address all feasible mitigation measures, particularly those that would help properties not in the acquisition area.

E.4.1.3 Time Constraints

A post-flood mitigation plan needs to be prepared quickly in order to take advantage of the window of opportunity that the flood has presented and to settle any uncertain-ties residents may have about their future (e. g., should they repair or sell and leave?).

Some preliminary ideas should be ready in time for presentation to the Interagency Hazard Mitigation Team and state mitigation planning staff. The plan itself should be drafted within two to three weeks. Do not delay the planning effort in order to obtain detailed data; an adequate plan can be based on generalized information. Enact a temporary moratorium on reconstruction in areas most likely to be acquired. Design the plan to address overall issues and make general recommendations. For example, it might recommend that additional studies be conducted before finalizing some projects.

E.4.2 Mitigation Opportunities

Hazard mitigation planners must view mitigation in the broadest sense; it is not limited to private buildings or city-owned facilities. There are three kinds of opportunities that may arise:

I. Acquiring and clearing destroyed or substantially damaged buildings,

2. Incorporating property protection measures during repairs and reconstruction, and

3. Implementing mitigation measures after reconstruction.

E.4.2.1 Acquisition Sites

The building condition assessment should provide an early indication of whether damage was severe enough to warrant clearing out an area. Places to consider for acquisition are:

- High damage areas, such as floodways,
- Pre-FIRM structures buildings not built to flood protection standards),
- Non-conforming uses that the community wants eliminated, and
- Sites contiguous to parks and open space that are appropriate for expansion of public property.

Where possible, the community should have such sites already identified in its pre-flood plan. Or, it may want to designate a potential acquisition area in its comprehensive plan. The community could purchase properties as they come up for sale, rather than wait for a flood to cause damage and suffering to the occupants.

Because acquisition and relocation has such a major impact on the targeted residents, they should be involved in the deliberations, or at least kept fully informed of them. One of the best ways to do this is through the mitigation planning committee. A decision needs to be reached quickly so people aren't kept in temporary housing for months while they wait to find out whether they can keep their homes.

E.5.2.2 Reconstruction Opportunities

Property protection measures should be implemented in buildings not slated to be acquired. For example, a substantially damaged house will stall have to be elevated. If the foundation was damaged, it may have to be lifted up anyway to make repairs. Wet flood-proofing is another measure to incorporate during reconstruction. Wet flood-proofing measures are outlines in **Appendix D**.

E.5.2.3 After Reconstruction

Many voluntary mitigation measures can be implemented at any time (see ***Appendix D***). For example, constructing barriers and installing some dry flood-proofing measures (other than those required by code) can be done after the building is rebuilt. Major public facilities, such as bridges, will take a long time to rebuild. Before their plans are finalized, the post-flood planning effort should identify appropriate mitigation measures. Such projects could be eligible for funding by disaster assistance.

E.5.2.4 Reconstruction Moratorium

If damage is widespread, and many buildings are likely to be declared substantially damaged, then the opportunities for mitigation projects (and the building officials' workloads) increase. Rather than deal with each building individually, the community may want to clear out one or more blocks of damaged buildings. Because this will involve preparation of a mitigation plan, a reconstruction moratorium may be needed. A moratorium would stop all repairs in a designated area whose borders would be delineated based on the findings of the building condition assessment.

The moratorium can be lifted when the mitigation plan concludes that reconstruction can proceed. To shorten it' the community could prepare an interim mitigation plan that focuses only on the issue of reconstruction in the affected area. When the community concludes what is best for the future of the area, the moratorium can be lifted or (if the plan concludes that the area should be acquired) extended.

Once the moratorium is lifted, property owners would still need to apply for building permits. Since the area was considered to be substantially damaged, each permit applicant would have to provide the information needed to determine if his or her building was substantially damaged.

E.4.2.5 Coordination

One of the benefits of the flood-opened window of op-

portunity is that many agencies will be in town wanting to help with technical and financial assistance. The Interagency Hazard Mitigation Team is a good starting point to identify these agencies and learn about how they can help.

E.4.2.6 Adoption and Implementation

The post-flood plan document should look the same as a pre-flood plan, unless the community wants to separate immediate concerns from long-range projects. Because a post-flood mitigation plan will be in effect as long as a pre-flood plan, the same care and procedures should be followed in getting it adopted and implemented In the pre-flood setting, several weeks could be dedicated to writing and reviewing the plan. But time is of the essence after the disaster; so much less time will be available for public review of the draft plan. The community will have to use its judgment and make a good faith effort to let people review and comment on the plan without taking too much time. The local officials may opt to send a copy of the draft to all affected residents within a reasonable time before it is due to be voted on.

The National Flood Insurance Program's Community Rating System

How the Community Rating System Works

Every year, flooding causes hundreds of millions of dollars worth of damage to homes and businesses around the country. Standard homeowners and commercial property policies do not cover flood losses. So, to meet the need for this vital coverage, the Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program (NFIP).

The NFIP offers reasonably priced flood insurance in communities that comply with minimum standards for floodplain management. The NFIP's Community Rating System (CRS) recognizes community efforts beyond those minimum standards by reducing flood insurance premiums for the community's property owners. Discounts range from 5 percent up to 45 percent. The discounts provide an incentive for new flood protection activities that can help save lives and property in the event of a flood.

You're probably already doing many of the CRS activities. To get credit, community officials will need to prepare an application documenting the efforts. The CRS assigns credit points for each activity. Based on the total number of points your community earns, the CRS assigns you to one of 10 classes. Your discount on flood insurance is based on your class.

CRS Activities

The CRS has 18 floodplain management activities available for credit divided into four categories.

Public Information (Series 300)

This series credits programs that advise people about the flood hazard, flood insurance, and ways to reduce flood damage. These activities also provide data needed by insurance agents for accurate flood insurance rating. They generally serve all members of the community and work toward all three goals of the CRS.

Mapping and Regulations (Series 400)

This series credits programs that provide increased protection to new development. These activities include mapping areas not shown on the FIRM, preserving open space, enforcing higher regulatory standards, and managing stormwater. The credit is increased for growing communities. These activities work toward the first and second goals of the CRS, damage reduction and accurate insurance rating.

Flood Damage Reduction (Series 500)

This series credits programs for areas in which existing development is at risk. Credit is provided for a comprehensive floodplain management plan, relocating or retrofitting floodprone structures, and maintaining drainage systems. These activities work toward the first goal of the CRS, damage reduction.

Flood Preparedness (Series 600)

This series credits flood warning, levee safety, and dam safety programs. These activities work toward the first and third goals of the CRS, damage reduction and hazard awareness.

How to Apply

Participation in the CRS is voluntary. If your community is in full compliance with the rules and regulations of the NFIP, you may apply. There's no application fee, and all CRS publications are free. Your community's chief executive officer (that is, your mayor, city manager, or other top official) must appoint a CRS coordinator to handle the application work and serve as the liaison between the community and FEMA. The coordinator should know the operations of all departments that deal with floodplain management and public information. And the coordinator should be able to speak for your community's chief executive officer.

Figure G-6

CRS Classifications, Discounts, and Rewards

(All communities start out with a Class 10 rating (which provides no discount)
Source: http://www.fema.gov/nfip updated: March 25, 1999

Ten CRS Classes:

There are 10 CRS classes: Class 1 requires the most credit points and gives the greatest premium reductions; Class 10 identifies a community that does not apply for the CRS, or does not obtain a minimum number of credit points and receives no discount. There are 18 activities recognized as measures for eliminating exposure to floods. Credit points are assigned to each activity. The activities are organized under four main categories: Public Information, Mapping and Regulation, Flood Damage Reduction, and Flood Preparedness. Once a community applies to the appropriate FEMA region for the CRS program and its implementation is verified, FIA sets the CRS classification based upon the credit points. This classification determines the premium discount for policyholders. Premium discounts ranging from 5 percent to a maximum of 45 percent will be applied to every policy written in a community as recognition of the floodplain management activities instituted. This is a voluntary program for communities.

CRS Premium Discounts

Class	Discount	Class	Discount
1	45%	6	20%
2	40%	7	15%
3	35%	8	10%
4	30%	9	5%
5	25%	10	. . .

SFHA (Zones A, AE, A1-A30, V, V1-V30, AO and AH): Credit varies depending on class. Non-SFHA (Zones B, C, X, D, A99 and AR, AR/A, AR/AE, AR/A1-A30, AR/AH, AR/AO): 5% credit for Classes 1-9. (zones effective May 1, 1999)

CRS Rewards

First, the CRS floodplain management activities provide enhanced public safety, a reduction in damage to property and public infrastructure, avoidance of economic disruption and losses, reduction of human suffering, and protection of the environment.

Second, a community can evaluate the effectiveness of its flood program against a nationally recognized benchmark.

Third, technical assistance in designing and implementing some activities is available at no charge.

Fourth, a CRS community's flood program benefits from having an added incentive to maintain its flood programs over the years. The fact that the community's CRS status could be affected by the elimination of a flood-related activity or a weakening of the regulatory requirements for new development, should be taken into account by the governing board when considering such actions. A similar system used in fire insurance rating has had a strong impact on the level of support local governments give to their fire protection programs.

Fifth, implementing some CRS activities, such as floodplain management planning, can help projects covered under this plan qualify for certain other federal assistance programs such as the Flood Mitigation Assistance Program (FMA), the Hazard Mitigation Grant Program (HMGP), and

Community Rating System in Colorado

(as of September 1999 Page 1 of 2)

Community Number	Community Name	CRS Entry Date	Current Effective Date	Current Class	Credit for SFHA	Credit for Non-SFHA	Status
080001	Adams County	10/1/93	10/1/98	8	10	5	C
080009	Alamosa County	10/1/96	10/1/96	9	5	5	C
080010	Alamosa, City of	10/1/91	10/1/91	9	5	5	C
080011	Arapahoe County	10/1/91	10/1/92	9	5	5	C
080273	Archuleta County	10/1/92	10/1/98	10	0	0	R
085072	Arvada, City of	10/1/91	10/1/96	7	15	5	C
08002	Aurora, City of	10/1/92	10/1/97	8	10	5	C
080023	Boulder County	10/1/91	10/1/96	8	10	5	C
080024	Boulder, City of	10/1/92	10/1/97	8	10	5	C
080130	Brush, City of	10/1/94	10/1/94	9	5	5	C
080068	Canon City, City of	10/1/92	10/1/92	9	5	5	C
080013	Cherry Hills Village, City of	10/1/96	10/1/96	9	5	5	C
080060	Colorado Springs, City of	10/1/92	10/1/92	9	5	5	C
080043	Delta, City of	10/1/96	10/1/97	8	10	5	C
080046	Denver, City and County of	10/1/96	10/1/96	9	5	5	C
080049	Douglas County	10/1/96	10/1/96	9	5	5	C
080099	Durango, City of	10/1/92	10/1/92	9	5	5	C
080059	El Paso County	10/1/92	10/1/92	9	5	5	C
085074	Englewood City of	10/1/95	10/1/96	8	10	5	C
080102	Fort Collins, City of	10/1/91	10/1/96	6	20	5	C
080061	Fountain City of	10/1/92	10/1/92	9	5	5	C
080067	Fremont County	10/1/93	10/1/93	9	5	5	C
080245	Frisco, Town of	10/1/93	10/1/98	8	10	5	C
080090	Golden, City of	10/1/96	10/1/96	9	5	5	C
080078	Gunnison County	10/1/94	10/1/94	9	5	5	C
080080	Gunnison City of	10/1/95	10/1/95	9	5	5	C
085075	Lakewood, City of	10/1/91	10/1/96	7	15	5	C
080101	Larimer County	10/1/92	10/1/97	10	0	0	R
080017	Littleton, City of	10/1/92	10/1/97	7	15	5	C
080027	Longmont, City of	10/1/92	10/1/97	8	10	5	C
085076	Louisville, City of	10/1/91	10/1/91	9	5	5	C
080063	Manitou Springs, City of	10/1/92	10/1/92	9	5	5	C
080092	Morrison, town of	10/1/96	10/1/96	9	5	5	C
080310	Parker, Town of	10/1/92	10/1/97	7	15	5	C
080287	Pitkin County	10/1/92	10/1/97	8	10	5	C

Community Rating System in Colorado

(as of September 1999 page 2 of 2)

Community Number	Community Name	CRS Entry Date	Current Effective Date	Current Class	Credit for SFHA	Credit for Non-SFHA	Status
080153	Rio Grande County	10/1/92	10/1/97	10	0	0	R
080153	Sheridan City of	10/1/93	10/1/98	8	10	5	C
080201	Silverthorne, Town	10/1/96	10/1/96	9	5	5	C
080159	Steamboat Springs, Town of	10/1/93	10/1/93	9	5	5	C
080168	Telluride, Town of	10/1/94	10/1/94	9	5	5	C
080007	Thornton, City	10/1/94	10/1/94	9	5	5	C
080054	Vail, Town of	10/1/91	10/1/96	8	10	5	C
080008	Westminster, City of	10/1/91	10/1/92	8	10	5	C
085079	Wheatridge, City of	10/1/91	10/1/96	7	15	5	C

Federal Emergency Management Agency
Federal Insurance Administration
Colorado Communities Participating in the National Flood Program
Source: http://www.fema.gov/nfip as of 9/23/99 Page 1 of 6

CID	Community Name	County	Date Of Entry [Emer or Reg]	Current Effective Map
	**COLORADO			
080001#	ADAMS COUNTY *	ADAMS COUNTY	02/01/79(R)	08/16/95
080177	AKRON, TOWN OF	WASHINGTON COUNTY	04/01/88(R)	04/01/88(L)
080009#	ALAMOSA COUNTY *	ALAMOSA COUNTY	01/19/78(R)	04/21/99
080010#	ALAMOSA, CITY OF	ALAMOSA COUNTY	09/15/77(R)	04/21/99
080230	ANTONITO, CITY OF	CONEJOS COUNTY	11/05/85(R)	(NSFHA)
080011#	ARAPAHOE COUNTY *	ARAPAHOE COUNTY	08/15/77(R)	08/16/95
080273#	ARCHULETA COUNTY *	ARCHULETA COUNTY	01/03/79(R)	01/03/79
085072#	ARVADA, CITY OF	ADAMS COUNTY JEFFERSON COUNTY	06/23/72(R)	02/19/92
080143#	ASPEN, CITY OF	PITKIN COUNTY	12/04/85(R)	09/30/88
080179	AULT, TOWN OF	WELD COUNTY	06/10/80(R)	(NSFHA)
080002#	AURORA, CITY OF	ADAMS COUNTY ARAPAHOE COUNTY	06/01/78(R)	09/07/98
080308#	AVON, TOWN OF	EAGLE COUNTY	08/19/87(R)	08/19/87
080052#	BASALT,TOWN OF	EAGLE COUNTY PITKIN COUNTY	03/18/80(R)	06/04/87
080098#	BAYFIELD, TOWN OF	LA PLATA COUNTY	09/29/78(R)	09/29/78
080271#	BENT COUNTY *	BENT COUNTY	05/01/89(R)	05/01/89(L)
080296	BERTHOUD, TOWN OF	LARIMER COUNTY	05/26/78(R)	(NSFHA)
080076#	BLACK HAWK, CITY OF	GILPIN COUNTY	10/16/84(R)	10/16/84
080148	BOONE, TOWN OF	PUEBLO COUNTY	07/15/85(R)	(NSFHA)
080023#	BOULDER COUNTY *	BOULDER COUNTY	02/01/79(R)	05/06/96
080024#	BOULDER, CITY OF	BOULDER COUNTY	07/17/78(R)	05/06/96
080172#	BRECKENRIDGE, TOWN OF	SUMMIT COUNTY	06/04/80(R)	06/04/80
080004#	BRIGHTON, CITY OF	ADAMS COUNTY	11/16/77(R)	08/16/95
085073#	BROOMFIELD, CITY OF	ADAMS COUNTY BOULDER COUNTY JEFFERSON COUNTY	09/07/73(R)	09/30/97
080130#	BRUSH, CITY OF	MORGAN COUNTY	12/01/77(R)	10/13/81
080030#	BUENA VISTA, TOWN OF	CHAFFEE COUNTY	09/30/82(R)	09/30/82
080192#	CALHAN, TOWN OF	EL PASO COUNTY	03/18/86(R)	08/23/99
080068#	CANON CITY, CITY OF	FREMONT COUNTY	11/03/82(R)	11/03/82
080234#	CARBONDALE, CITY OF	GARFIELD COUNTY	02/05/86(R)	02/05/86
080050#	CASTLE ROCK, TOWN OF	DOUGLAS COUNTY	08/15/78(R)	09/30/87
080304				
080077#	CENTRAL CITY , CITY OF	GILPIN COUNTY	03/01/86(R)	02/16/94
080269#	CHAFFEE COUNTY*	CHAFFEE COUNTY	03/04/87(R)	03/04/87
080013#	CHERRY HILLS VILLAGE, CITY OF	ARAPAHOE COUNTY	08/01/78(R)	08/16/95
080034#	CLEAR CREEK COUNTY *	CLEAR CREEK COUNTY	03/11/80(R)	03/11/80(M)
080116#	COLLBRAN, TOWN OF	MESA COUNTY	04/15/82(R)	04/15/82
080060#	COLORADO SPRINGS, CITY OF	EL PASO COUNTY	12/18/86(R)	08/23/99
080014#	COLUMBINE VALLEY, TOWN OF	ARAPAHOE COUNTY	06/15/78(R)	08/16/95
080006#	COMMERCE CITY, CITY OF	ADAMS COUNTY	02/15/78(R)	08/16/95
080037#	CONEJOS COUNTY *	CONEJOS COUNTY	11/16/90(R)	11/16/90
080121B	CORTEZ, CITY OF	MONTEZUMA COUNTY	04/01/77(R)	04/01/77(M)
080276#	COSTILLA COUNTY*	COSTILLA COUNTY	07/16/91(R)	07/16/91(M)
080119#	CRAIG, CITY OF	MOFFAT COUNTY	09/28/84(R)	09/28/84

Federal Emergency Management Agency
Federal Insurance Administration
Colorado Communities Participating in the National Flood Program
Source: http://www.fema.gov/nfip as of 9/23/99 Page 2 of 6

CID	Community Name	County	Date Of Entry [Emer or Reg]	Current Effective Map
080118B	CREEDE, CITY OF	MINERAL COUNTY	01/01/86(R)	01/01/86(L)
080079#	CRESTED BUTTE, TOWN OF	GUNNISON COUNTY	09/04/85(R)	09/04/85(M)
080174#	CRIPPLE CREEK, CITY OF	TELLER COUNTY	12/18/85(R)	09/30/88
080111#	CROOK, CITY OF	LOGAN COUNTY	02/05/86(R)	02/05/86(M)
080211	CROWLEY, CITY OF	CROWLEY COUNTY	12/11/85(R)	(NSFHA)
080236#	DACONO, TOWN OF	WELD COUNTY	07/16/79(R)	07/16/79
080307#	DE BEQUE, TOWN OF	MESA COUNTY	04/17/89(R)	04/17/89
080015#	DEER TRAIL, CITY OF	ARAPAHOE COUNTY	11/05/85(R)	(NSFHA)
080154#	DEL NORTE, TOWN OF	RIO GRANDE COUNTY	09/30/82(R)	09/30/82
080041#	DELTA COUNTY *	DELTA COUNTY	03/15/84(R)	08/19/91
080043#	DELTA, CITY OF	DELTA COUNTY	06/01/84(R)	08/19/91
080046#	DENVER, CITY AND COUNTY OF	DENVER COUNTY	04/15/86(R)	09/07/98
080279#	DOLORES COUNTY *	DOLORES COUNTY	03/01/86(R)	03/01/86(L)
080122#	DOLORES, TOWN OF	MONTEZUMA COUNTY	09/29/89(R)	09/29/89
080049#	DOUGLAS COUNTY*	DOUGLAS COUNTY	09/03/80(R)	01/05/96
080047B	DOVE CREEK, CITY OF	DOLORES COUNTY	01/01/86(R)	01/01/86(L)
080099#	DURANGO, CITY OF	LA PLATA COUNTY	01/17/79(R)	12/05/89
080051#	EAGLE COUNTY *	EAGLE COUNTY	11/19/80(R)	01/25/83
080180#	EATON, TOWN OF	WELD COUNTY	06/04/80(R)	09/01/82
080089#	EDGEWATER, CITY OF	JEFFERSON COUNTY	08/15/89(R)	08/15/89
080059#	EL PASO COUNTY*	EL PASO COUNTY	12/18/86(R)	08/23/99
085074#	ENGLEWOOD, CITY OF	ARAPAHOE COUNTY	02/11/72(R)	08/16/95
080181#	ERIE, TOWN OF	WELD COUNTY	10/17/78(R)	09/28/90
080193#	ESTES PARK,TOWN OF	LARIMER COUNTY	01/17/79(R)	05/04/87
080182#	EVANS, CITY OF	WELD COUNTY	04/02/79(R)	04/02/79
080239A	FAIRPLAY, TOWN OF	PARK COUNTY	08/05/86(R)	08/05/86(M)
080240#	FEDERAL HEIGHTS, CITY OF	ADAMS COUNTY	04/15/86(R)	08/16/95
080241#	FIRESTONE, TOWN OF	WELD COUNTY	12/18/79(R)	12/18/79
080112	FLEMING, TOWN OF	LOGAN COUNTY	07/15/85(R)	(NSFHA)
080070#	FLORENCE, CITY OF	FREMONT COUNTY	12/04/84(R)	12/04/84
080102#	FORT COLLINS, CITY OF	LARIMER COUNTY	07/16/79(R)	03/18/96
080183#	FORT LUPTON, TOWN OF	WELD COUNTY	04/02/79(R)	04/02/79
080131#	FORT MORGAN, CITY OF	MORGAN COUNTY	02/05/86(R)	02/05/86(M)
080061#	FOUNTAIN, CITY OF	EL PASO COUNTY	06/05/85(R)	08/23/99
080244#	FREDERICK, TOWN OF	WELD COUNTY	07/16/79(R)	07/13/82
080067#	FREMONT COUNTY *	FREMONT COUNTY	09/29/89(R)	09/29/89
080245#	FRISCO, TOWN OF	SUMMIT COUNTY	05/15/80(R)	04/26/83
080194#	FRUITA, CITY OF	MESA COUNTY	12/01/81(R)	07/15/92
080205#	GARFIELD COUNTY*	GARFIELD COUNTY	12/15/77(R)	01/03/86
080035#	GEORGETOWN, TOWN OF	CLEAR CREEK COUNTY	06/05/89(R)	06/05/89
080213	GILCREST, CITY OF	WELD COUNTY	06/10/80(R)	(NSFHA)
080075	GILPIN COUNTY *	GILPIN COUNTY	03/01/86(R)	03/01/86(L)
080071#	GLENWOOD SPRINGS, CITY OF	GARFIELD COUNTY	07/16/79(R)	10/15/85
080090#	GOLDEN, CITY OF	JEFFERSON COUNTY	05/15/85(R)	05/15/85
080144#	GRANADA, TOWN OF	PROWERS COUNTY	09/24/84(R)	09/24/84(M)
080117#	GRAND JUNCTION, CITY OF	MESA COUNTY	01/06/83(R)	07/15/92
080214B	GRAND LAKE, CITY OF	GRAND COUNTY	01/01/86(R)	01/01/86(L)
080184#	GREELEY, CITY OF	WELD COUNTY	07/16/79(R)	07/16/79
080062#	GREEN MOUNTAIN FALLS, TOWN OF	EL PASO COUNTY	06/05/85(R)	08/23/99
080195#	GREENWOOD VILLAGE, CITY OF	ARAPAHOE COUNTY	01/05/78(R)	08/16/95
080078#	GUNNISON COUNTY *	GUNNISON COUNTY	09/29/89(R)	09/29/89
080080#	GUNNISON, CITY OF	GUNNISON COUNTY	04/18/83(R)	09/18/85

Federal Emergency Management Agency
Federal Insurance Administration
Colorado Communities Participating in the National Flood Program
Source: http://www.fema.gov/nfip as of 9/23/99 Page 3 of 6

CID	Community Name	County	Date Of Entry [Emer or Reg]	Current Effective Map
080295#	GYPSUM, TOWN OF	EAGLE COUNTY	09/16/81(R)	09/30/83
080140	HAXTUN, CITY OF	PHILLIPS COUNTY	12/11/85(R)	(NSFHA)
080157#	HAYDEN, TOWN OF	ROUTT COUNTY	06/01/78(R)	06/01/78
080081#	HINSDALE COUNTY*	HINSDALE COUNTY	09/30/87(R)	09/30/87
080145	HOLLY, TOWN OF	PROWERS COUNTY	05/20/83(R)	(NSFHA)
080141#	HOLYOKE, TOWN OF	PHILLIPS COUNTY	02/19/87(R)	02/19/87
080044#	HOTCHKISS, TOWN OF	DELTA COUNTY	07/03/85(R)	07/03/85
080206A	HUERFANO COUNTY*	HUERFANO COUNTY	10/01/86(R)	10/01/86(L)
080036#	IDAHO SPRINGS, CITY OF	CLEAR CREEK COUNTY	11/15/78(R)	11/15/78
080268	IGNACIO, TOWN OF	LA PLATA COUNTY	03/27/86(R)	(NSFHA)
080207#	ILIFF, TOWN OF	LOGAN COUNTY	08/04/87(R)	08/04/87
080216#	JAMESTOWN, TOWN OF	BOULDER COUNTY	07/18/83(R)	05/06/96
080087#	JEFFERSON COUNTY *	JEFFERSON COUNTY	08/05/86(R)	07/04/89
080169#	JULESBURG, TOWN OF	SEDGWICK COUNTY	04/02/86(R)	04/02/86(M)
080251	KEENESBURG, TOWN OF	WELD COUNTY	08/24/81(R)	(NSFHA)
080038	LA JARA, TOWN OF	CONEJOS COUNTY	06/30/76(R)	(NSFHA)
080133#	LA JUNTA, CITY OF	OTERO COUNTY	12/01/82(R)	12/01/82
080097#	LA PLATA COUNTY *	LA PLATA COUNTY	12/15/81(R)	03/16/95
080186	LA SALLE, TOWN OF	WELD COUNTY	05/25/78(R)	(NSFHA)
080084#	LA VETA, TOWN OF	HUERFANO COUNTY	09/29/86(R)	09/29/86
080026#	LAFAYETTE, CITY OF	BOULDER COUNTY	03/18/80(R)	05/06/96
080082#	LAKE CITY, CITY OF	HINSDALE COUNTY	09/30/87(R)	09/30/87
080282#	LAKE COUNTY *	LAKE COUNTY	03/01/98(R)	03/01/98(L)
085075#	LAKEWOOD, CITY OF	JEFFERSON COUNTY	07/21/72(R)	01/03/83
080146#	LAMAR, CITY OF	PROWERS COUNTY	11/17/82(R)	11/17/82
080101#	LARIMER COUNTY *	LARIMER COUNTY	04/02/79(R)	03/23/99
080309#	LARKSPUR, TOWN OF	DOUGLAS COUNTY	09/30/87(R)	09/30/87
080105#	LAS ANIMAS COUNTY*	LAS ANIMAS COUNTY	09/01/77(R)	04/03/84
080022	LAS ANIMAS, CITY OF	BENT COUNTY	07/10/85(R)	(NSFHA)
080109#	LIMON, TOWN OF	LINCOLN COUNTY	11/01/84(R)	11/01/84
080017#	LITTLETON, CITY OF	ARAPAHOE COUNTY	12/01/78(R)	09/29/89
080110#	LOGAN COUNTY *	LOGAN COUNTY	09/29/89(R)	09/29/89
080027#	LONGMONT, CITY OF	BOULDER COUNTY	07/05/77(R)	05/06/96
085076#	LOUISVILLE, CITY OF	BOULDER COUNTY	05/04/73(R)	05/06/96
080103#	LOVELAND, CITY OF	LARIMER COUNTY	09/01/78(R)	03/23/99
080029#	LYONS, TOWN OF	BOULDER COUNTY	08/01/80(R)	05/06/96
080253#	MANASSA, CITY OF	CONEJOS COUNTY	02/19/86(R)	02/19/86(M)
080123#	MANCOS, TOWN OF	MONTEZUMA COUNTY	09/29/86(R)	09/29/86
080063#	MANITOU SPRINGS, CITY OF	EL PASO COUNTY	02/01/84(R)	08/23/99
080134	MANZANOLA, TOWN OF	OTERO COUNTY	06/30/76(R)	(NSFHA)
080197B	MARBLE, TOWN OF	GUNNISON COUNTY	10/01/90(R)	10/01/90(L)
080151#	MEEKER, TOWN OF	RIO BLANCO COUNTY	09/27/91(R)	09/27/91
080115#	MESA COUNTY *	MESA COUNTY	07/03/78(R)	07/15/92
080187#	MILLIKEN, TOWN OF	WELD COUNTY	08/01/79(R)	08/01/79
080284#	MINERAL COUNTY *	MINERAL COUNTY	04/16/91(R)	04/16/91
080053#	MINTURN, TOWN OF	EAGLE COUNTY	09/17/80(R)	09/17/80
080270#	MOFFAT COUNTY *	MOFFAT COUNTY	08/02/82(R)	08/02/82
080155#	MONTE VISTA, CITY OF	RIO GRANDE COUNTY	09/30/82(R)	09/30/82
080285#	MONTEZUMA COUNTY *	MONTEZUMA COUNTY	05/04/89(R)	05/04/89
080124#	MONTROSE COUNTY *	MONTROSE COUNTY	02/15/84(R)	07/17/86

Federal Emergency Management Agency
Federal Insurance Administration
Colorado Communities Participating in the National Flood Program
Source: http://www.fema.gov/nfip as of 9/23/99 Page 4 of 6

CID	Community Name	County	Date Of Entry [Emer or Reg]	Current Effective Map
080125#	MONTROSE, CITY OF	MONTROSE COUNTY	03/01/84(R)	07/17/86
080064#	MONUMENT, TOWN OF	EL PASO COUNTY	12/18/86(R)	08/23/99
080129#	MORGAN COUNTY *	MORGAN COUNTY	09/29/89(R)	09/29/89
080092#	MORRISON, TOWN OF	JEFFERSON COUNTY	12/01/82(R)	12/01/82
080126#	NATURITA, TOWN OF	MONTROSE COUNTY	01/06/82(R)	01/06/82
080255#	NEDERLAND, TOWN OF	BOULDER COUNTY	08/01/79(R)	05/06/96
080257#	NORTHGLENN, CITY OF	ADAMS COUNTY	09/15/78(R)	03/31/81
080167#	NORWOOD, TOWN OF	SAN MIGUEL COUNTY	01/27/85(R)	(NSFHA)
080188#	NUNN, TOWN OF	WELD COUNTY	02/01/79(R)	02/01/79
080158#	OAK CREEK, TOWN OF	ROUTT COUNTY	07/17/89(R)	07/17/89
080128#	OLATHE, TOWN OF	MONTROSE COUNTY	09/16/82(R)	09/16/82
080258#	ORCHARD CITY, CITY OF	DELTA COUNTY	05/16/83(R)	07/16/81
080259#	ORDWAY, TOWN OF	CROWLEY COUNTY	12/18/85(R)	12/18/85(M)
080132#	OTERO COUNTY *	OTERO COUNTY	08/19/85(R)	08/19/85
080178#	OTIS, TOWN OF	WASHINGTON COUNTY	08/19/85(R)	08/19/85(M)
080136#	OURAY COUNTY *	OURAY COUNTY	07/03/85(R)	07/03/85
080137#	OURAY, CITY OF	OURAY COUNTY	07/03/85(R)	07/03/85
080019#	PAGOSA SPRINGS, TOWN OF	ARCHULETA COUNTY	12/01/78(R)	05/02/91
080198#	PALISADE, CITY OF	MESA COUNTY	02/05/86(R)	07/15/92
080065#	PALMER LAKE, TOWN OF	EL PASO COUNTY	07/03/78(R)	08/23/99
080045#	PAONIA, TOWN OF	DELTA COUNTY	03/16/83(R)	03/16/83
080215#	PARACHUTE, TOWN OF FORMERLY THE TOWN OF GRAND VALLEY	GARFIELD COUNTY	09/27/91(R)	09/27/91
080139#	PARK COUNTY*	PARK COUNTY	04/01/87(R)	04/01/87(L)
080310#	PARKER, TOWN OF	DOUGLAS COUNTY	09/30/87(R)	02/02/96
080189#	PIERCE, TOWN OF	WELD COUNTY	11/15/79(R)	11/15/79
080287#	PITKIN COUNTY*	PITKIN COUNTY	06/04/87(R)	09/30/88
080190	PLATTEVILLE, TOWN OF	WELD COUNTY	02/29/80(R)	(NSFHA)
080220#	PONCHA SPRINGS, TOWN OF	CHAFFEE COUNTY	02/19/87(R)	02/19/87
080272#	PROWERS COUNTY*	PROWERS COUNTY	07/01/86(R)	07/12/77
080147#	PUEBLO COUNTY *	PUEBLO COUNTY	09/29/89(R)	09/29/89
085077#	PUEBLO, CITY OF	PUEBLO COUNTY	08/24/73(R)	09/29/86
080066#	RAMAH, TOWN OF	EL PASO COUNTY	08/05/86(R)	08/23/99
080152#	RANGELY, TOWN OF	RIO BLANCO COUNTY	12/01/77(R)	09/28/90
080260#	REDCLIFF, TOWN OF	EAGLE COUNTY	04/18/85(R)	06/04/80
080048A	RICO, TOWN OF	DOLORES COUNTY	08/05/86(R)	08/05/86(M)
080138#	RIDGWAY, TOWN OF	OURAY COUNTY	03/18/77(R)	09/27/85
085078#	RIFLE, CITY OF	GARFIELD COUNTY	06/15/73(R)	01/03/86
080288#	RIO BLANCO COUNTY *	RIO BLANCO COUNTY	02/16/90(R)	02/16/90
080153#	RIO GRANDE COUNTY *	RIO GRANDE COUNTY	05/19/87(R)	05/19/87
080221#	ROCKVALE, TOWN OF	FREMONT COUNTY	10/15/85(R)	10/15/85(M)
080135#	ROCKY FORD, CITY OF	OTERO COUNTY	06/03/80(R)	06/03/80(M)
080156#	ROUTT COUNTY *	ROUTT COUNTY	09/29/89(R)	09/29/89
080031#	SALIDA, CITY OF	CHAFFEE COUNTY	09/30/82(R)	09/30/82
080267#	SAN JUAN COUNTY *	SAN JUAN COUNTY	09/01/78(R)	09/01/78
080039A	SAN LUIS, TOWN OF	COSTILLA COUNTY	09/01/87(R)	09/01/87(L)
080166#	SAN MIGUEL COUNTY *	SAN MIGUEL COUNTY	09/29/78(R)	09/30/92
080171#	SEDGWICK, TOWN OF	SEDGWICK COUNTY	08/03/89(R)	08/03/89
080317#	SEVERANCE, TOWN OF	WELD COUNTY	03/28/95(R)	09/22/99

Federal Emergency Management Agency
Federal Insurance Administration
Colorado Communities Participating in the National Flood Program
Source: http://www.fema.gov/nfip as of 9/23/99 Page 5 of 6

CID	Community Name	County	Date Of Entry [Emer or Reg]	Current Effective Map
	USE THE WELD COUNTY [080266] FIRM, PANEL #0475 DATED SEPTEMBER 28, 1982.			
080018#	SHERIDAN, CITY OF	ARAPAHOE COUNTY	07/13/76(R)	08/16/95
080223A	SILT, TOWN OF	GARFIELD COUNTY	04/01/87(R)	04/01/87(L)
080200#	SILVER PLUME, TOWN OF	CLEAR CREEK COUNTY	12/05/84(R)	01/17/79
080201#	SILVERTHORNE, TOWN OF	SUMMIT COUNTY	05/01/80(R)	05/01/80
080165#	SILVERTON, TOWN OF	SAN JUAN COUNTY	09/01/78(R)	09/01/78
080312#	SNOWMASS VILLAGE, TOWN OF	PITKIN COUNTY	06/04/87(R)	09/30/88
080318#	SOUTH FORK, TOWN OF	RIO GRANDE COUNTY	06/05/95(R)	
	USE THE RIO GRANDE COUNTY [080153] FIRM			
080159#	STEAMBOAT SPRINGS, TOWN OF	ROUTT COUNTY	01/19/78(R)	04/19/83
080294#	STERLING, CITY OF	LOGAN COUNTY	09/29/89(R)	09/29/89
080290#	SUMMIT COUNTY *	SUMMIT COUNTY	12/16/80(R)	12/16/80
080203#	SUPERIOR, TOWN OF	BOULDER COUNTY	09/28/79(R)	05/06/96
080173#	TELLER COUNTY *	TELLER COUNTY	09/30/88(R)	09/30/88
080168#	TELLURIDE, TOWN OF	SAN MIGUEL COUNTY	09/15/78(R)	09/30/92
080007#	THORNTON, CITY OF	ADAMS COUNTY	06/15/78(R)	08/16/95
080107#	TRINIDAD, CITY OF	LAS ANIMAS COUNTY	07/03/78(R)	04/03/84
080054#	VAIL, TOWN OF	EAGLE COUNTY	05/02/83(R)	05/01/85
080086B	WALDEN, TOWN OF	JACKSON COUNTY	08/05/86(R)	08/05/86(M)
080083#	WALSENBURG, CITY OF	HUERFANO COUNTY	09/29/86(R)	09/29/86
080021	WALSH, TOWN OF	BACA COUNTY	06/30/76(R)	(NSFHA)
080266#	WELD COUNTY *	WELD COUNTY	03/18/80(R)	09/22/99
080104#	WELLINGTON, TOWN OF	LARIMER COUNTY	02/15/79(R)	10/20/98
080008#	WESTMINSTER, CITY OF	ADAMS COUNTY JEFFERSON COUNTY	09/30/88(R)	04/02/97
085079#	WHEAT RIDGE, CITY OF	JEFFERSON COUNTY	05/26/72(R)	02/04/88
080204#	WIGGINS, CITY OF	MORGAN COUNTY	02/15/79(R)	02/15/79
080228	WILEY, TOWN OF	PROWERS COUNTY	08/03/95	
080305#	WINTER PARK, TOWN OF	GRAND COUNTY	11/15/85(R)	11/15/85
080175#	WOODLAND PARK, TOWN OF	TELLER COUNTY	09/30/88(R)	09/30/88
080191#	WRAY, CITY OF	YUMA COUNTY	06/19/85(R)	06/19/85
080160	YAMPA, CITY OF	ROUTT COUNTY	12/23/85(R)	(NSFHA)
080291#	YUMA COUNTY *	YUMA COUNTY	06/19/85(R)	06/19/85
080265	YUMA, TOWN OF	YUMA COUNTY	11/01/84(R)	(NSFHA)

TOTAL IN FLOOD PROGRAM	228
TOTAL IN THE REGULAR PROGRAM	222
TOTAL IN REGULAR PGM WITH NO SPECIAL FLOOD HAZARD	21
TOTAL IN REGULAR PGM BUT MINIMALLY FLOOD PRONE	29
TOTAL IN EMERGENCY PROGRAM	6
TOTAL IN EMERGENCY PROGRAM WITH HAZARD IDENTIFIED	2

(R) - Indicates Entry In Regular Program
NSFHA - No Special Flood Hazard Area - All Zone C
> - Date Of Current Effective Map is after the Date Of This Report
* - Unincorportated Areas Only

Federal Emergency Management Agency
Federal Insurance Administration
Areas Which Have Had Special Flood Hazard Areas Identied Not In The Program
Source: http://www.fema.gov/nfip as of 9/23/99 Page 6 of 6

CID	Community Name	County	Hazard Area Identified	Date On Which Sanctions Apply
	**COLORADO			
080229	AGUILAR, TOWN OF	LAS ANIMAS COUNTY	07/11/75	07/11/76
080003#	BENNETT, TOWN OF	ADAMS COUNTY	08/16/95(F)	11/22/75
080210	COAL CREEK, TOWN OF	FREMONT COUNTY	08/15/75	08/15/76
080040A	CUSTER COUNTY*	CUSTER COUNTY	06/07/77	06/07/78
080120A	DINOSAUR, TOWN OF	MOFFAT COUNTY	08/30/74	08/30/75
080238#	EAGLE, TOWN OF	EAGLE COUNTY	03/18/80(F)	05/17/89(S)
080056#	ELIZABETH, TOWN OF	ELBERT COUNTY	12/12/78(F)	09/06/75
080247#	GLENDALE, TOWN OF	ARAPAHOE COUNTY	04/17/89(F)	04/17/90
080074A	HOT SULPHUR SPRINGS, TOWN OF	GRAND COUNTY	11/22/74	11/22/75
080108#	HUGO, TOWN OF	LINCOLN COUNTY	10/15/85(F)	10/15/85(S)
080033	KIT CARSON, TOWN OF	CHEYENNE COUNTY	12/13/74	12/13/75
080256	NEW CASTLE, TOWN OF	GARFIELD COUNTY	07/25/75	07/25/76
080127A	NUCLA, TOWN OF	MONTROSE COUNTY	05/24/74	05/24/75
080170#	OVID, TOWN OF	SEDGWICK COUNTY	11/15/74	11/15/75
080293#	PITKIN, TOWN OF	GUNNISON COUNTY	06/20/78	06/20/79
080150#	RYE, TOWN OF	PUEBLO COUNTY	07/18/75	07/18/76
080164	SAGAUCHE, TOWN OF	SAGUACHE COUNTY	05/28/76	05/28/77
080316#	SAWPIT, TOWN OF	SAN MIGUEL COUNTY	09/30/88(F)	09/30/89
080106A	STARKVILLE, TOWN OF	LAS ANIMAS COUNTY	09/06/74	09/06/75

TOTAL SUSPENDED FROM EMERGENCY PROGRAM	0
TOTAL SUSPENDED FROM REGULAR PROGRAM	2
TOTAL WITHDRAWN COMMUNITIES NOT IN PROGRAM	0
TOTAL NOT IN PROGRAM WITH HAZARD AREA IDENTIFIED	17
TOTAL NOT IN PGM WITH HAZARD AREA > 1 YEAR	17

N/A - Not Applicable At This Time
(S) - Suspended Community
(W) - Withdrawn Community
(F) - Effective Map Is A Flood Insurance Rate Map
* - Unincorporated Areas Only
All Other Code Or Symbols Are Explained On Page 2 Of This Book