City of Rifle

Flood Hazard Mitigation Plan

"The May 15, 1993 Flood"

City of Rifle

and

Colorado Department of Local Affairs
Division of Local Government
Office of Emergency Management
Disaster Preparedness Improvement Grant Program

by

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Table of Contents

Foreword

Courtesy - Al Gibes, Grand Junction Daily Sentinel

On Saturday May 15th, 1993, the City of Rifle in Garfield County was hit hard by a severe flash flood. The flood, possibly the "flood of record", according to the Colorado Water Conservation Board, caused damage to several homes and businesses in the City of Rifle. In sympathy with those who lost homes or possessions in the flood, Governor Roy Romer toured the damaged area on Wednesday, May 19th. The Governor expressed his desire for state and local officials to work together to help the community recover from the effects of the flood. This flood hazard mitigation plan is an attempt to help the community not only recover, but to mitigate the effects of future floods as well.

The City of Rifle is faced with a serious flood risk. Government and Rifle creeks, which flow through the City, have the potential to cause major flood damage to land and property adjacent to them. The safety of those living along the creek banks is a prime concern. Through community awareness, mitigation and preparedness the effects of future floods can be reduced. The lessons learned from this flash flood event were used to outline this plan for the mitigation of flooding problems in Rifle.

The May 15th. 1993 Flood

Based on the observations of local residents, it was determined that a major thunderstorm cell passed north of Rifle on the evening of Saturday May 15th. The flash flooding that inundated areas along the two creeks was caused by this intense storm, which was situated over the upper half of the Government Creek Basin. The storm was estimated to last approximately four hours, from 5:30 to 9:30 p.m. Another thunderstorm cell also passed through the area during the early morning hours of the 16th. This second cell caused flooding conditions to linger, however it was the first cell which was primarily responsible for releasing the torrents of water which flowed down Government Creek.

A rain gauge located at the Department of Energy's Estes Gulch uranium clean-up site indicated a peak rainfall of 2.5 inches over the four hour period. Estes Gulch is a small side-tributary to Government Creek north of Rifle. Hydrologic data on peak discharges was not obtained by any federal agency. Using eyewitness accounts, the Estes Gulch rainfall information and by measuring the high water mark, the Colorado Water Conservation Board (CWCB) determined the peak flows of the flash flood to be 2,950 cubic feet per second (cfs) for Government Creek and 2,970 cfs for Rifle Creek (below the confluence with Government Creek). It was estimated that some areas along the creek were inundated by a wall of water nearly 10 feet high. Other areas reported depths ranging from 2.5 feet to 5 feet. The CWCB estimated the flash flood to be a 125-year flood event.

A 100-year flood event is defined as the degree of flooding which has a 1% chance of occurring each year.

Communities nationwide are urged to participate in the National Flood Insurance Program (NFIP), which requires adoption of floodplain regulations. These regulations guide development within the 100-year floodplain, that area subjected to flooding in the event of a 100-year flood. By adopting and administering these regulations, flood insurance can be purchased by home and business owners in the community. The City of Rifle participates in the NFIP, and is a member in good standing.

The flood impacted several homes and businesses adjacent to Rifle Creek where the creek winds through the city. There was some damage on Government Creek upstream of the confluence with Rifle Creek, but the damage was minor because of the sparse development found at the northern end of town.

Emergency Response

Agencies Responding to Flood

- **City of Rifle**
- **Rifle Fire Protection District**
- **Colorado State Patrol**
- **Garfield Road & Bridge**
- **Garfield County/Emergency Mgt.**
- **State Highway Department**

Agencies Responding to Rifle Flood

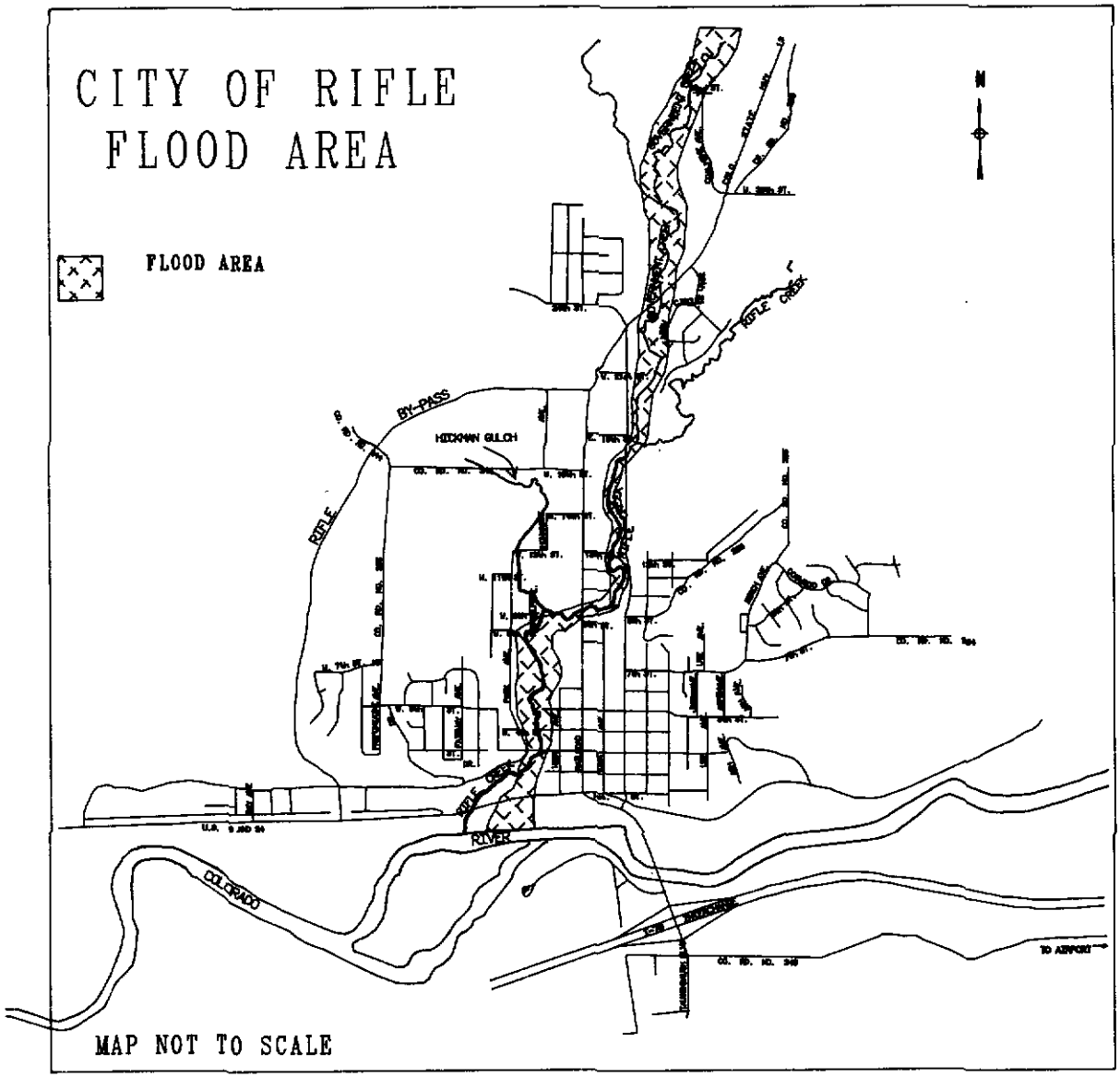
Emergency personnel from the Rifle Police Department and the Rifle Fire Protection District responded immediately to the situation. However, the initial warning was received too late to conduct an emergency flood fight. All that could be done was to begin warning residents along the stream that flooding was imminent.

The initial warning came from a motorist traveling into town on Highway 13 from the north. The highway runs adjacent to Government Creek and the motorist reported water flowing over the

highway and into the swollen creek. The two officers on duty decided to alert the Police Chief, and the decision was made to alert the Fire Protection District's stream spotters and begin warning residents. During the initial phase of the response the two officers on duty were called away to respond to unrelated emergencies. This left the police chief severely understaffed until fire personnel arrived on scene. Approximately two dozen city employees were involved in the flood response. Fire personnel rescued 3 people and a dog from rising floodwaters. The City's Emergency Operations Center, located in City Hall, was activated on Saturday night and again on Sunday morning to assess damage and prepare for further flooding.

Damage

The flash flood had a very serious impact on several residents of Rifle. Eight homes had to be evacuated and two homes were destroyed. Approximately 12 homes were damaged by floodwaters. Two businesses were damaged, several



Map of Rifle Flooded Area

vehicles, a motorcycle, two trailers and some farm equipment were destroyed. In many places city streets were covered with mud and debris.

One woman's home filled with water so quickly that she was forced to take refuge on the kitchen counter, where fire personnel found her. Her home was moved approximately 30 feet by the force of the water. One man's truck was washed downstream, finally coming to a stop nearly a mile away. Some yards were filled with up to four feet of mud and rock. The railroad yard at the southern end of town was immersed in water. Fortunately, the only known casualties were some five-week old kittens.

Most of the homes that were damaged were located in the 100-year floodplain. However, few had flood insurance. There are 45 structures located in the floodplain, but only 12 flood insurance policies are currently in force. Most homeowners insurance policies will not cover damages caused by flooding. As a result several people are now faced with tremendous financial difficulties. The flash flood caused most of this damage in a short period of time, and the damage would certainly have been far greater had the storm continued.

Flooded Southern Pacific Rail Yard

Damage Assessment

Damage assessment was completed by officials from the City of Rifle and the State of Colorado's Office of Emergency Management.

Post-flood Assistance

The American Red Cross and the organization "Lift Up", a local (Garfield County) all-volunteer group dedicated to helping those in need, provided assistance to citizens deprived of basic needs.

The American Red Cross helped people whose own friends or families did not possess the resources to help them. They provided temporary shelter to two families, a few weeks worth of food to one family and clothing to at least two families.

"Lift Up" provided groceries to several families who were displaced by the flood and assisted with clean-up efforts. Additionally, they provided some furnishings and paid the first month's rent for one woman whose house was completely destroyed.

The Salvation Army provided assistance to one family, giving them cleaning supplies, and identified several unmet needs within the community. Additionally, several men from the Mennonite Church in Glenwood Springs assisted with debris removal.

The Rifle Correctional Center provided manpower to the community for three days. Seven inmates, supervised by one corrections officer, filled 2,000 sandbags in anticipation of further flooding. They also helped remove mud and debris from yards, homes and businesses.

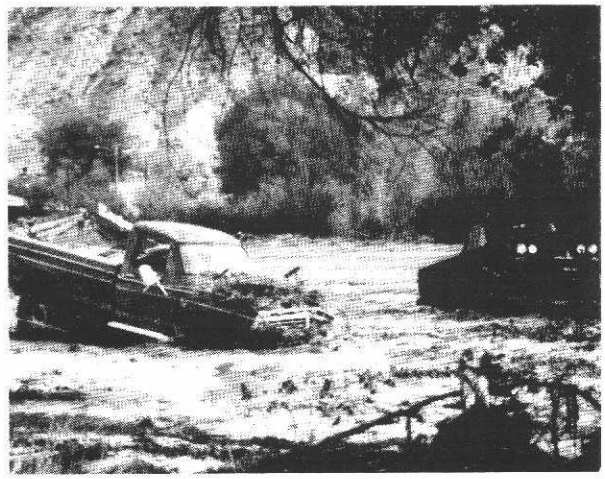
Lessons Learned

The response was handled remarkably well. One reason is the level of preparedness maintained by local officials. Garfield County conducted a table-top Flood/Dam Break Exercise on February 5th, which was followed on April 8th by a Functional Exercise, hosted by the City of Rifle. The Functional Exercise involved response to a severe flooding situation, including the actual evacuation of three schools in town. The exercise gave the people involved a much better sense of what their role would be during

City of Rifle Emergency Operations Center

an actual emergency. Additionally, the Department of Local Affairs hosted a Flood Awareness/Preparedness Public Officials Conference on the 15th. of April, which was attended by Rifle City officials. The conference helped attendees focus on flood related issues and concerns. Some other factors which contributed greatly to the response effort were the friendly working relationship between the different agencies involved (primarily the Rifle Police Department and the Rifle Fire Protection District) and the use of the Incident Command System. These two factors helped eliminate the types of "turf battles" that can be so prevalent during a crisis.

City and Rifle Fire Protection District officials have identified areas of the response they would like to improve. The City of Rifle's Emergency Operations Center (EOC) is inappropriate. During the initial stages of the emergency the EOC was located in the Dispatch Center in Rifle City Hall. This quickly became cramped and noisy. Calls from the press were being fielded with emergency calls, contributing to a heightened state of confusion. It was quickly decided to move the EOC to a conference room in City Hall. However, there were no phones in the room so phones had to be routed through the ceiling panels from adjoining offices during the actual emergency. The City Hall location itself is less than desirable because of the possibility of inundation in an extremely severe flood event (such as the failure of Rifle Gap Dam) and its proximity to the Rio Grande Railroad line and Interstate 70. If



Trucks Washed Down Rifle Creek

there were a serious hazardous materials spill on either route it might become necessary to evacuate the part of town in which City Hall is located. The EOC would be rendered inoperable in either worst-case scenario. The Rifle Senior Citizens Activities Center has been identified as a more suitable location. The center has ample space and is located on a hill above and to the west of town. It would be isolated from both the threat of inundation and a hazardous materials spill.

Communications between the EOC and field personnel were also identified as inadequate. The EOC was equipped with hand-held radios which had a limited range. It became necessary to relay communications between the EOC and various

Flood Damaged Property

personnel, talking to those within range and having them relay a message to the appropriate person. The relocation of the EOC may help improve this problem because of the higher elevation of the proposed facility. Installation of a repeater may also help improve communications significantly.

It was realized after the emergency that staffing and tracking of all personnel was an issue that had not been addressed. During the emergency a city employee had been working in a facility near the flooding. This was not known by the EOC. It was realized that should that individual have been needed, or should the facility have been destroyed, the individuals whereabouts would have been unknown.

The lack of an early warning system in Rifle was painfully obvious in this emergency. As stated earlier, the first warning was sounded by a concerned motorist. Had that individual chosen to ignore the problem and "not get involved", as is often common, there may have been no warning whatsoever. One option that may be considered in developing an early warning system is the utilization of the City's civil defense sirens. Three sirens exist in strategic locations within the city limits. Currently the only way to activate these sirens is by actually turning each one on at the site. There may be a way to link these sirens to stream flow gauges which would have to be installed on Rifle and Government Creeks, and perhaps even at Hubbard Gulch. When the capacity of these creeks reached a certain pre-designated point, the sirens would be remotely activated. Since Government Creek feeds into Rifle Creek at the upstream end of town, there

Flood Damaged Property

would be few areas subjected to false alarms. The cost of this system is unknown, but the existence and under-utilization of the sirens may warrant further examination.

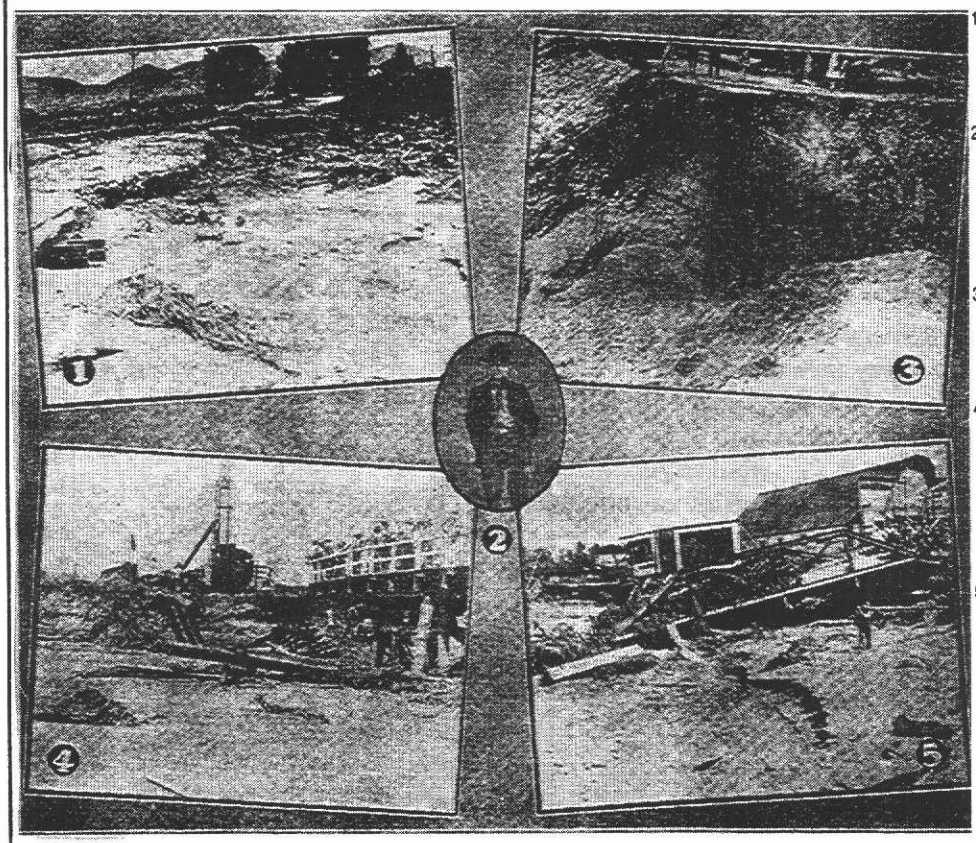
City of Rifle Flood Vulnerability

Community Description

The City of Rifle is located in central Garfield County, in northwestern Colorado and is approximately 28 miles west of Glenwood Springs. The City was incorporated in 1905, at which time the population was approximately 400 people. At the time of incorporation Rifle's economy consisted mainly of cattle and agricultural concerns, as well as the railroad. Today the city serves as the local center for retail trade, transportation, tourism and the recovery and processing of mineral resources. The city has grown considerably, from an approximate 3,200 in 1980 to just over 5,000 in 1993. The commercial section of Rifle is situated in a narrow, shallow valley at the junction of Rifle and Government creeks and north of the Colorado River. The Rifle Creek floodplain has been intensely developed and is devoted largely to residential, commercial and civic uses.

The climate in the Upper Colorado River Basin can be characterized as semi-arid, except in the higher elevations where precipitation is moderately heavy, especially during the winter months. Precipitation ranges from less than 10 inches per year in the lower valleys to more than 50 inches per year on the higher peaks. While most precipitation over the basin occurs as snow, the Rifle Creek watershed is subjected to cloud-

VIEWS OF DAMAGE FROM RIFLE'S WORST RECORDED FLOOD, AUGUST 8, 1930



1 — View where Meeker highway crosses Government Creek north of Rifle, looking east.
2 — Lee Clonch of Rifle, State Highway Patrolman, who lost his life when the bridge on West Third Street fell into Rifle Creek.
3 — Hiway washout on U.S. 40 South, just east of Vanadium mill, east of Rifle, looking east.
4 — Washout of west approach to bridge over Rifle Creek on Denver & Rio Grande Western Railroad, west of Rifle. Pile driver at work. Looking west.
5 — Bridge on West Third Street, showing new channel west of bridge and fallen concrete piers at west end of bridge. Looking north. Lee Clonch lost his life standing upon this bridge near the left lower corner.

Courtesy - Susanna Hart, Rifle Citizen Telegram

burst activity with high-intensity rainfall of short duration during the summer and fall months. Average annual temperatures vary from less than 32 degrees F in the high headwater areas to approximately 50 degrees F in the lower valleys.

Rifle Creek Flood History

The Rifle Creek basin has a long history of flooding. Damage from flooding has been incurred several times since Rifle was settled. Despite this flood-prone history, data for specific flood events is poor. This is due mainly to the lack of stream gauges in the area. As a result, historic flood information has been pieced together mainly from newspaper accounts. From available information, it can be concluded that the most damaging floods along Rifle Creek and Government Creek have been the result of high intensity, short duration rainfall. As stated above, such cloudbursts generally occur during the summer months, but as the May 15th flood demonstrates, they can occur earlier in the year as well.

The 1930 Flood

The worst flood in Rifle history, prior to the May 15th 1993 flood, happened on August 8th 1930, in the midst of what was then the worst drought in U.S. history. The flood was caused by a 2-hour cloudburst that produced high peak flows in both Government and Rifle Creeks. The flood washed out two bridges, undermined railroad tracks, flooded the train station and inundated the sewage treatment plant as well as the bulk storage facilities of six oil companies. The flood also claimed the life of a state highway patrolman. Unlike the May 15th 1993 flood, the 1930 flood caused only minor flooding in some homes.

The most recent floods of importance occurred in August 1963. On August 9th, flood flows from a cloudburst severely damaged the Pioneer Ditch diversion in Rifle. In areas nearby, roads were covered with mud, agricultural facilities were damaged and a large culvert was destroyed. On August 12th, another cloudburst resulted in the flooding of several downtown streets causing severe damage to streets and deposition of tons of sediment and other flood debris on streets and roads. It is clear that the City of Rifle is vulnerable to flash flooding from intense local cloudbursts.

Damaging Floods Within the Rifle Creek Basin occurred during 1914, 1917, 1921, 1929, 1930, 1937, 1945, 1947, 1951, and 1963.

Dam Failure Flood Hazard

The Rifle Gap Dam, an irrigation water dam owned by the U.S. Bureau of Reclamation, is located at the confluence of East Rifle Creek and West Rifle Creek, about 7 miles upstream of the City of Rifle. The dam and associated reservoir provide no flood control protection for the City of Rifle. The reservoir holds about 11,000 acre feet of water. The dam is a Class I high hazard dam, indicating potential loss of life and damage to property should the dam fail. It is estimated that in the case of a dam failure the flood wave would reach the City of Rifle in under one half hour. The City would be subjected to wide-spread flooding.

Vehicle Washed Downstream Along Rifle Creek

Flood Hazard Mitigation Activities

The City of Rifle has no flood control structures on either Rifle or Government Creeks. This, combined with the sparse vegetation in the drainage basins, makes Rifle particularly vulnerable to flash flooding. Programs which will encourage the construction of flood control structures and improvement of the watershed vegetation should be encouraged.

The United States Department of Agriculture's Soil Conservation Service (SC) has some programs that may be able to help improve the condition of the watershed in the basins above Rifle. There are also SCS programs that provide design help for structures and other facilities, to maximize their flood control attributes. It is apparent that some type of flood control struc-

Courtesy - Kevin Holderness, City of Rifle

ture(s) is/are needed.

The Rifle Trail

Prior to the May 15th flood, the City of Rifle was in the final stages of planning the Rifle Trail. The plan calls for a multiple user trail to be developed over the next several years which would follow Rifle Creek through the City of Rifle north to the Rifle Gap Dam. From there, the trail will extend to the city's Rifle Mountain Park. Through town, the plan calls for separate hard surface and soft surface trails running next to each other for use by a variety of individuals including handicapped persons, seniors, bicyclists, joggers and so forth. The hard surface would ideally be a ten-foot wide concrete path and the soft surface a five- foot wide non-surfaced section. In order to cut costs, crusher fines would be used instead of concrete. The right-of-way for the trail will be twenty to twenty-five feet wide.

The fact that the proposed trail follows Rifle Creek through town provides an excellent opportunity for flood mitigation. One of the properties that was destroyed lies along the path of the proposed trail. The City of Rifle should make every effort to purchase this property and incorporate it into the trail system. Public acquisition of flood hazard property is perhaps the most cost-effective means of flood hazard mitigation. These hazardous properties can be developed to benefit the community in multiple ways. The

Harold Marrs - Pumps Water Out of Yard, by Ellen Jaskol, RMN

basic benefit they provide is in the removal of people and their structures from the floodplain. This helps restore the natural values of the floodplain, some of which are flood control and improved water quality. These flood hazard properties can also host minimal development in the form of picnic areas, trails or parks which provide intrinsic aesthetic values to the community.

Flood Mitigation Meeting

On Thursday June 17th. a flood debriefing session was held with city, county and various other concerned agencies. The following items were addressed during that meeting:

- ☐ ***Support for Rifle Trail***
  - Funds may be available from "GO Colorado". A letter of support for the trail should be developed, and backed up with appropriate signatures.
- ☐ ***Victim Assistance***
  - Assistance to help victims with their housing needs may be available from the Colorado Realtors Association's Emergency Housing Fund, the State of Colorado's Division of Housing and the Colorado Volunteers Active in Disasters (COVOAD's) Mennonite members (in the form of actual construction assistance).

City of Rifle Flood Mitigation Action Items

Action Item	Agency Responsible,	Time Frame	Status
Warning - Research warning systems available.	City	Summer '93	On-going
Training and Education - sandbagging & flood-fight measures	OEM	Summer '93	
Flood proofing - homes and businesses	OEM	Summer '93	
Water Rescue - for emergency responders	Rifle F.P.D.	Summer '93	
Professional Evaluation of River Systems & Recommended Actions:	Rifle	Summer '93	
What types of flood control measures are suitable?	CWCB, COE or OEM	Each Year	
Cost/Benefit Analysis (C/BA): Evaluation of flood mitigation effort underway.	Rifle	Fall '93	
Refinement of EOC , emergency response plans, communications, relocation of EOC, ICS training	Rifle	Fall '93	
Mutual Aid Agreements: What is available; what is needed?	Rifle	Fall '93	
Rural Development Council: How can they help?	Garfield Co.	Fall '93	

☐ ***The Floodplain***

- The NFIP's Flood Insurance Rate Maps (FIRM's) for the City of Rifle were determined by the CWCB to be adequate. Plans were good, and the CWCB would be available to help the City in design, review and inspection of flood control measures
- The SCS can evaluate the drainage basin to see if the possibilities of improving the vegetation and using dams and retention devices to eliminate flooding problems exist. The SCS can also provide assistance to agricultural producers in mitigating for flood damages to agricultural facilities. Additionally they can provide technical assistance to municipalities in the design of facilities and trails, to enhance their flood mitigation characteristics.

The "ACTION ITEMS" on the previous page were derived from the June 17th meeting.

Appendix A - In The Event of a Flood: Tips to minimize loss of life and property

The following tips are from the Federal Emergency Management Agency Federal Insurance Administration National Flood Insurance Program and should be used as suggested guidelines for action before, during, and after a flood.

Steps to take Today

- ☐ Make an itemized list of personal property, including furnishings, clothing, and valuables. Photographs of your home - inside and out - are helpful. These will assist an adjuster in settling claims and will help prove uninsured losses, which are tax deductible.
- ☐ ***Learn*** the safest route from your home or place of business to high, safe ground if you should have to evacuate in a hurry.
- ☐ ***Keep*** a portable radio, emergency cooking equipment, and flashlights in working order.
- ☐ ***Persons who live in frequently flooded areas should keep on hand materials such as*** sandbags, plywood, plastic sheeting, and lumber which can be used to protect private property. (Remember, sandbags should not be stacked directly against the outer walls of a building, since, when wet, the bags may create added pressure on the foundation.)
- ☐ ***Buy flood insurance***. You should contact your property/casualty agent or broker about eligibility for flood insurance, which is offered through the National Flood Insurance Program. Generally, there is a five-day waiting period for this policy to become effective, so don't wait until the last minute to apply.
- ☐ ***Keep*** your insurance policies and a list of personal property in a safe place, such as a safety-deposit box. Know the name and location of the agent(s) who issued the policies.

When the Flood Comes

The safety of your family is the most important consideration. Since floodwaters can rise very rapidly, you should be prepared to evacuate before the water level reaches your property.

- ☐ Keep a battery-powered radio tuned to a local station, and follow all emergency instructions.
- ☐ **If you're caught in the house** by suddenly rising waters, move to the second floor and, if necessary, to the roof. Take warm clothing, a flashlight, and portable radio with you. Then wait for help...don't try to swim to safety. Rescue teams will be looking for you.
- ☐ ***When outside the house,*** **remember.... FLOODS ARE DECEPTIVE.** Try to avoid flooded areas, and don't attempt to walk through floodwaters that are more than knee deep.
- ☐ **If, and only if, time permits...**there are several precautionary steps that can be taken.
- ☐ **Turn off all utilities** at the main power switch and close the main gas valve if evacuation appears necessary. Do not touch any

electrical equipment unless it is in a dry area and you are standing on a piece of dry wood while wearing rubber gloves and rubber soled boots or shoes.

- ☐ **Move valuable papers,** furs, jewelry, clothing, and other contents to upper floors or higher elevations.
- ☐ **Fill bathtubs, sinks and jugs with clean water** in case regular supplies are contaminated. You can sanitize these items by first rinsing with bleach.
- ☐ **Board up windows** or protect them with storm shutters or tape to prevent flying glass.
- ☐ **Bring outdoor possessions inside the house** or tie them down securely. This includes lawn furniture, garbage cans, tools, signs, and other movable objects that might be swept away or hurled about.
- ☐ **If it is safe to evacuate by car,** you should consider doing the following:
- ☐ **Stock the car with non perishable foods** (like canned goods), a plastic container of water, blankets, first aid kit, flashlights, dry clothing, and any special medication needed by your family.
- ☐ **Keep the gas tank at least half full** since gasoline pumps will not be working if the electricity has been cut off.
- ☐ **Do not drive where water is over the roads.** Parts of the roads may already be washed out.
- ☐ **If your car stalls out in a flooded area,** abandon it as soon as possible. Floodwaters can rise rapidly and sweep a car (and its occupants) away. Many deaths have resulted from attempts to move stalled vehicles.

After The Flood

If your home, apartment or business has suffered flood damage, immediately call the agent or broker who handles your flood insurance policy. The agent will then submit a loss form to the National Flood Insurance Program. An adjuster will be assigned to inspect your property as soon as possible.

- ☐ *Prior to entering a building*, check for structural damage. Make sure it is not in danger of collapsing. Turn off any outside gas lines at the meter or tank, and let the house air for several minutes to remove foul odors or escaping gas.
- ☐ ***Upon entering the building,*** do not use open flame as a source or light since gas may still be trapped inside; a battery-operated flashlight is ideal.
- ☐ **Watch for electrical shorts or live wires** before making certain that the main power switch is turned off. Do not turn on any lights or appliances until an electrician has checked the system for short circuits.
- ☐ **Cover broken windows** and holes in the roof or walls to prevent further weather damage.
- ☐ **Proceed with immediate cleanup measures** to prevent any heath hazards. Perishable items which pose a health problem should be listed and photographed before discarding. Throw out fresh food and previously opened medicines that have come in contact with flood waters.
- ☐ ***Water for drinking and food preparation*** should be boiled vigorously for ten minutes (until the public water system has been declared safe). Another method of disinfecting is to mix 1/2 teaspoon of liquid commercial bleach with 2-1/2 gallons of water...let stand for five minutes before using. The flat taste can be removed by pouring the water

from one container to another or adding a pinch of salt. In an emergency, water may be obtained by draining a hot water tank or melting ice cubes.

☐ ***Refrigerators, sofas, and other hard goods*** should be hosed off and kept for the adjuster's inspection. A good deodorizer when cleaning major kitchen appliances is to add one teaspoon of baking soda to a quart of water. Any partially damaged items should be dried and aired; the adjuster will make recommendations as to their repair or disposal. Take pictures of the damage done to your building and contents.

☐ **Take all wooden furniture outdoors,** but keep it out of direct sunlight to prevent warping. A garage or carport is a good place for drying. Remove drawers and other moving parts as soon as possible, but do not pry open swollen drawers from the front. Instead, remove the backing and push the drawers out.

☐ **Shovel out mud while it is still moist** to give walls and floors a chance to dry. Once plastered walls have dried, brush off loose dirt. Wash with a mild soap solution and rinse with clean water; always start at the bottom and work up. Ceilings are done last. Special attention at this early stage should also be paid to cleaning out heating and plumbing systems.

☐ **Mildew can be removed from dry wood** with a solution of 4 to 6 tablespoons of tri-sodium phosphate (TSP), 1 cup liquid chlorine bleach, and 1 gallon water.

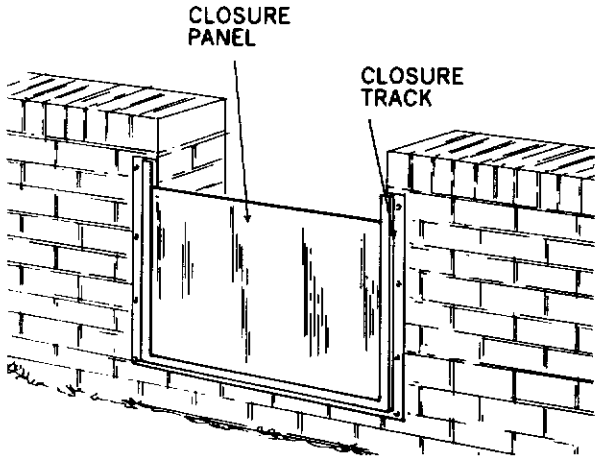
☐ **Clean metal at once** then wipe with a kerosene-soaked cloth. A light coat of oil will prevent iron from rusting. Scour all utensils, and, if necessary, use fine steel wool on unpolished surfaces. Aluminum may be brightened by scrubbing with a solution of vinegar, cream of tartar, and hot water.

☐ **Quickly separate all laundry items** to avoid running colors. Clothing or household fabrics should be allowed to dry (slowly, away from direct heat) before brushing off loose dirt. If you cannot get to a professional cleaner, rinse the items in lukewarm water to remove lodged soil. Then wash with mild detergent; rinse and dry in sunlight.

☐ ***Flooded basements should be drained*** and cleaned as soon as possible. However, structural damage can occur by pumping out the water too quickly. After the flood waters around your property have subsided, begin draining the basement in stages, about 1/3 of the water volume each day.

Floodproofing for Business and Homeowners

Many of the floodproofing techniques that keep water away from a residence, such as flood walls, levees, and structural sealing, may require special treatment for openings such as doors, windows, driveways, etc. These closures act as shields to cover the gap and prevent water from entering, and can be of a variety of shapes, sizes, and materials.



Example of Drop-In Closure

In some cases closures are permanently attached using hinges so that they can remain open when there is no flood threat. They may be portable, normally stored in a convenient location and slipped into place when a flood threatens. In

certain situations, when flooding is of very low level, usually less than one foot, some method of enclosing low entrances such as basement doors or window wells might be a satisfactory option. In any case, there are a number of elements involved in designing and using a closure system.

In areas of shallow, low-velocity flooding, closures can be used on doors, windows, vents, and other building openings. However, the first step with the use of closures placed directly on buildings is to be certain that both the closure and the wall systems are strong enough and sufficiently watertight to withstand flood pressures.

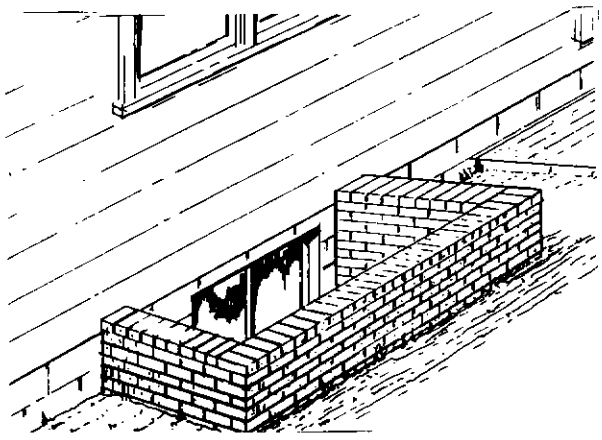
The use of closures directly on a structure is considered to be part of the sealing process. Closures can be considered as an option only if a flooding situation provides sufficient time to install the closures. The need for both warning time and ***"human intervention"*** is critical, since all closure system require personnel to install them and make certain they are properly sealed.

Closures that are stored between floods must be readily accessible. The effectiveness of an entire closure system will be compromised if the closures are stored such that flooding renders theminaccessible, or if even one closure is improperly installed.

For most flooding situations, a homeowner should consult with a professional engineer to be certain that the closure system being planned can withstand the hydrostatic and hydrodynamic pressures that will be involved.

Low Profile Permanent Closures

For cases involving flood levels of up to two feet, a type of ***"mini-flood wall"*** can be used to permanently protect various types of openings. Possible materials for this use include brick, concrete block and poured concrete. The figure above shows a wall around a window well. For flooding around a basement door, a low wall around the entrance may be the solution, as shown. Though the "mini"-walls may not require the degree of reinforcing of larger flood walls, they should be supported by and securely tied unto a footing so that they will not be undercut by scouring.

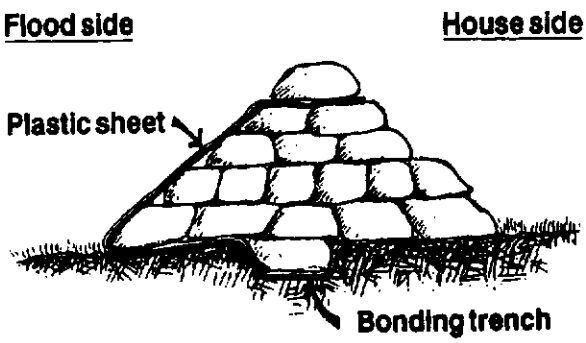


Example "Mini" Floodwall for Windows

Sandbagging

As a last resort or during emergencies, sandbags can keep water away from vulnerable property. However, flood proofing measures and moving contents out of the way are much more secure methods to accomplish the same thing. Additionally, sandbagging can be very expensive.

A community plan for sandbagging requires



Example of Sand-Bag Wall

Sandbagging Steps

1. **Strip the ground of sod. Grass gets slippery when wet and your wall could be pushed along the ground by the weight of the floodwater.**
2. **Dig a bonding trench and lay a plastic sheet in the trench and on the flood side.**
3. **Fill bags 1/2-3/4 full. Don't tie them.**
4. **Starting in the bonding trench, lay the bags on top of the plastic sheet. Place each bag on top of the previous one's flap.**
5. **Lay each layer's bag at right angles to the layer below it and tamp tightly in place.**
6. **When you reach your flood protection level, pull the plastic sheet up in front of the wall and hold it down with more bags.**
7. **If strong current and debris are expected, protect your plastic sheet from ripping with another layer of sandbags.**

Sandbagging Steps

buying sandbags before a flood. Get burlap or plastic sandbags. Other kinds of bags simply won't hold up. Burlap or plastic bags cost 25 to 50 cents each. Sand and plastic sheeting must also be stockpiled.

Sandbagging can also be very time consuming. It takes two people approximately one hour to fill and place 100 sandbags, giving you a wall one foot high and 20 feet long. If you skimp on the bags, you risk putting up a wall that will be knocked over.

When a flood is imminent, everyone wants to sandbag, usually because they don't know what else to do. While it does have a therapeutic effect, sandbagging should be considered only as part of an overall flood response plan, or as a last resort for individuals.

A good plan will help use your limited time and resources most efficiently. An overall flood response plan might call for sandbags to fill in any gaps in a flood wall.

State Assistance

OEM will improve the state's capability to respond to disaster response and recovery efforts by the incorporation of mitigation into disaster preparedness and recovery programs and activities.

The Disaster Preparedness Improvement Grant (DPI) and Emergency Management Training (EMT) will work in unison to establish and complete training activities for emergency managers, state and local government officials, business and industry, and private citizens of Colorado.

Appendix B - Sources of Assistance

The following agencies can provide advice or assistance before, during, or after a flood.

Emergency Management

Colorado Office of Emergency Management
Camp George West, Bldg 120
Golden, CO 80401
(303) 273-1622

Flood Mitigation/Control Information

Colorado Water Conservation Board
1313 Sherman St, Rm 720
Denver, CO 80203
(303) 866-3441

Flood Insurance

Local Insurance Agents
Your City or County

Federal Emergency Management Agency (FEMA)
Federal Insurance Administration
Washington, D.C. 20472
(202) 646-2780
(800) 638-6620

Victim Assistance

American Red Cross