

**IMPLEMENTATION OF  
THE NATIONAL FLOOD INSURANCE PROGRAM  
IN LARIMER COUNTY, COLORADO**

by

**Dwayne A. Landenberger  
Howard M. Whittington**

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## I. INTRODUCTION

Prior to 1968, when Congress passed the first effective National Flood Insurance Act, flood victims could obtain little or no relief from their economic plight and usually had no recourse other than to suffer their losses. The only source of relief that was usually available to the victims of flood destruction was from special disaster loans from the Federal Government. For many of the unfortunate flood victims, the real tragedy came with the discovery that flood losses are almost always excluded from the average homeowner's insurance policy. Because of the high risks, the lack of underwriting standards, and the small insurance pools created by the relatively few people living in flood-prone areas, insurance companies simply could not afford to provide flood insurance policies at reasonable rates.

The Federal Government is acutely aware of the national need for a reliable and comprehensive flood insurance program to provide adequate relief for the property and personal losses suffered by victims of recurring flood disasters. Realizing that floods are one of the most destructive natural hazards facing the American citizen, the Federal Government has assumed more and more responsibility for providing relief and for

partial indemnification for property losses resulting from floods. Massive sums have also been spent for flood protection works (an estimated \$9 billion between 1936 and 1973). Nevertheless, as a result of unwise use of the nation's flood plains, annual losses from floods continued to increase. Congress has realized that if an effective flood insurance program is to be created, adequate safeguards and land use regulations would also be needed to minimize future losses of life and property.

Congress has made several attempts to develop and implement a national insurance program beginning with the Federal Flood Insurance Act of 1956 and culminating in the 1973 Flood Disaster Protection Act. The early political sparring over the issue was not over the necessity of a Federal insurance program, but rather how the program would be implemented. However, when the time came for action in the local communities, conflicting interests caused the rapid formation of opposing groups which has led to bitter feelings and disharmony in many communities.

In this report we will examine a brief history of the flood insurance program, how and why the program has evolved in Larimer County, how it has affected and been affected by various organizations and groups, the key problems that have been encountered during implementation of the program, and the

possible and proposed solutions to these problems. It has not been our purpose to point the finger of blame for these problems at any individual or group of individuals, but rather to identify key areas where communities are likely to encounter trouble as they implement the program.

Our reason for writing this report is to provide insight into the problems related to the implementation of the Flood Insurance Program. We have decided to use Larimer County merely to illustrate some of the underlying factors which may breed dissatisfaction with the program and to identify possible solutions to these conflicts of interest. It is our intent that this type of study will provide local planners with information about the type of problems that can occur when flood insurance becomes a local issue. Hopefully, the planner will then be better prepared to anticipate problem areas and to find suitable solutions before interests become so polarized that meaningful discussion and compromise becomes impossible.

In addition, many have expressed an interest in the results of this study. First, a history of the evolvement of the insurance program and flood plain regulations in Larimer County is useful as a reference. This is especially true for future officials and planners who were not involved when the program was initiated. Second, since the flood insurance program is quite involved, hopefully, this study will be able to

provide a better understanding of the program. Third, the efforts of Larimer County provide insight into how flood plain management in connection with the flood insurance program can be made more effective. Fourth, it is hoped that the report will result in a greater appreciation and understanding of different points of view at the Federal, state, and local levels.

Finally, we would point to the need for an assessment of the impacts of the insurance program. In particular, what might be the impact of the floodway concept under the criteria of the FIA. Could the floodway concept generate more damages and result in more costs to the Federal Government as well as to local and state governments? This is one question that needs to be explored.

## II. BRIEF HISTORY OF THE FLOOD INSURANCE PROGRAM

The reasons for implementation of an insurance program, the evolution of the program, and the present status of the National Flood Insurance Program will be discussed.

### REASONS FOR IMPLEMENTATION

#### Historical Flood Plain Uses

Flooding of bottomlands is a fact of nature. River channels contain the normal flow most of the time, but regularly, if not predictably, rivers overflow their banks and inundate the adjacent bottomlands. If these bottomlands are forested, pastures, or open space, then damage is usually slight and may even be beneficial to the soil. However, when there is unregulated development by man, the potential for loss can be enormous. Historically, our country has reacted to this flood disasters by indemnifying the victims and constructing flood control structures. In addition to spending billions of dollars for protective structures, flood relief has accounted for ninety percent of all national disaster relief averaging \$1.5 billion annually in 1972 and HUD estimates this could reach \$13 billion by the year 2000.

Rather than reducing flood damages, structural solutions have tended to entice development of the flood plains and

build a false sense of security with the flood plain developers. Congress realized that if this trend was to ever be reversed, then it would be necessary to try to control the actions of people, rather than water, as a long-term solution. The use of such controls, however, has proven to be very difficult if not impossible. Prior to the 1973 Flood Disaster Protection Act, which put some teeth into the flood insurance program, it seemed that the only controls of flood plain development were by local zoning and building codes. These regulations were not usually enforced with enthusiasm because local officials were constantly pressured by developers saying that the danger of flooding seemed remote and the cost of avoiding trouble was too high. Therefore, variances were often granted with the net result being a counter-productive cycle of unwise flood plain use, reliance on disaster relief, the call for more structural flood control, and a lemming-like return to the flood plain.

#### A National Flood Insurance Program

The National Flood Insurance Program, as set up by the Congress, places the burden of expense for flood relief on the landowners in the flood plain, who are deriving the greatest benefit from the program. It enhances the environment by discouraging the urbanization of the flood plain and promoting the development of recreational, agricultural, and ecological

uses, but most important of all, it withholds Federal financial aid from those who fail to adopt and enforce satisfactory flood plain regulations.

The major drawback to the program is that it may lull the participating communities into the belief that they are now immune to disasterous floods. In fact, they are now only prepared for floods equal or less than a given magnitude, the 100-year flood. To substantiate this danger, we need only look, for example, to 1972 when there were 45 Presidentially-declared flood disasters, of which over 50 percent were equal to, or greater than, the 100-year flood. Thus, local politicians must be willing to endure pressure for flood plain development over an extended period of time and they must keep the flooding issue before the people. They must not only enforce the flood plain regulations but also actively promote a program for public awareness of the real dangers of flooding.

The major thrust of the National Flood Insurance Program is not to penalize or stifle city growth or increase economic burdens, but to call attention to the necessity for communities to undertake wise land use management in order to avert future economic loss resulting from flooding.

While the enacting legislation was being prepared for this program, a member of the National Academy of Sciences testified:

to the extent that communities have not engaged in this (land use management) one must recognize that there has been a trade-off, and continues to be a trade-off, and the trade-off is between the short-term benefits that are gained by a private developer and landowner and the long-term costs of the Federal Government in bailing out those people who subsequently occupy the property and then come to the Federal Government for relief or for costly protective works.<sup>1</sup>

## EVOLUTION OF THE PROGRAM

### Federal Flood Insurance Act of 1956

Realizing that flood insurance would be a rational approach to alleviating some of the losses resulting from floods, Congress passed the Federal Flood Insurance Act of 1956. This Act was the first attempt by the Federal Government to provide low-cost flood insurance to homeowners through a federally subsidized program. After only 9 months of existence, however, the program failed when the House of Representatives refused by a vote of 218 to 186 to appropriate any funds to implement the program. Testimony before the Senate Committee on Banking and Currency on 12 July 1962 revealed that the rate setting policy adopted had basically been an unworkable program. It had provided a joint Federal-State venture but failed to provide a mechanism for coordinating the State and Federal activities. The "flat rate" plan was based on the average annual flood damages and not on the probability of flood occurrence and damage in any particular

local area. Furthermore, deficiencies in actuarial justification and less than complete industry support resulted in a still birth for the experiment.

### Further Efforts

After this failure, efforts were made to revive the flood insurance legislation in 1962, 1963, and 1965. These attempts were culminated in the Southeastern Hurricane Disaster Relief Act of 1965 which contained a directive to the Secretary of Housing and Urban Development to undertake a study of the feasibility of providing financial assistance to the victims of floods and other natural disasters.

This study was submitted to President Johnson on 8 August 1966 and was forwarded to Congress on 12 August 1966. The HUD report indicated that people were moving into coastal and river-front locations faster than flood protection works could be built and the damage potential of floods in the United States was higher than ever before. Furthermore, the people occupying the flood-prone areas were, to a large extent, completely unaware of the flood damage risks that they faced.

The report, "Insurance and Other Programs for Financial Assistance to Flood Victims," found that, primarily because of recent advances in the science of hydrology, it was entirely feasible to provide a flood insurance program with rates based on flood probability. Since the private insurance industry

could not provide flood insurance at rates that homeowners could generally afford, the report focused on three alternatives: 1) provide an insurance program totally administered by the Federal Government; 2) provide a Federal program using private industry to act only as agents; and 3) the recommended plan, set up a cooperative program where the Federal Government and the insurance industry would share the risks with large scale participation by the government (primarily in the form of subsidizing the program) but carried out to the maximum extent by the private insurance companies. This program was recommended not only to protect the insurance industry from heavy losses, but since subsidizing of the program was essential, the only way that the government could justify such expenditures would be to create an incentive for wise land use management.

In summary, the 1966 study found that the program was feasible and could provide subsidized premium rates for properties already existing in high-risk areas, but only if actuarial rates were charged for future construction and the program required sound land use and control measures to reduce or avoid future losses.

#### National Flood Insurance Act of 1968

Administration-backed flood insurance bills were introduced in 1967 with almost unanimous support by the insurance

industry, the National Association of Insurance Commissioners, and many of the mayors of flood-prone cities. The bill was made part of the Omnibus Housing Bill and was signed into law on 1 August 1968.

This measure was known as the National Flood Insurance Act of 1968 and became effective on 28 January 1969. It was a big step forward in many ways: It would reduce the disaster loans and grants the government paid to flood victims in ever-increasing amounts, it would provide reasonably priced flood insurance to homeowners already living in flood hazard areas, it would alert the public to the folly of building in flood hazard areas, it would encourage the prudent use of the flood plain for the preservation and enhancement of the environment, it would provide income and growth for the insurance industry, and most of all, it would provide a vehicle for flood plain zoning and regulation.

The basic purposes of the 1968 Flood Insurance Act were to authorize a flood insurance program, which was a joint venture of the Federal Government and the insurance industry, to guide future development away from flood hazard areas, and to encourage lending institutions to assist in furthering the objectives of the program. The Secretary of Housing and Urban Development was authorized to carry out the program and he was given the authority to set up the program in one of two

possible ways. The preferred method was for private insurance companies, with government backing, to form a pool in order to provide the insurance and to assume a reasonable portion of the responsibility for adjustment and payment of claims. This method was implemented by HUD with the insurance companies organizing as the "National Flood Insurers' Association."

If for some reason the Secretary of HUD should determine that the industry program would not work, he was authorized to implement a Government Program with industry assistance using Federal manpower to operate the program.

The impetus for the program had come from the members of Congress that represented voters from flood-prone areas. Since every state and practically every county in the country has some flood hazard areas, there was no member of Congress who was openly opposed to the program. The only political sparring that was evident was over the methods by which the program should be implemented.

This is not to say, however, that the Act did not meet some opposition. In an effort to avert as many controversial issues as possible, the newly created Federal Insurance Administration sent out notices of the proposed qualification procedures and criteria for land management use on 28 February 1969. They solicited comments on the proposed regulations from federal, state, and local officials and others. Replies were

received from governors, mayors, federal departments, state water resource agencies, insurance commissioners, and others. The comments were reviewed and changes were incorporated to the final form with the definitive flood insurance regulations being published on 18 June 1969.

The officials of many flood-prone towns and cities quickly responded that the requirements for flood insurance could be met easily. Others found fault with the regulations saying that the wording was vague and they voiced their opinion that the zoning requirements might be impossible to effecuate. While homeowners lined up on one side for quick action to provide them with the needed flood insurance, others lined up in opposition to the program. Land developers stood to lose by not being allowed to develop the flood plain lands for which they had paid large sums of money. Homeowners who were not located in the flood-prone areas objected to the higher taxes they would have to pay as a result of the program reducing the potential tax base from the flood plain. Some people living in high hazard areas refused to believe they were in any danger and this prompted one local official to say he hoped the Corps of Engineer's flood prediction would actually hit the town in order to convince the apathetic people of the very grave situation and the dire need for the program.<sup>2</sup> Local officials were caught in the middle of the fight and had to resist the

enormous political pressure that industries and land developers were bringing to bare. Clearly, the opposition to the program first became evident at the local level.

#### Housing and Urban Development Act of 1969

It was also soon realized that a stumbling block for community participation existed in the expensive and time consuming rate-making study to establish the insurance premium rates. This resulted in an amendment to the 1968 Act which was contained in the Housing and Urban Development Act of 1969 which set up an emergency program.

This amendment divided the implementation requirement into two phases. First, the community had to apply to the FIA for the emergency program and also pass a resolution that flood zoning regulations would be passed upon completion of the study identifying the flood hazard areas. In the interim the community was to regulate flood plain development to the best of its ability. After the rate-making study was completed, the community would be changed to the regular program and the city would pass and begin enforcing more stringent flood plain zoning regulations.

The emergency program was to expire on 31 December 1971 but because of the time that is involved for the many detailed studies, this deadline was extended several times by various legislative actions. The emergency program is now in effect

until February, 1977, for any community which complies with the requirements and does not have a completed rate-making study.

The flood insurance program developed in 1968 was purely voluntary and the main incentive for the local communities was subsidized insurance. Furthermore, flood insurance was only provided for residential and small business properties. Numerous cities entered the program under the emergency program and were subsequently dropped for failure to adopt and enforce flood plain zoning ordinances.

There was relatively little public interest in the program, especially in areas that had not suffered a serious flood in a number of years. Despite the efforts of FIA to carry out the program as intended by Congress, with the primary objective of curtailing flood plain development, it became obvious that without positive measures to bring about these objectives the Act as written in 1968 would prove to be a futile effort. The 1968 Act had a major flaw; it was voluntary.

#### Flood Disaster Protection Act of 1973

The Flood Disaster Protection Act of 1973 required states or local communities, as a condition of future Federal financial assistance, to participate in the flood insurance program and to adopt and enforce adequate flood plain zoning regulations. The Act also required the purchase of flood insurance by property owners who were assisted in any way by

Federally-backed lending institutions for construction in identified areas having special flood hazards. Insurance coverage was extended to include not only residences and small businesses but all buildings having walls and roofs, whether privately or publicly owned. The coverage now also included mudslides caused by water accumulation on or under the ground, and erosion damage caused by water exceeding anticipated cyclical levels.

Under the 1968 Act, actuarial rates were imposed on any new construction which commenced after the effective date of the initial insurance rate maps. This was amended by the 1973 Act to 31 December 1974 or the effective date of the initial insurance rate maps, whichever is later. This meant that actuarial rates will not be applied to any structure built before 31 December 1974, regardless of flood threat.

The limits of coverage were substantially increased by the 1973 Act. Under this program, the limits of coverage are divided into two layers where the first layer is available under the terms of the emergency program at subsidized rates, and the second layer is available only after the rate-making study is completed and at actuarial rates. Any structures built in identified hazard areas after completion of the rate-making study will pay actuarial rates for both first and second layer coverage. The following tables illustrate the

limits of coverage under the 1968 and 1973 Acts and the subsidized policy rates under the 1973 Act.

TABLE 1  
LIMITS OF COVERAGE

<u>Type of Structure</u>	<u>Subsidized Coverage</u>		<u>Total Coverage</u>	
	<u>'68</u>	<u>'73</u>	<u>'68</u>	<u>'73</u>
Single Family Residential	\$17,500	\$ 35,000	\$35,000	\$ 70,000
Other Residential	30,000	100,000	60,000	200,000
Nonresidential	30,000	100,000	60,000	200,000
Contents, Residential	5,000	10,000	10,000	20,000
Contents, Nonresidential	5,000	100,000	10,000	200,000

TABLE 2  
SUBSIDIZED POLICY RATES

<u>Type of Structure</u> <u>(1973 Rates)</u>	<u>Rate per year per</u> <u>\$100 coverage on</u> <u>structure</u>	<u>Rate per year per</u> <u>\$100 coverage on</u> <u>contents</u>
Residential	\$0.25	\$0.35
Nonresidential	0.40	0.75

Table 3 shows the rapid growth of the National Flood Insurance Program since the Flood Protection Act of 1973 which imposed economic sanctions.

TABLE 3  
NATIONAL FLOOD INSURANCE PROGRAM

Year End Totals

	1974	1975
Communities participating	5,488	13,256
Insurance policies in force (estimate)	49,300	690,000
Coverage (Billion)	\$12.5	\$18.3
Number of claims paid	3,283	17,524
Claims paid (Million)	\$21	\$72.1

In one of the nation's most flood-prone states, Pennsylvania, the flood insurance program had its most astonishing growth: from about 683 policies in the entire commonwealth at the time of Tropical Storm Agnes in 1972 to more than 40,180 policies when Hurricane Eloise struck in 1975.

Housing and Community Development Act of 1974

The Housing and Community Development Act of 1974 added a requirement that lenders must give notice to a borrower of special flood hazard. After September 21, 1974, a borrower located in an identified special flood hazard area must be notified not less than 10 days before closing of the transaction.

## PRESENT STATUS OF THE PROGRAM

It may now be helpful to summarize the present status of the flood insurance program. In order for borrowers to obtain federally-backed loans for construction or refinancing in identified flood hazard areas, they are required to purchase flood insurance for the structure. However, the community must follow some clearly defined guidelines.

### Required Land Use and Control Measures

If a detailed rate-making study has not been completed for the community by the Federal Insurance Administration (FIA), then the community can become eligible under the Emergency Program. It does so by applying for eligibility and meeting the following requirements for land use and control measures within 6 months after the indicated data has been provided by FIA:<sup>3</sup>

(a) Undefined special flood hazard area

The community must (1) require building permits for all construction, (2) review all building permit applications and require modifications to minimize flood damage, (3) review subdivision and new development proposals to minimize flood damage, and (4) require new or replacement water and sanitary systems that would minimize contamination.

(b) Identified special flood hazard area by an official Flood Hazard Boundary Map (FHBM)

Community measures for identified areas must (1) take into account neighboring flood plain management programs,

(2) apply to all identified areas, (3) provide that flood plain ordinances take precedence over conflicting ordinances, (4) require building permits for all construction, (5) review building permit applications for new construction and major repairs or improvements to minimize flood damage, (6) review subdivision and new development proposals to assure minimum flood damage, and (7) require new or replacement water and sanitary systems to be designed to minimize contamination.

The Flood Hazard Boundary Map (FHBM) is the official map of the community, which is used by FIA, and represents the boundaries of the flood plain, mudflow areas, and erosion areas having special hazards. Special hazards are defined as those areas having a one percent chance of annual flood occurrence.

The following additional land use and control measures are required within 6 months after the indicated data has been provided by the FIA:<sup>4</sup>

(c) Identified special flood hazard area with 100-year water surface elevations

Community measures for identified areas must (1) meet the requirements of paragraph (b), (2) require new construction or major improvements of residential structures to have the lowest flood (including basement) elevated to or above the 100-year flood level, (3) require new construction or major improvements of non-residential structures to have the lowest floor (including basement) flood proofed to or elevated to or above the 100-year flood level, and (4) until a floodway has been designated, not permit any use unless it is demonstrated that the use will not increase the 100-year water surface elevation more than one foot at any point.

(d) Identified special flood hazard area with 100-year water surface elevations and floodway data.

Community measures must (1) meet the requirements of paragraph (c) with the exception of (c) (4), (2) designate a floodway for passage of the 100-year flood without increasing the water surface of that flood more than one foot at any point, (3) provide that nonconforming uses shall not be expanded but may be flood-proofed if the 100-year flood level is not raised, and (4) prohibit fill or encroachments within the designated floodway unless offset by stream improvements.

### Flood Insurance Rates

Under the Emergency Program, landowners may purchase up to \$35,000 worth of insurance for single family dwellings at an annual rate of 0.25 per \$100 coverage. At the completion of the rate-making study, a Flood Insurance Rate Map (FIRM) is issued by FIA and the community enters the regular phase of the flood insurance program. The FIRM delineates areas in which flood insurance may be sold at actuarial rates, and indicates the actuarial rate zones with each such area. The FIRM supercedes the FHBM and becomes the official zone designation by FIA for the community.

Construction of a building in a flood hazard area, which begins after the effective date of the FIRM or 31 December 1974, whichever is later, will require that flood insurance be purchased at actuarial rates. These rates are not only a function of location in the flood plain but also of the type of structure and its ability to withstand flooding. Structures built before the effective date of the FIRM (or 1 January 1975, whichever is later) or located outside of the

identified flood hazard areas, can purchase first layer coverage at either subsidized or actuarial rates, whichever is cheaper. Second layer coverage is always at actuarial rates.

Communities notified of their special flood hazard areas should qualify for the program by July 1, 1975, or within one year of identification, whichever is later, or face the economic sanctions of the Flood Disaster Protection Act of 1973. Only Federal financial assistance for use in the special flood hazard areas is affected by non-participation.

A community may qualify for the program at any time. Should a community not qualify for the program by the prescribed dates, the community may enter the program at a later date. When the community enters the program, Federal financial assistance may be resumed for the special flood hazard areas.

A flood disaster victim will not be penalized for failing to purchase a flood insurance policy prior to a disaster. However, as a condition for the Federal disaster assistance loan, the victim will be required to purchase flood insurance to protect his home against future flood damage.

Only new construction in the special flood hazard areas is required to be built in conformity with the program's minimum criteria in return for the availability of flood

insurance. The program does not prohibit new construction in the flood plains or floodway fringe areas.

Larimer County is in the process of entering the Regular Program. It will be beneficial to see how the program has evolved in Larimer County.

### III. LARIMER COUNTY AND THE FLOOD INSURANCE PROGRAM

First, a brief history of flooding in Larimer County will help to assess the potential for damaging floods. Second, a history of flood plain management will provide a background for efforts to delineate and regulate flood plains in Larimer County. Third, the reasons why Larimer County and the communities of Estes Park, Fort Collins, Loveland, and Wellington entered the flood insurance program will be examined. In addition, the level of awareness of the program will be discussed. Finally, the first and second phases of the implementation of the flood insurance to date will be covered.

#### HISTORY OF FLOODING IN LARIMER COUNTY

Many of the major rivers in Larimer County have their origin in the Front Range of the Rocky Mountains. The major rivers and tributaries of Larimer County are shown on Figure 1. Annual peak flows on these rivers normally occur in the period May through September, with about 70 percent occurring in June. Though most floods result from heavy rainfall in the basin, snowmelt runoff is a factor and the worst potential flooding condition is when heavy rains occur at a time that

W Y O M I N G

LARIMER COUNTY

WELD COUNTY

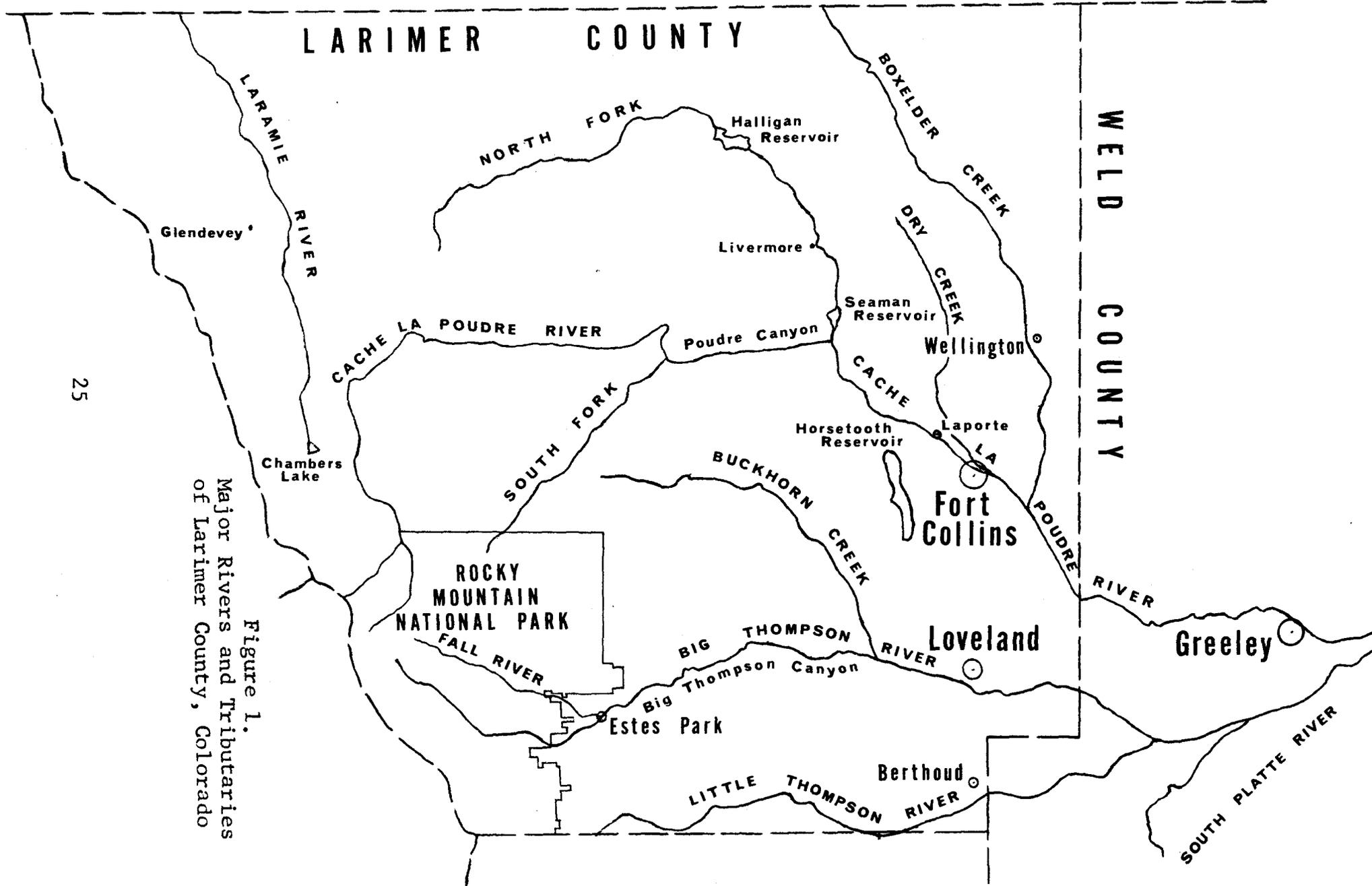


Figure 1.  
Major Rivers and Tributaries  
of Larimer County, Colorado

snowmelt runoff is highest, in May or June. A brief history of flooding on these rivers and tributaries will help in assessing the flood hazards in Larimer County.

### Laramie River

The Laramie River begins in the Rocky Mountains above Chambers Lake and drains the eastern slope of the Medicine Bow Mountains as it flows north into Wyoming. A United States Geological Survey (U.S.G.S.) gage located on the Laramie River east of Glendevy has provided a continuous record since 1910 and recorded a maximum discharge of 2240 cubic feet per second (c.f.s.) in June 1923. Flooding from the Laramie River is not a problem at present because the region is sparsely populated.

### Cache la Poudre River and Boxelder Creek

The Cache la Poudre River begins in Rocky Mountain National Park and flows in a north and easterly direction to where it joins the South Fork and then, a major tributary, the North Fork Cache la Poudre River. From this point it flows through Poudre Canyon out into the high plains area and southeast through Fort Collins. Another major tributary, Boxelder Creek, flows in a southerly direction from Wyoming, passes the western edge of Wellington, and joins the Cache la Poudre River about 6 miles downstream from Fort Collins. From

this point the Cache la Poudre flows in an easterly direction through Greeley, Colorado, to the South Platte River. The Cache la Poudre River through Fort Collins has a channel capacity of about 5,000 c.f.s.

Three very large floods occurred in 1864, 1891, and 1904 on the Cache la Poudre River. The present location of the City of Fort Collins was first established as a result of the June floods of 1864 when a detachment of the U.S. Army was forced to relocate from its flood damaged camp site near Laporte to the present site of Fort Collins. A U.S.G.S. gaging station near the mouth of Poudre Canyon upstream of Fort Collins has provided annual peak discharges for the Cache la Poudre River since 1882. Peak discharges between 1883 and 1949 are shown on Table 4. A peak discharge of about 21,000 c.f.s. was estimated during the June 1891 flood which was caused by failure of Chambers Lake Dam. The floods of 1864 and 1904 both exceeded 21,000 c.f.s. Flooding resulted on May 20, 1904 from intense rainfall in the headwaters of the North Fork Cache la Poudre River and Boxelder Creek. On May 25, 1904, the Fort Collins Express newspaper gave an account of the flood:

The effect cannot be described. The whole river bottom was overflowed, not with stagnant water but with rushing torrent. The damage was what might have been expected from a stream swollen to nearly a mile wide.

At Laporte nearly every house was flooded...

Table 4  
Flood Peak Stages and Discharges  
Cache la Poudre River <sup>1/</sup>

<u>Year</u>	<u>Date</u>	<u>Stage, Ft.</u>	<u>Peak Discharge, c.f.s.</u>
1883	22 June	-	7,900
1884	20 May	5.6	6,850
1891	9 June	-	21,000 <sup>2/</sup>
1900	29 May	-	5,000
1901	21 May	7.5	12,000
1904	20 May	-	- <sup>3/</sup>
1909	19 June	-	5,900
1914	2 June	5.5	5,380
1917	23 June	6.3	7,000
1918	20 June	5.6	5,200
1921	8 June	5.8	5,230
1923	15 June	7.4	8,550
1924	14 June	6.9	7,440
1930	31 May	7.9	10,200
1938	22 June	6.4	6,180
1949	5 June	6.3	6,090

<sup>1/</sup> Peak discharges in excess of 5,000 c.f.s., from U. S. Geological Survey Water Supply Papers, gage at mouth of canyon upstream from Fort Collins.

<sup>2/</sup> Caused by failure of Chambers Lake Dam.

<sup>3/</sup> Greater than 1891 flood.

On the College Avenue road the water ran about five feet deep.

Mr. Coy is sure, however, that this flood was greatly exceeded by that of 1864, which occurred while he was on his present place.

The Boxelder valley was afloat from bluff to bluff, and there were three feet of water at the Wellington store.

In addition, the newspaper reported that several buildings had been swept away at Livermore and that extensive damage had been done to irrigation ditches.

Also two floods in excess of 10,000 c.f.s. occurred in 1901 and 1930. No large flood has seriously threatened Fort Collins in recent years. This is remarkable in view of the fact that there were three very large floods in a span of 40 years, while in the past 46 years only a recorded peak discharge of 6,180 c.f.s. in 1938 and an estimated discharge of 8,000 c.f.s. at Fort Collins (4,630 c.f.s. at the gage) in 1951 have occurred. The August 1951 flooding of the Buckingham area from the Cache la Poudre River and the flooding of the Colorado State University Campus at Fort Collins was the result of a cloudburst rain in the foothills area west of Fort Collins. Because of the fact that only two small floods have occurred in the past 46 years, many local residents have become complacent or are at least unaware of the potential for devastating floods. Meanwhile, the population of Fort Collins has grown rapidly, increasing from 14,937 in

1950 to 43,337 in 1970. Fortunately, limited development has taken place to date along the Cache la Poudre River.

Since the flood of 1904, the town of Wellington has not been flooded by Boxelder Creek. The ponding of rain water in Wellington due to inadequate drainage has been alleviated by the recent construction of paved streets and a storm drainage system.

### Big Thompson River

The Big Thompson River flows easterly from the high mountains of the Continental Divide in Rocky Mountain National Park, through the town of Estes Park and down the Big Thompson Canyon. Eight miles west of Loveland the river leaves the canyon, passes through a short reach of foothills, and enters the high plains area, flowing past the southern edge of Loveland. From Loveland the river flows easterly to join the South Platte River southwest of Greeley, Colorado. Major tributaries are Buckhorn Creek which drains from the north and enters just west of Loveland, and the Little Thompson River which flows easterly from the Front Range south of Estes Park and joins the Big Thompson River near its mouth.

The Fall River, which begins in Rocky Mountain National Park, joins the Big Thompson in Estes Park. The largest recorded flows by a U.S.G.S. gage for the Big Thompson River in Estes Park were 1,660 c.f.s. in June 1949 and

1,640 c.f.s. in June 1965. Neither of these flows caused flooding in Estes Park. There is no known history of flooding, at least major flooding, since Estes Park was first settled in the 1860's.

The major part of the city of Loveland is above the Big Thompson River flood plain, which is south of the city, though there is some development, especially along U.S. Highway 287. Historically, damage from floods, for the most part, have been limited to bridges, farms, and irrigation works. Fortunately, there is considerable awareness in the City of Loveland of the flood hazard potential from the Big Thompson River. In August 1951, the largest known flood occurred with an estimated peak discharge of 22,000 c.f.s. at Loveland. Failure of a dam on Buckhorn Creek contributed to the peak. As a result of the flood, one mile of U.S. Highway 34 west of Loveland was washed away, crops and irrigation works were destroyed, many rural homes were flooded, and four people lost their lives. Total flood damages were estimated at \$602,000. In August 1949, a flood with a recorded peak discharge of 7,750 c.f.s. flooded the lowland areas west of Loveland and damaged U.S. Highway 34 to Estes Park. Other notable floods occurred in 1864, 1894, 1921, and 1923, but there is no record of their discharge at Loveland.

## HISTORY OF FLOOD PLAIN MANAGEMENT

### Big Thompson River Flood Plain Studies Near Loveland

In order to plan flood plain uses, the City of Loveland requested in 1968 through the Colorado Water Conservation Board a flood plain information study from the Omaha District Corps of Engineers. After the report was presented formally in January, 1972, the city requested a 12-mile extension and the county assumed responsibility.

The Colorado Water Conservation Board (CWCB) coordinates the activities of all Federal agencies within Colorado. These activities include flood plain delineation, flood control planning, construction of flood control works, and flood insurance studies. Each year, the CWCB assists local governments throughout Colorado in the delineation of flood plains. The CWCB presently uses the Intermediate Regional Flood, called the 100-year flood, for the purposes of flood plain delineation. It is defined as a flood that occurs with an average frequency of occurrence of about once in 100 years, although it could occur in any year.

The Corps of Engineers was granted authority to provide flood plain information studies by Section 206 of the Flood Control Act of 1960 (Public Law 86-645) as amended. Under the Flood Plain Management Services program of the Corps,

any state or local government may apply to the Corps for a flood plain information study. The request is usually submitted to the state coordinating agency, which for Colorado is the Colorado Water Conservation Board. The agency then forwards the application to the appropriate district office of the Corps of Engineers. Although flood plain information studies are provided at no cost to state and local governments, they are encouraged to furnish mapping and surveys.

#### Cache la Poudre River Flood Plain Studies

In 1969 the CWCB initiated efforts to delineate the Cache la Poudre River flood plain from the mouth of Poudre Canyon to the South Platte River. The Larimer-Weld Regional Planning Commission (now the Larimer-Weld Regional Council of Governments) acted for the jurisdictions of Larimer County, Weld County, the City of Fort Collins, and the City of Greeley and requested through the CWCB a flood plain information study of the Cache la Poudre River. Actual authority and planning, however, rested with each responsible jurisdiction. The formulation of land use regulations was an eventual goal.

A consulting firm provided 4-foot contour mapping and cross section data using photogrammetric methods. The studies for Larimer County were completed with Volume I in October 1973 and Volume III in October 1975.

## Big and Little Thompson Flood Plain Studies

In July 1973, a request for flood plain information studies for the Big and Little Thompson Rivers was made by the Larimer-Weld Regional Planning Commission.

### WHY THE COUNTY BECAME INVOLVED IN THE PROGRAM

Following meetings with FIA representatives and the FHBM identification of special hazard areas in Larimer County, all the affected jurisdictions in Larimer County entered the emergency program. There were several reasons why the jurisdictions entered the program. Some of the reactions of local officials are included.

### Meetings With Flood Insurance Specialists

Following enactment of the Flood Disaster Protection Act of 1973, FIA appointed two Flood Insurance Specialists for Region VIII. The Region VIII Office is located in Denver, Colorado, and has administrative responsibility for 6 western states, including North Dakota, South Dakota, Montana, Utah, Wyoming, and Colorado. The Flood Insurance Specialists are responsible for coordinating flood insurance studies with each community.

Meetings were held in Denver, Fort Collins, Greeley, and Loveland in July 1975 by the FIA Flood Insurance Specialists

to explain the new provisions of the National Flood Insurance Program. The meetings were held before state and local officials, bankers, and other groups to provide education and guidance. It was requested that local jurisdictions declare their intention to enact flood plain regulations if they planned to enter under the Emergency Program. In June, 1974, Larimer County made an application to enter the Emergency Program and was admitted. A sample application, which indicates requirements for eligibility, is shown in Appendix A.

#### Flood Hazard Boundary Maps

In order to accelerate the identification and mapping of flood hazard areas, Section 204 of the Flood Disaster Protection Act of 1973 directed that all involved Federal agencies be given the highest practical priority in the allocation of manpower and resources. In addition, authority was given to make contracts with private firms.

Accordingly, a contract was made by FIA in Washington, D.C., with Michael Baker Jr. Incorporated, a consulting firm in Pennsylvania, to furnish Flood Hazard Boundary Maps for several western states, including Colorado. It was felt by FIA that with a consultant within close proximity to Washington, D.C., better coordination could be provided in the preparation of the maps.

Table 5 shows the flood hazard areas which were designated for the various jurisdictions of Larimer County by the Flood Hazard Boundary Maps.

TABLE 5  
FLOOD HAZARD BOUNDARY MAPS FOR THE  
JURISDICTIONS OF LARIMER COUNTY

<u>Jurisdiction</u>	<u>Designation Date</u>
Larimer County, unincorporated areas	Dec. 27, 1974
City of Loveland	Mar. 1, 1974
Town of Wellington	Mar. 22, 1974
City of Fort Collins	June 28, 1974
Town of Estes Park	Sept. 19, 1975

Flood Hazard Boundary Maps for Larimer County and Fort Collins are shown in Appendix B.

Reasons for Entering the Flood Insurance Program

Reasons for entering the program varied among the jurisdictions. One reason was the desire to obtain subsidized insurance for those located in the flood plain. A more important reason was that local officials did not want to lose the availability of assisted mortgage money for those wanting to locate in flood plain areas.

The third reason, the towns of Estes Park and Wellington entered the program to protect the welfare of those presently

located in the designated flood hazard area. The towns of Estes Park and Wellington strongly disagreed with the Flood Hazard Boundary Maps as designated by Michael Baker Jr. In the case of Wellington, a large portion of the town was designated as having special flood hazards. Officials of Wellington felt that non-participation would result in economic hardship for the community.

An important reason for Larimer County, Fort Collins, and Loveland entering the program is that officials did not want to risk losing Federal assistance for possible municipal and county improvements in the flood plain.

#### Reactions of Officials to the Flood Insurance Program

Reactions by local officials to the flood insurance program have varied widely. Officials of Wellington feel that the community was forced into the flood insurance program and didn't have any other choice. Officials of Estes Park feel that the engineering studies were so poorly done by Michael Baker Jr. that they don't know whether flooding is a problem or not. One planner for the City of Fort Collins favorably viewed the flood insurance program because it forced the city into much needed flood plain regulations. An official for Larimer County took the flood insurance program in stride, saying that it was something that was here and had to be dealt with.

## LEVEL OF AWARENESS OF THE FLOOD INSURANCE PROGRAM

A broad survey of the awareness about the program within Larimer County is beyond the scope of this study. Consequently, the following discussion will give only a general indication of the level of awareness about the flood insurance program within each jurisdiction in Larimer County.

### Larimer County

Probably the greatest awareness of the program in the unincorporated areas of the county are by landowners in the flood plain along the Cache la Poudre River near Fort Collins. The LaPorte area is really the only special flood hazard area that has been identified by a FHBM, shown in Appendix B, for the unincorporated areas of Larimer County. In the LaPorte area, several residents are aware of the insurance program, the availability of insurance, and some of the flood plain regulation requirements.

There is also awareness of the program as a result of the adoption of flood plain maps and regulations for the Poudre River by Larimer County. Several developers, businesses and landowners in the Poudre River flood plain objected to the actions of the county, creating a local issue and increasing awareness and interest on the part of the residents.

The First National Bank of Fort Collins, one of the major banks that handles mortgage loans in Northern Colorado, is well aware of the insurance program but has made relatively few loans in the flood plain. Other banks in Fort Collins are aware but unfamiliar with the flood insurance program.

### Estes Park

In Estes Park the community in general is not aware of the flood insurance program. Essentially, those who have had to buy insurance are aware of the program. Loveland Savings and Loan, First National Bank of Estes Park, and Estes Park Bank are all aware of the flood insurance program and have required flood insurance for a few refinance loans in Estes Park.

### Fort Collins

The community, for the most part, is unaware of the flood insurance program or of the flood plain regulations enacted by the city. Flood plain regulations didn't appear to be an issue, with very few people even attending the public hearings or meetings. The reason for this is probably because only a small portion of the Poudre River, about one mile, is encompassed within the city boundaries.

## Loveland

There is a fairly wide awareness in Loveland about the need to manage the flood plains. Also, an environmental awareness of flood plain values has been created by the planning efforts of Loveland.

## Wellington

Because of the strong impact that the insurance program has had on the community, there is a high level of awareness in the town of Wellington of not only the flood insurance program but of the flood plain delineation and regulations.

### FIRST PHASE IMPLEMENTATION OF THE PROGRAM

The Emergency Program is the first phase of the flood insurance program. After a community enters the program and receives a Flood Hazard Boundary Map, the community must enact as a minimum the land use and control measures as required by FIA. Larimer County, the cities of Fort Collins and Loveland, and the towns of Estes Park and Wellington have entered the Emergency Program and received Flood Hazard Boundary Maps. We will see how they have enacted flood plain regulations as required by the program.

## Larimer County

Larimer County is a highly productive agricultural area, with fertile flood plain lands and extensive irrigation. Larimer County is the fastest growing county, having grown from 53,343 in 1960 to 89,900 in 1970. There is some development pressure in the flood plain at present near Fort Collins and Loveland and the pressure may be expected to grow in the future.

Since 1974 Larimer County has provided initiative and leadership with a program of mapping flood plains, obtaining flood plain information studies, enacting flood plain regulations, and assisting the communities of Larimer County.

## Support for Flood Plain Management

Certainly, the National Flood Insurance Program has been a factor behind the initiative and leadership of Larimer County. The technical and financial assistance of the Colorado Water Conservation Board (CWCB) has helped Larimer County undertake an active program of flood plain mapping and delineation. Political support for the program has come from the Poudre Valley Greenbelt Association and the Environmental Task Force of Designing Tomorrow Today, a Fort Collins citizen organization which provides citizen participation in an advisory and planning capacity.

### Local Government Land Use Enabling Act of 1974

In addition, legislation of the State of Colorado has given impetus to flood plain delineation. The first, the Local Government Land Use Enabling Act of 1974, provides under Section 29-20-104 (1) (a) of the Colorado Revised Statutes (CRS), 1973 that:

(1) Without limiting or superceding any power or authority presently exercised or previously granted, each local government within its respective jurisdiction has the authority to plan for and regulate the use of land by: (a) regulating development and activities in hazardous areas

### House Bill 1041

Second, in 1974, House Bill Number 1041 was passed by the General Assembly of the State of Colorado, which added further provisions to the Colorado Land Use Act of 1965. The emphasis of the bill is to encourage local governments to adopt land use practices. If local governments fail to act, the Colorado Land Use Commission will assume responsibility. Specifically, local governments must identify and designate areas and activities of state interest, issue guidelines for the regulation of those areas, and provide for their regulation.

Flood plains are included as an area of state interest. Therefore, pressure is also being applied at the state level

for local governments to regulate and manage flood plains.

Section 24-65.1-103, CRS, 1973 defines the flood plain:

(7) "floodplain" means an area adjacent to a stream, which area is subject to flooding as the result of the occurrence of an intermediate regional flood and which area thus is so adverse to past, current, or foreseeable construction or land use as to constitute a significant hazard to public health and safety or to property. The term includes but is not limited to:

- (a) Mainstream floodplains;
- (b) Debris-fan floodplains; and
- (c) Dry wash channels and dry wash floodplains.

The Department of Local Affairs was given authority to oversee and coordinate the provision of technical assistance and provide financial assistance as authorized. The Colorado Land Use Commission reviews the designation and guidelines enacted by a local government within 30 days.

Senate Bill 468 (Long Bill 1975-1976) required that regulations had to be enacted by June 30, 1976, as a condition for H.B. 1041 funding. This stimulated Larimer County to adopt flood regulations and maps before this date. Larimer County will receive \$26,750 for fiscal year 1976-77 compared to \$25,000 for the previous two fiscal years.

#### Larimer County Planning Office

Technical skill and understanding are required in delineating flood plains and developing flood plain regulations. It is fortunate that the Larimer County Planning Office has competent and technically capable planners who are able to direct an active and effective program of flood plain delineation and regulation. In addition, the Larimer County Planning Office has provided assistance and continues

to offer assistance to communities attempting to develop and enact regulations.

#### Larimer County Flood Plain Mapping and Surveys

Photogrammetric mapping with 2-foot contours and cross section data have been completed for the Big and Little Thompson Rivers and the Upper Big Thompson and Fall Rivers in Estes Park. The CWCB presently prefers 2-foot contour mapping for the purposes of regulation. When funds are available, Larimer County would like to map the flood plains of Buckhorn Creek, Dry Creek and Boxelder Creek.

Larimer County has been obtaining maps with a scale of one inch equal to 200 feet. This scale and 2-foot contour intervals provide the accuracy that Larimer County feels it needs in order to implement flood plain regulations.

#### Flood Plain Information Studies and Delineation

The maps and cross section data obtained by Larimer County are sent to the Omaha District for a flood plain information study. After the studies are completed, the 100-year flood is outlined on the maps along with a floodway and the maps are returned to the County. The Omaha District is presently working on studies for the Little and Big Thompson Rivers, and for the Town of Estes Park.

The Colorado Water Conservation Board (CWCB) is given authority under Sections 30-28-111 and 31-23-201, of the CRS 1973 to designate and approve flood plain delineation before local governments can implement flood plain regulation. On

March 10, 1974 and March 17, 1976, the CWCB designated the flood hazard areas subject to the 100-year flood for the Cache la Poudre River indicated by Corps of Engineers' Flood Plain Information Reports, Cache la Poudre River, Volumes I and III, respectively.

#### Enactment of Flood Plain Regulations for Larimer County

After entering the Emergency Program in June, 1974, the Larimer County Planning Office formulated draft flood plain regulations and a Flood Plain Review Committee was formed. The Committee, which consisted of representatives of Larimer County and the City of Fort Collins and members of the public, met once a month from June, 1974, to September, 1975. The purpose of the Committee was to provide assistance in formulating the regulations and to gain political acceptance of the regulations. Public meetings were held in October, 1974, and March, 1975, to obtain input concerning the form and content of the flood plain regulations. Eventually, the draft regulations were revised by the Committee in consultation with the County Attorney.

On September 10, 1975, the Larimer County Planning Commission held a public hearing, attended by about 100 people, upon flood plain regulations. A newspaper article concerning the meeting is shown in Appendix D. The motion recommending adoption passed by a 3 to 1 vote of the Larimer County Planning Commission despite opposition of property owners in the flood plain areas. Most of the opposition concerned alleged errors by the Corps of Engineers. Property

owners also objected to the fact that they would have to pay surveying costs to correct the errors and to locate elevations without the aid of benchmarks.

Following the meeting, there was political reaction by County officials. Concerning the Corps study, Commissioner Warren Wolaver said:

They've probably taken a safe level and multiplied it by three to protect themselves.<sup>5</sup>

Commission Chairman William Lopez commented on the study:

We have a number of people in the local community who are not satisfied enough to see the county give it the County's seal of approval.<sup>6</sup>

A second public hearing, as required by Colorado State Law prior to the adoption of land use regulations, was held on October 15, 1975, before the Larimer County Board of Commissioners. George Patenoid of the Omaha District Corps of Engineers was present to explain questions concerning the engineering studies on the Cache la Poudre River. Many at the meeting felt that the Corps had not deducted for the effects of the Halligan and Seaman Reservoirs and irrigation ditches. The audience convinced the Commissioners to table the meeting until there was a chance to study the maps.

Following public hearings before the Larimer County Commissioners on October 28 and November 13, 1975, it was decided that the regulations would be adopted with provisions to correct the alleged errors and that monuments would be established.

Consequently, on December 1, 1975, the Larimer County Board of Commissioners adopted the text of the Flood Plain

Amendment to the Larimer County Building Code and the text of A Flood Plain Supplementary Regulation to the Larimer County Comprehensive Zoning Regulation but adoption of the maps was delayed pending further study and consideration. The resolutions are shown in Appendix E and regulations are shown in Appendices F and G, respectively.

With the use of H.B. 1041 funds, Larimer County established monuments in May, 1976, about every one-half mile along the Cache la Poudre River. At a public meeting on June, 1976, before the Larimer County Planning Commission to consider adoption of the flood plain maps, Senior Planner Rex Burns reported that monuments had been established and Corps elevations had been checked within a foot. As a result of the efforts by Larimer County, there was no opposition at the meeting. The motion to recommend adoption of the 100-year flood plain maps of the Poudre River was passed by the Planning Commission.

On June 16, 1976, a public hearing was held before the County Commissioners to consider adoption of the Cache la Poudre flood plain maps. The Commissioners adopted the maps but indicated that the county might provide engineering studies for the larger development properties because of the burdens that have been placed on them. The resolution is shown in Appendix E.

Thus, the Larimer County government is not only concerned with the planning and development of flood plain uses but is also responsive to the needs of individual landowners in the

flood plain. The equitable treatment of flood plain landowners has been a primary consideration of the Commissioners of Larimer County.

### Larimer County Flood Plain Regulations

The Larimer County Flood Plain Regulations and the Flood Plain Amendment to the Larimer County Building Code are shown in Appendices F and G, respectively. The regulations provide for two zoning districts, the Floodway District and the Flood Fringe District. The Floodway District is that portion of the flood plain which is required to carry the entire volume of the 100-year flood allowing no more than a one-half foot rise. The Flood Fringe District is the remaining area within the natural 100-year flood boundaries. A free-board of one foot as favored by CWCB is provided. Thus, the first level of a structure built in the Flood Fringe District as well as utilities and electrical and heating equipment, must be at least one and one-half feet above the 100-year flood level. The purpose of the regulations is not to prohibit development but to assure that flood plain uses are compatible with the level of flood hazard involved. A Board of Review has been constituted to resolve the details of applying the regulations including location of zoning district boundaries and the issuance of special use permits and variances.

### Estes Park

Estes Park, which had a population of 1,616 in 1970, is surrounded by mountains of the Front Range. The Fall River

and Big Thompson Rivers through the town are fast moving mountain streams and the flood plains tend to occupy a narrow valley. Development, for the most part, has already taken place along these rivers in the Town of Estes Park.

Local officials objected to the Special Flood Hazard Area delineation as shown by the FHBM designated on September 19, 1975. Since the largest flow of record, which occurred in 1965, caused no flooding local officials were doubtful that there was a flooding problem.

There are several reasons why local officials feel that the engineering studies for the FHBM were inadequate. First, they feel that Michael Baker Jr. was probably being safe. Second, they believe that an Eastern analysis of Western hydrology was inappropriate, especially since no one from Michael Baker Jr. came to the community. Third, community input was not obtained nor did the community have the opportunity to review the FHBM. Finally, officials were not informed about how the studies were conducted or what the basis of the analysis was. Nonetheless, the Town of Estes Park entered the Emergency Program to prevent economic hardship on those located within the designated special flood hazard areas.

Because local officials felt the need for a more thorough engineering study, the Town of Estes Park through the Colorado Water Conservation Board requested a flood plain information study from the Omaha District. Completion is expected in October, 1978. However, FIA has told the officials of Estes

Park that they must use FIA's consultant, Gingery and Associates, Incorporated. But officials are going ahead with the Corps flood information study.

Local officials are dissatisfied with the administration of the flood insurance program by FIA. First, FIA has not provided enough guidelines for local officials. Second, local officials feel that FIA has not obtained local input or coordinated enough with the community. Third, FIA has lost credibility because of the Flood Hazard Boundary Map furnished for the community. Finally, officials feel that FIA has not been responsive to the needs of the community.

#### Fort Collins

Fort Collins, which had a population of 43,337 in 1970, is in the high plains area. The Cache la Poudre River channel averages about 160 feet wide and 7 feet deep through Fort Collins. The average 100-year flood plain width is about 3,000 feet. The city owns a large portion of the small flood plain area within city boundaries. Private development is concentrated along U.S. Highway 287. A FHBM for Fort Collins is shown in Appendix B.

With the assistance of County Senior Planner Rex Burns, the City Planning Department formulated a flood plain ordinance. The flood plain ordinance was not an issue in Fort Collins because relatively few were affected. Only a few interested citizens came to the public meetings and surprisingly, there was no opposition. On August 5, 1975, the

Council of the City of Fort Collins adopted the Flood Hazard Areas Ordinance.

### Loveland

The City of Loveland, which had a population of 16,220 in 1970, is, for the most part, above the flood plain of the Big Thompson River in the high plains area. The 100-year flood plain averages about 2,200 feet in width in the vicinity of Loveland. The flood plain is predominately agriculture and gravel mining but there is a moderate degree of development along U.S. Highway 287.

In May, 1976, Master Plan 1976 was adopted by the City of Loveland. In developing Master Plan 1976 public meetings and committees were formed, bringing developers, ditch owners, and landowners into the planning process. One goal is to maintain the environmental character of the Big Thompson River by encouraging open space use and development away from the flood plain.

The city was able to enter the Emergency Program on the basis of existing flood plain ordinance enacted in 1968, shown in Appendix H. A Citizen Advisory Committee has been formed for the purpose of reviewing and restructuring the zoning ordinances of the City of Loveland. It is anticipated that the flood plain ordinance will be revised to reflect the minimum land use and control measures required by FIA and community needs. It is also anticipated that the City Planning Department will work closely with the County Planning Office and enact regulations similar to and consistent with

the flood plain regulations of Larimer County. In addition, the City of Loveland will try to coordinate their flood plain regulations with the CWCB.

### Wellington

The Town of Wellington, which had a population of 691 in 1970, is in the high plains area. The flood plain of the Boxelder Creek is wide and is primarily devoted to agricultural use. Irrigation ditches and canals, which divert water from the Boxelder Creek, are quite numerous in the area.

The Wellington Urban Renewal Authority provides planning for the community. Recently, streets were paved and a storm drainage system was constructed. This project alleviated a serious drainage problem in the Town of Wellington that tended to pond water in the town following a rainstorm.

SCS is presently building a watershed project upstream of Wellington on the Boxelder Creek drainage basin. The project consists of 5 floodwater-retarding structures and one grade stabilization structure. According to the SCS, the project will provide 100-year flood protection to the Town of Wellington after completion of the project. The community has been in favor of the project and has supported its construction.

However, discrepancies were found in the SCS report. The report attributes flooding to the Town of Wellington from a tributary of the Boxelder Creek, Coal Creek. However, Coal Creek was diverted upstream from Wellington for irrigation purposes about 20 years ago. As a result, the reliability

of the flood plain analysis has been questionable to local and county officials. In June, 1974, the Larimer County Commissions conducted an evaluation of the SCS Boxelder Watershed Project Report and found it unacceptable.

When Michael Baker Jr. was carrying out studies to determine the special flood hazard area for the Town of Wellington, it obtained data from the SCS. The first FHBM indicated that the entire Town of Wellington was in a special flood hazard area. Local officials objected on two grounds. First, they felt that Michael Baker Jr. did not do a thorough engineering study. Second, no community input or review of the FHBM was obtained.

The Wellington Urban Renewal Authority then made efforts to rectify the situation. As a result, the Town of Wellington received a revised FHBM which was dated March 22, 1974, and showed about 50 percent of the community in a special flood hazard area.

Still, local officials felt a thorough engineering study was needed. In the meantime, local officials felt compelled to enter the flood insurance program for the welfare of the community. On November 12, 1974, the Town of Wellington adopted flood plain regulations and a building permit code.

The Wellington Urban Renewal Authority continued to make efforts to obtain accurate flood plain studies and was strongly in favor of a private consultant for the studies. Consequently, following a flood plain coordination meeting in February, 1975, between the CWCB, FIA, and other agencies

involved with flood plain studies, the Town of Wellington was given a priority number one for flood plain studies by the CWCB and FIA.

There has been a large impact on the Town of Wellington as a result of the flood insurance program. Economic uncertainty has resulted. Banks are hesitant to make loans on property in the community according to local officials. Also, people are afraid to buy homes in the Town of Wellington and property values are depressed somewhat. But the impact goes beyond economics because it affects the lives of people in the community. Was it necessary, considering that 100-year protection is to be provided by a SCS project by 1977?

#### SECOND PHASE IMPLEMENTATION OF THE PROGRAM

Under the second phase of the flood insurance program, the Flood Hazard Boundary Maps initially issued will be replaced by Flood Insurance Rate Maps upon completion of a Flood Insurance Study. A sample FIRM is shown in Appendix C. Then, the county and the communities will enter the Regular Program and will be required to enact regulations which utilize, at a minimum, the engineering data generated by the study.

#### Flood Insurance Study

The Flood Insurance Study (FIS) is an on-site engineering analysis designed to determine the specific water surface elevations of flooding hazards within each community. This engineering data will be the basis for actuarial flood

insurance rates and for local flood plain management programs. During the course of the FIA Study, comments and input from the general public will be solicited. At least one public meeting will be held to present the preliminary hydrologic data to the community. The engineering study is funded in total by FIA.

#### Initiation of a Flood Insurance Study for Larimer County

On April 20, 1976, a public meeting and workshop was held by Flood Insurance Specialist Jerome Olson, who will be the Consultation Coordination Officer (CCO) for the Flood Insurance Study, in the Larimer County Commissioner's Hearing Room. The purpose of the meeting and workshop was to provide information and obtain community input for the Flood Insurance Study. Present were local officials, planners and landowners; Eugene Jencsok, Flood Insurance Coordinator for the CWCB; and Project Manager Larry Mueller, Gingery and Associates, the consultant for FIA.

Jerome Olson outlined the purpose of the meeting and workshop, the purpose and procedures of the flood insurance program, and the Flood Insurance Study. Guidelines of the FIA provide for coordination of the study:

Areas to be studied in detail and to be studied by approximate methods will be determined in consultation with the local community, the State Coordinating Agency, if available, and the Federal Insurance Administration Consultation Officer (CCO).

It was estimated that the preliminary studies would take from 6 months to one year to complete. After the draft form of

the proposed water surface elevations for specified streets is submitted to the community officials for review, there will be two public newspaper notices and a 90-day appeal period. Revisions will be made if technical evidence is provided during the review process.

The Commissioners voiced concern that the engineering studies need to be accurate as possible. After the discussion a workshop was held to delineate community boundaries and to designate streams which needed to be studied.

#### How the Flood Insurance Study Will Be Conducted

The Flood Insurance Study of the FIA has two objectives:

1. Provide communities with the necessary information to enable them to adopt flood plain management measures that meet requirements of the Flood Insurance Program.<sup>8</sup>
2. Determine flood hazard areas and actuarial flood insurance rates for communities participating in the Flood Insurance Program.<sup>9</sup>

The scope of work involves two levels of study:

Flood hazard evaluations for flooding sources that affect developed or developing areas are to be based on detailed studies. The detailed study may be terminated where the 100-year flood plain width is equal to or less than: (1) 200 feet in urban or developing areas with known or potential flood problems, and (2) 400 feet in other areas with a low development potential.<sup>10</sup>

Generally, areas not to be studied in detail will be studied by approximate methods.<sup>11</sup>

Other areas such as Federal and state lands and forests are not to be studied.

The work tasks for the Flood Insurance Study are as follows:

- Task 1 - Reconnaissance
- Task 2 - Approximate Flood Boundary Determinations
- Task 3 - Surveys
- Task 4 - Hydrologic and Hydraulic Analyses
- Task 5 - Flood Hazard Factor Determination
- Task 6 - Base Map Information
- Task 7 - Preparation of Work Maps
- Task 8 - Study Coordination
- Task 9 - Estimate of Structures in the Special Flood Hazard Area
- Task 10 - Tabulation of Addresses<sup>12</sup>

There are several items to be noted. Under Task 3, elevation reference marks will be established and recorded in and near the flood plain of streams studied in detail, such that no point in a Special Flood Hazard Area is further than 2,000 feet from the nearest mark. Under Task 4, discharges, flood elevations, and flood profiles are to be determined for the 10-, 50-, 100-, and 500-year flood for each flooding source studied in detail. Also, results shall agree with published reports by other agencies or a full explanation and justification of the differences shall be given after every attempt to resolve the differences has been made. In addition, a floodway to pass the 100-year flood shall be developed for a one-foot rise or a lesser maximum rise that has been adopted by state or local authorities.

#### IV. CONCERNS OF INSTITUTIONS AND ORGANIZATIONS

Many are involved with or have concerns about flood plain management and the Flood Insurance Program at Federal, state, and local levels of government. Insurers have questions about their role. In addition, environmental, recreational, civic, and other institutions and organizations have concerns about flood plain management and insurance.

##### FEDERAL LEVEL

In addition to the Flood Insurance Studies being conducted by FIA, several other agencies, especially the Corps of Engineers, are involved with flood plain studies. The Bureau of Outdoor Recreation is stressing the use of flood plains for recreation. The U.S. Water Resources Council is developing "A Unified National Program for Flood Plain Management."

##### Federal Insurance Administration (FIA)

FIA is seeking cheaper and faster methods of flood hazard delineation as flood hazard delineation is taking longer and costing more than originally anticipated following the Act of 1973. FIA wants to avoid aerial mapping and ground surveys because they represent a large cost of the flood hazard delineation.

FIA feels that there are several questions that need to be researched or resolved. One, what are the economic, sociological and environmental impacts of the Flood Insurance Program? Second, can flood insurance industry become self-sufficient? Third, how accurate must flood delineation studies be in order to be legally defensible?

#### Agencies Involved With Flood Plain Studies

Agencies providing flood insurance studies for FIA are the Soil Conservation Service, National Oceanic and Atmospheric Administration, U.S. Army Corps of Engineers, U.S. Geological Survey, Bureau of Reclamation, and Tennessee Valley Authority.

#### U.S. Army Corps of Engineers

As a result of the Flood Insurance Program, the Corps is shifting emphasis from Flood Plain Information (FPI) reports to providing a full range of technical and planning services which involve interpretation, assistance, and guidance for all flood plain problems. The Corps is undertaking studies of flood plain dynamics considering the inter-relationship of physical, economic, and environmental factors.

There are several potential problem areas. First, a computed 100-year flood delineation is not an absolute determination and changes with urbanization and changing land use. In delineating flood plains, models need to be developed in

order to consider the effects and implications of future patterns and intensities of land use. Second, the Flood Insurance Program may result in a reliance on flood insurance alone and a neglect of a full flood plain management program.<sup>13</sup>

#### Bureau of Outdoor Recreation

Areas adjacent to flood-prone rivers and streams often offer ideal outdoor recreation opportunities. The Land and Water Conservation Fund, administered by the Bureau of Outdoor Recreation, has assisted a total of 141 park and recreation projects in flood plain areas, with grants totaling almost \$18 million up through 1976.<sup>14</sup>

It is felt that the Flood Insurance Program works against recreation programs for the flood plain. First, it encourages people to remain in or move into the flood plain making public acquisition more difficult. Second, communities may rely on flood insurance alone instead of considering a broader flood management program that includes flood plain recreation.

#### U.S. Water Resources Council

The U.S. Water Resources Council is developing "A Unified National Program for Flood Plain Management," which will be available by fall 1976. It will stress a common conceptual framework from Federal to local levels, and coordination of Federal and state programs.<sup>15</sup>

The Council is concerned with several problem areas. A short cut method is needed for rapid identification of flood hazards. There is a need for consistent procedures and data for flood analyses since many agencies and private firms are involved. Two areas of public policy need to be defined. First, for institutional aspects of non-structural cost sharing, who should be involved and how big the share? Second, what is the acceptable level of residual risk after the Flood Insurance Program has been implemented?<sup>16</sup>

#### STATE LEVEL

The Colorado Water Conservation Board and the Division of Planning, Department of Local Affairs are involved with flood plain studies. To a certain extent, the Colorado Land Use Commission is involved with the broader area of land use.

#### Colorado Water Conservation Board (CWCB)

The Colorado Water Conservation Board under the Department of Natural Resources is the principle state agency responsible for flood plain studies and delineation and coordination of flood insurance studies. The Colorado Geological Survey provides technical information to the CWCB and the Division of Water Resources conducts some flood plain studies in connection with reservoirs. The CWCB reviews the sufficiency and accuracy of information for regulations.

The CWCB and the U.S.G.S. have combined efforts to publish a flood hazard information map. The map shows and lists all available flood plain information studies and all U.S.G.S. quads which have identified flood hazard areas for the State of Colorado.

The CWCB has several areas of concern. First, the CWCB feels that accuracy is required for the purposes of regulation in order to provide equal treatment. The CWCB feels there is a need for better mapping. The CWCB prefers 2-foot contour mapping while FIA feels that 4-foot contour mapping is adequate. According to the CWCB, the Flood Hazard Boundary Maps are not of a content which is adequate for state programs for flood plain regulation. Second, the CWCB does not agree with the floodway criteria of the FIA. The FIA permits a floodway design allowing a one-foot rise of the 100-year flood level while the CWCB favors a no rise criteria. The CWCB feels that unless a floodway design is uniformly applied, legal difficulties could arise. The one-foot rise could impinge on others located at the natural 100-year level which would be a taking of property. The CWCB also feels that the floodway design and regulations will present administrative "headaches" for communities. The CWCB has requested the FIA to furnish floodway data on separate maps from the 100-year flood maps. Third, the CWCB believes there is a need for better coordination with the FIA. Fourth, the CWCB is concerned with the

problem of defining flood hazards since the hazard depends on the velocity and depth of flow.

Division of Planning, Department of Local Affairs

Larimer and Weld Counties form one of 12 Colorado Planning and Management Regions. There are several problem areas. First, local jurisdictions need technical understanding and assistance in order to enact and administer flood plain regulations which are highly technical. Second, local jurisdictions are not fully aware of what can go into the regulations, what can be left out of the regulations, and the alternative actions which are available. Third, better coordination is needed among Federal and state agencies and local jurisdictions.

LOCAL LEVEL

There are two primary concerns which the county and the communities all agree upon. First, officials want accurate, well documented, and detailed flood studies that will be acceptable for flood plain regulation. Local officials find it difficult to regulate without supporting technical data. Second, officials desire better coordination that provides technical knowledge and assistance. Officials find it difficult to understand hydrology and probability. When a specific problem arises, officials want to be able to work with the

agencies which can deal with that particular problem. Officials are unclear about who to contact and how.

CIVIC, ENVIRONMENTAL, RECREATIONAL,  
AND OTHER GROUPS

Letters were sent to various types of interest groups at local, county, regional, and state levels to obtain views on the Flood Insurance Program. However, response has been limited.

The League of Women Voters feels there are four areas that need attention. First, how are the acts of man related to flood hazards? Second, more citizen participation is needed in public policy decision making. Third, what do citizens need to know in order to participate in decision-making? Fourth, agencies and educational institutions have the responsibility to pass knowledge on to the public.<sup>17</sup>

Neighbor to Neighbor, Incorporated of Fort Collins is a comprehensive family service and neighborhood-community development agency. It has a special focus on low-income housing problems. Low-income housing, such as the Buckingham area of Fort Collins, in the flood plain has special problems. These problems are addressed later in the report.<sup>18</sup>

The Poudre Valley Greenbelt Association strongly favors the use of the Poudre River flood plain for open space and recreation.

## V. KEY PROBLEMS ENCOUNTERED DURING IMPLEMENTATION

The significant problems that are evident with the flood insurance program are nearly all found at the local level. The reasons for program implementation and the basic structure through which the program functions are sound. Trouble has developed, however, when local interests view the program as having some adverse effect upon them. This detrimental effect may be real, as when a developer is prohibited from building on his flood-prone land, or imaginary. The imaginary effects of the program have caused many headaches for program administrators, and these problems are not only the result of faulty information being released by the program's opponents, but are largely because of widespread ignorance of the purposes of the program and the procedures involved.

### THE ROLE OF PUBLIC PARTICIPATION

#### As Part of the Political Process

At the heart of public participation is the desire of the citizen for a voice in the planning and decision-making that affects his environment and his life. Participation is an attempt to influence decisions.

Why do we need citizen participation if we have elected representatives? There are two ways in which elected representatives can be ineffective. First, the representative is often elected on his basic character and on broad issues. A specific community issue may not have been dealt with or even existed at the time of the election. Second, administrators who are appointed by elected representatives are not part of the open political process and are not directly accountable to the public. Consequently, the citizen often finds institutions unresponsive to his felt needs because they don't have to answer to him.

There are other problems. In the past, public officials have determined what the public good is and how to define the public interest. But planning which was claimed to be in the public interest has sometimes turned out to be in the interest of the planner and his constituents.

Participation of the governed in their government is a basic principle of democracy. Public participation is as much a part of democracy as elected representatives are and is part of the democratic political process. Politics is the process in society by which authoritative decisions are made with respect to the allocation of values in that society. Public participation is a means of voicing values and an attempt to influence the authoritative decision in the

allocation of those values. It is, then, a way of opening the decision-making process to a more open responsive forum. Many Federal programs and activities including the Flood Insurance Program, require some type of public participation.

### As Part of the Planning Process

Public participation as part of the planning process can help to establish communication, provide data, identify public values and objectives, identify interest groups, build support and determine acceptable solutions. Also, public participation can provide support for implementation in the decision-making process.

True public participation should (1) provide participants a voice in the planning and decision-making process, (2) give participants an influence on the outcome, (3) orient the participants to the rules of the game, (4) keep the participants informed about what is happening and how their participation is affecting the planning process, (5) make participation available to all who are affected, and (6) be flexible.

### Problems of Public Participation

Part of the problem of public participation is definitional. Who is the public? What will the level of participation be? How will the public participate? Will the public

be merely informal, given a chance to express their point of view, or take a part in the planning and decision-making.

The problem of getting relevant information to the public is very difficult especially if the information is highly technical. Since the public is generally apathetic about a program unless they feel some direct effect, the local official usually finds that public hearings only attract citizens with strongly opposing interests. The official then is placed in the precarious position of trying to disseminate information to groups that are often so polarized that even rational discussion becomes impossible, much less any meaningful compromise. While we realize that public participation has both good and bad aspects, we should not lose sight of the fact that public participation is an almost sacred element in our democratic process.

The principle of participation applies to local officials as well as the general public. This became evident in Larimer County when a large engineering firm in the East was hired by FIA to perform the technical studies for delineation of flood hazard areas. Local officials expressed opposition to the fact that they were often not consulted in the early stages of the studies, and also felt that because of the type of information requested, the Eastern engineers might not have a complete understanding of Western hydrology. It is evident

then that when those affected by a program are not consulted and given a chance to contribute to the program formulation, then they will often be resentful and distrustful of it.

### Public Resistance Encountered

Because the 1973 Act made it mandatory that loans to build in flood-prone areas be insured against flood damage, the public will become involved in the program whether they want to or not. A major problem for local planners, with respect to the general public, will be to see that they receive the appropriate relevant information about the program. This will help to neutralize some of the irrational arguments that opposing groups will knowingly or unknowingly interject at hearings that can polarize interests further and prevent meaningful discussion.

This is best illustrated by looking at a situation which developed at a public hearing to review proposed county flood plain regulations. A local official made an innocent, though factual, statement that engineering surveys were based on the best available data, but due to monetary limitations they were not in sufficient detail to insure that there were no discrepancies in the surveys. He was trying to be truthful and illustrate that if landowners found a discrepancy, then there were provisions in the program to make the necessary corrections. Opponents to the program were either ignorant

of the minor significance of this statement or knowledgeable enough about public hearings, to seize the opportunity to sabotage the meeting. They immediately made it appear that if there was some possibility of a discrepancy then the whole study must be worthless. The meeting degenerated into a shouting match and nothing else was accomplished. If more of the participants had been aware of the technical aspects of the engineering studies, the monetary and time limitations imposed upon the organizations performing the studies, and the very high degree of accuracy obtained from the studies despite the limitations, then the meeting might have been more productive. As a result of this situation, the county agreed to investigate the accuracy of the surveys and results showed that the surveys were well within the allowable tolerances. Nevertheless the county had to spend additional money to find this out and allay the suspicion of the public.

#### Control of Public Meetings

It is agreed that public participation in the planning process is beneficial, not only in obtaining information but also in evaluating public support for programs and allowing the public to feel that they had some part in shaping the program. At the same time, public meetings give dissidents the opportunity to disrupt hearings and create false illusions that may turn others away from honest evaluation of a program.

For this reason, the planner must always approach these hearings cautiously and be completely versed in all aspects of the program. As was seen in a September, 1975, public hearing, opponents to the flood insurance meeting were able to turn the whole thrust of the meeting from a rational discussion of the program to a squabble over minor inaccuracies in the surveys. The public became engrossed in an argument over these minor errors and nothing else of value was discussed.

The planner must be aware of the potential for disruption by knowledgeable opponents who realize that they can upset these meetings by merely bringing up false, or at least misleading, statements. For example, an opponent may claim that studies show that the flood insurance program cuts land values along the flood plain by 50 percent. Obviously this would upset landowners at the meeting, and if the planner is not prepared to refute such claims with facts, from lenders and appraisers, public support for the program can be diminished. Because he cannot predict the nature of the opposition that may develop, the planner must be completely familiar with all the consequences of the program, as well as the details of it.

Therefore, while public participation is an important and necessary part of program implementation, the planner must be aware that it also presents an opportunity for

opponents to disrupt the process by making false or misguided statements and he must be skillful enough to recognize misleading inputs and convincingly correct them.

### Government Intervention and the Public

As interviews were made, many personal prejudices surfaced as individuals strayed from a strict analysis of their organization's concerns. One sentiment that often emerged was a resentment of more government intervention or regulation. Most of those interviewed seemed to favor a voluntary program which was tried and failed under the 1968 Act. They would favor voluntary purchases of flood insurance with no Federal relief for uninsured landowners after flooding. Although this approach would lessen the direct intervention by the government in the private lives of the citizens, it is doubtful that these people would sit idle after floods when their uninsured neighbors asked for relief.

Probably the greatest burden placed on the public has been the result of the necessary methods used to identify the flood hazard areas. For reasons which we will discuss later, it is not possible to determine the floor elevation of each structure in the study area and tell whether it is or is not subject to inundation by the 100-year flood. Therefore, the program has a provision that allows a resident to hire an engineer to prove that his structure is higher than the

designated flood elevation even though the flood hazard maps show him to be within the flooded area. This proof will allow the resident, if he so chooses, to purchase flood insurance at cheaper rates and free his structure from any future flood insurance requirements.

At public hearings, the residents have strongly objected to having to pay an engineer to prove that the government flood maps have an error. Why should the government come in and produce a study with errors when the private citizens have to pay for correcting the errors? At the same time, why should the government spend literally millions of public dollars to investigate the floor elevation of structures when only a few people will benefit from the additional costs?

Is there some solution to this problem? Larimer County has helped these residents by installing vertical control points along the Cache la Poudre flood plain so that when residents begin investigating their structure's relation to the flood elevation, the engineering studies will be less expensive because of nearby control points. Are there other solutions to this burden that the private citizen must bear?

Government intervention in our private lives is often an unfortunate result of the private sector being unable to economically provide a service. Similar objections to government interference were voiced when auto insurance and fire

insurance became mandatory and this issue is just another round in the fight of public vs. private rights.

### PROBLEMS WITH ENGINEERING STUDIES

One of the primary reasons that the public has voiced their dissatisfaction with the program has been their distrust of the accuracy of the engineering studies. The public has been led to believe that: (1) basic data, such as surveys, are erroneous, (2) studies are not in sufficient detail, (3) agencies performing the studies are not technically qualified, (4) minor errors in data make the entire study invalid, and (5) the agencies add "safety factors" by extending the flood-prone boundaries to insure that a flood will not overflow the boundary and make the agency appear incompetent. In almost every sense, these misconceptions are based on ignorance of the technical aspects involved in a flood hazard study. This ignorance is understandable for the general public, but it unfortunately appears to also cloud the viewpoint of lenders, insurance agents, developers, and local officials as well. We do not mean to imply that identification of flood hazard boundaries are always technically correct, or that this critical aspect of the program should be understood by all. However, the great amount of time and resources that is typically devoted to arguments about the

validity of a study is usually unwarranted and very often the arguments are introduced as a "smokescreen" by interests which are opposed to flood plain regulation.

If local planners and officials are going to evaluate the validity of a claim that engineering investigations are inadequate, it is essential that they be able to identify the source of any errors and be able to understand the effect of these errors on the total study. Moreover, it is imperative that local officials be able to explain this situation to the public in an atmosphere of highly charged emotions. We should investigate some of the claims made about the accuracy of the studies and evaluate the validity of these claims.

#### Errors Resulting from Poor Data

Probably the most frequent challenge is that the flood hazard studies are based on inaccurate, insufficient, or outdated information. We should realize, first of all, that this claim is often true to some extent. The FIA was given a very limited time (until 1983), and limited money, to delineate the flood-prone areas in the United States and assign insurance rates based on actual flood risk. To do this with such limited resources, it would be impossible to perform the required mapping and investigation without relying heavily upon information and maps that are readily available. It was, of course, realized that some of these data were not

current in all respects and that some errors would occur. Nevertheless, measures were taken to check the data as closely as possible with the limited money available. It would be impractical and a waste of the taxpayer's dollar if the time and money necessary to provide all new information were made available. This is because many communities are growing so fast that conditions in the flood plain often change between the time that surveys are made and the information is put on a map. Also, hydraulic and/or topographic characteristics may be such that minor inaccuracies in mapping have no effect on the height of flood crests. For example, if the flood plain exhibits a natural constriction that forms a "control point" and creates a backwater effect for a short distance upstream, then slight errors in the assumed topography that occur within this backwater area, may have no effect on the accuracy of the study. In areas where the engineers felt that sufficient data is lacking, then investigations are made to provide the necessary information. The fundamental fact, however, is that minor inaccuracies in modeling the flood plain topography will not generally affect the overall study results. For example, in a relatively wide flood plain, if a structure is placed on fill after maps of the area are drawn, the engineer may not be aware of this obstruction to flood flows. However, if the percentage of flow area blocked

is relatively small, or if the structure is in a flooded area that is not part of the "effective flow area" of the flood plain, it usually does not have a noticeable effect on flood stages.

Opponents to the program have often told of some change in flood plain conditions that they know is not reflected in the maps. Usually, as was previously noted, a small change has an insignificant effect on the accuracy of the study, but the public may be led to believe "where there's smoke there's fire" and confidence in the study dwindles. Opponents to flood plain regulation may even try to block agencies from obtaining the necessary information. One local landowner proclaimed at a public hearing that he knew the information for the studies was inaccurate, because he had refused to give permission for survey parties to cross his land and obtain detailed information.

Generally, the information used by the engineers is completely adequate to delineate the flood hazard areas. When significant discrepancies in the data are discovered, the studies are done over to reflect the changes. By June, 1975, the FIA had rescinded 343 maps and amended 243 more because of errors that were discovered. The public should be made aware that when minor discrepancies are found, even though they do not affect the flood elevation in any significant way

but which may affect landowners, there are provisions in the program which allow appeals from these landowners. If they can provide evidence that their property is not actually within a flood hazard area, then they may be excused from participation in the program.

#### Lack of Technical Competance

Another frequent charge is that the engineering studies are not in sufficient detail or that the organizations performing the studies are not technically qualified. These charges are usually made by persons who are not qualified to make such judgments and cannot comprehend the technical explanations when they are provided. Again, these charges are often made for the primary purpose of disrupting the implementation of the program by creating public distrust.

Actually the state of the art that has been developed for flood prediction and evaluation is surprisingly accurate. This science has primarily been developed by university research and by the governmental agencies that are doing many of the studies. Most of the engineering manuals for evaluating flood potential that are used by private engineering firms, are based on concepts developed by the Federal agencies and universities. The science has evolved to the point that mathematical models can reproduce past floods with remarkable precision and predict hypothetical floods, such as the

100-year flood, with equal accuracy, consistent with the amount of data available for statistical analysis of meteorological probability.

While the state of the art is sound, and the engineering studies performed by Federal agencies are generally adequate, we have found some dissatisfaction with engineering studies performed by private AE firms. In order to meet the 1983 deadline for mapping of the country's flood-prone areas, it was necessary to distribute part of the workload to private engineering companies. Some of these have not exhibited the expertise necessary to accomplish the work and have not been retained for further studies. As stated before, there has also appeared some problems with large AE firms in the East being hired to perform studies for Western communities. Local officials have expressed a lack of confidence in work done by engineering companies in the East because of two major reasons. First of all, the engineering firm did not try to coordinate closely with local residents to get their valuable input for the study. Second, when the firm did contact the local officials, it appeared from their questions that they had a very weak understanding of Western hydrology and the problems unique to the semi-arid climate of Larimer County. This caused much distrust of any engineering study performed by Eastern engineering firms.

## It Can't Happen Here

It appears that residents of Larimer County have a somewhat skeptical opinion of the magnitude of the 100-year flood that was designated by the Corps of Engineers. This is primarily because there has not been a significant flood on the Cache la Poudre River since 1904 and local residents just cannot visualize the true flood potential that exists. Statistical studies indicate that the peak discharge of the 100-year flood, at the U.S.G.S. gage near the mouth of Poudre Canyon, would be about 17,400 c.f.s. While the largest flood that most citizens can recall is the 1951 flood which had a peak discharge of only about 8,000 c.f.s., the river has actually experienced recorded floods in excess of 21,000 c.f.s. on three separate occasions (1864, 1891, and 1904). When there were three such large floods in the span of only 40 years, it is very surprising that in the past 70 odd years the peak flood was only around 10,200 c.f.s. (1930). In spite of the history of local floods, most residents that we interviewed feel that the 100-year flood is something that "can never happen here." Our interviews indicate that a major reason for this belief seems to be a widespread confidence that upstream irrigation structures will be effective in reducing the flood peaks. The engineering studies looked into the effect of these diversion structures and found

that they have practically no capacity for flood storage and would have a negligible impact on the crest stage of large floods.

### Built-in Safety Factors

One of the local officials expressed the viewpoint that the Corps of Engineers had probably extended the boundary of the 100-year flood to provide a "safety factor" and insure that residents outside the designated flood hazard area would not be flooded by the 100-year flood. He readily admitted his lack of knowledge about the technical aspects of the study or the meaning of flood "probability," but said that was his "general feeling." Such attitudes by public servants is counter-productive to the program and better flow of information between the FIA and local officials would seem appropriate. It will be most difficult to implement the program if the local officials are not more familiar with the technical aspects of the program.

Actually, should the county experience a 100-year flood, the flood boundary will probably be exceeded in some areas. In making the study it was impossible to estimate how much debris will be carried in the flood waters to pile up against bridge piers and abutments retarding the flow and spreading the flood waters. Therefore, engineering reports

have stated that they assumed that no debris accumulated and that actual flood heights would necessarily fluctuate from the designated heights as this debris accumulates. Furthermore, and of major importance, the flood boundary which designated the flood hazard area outlines the extent of the 100-year flood only. Local residents continually expressed the belief that those living outside this boundary were not subject to flooding. Citizens must be made to realize that floods can, and eventually will, exceed the limits shown on the flood boundary maps. The Corps of Engineers and other organizations performing the studies realize that this flood boundary will eventually be exceeded, so there is no reason for agencies to extend these boundaries any further than the studies indicate.

#### Summary of Complaints About the Engineering Studies

In summary then we have found that yes, some errors have been found in the data used for engineering studies. Generally the inaccuracies are minor and have no measurable effect on the study results. If it is found that the study results are affected, FIA has required new studies with corrected data. The agencies performing the studies are often the leaders in the field of flood evaluation. Engineering firms now hired by FIA are of proven competence and are closely watched for compliance with the accepted methods of investigation.

The real problem that we have found is an unwarranted distrust of the validity of the engineering studies. The danger of this is the seemingly widespread belief that there is no real potential for damaging floods. Public distrust of the studies has already cost the county some \$9,500 to check the accuracy of Corps surveys and provide benchmarks along the Cache la Poudre flood plain from which residents can check the floor elevations of structures. As alluded to previously, this came about when some citizens voiced their opinion that engineering surveys were inaccurate and many homes included in the flood-prone areas were actually above the elevation of the 100-year flood. Though they realized that they could hire an engineer to check the elevation of their homes, residents strongly objected to having to pay for this service as a result of the Federal Government providing inaccurate information. In response to requests, the county undertook a study to check the precision of the Corps surveys and to install benchmarks about every half mile along the flood plain of the river. The study shows that the Corps surveys were well within the allowable tolerances but it did provide a service for flood plain residents by providing a network of reliable benchmarks.

We would agree that undue hardship may be placed on residents who are shown in flood hazard areas when actual

floor elevations place them above the 100-year flood. It is not equitable that they should have to pay to prove that someone else made a mistake in the surveys, but at the same time it would be an insurmountable burden on the taxpayers if the engineering investigations had to account for all the topography and floor elevations in or near the flood plain when such detail is not relevant to the study. Instead of making an issue of whether or not a structure is just in or just out of the flood hazard area, the residents should be made aware of the fact that the boundary is merely a line on a map and generally those living along the boundary line have about the same probability of being flooded. The great concern over the exact location of the flood hazard boundary is another indication of the lack of understanding about the meaning of "flood probability," and the belief that this flood magnitude will probably not occur. The lack of confidence in the engineering studies will mean continued pressures on local officials to allow flood plain development.

#### PROBLEMS IDENTIFIED FOR LENDING, INSURANCE, AND REAL ESTATE INTERESTS

##### Lending Institutions

It is possible that the burden of implementation for the flood insurance program has fallen most heavily upon the shoulders of the Federally-backed lending institutions.

They have been made the "policemen" for the program by the requirement that no Federally associated loans may be provided for construction in identified flood hazard areas unless flood insurance is purchased. The lending institutions are responsible to determine (1) whether or not the community is participating in the insurance program, (2) whether or not the property in question is in an identified flood hazard area, and (3) that flood insurance is purchased if required.

In general, it appears that mortgage lenders have a relatively poor understanding of the technical aspects of the engineering studies, or an awareness of the true threat of flooding in Larimer County. Members of the Mortgage Bankers Association have attended seminars concerning the implementation procedures of the program and appear to be well versed in the mechanics of operating the program. Other lenders, however, seemed somewhat confused as to the value of the program and were even unaware of where to seek advice and information about maps, requirements, forms, and procedures.

The major reason why some of the smaller lending institutions in this area are unaware of these things seems to stem from the fact that Larimer County has experienced very little flood plain development. Only a very small percentage of construction loans have been for flood hazard areas, and therefore the smaller lenders have just not been

exposed to the problem enough to stimulate their interest. For example, one lender expressed a desire for the latest flood boundary maps, but stated that he did not know where to obtain them nor had he tried to find out. He had only made a few loans, for which he happened to have adequate maps, but in general it had not been important enough to warrant spending the time to pursue the information.

Mortgage loan officers in the 1st National Bank at Fort Collins expressed unusual knowledge of the program which resulted from their association with the Mortgage Bankers Association and the flood insurance servicing company for Colorado, CNA Insurance Company of Denver. It is important that all the lenders become aware of these sources of information about the program, especially the CNA company which is their official source for the latest maps and regulations.

An interesting fact that emerged from interviews with the lenders was that a large number of residents had no idea that their property was subject to flooding until they were required to purchase flood insurance. The lenders said that although this knowledge surprised the people, neither did they change their minds about deciding to build, nor did they object to the requirement for flood insurance. This seems to indicate that real estate agents and developers are either not

readily informing prospective buyers about flood threats, or that they too are ignorant or disbelieving of the identified flood hazard. When borrowers so readily proceed with their building plans, it may also indicate their lack of confidence and understanding of the designated flood hazards.

A major topic at public hearings regarding flood insurance has been the effect of the program on property values. Land developers have often alluded to lost sales and depressed values when an area is designated as being subject to flooding. The lenders interviewed stated that they were not aware of any local case where property values were affected by the program, except for one instance. The one exception appeared in Wellington when the community refused for a short time, because of some unusual political conflicts, to enter the program. When Federally-backed loans were no longer available for flood plain development, the property values naturally dropped. This drop in value, however, was due to a lack of flood insurance availability, not because of it.

The lending institutions do not seem to have any objections to the extra work they are required to perform because they see the program as protecting their interests. Although it is a problem to check the location of property for each new loan, when only a small percentage of loans are for flood hazard areas, the lenders seem to willingly accept these

additional duties. When questioned, however, about the prospect of investigating all outstanding loans, which were made prior to the enactment of the flood insurance program, to determine which ones were in flood hazard areas, the lenders expressed doubt that the work would be worthwhile. Although, they felt some obligation to do so, and saw the value of telling borrowers about flood threats and encouraging them to voluntarily purchase flood insurance, the lenders recognized the enormous amount of work that would be involved and the very little response that would likely be received.

#### Insurance Agencies

The insurance agents that were interviewed in Larimer County did not seem to be overly enthusiastic or knowledgeable about the program. In general, their understanding was limited to the procedures involved in filling out the necessary forms when flood insurance was purchased. Again, their lack of understanding and enthusiasm about the program seems to result from the fact that very little flood insurance is being purchased. Agents expressed that they had only sold a few policies and as far as they were concerned, from a standpoint of profit potential, it was not worth the time involved to actively promote the flood insurance program. They had not made any efforts to canvass the flood-prone subdivisions to inform residents about the availability of flood insurance.

One agent, who was obviously misinformed about the requirements of the program, complained that there were too many conflicting maps of flood hazard areas put out by too many different organizations. He said that when a client expressed a hope that he would not be required to purchase flood insurance, they merely looked through the conflicting maps until they found one showing the client's property lying outside of the flood hazard boundary. This practice is illegal and there are heavy penalties for such action. There is only one official map at any given time and the agent should be aware of this fact.

All information and the latest updated maps are available to the agent through his servicing company. We have seen the information packets put out by this company, CNA Insurance of Denver, and discussed the program with them. Their understanding of the program is complete, and if agents will only take the time to study the information they receive from CNA, then much of this misunderstanding can be eliminated. Unfortunately though, there is just not enough profit available for local agents to generate this kind of interest. Representatives from CNA said that many of the problems they had experienced were the result of ignorance of the program by the people actually selling the insurance.

## Real Estate and Development Interests

Probably most of the overt opposition to the flood insurance program has come from the land developers. Their reactions in Larimer County have run the full range from honest compliance through biased opposition to deceptive sales practices. While we can sympathize with their situation when part of their property is rezoned to prevent construction in the floodway or construction costs rise because of flood plain requirements, we must not lose sight of the fact that one of the stated objectives of the program is to force the developers to internalize their costs. Short-term gains by developers have led to long-term costs for the public as flood plains have been developed.

At one end of the scale is a local developer who delayed construction until he and the county could assess the impacts of the insurance program and then make adjustments in his program. He has apparently been unusually frank and honest with prospective buyers by telling them of the flood history and the designated flood threat. Residents of his subdivision are very pleased with his approach and some even took his advice to build their homes six inches higher than required by the building code. The homeowners interviewed in this subdivision were aware of the designated flood hazard and most of them had already bought, or intended to buy, flood insurance. While this developer has complained of lost sales and reduced

property values, residents had not seen any affect on land costs. Those living right adjacent to the Cache la Poudre River said that they had paid premium prices in fact, because they wanted the choice waterfront lots. This incidently says something about behavioral aspects affecting the program when people readily move into known flood hazard areas.

Another developer said that he did not think it was necessary to inform prospective buyers about possible flood threats. He expressed disbelief with the engineering studies and belittled the "sensational tales" about the county's historical floods. He said that flood plain property values had been "cut in half" by the program and that the government had no right to cause such an effect on his profit potential without some compensation. He claimed that he had lost many sales as a result of people being scared off by a flood threat or by the additional cost of mandatory insurance. He proposed more structural solutions to allow flood plain development such as dams, levees, and channalization projects.

Between these two extreme positions there is the majority of real estate and development interests that are generally in favor of the program, so long as it does not cost them any money. Many of their objections to the program center around the "engineering study issue," which primarily results from a lack of technical understanding.

The major complaint that CNA has received from realtors has been about lost sales when prospective buyers are required to purchase flood insurance on a budget which is already stretched thin. This argument however was not substantiated in any of the interviews with lenders. In the discussions with some of the county's bankers, they said that in no case did borrowers object to flood insurance requirements.

#### Fort Collins Board of Realtors

The position taken by the Fort Collins Board of Realtors is most encouraging. They consist of nearly 400 local agents and are also members of the Colorado Association of Real Estate Boards and the National Association of Realtors. This organization was formed to promote the welfare of the real estate interests and to provide a code of ethics under which the members will transact their business. The members of this organization are required to fully and truthfully inform prospective buyers of any and all flood threats associated with a land sale. They are not excused for ignorance and have an obligation to know of the latest relative information concerning flood hazards. Whether or not they personally agree with the engineering studies, they are compelled to inform their clients of the flood threat. The "Multiple Listing Service" provided by the Board designates whether or not each listing is in a designated flood

hazard area. This service can be very beneficial in informing the public about flood threats.

## POLITICAL, PLANNING, AND ADMINISTRATIVE PROBLEMS

### Political Problems

The political issues and problems center on the public welfare as opposed to private rights. In the past, developers have internalized their benefits by building on the flood plain while externalizing the costs of flooding on individual buyers and society. In this situation, the public sector must step in because the private sector is working imperfectly. Perhaps, if individuals were allowed to suffer their losses without assistance there might not be a need for the public sector to step in. However, it is the public policy of the Federal Government to provide disaster assistance and people would probably object if the Federal Government didn't provide assistance. The Flood Insurance Program shifts the burden of responsibility from the public to the developer and landowner. Yet, one county official felt that the county should not interfere with the flood plain.

Of course, developers and landowners object to sharing the responsibility because of the added costs to them rather than to the public. Developers and landowners believe that

their rights are being impinged upon. They have the resources to organize and present their position to the local government while the general public does not. The local government faces considerable political pressure from them. However, the mandatory requirements of the Flood Insurance Program provides a balance and local officials can fall back on the Flood Insurance Program as a reason for implementing regulation. While it is only right for developers and landowners to share the responsibility in shifting costs from the public to private sector, they should not be overburdened. Regulations must be legally and politically acceptable. The basic power to regulate land use resides in the state. A local government derives its power to regulate from the state legislature. Regulations must be enacted for valid reasons, must be reasonable, and must not abridge the constitutional rights of not having property taken except by due process of law and just compensation, and the right to equal protection under the law. Regulations to guide and limit flood plain development must be based upon sound, flood data to meet due process and equal protection requirements.

Accuracy is as important for political acceptability as it is for legal acceptability. Larimer County ran into political difficulties and problems when the accuracy of engineering studies were challenged by landowners. Not until

the county established monuments and a reasonable degree of accuracy for the studies with considerable cost, did the opposition decrease. Anything larger than the present 100-year flood delineation, such as the 200-year flood, would not be politically acceptable. One county official felt that the present 100-year flood delineation for the Poudre River was unrealistic.

Some view regulation as interference with individual rights, feeling that the individual should be allowed to live in the flood plain if he chooses and should bear the burden for his choice. Others believe that the government is trying to do too much for the individual and not letting the individual think for himself.

#### Planning Problems

As soon as a flood plain delineation boundary is drawn on a map by planners, the line takes on implications, such as who is inside the line and who is outside the line. Since data will always be imperfect, the line will be challenged for minor discrepancies. When enough minor discrepancies show up, political opposition will try to discount the delineation completely. These problems will probably always exist and the planner must do his best to be as accurate as possible.

Accuracy is not without its price. Costs can become prohibitive and planning budgets may be inadequate to achieve the level of accuracy desired. In reality, the 100-year flood delineation is theoretical and many factors are involved. For example, accumulation of debris at a bridge would change the affects that a particular flood would have. There are a host of other factors that are difficult to plan for, such as urbanization effects. Thus, it is probably unrealistic to try to be completely accurate.

#### Administrative Problems

There are no problems of administration at present. But three key problems may arise in the future. The first problem is in the area of enforcement. One building inspector is not in favor of flood plain regulations and may not be enthusiastic about enforcing regulations. It may be possible that certain construction will end up below the required elevation unless local government closely monitors construction.

A second problem may be political pressure. As a result of political pressure, variances may be issued. Also, it is anticipated that some will try to petition out of the designated flood plain and a few will be probably successful. Thus, political pressures will make administration of flood plain regulations less effective if political pressure "eats

away" at the designated flood plain.

Third, it can be anticipated that the administration of the floodway will present difficulties since floodway boundaries are curvilinear and encroachment will not occur uniformly.

## COMMUNICATION AND COORDINATION PROBLEMS

### General

There are communication problems between Federal and local levels. Most of the coordination problems are between Federal and state, and Federal and local levels. There is good coordination among Colorado agencies and little duplication of effort. For the most part, there has been good coordination between the Colorado Water Conservation Board and local government, especially at the county level. There have been no complaints by local officials. In one instance, one local official felt that more technical assistance was needed. The CWCB would like to provide additional technical assistance but has staff and budget limitations.

### Communication Problems

There is a definite communication gap between the Federal and local levels. Many Federal officials do not fully understand or appreciate local problems and the impacts

that the Flood Insurance Program has had on local communities. The FIA, however, is attempting to understand the environmental, economic, and sociological impacts of the insurance program. On the other hand, many local officials do not understand hydrology or probability. Flood frequency misconceptions by local officials are barriers to understanding. One local official said he didn't know what a 100-year flood was and didn't think that the Corps of Engineers knew either. Also, local officials do not know what agencies to contact for special problems.

#### Coordination Between Federal and State

There was a problem of coordination between FIA and the CWCB when the FIA began implementing the provisions of the 1973 Act because each had a different set of priorities for conducting flood plain studies. Coordination between the FIA and the CWCB is much better now but according to the CWCB improvements can still be made. One problem area is that FIA and the CWCB do not agree on criteria for the purposes of regulation.

#### Coordination Between Federal and Local

One of the sources of difficulties for the FIA was the fact that FIA had to implement the provisions of the 1973 Act too quickly and with too little knowledge about the probable

needs and impacts of the Flood Insurance Program. Many of the coordination problems occurred during the first phase implementation of the Flood Insurance Program. Communities complained about the lack of coordination when the Flood Hazard Boundary Maps were prepared. Since then, the FIA has taken steps to correct this deficiency by first sending a preliminary FHBM for community review before issuing a final FHBM.

FIA coordination was most adequate at the county level. However, at the community level, especially small communities like Estes Park and Wellington, there is a felt need for more assistance and coordination from FIA. However, since there are only two Flood Insurance Specialists for 6 states and there is limited funding, it is difficult for FIA to provide coordination to small communities.

During the second phase implementation of the Flood Insurance Program, the coordination by FIA appears to be much better. In April, 1976, a good presentation was made by FIA to Larimer County officials concerning the Flood Insurance Study.

Because of coordination problems during the first phase implementation of the program, the county has probably done more than it needed to do. The Flood Insurance Study will provide information that the county has already undertaken, such as

monumentation, surveyed cross sections and determination of the 100-year flood. There is the possibility there will be a duplication of effort. This also reflects that there has been a lack of guidelines for local regulations during the Flood Insurance Program or that the regulation requirements have not been made clear to local officials.

As a result of the lack of coordination with the Town of Estes Park, local officials are obtaining a flood plain information report from the Corps while the FIA is conducting a Flood Insurance Study.

#### OTHER KEY PROBLEMS

##### Western Hydrology

It is very difficult to implement a nationwide hydraulic program when so many parts of the country exhibit such different hydrologic characteristics. A prime reason why people in this area have so little confidence in the engineering studies is that they have not experienced a really major flood in over 70 years. This semi-arid climate is subject to these protracted time periods without experiencing heavy rainfall and the residents gain an unwarranted confidence that serious flooding is not a real threat. When an unusually heavy rainfall finally occurs, however, the relatively narrow flood plain is subject to the very hazardous

conditions of high velocities combined with a rapid rise of the flood waters.

These narrow flood plains cause another problem for Colorado planners. The "floodway concept" of the program was put in to allow encroachment by some development to the point where the 100-year flood crest will not be raised more than 1 foot. This concept applies very well to humid areas with wide flood plains where economics dictate this to be a prudent approach. In Colorado, however, only a little encroachment on a narrow flood plain by one landowner could raise the flood elevation a full foot and this developer would gain the entire benefit of the provision before adjacent residents had a chance to. The Colorado Water Conservation Board feels this inequitable provision does not really apply to Colorado hydrology and therefore recommends that no encroachment be allowed on the 100-year flood if it will raise the flood crest. They feel that such a provision will preclude much litigation as residents squabble over the liabilities resulting from encroachment. Fighting against this provision, of course, will be the developers who want the right to encroach on the flood plain just like they do in other states.

#### Accuracy Required for Program Uses

The problems identified with the engineering studies and the coordination between local and Federal agencies,

combine to form yet another problem area. The engineering studies furnish the pertinent data required for two separate uses. The FIA is concerned with getting sufficient data to administer the flood insurance program while not wasting the taxpayers' money by requiring "unnecessary" detail. The local officials, however, want very detailed studies with which to write the required zoning regulations and to provide legal descriptions of the flood boundaries. The reader can get some appreciation for the problems associated with developing zoning regulations based on the FHBM by seeing page 1 of Appendix B.

The Colorado Water Conservation Board, therefore, is asking that all flood insurance studies in this state be mapped with 2-foot contour intervals. Since this detail is not generally available on maps in most communities, it would mean that the FIA spend more money on Colorado studies than is usual. It would also require more detail than is usually necessary to merely identify the hazard areas and sell the insurance. Obviously, as more detail is provided, the problems encountered by local officials and landowners will decrease, but what is the proper balance between reduced study costs and reduced problems of implementation? Surely it will be difficult for Federal and local officials to agree on the point at which it becomes impractical to spend more money

for increased study precision, and this will probably always be a source of friction between the Federal and local authorities.

#### Affect on Low Income Housing Areas

The Flood Insurance Program can have a serious effect upon the residents of low income housing located in flood hazard areas. Low income areas are often located in the less desirable flood-prone areas and this is somewhat in evidence for areas along the Cache la Poudre River. Low income persons owning homes in a flood hazard area need the advantage of low cost flood insurance. However, many of these people are living on extremely limited budgets and it becomes a difficult balancing feat for them to include yet another necessary item in their budget. The program must be presented to these people in a common-sense, down-to-earth approach to avoid creating fear, panic, and a negative attitude that "here is another way that the government is trying to take our homes."

Here is a prime example of the necessity for "grass roots" input to the planning process, since it is extremely unlikely that administrators can visualize the concerns and values of the economically less fortunate. Rather than deal with these segments on a community-wide basis, it may be prudent to address neighborhood groups through an organization

which is motivated by the interests of the low income group and has their trust, such as Neighbor to Neighbor, Inc.

Since low income groups will be more significantly affected by the benefits and costs of the program, their views should receive serious consideration since their reactions to the program may be strongly felt either positively or negatively.

### Stability of Rivers and Floodway Channels

One issue that was not brought out during the interviews and that has not been addressed, concerns the stability of the designated boundaries for the floodway and the flood hazard area. Fundamentally, river systems are dynamic and constantly changing. The problem of development and urbanization adding to flood heights has already been mentioned, but rivers also move laterally, that is, they meander. Also, they are in flux with respect to discharge, stage, depth, velocity, sediment load, and bed form.

The problem is that many, including the FIA, have considered rivers as being static and fixed in location when in nature this is not the case. In addition to lateral movement, development can result in stream bed degradation or aggradation. Aggradation of the stream bed will raise flood heights for the same frequency of flood and induce instability. With instability, a river could go almost anywhere.

Millions of dollars have been spent to accurately identify the nation's floodways and floodway fringe areas. Local governments are calling for greater detail of engineering studies so that legal descriptions can be written for the flood boundaries. Very strict zoning regulations have been developed and implemented based on the engineering studies. What is going to happen, however, when the rivers begin to meander across the flood plain, moving the actual floodway and floodway fringe areas with it? Aerial photographs of the Cache la Poudre River graphically show the amount of river movement that has taken place in the past and illustrates the mobility of this river.

In addition, millions of dollars will be spent on the development of the flood plain up to the floodway boundaries. Will additional millions be required for stabilization of floodway channels or will development succumb to the lateral movements of the river? History has shown that extensive river stabilization is required near bridges with continued maintenance. And still, bridges are damaged by river movements. Stabilization would also be environmentally detrimental.

The legal and economic problems that this may cause have not been considered. Although, this problem is beyond the scope of this paper, it could be the most significant problem for the Flood Insurance Program as it now stands

and there is a definite need for research and assessment of this potential problem before millions of dollars are committed.

#### SUMMARY OF PROBLEM AREAS

All of the various problems that have surfaced during interviews with various interests in this Colorado county can be divided into four major categories.

##### Ignorance of the Programs Components and Functions

The major complaint that was identified by the FIA, Colorado Water Conservation Board, the U.S. Army Corps of Engineers, and the program servicing agency, CNA, was that most problems arose because someone with some interest in the program was just not familiar with the procedures or technical aspects of it. This statement did not, of course, apply to all those affected by the program in Larimer County, but merely that when some problem was encountered, it was very often the result of some misunderstanding. Furthermore, it does not mean that an explanation of the misunderstanding will solve the problem since self-interests or lack of technical training may preclude acceptance of a proper explanation. It appears that a major obstacle to the program's success will be whether or not people affected by the program can be

encouraged to study and comprehend the excellent informational material that is available.

It is important to interject here that this section is not addressed to any particular individual, or group of individuals, but merely to identify the reason for many problems. It especially does not apply to the Larimer County Planning Office since one of its members, Rex Burns, was repeatedly identified as having an unusually clear understanding of the program's functions and problems.

#### Distrust of the Identified Flood Threat

Much of the opposition from landowners has been the result of their disbelief that there is any real threat of flood disaster. Because of a lack of technical training, their disbelief cannot generally be dealt with through an explanation of the sciences of statistics, hydrology, and hydraulics. The optimistic outlook of most people prevents them from believing that it could "ever happen to them." Because a flood is viewed as a remote possibility, people discount the potential damage. This type of thinking, combined with unusually long periods without experiencing major floods, can cause intense pressures on local government officials to allow flood plain development. If these officials also exhibit a lack of confidence in the technical aspects of the program, then implementation becomes extremely arduous.

The problem is how to really convince people of the flood threat without resorting to the technical presentations which they seem to "tune out."

#### Lack of Community Enthusiasm

Much of the ignorance about the program in Larimer County results from a lack of motivation to find out the details of the program. This problem seems to be somewhat related to the relatively small portion of the community that is actually affected by floods. If most of the downtown area of Fort Collins was threatened by flood disaster, then the Flood Insurance Program would, undoubtedly, be a very "hot" issue in the community. Instead, only a small portion of the county is subject to flooding, and only a small part of this is under any pressure for development.

For this reason, insurance agents and lenders only have to deal with the program at infrequent intervals, and therefore cannot devote a significant portion of their interest to the flood insurance problems. For the insurance agents, it even seems to be more of a headache since they do not sell enough flood insurance to make it profitable. While the lenders are glad to see their loans protected from flood threat, at the same time they are not enthusiastic enough to encourage their clients, with existing loans in identified hazard areas, to voluntarily purchase the insurance. As more flood plain is developed, more enthusiasm may appear and

encourage the local interests to become more familiar with the details of the insurance program.

### Coordination of Federal and Local Interests

As stated before, there seems to be some diversity of understanding between local and Federal authorities as to the detail required from the engineering studies. This is not the result of a lack of effort on either part, however, because both sides expressed an appreciation of the cooperation received throughout the implementation process.

The problem exists because the Federal and local officials must serve different clients. The local authority is genuinely interested in getting the best data possible in order to fairly and comprehensively administer a program that has a minimum of ambiguities. Conversely, the FIA must make the best possible use of its limited budget to insure that all communities receive an equitable amount of guidance and information, consistent with the Federal program objectives. While FIA would like to provide more detailed information for each community, that would not only reduce the local problems of implementation but also provide a data base for other community purposes, the FIA is charged with administering a workable program with limited manpower and monetary resources. It is probable that since there is some divergence of interests here, there will continue to be some friction between local and Federal officials about the priorities of the program.

## VI. SOLUTIONS TO PROBLEMS

The problems that are presented to the local authorities are fairly easily identified, but there will be no easy answers. Most of the problems of implementation have arisen because the impacts of the program affect different people in different ways, and their individual value systems prevent them from seeing the program in the same light. It is the same old story of people wanting to internalize as many benefits as they can, preferably in the short time, and externalize a maximum amount of the costs. The average citizen just doesn't want to hear that he must give up something he has "for the public good." Because he can see some real or imagined threat to his personal life, he begins to find faults with the program such as: "It can't happen here!", or "The engineering studies are erroneous!", or "I'm just against Big Government regulating more of my life!"

### LARIMER COUNTY

What can be done to combat some of the objections and problems that have been identified in Larimer County?

#### Present Plans

The present plans of Larimer County to alleviate problems of implementation have been primarily aimed at

alleviating some of the adverse affects of the program, rather than trying to make any changes in the program itself.

The public hearings have not only been an attempt to gather input from the citizens but also to serve as a method of informing the public about the structure and functions of the program. At these meetings they have presented experts from the government agencies to explain the details of the program and to answer questions posed by the public.

The county has worked very closely with the state and representatives of the towns and cities in the county to insure that the required zoning regulations are compatible, complete, and implementable. They have also called for greater detail of engineering surveys to allow for better regulation of the flood plain.

The county undertook an engineering investigation to check the validity of surveys performed by the Corps of Engineers. This was in response to claims by citizens that the surveys were erroneous, and these checks helped to quiet public dissatisfaction with the Corps' reports.

The most obvious attempt to alleviate some of the hardships imposed by the Flood Insurance Program was the installation of the benchmarks in the flood plain. Colorado and Larimer County may be leaders in the field of providing local funds to lessen the burden that the government sometimes

places on the private citizen. This action did much to reduce the overt public opposition to the program and apparently made the residents feel as if the local officials, at least, were on their side.

The local, state, and Federal planning authorities remain available to answer questions from the public about the Flood Insurance Program. The FIA office and CNA Insurance Company, both located in Denver, are the best sources of factual information about the program.

#### Recommendations

Many of the problems associated with implementation will continue to be caused by misunderstandings about the purposes, technical aspects, operating procedures, and effects of the Flood Insurance Program. It would seem that a better program of educating the public would be most beneficial. While it is realized that much of the lack of interest is due to the relatively small amount of people involved, continued pressure for flood plain development will eventually make the program more relevant in Larimer County. Therefore, it is important that the lenders, insurance agents, real estate brokers, developers, and local officials at least know where to get the latest information and preferably keep files of this pertinent material at hand.

While the FIA would like to be able to give presentations to the individuals concerned, their manpower restrictions prevent any concentrated effort to educate the local communities. It would be most beneficial if some local interest group, say the League of Women Voters or a task force from DTT, could undertake a concentrated education program in the local communities to distribute the excellent information that is available. They could also coordinate meetings with experts to address specific issues and see that relevant information was made available to the news media.

One specific issue that seems to be of major concern to citizens is the disbelief that there is any real potential for serious flooding. It is recommended that the county provide for an intensive effort to explain the true flood threat to the citizens. This must be done in layman's language and with enough enthusiasm to spark the community interest.

The campaign should especially address the effect of irrigation structures on the flood peaks. The previous studies only said that the structures were considered and that they were insignificant in their effect on flood stages. This is insufficient! Interviews were almost unanimous in disbelief of this statement and we feel that the public will never accept the flood hazard boundaries until this issue is

addressed or until the boundaries are exceeded by a flood.

Instead of reporting the historical flood discharges and stages, a better approach may be to point out the meteorological events that caused the severe floods and compare them to recent events. Another effective presentation would be to meet with officials of Rapid City, South Dakota, who had said, prior to 1972, that "it can't happen here."

#### POSSIBLE PROGRAM IMPROVEMENTS

The program seems to be sound. The problems that are evident are mostly because of misunderstandings or result from deficiencies in manpower and monetary resources.

#### Information

Better flow of information throughout the program structure would be beneficial. The local citizen does not understand the concerns of the Federal bureaucracy and the program administrator cannot visualize the program through the eyes of the low income family living in the flood plain.

To this problem, there is no easy solution and possibly none at all. The information about the program itself is available, but there is no manpower currently available to insure that it is distributed to the appropriate interests and then comprehensively explained. The flow of information

in the other direction, from homeowners, through local, state, and Federal channels is probably even less effective.

Again we feel that it may be possible for a national organization of a civic interest group to undertake this task of providing the structure through which information about the program could flow. If the implementation at the local level is to proceed effectively, it is important that the main issues be identified and objectively assessed by knowledgeable participants. Federal agencies administering the program do not have the resources to monitor the basic problems in each community and local governments are similarly short of the resources to assess the problems of the lenders, insurance agents, real estate brokers, and homeowners. Voluntary organizations that are heavy in manpower and civic interest could aid in this flow of information.

#### Engineering Study Errors

A better flow of information about the technical aspects of the Flood Insurance studies would help reduce the public criticism of them. Naturally, an explanation of these studies must be in layman's language and it may require intensive effort to bring about an understanding in communities where distrust of the study is widespread.

The issue which most often brings criticism of the studies concerns the public's disdain for having to pay for

investigations to prove that the government study erroneously placed their homes in hazard areas. This issue was partly settled by Larimer County's installation of benchmarks in the flood plain to reduce survey costs to the private citizen.

We recommend a change in the program. If a resident feels that his floor elevation is higher than the 100-year flood, he should have to pay an engineer or surveyor to establish the validity of his claim. If he is not above the flood elevation then his money is lost. If the survey shows him to be out of the identified hazard area, then the agency or engineering firm providing the flood hazard study would be required to reimburse the owner for the study, up to some limiting amount, say \$100.

This would take the burden of errors off the private citizen and place it on the shoulders of the investigating agency. It would relieve local governments from any obligation to assist a few residents at the expense of the whole community, and it would dissuade the great number of residents who would request surveys if they were provided for free by the local, state, or Federal Government.

#### NEED FOR IMPACT ASSESSMENT

We have identified two areas for study and research that are beyond the scope of this study. First, the Flood Insurance Program is affecting a lot of people. There is need for the assessment of the impacts of the program on people. Second, millions are being spent on studies and

development based on the floodway concept. Is this wise? Will additional millions be required for river stabilization? Who pays for damage as a result of lateral river movements? These questions and the floodway concept need to be assessed before irrevocable commitments have been made.

#### CORPS FLOOD PLAIN INFORMATION REPORTS

Many local planners and officials have expressed the view that Flood Plain Information Reports are good enough for planning purposes but need more detail for regulation purposes. Instead of using report maps, Larimer County has based regulations on maps which the county had made and the Omaha District delineated the 100-year flood.

The FIA also requires greater detail for a Flood Insurance Study than a Flood Plain Information Report contains though it can be used as a basis for the Flood Insurance Study.

Adequate documentation is also required in order that local officials and planners will be assured that all factors have been adequately considered. The results of the report will be more readily accepted if the community feels that the study is a complete study.

The Flood Plain Information Study program could be made more effective in two ways. First, the report format could be changed so that the report could directly meet the needs of a community and the needs of the FIA. A necessary requirement would be adequate coordination with a community,

the State Coordinating Agency, and the FIA. Second, reports could be based on a basin-wide approach. This would be cheaper and more effective if several communities or jurisdictions are involved.

## VII. CONCLUSION

As previously stated, the purpose of this report is to alert program administrators, especially at the local level, to the potential problems that are likely to arise during implementation of the program. It appears that many of these problems can be avoided, or reduced in impact, through a concentrated effort by local administrators to educate themselves, the citizens, business leaders, insurance agents, lending institutions, and civic groups. Better understanding of the program and its effects will greatly reduce the unnecessary conflicts and improve the implementation process.

The National Flood Insurance Program will expire on 30 June 1977, unless Congress acts to extend it. It is our belief that it will be extended and become as common as fire insurance is today, once the mandatory purchase requirements of the Act become firmly rooted. As a result of the stringent flood plain regulations, the annual flood damages in the United States should begin to decrease. This decrease in flood damages, along with compensation for losses suffered by flood victims, will also reduce the necessity for new flood control structures.

There are many unanswered questions about the program at the present. For one, what level of accuracy is required

for regulations? A review of court cases since 1974 reveals no real challenges to flood plain regulations on the basis of accuracy. The concern for accuracy on the part of local officials may be largely for political reasons in order to appear as fair as possible to their constituents. Further research, study, and experience will help resolve these questions.

#### ADDENDUM

On the night of July 31, 1976, after this study was completed, a devastating flood (probably exceeding 500 yr.) struck the Big Thompson Canyon resulting in tremendous damage and over 80 persons killed. Newspaper articles are shown in Appendix I. On August 1, the President declared Larimer County a National Disaster.

This unfortunate flooding points out several things. First, enactment of regulations before the flood would not have been effective because the Canyon was already fully developed. Second, few probably had insurance because no serious flooding has occurred in over 30 years. Third, while a narrow canyon appears attractive for homes, it has high potential for devastating floods. Fourth, an upstream dam, Olympus Dam, and an irrigation diversion, the Big Thompson Siphon, did not prevent flooding and gave a false sense of security.

It will be especially important in the post-disaster period to investigate the adequacy of the flood warning system and to educate the residents about the insignificant effect of the irrigation structures in reducing the flood peak. Application of flood plain regulations in reconstruction will help to prevent a future recurrence of such a tragedy.

ENDNOTES

<sup>1</sup>Senate Report No. 93-583 (Committee on Banking, Housing and Urban Affairs).

<sup>2</sup>"...Meanwhile, Flood Zoning Fight Begins," Engineering News Record, 13 March 1969.

<sup>3</sup>U.S. Code, Title 24, Part 1910, Subpart A - Requirements for Land Use and Control Measures.

<sup>4</sup>Ibid.

<sup>5</sup>Fort Collins Coloradoan, 1 October 1975.

<sup>6</sup>Ibid.

<sup>7</sup>Federal Insurance Administration, U.S. Department of Housing and Urban Development, Schedule for Flood Insurance Studies, December 1975, p. 2.

<sup>8</sup>Ibid., p. 1

<sup>9</sup>Ibid.

<sup>10</sup>Ibid.

<sup>11</sup>Ibid., p. 2.

<sup>12</sup>Ibid., pp. 3-17.

<sup>13</sup>George Pippen, Corps of Engineers "Flood Plain Management Services," speech presented at National Workshop, Natural Hazard Areas Research Application at Boulder, Colorado, 1 July 1976.

<sup>14</sup>Bureau of Outdoor Recreation, U.S. Department of the Interior, "Flood Plains for Open Space and Recreation," Outdoor Recreation Action, No. 39 (Spring 1976), p. 11.

<sup>15</sup>Gary Cobb, U.S. Water Resources Council, "Implications of the WRC Flood Plain Management Package," speech presented at National Workshop.

<sup>16</sup>Cobb, "Hazard Related Problems facing the Water Resources Council," speech presented at National Workshop.

<sup>17</sup>Jean Anderson, Director, League of Women Voters of the United States, "Citizen Participation in Public Policy," speech presented at National Workshop.

<sup>18</sup>Louise Stitzel, Manager, Neighbor to Neighbor, Inc. Correspondence, 13 July 1976.

## OTHER REFERENCES

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- Levin, Theodore H., "The National Flood Insurance Program -- Element in Water Resource Management," Water Resources Bulletin, Vol. 6, No. 1, January-February 1970.
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- Senate Hearings, Committee on Banking, Housing, and Urban Affairs, 13 and 23 June 1975.
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- Housing and Urban Development Act of 1969, Public Law 91-152 approved 24 December 1969.
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- Flood Plain Management of the Cache la Poudre River Near Fort Collins, Colorado by G.M.Combs, R.A. McDonald, M.R. Martens, and G.M.Rowe, Environmental Resources Center, Colorado State University.
- Kunreuther, Howard, "Limited Knowledge and Insurance Protection," Public Policy, Vol. XXIV, Spring 1976, No. 2.
- HUD, "Questions and Answers, National Flood Insurance Program," HUDNEWS, No. 75-67, 10 March 1975.
- National Flood Insurers Association, Flood Insurance Manual, 2-75 Edition.

U.S. Army Engineer District, Omaha, Flood Plain Information  
Report Big Thompson River, Colorado, December 1971.

Kusler, Jon A. and Thomas M. Lee Regulations for Flood Plains  
Report No. 277. American Society of Planning Officials:  
Chicago, 1972.

Kusler, Jon A. and Douglas A. Yanggen. Regulations of Flood-  
Hazard Areas to Reduce Flood Losses. Vol. I and II,  
Water Resources Council, 1972.

APPENDIX A  
FIA EMERGENCY PROGRAM APPLICATION

Sample

EMERGENCY PROGRAM

Complete Application

1. Application Form - All boxes must be completed (Note mailing instructions in lower left corner of Application Form).
2. Ordinance A - Signed and Dated \*
3. Ordinance B-I - Signed and Dated \* (B-II for Mudslide Areas)  
  
Local Flood Plain regulations may be substituted for the B-I Ordinance, but submission of the B-I is recommended to expedite FIA review.  
  
\* Must have proof and date of adoption (Notarized).
4. Building Permit System - May be ordinance adopting UBC, NBC, SSBC, BOCA Codes. It is an administrative procedure. The national codes are not required.
5. 1 Map - 1 Local Flood Map - May be free hand drawn to identify known local flooding problems.

NOTE: The first four items are necessary to receive FIA approval on your application.

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT FEDERAL INSURANCE ADMINISTRATION				
APPLICATION FOR PARTICIPATION IN THE NATIONAL FLOOD INSURANCE PROGRAM*				
To be submitted to: FEDERAL INSURANCE ADMINISTRATOR Department of Housing and Urban Development, Washington, D.C. 20410				DATE January 1, 1974
1. APPLICANT (City, Town, etc.) City of Waterford				
ADDRESS (County, State) Duxbury County, Colorado				
2. OFFICIAL OFFICE OR AGENCY WITH OVERALL RESPONSIBILITY (See Appendix A(2)) City Manager, John Doe			TELEPHONE 303/555-1212	
ADDRESS (Street or Box No., City, State, ZIP Code) 101 Main Street Waterford, Colorado 80111				
3. PROGRAM CORDINATOR (Official, if different from above, with responsibility for coordinating program) City Planner			TELEPHONE 303/555-1212	
ADDRESS (Street or Box No., City, State, ZIP Code) 101 Main Street Waterford, Colorado 80111				
4. FIRST FLOOR ELEVATION INFORMATION WILL BE RECORDED BY: (See Appendix A(3)) City Clerk and Recorder			TELEPHONE 303/555-1212	
ADDRESS (Street or Box No., City, State, ZIP Code) 101 Main Street Waterford, Colorado 80111				
5. LOCATION OF COMMUNITY REPOSITORY FOR PUBLIC INSPECTION OF FIA MAPS City Clerk and Recorder / Building Inspector				
ADDRESS 101 Main Street Waterford, Colorado 80111				
6. ESTIMATES FOR ONLY THOSE AREAS SUBJECT TO FLOOD AND OR MUDSLIDE AS KNOWN AT THE TIME OF APPLICATION				
AREA	POPULATION	NO. OF 1-4 FAMILY STRUCTURES	NO. OF SMALL BUSINESS STRUCTURES	NO. OF ALL OTHER STRUCTURES
6 city blocks / 24 acres	120	40	12	2
7. ESTIMATES OF TOTALS IN ENTIRE COMMUNITY				
* NOTE: Submit the first and second copies to the Federal Insurance Administration; the third copy to the State Coordinator; Retain the last copy for your files.	POPULATION	NO. OF 1-4 FAMILY STRUCTURES	NO. OF SMALL BUSINESS STRUCTURES	NO. OF ALL OTHER STRUCTURES
	4,000	410	78	20

**ORDINANCE**

**A**

**SAMPLE ██████████ TO BE USED WHEN APPLYING FOR FLOOD INSURANCE**

(Note that Resolution B may also be required)

WHEREAS, certain areas of (COMMUNITY) are subject to periodic flooding (and/or mudslides) from (STREAMS, RIVERS, LAKES, OCEANS, ETC.), causing serious damages to properties within these areas; and

WHEREAS, relief is available in the form of Federally subsidized flood insurance as authorized by the National Flood Insurance Act of 1968; and

WHEREAS, it is the intent of this (BOARD, LEGISLATURE, COUNCIL, ETC.) to require the recognition and evaluation of flood and/or mudslide hazards in all official actions relating to land use in the flood plain (and/or mudslide) areas having special flood (and/or mudslide) hazards; and

WHEREAS, this body has the legal authority to adopt land use and control measures to reduce future flood losses pursuant to (CITE APPROPRIATE SECTION OF STATE LAW AND ANY OTHER RELEVANT AUTHORITY);

NOW, THEREFORE, BE IT RESOLVED, that this (BOARD, LEGISLATURE, COUNCIL, ETC.) hereby:

1. Assures the Federal Insurance Administration that it will enact as necessary, and maintain in force for those areas having flood or mudslide hazards, adequate land use and control measures with effective enforcement provisions consistent with the Criteria set forth in Section 1910 of the National Flood Insurance Program Regulations; and

2. Vests (OFFICIAL, OFFICE OR AGENCY) with the responsibility, authority, and means to:

(a) Delineate or assist the Administrator, at his request, in delineating the limits of the areas having special flood (and/or mudslide) hazards on available local maps of sufficient scale to identify the location of building sites.

(b) Provide such information as the Administrator may request concerning present uses and occupancy of the flood plain (and/or mudslide area).

(c) Cooperate with Federal, State, and local agencies and private firms which undertake to study, survey, map, and identify flood plain or mudslide areas, and cooperate with neighboring communities with respect to management of adjoining flood plain and/or mudslide areas in order to prevent aggravation of existing hazards.

(d) Submit on the anniversary date of the community's initial eligibility an annual report to the Administrator on the progress made during the past year within the community in the development and implementation of flood plain (and/or mudslide area) management measures.

3. Appoints (OFFICIAL, OFFICE OR AGENCY) to maintain for public inspection and to furnish upon request a record of elevations (in relation to mean sea level) of the lowest floor (including basement) of all new or substantially improved structures located in the special flood hazard areas. If the lowest floor is below grade on one or more sides, the elevation of the floor immediately above must also be recorded.

4. Agrees to take such other official action as may be reasonably necessary to carry out the objectives of the program.

Date Passed \_\_\_\_\_

Certification \_\_\_\_\_

**B-1**

**ORDINANCE  
SAMPLE ~~RESOLUTION~~ TO BE USED TO INDICATE THE BUILDING PERMIT SYSTEM  
WHICH THE COMMUNITY HAS ADOPTED AND THE  
REVIEW PROCEDURE FOR THE SYSTEM**

WHEREAS, the (NAME OF COMMUNITY) has adopted and is enforcing (CITE BUILDING CODE, ZONING ORDINANCE), and

WHEREAS, Section of the aforesaid prohibits any person, firm or corporation from erecting, constructing, enlarging, altering, repairing, improving, moving or demolishing any building or structure without first obtaining a separate building permit for each building or structure from the (TITLE OF OFFICIAL), and

WHEREAS, the (TITLE OF OFFICIAL, OFFICE OR AGENCY) must examine all plans and specifications for the proposed construction when application is made to him for a building permit.

NOW, THEREFORE, BE IT RESOLVED by the (NAME OF LOCAL LEGISLATIVE BODY) of (NAME OF COMMUNITY) as follows:

1. That the (TITLE OF OFFICIAL, OFFICE OR AGENCY) shall review all building permit applications for new construction or substantial improvements to determine whether proposed building sites will be reasonably safe from flooding. If a proposed building site is in a location that has a flood hazard, any proposed new construction or substantial improvement (including prefabricated and mobile homes) must (i) be designed (or modified) and anchored to prevent flotation, collapse, or lateral movement of the structure, (ii) use construction materials and utility equipment that are resistant to flood damage, and (iii) use construction methods and practices that will minimize flood damage; and

2. That the (TITLE OF OFFICIAL, OFFICE OR AGENCY) shall review subdivision proposals and other proposed new developments to assure that (i) all such proposals are consistent with the need to minimize flood damage, (ii) all public utilities and facilities, such as sewer, gas, electrical, and water systems are located, elevated, and constructed to minimize or eliminate flood damage, and (iii) adequate drainage is provided so as to reduce exposure to flood hazards; and

3. That the (TITLE OF OFFICIAL, OFFICE OR AGENCY) shall require new or replacement water supply systems and/or sanitary sewage systems to be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters, and require on-site waste disposal systems to be located so as to avoid impairment of them or contamination from them during flooding.

Date Passed \_\_\_\_\_

Certification \_\_\_\_\_

## Building Permit System

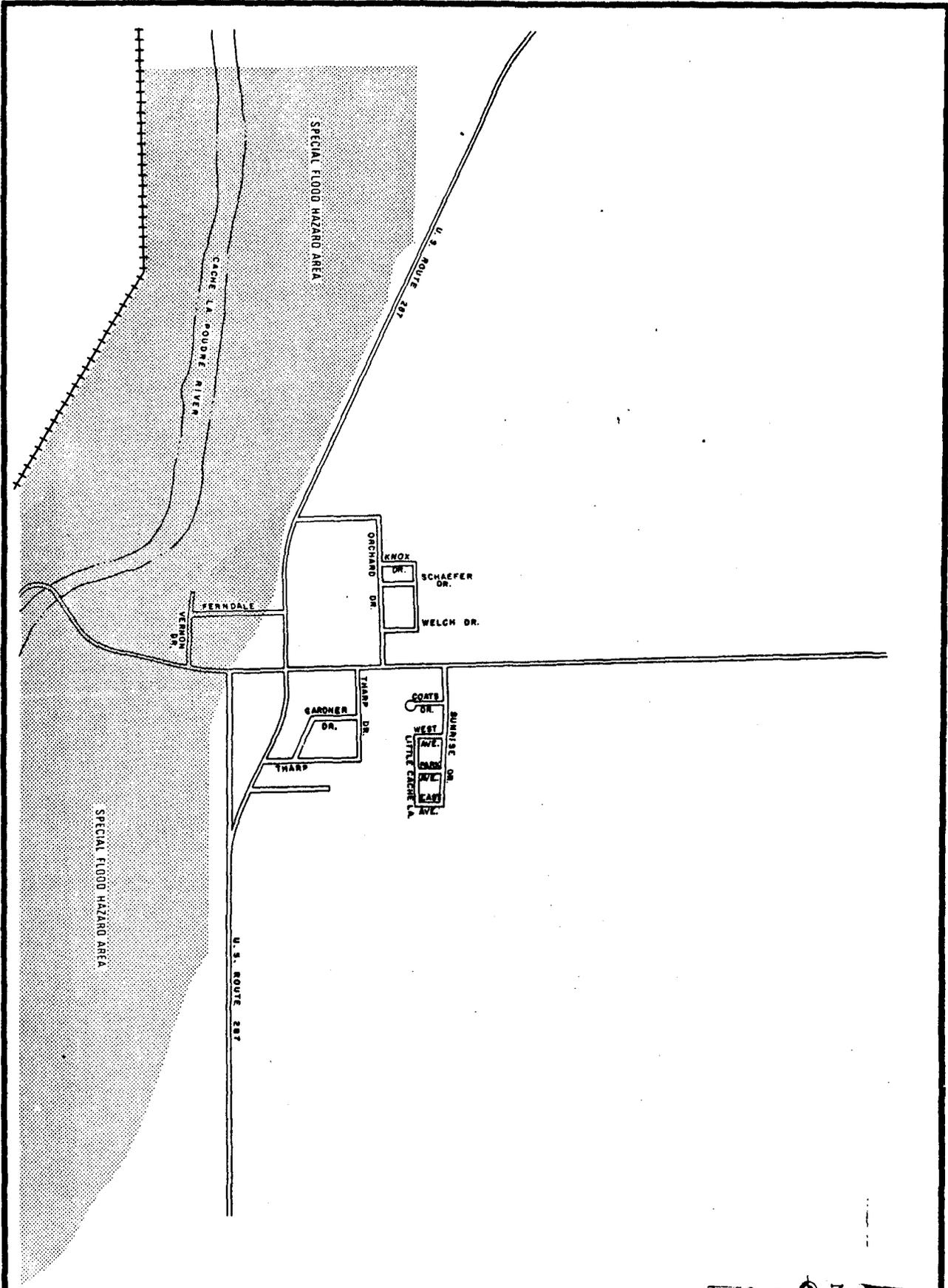
Evidence of a Building Permit System must be provided. The FIA is looking for an administrative procedure which requires the issuance of a permit to build in the town or county.

Exceptions to the permit system must be minimal. Do not send copies of building codes. You may find that the building permit system was adopted a number of years ago and is in the form of a one page ordinance. It is suggested that the copy of the building permit system be certified.

APPENDIX B  
FLOOD HAZARD BOUNDARY MAPS

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Larimer County (unincorporated areas)	<u>Page</u> B-1
City of Fort Collins	B-2



LAPORTE, CO

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT  
Federal Insurance Administration

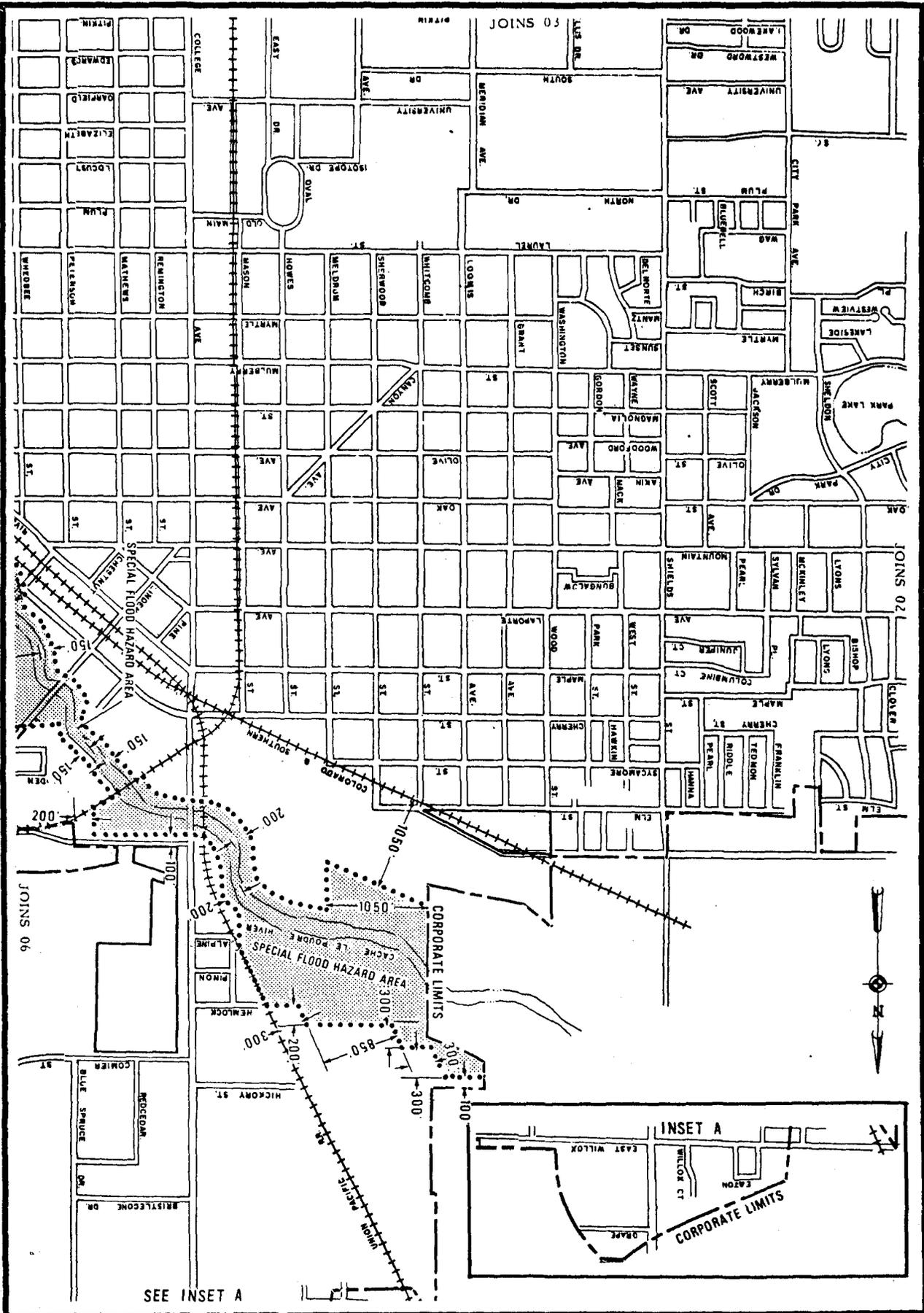
LARIMER CO., CO  
(UNINC. AREA)

APPROXIMATE SCALE  
500 0 1000 2000 3000 FEET

FIA FLOOD HAZARD BOUNDARY MAP  
No H 02

Effective Date  
DECEMBER 27, 1974

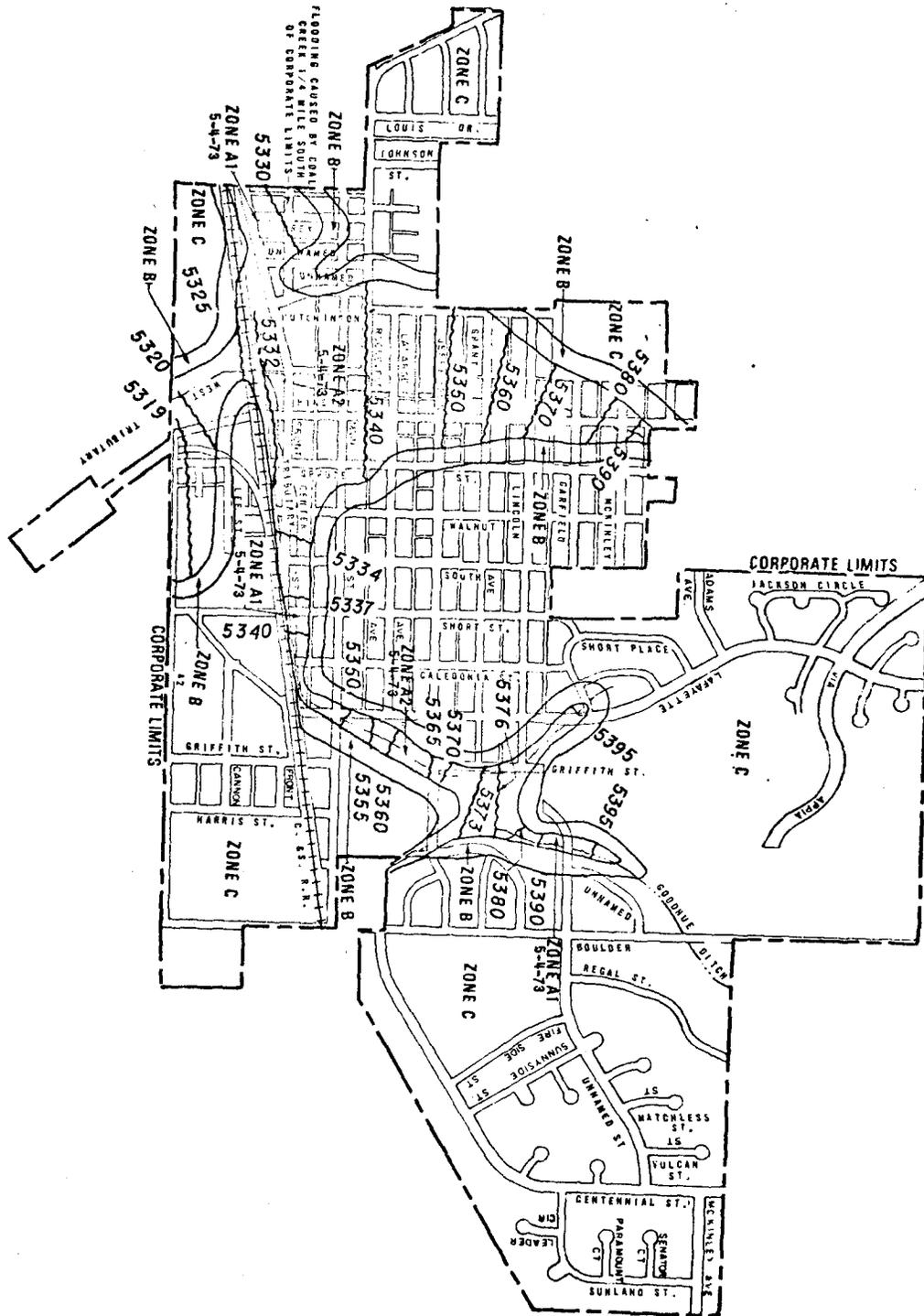
02



SEE INSET A

04 DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT Federal Insurance Administration <b>CITY OF FORT COLLINS, CO</b> (LARIMER CO.)	APPROXIMATE SCALE 500 0 1000 2000 3000 FEET	Effective Date <b>JUNE 28, 1974</b>
	FIA FLOOD HAZARD BOUNDARY MAP No H 04	

APPENDIX C  
FLOOD INSURANCE RATE MAP



DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT  
Federal Insurance Administration  
CITY OF LOUISVILLE, CO  
(BOULDER CO.)

APPROXIMATE SCALE			
500	0	1000	2000
			3000 FEET
FIA FLOOD HAZARD BOUNDARY MAP No H 02	FIA FLOOD INSURANCE RATE MAP No I 02	MAP REVISED JULY 25, 1975	

02

APPENDIX D  
NEWSPAPER ARTICLE  
SEPTEMBER 10, 1975 PUBLIC MEETING

# Planning commission advocates restricted flood plain land use

by Harold Reutter  
County Reporter

Resolutions restricting land use in the county's designated flood plains were approved by a 3-1 vote of the Larimer County Planning Commission at its public hearing Wednesday.

The resolutions were passed despite misgivings on the part of property owners in the flood plain areas.

Most of the opposition expressed by the property owners concerned alleged surveying errors committed by the Army Corps of Engineers in determining which land lies in the flood plain's two zones, the floodway and the flood fringe. Property owners also objected to the fact that they would have to pay surveying costs to correct the errors.

New construction will be prohibited in the floodway, while only new construction that complies with flood plain regulations will be permitted in the flood fringe.

## Errors alleged

County Planner, Rex Burns, admitted that "everyone knows" the Army Corps of Engineers made "some" mistakes in determining land elevations and hydrology (volume of water flow) in the Cache la Poudre River.

Burns said the engineers' figures were the "only ones" the county could use in drawing up the regulations, and discounted property owners' suggestion that the county do its own surveying.

The county planner said the cost of a surveying job to correct the errors would be

prohibitive, since flood plain regulations will probably be extended to other county rivers such as the Big and Little Thompson Rivers, and Boxelder Creek.

Commenting on suggestions that the county should also pay for surveying costs for new construction in the flood fringe, Burns said he thinks it is only fair for property owners to pay. He noted that private property owners would reap the economic benefits for new construction, and therefore it would be unfair to ask taxpayers to share the surveying cost burden.

Burns also rejected a suggestion that no flood plain regulations be adopted, explaining that without such regulations, no citizen is eligible for federal flood protection insurance. The insurance is a prerequisite on new mortgages within the flood plains area, and inability to obtain such mortgages would probably upset more people than the proposed flood plains regulations, he said.

The second hearing on the proposed flood plains regulations will take place before the County Commissioners Oct. 15.

In other action, the commission recommended the county commissioners act favorably on a request to build a wolf rearing and research facility.

The commission made the recommendation after Jack Lynch, director of the wolf foundation, reassured adjacent property owners the facility would be entirely fenced and that in 50 years of operation the foundation has never received a complaint of harm to humans by the wolves.

APPENDIX E  
LARIMER COUNTY FLOOD PLAIN RESOLUTIONS

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Resolution Adopting the Floodway Zoning District and Flood Fringe Zoning District	E-5

FLOOD PLAIN AMENDMENT TO THE LARIMER COUNTY  
BUILDING CODE AND THE TEXT OF A FLOOD  
PLAIN SUPPLEMENTARY REGULATION TO  
THE LARIMER COUNTY COMPREHENSIVE ZONING REGULATION

WHEREAS, on October 28, 1975 and November 13, 1975 in the County Board Hearing Room of the Larimer County Courthouse, Fort Collins, Colorado, the Board of County Commissioners conducted public hearings upon the proposed flood plain amendment to the Comprehensive Zoning Resolution and flood plain amendment to the Larimer County Building Code; and

WHEREAS, the Larimer County Planning Commission has reviewed said flood plain amendments and maps in connection therewith and has recommended that said flood plain amendments be approved by the Board of County Commissioners and apply to the unincorporated areas of Larimer County as designated FF and FW on the proposed maps; and

WHEREAS, authority exists to adopt said flood plain amendments under Chapter 30, Article 28 of the Colorado Revised Statutes; and

WHEREAS, deficiencies in the mapping process have been brought to the attention of the Board of County Commissioners through public hearings thereon indicating a need for greater detail in establishing the location of the FW and FF districts as designated on said maps; and

WHEREAS, it is the intention of this Board to establish in a more precise nature the location of the zoning district boundaries of the proposed FW and FF zoning districts through the establishment of permanent bench marks showing elevations of various points throughout the area encompassed by the proposed maps; and

WHEREAS, it is desirable to now enact the text relative to the flood plain amendments to the Larimer County Zoning Resolution and Larimer County Building Code and adopt the

maps relative thereto at a later time;

NOW, THEREFORE, BE IT RESOLVED as follows:

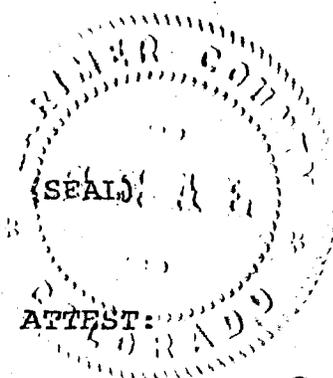
1. The Larimer County Flood Plain Amendment to the Building Code and the Larimer County Flood Plain Regulations, a supplementary regulation to the Larimer County Comprehensive Zoning Regulations be and the same hereby are adopted in the form attached hereto and incorporated herein by this reference.

2. The text will only affect those areas designated FW and FF along various rivers, streams and drainages throughout the unincorporated area of Larimer County all as indicated on amendments to the official zoning map for Larimer County as may from time to time be hereafter adopted by this Board.

DATED This 1st day of ~~NOVEMBER~~<sup>December</sup>, 1975.

BOARD OF COUNTY COMMISSIONERS  
OF THE COUNTY OF LARIMER

By William Lopez  
Chairman



Mary C. Hernandez  
Deputy and Acting Clerk  
of the Board

TEMPORARY REGULATION CONCERNING  
FLOOD PLAIN AMENDMENT TO THE LARIMER COUNTY  
ZONING REGULATION

WHEREAS, the Board of County Commissioners has heretofore adopted text material relating to a flood plain amendment to the Larimer County Comprehensive Zoning Regulations and the Larimer County Building Code; and

WHEREAS, a map delineating FW and FF zones to which said flood plain amendments would apply has been prepared under the direction of the Larimer County Planning Commission; and

WHEREAS, the Larimer County Planning staff under the direction of the Larimer County Planning Commission will delineate the zoning boundaries of the FW and FF zoning districts in greater detail; and

WHEREAS, completion of the zoning plan and map will require an additional period of time, not exceeding six months from the date hereof; and

WHEREAS, the health, safety, convenience, order, prosperity, welfare and property of present and future inhabitants of the State of Colorado and County of Larimer require the adoption of a temporary regulation as hereafter set forth pending completion of the FW and FF zone mapping; and

WHEREAS, authority exists for enactment of a temporary zoning regulation under CRS, 1973 30-28-121;

NOW, THEREFORE, be it resolved as follows:

1. Any building permit applied for relative to the construction, reconstruction or alteration of any building or structure used or to be used for any business, residential, industrial or commercial purpose in the FW zoning district as presently shown on the proposed flood plain maps shall first be reviewed by the Board of Review as a special review item as set forth in the flood plain amendment to the Larimer County zoning resolution and Larimer County Building Code.

2. The proposed flood plain maps shall be kept in the Larimer County Planning Office and shall be available for public inspection during usual business hours.

3. Upon such special review, the review board may deny the issuance of a building permit, conditionally grant it, or grant it consistent with the appropriate factors pertaining to special review items set forth in the flood plain amendment to the zoning resolution and flood plain amendment to the Building Code.

3. This temporary regulation shall expire six months from the date hereof and after that time shall be of no further force or effect.

DATED This 1st day of ~~November~~ December, 1975.

BOARD OF COUNTY COMMISSIONERS  
OF THE COUNTY OF LARIMER

By William Lopez  
Chairman



Shirley D. Schneider  
Deputy and Acting Clerk of  
the Board

RESOLUTION ADOPTING THE FLOOD WAY ZONING  
DISTRICT AND FLOOD RANGE ZONING DISTRICT  
FRINGE

On June 16, 1976, in the County Board Hearing Room of the Larimer County Courthouse, Fort Collins, Colorado, the Board of County Commissioners of the County of Larimer conducted a public hearing upon the maps establishing the boundaries of the Flood Way District and the Flood Range Fringe District. The Board having heard the material presented at said hearing and having considered the recommendation of the Larimer County Planning Commission which also conducted a public hearing upon said maps and having carefully weighed the same resolves:

1. The maps establishing the zoning district boundaries for the FW, Flood Way District and the FF, Flood Fringe District be and the same hereby are adopted as a part of the official zoning map for Larimer County, Colorado.

2. The Deputy Clerk of this Board shall forthwith cause a certified copy of this resolution to be filed with the Clerk and Recorder for the County of Larimer and that the County Planner shall cause the official zoning district map for the County, filed in the County Clerk's Office, a part of the Comprehensive Zoning Resolution of Larimer County, to be amended and to amend the maps in the office of said County Planner in accordance with this resolution.

2. The zoning district boundaries created hereby shall apply to the previously adopted Larimer County Flood Plain Regulations, a supplementary regulation to the Larimer County Comprehensive Zoning Resolution.

Commissioners Wolaver, Lopez and Michie vote in favor of this resolution and the same is duly adopted on this

16th day of June, 1976.

THE BOARD OF COUNTY COMMISSIONERS  
OF THE COUNTY OF LARIMER

By *John Michie*  
Chairman

ATTEST:

*Mary C. Hernandez*  
Deputy and Acting Clerk of  
said Board

APPENDIX F  
LARIMER COUNTY FLOOD PLAIN REGULATIONS

LARIMER COUNTY FLOOD PLAIN REGULATIONS

A Supplementary Regulation to the  
Larimer County Comprehensive Zoning Regulations

SECTION 1.0 TITLE AND AUTHORITY

- 1.1 Short Title. This resolution shall hereafter be referred to as the Larimer County Floodplain Resolution.
- 1.2 Authority. This resolution is authorized by provisions of Article 28 of Chapter 30 of the Colorado Revised Statutes, 1973.
- 1.3 Purpose. To protect the health, safety, convenience, order, prosperity, welfare and property of present and future inhabitants of the State of Colorado and County of Larimer by securing safety from flood waters and all dangers associated therewith.

SECTION 2.0 DISTRICTS

- 2.1 There are hereby created and established in Larimer County, Colorado, the following classifications for zoning districts.

Floodway District	FW
Flood Fringe District	FF

- 2.2 District Boundaries. The boundaries of the zoning districts shall be determined whenever possible by scaling distances from the official zoning map. Location of the boundaries shall be determined by actual elevation of the ground surface as determined by survey. Any person contesting the location of the district boundary may present such dispute to the Board of Review, which Board shall make the final decision as to the location of the district boundary upon technical evidence submitted to it.
- 2.3 Zoning Map. The boundaries and zoning classifications of the districts hereby established are as shown on the official zoning maps for the areas within Larimer County as adopted or amended after public hearings by the Board of County Commissioners of Larimer County. Such maps and all notations, references, data and other information shown thereon are by reference hereby made a part of this regulation.

SECTION 3.0 INTERPRETATION AND APPLICATION

- 3.1 The districts and regulations established hereby and those areas of the County as shown on the official zoning map as being within either of the districts established hereby shall be subject to the provisions of the Larimer County Comprehensive Zoning Resolution and the provisions of the Larimer County Flood Plain Supplementary Regulation.

- 3.2 Whenever possible, the provisions of this supplementary regulation shall be interpreted to apply together and in conjunction with other County land use regulations. Whenever a provision of any other land use regulation is inconsistent with a specific provision of this supplementary regulation, the provisions of this supplementary regulation shall apply.
- 3.3 Except as specifically provided in this supplementary regulation, all other provisions of the Comprehensive Zoning Resolution and other County land use resolutions shall continue to apply within those districts established by this supplementary regulation.

#### SECTION 4.0 FLOODWAY DISTRICT

- 4.1 Uses permitted without Special Permits.
1. Agricultural uses.
  2. Recreational uses.
  3. Residential accessory uses.
- 4.2 Conditions for uses permitted without a special permit.
1. No use shall be permitted which is prohibited by any other provision of the Larimer County Comprehensive Zoning Resolution.
  2. No use shall limit or restrict the flow capacity of the floodway or channel or a main stream or a tributary to the main stream.
  3. No structure, fill, storage of materials or equipment shall be permitted.
- 4.3 Uses permitted by Special Permit.
1. Circuses, carnivals and similar transient amusement enterprises.
  2. Temporary roadside stands.
  3. Limited stockpiling of sand and gravel.
  4. Marinas, boat rentals, docks, piers, and wharves.
  5. Railroads, streets, bridges, utility transmission lines and pipelines.
  6. Other uses similar in nature to those described above.
- 4.4 Conditions for Floodway Special Permit Uses.
1. They are not prohibited by the provisions of the Comprehensive Zoning Resolutions.
  2. Special Permit uses shall be allowed only after application to the Planning Office and issuance of a special permit by the Board of County Commissioners as provided in Section 6. hereof.
  3. No structure, deposit, obstruction, or other use shall be allowed which acting alone or in combination with existing or future uses adversely affects the flow capacity of the floodway or increases flood heights.
  4. Storage. The storage of processing materials that are in time of flooding buoyant, flammable, explosive, or could be injurious to human, plant, or animal life shall be prohibited.

## SECTION 5.0 FLOOD FRINGE DISTRICT

- 5.1 Permitted Uses. All uses excluding outside storage as permitted by the underlying zone as established by the Larimer County Comprehensive Zoning Resolution.
- 5.2 Conditions for Permitted Uses.
1. All structures shall be placed on fill so that the lowest floor of such structure is above the regulatory flood protection elevation.
  2. No use shall be commenced nor structure built which may limit or restrict the flow capacity of the channel of a tributary, or drainway, or retard drainage of flood waters from the area in which a structure is built.
  3. Fill or deposition of materials shall be permitted only to the extent required for the placement of structures and their accessory uses.
- 5.3 Special Permit Uses. All uses permitted by the underlying zone as established by the Larimer County Comprehensive Zoning Resolution.
- 5.4 Conditions for Flood Fringe Special Permit Uses.
1. They are not prohibited by the provisions of the Comprehensive Zoning Resolution.
  2. Special permit uses shall be allowed only after application to the Planning Office and issuance of a special permit by the Board of County Commissioners as provided in Section 6. hereof.
  3. Fill or deposition of materials shall not be permitted if such is found to imprudently reduce the storage or flow capacity of a waterway.
  4. The lowest floor of all habitable structures shall be placed above the flood protection elevation.
  5. Storage. The storage or processing of material other than material that is in time of flooding, buoyant, flammable, explosive, or could be injurious to human, plant, or animal life may be permitted.

## SECTION 6.0 SPECIAL PERMITS

- 6.1 Application. Any use listed in this supplementary regulation as requiring a special permit may be allowed only upon compliance with this section.
1. Application for special permits shall be made to the Larimer County Planning Office.
  2. Each applicant shall furnish the following as necessary with each application for a special permit, and which shall be prepared by a registered professional engineer and/or architect.
    - a. Four sets of plans drawn to scale showing the nature, location, dimensions, and elevation of the lot, existing or proposed structures, fill, storage of materials, flood-proofing measures, and the relationship of the use or structures to the location of the channel, floodway and the flood protection elevation.

- b. A typical valley cross-section showing the channel of streams, elevation of land areas adjoining each side of the channel, cross sectional areas to be occupied by the proposed development, and high water information.
  - c. Surface view plans showing elevations or contours of the ground, pertinent structures, fill, or storage elevations, size, location, and spatial arrangement of all proposed and existing structures on the site; location and elevations of streets, water supply, and sanitary facilities, photographs showing existing land uses and vegetation upstream and downstream and soil types.
  - d. A profile showing the slope of the bottom of the channel or flow line of the stream.
  - e. Specifications for building construction and materials, floodproofing, filling, dredging, grading, channel improvement, storage of materials, water supply and sanitary facilities.
3. The Board of Review shall review applications for special permits and make recommendations thereon to the Board of County Commissioners.
  4. The Board of County Commissioners shall conduct a hearing upon such special permits notice of which may, at the discretion of the Board of County Commissioners be published at least 14 days prior to the date of said hearing in a newspaper of general circulation within Larimer County. Such notice shall designate the time and place of hearing, the location of the proposed uses and the type of use proposed. In addition, written notice of the County Commissioners hearing may be sent to all land owners within 500 feet of the location of the proposed use. The mailing of such notices shall be discretionary and the failure to mail or receive such notice shall not affect the validity of any proceedings before the Board of County Commissioners. Upon holding of said hearing, the County Commissioners may approve the special permit, approve the special permit with conditions, or deny the special permit, after considering the recommendation of the Board of Review, and the factors set forth in Section 6.2.

6.2 Factors to be considered by the Board of County Commissioners at the Special Permit Hearing.

1. The danger of life and property due to the increased flood heights or velocities caused by encroachments upstream or downstream within the floodplain.
2. The danger of materials being swept away onto other lands or downstream to the injury of others in the event of a flood.
3. The proposed water supply and sanitation systems and the ability of these systems to prevent disease, contamination and unsanitary conditions in the event of a flood.
4. The relationship of the proposed use to the flood management program for the area in question.
5. The safety of access to the property in times of flood.

6. The expected heights, velocity, duration, rate of the rise, and sediment transport of flood waters at the proposed location and their effect on the proposed use.
7. The recommendation of the Board of Review.

6.3 Conditions which may be Attached to Special Permits.

1. Modification of utility service facilities, such as electrical, water and sewer.
2. Limitations on periods of use of operation and the imposition of operational controls.
3. Requirements for construction of channel modifications, dikes, levees and other protective measures.
4. Imposition of floodproofing measures.
5. Other conditions in furtherance of the factors to be considered in connection with the special permit and the objectives of this supplementary regulation.

6.4 With all special permit applications the applicant shall pay a fee of \$100.00.

#### SECTION 7.0 NON-CONFORMING USES

7.1 A structure or use within a structure or use of premises which was lawful before the passage of this supplementary regulation but which is not in conformity with the provisions hereof, may be continued without compliance with the supplementary regulation. Such non-conforming uses or non-conforming buildings may be repaired, expanded, or altered only upon compliance with the following conditions.

1. Any non-conforming use of property may be expanded provided that such expansion is approved by the Board of Review pursuant to Section 8.2 (d) of this supplementary regulation.
2. Any non-conforming structure may be repaired, altered or enlarged provided the repair, enlargement or alteration does not exceed 25% of the non-conforming structure's actual value at the time the alteration, repair or enlargement takes place.
3. If a non-conforming use of property or non-conforming building is discontinued or vacated for a period of twelve consecutive months, it shall be deemed to be abandoned and any further use of the property or structure shall conform to this supplementary regulation.

7.2 A non-conforming structure which is damaged or destroyed by any calamity, except flood, may be restored to its original condition if such restoration commences within one year from the date of the calamity. If any non-conforming structure is damaged to the extent of 50% of its actual value by flood, said non-conforming structure shall be restored only in compliance with this supplementary regulation and flood plain amendment to the Larimer County Building Code. If such flood damage is less than 50% of the structure's actual value, such structure may be restored without compliance with this supplementary regulation nor the flood plain amendment to the building code provided said restoration commences within one year from the date of damage.

## SECTION 8.0 BOARD OF REVIEW

- 8.1 There shall be created a Board of Review appointed by the Board of County Commissioners, which Board shall consist of three members and of which Board the Larimer County Engineer shall be appointed as chairman.
- 8.2 Powers of the Board of Review:
- a. To review the exact zoning district boundary of the FW and FF district as it relates to any specific piece of property.
  - b. To review special permit applications as provided herein.
  - c. To grant variances from the terms and conditions of the Flood Plain Supplementary Regulation. Variances may only be allowed upon a showing that the strict application of any provisions of this Supplementary Regulation would result in a peculiar and exceptional and undue hardship upon the owner of such property. Variances shall not impair the intent and purpose of this Supplementary Regulation. Furthermore, use variances from the uses set forth in the FW and FF zoning districts may be allowed or conditionally allowed after review of said use variance in accordance with the applicable factors set forth in Section 6.2 hereof.
  - d. To grant or conditionally grant an expansion of a non-conforming use of property under this supplementary regulation upon reviewing such request for expansion in accordance with the applicable factors set forth in Section 6.2 of this supplementary regulation.

## SECTION 9.0 DEFINITIONS

- 9.1 Channel - A natural or artificial watercourse or drainway of perceptible extent with definite bed and banks to confine and conduct continuously or periodically flowing water.
- 9.2 Drainway - A natural or artificial land surface depression with or without perceptibly defined beds and banks to which surface runoff gravitates and collectively forms a flow of water continuously or intermittently in a definite direction.
- 9.3 Fill - A deposit of materials of any kind placed by artificial means.
- 9.4 Flood - A temporary rise in stream flow which results in water flowing or standing where it would not normally be.
- 9.5 Floodproofing - A combination of structural provisions, changes or adjustments to properties and structures subject to flooding for the purpose of reduction and elimination of flood damages to properties, water and sanitation facilities, structures and contents of buildings in a flood hazard area.

- 9.6 Floodway - The channel of a stream and those portions of the flood plain which are required for the reasonable passage and conveyance of the 100 year return frequency flood provided that flood heights and velocities do not exceed designated levels.
- 9.7 Flood Fringe - That portion of the flood plain inundated by the 100 year return frequency flood not within the floodway.
- 9.8 Flood Plain - The land adjacent to a body of water which has been or may hereafter be covered by floodwater.
- 9.9 Flood Profile - A graph or longitudinal profile showing the relationship of the water surface elevation of a flood event to location along a stream or river.
- 9.10 Obstruction - Any dam, wall, wharf, embankment, levee, dike, pile abutment, projection, excavation, channel rectification, bridge conduit, culvert, building, fence, rock, gravel, refuse, fill, structure or matter in, along, across, or projecting into any channel, watercourse, or regulatory flood hazard area which may impede, retard or change the direction of water flow, either in itself or by catching or collecting debris carried by such water, or that is placed where the flow of water might carry the same downstream to the damage of life and property elsewhere.
- 9.11 Regulatory Flood Datum - The reference elevation above mean sea level which represents the peak elevation of the 100 year return-frequency flood.
- 9.12 Regulatory Flood Protection Elevation - The elevation one and one-half feet above the regulatory flood datum.

#### SECTION 10.0 SEVERABILITY

- 10.1 It is the legislative intent that the several provisions of this resolution shall be severable so that in the event any provision of this supplementary regulation is declared to be invalid, such decision shall be limited to that provision or provisions which are expressly stated in the decision and such decision shall not affect, impair, or nullify this supplementary regulation as a whole or any other part thereof. If the application of any provision of this supplementary regulation to a tract of land is declared to be invalid, the effect of such a decision shall be limited to that tract of land immediately involved in the controversy and such decision shall not affect, impair or nullify this supplemental resolution as a whole or to the application of any provision thereof to any other tract of land.

SECTION 11.0 MISCELLANEOUS

- 11.1 The Larimer County Board of Adjustment's jurisdiction shall not extend to the provisions of this Supplementary Floodplain Regulation and said Board shall exercise no authority hereunder.
- 11.2 Section 3.3 of the Larimer County Comprehensive Zoning Resolution shall not apply to this Floodplain Supplementary Regulation. This Supplementary Regulation shall apply throughout the unincorporated territory of Larimer County.

SECTION 12.0 ENACTMENT

- 12.1 This supplemental regulation shall be in full force and effect after its approval and adoption.

APPROVED AND ADOPTED THIS 1st DAY OF December, 1975.

THE BOARD OF COUNTY COMMISSIONERS  
OF THE COUNTY OF LARIMER

By

William Lopez

ATTEST:

Marjorie Alexander  
Deputy and Acting Clerk of Said Board

APPENDIX G  
LARIMER COUNTY FLOOD PLAIN AMENDMENT  
TO THE BUILDING CODE

FLOOD PLAIN AMENDMENT

TO THE LARIMER COUNTY BUILDING CODE

SECTION I - TITLE

- 1.1 Short Title. This resolution shall hereafter be referred to as the Larimer County Flood Plain Building Code.

SECTION II - INTERPRETATION AND APPLICATION

- 2.1 Whenever possible, the provisions of this supplementary building code shall be interpreted to apply together with and in conjunction with other Larimer County Building Codes. This Amendment is not to be interpreted as a repeal of prior building codes, but rather, regulations to apply in addition to other building codes.
- 2.2 Except as specifically provided in this Amendment, all other provisions of the Larimer County Building Code shall continue to be applied in addition to the requirements set forth herein.
- 2.3 This Amendment to the Larimer County Building Code shall apply in those areas of the County zoned either FW-Floodway or FF-Floodfringe.
- 2.4 Zoning Map. The boundaries and zoning classifications of the districts herein referenced are as shown on the official zoning maps for the areas within Larimer County as adopted or amended after public hearings by the Board of County Commissioners of Larimer County. Such maps and all notations, references, data and other information shown thereon are by reference hereby made a part of this resolution.

SECTION III - REGULATIONS - FLOODWAY DISTRICT FW

- 3.1 Use of Fill. Fill shall not be permitted in the FW District except when such fill, acting alone or in combination with existing or future flood plain uses shall be shown to have no detrimental effect upon the hydraulic capacity of the floodway. In the event fill is permitted, it shall be protected against erosion where erosive velocities may occur by the use of riprap, bulkheading or vegetative cover.
- 3.2 Structures. Where structures are allowed by the Larimer County Comprehensive Zoning Resolution, the following restrictions shall apply:
  - a. Structures shall not be designed for human habitation.
  - b. Structures shall be constructed so that the longitudinal axis of the structure is parallel to the direction of the flood flow.
  - c. Whenever possible, placement of structures shall be upon the same flood-flow lines as those of adjoining structures.

- d. Structures shall be firmly anchored.
- e. All utility services in connection with structures shall whenever possible be placed above the flood protection elevation or where not practicable shall be adequately floodproofed in a manner approved by the County Building Department.

#### SECTION IV - REGULATIONS - FLOODFRINGE DISTRICT FF

- 4.1 Fill. The use of fill in the FF District shall be the minimum necessary to comply with the provisions of this regulation. When required by the provisions of the Larimer County Comprehensive Zoning Resolution, fill in the FF District shall be to a point no lower than the regulatory flood protection elevation for the area in question. Such fill shall further extend at such elevation at least fifteen feet beyond the extremities of any structure erected on such fill. No fill shall be used in such a manner as to restrict the flow capacity of any tributary or other drainway to the main stream.
- 4.2 Structures
  - a. Any structure may be placed in the FF District only if the lowest floor level is at or above the regulatory flood protection elevation.
  - b. If any structure or portions of any structure are not constructed upon fill, the portion not on fill shall be floodproofed in a manner consistent with requirements for placing a structure in the FW District to an elevation equal to the flood protection elevation.
  - c. All utility services, furnaces, water heaters and electrical wiring in connection with structures shall wherever possible be placed above the flood protection elevation or where elevation is not practicable shall be adequately floodproofed in a manner approved by the County Building Department.

#### SECTION V - ADMINISTRATION

- 5.1 Application Procedure. Applications for building permits in the FF and FW Zoning District shall be accompanied by surveys, plot plans, drawings, plans and other materials as necessary showing compliance of the proposed construction with the provisions of this resolution and the flood plain supplementary zoning resolution. Such submittals may include the following as necessary and shall be prepared by a registered professional engineer or architect:
  - a. Four sets of plans drawn to scale showing the nature, location, dimensions, and elevation of the lot, existing or proposed structures, fill, storage of materials, floodproofing measures, and the relationship of the above to the location of the channel, floodway, and the flood-protection elevation.

- b. A typical valley cross section showing the channel of stream, elevation of land areas adjoining each side of the channel, cross sectional areas to be occupied by the proposed development, and high-water information.
- c. Plans (surface view) showing elevations or contours of the ground; pertinent structure, fill, or storage elevations; size, location, and spatial arrangement of all proposed and existing structures on the site; location and elevations of streets, water supply, sanitary facilities; photographs showing existing land uses and vegetation upstream and downstream, soil types, and other pertinent information.
- d. A profile showing the slope of the bottom of the channel or flow line of the stream.
- e. Specifications for building construction and materials, flood-proofing, filling, dredging, grading, channel improvements, storage of materials, water supply, and sanitary facilities.
- f. An additional fee in the amount of one-fourth times normal permit fee.

5.2 Flood-proofing measures taken pursuant hereto, shall be designed consistent with the flood protection elevation for the particular area, flood velocities, durations, rate of rise, hydrostatic and hydrodynamic forces, and other factors associated with the regulatory flood. The building department shall require that the applicant submit a plan or document certified by a registered professional engineer or architect that the flood-proofing measures are consistent with the regulatory flood-protection elevation and associated flood factors for a particular area. The following flood-proofing measures may be required or taken in connection with specific construction. Such measures shall be undertaken in a manner consistent with requirements detailed by flood proofing regulations as published by the U.S. Army Corps of Engineers.

- a. Anchorage to resist flotation and lateral movement.
- b. Installation of watertight doors, bulkheads, and shutters, or similar methods of construction.
- c. Reinforcement of walls to resist water pressures.
- d. Use of paints, membranes, or mortars to reduce seepage of water through walls.
- e. Addition of mass or weight to structures to resist flotation.
- f. Installation of pumps to lower water level in structures.
- g. Construction of water supply and waste treatment systems so as to prevent the entrance of flood waters.
- h. Installation of pumping facilities or comparable practices for subsurface drainage systems for buildings to relieve external foundation wall and basement flood pressures.
- i. Construction to resist rupture or collapse caused by water pressure or floating debris.
- j. Installation of valves or controls on sanitary and storm drains which will permit the drain to be closed to prevent back-up of sewage and storm waters into the buildings or structures.

- k. Location of all electrical equipment, lines, circuits, and installed electrical appliances in a manner which will assure they are not subject to flooding.
- l. Construction of water, sewer, and natural gas lines to resist rupture or collapse caused by water pressure.
- m. Location of any structural storage facilities for chemical explosives, buoyant materials, flammable liquids, or other toxic materials which could be hazardous to public health, safety, and welfare in a manner which will assure that the facilities are situated at elevations above the heights associated with the regulatory flood protection elevation or are adequately flood-proofed to prevent flotation of storage containers which could result in the escape of toxic materials into flood waters.

5.3 Board of Review. There shall be a Board of Review appointed by the Board of County Commissioners consisting of three members of which the Larimer County Engineer shall be appointed as chairman. With the exception of the chairman, terms shall be for two years. Said Board of Review shall have the qualifications and powers designated in Colorado Revised Statutes, 1973, 30-28-206 as amended. In addition, all members of the Board of Review shall be trained and experienced in technical matters relative to flood control and protection specified herein.

5.4 Appeals to the Board of Review may be taken by any person aggrieved by his inability to obtain a building permit in the FW or FF zones or by any officer, department, board, or bureau of the County. Upon review, the Board of Review shall have jurisdiction only over the following matters.

- a. To review the exact zoning district boundary of the FW and FF districts as it relates to any specific piece of property.
- b. Determining the suitability and advisability of alternate methods of construction in the FW and FF zones which alternate methods shall not reduce the capacity of the structure involved to withstand flood damage, and which alternate methods shall not restrict the flow capacity of the main channel or any drainage relative thereto.
- c. In appropriate cases, the Board of Review may issue a variance from the provisions of this regulation only after making a specific finding that the variance will not endanger health, welfare or prosperity and property of the applicant or any upstream or downstream owner or occupier of land.

#### SECTION 6.0 - DEFINITIONS

6.1 Channel - A natural or artificial watercourse or drainway of perceptible extent with definite bed and banks to confine and conduct continuously or periodically flowing water.

6.2 Drainway - A natural or artificial land surface depression with or without perceptively defined beds and banks to which surface runoff gravitates and collectively forms a flow of water continuously or intermittently in a definite direction.

- 6.3 Fill - A deposit of materials of any kind placed by artificial means.
- 6.4 Flood - A temporary rise in stream flow which results in water flowing or standing where it would not normally be.
- 6.5 Floodproofing - A combination of structural provisions, changes, or adjustments to properties and structures subject to flooding for the purpose of reduction and elimination of flood damages to properties, water and sanitation facilities, structures and contents of buildings in a flood hazard area.
- 6.6 Floodway - The channel of a stream and those portions of the flood plain which are required for the reasonable passage and conveyance of the 100-year return frequency flood provided that flood heights and velocities do not exceed designated levels.
- 6.7 Flood Fringe - That portion of the flood plain inundated by the 100-year return frequency flood not within the floodway.
- 6.8 Flood Plain - The land adjacent to a body of water which has been or may be hereafter covered by floodwater.
- 6.9 Flood Profile - A graph or longitudinal profile showing the relationship of the water surface elevation of a flood event to location along a stream or river.
- 6.10 Obstruction - Any dam, wall, wharf, embankment, levee, dike, pile abutment, projection, excavation, channel rectification bridge conduit, culvert, building, fence, rock, gravel, refuse, fill, structure or matter in, along, across, or projecting into any channel, watercourse, or regulatory flood hazard area 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 flow of water might carry the same downstream to the damage of life and property elsewhere.
- 6.11 Regulatory Flood Datum - The reference elevation above mean sea level which represents the peak elevation of the 100 year return frequency flood.
- 6.12 Regulatory Flood Protection Elevation - The elevation one and one-half feet above the regulatory flood datum.

SECTION 7.0 ENACTMENT

7.1 This supplemental regulation shall take effect after its approval and adoption.

APPROVED AND ADOPTED THIS 1st day of December, 1975.

THE BOARD OF COUNTY COMMISSIONERS  
OF THE COUNTY OF LARIMER

By William Lopez

ATTEST  
  
Theresa Hernandez  
Deputy and Acting Clerk of Said Board

APPENDIX H  
CITY OF LOVELAND FLOOD PLAIN ORDINANCE

CITY OF LOVELAND FLOOD PLAIN ORDINANCE

18.52.040 Major flood channels. For the purpose of this title there are or may be established and designated on the zoning district map of the city, "Major Flood Channels" within which no building or other structure except a flood control dam or irrigation structure shall be constructed unless adequate flood protection measures are taken or until the plans for such building or structure are first approved by the city council according to the following special conditions:

A. Any building or structure which is approved shall be located so as to offer minimum obstruction to the flow of flood water and shall not cause lands outside of the natural flood channel to be flooded;

B. No dwellings or mobile homes shall be permitted;

C. No schools, churches or other places of public assembly shall be permitted;

D. No storage of materials which could be moved by flood waters shall be permitted. (Ord. 1004 15.4, 1968).

APPENDIX I  
NEWSPAPER ARTICLES  
JULY-AUGUST 1976 FLOODS



# Rocky Mountain News

Denver's Morning Newspaper

Reg. U.S. Post. Off.

Colorado's First Newspaper—Founded in 1859

118TH YEAR, NO. 102

Published by Denver Publishing Co.  
Second-class postage paid at Denver, Colorado

DENVER, COLORADO 80201, MONDAY, AUG. 2, 1976

METRO

15¢

10¢

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# Scores dead, hundreds hurt in Big Thompson flash flood

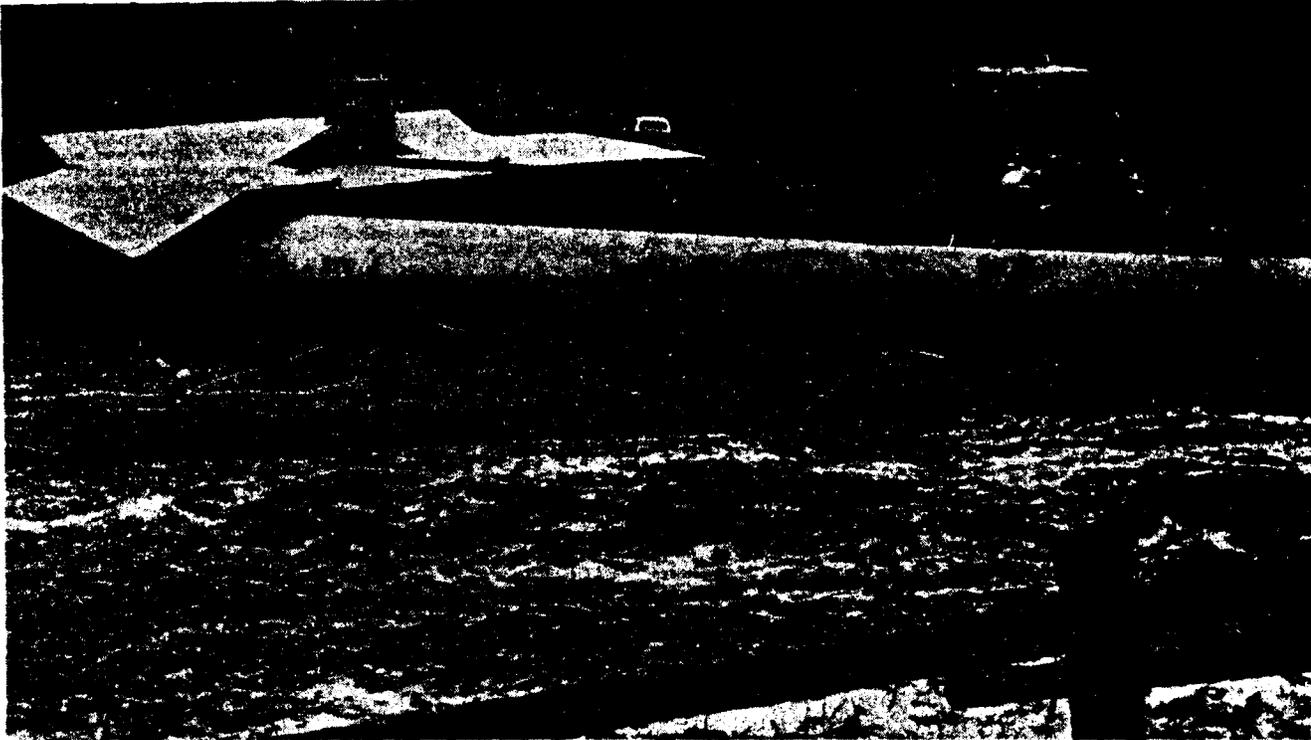


NEWS PHOTO BY BILL PERRY

## U.S. 34 west of Loveland is no more

This was the scene at the end of U.S. 34 west of Loveland. The road once ran along the left side of the canyon. A corner shows in bottom right.

### Flood photos on pages 15, 38 and 65



Once a water duct across the Big Thompson, this pipe was washed loose and into a house near Loveland. Pipe carried water from Carter Lake.

NEWS PHOTO BY BILL PERRY

# 56 known dead in flood; hundreds trapped

By JACK OLSEN JR.

News Staff

**LOVELAND** — At least 56 persons were dead and hundreds injured or trapped on steep slopes and in mud-bound cars late Sunday, after a flash flood swept through 30 miles of canyons Saturday night between Loveland and Estes Park.

Shortly before rescue operations were suspended for the night at 8 p.m., the Colorado State Patrol reported 56 confirmed dead and at least 250 injured.

A total of 500 persons were evacuated Sunday from the flood-ravaged area. A group of 42 persons reported stranded at the town of Glen Haven were to be airlifted out of the area late Sunday or early Monday, the state patrol said.

Only one of the dead had been identified by late Sunday. He was State Patrol Sgt. W. Hugh Purdy, 53, of Loveland, a 26-year veteran of the Patrol. Other names weren't expected to be known before Monday.

The CSP said Purdy was one of the first officers to enter the flood area in hopes of aiding in the rescue effort.

Larimer County Sheriff Bob Watson said the death toll would soar.

"Come morning, we are going to find bodies all over the damned place," he said at dusk Sunday.

On Sunday night, heavy rain was falling in the flood-stricken area and the state patrol reported that water levels were rising again.

Gov. Dick Lamm, who earlier called up 150 members of the Colorado National Guard, late Sunday requested emergency federal aid.

Survivors told of a surge of water in the Big Thompson River and its north fork that ranged from "a wall six to eight feet tall" to "a steady rise that took everything with it — cars, houses, everything."

Many of those rescued reported that their terror had been increased by the sounds of exploding propane tanks, which broke loose from cabins and campers, then blew up as they collided with floating debris.

**THE FLASH FLOOD HIT** between 8:30 p.m. and 10 p.m. Saturday night following a violent thunderstorm centered in the high country a few miles east of the Continental Divide.

An estimated 600 to 800 persons — who perched themselves on steep banks or sat shivering in their cars and campers through the night — were evacuated starting at dawn Sunday.

By 6 p.m., Larimer County Sheriff Bob Watson estimated that between 200 and 300 persons still were stranded in the canyon. Helicopters from several agencies — including the Colorado National Guard, the U. S. Army and St. Anthony Hospital — were scheduled to drop in sleeping bags, food and other overnight supplies to victims.

Stranded survivors were told in leaflets dropped from the air that they should gather in groups for another night of waiting on the high ground.

"We are expecting more rain tonight," the leaflets warned. At 6 p.m., Watson said that it was raining again over the canyon.

A drizzle resumed at 8:30 p.m., but had slowed by 10 p.m.

The canyon road — U.S. 34 — begins about 45 miles north of Denver. After Saturday night's flood, it was covered by water, upturned in large chunks or completely washed out from the plains three miles west of Loveland to a point just a few miles from Estes Park.

**HUNDREDS OF CARS** and campers were strewn along the Big Thompson and its northern fork.

Watson described the destruction as like a child "throwing play cards and houses around." He said the immediate problem was to evacuate the remaining stranded, then search the flatlands all the way into Weld County, miles to the east, for the dead.

"Bodies went (floating) by us at the (evacuation) command post," Watson said, "but we couldn't do anything about it."

One body was found at the intersection of the Big Thompson River and Interstate 25, four miles east of Loveland.

A county coroner's spokesman said the recovered bodies — 33 at one Loveland mortuary, but 40 in all so far, according to authorities — included children as young as 7 and many old persons. Some were stripped naked by the water. Many, it was thought, were swept from their cars as the road washed out from beneath them.

Paul Finnman, administrator at Loveland's McKee Medical Center, said that by late Sunday, about 90 persons had been treated in the

emergency rooms, and the influx remained steady. Five of them were admitted to the hospital, one of whom was in critical condition with heart trouble.

**MOST OF THE INJURED** suffered cuts and scrapes climbing up the canyon sides, where many remained by the end of the day, waving at helicopters flying overhead in search of clear areas to touch down.

Larimer County sheriff's deputies had driven up the canyon about 8 p.m. Saturday, warning everyone of a flash flood. One of the deputies, Capt. Terry Uriata, who lives in the canyon, said, "The people could not comprehend — the water was low, and it wasn't raining right there in certain areas."

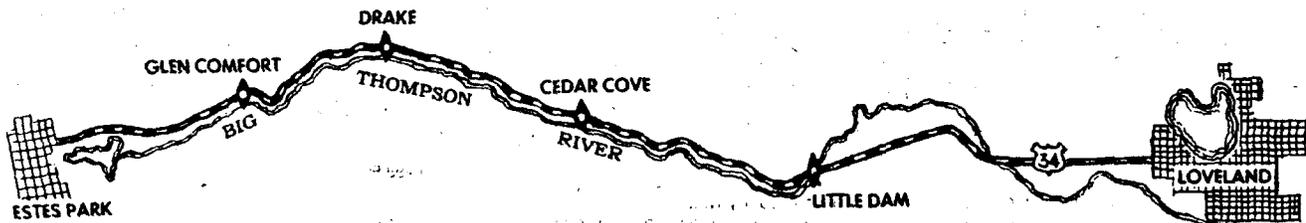
One camper park of about 50 vehicles, Watson noted, required three warnings from deputies before most of the occupants moved to the high ground.

"We still don't know how many got out of there," the sheriff said. The park was near an area of the canyon known as The Narrows, about six miles west of Loveland. One deputy said the park was devastated.

Newsmen saw camper shells and trailers flattened and jammed under rocks. Cars were crushed on their sides and tops and bunched up against tree clumps lining the river.

John McMaster, 29, owner of Loveland Ambulance Service, and an attendant, George Woodson, were driving an ambulance up the

(Continued on page 15)



Map shows route of the flash flood in Big Thompson Canyon.

NEWS SKETCH BY JACK SHANNON

# 56 known dead in flood; many missing

(Continued from page 5)  
 canyon about 10:20 p.m. Saturday on an emergency call when they saw a "wall of water" closing their way.

THEY TRIED TO MAKE a U-turn but were hit broadside and lifted eight or 10 feet above the roadbed, they said. They escaped through a window seconds before the ambulance was swept away and spent a harrowing night standing in swirling water. (See separate story on page 6.)

Mrs. Louise Dikeman, 22, of Pueblo was driving down the canyon in a pick-up truck with her three young children, aged 8, 3 and 2 months,

and her sister-in-law, Mrs. Sandra Darras, 22, of Canon, and Mrs. Darras's 12-year-old daughter.

"The water started to rise ahead, and we couldn't go any farther," Mrs. Dikeman said. "We couldn't back up. There were others. The mud just came across, then the asphalt started washing away."

"We stayed in the truck all night, too scared to be cold. It was pitch black. The river was up to our (truck's) door step."

As dawn, they could see how close harm had come: The road ahead and the road behind were washed away.

"The people in the van ahead of us said they

heard people screaming, going by in the river," Mrs. Dikeman said, "but we couldn't see them. . . . Two (empty) campers, a car and a cabin were there by the river but, when it happened, they were gone in nothing flat."

HENRY SAXTORPH, 86, and his wife, Trudy, 73, of Fort Collins, were at their summer home near Glen Haven, in a steep part of the canyon, when the water started to rise. As it threatened their house, they moved to a neighbor's house on higher ground.

About 1 a.m., Mrs. Saxtorph said, she went out into the darkness to call for her missing cat, Smokey. The roar of the river ruled out hearing

a return meow. Then, across a swirling stream, she said, Smokey came swimming — and made it.

"This cat lived!" she said, hugging the animal soon after all three stepped out a rescue helicopter.

Mrs. Yvonne Langren of 816 Cook St., Denver, did what hundreds apparently did to survive. About 8:30 p.m., she said, mud washed across the road, making further driving down the canyon impossible.

"About 12 of us from four cars got out and climbed up the mountain about 100 feet," she said. Their Honda automobile wasn't in sight at dawn. A helicopter, chartered by the U.S. Forest Service, then lifted them out three at a time.

"Propane tanks were bobbing by on the river," Mrs. Langren said.

Kathy Piatone, 18, of Palestine, Ill., was forced from her car by a rockslide.

THE REFLECTORS ON the side of the road just started falling down," she said. Kathy and her father climbed the banks, carrying her sister, 8-year-old Glen. Kathy lost both her shoes.

Mrs. Ernestine Mason, 43, of Greeley, her son and his three daughters, ages 4, 5 and 8, were driving down the canyon when a bridge washed out before them.

They, too, climbed the hillside for the night. "Everybody cried," Mrs. Mason said.

There are about a dozen places where U.S. 36 crosses the Big Thompson River and about 13 where Devil's Gulch Road crosses the north fork of the Thompson. Most of those crossings were washed out, Watson said.

The evacuations shuttle included at least seven helicopters that brought the victims down to a pair of fields just west of Loveland, where ambulances stood by and took the injured to the hospital and the uninjured to Loveland High School. There, the process of reuniting the injured — who were often separated from their friends and relatives — was under way at dusk Sunday.

WATSON SAID THAT Loveland's water supply wouldn't be affected by the flooding, but an electric generating plant in the canyon, about the size of a large house, was destroyed. "All you can see now is a generator sitting there," one official said.

Most of the river drainage lies in the Northern Colorado Water Conservancy District, a quasi-municipal district. Its manager, Earl F. Phipps, said that from six to 10 inches of rain fell in various parts of the canyon in a period of from two to five hours Saturday. He said the canyon rises from about 5,500 feet elevation to 7,500 feet.

Phipps said that a critical factor was that the rain fell over the high mountains and not over the foothills, where it would have dissipated with less damage. He said the river, normally four or five feet deep, rose to 20 feet in places. It would have been worse, Phipps said, had officials not closed the Olympus Dam near Estes Park to retain the runoff.

Phipps said a severe thunderstorm in 1965, which preceded that year's major flood in Denver, fell only in the foothills. There were no deaths in the Big Thompson River area then, although there was some property damage.

Grampa's Retreat, a secluded trailer camp near the river that normally contains between 30 and 40 trailers, is "just as clean as if somebody swept it with a broom," Watson said. A St. Anthony nurse, Miss Kathie Wallace, 23, was dispatched in a helicopter to treat an 80-year-old man at the camp.

WHEN SHE GOT THERE, the front door of the man's home was jammed shut with mud and debris, she reported, and a Colorado State Patrolman climbed in through a window.

Inside, the man lay unconscious in the mud and pinned beneath furniture, Miss Wallace said. He was evacuated by helicopter and was hospitalized.

The mass evacuation was coordinated by Watson, as well as Sonny Stiger, a U.S. Forest Service official from Fort Collins. Stiger was occasionally informed that "another body" had been found, but he repeated several times that the living had first priority.

"Just remember where it's at," Stiger said to one searcher who had made such a report.

Minutes later, Stiger was using a radio to direct a helicopter manager to a clearing in the canyon where the stranded were to be moved for the overnight stay.

Like they'd been doing it for years

## Copter evacuation done with finesse

By JACK OLSEN JR.

LOVELAND — The helicopter evacuation of Big Thompson Canyon was conducted Sunday by more than 100 medical, law enforcement and U.S. Forest Service officials, aided by assorted volunteers, all working together in a small field west of here.

It looked as if they had been rescuing flood victims for years.

As helicopters cracked in for landings and lifted out clouds of dust, LZ (landing zone) teams scampered out and back through ankle-deep grass.

Vern Schuster, 34, a professional Poudre Valley fireman, lifted a woman from an Army Huey helicopter. She clutched his arm and they ducked from the overhead blades as they ran to the edge of the field.

"MY SON FLEW ONE of those in Vietnam," the woman said, nodding to the helicopter. "He died in it. That hurt worse than losing my mine."

"Her house was destroyed up in the canyon," Schuster explained.

Four or five doctors and twice that many nurses stood by near three squares of ground, delineated by red, yellow and green ribbons. The red area, empty almost all day, was for the critically injured; the yellow for those with broken bones; and the green for those who were uninjured.

Loveland nurse Janette Barnes, 21, said one man came through in "cardiovascular shock — his heart wasn't putting out enough."

"Most of the babies were in good shape," Miss Barnes said. Other volunteers noted that the helicopter noise had burst one child's eardrum. Thereafter, field escorts were told to cup their hands over children's ears.

AT THE EDGE of the makeshift helipad, Mrs. Beverly Stiger, 35, of Fort Collins, stood by a chalk board tied to the ground with wire to keep the chopper wash from upending it. She kept track of the names, destinations and arrival and departure times for seven helicopters, each of which remained on the ground for less than 10 minutes at a time.

Their destinations were clearings or intact stretches of roadbed along the Big Thompson — at Cedar Grove, Drake, Grandpa's Retreat and anywhere on the lower river.

One of the notations was "Drake — bodies." This cluster of houses and cabins was to be a temporary morgue.



Mrs. Frank Hollar, who lives in Big Thompson Canyon, sits under her possessions.

During hills in helicopter traffic, Mrs. Stiger went to wipe her husband's brow with a wet cloth. Sonny Stiger of the U.S. Forest Service had been designated the airlift coordinator because of his aerial fire fighting experience.

He and Dave Roegen, 23, also of the U.S. Forest Service from Fort Collins, spent much of their time formulating a plan to move groups of people into clearings of the canyon where supplies could be dropped to help survivors last another night in the elements.

Behind the medical area, ambulances from as far away as Longmont lined up to take the rescued persons for treatment or admission to McKee Medical Center — or to Loveland High School for food and accommodations.

BEHIND THE HELIPAD in a field strewn with mud and debris, Dennis Hoefler, 37, of Loveland, searched for bodies.

"One was back over there," he said, pointing

toward the canyon mouth. "I saw 25 or 30 propane gas tanks from campers float by."

Helping guide the survivors to the edge of the field — to be tagged with name tapes and reunited with relatives — were Arthur McCloskey, 46, of Loveland, and his three sons: Paul, 12; Robert, 18, and Tom, 19 — all volunteers.

At the edge of the field, nearby residents, including Mrs. Janet F. Label, 28, and Mrs. Margie Hutchinson, 47, had assembled an outdoor restaurant consisting of about 15 card tables.

Atop them was more food than the rescuers and survivors could ever hope to eat, all donated by area people.

Out at the helicopter pad, a woman motioned to a volunteer that she could step down from the aircraft on her own. When the pair got to the edge of the field, the chopper lifted off and there was a hull in the racket.

The woman motioned her escort down to her level and then kissed him on the cheek.

## Thompson flood toll higher than Platte in '65

The death toll from Saturday night's flash flood in Big Thompson Canyon was at least twice as high as the 1965 South Platte River flooding, which killed 26 persons.

But the 1965 flooding, which extended from the South Platte headwaters all the way to the Nebraska border, caused considerably more property damage. It destroyed more than 1,270 buildings, crushed 45 bridges and snuffed out electrical power in many parts of Denver. The damage estimate was \$540 million.

Advance warning of the 1965 flooding held down loss of life. Flash flooding in the mountains preceded flooding on the South Platte, which continued from June 13 to June 16.

In addition to the 26 dead, 600 persons were injured in 1965.

At one time during the flooding a wave of water 25 feet high rushed down the South Platte, homes and office buildings along its banks.

The flooding hastened construction of the \$60 million Chatfield Dam south of Littleton to serve as a holding tank for future flood waters.

In May 1973, flood waters again rampaged down the South Platte, causing \$50 million in damage. No flood-related deaths were reported.

In Colorado, a flood which probably caused more deaths than the Big Thompson Canyon

disaster was the 1927 Pueblo flood. Records show that 78 bodies were recovered, but many more bodies carried down the Arkansas River never were found.

The Pueblo flood, touched off by heavy June rains, also washed away 510 dwellings.

The 1972 Rapid City, S.D., flood took 238 lives and caused \$160 million in property damage. Like the Big Thompson Canyon flood, loss of life was high in Rapid City because residents were caught by surprise when an earthen dam burst just before midnight on June 9, 1972.

Eleven persons were killed when the Taylor Dam in southeastern Idaho collapsed on June 5 of this year. Property damage has been estimated at more than \$1 billion.

# 'I never expected to see the river do that'

By MIKE CHAPMAN  
Of the Coloradoan

"I never expected to see the Poudre River do anything like that, not in a million years," said Mike Oase this morning.

Oase, of 317½ Walnut Street, had started out Saturday evening for a small party at the Robert Hufziger residence next to the Columbine Lodge in Poudre Park. His group of eight arrived about 8 p.m., bringing the number of persons to around 20.

"It was really raining hard on the drive up but we figured we wouldn't let a little rain stop us," said Oase. "We didn't pay any attention to the river then."

Two hours later, a friend of one of the persons at the party called to warn them of the rising river, suggesting that everyone leave as quickly as possible.

"We took a look at the river then and it was bad, really precarious," said Oase, who works at a local lumberyard. "We figured it was a pretty good time to be leaving."

The rain made it almost impossible to see for more than a few yards and the car that Oase was in had to creep along at about 10 miles an hour. There were rocks lying in the road and the riders feared a landslide at any moment.

"Once, a bunch of little rocks went running along the road in front of us, just like they had legs," he said. "Then, a huge boulder, about the size of an office desk and certainly big enough to have disabled the car, hit right in front of us and bounced about three feet into the air before going off the road."

"We stopped the car for a moment then; we were pretty scared at that point, but we started going again right away."

Moments later the car was stopped by a landslide and had to turn around. They tried to get through again about 12:30 a.m., but they were rebuffed in their attempts.

"We got stopped at the landslide again and a sheriff or deputy was going around telling everyone on a loud-

speaker that we couldn't get through, that we'd have to stay overnight," said Oase.

On the way back to the house the second time, the party found a deserted car they recognized as belonging to another member of the group that had been at the house.

"We were worried about them, but they had just gotten their way blocked, too, and had stayed with some other friends. They got their car the next morning."

BACK AT THE house where they had begun the party about three hours earlier, water was everywhere.

"There is an underground stream that they (the Hufzigers) take their water from, and it had surfaced and was flooding the yard next door and was moving toward ours," said Oase. There was also a dramatic rescue of two adults and a youngster in a house nearby.

"This stream had split and was running all around the house," relates Oase. "The people inside were trapped and really shook up. One of the fellows in our group — I don't know his name, but I wish I did because I think he really did a brave thing — got over to them somehow and then a sheriff's rescue team came and got them out."

Oase and his group finally left about 8 a.m. Sunday. The slide had been cleaned away and they were able to get past the point that had stopped them twice the night before.

"There were new streams everywhere, about 10 to 20 of them where normally there weren't any," said Oase, "and there were rocks all over the road."

BUT THEY weren't the strangest things that caught his eye.

"As we were going down the road, we saw this guy out by the river . . . and he was fishing. Can you imagine that? I mean, the river was full of mud and debris. Certainly the fish weren't going to be biting on a day like that."



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## Evacuation complete

# Death toll reaches 80

By JACK OLSEN JR.

News Staff

**LOVELAND** — The death toll from the Big Thompson Canyon flash flood climbed to 80 Monday night as helicopters evacuated the last of the survivors from the devastated 25-mile canyon west of here.

As darkness approached Monday, fog which had blanketed the area all day lifted briefly, allowing pairs of U.S. Army helicopters to fly along the canyon floor. Within an hour, about 75 persons who had been stranded since the Saturday night flood were plucked from the canyon and returned to Loveland.

Larimer County Sheriff Bob Watson said the 80 dead had been confirmed by 9 p.m., and "more reports are coming in all the time."

**PRESIDENT FORD** declared Larimer County a major disaster area Monday. Gov. Dick Lamm, who had requested federal aid, said the amount of money available from the federal government would be virtually unlimited.

Earlier in the day, crews working out of Estes Park told a deputy coroner they had

**Additional flood stories  
on pages 5, 6, 22,  
23 and 26.**

counted 18 bodies that hadn't yet been picked up.

Reports of additional body sightings came periodically throughout the day. Only five names of dead persons had been released as of Monday evening, although it was known that at least four more victims had been identified.

The five were State Patrol Sgt. W. Hugh Purdy, 53, of Loveland; Rae Ann Johnston, 28, of Crystal, S.D.; Cathie Melissa Loomis, 29, of Seattle; Carol Louise Rhoad, 23, of Grantville, Pa.; and Jessy Manongdo, about 25, of the Philippines.

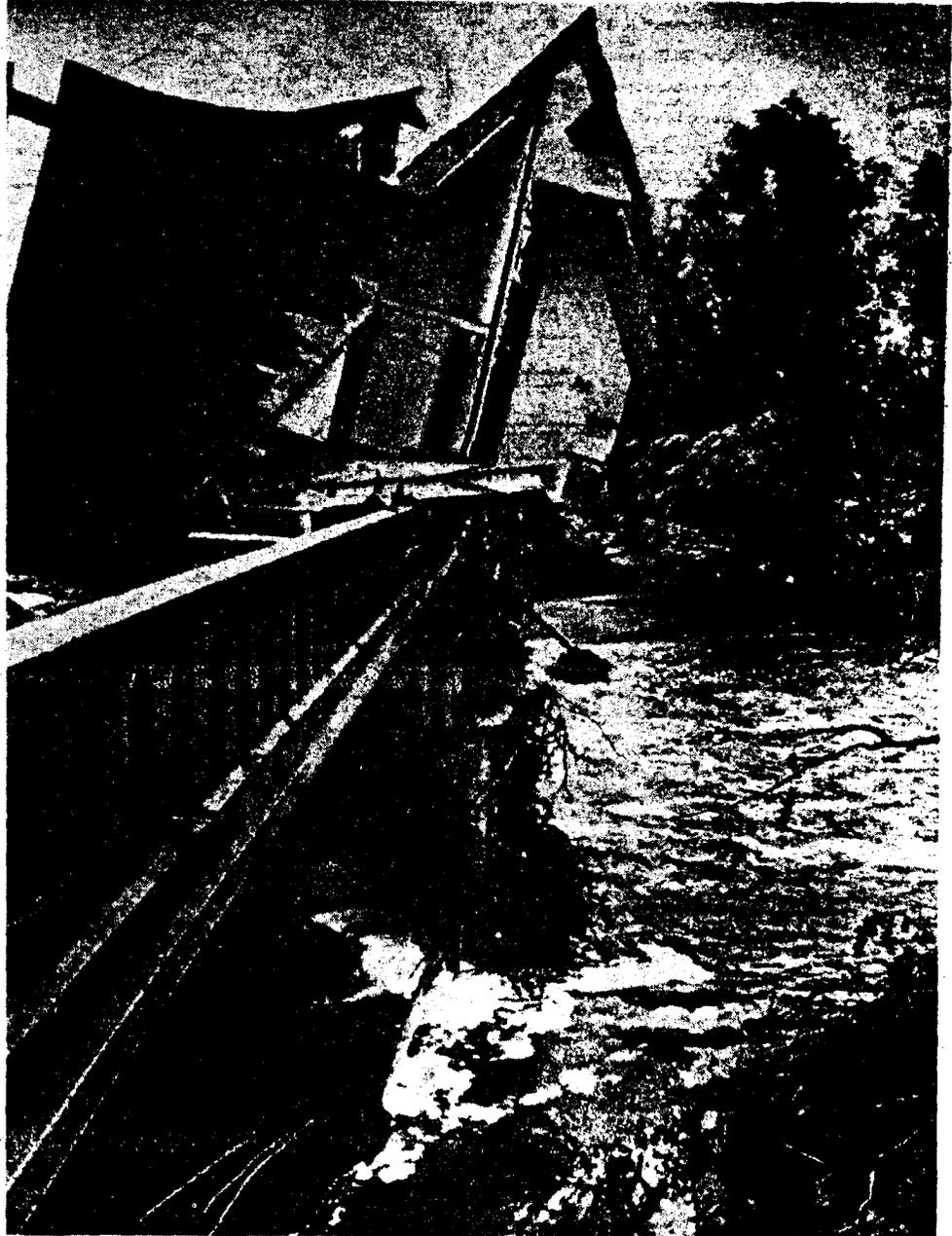
**THE FOUR WOMEN** were members of a church group which had been holding a retreat at Estes Park. Purdy was killed as he tried to warn people of the approaching floodwaters Saturday night.

Earth-moving equipment worked throughout the day Monday to clear a path for four-wheel drive vehicles to travel along two canyon roads from Estes Park — U.S. 34 and Devil's Gulch Road along the north fork of the Big Thompson River.

The ground crews rescued many of the stranded before helicopters completed the evacuation. The earth-moving job was set to continue Tuesday, but with less urgency because it was believed "everyone who wanted to come out is now out," Watson said.

He originally had estimated several hundred persons were still stranded, precipitating the road crews' efforts to break through when weather officials suggested the helicopters might be grounded for another 24 hours because of fog and drizzle.

(Continued on page 23)



An A-frame house, swept off its foundation by a flash flood in Big Thompson

Canyon Saturday, ends up on a bridge east of the Cedar Cove area.

Seventeen persons remained in the isolated area Monday.

NEWS PHOTO BY DAVID L. CORNWELL



Charles Chappell inspects damage to his motel which was ravaged by flash flood waters in the Big Thompson Canyon.

NEWS PHOTO BY DAVID L. CORNWELL

# Death toll mounts in Big Thompson flood

(Continued from page 1)

But dozens of persons decided to stay in the canyon at still-standing houses and cabins, the sheriff explained.

Watson said about 240 persons were evacuated by helicopter Sunday.

More than 250 of them were injured, about 80 of whom were treated at Loveland's McKee Medical Center. Eight were admitted but only six remained in the hospital Monday.

THE DEAD were being identified in a temporary morgue at the old Loveland Memorial Hospital. The McKee hospital administrator, Paul Finnman, said those with missing relatives were asked to go to the old hospital and take evidence that might help identification.

Many of the bodies — dragged miles down the canyon and onto the plains — were mangled. Watson said the FBI had been asked to help with the identification process.

The sheriff and several other deputies admitted privately that the death count could climb by the dozens when more manpower could be found to search for bodies. A plan to bring in refrigeration units to supplement the temporary morgue was discussed, as teams of firemen from nearby towns combed the river's edge near Loveland.

Finnman said only two persons were treated in the hospital emergency room Monday, because the evacuation choppers were grounded most of the day. One was 62-year-old Louis Thomson, treated for exposure.

Also brought out on a helicopter with Thomson was 70-year-old Helen Avery of Little Rock, Ark., a diabetic.

IN LATE AFTERNOON a twin rotor Chinook helicopter managed to penetrate the fog and pick up about 50 persons on high ground near an area called Glen Haven. At least one other helicopter was dispatched through the treacherous fog to let experts view several dams up-river. They were all pronounced sound and capable of holding or controlling much more water.

Mervin S. Peterson, a hydrologist for the U.S. Geological Survey, said the Big Thompson was estimated to have reached a peak flow of 25.8 billion gallons a day since Saturday. He said this was a record for the site.

Roy Romer, the governor's executive assistant, said a command post at Estes Park had been beefed up "because of the emphasis on getting in from Estes on the ground." He said that by Monday afternoon a temporary trail had been extended to Glen Haven, about seven miles down the Big Thompson's north fork.

Also, a path had been established to within a

few miles of the group of cabins and houses in the village of Drake. Drake is roughly midway in the steepest part of the canyon between Estes Park and Loveland.

THE CATASTROPHE had so shocked many residents that Sheriff Watson, at a press conference, predicted U.S. 24 would never again go through the Big Thompson Canyon.

A feasibility study had previously been completed for the possible construction of Pole Hill Road, on higher ground a few miles south of the canyon, Watson said. He suggested morosely that the devastated canyon road should be turned into "an isolated retreat for those who care to live there."

Authorities said Loveland's water supply was safe, despite flooded sewage systems in some areas. Water was being pumped in from two pipes as crews worked to repair a third, broken by the flood.

Two questions were heard repeatedly Monday as officials paused in the drizzle to consider what had hit them. First, why did many tourists and permanent residents in the lower half of the canyon ignore or not respond fast enough to warnings that a flash flood was imminent? (See story on page 6.)

Second, why did the victims at the upper end of the canyon get no warning?

In some areas, it seemed, even a warning system might not have helped. At the west end of the 23-mile main canyon, a park with 40 or more campers in it, called Grampa's Retreat, was washed away.

"There is not a blade of grass left standing," Watson said, adding that he doubted the persons there knew what hit them. The camp was situated in a loop of the river with cliffs on at least one side.

LARRY SIMPSON, a local water district official, said, "It was sheer cliffs next to them. I would guess that there was no way anyone could have climbed out of there. . . . (It would be) like standing in a hallway with water coming down the hall."

A Larimer County sheriff's deputy, Capt. Terry Urista, told a story of heroism and frustration Saturday night on the canyon floor. He left his wife and two children in their canyon home after a call from the sheriff's office warning of a flash flood about 8:30 p.m. The canyon road washed out in front of him and a bridge behind was blocked by an A-frame house sitting on top.

Urista and another deputy, Jim Garcia, waded the river at points to find survivors. Garcia dragged an elderly woman to high ground and went back into the muddy water to find a boy, supposedly clinging to the inside of a partially submerged car. The boy was gone.

There were several people stranded on a high spot in the river, Urista said, and the two deputies divided their time between locating other victims and keeping track of people in the river.

"But in the morning they were gone," Urista said.

His own family was rescued by someone else, he learned later. The sheriff's captain may have revealed the attitude of many who were lost in the flood.

"It wasn't raining at that point. The river wasn't up at first. I said 'Somebody's got to be kidding,'" Urista said.

"Then it rose six feet in five or 10 minutes."

Volunteers Monday continued to care for scores of homeless at Loveland High School and at private homes in the town. Contributors

had given more clothes and food than the victims could use.

Over a loudspeaker system came this announcement at one point: "We have a Loveland resident with a station wagon willing to drive anybody anywhere in Colorado." Similar state- and region-wide temporary taxis were announced throughout the day.

IN THE AUDITORIUM, an elderly woman sitting by herself began to sob uncontrollably. Two toddlers, whose parents had lost only their cars, played together as if nothing were unusual.

Others exchanged stories of their escapes and there was considerable bad news being passed around among some of the canyon residents. "Vern was last seen floating down on a roof," one man said. The listener, a middle-aged woman — "just a friend," she said — walked away with her head down.

Watson said the dead were twice as many women as men, mostly other persons and "a few" children. The searchers and rescuers included "professional help of about 500 people," the sheriff said, and so many would-be volunteers arrived from the region that they had become a nuisance at times.

## Insurance news is all bad

"You probably have no insurance coverage. I'm sorry."

That's the news that Lane Olson of Loveland, a 35-year-old insurance agent, flew in from South Dakota to deliver to flood victims in Loveland.

"Rather than say, 'I'll have to check your policy,' I decided to get the anxiety out of it," the local agent explained.

He terminated his vacation, returned to Loveland and volunteered to single-handedly man an insurance advice table because, he said, the survivors "deserved" some information.

He flew back to Colorado from a vacation

to face the somber and stunned faces at Loveland High School, an evacuation center.

High cost, except in the case of federally subsidized policies, keeps most people from buying flood insurance.

A typical policy, if you could get an agent to write one, might cost more than \$800 a year, according to insurance industry spokesmen.

Many of the victims of the raging waters were angered by the absence of coverage they didn't know they lacked.

But none of them expressed anger toward Olson.

"They were happy to be alive," he said.

# Relatives, friends go to morgue to find victims



Dr. Patrick Allen, left, and two assistants examine photographs of missing persons in one effort to identify the scores of bodies in makeshift morgue.

By PAMELA MAYHEW

A stunned procession of relatives and friends trudged through a steady rain in Loveland Monday to identify flood victims.

They went to Loveland Memorial Hospital, part of which was converted into a morgue following Sunday's disaster in Big Thompson Canyon.

Many carried photographs which, with descriptions of missing persons, were taken by volunteers at the hospital.

Then they sat in the lobby, waiting anxiously to see if their pictures and descriptions would be matched with photographs taken of the 58 bodies lying in rooms on the hospital's first floor.

Occasionally a relative would be summoned to one of the refrigerated rooms to identify a body.

"But we don't like to do this unless we absolutely have to," said Dr. Michael Channing, a pathologist assisting with the operation.

A number of staff members showed signs of weariness as they carried description cards

and pictures to a file room where the McCabe matching process had been going on since 11 a.m. Sunday.

As of Monday afternoon nine victims were positively identified.

Dr. Patrick Allen, a pathologist in charge of the operation, said that more than two-thirds of the bodies brought to the morgue Sunday and Monday were those of women.

He and other staff members expected an onslaught of bodies to be delivered to the hospital Tuesday, when helicopters once again would be able to lift out of the disaster area.

As Allen talked, more bodies were being delivered to the back door. Both he and Dr. Channing said that they expect the morgue to be open for months.

"We will be in contact with dentists' offices for dental records and with police agencies for fingerprints. We want to identify as many people as possible," said Allen.

Occasionally the gloom at Memorial Hospital was eased as an apprehensive parent found out that a relative's name was on the survivor's list.

## 'We had trouble convincing them'

# Many ignored warnings, sheriff says

By JACK OLSEN JR.

LOVELAND — Many of the victims who died in the Big Thompson Canyon flash flood could have moved to safety in time, but they didn't believe warnings that the flood's threat was serious.

At the time, between 8 and 10 p.m. Saturday, the canyon was crowded with "flatland tourists" who had no idea what a flash flood can do, authorities said. And permanent residents had heeded false alarms too many times in the past to move out as fast as they needed to.

LARIMER COUNTY commissioners had fought development along the river, but new houses, cabins and trailer parks had been built by individuals and entrepreneurs who downplayed or never fully understood the flash-flood threat.

Larimer County Sheriff Bob Watson said Monday — the second evacuation day — that his deputies tried to drive up the canyon from Loveland Saturday night to warn as many people as they could. But in many cases, "We had trouble convincing them that the river was even coming up."

"They'd want to know if it was going to be up to here or here," the sheriff said, placing his hand at his leg and hip to indicate water depth.

The river in places rose 15 feet or more from its usual depth of six feet or less, and some persons who didn't heed the first warning were hit minutes later by moving walls of water. The scenic canyon was gutted.

Watson said Sgt. W. Hugh Purdy, 53, of the Colorado State Patrol was racing in his patrol car up the canyon, "giving everything he had to warn people."

"THE PROBLEM IS that there wasn't time to convince the people, to get the urgency across to them," the sheriff said.

According to State Patrol Lt. Marvin Schlager, it is believed that Purdy's car "was hit by a wall of water." His body was found miles downstream. Two other state patrolmen — Bill Miller and Tim Littlejohn — were "working the canyon" also but they avoided the fate of their partner.

Watson noted: "Sgt. Purdy gave everything he had. But he finally ran out of time."

County Commissioner Bill Lopes said many of the victims "have never seen a mountain flash flood" and therefore doubted its potential impact.

Said Larry Simpson, assistant manager of the Northern Colorado Water Conservancy District: "People don't understand that in the West, a flash flood can be a 'wall of water' type of thing. The oldtimers in the canyon have heard warnings — people have cried 'wolf' before. In 1968, I'm sure there were warnings." But during heavy rains then most of the canyon was spared from damage.

On July 16, Simpson was an informal tour

guide for six area city councils traveling up the canyon to examine a water project.

"At the area around Drake, I commented about the heavy developments," Simpson said, "how if we had a flood in this area, it was really going to be a hazard."

Many others also knew that a rare rainstorm would cause millions of dollars in damage.

THE CHAIRMAN of the commissioners, John Michie, said he recalled that an extreme possible storm predicted by the U.S. Corps of Engineers might deposit some 20 inches in a brief period, perhaps less than two days. Rainfall Saturday night amounted from five to 10 inches, although Michie suggested the estimation might be low.

The commissioner has lived in Larimer County all his life — 54 years — and "I've never seen this amount of water," falling or coursing down the canyon, he said.

Development has been a hotly debated issue along the Big Thompson River and its northern

fork, which also was hit hard. The north fork enters the Big Thompson River at Drake, 17 miles west of Loveland.

According to Simpson, who is a geological engineer, "The county commissioners have honestly been fighting to stop development in the flood plain."

"Right up there (three miles up the canyon a year or so ago)," he said, "there was a request for a large recreational vehicle park right next to the river."

"The developer complained bitterly about the commissioners' reluctance to approve the park site. The commissioners got all kinds of criticism, but they stood their guns."

The flat area, where the park was to be and the developer's trailer at the proposed site are probably "no longer in existence," Simpson said.

Said commissioner Lopes: "If people want to build on their own property, and they have the money to do it themselves without borrowing, and they can put in the sewage, then we have

no choice but to allow their own recklessness take its course."

"We are going to get — with the support of the people — firmer, harsher (sounding) laws to protect people against themselves."

SAID MICHE: Preventing people from building in the flood plain "has been a struggle. We have had battles denying permits."

"It's going to be easier now."

Simpson said "oldtimers" had warned some persons they were building their homes and cabins "right in the middle" of the flood plain, but they'd say, "It can't happen to us."

About six years ago, Simpson bought a home in Larimer County and he noted that "some developers and realtors showed me homes and would say, 'this (potential flooding) isn't really a problem.'"

Simpson said, "what people don't understand is that these canyons were created by water, and at various times this is going to happen."



A battered automobile gives an indication of how high water levels were near Glen Comfort, east of Estes Park. Propane tanks like the one pictured were dislodged from cabins to present a continuous threat of explosion.

# Larimer County declared disaster area by President

By GEORGE GUDAUSKAS News Staff

President Ford declared flood-devastated Larimer County a major disaster area Monday, setting in motion a host of federal relief programs.

"There is really no limit to the amount of money that is available from the federal government for the public reconstruction," said Gov. Dick Lamm, who sought the aid. Millions of dollars will be available to rebuild roads and other public facilities. Assistance will be offered to those left homeless and jobless by the flood.

Few in the path of the raging waters had flood insurance, which is offered by few commercial firms because of its high cost.

Only 84 policies for government-subsidized flood insurance existed at the time of the flood, according to federal officials.

The policies, costing less than \$50 a year, were valued at \$2.5 million.

Federal and state officials are planning to set up disaster assistance centers, possibly in Loveland, Estes Park and Fort Collins.

tration's regional office in Denver, said the big problem at present is establishing the disaster centers.

Once the centers are established, he said anyone even remotely affected by the flood should stop in to see if they qualify for assistance.

"It's one-stop disaster assistance. That's what we call it," said Kalczewski, noting the exact locations will be announced as soon as centers are set up.

AMONG OTHER THINGS, the centers will provide information and support for the jobless.

Burton L. Carlson, director of the Colorado Division of Employment and Training, said persons left without work as a result of the flood can apply for weekly compensation under the disaster unemployment program.

Anyone who is eligible for benefits, including farm and nonfarm workers and the self-employed, has 60 days from Aug. 20 to which to file a claim.

**AID WILL BE** offered to persons needing temporary housing, including those who are men who suffered property losses because they were jobless because of the disaster. Assistance will be offered to those who sustained losses.

Individuals and firms who are eligible for disaster relief under the federal disaster aid act of 1960 can receive up to \$5,000 of such aid.

Lamm said that the state will be providing financial assistance to help pay the cost of other public facilities.

The state will provide U.S. dollars for the purchase of temporary housing.

He said that the state will be providing funds to help the needy, and that \$250,000 will be used to help the needy.

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**FORD'S DESIGNATION** of Larimer County as a major disaster area will help provide additional disaster relief to the people of Colorado in the form of federal aid.

During that 20-year period, more than \$4.5 million has been spent by federal authorities in Colorado to aid flood victims.

The largest amount spent—\$14.2 million—came after the severe flooding following the storms and tornadoes that hit here in June 1965.

Rich Kalczewski, public information officer for the Federal Disaster Assistance Administration's regional office in Denver, said the big problem at present is establishing the disaster centers.

There's a dreadful lack of public information, he said, noting that several private insurance companies Monday being hit out of business.

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## About 7 miles wrecked \$10 million, year needed to rebuild road

It will take \$10 million and from nine months to a year to rebuild the portion of U.S. 34 destroyed in the Saturday night flood which swept down the Big Thompson Canyon from Estes Park, a state highway official said Monday.

Wayne Capron, assistant chief engineer, said the Colorado Division of Highways has estimated that six to seven miles of the highway was destroyed or badly damaged by the flash flood. The roadbed of three miles of highway at the mouth of the canyon in a section called The Narrows is "completely gone," he said. Sections of the next three or four miles of road between The Narrows and the community of Drake were washed away.

Capron said the estimate of damage was made by Dwight Bower, district engineer, who surveyed the area by plane.

**"WE WILL BE REQUESTING** federal money for the entire cost," Capron said.

He said there was no question the road would be replaced, although questions have been raised by some about the wisdom of that plan.

"There will be tremendous pressure to rebuild (U.S. 34)," said Larry Simpson, assistant manager of the Northern Colorado Water Conservancy District.

"I really question whether they need a road up that canyon," Simpson said. "If it's built back up we are faced with the knowledge that eventually it's going to happen again."

He and Larimer County Commissioner Bill Lopez noted that the state had once considered building a second, higher road through the canyon.

The road which Lopez, Simpson and highway officer Capron all agree "never got out of the talking stages" was to relieve the heavy traffic

Until the highway is replaced, westbound traffic into Estes Park will be routed through Lyons via U.S. 36. The U.S. 36 route is the one most often used by Denver area residents traveling to the mountain town and Rocky Mountain National Park, Capron said. The U.S. 34 route was heavily used by tourists from states east of Colorado.

Emergency repair work on U.S. 34 began Sunday.

"We're trying to pioneer a road down from Estes Park to Drake for emergency use only, for evacuation and emergency vehicles," Capron said. Rain Sunday night washed away some of the grading work done by highway crews earlier in the day.

The state highway department has a 100-man crew working on the emergency roadway and repairing other damage in the area.

"All our available people are working or have been," Capron said.

A second emergency road is being attempted from Estes Park to Glen Haven. The county road from Estes Park through Glen Haven to Drake, Devil's Gulch Road, was also destroyed. Property along the road was among the most heavily damaged by the flood.

Capron said the highway department has contracted with several paving and construction firms to do the major emergency work. He said the state department doesn't own the large graders and other heavy equipment needed for such work.

Also heavily damaged in the flood was a 200-foot section of U.S. 36 11 miles north of Lyons. It collapsed Saturday night about 10:30 p.m. as a result of a car driven by Boulder County

Sheriff's Sgt. Bruce Campbell. Sgt. Bruce Goodman said Campbell was checking the rising waters in the West Fork of the Little Thompson, which runs next to U.S. 36, when the roadway dropped about 75 feet into the creek bed.

Campbell was unharmed. He assisted Larimer County deputies in evacuation operations.

**U.S. 36 WAS CLOSED** to all traffic Monday evening. Earlier, local residents and emergency vehicles were allowed past the roadblock at Lyons. The fallen section of highway had been made passable but became soft with afternoon rains.

Small rock slides caused the closing of Colorado 7 to all but emergency vehicles Monday morning. It was reopened to all traffic at 10:45 a.m. Colorado 14 was closed west of Fort Collins because of high water in the Cache la Poudre River.

A state patrolman at the Lyons roadblock of U.S. 36 said some out-of-state tourists he stopped hadn't heard of the devastating flood a few miles to the north. When he told them of the damage, some proceeded on to Estes Park on Colorado 7 and others said they would bypass Colorado altogether and proceed to Yellowstone or their next vacation stop. Some of those who went to Estes Park were delivering children to camps in the area.

Shops and motels in Estes Park were open for business as usual but there were fewer tourists and more empty rooms than usual for this time of year, according to Dave Thomas, news director of KSIR radio in Estes Park.

He said the YMCA Camp of the Rockies had 250 empty beds and several motels had vacancies. They were offering spaces to dislocated earners, Thomas said.



**Officer is victim**

Colorado State Patrol Sgt. W. Hugh Purdy, 53, is one of the first flood victims to be positively identified. Purdy, a 25-year patrol veteran, drowned as he tried to warn endangered residents of the impending disaster. He is survived by his wife, two sons and a daughter.

# Zoning changes likely in Big Thompson Canyon

By STEPHANIE BROWN  
Of the Coloradoan

Before the Big Thompson disaster, the National Flood Insurance Administration (NFIA) was preparing to map about 40 miles of river in Larimer County in a ratemaking study for flood insurance.

The study would determine the amount people would pay for insurance in proportion to the degree of hazard they faced.

The contract for the study was let to Gingery Associates of Englewood and was to include the Poudre River, Boxelder Creek, Buckhorn Creek—and the Big Thompson.

The study will still be done, but the original plans for the Thompson area (from Interstate 25 on the east to the mouth of the canyon on the west) are going to be revised to include the whole canyon where there is potential for redevelopment.

Larimer County Planning Office staff members, the NFIA and Gingery Associates are going to inspect the canyon Friday morning.

GINGERY'S study will include land surveys, a hydrologic analysis of the basin, and hydrolic analysis of the flood flow.

A possible outcome is that on the county zoning map, there will be areas where building will be restricted in the Big Thompson Canyon and Loveland.

"If the road goes through the canyon again, many people, I expect, will want to build

houses there," said Planner Rex Burns. "Hopefully we will be able to enact more restrictive flood zoning regulations."

Asked if the flood will effect zoning policies in the canyon, Burns said, "Yes, I expect it's going to be a lot harder for people to build in the Big Thompson."

There is a good possibility that the Big Thompson, like the Cache la Poudre, will have flood zoning. The county approved flood plain zoning from the mouth of Poudre Canyon to the Weld County line last fall; the floodplain zoning maps were approved by the commissioners this June.

"We will likely use the same regulations on Big Thompson as we have on the Cache la Poudre," said Burns.

What this means is that once flood zoning is approved, building requests will be carefully scrutinized before permission is granted or denied.

The purpose of flood zoning is to preclude construction structures that would obstruct waters, and to preclude devastation of property.

INTERESTINGLY, a meeting had been scheduled with the commissioners on Tuesday afternoon to talk about flood study contracts on the Big Thompson. The meeting was canceled because of the flood.

But at 3:30 p.m. today, planners were scheduled to meet with the commissioners to discuss land use considerations in the Big Thompson.

Burns said he thought planners would recommend that a temporary emergency regulation be drawn up. That would put temporary restrictions on land use activities there pending adoption of a more permanent regulation.

Gingery Associates has assured planners their study will be done within six months, the deadline for a temporary restriction.

In December 1971 a floodplain study was done for the City of Loveland and the area around Loveland. It encompassed 6½ miles of the Big Thompson River (three miles west of Loveland and three miles east).

Burns said there were several reasons the canyon wasn't included. The studies, by the U.S. Corps of Engineers, are expensive and done on a priority basis. At the time, other areas with more development pressure were a priority.

The canyon was "more or less saturated with dwellings," said Burns, and the possibility of any large, new developments was slim. As a result, there had been no planning purpose to do a study in the canyon because there was a lesser purpose in that location than would have been elsewhere.