FlOOD CONTROL STATUS REPORT

FOR

ALAMOSA CITY AND ALAMOSA COUNTY, COLORADO

PREPARED BY THE

COLORADO WATER CONSERVATION BOARD

DEPARTMENT OF NATURAL RESOURCES

DENVER, COLORADO

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EXECUTIVE SUMMARY

The Rio Grande has a history of flooding which dates back to 1869. More recently, flood conditions occurred in 1985, 1986, and 1987 in the Alamosa area. Only a successful flood fight and flood mitigation measures prevented substantial damage within the community.

Flood damages in the vicinity of Alamosa prior to the channel clearing and levee rehabilitation projects for the city and county was estimated to be $1,047,700 per year. This vulnerability to floods not only robbed the local economy but also inhibited the chances for sound economic development. Government agencies were becoming reluctant to sponsor any more projects in the 100-year floodplain. Almost the entire developed area is subject to shallow 100-year flooding from the Rio Grande.

Hot temperatures and an unusually heavy late snowpack in the upper reaches of the Rio Grande basin combined to cause unusually rapid runoff in June 1985, 1986, and 1987. A peak discharge of 4,420 was measured at the Alamosa gage on June 9, 1985. This magnitude flood can be expected to occur about once every 8 years on the average. Although failure did not occur, the existing levee system proved to be structurally unsound in several areas. These levees were constructed in a piecemeal fashion during the 1940's and do not meet current federal levee criteria. It was estimated that floods greater than about a 25-year magnitude (7,000 cfs) would flank the levees and flood the entire city. Flood damages in 1985 amounted to approximately $601,474 to the county and $187,772 to the city.

Denial of a Community Development Block Grant application for low income housing re-habilitation in the floodplain and flood damages in 1985 caused the local elected officials to rethink their community development priorities. By pooling their resources in a coordinated effort, the City of Alamosa and Alamosa County worked together to develop a strategy to mitigate the flood hazard. Reducing vulnerability to flood losses was viewed as a fundamental step towards continued improvement in the local economy. A formal request was made to the Colorado Water Conservation Board to serve as project coordinator to formulate a flood control project for Alamosa and vicinity. A technical advisory committee was formed to assist with the technical aspects of project formulation and funding.

In September 1985, Muller Engineering Company Inc. was placed under contract to prepare a Feasibility Study for project formulation and cost.

The Study was completed on October 31, 1985 on behalf of the City of Alamosa and Alamosa County in cooperation with the Colorado Water Conservation Board. The Feasibility Study identified a conceptual plan of improvement which was divided into four project phases at an estimated cost of $6.5 million. This cost estimate includes construction, contingencies, engineering, and administration. These improvements are estimated to reduce average annual flood losses in the area to approximately $63,315/year. This is an annual benefit to the community of about $984,385 per year. The benefit/cost ratio is estimated between 2.5 and 3.0.

Emergency funds from the Division of Disaster Emergency Services following the 1985 State Emergency Declaration were used in conjunction with previously obtained block grant funds and energy impact funds from the Division of Local Affairs and local money to provide sufficient funds to initiate certain phases of the flood control project. Technical design expertise was provided by Muller Engineering, the Corps of Engineers and the Colorado Water Conservation Board. The Colorado Water Conservation Board also served as project coordinator.

The Alamosa Flood Control Project improvements are being completed in the following sequence, as recommended by the technical advisory committee.

Phase I- U.S. 160 Bridge to D&RGWRR

a. Clear vegetation and sand bars out of the river channel.

b. Rehabilitate and install riprap armor on levee near the golf course.

c. Reconstruct levees along East Alamosa between U.S. 160 and the D&RGWRR.

Phase II- State Street Bridge to U.S. 160 Bridge

a. Construct improvements adjacent to Cole Park.

b. Raise the north levee and install riprap at the bend in the river on the north levee and upstream of the bend on the south levee, between State Avenue and U.S. 160.

Phase III- Upstream Limit (Riverwood Estates) to State Street Bridge

b. Upgrade and raise levees throughout reach to provide adequate freeboard and stability control.

Phase IV

a. Construct both the north and south tieback levees.

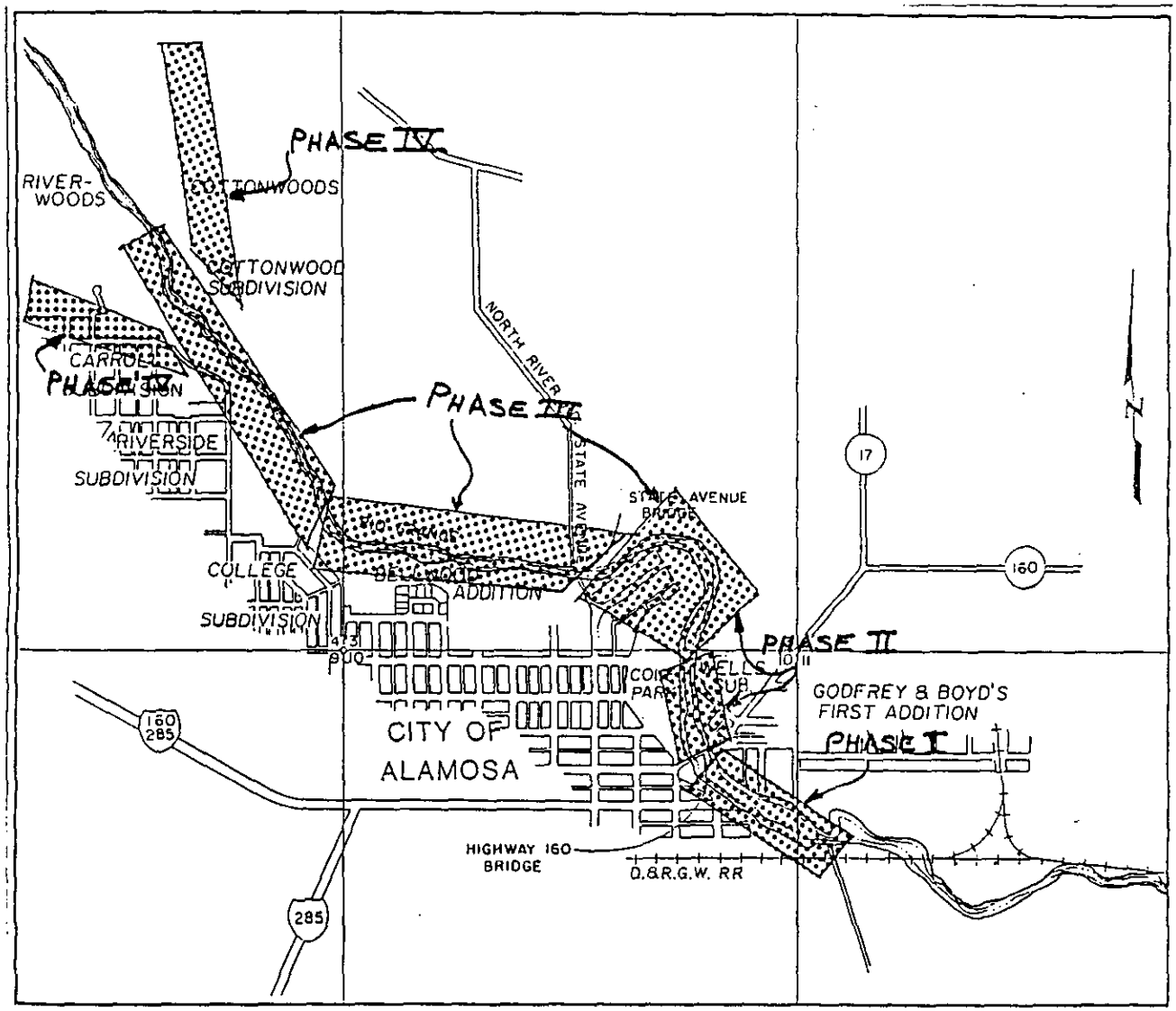
b. The Muller Engineering Study determined that the most critical areas were within Phases I and II. In order maximize State and local resources, the decision was made to commence construction of Phase I and proceed upstream to the extent of available funds.

Prior to the initiating construction of Phase I, a formal request was made to the Albuquerque District Corps of Engineers seeking project endorsement and financial assistance for completion of the project which will provide the community a 100-year flood protection.

Another heavy snowpack in the spring of 1986 caused the Rio Grande to reach a peak discharge of 4,580 cfs on June 7, 1986. However, due to the completion of recommended channel clearing by the City of Alamosa Public Works Department and emergency repairs to the golf course levee, this slightly higher flood did not result in any significant damages.

During the fall of 1986, the levees on both sides of the river between U.S. 160 and the D&RGW railroad bridge were completely rebuilt under Phase I. Without these Phase I improvements, it is almost certain that failure of the old levee would have occurred during the 1987 snowmelt flood season. On May 16, 1987, the gage at Alamosa recorded 5,200 cfs or about a 12-year flood. The river remained in flood stage through June 16, 1987 with a second flood peak of 5160 cfs on that date. The willow mowing and channel cleaning during 1985 saved an estimated $315,000 in potential flood damages during the 1986 flood peak. The levee improvements in Phase I during 1986 saved an additional $315,000 in potential flood damages during the 1987 flood peak. The total savings to Alamosa residents from flood damages is estimated to be $630,000. (based on Muller Engineering's "Summary of Flood Damage Estimates and Annual Flood Risks" figure 2).

The total cost of the project through Phase I is approximately $1.0 million. The city and the county have obtained another block grant for the completion of a portion of Phase II in late 1987. It is hoped that the state and local monies expended for Phase I and II can be used as the required matching funds under a Corps of Engineers program authorized under the Water Resources Development Act of 1986 for construction of Phases III and IV in the near future. The Corps is expected to complete their reconnaissance report by the end of October 1987.



Alamosa Flood Control Project Map

ACKNOWLEDGEMENTS

A large number of people and agencies have been directly involved in the City of Alamosa and Alamosa County flood mitigation projects. The success of the these projects can only be attributed to the many "partnerships" among Federal, State, Local, and private interests.

Special recognition and thanks is hereby given to the individuals and entities who directed flood fight activities and assisted in bringing the Alamosa Flood Control Project to the present completion stage.

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Greg Sparks . . . . . City Manager
Terry Hougan . . . . . Public Works Director
Charles Manzaneres . . . . . Director of Community Development

Alamosa County

Jorge Amaya . . . . . .Commissioner
Pat Herrera . . . . . .Commissioner
Barbara McCoy . . . . . .Commissioner
Louise Williams . . . . . .County Administrator
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AKNOWLEDGEMENTS

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1.0 PURPOSE

The purposes of this report are:

- To evaluate and present the efforts of all agencies involved in the Alamosa Flood Control Project.
- To take a chronological look at the steps taken from the initial flood impact of 1985 to the present date.
- To evaluate the emergency work completed under the Governor's Emergency Fund assistance during 1985.
- To evaluate the 1987 cleaning of irrigation channels and the effects of releasing excess flood waters into San Luis Lake.
- To prepare documentation of the State and local flood control activities for cost sharing with the U.S. Army Corps of Engineers.

2.0 PROJECT AREA

2.1 Alamosa County

Alamosa County, comprising an area of about 719 square miles, is located in south central Colorado. The County is almost level and has an elevation of approximately 7,500 feet except for the extreme eastern part. The eastern edge includes a small part of the Sangre de Cristo Mountain range and rises to an elevation of about 11,000 feet. Located in the San Luis Valley, Alamosa County is drained by the Rio Grande and its tributaries.

The sun shines at least part of each day for 360 days a year, with an average temperature of 64.6° F in July and 16.6° F in January. Annual mean temperature is 41.9° F. Average precipitation, including winter snows and summer showers, has been about 5-1/2 inches. The maximum 14-hour precipitation recorded at Alamosa is 1.78 inches. Average annual snowfall at Alamosa is 22.8 inches. During the winter months there is heavy snowfall in the upper mountainous area of the watershed.

2.2 The Rio Grande

The Rio Grande, one of the principal streams in the southwestern United States, is an interstate and international river. From its source on the eastern slopes of the Rocky Mountains in south central Colorado, the Rio Grande flows eastward for about 150 miles to Alamosa and then southward to the Colorado-New Mexico State Line, through New Mexico and El Paso, Texas, where it becomes the International Boundary between the United States and Mexico.

The river originates along the Continental Divide in the San Juan Mountain range at elevations generally above 10,000 feet. Along the Continental Divide, the river is fed by perpetual snow fields and springs. From its source until it reaches the Alamosa stream gage, the river drains approximately 1,710 square miles. The Rio Grande meanders through the San Luis Valley, a gently sloped plain surrounded by high mountain ranges. The San Luis Valley is about 100 miles long and about 60 miles wide. The valley is surrounded by the Sangre de Cristo Mountains on the east, the San Juan Mountains on the west, and the La Garita Mountains on the north. The Rio Grande is a perennial river.

3.0 FLOOD HISTORY

Flooding on the Rio Grande can result from snowmelt runoff, general rains, cloudburst storms, or a combination of those conditions. The runoff from snowmelt occurs during the period from late May to early July. This is the time of the year that the river is most susceptible to flooding, especially if there are warmer than usual temperatures and the snowmelt is characterized by moderate peak flows, long duration, and large volumes of water. Most of the annual rainfall occurs during the months of July through October. The intensity of rainfall is moderate to high, and the runoff is characterized by high peak flows of short duration with relatively small volumes of water. Following are notable floods of record at various locations (Table 1).

Table 1. Notable Floods on the Rio Grande

Date	Location	Discharge Cubic Feet/Second
1869	Alamosa	Unknown
Spring 1884	Alamosa	± 20,000
June 5, 1895	Del Norte	10,000
Oct. 5, 1911	Del Norte	18,000
June 13, 1921	Del Norte	9,630
June 29, 1927	Del Norte	15,000
May 22, 1948	Monte Vista	7,100
June 19, 1949	Monte Vista	6,650
May 30, 1979	Del Norte	8,060
June 9, 1985	Del Norte	9,040
June 7, 1986	Alamosa	4,580
May 16, 1987	Alamosa	5,200

Of the several recorded floods, all but one occurred during the months of May to July. The flood of June 1884, caused primarily by extraordinary snow cover, lasted much longer than the others. The river was at overflow stage at Del Norte from

about May 24 to June 20. The flood of 1927 was the highest since stream gage records have been kept. This flood was caused by melting snow and increased by precipitation.

Recent high flows occurred during 1979, 1985, 1986, and 1987 in the Alamosa area, only a successful flood fighting effort by local government in all four years prevented substantial damage within the Alamosa area. Also, the channel clearance and willow mowing in October of 1985 contributed significantly to the no damage effect during 1986 and 1987 peak flows. In addition, irrigation diversions and operation plan for the Rio Grande Reservoir can play an important role in determining flood stage to downstream communities. The Rio Grande Reservoir can store up to 52,500 acre feet and the irrigation canal systems can divert up to 4,000 cfs.

The Albuquerque District, Corps of Engineers developed hydrology for the Rio Grande at Alamosa using recorded stream gage data for their analysis.

The hydrologic data for the flood impacted reach of the Rio Grande is presented in Table 2.

Table 2. Rio Grande Flood Discharges

Location	Drainage Area	Flood Frequency			
		10-year	50-year	100-year	500-year
Alamosa	1710	4,600	9,000	10,900	18,000
Monte Vista	1590	9,320	11,850	12,880	15,150
Del Norte	1320	7,701	9,879	10,734	12,608
South Fork	1164	7,360	10,620	12,230	16,530

3.1 The Flood of June 1985

3.1.1 Magnitude

Hot temperatures and an unusually heavy late snowpack in the upper reaches of the Rio Grande basin combined to cause unusually rapid runoff from June 8 through June 14, 1985.

The following peak discharge was recorded on the stream gages at Alamosa (Table 3).

Table 3. Recorded Peak Discharges

Location	Date	Time	Peak Discharge
Alamosa	Wed., June 11, 1985	Midnight	4,420 cfs
Alamosa	Sat., May 16, 1987		5,160 cfs

In comparing the recorded peak discharges with the flood frequency information, it appears that the magnitude of the 1985 flood ranged from about one in a 30-year event above Del Norte to about a one in 10-year event in Alamosa.

The reduction in magnitude was due in part to diversions by irrigation ditches and natural storage in the floodplain.

3.1.2 1985 Flood Damages

The existing levee system at Alamosa was constructed by local citizens to protect the City of Alamosa in the 1940s. The levee system begins north of the City and continues to the southwest of town near the sewage lagoons.

The Alamosa flood control levees contained the floodwater; however, a number of locations were eroded and excessive leakage occurred. The leakage occurred due to dense tree population on and adjacent to the levees throughout the lower reaches of the system. Failure of the levee was prevented by constructing a back-up dike and flooding the area between the levees to back pressure the Alamosa levee system. The levee system through the City of Alamosa withstood the June flood with two to three feet of freeboard with a number of locations maintaining only a one foot freeboard. Had the levee failed, the entire business section of Alamosa would have been inundated. The Corps of Engineers and the Colorado Water Conservation Board have stated that major flood events in the future of 25-year or greater magnitude will outflank the upper end of the levees and become tributary to the areas behind the levees.

The Division of Water Resources Office in Alamosa, the Division of Disaster Emergency Services out of Golden, and the Corps of Engineers out of Pueblo provided technical assistance to Rio Grande County, Alamosa County, and the City of Alamosa, during the flood fight (Table 4).

Table 4. 1985 Flood Losses Estimated by Local Governments (Reported as of July 31, 1985)

Damage Category	Alamosa County	City of Alamosa	Total
Public Facilities	$ 92,120	$143,709	$ 235,829
Private Residential and Commercial Property	142,000	none reported	142,000
Private Agricultural Property	332,000	none reported	332,000
Flood Fight Activities	35,354	44,063	79,417
Total	$601,474	$187,772	$ 789,246

Governor Lamm declared a State of Emergency for Alamosa by Executive Order Proclamation on June 28, 1985. The "Incident Period" for this flood event was June 8, 1985 to July 1, 1985. This proclamation entitled these areas to "aid, relief and assistance, pursuant to the Colorado Disaster Emergency Act of 1973, and as may be available under provisions of federal law."

4.0 LOCAL ACTIONS TAKEN TO DATE

4.1 1985 Flood Protection Efforts

4.1.1 State Technical Assistance Provided in 1985

On July 26, 1985, John P. Byrne, Director, Division of Disaster Emergency Services (DODES) and State Coordinating Officer, in a memorandum to David Getches, Executive Director, Department of Natural Resources, in accordance with the State Natural Disaster Emergency Operations Plan mission assigned the following tasks to the Department of Natural Resources:

> "1. Provide technical engineering assistance thru provision of qualified departmental personnel to participate in a State Damage Survey Team, the purpose of which will be to determine engineering scope of work and related costs for each specific area of concern identified by the local governments in Alamosa County which they feel constitute an imminent threat as defined by the State's criteria and which deal with dikes, levees, river channel conditions, and other flood related facilities.
>
> 2. Identify those potential projects that qualify under the State's criteria for emergency work as contained in the 'Guidelines for the Administration of the State Disaster Emergency Fund', and those that might qualify for federal assistance. Make recommendation to local governments concerning application for federal assistance.
>
> 3. Provide a dollar estimate of the long term flood control costs facing each of the counties."

The following agencies participated on the Damage Survey Team and reconnaissance level investigation of the impacted areas along the Rio Grande in Alamosa County.

Colorado Water Conservation Board, Denver

Division of Disaster Emergency Services, Golden

U. S. Army Corps of Engineers, Albuquerque District, Southern Colorado Project Office, Pueblo

U. S. Soil Conservation Service, Monte Vista Office

Division of Water Resources, Division III, Alamosa

On August 8, 1985, the report on the findings of a State Damage Survey Team on the Rio Grande flood of June 8-14, 1987 was published. The team outlined 19 sites in the Implementation Summary. They divided their recommendations into four categories: private responsibility, local government responsibility, sites that would qualify for Emergency Disaster Assistance, and those sites designated for long range planning.

Following the completion of the State Survey Team's reconnaissance level investigation and implementation summary the Division of Disaster Emergency Services director requested and obtained financial assistance through the Governor's emergency authority. The amount of financial aid authorized was limited to a 50/50 cost share match. The state-local agreement provided certain specific requirements such as a Local Hazard Mitigation Report. The agreement also required operation, maintenance, inspection and reporting on the condition of the local dike and levee systems.

Part of the consideration in rendering State assistance was based on the fact that such assistance on the front end would free up local funds that otherwise would have been committed as these funds could be used to pursue a long term solution to the flood problem.

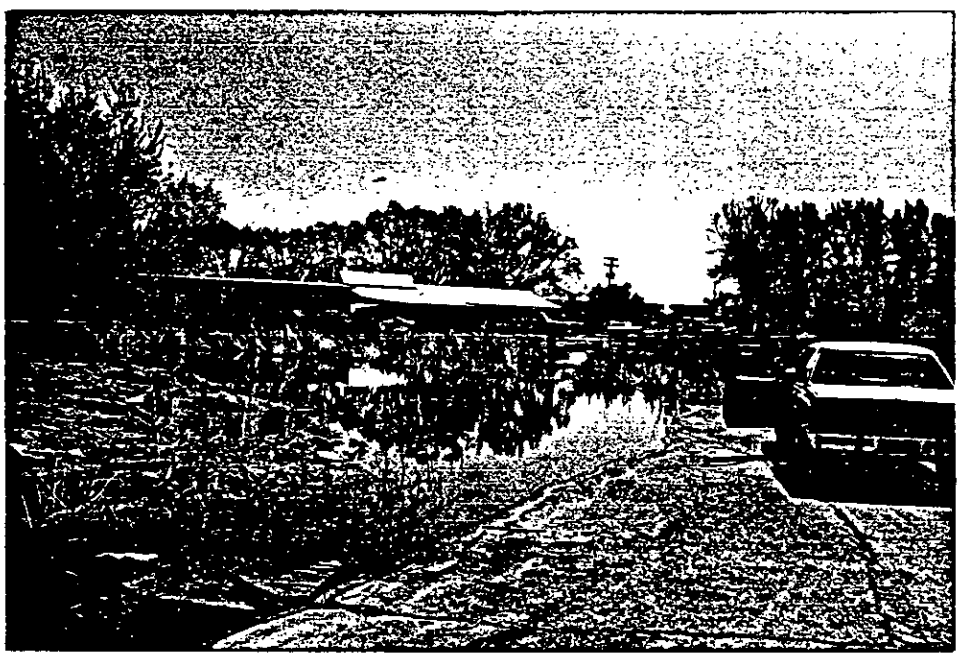
The State assistance to the local governments was further defined as seen in Table 5.

Table 5. State Assistance Governor's Emergency Authority (1985 required minimum match)

Local Government	Local Share	State Share	Total Funds
Alamosa County	$ 92,500	$ 92,500	$185,000
City of Alamosa	$ 52,500	$ 52,500	$105,000
Total	$145,000	$145,000	$290,000

4.1.2 Funding Problems (CDBG Denial)

During February 1985, Alamosa County submitted a Community Development Block Grant application for a target project in the unincorporated area of East Alamosa. The $342,000 grant application's objective was to rehabilitate all substandard housing units and relocate those individuals and families in housing units which were unsuitable for rehabilitation. During the normal review process the Colorado Water Conservation Board was asked to comment on the Alamosa application. The CWCB commented during the review process that a large portion of the project area was located in the 100 year floodplain of the Rio Grande as shown on FEMA's Flood insurance Study (CWCB Designated No. 90). CWCB also commented that the East Alamosa housing rehabilitation could be inundated by flood waters of from one to four feet in depth during the 100 year flood event.



Photograph 1. 1985 flooding and seepage in an East Alamosa Low Income Housing Area.

During August of 1985, the Division of Housing (DOH) in a letter to Alamosa County stated that CDBG funds would not be permitted for projects within the East Alamosa floodplain unless DOH determined no practical alternative to such encroachment existed. This decision by DOH came as a result of an on-site visit by DOH staff to the affected East Alamosa County area during the high run-off period. It was during this high run-off period that homes in the affected area suffered subsurface water problems due to leakage of the existing levee system. Federal Executive Order 11988 and similarly the Governor's Executive Order require a flood hazard evaluation of impact (8-step process) before any State or Federal funds can be expended in the floodplain. The Division of Housing suggested only relocation or demolition assistance was an available option for the eligible householders in East Alamosa.

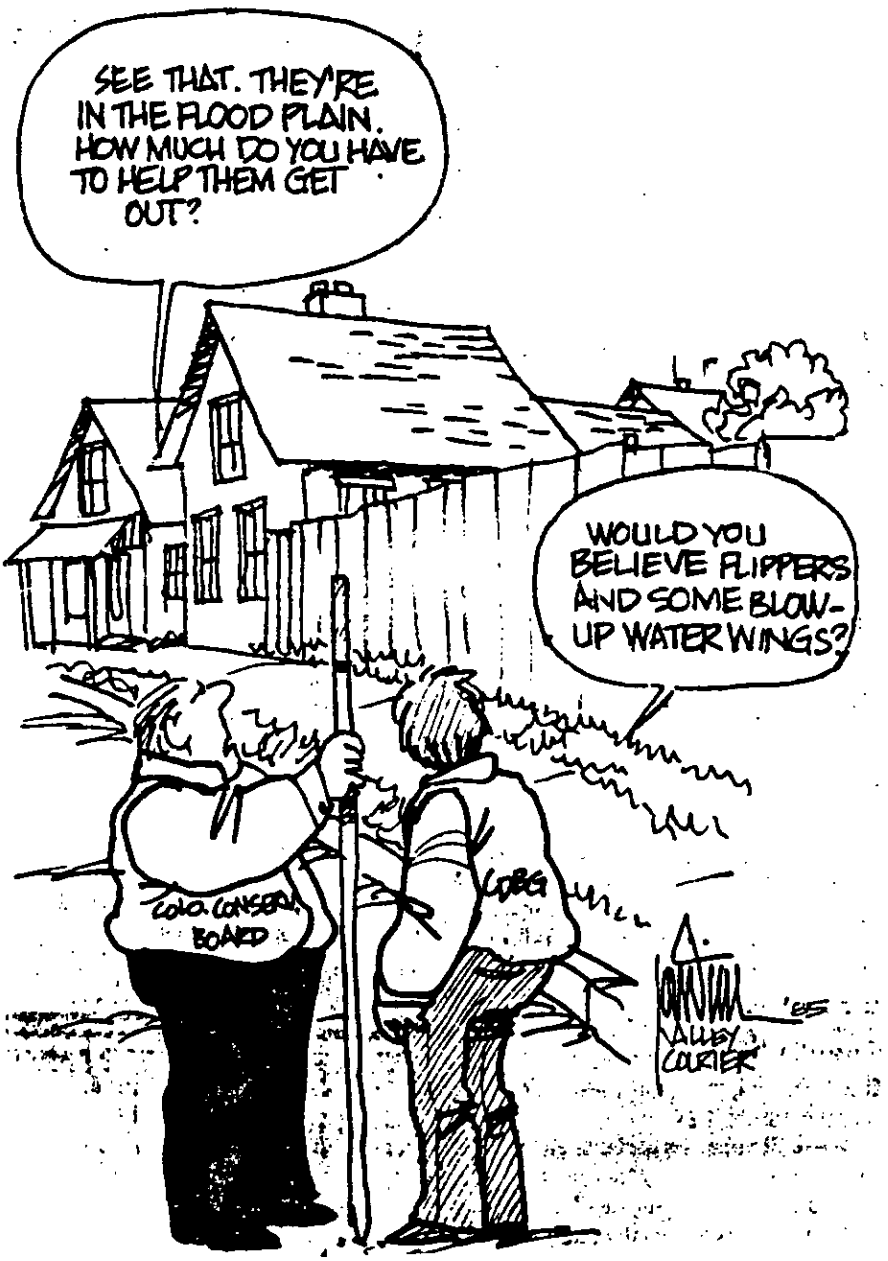
Housing rehabilitation in another area out of the floodplain would be acceptable. The Colorado Division of Housing expressed concern for reducing the risk of potential loss of life, property and public funds at stake.

The City and County began to examine their priorities at this point and on August 23, 1985, a special meeting to discuss the flood problems and housing problems at Alamosa was held. Representatives from the Colorado Water Conservation Board (CWCB), Colorado Division of Housing (DOH), and Colorado Department of Local Affairs (DOLA) were in attendance to discuss the release of CDBG funds granted in 1984. At issue was whether or not Alamosa City and County should be allowed to pursue use of State and Federal funds in the 100 year floodplain of the Rio Grande.

During this meeting, Alamosa County CDBG staff were prepared to offer some alternatives for working in the floodplain as part of their environmental review process. However, CWCB and DOH felt that their review comments to the CDBG application and a follow up on-site visit should be enough to shelf the housing rehabilitation project in East Alamosa.

4.1.3 Project Formulation

During the August 25, 1985 meeting, CWCB stated that the CWCB damage assessment subsequent to the flood fight of 1985 pointed to inadequacies in the levee system and poor channel capacity that had not been addressed for a number of years. The discussion of the meeting focused on the merits of the housing project, versus the flooding potential. From the restriction placed on Alamosa County by the President's Executive Order 11988, it was determined that it would not be feasible to proceed with the housing project.



This editorial comic view appeared in the Alamosa newspaper Valley Courier, during the period of CDBG funding for low income housing in Alamosa.

Alamosa City, Alamosa County and State officials discussed the most practical means by which the two local governments could deal with the potential for flooding posed by the existing levees should the Rio Grande continue to have high flows. The CWCB and DOH suggested that the City and County consider using the CDBG grant to begin a flood control project and ask for further assistance from the State and Federal governments. The City and County officials agreed to the idea of a flood control project and a second meeting was set up to invite the Department of Local Affairs (DOLA) and the Army Corps of Engineers to discuss the feasibility of a project and how to finance it.

On September 25, 1985, a follow up to the August 23rd meeting was conducted in Alamosa to discuss the direction the City and County would take in regards to the flooding potential within and around the City.

Alamosa City and County officials indicated they were prepared to divert their CDBG project funds if the State and Federal officials would assist in financing future portions of the project. DOLA indicated that they would assist in the administrative procedures for shifting the funds to the flood project.

The Corps of Engineers representative stated that their involvement at the beginning would be technical assistance and perhaps some preliminary studies to evaluate the potential for a future Corps project. Following this meeting, elected officials of Alamosa City and Alamosa County pooled their resources and in a joint effort authorized a number of positive action items to alleviate the future flood threat. The CWCB was asked to assist in the selection of a firm to conduct a reconnaissance study of the Alamosa flood project.

4.1.4 Reconnaissance Report, Muller Engineering 1985

On September 30, 1985, the Colorado Water Conservation Board assisted Alamosa City and County officials in selecting Muller Engineering Company, Inc., to conduct a reconnaissance level investigation and develop viable structural measures to lessen the erosion and flooding problems along the Rio Grande at Alamosa and surrounding areas. The study included the following work scope:

a. Visit the site to become familiar with the current conditions of the existing levee system and the community.

b. Identify and record the flood history and hydrology of the area.

c. Prepare an estimate of the potential flood damages and determine the average annual cost of flood damages.

d. Prepare a hydraulic analysis of the Rio Grande to determine anticipated flood profiles.

e. Identify possible improvements to the existing levee system to upgrade deficient areas so as to provide flood protection freeboard and levee stability.

f. Identify costs of the suggested improvements.

g. Recommend a priority for implementing the improvements.

h. Depict the recommended improvements on base maps and prepare a summary report explaining the study effort and the findings.

Photo base maps were prepared by the Colorado Water Conservation Board and the hydraulic computer model for the river system was made available by the U.S. Army Corps of Engineers, Albuquerque District for use by Muller Engineering. On October 17, 1985, surveyed cross sections of the river channel were completed by the Alamosa County Surveyor an forwarded to Muller Engineering.

On October 21, 1985, the preliminary findings of the reconnaissance study were reviewed with all involved entities, including the City of Alamosa, Alamosa County, Colorado Water Conservation Board, Division Of Disaster Emergency Services, U.S. Army Corps of Engineers and the Department of Local Affairs.

4.1.5 Preliminary Report Findings

The report by Muller Engineering indicated that the City of Alamosa and Alamosa County should take steps to fund a major improvement program to upgrading the existing levee system along the Rio Grande. This action, if taken, would provide for the health, safety and welfare of the citizens and property of Alamosa, East Alamosa and the immediate surrounding areas against future flooding events.

The Muller report indicated the Alamosa area experienced an annual flood risk or cost of $900,000 to $1,000,000. This represented an annualized cost of flood damages over a 100-year period, assuming the 1985 status of development and flood protection. This cost represented past and future damage to private and public property. Improving the levee system to federal criteria would result in average annual risks being reduced to approximately $50,000 to $75,000.

The Muller report hydraulic evaluations indicated that a cleared river system could pass the 100-year flood at a profile approximately 2-feet lower than the comparable flood profile with the river choked with vegetation and large accumulations of river sediment. Clearing the river channel on a regular basis would provide significant economic benefits to the community in terms of maintaining the levee system capacity. Improvements to the levee system were identified that, if implemented, would upgrade the integrity and capacity of the system to federal standards and criteria. Improvements included raising and widening the levees, providing riprap armor protection, reducing seepage under and through the levees, providing access control along the top of the levees and constructing new tieback levees northwest of the City for right and left bank levee systems.

Initial estimates of construction costs for the conceptual improvements totaled approximately $6.4 million, including construction, contingencies and engineering. Based upon the cost estimates of flood damages and constructing the improvements, as outlined in the report, the improvements were rated economically justifiable as represented by an approximate benefit/cost ratio ranging from 2.5 to 3.

The Muller Engineering report contained an economic analysis of the potential flood losses in the area resulting from the flood inundation of the community. The purpose of this analysis was to determine an estimate of the cost of the average annual flood risk.

The majority of the damages would occur to private and public properties once the capacity of the current system was exceeded, at about the 25-year flood event. Figure 1 shows the damage curve of estimated flood losses for each flood frequency.

Also shown on Figure 1 and Table 2 are the damage curve and annual risk to the community with an improved levees system capable of passing the 100-year flood through the community, as well as part of the 500-year flood. The annual flood risk after improvements would be $63,315.

The report indicated that the improved levee system could provide a reduction in the annual risk and thus a benefit to the Community of approximately $984,385. The report also stated that with funding available, first priority and immediate action should be taken to upgrade the East Alamosa levee between U.S. 160 and the railroad.

4.1.6 Implementation Plan

Based upon the funding availability, Muller Engineering recommended that the proposed improvements be implemented in the following sequence:

a. Clear vegetation and sand bars out of the river channel.

b. Reconstruct levees along East Alamosa between U.S. 160 and the Denver and Rio Grande Western Railroad (D&D&RGWRR) in Phase I.

c. Rehabilitate and install riprap armor on levee near golf course.

d. Construct both the north and south (Alternative B) tieback levees.

e. Construct improvements at Cole Park.

f. Raise the north levee and install riprap at the bend in the river on the north levee and upstream of the bend on the south levee, between State Avenue and U.S. 160.

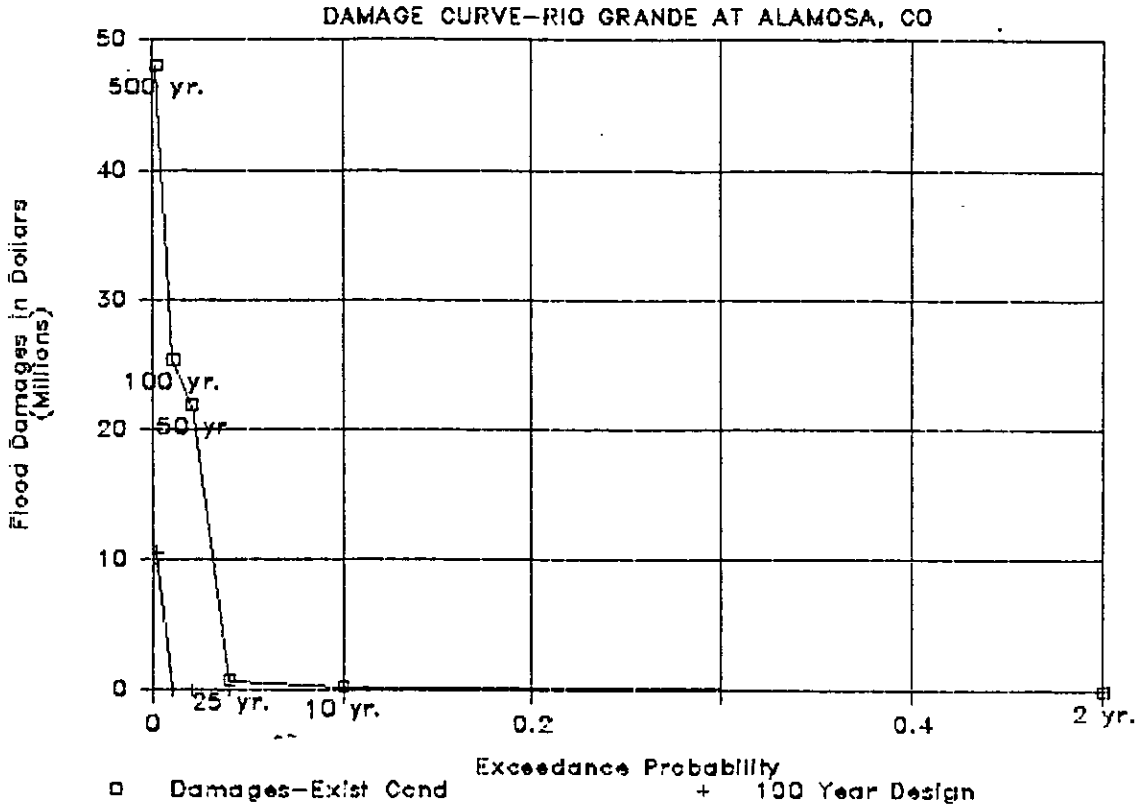
g. Upgrade and raise levees in other locations to provide adequate freeboard and access control.

4.1.7 ALAMOSA CITY AND COUNTY ACTIONS TAKEN DURING 1985

During the Fall of 1985, the City of Alamosa public works crews removed the willows and brush from the Rio Grande channel starting at a point below the railroad bridge proceeding upstream to the area of the golf course, action item c. of the overall implementation plan of action. (Appendix III, Figure 3 of the Muller Engineering report.) The City and County augmented a five year maintenance program of removal of undesirable vegetation and sediment from the channel. The river side willow trees were also cut along Cole Park to improve hydraulic efficiency. A contract for removal of sediment was issued to Southway Construction of Alamosa. At the same time, the City and County issued Muller Engineering "a notice to proceed" to begin preliminary designs for the levee system along East Alamosa between U.S. 160 and the D&RGWRR bridge thus fulfilling action item b. of the overall implementation plan of action.

The channel clearing and debris removal operation which was conducted in 1985 resulted in lowering flood stages by 1.5 foot in 1986 and 1987.

Figure 1



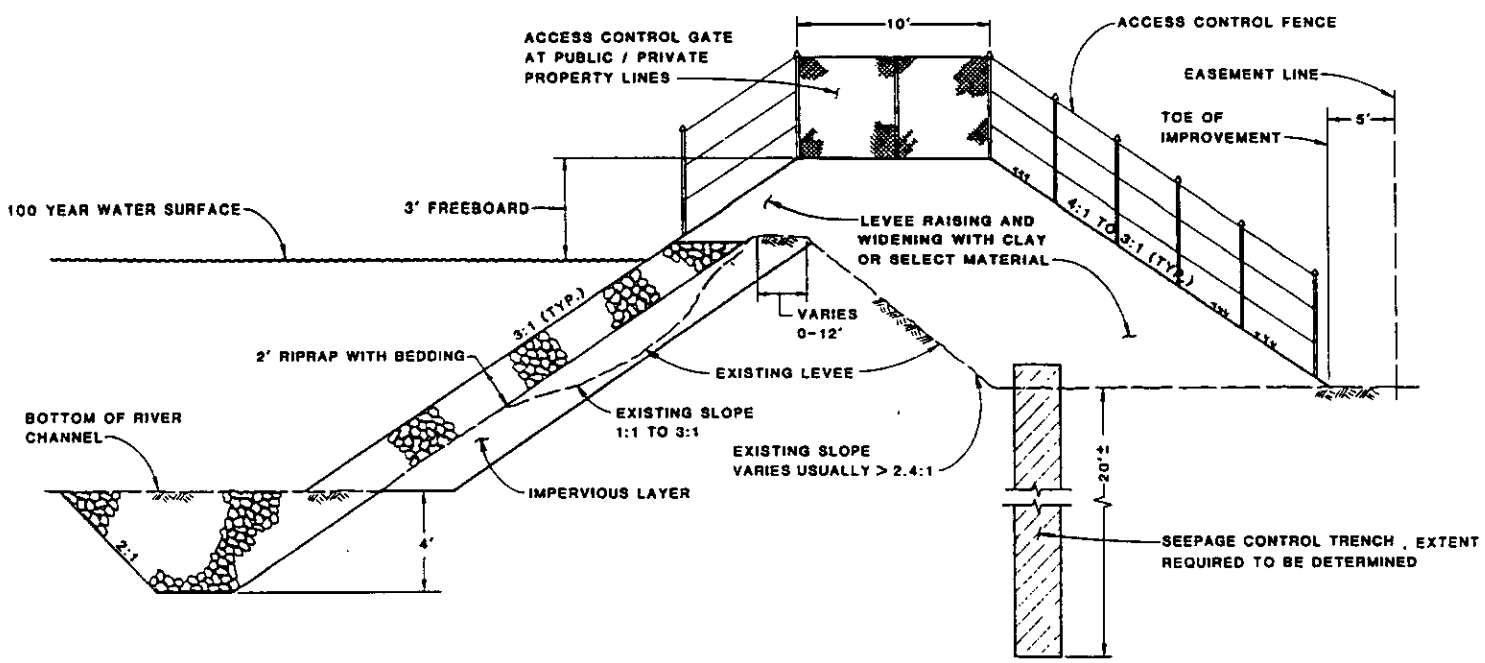


Figure 1-A

TYPICAL SECTION OF LEVEE IMPROVEMENTS

(N.T.S.)

8528.01
10/23/85

RIO GRANDE AT ALAMOSA

SUMMARY OF FLOOD DAMAGE ESTIMATES

AND ANNUAL FLOOD RISKS

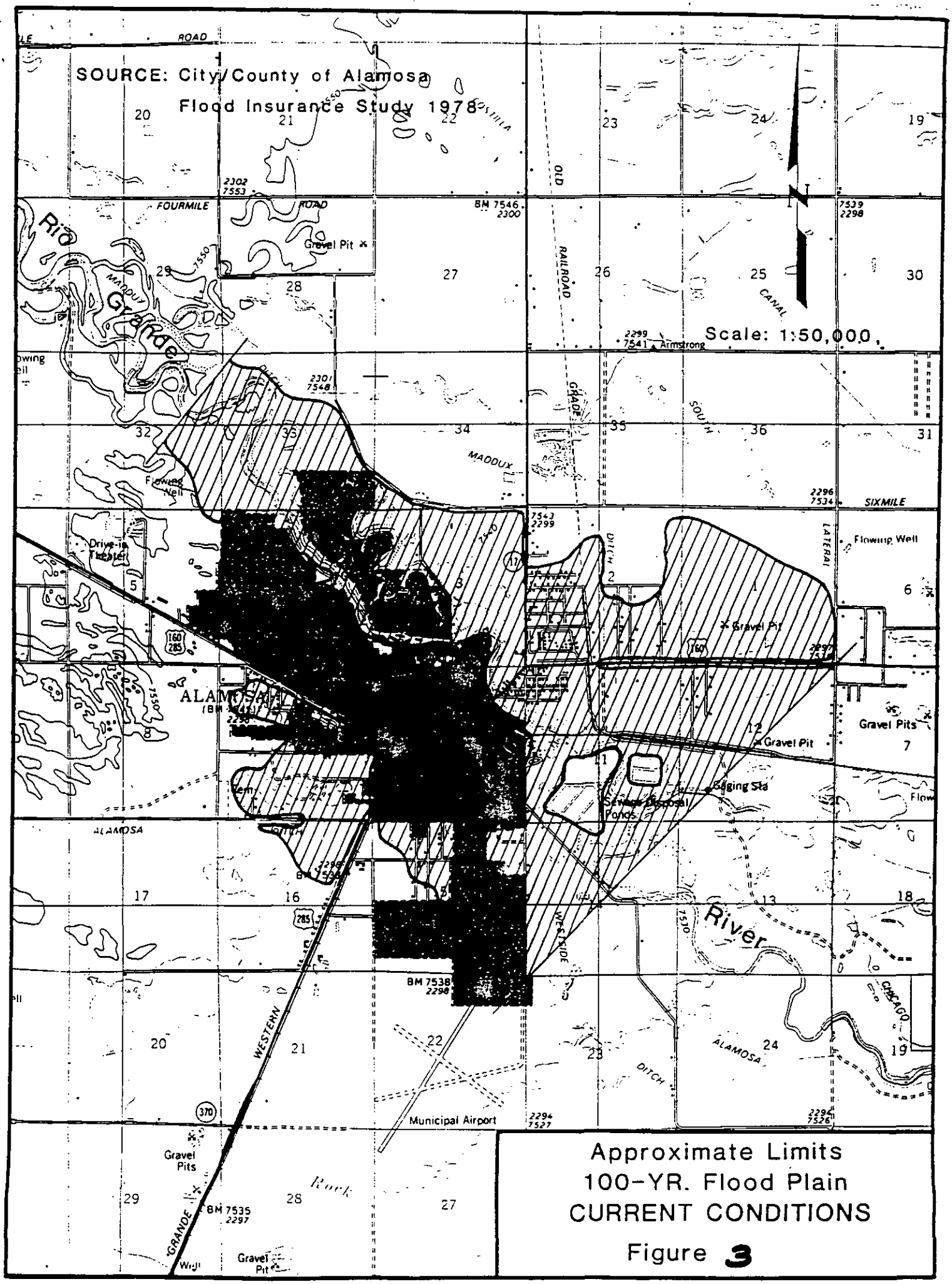
EXISTING CONDITION

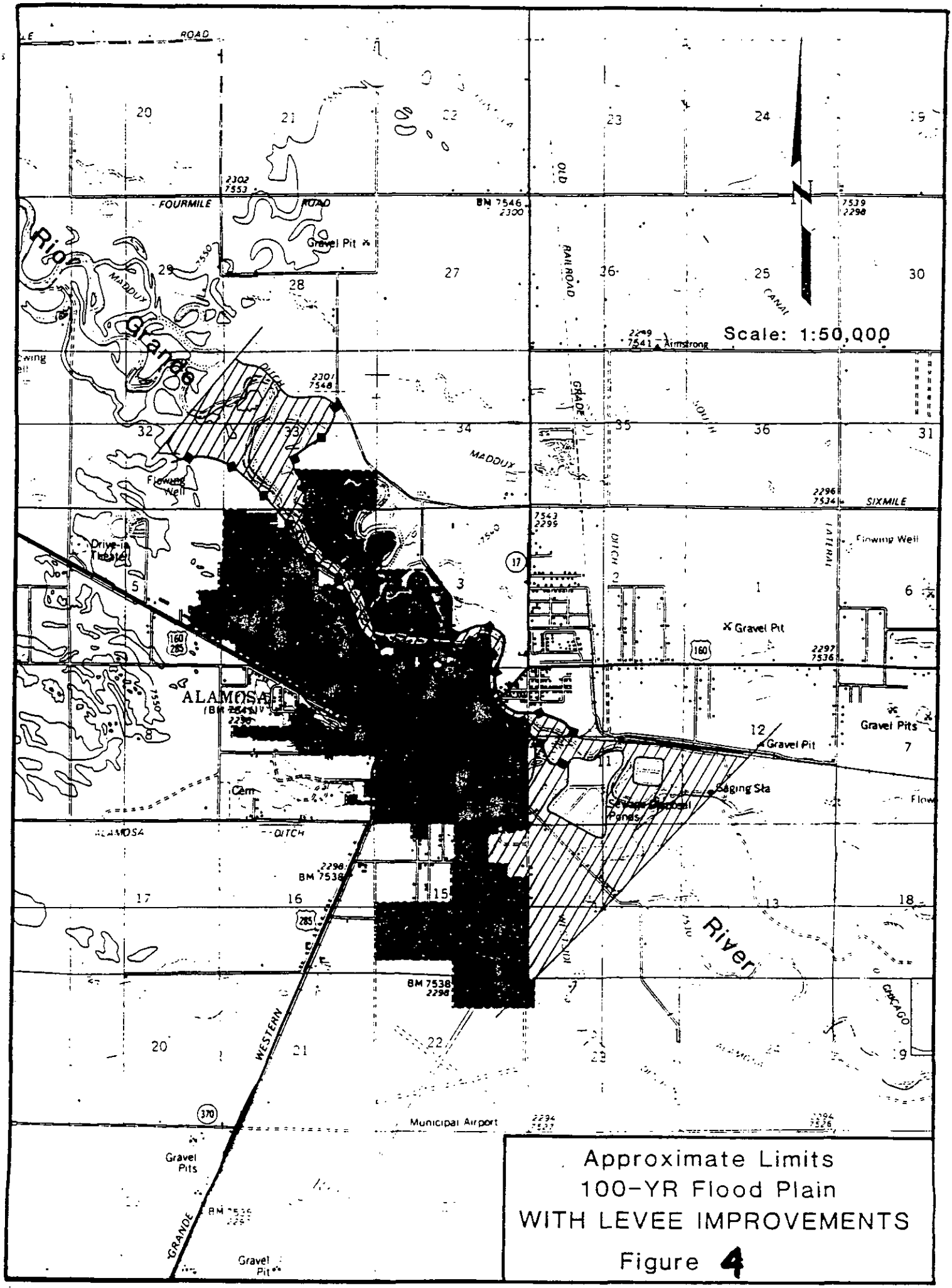
RUNOFF EVENT	HOUSE LOSSES	COMMERCIAL BUILDING LOSSES	MOBILEHOME LOSSES	ROADWAYS/ UTILITIES LOSSES	TRAFFIC LOSSES	DIKES/PUBLIC FACILITIES LOSSES	TOTAL LOSSES	EXCEEDANCE PROBABILITY	DELTA PROBABILITY	ANNUAL RISK (NO BUILD)
2 yr.	$0	$0	$0	$0	$0	$0	$0	0.500		
10 yr.	$0	$0	$0	$0	$0	$315,000	$315,000	0.100	0.400	$63,000
25 yr.	$0	$0	$0	$0	$0	$800,000	$800,000	0.040	0.060	$33,450
50 yr	$11,134,550	$6,638,720	$78,300	$2,860,622	$127,699	$1,000,000	$21,839,891	0.020	0.020	$226,399
100 yr.	$12,725,200	$7,286,400	$587,250	$3,306,245	$178,779	$1,200,000	$25,283,874	0.010	0.010	$235,619
500 yr.	$22,400,688	$14,582,480	$2,456,300	$6,321,188	$255,398	$2,000,000	$48,016,054	0.002	0.008	$293,200
							$48,016,054		0.002	$96,032
TOTAL ANNUAL RISK										$947,700
ANNUAL COST OF FLOOD INSURANCE										$100,000
TOTAL ANNUAL COST OF NO-BUILD ALTERNATIVE										$1,047,700

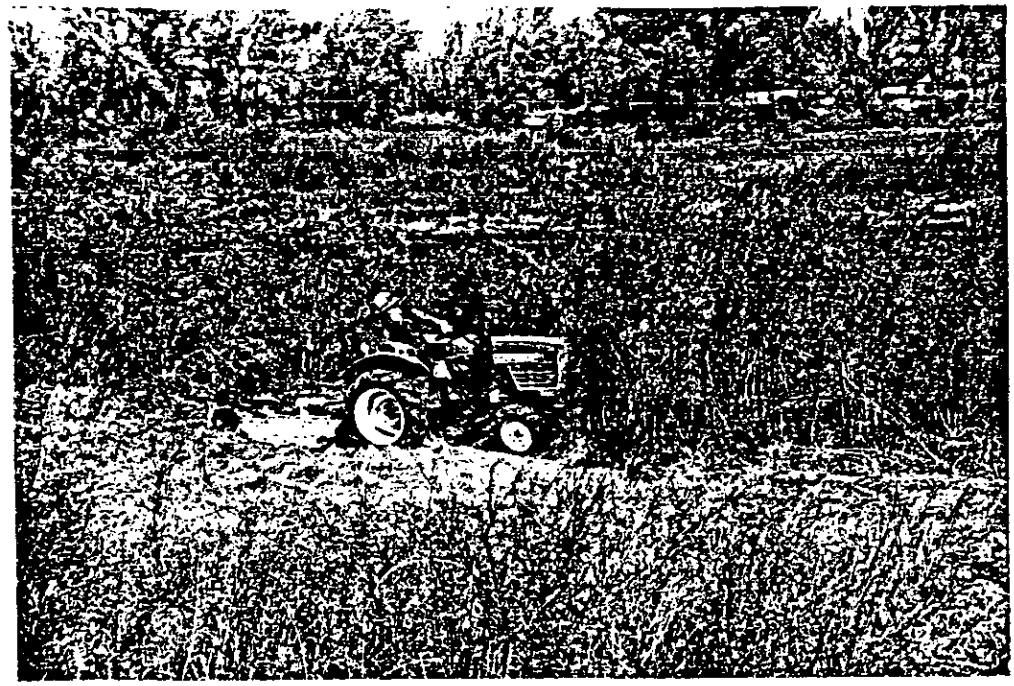
IMPROVED CONDITION

RUNOFF EVENT	HOUSE LOSSES	COMMERCIAL BUILDING LOSSES	MOBILEHOME LOSSES	ROADWAYS/ UTILITIES LOSSES	TRAFFIC LOSSES	DIKES/PUBLIC FACILITIES LOSSES	TOTAL LOSSES	EXCEEDANCE PROBABILITY	DELTA PROBABILITY	ANNUAL RISK (IMPROVED CONDITION)
2 yr.	$0	$0	$0	$0	$0	$0	$0	0.500		
10 yr.	$0	$0	$0	$0	$0	$0	$0	0.100	0.400	$0
25 yr.	$0	$0	$0	$0	$0	$0	$0	0.040	0.060	$0
50 yr	$0	$0	$0	$0	$0	$0	$0	0.020	0.020	$0
100 yr.	$0	$0	$0	$0	$0	$0	$0	0.010	0.010	$0
500 yr.	$5,567,275	$3,076,480	$31,320	$1,392,291	$85,133	$400,000	$10,552,499	0.002	0.008	$42,210
							$10,552,499		0.002	$21,105
TOTAL ANNUAL RISK FOR IMPROVED CONDITION										$63,315

Figure 2. Rio Grande at Alamosa
Summary of Flood Damage Estimates
And Annual Flood Risks


SOURCE: City/County of Alamosa
Flood Insurance Study 1978
Scale: 1:50,000
Approximate Limits
100-YR. Flood Plain
CURRENT CONDITIONS
Figure 3


Scale: 1:50,000
Rio Grande
ALAMOSA
FOURMILE ROAD
MADDUX
SIXMILE
Gravel Pit
Flowing Well
Drive-in Theatre
Municipal Airport
WESTERN
GRANDE
River
Gravel Pits
Approximate Limits
100-YR Flood Plain
WITH LEVEE IMPROVEMENTS
Figure 4



Photograph 2. October 1985
Removal of Willows by City Crews

4.2 ALAMOSA CITY AND COUNTY ACTIONS TAKEN DURING 1986

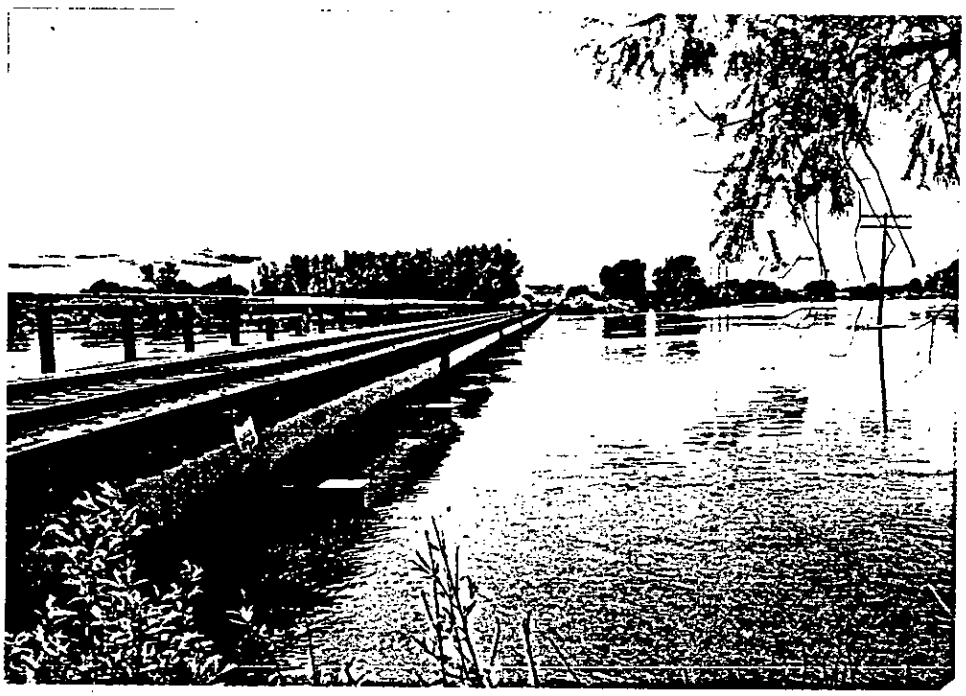
On March 5, 1986, Muller Engineering presented the Rio Grande Levee Improvements Phase I Preliminary Design to the City of Alamosa for their approval and comments. This document presented the results of the preliminary design of the levee system on the Rio Grande for the following areas:

- East Alamosa levee, upstream of the Denver and Rio Grande Western Railroad Bridge to U.S. 160.
- West Alamosa Levee, upstream of the Denver and Rio Grande Railroad bridge to U.S. 160.
- Golf Course Levee, emergency repair only.

The purpose of the preliminary design was to refine construction costs that addressed two main problems with the existing levee system: seepage through and instability of the earth levee, and erosion protection of the levee face. Of major importance to the preliminary design was the preparation of a geotechnical study by Chen and Associates, and the surveying of existing ground by Knapp Engineering and Surveying Services.

The Phase I Preliminary Design recommended that the entire levee system be rebuilt which included designing the levees to be constructed toward the river side of the existing levees to minimize disruption to private property owners.

Photograph 3. May 1986
Looking Upstream From D&RGRR Bridge



Photograph 4. June 7, 1986
Flood Peak at Alamosa; 4,460 cfs

The Phase I design also allowed some of the existing levee fill material to be used in the new levees thus saving costs for fill material. Also included in the design was the provision for maintenance to be performed regularly for improvements constructed and that maintenance access would be made available to the levee crests.

The City and County of Alamosa, Colorado Water Conservation Board, U. S. Army Corps of Engineers, Division of Disaster Emergency Services and others reviewed the Phase I Preliminary Design and authorized Muller Engineering to proceed with final design and contract documents.

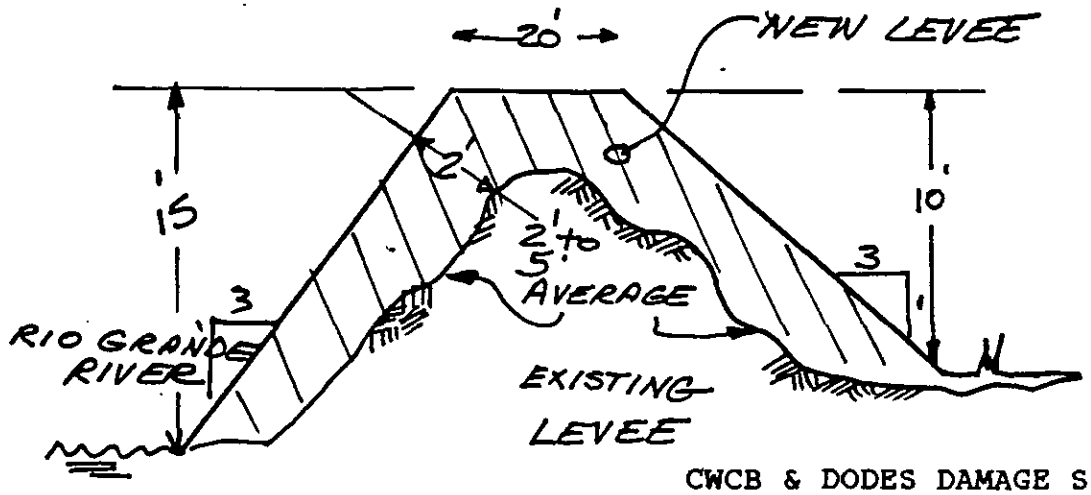
On August 28, 1986, the City and County accepted bids for construction of the Phase I levee system along East Alamosa between U.S. 160 and the D&RGWRR. The construction contract was awarded to Southway Construction of Alamosa. The Phase I construction of the levees, was completed during December of 1986.

4.3 ALAMOSA CITY AND COUNTY ACTIONS TAKEN DURING 1987

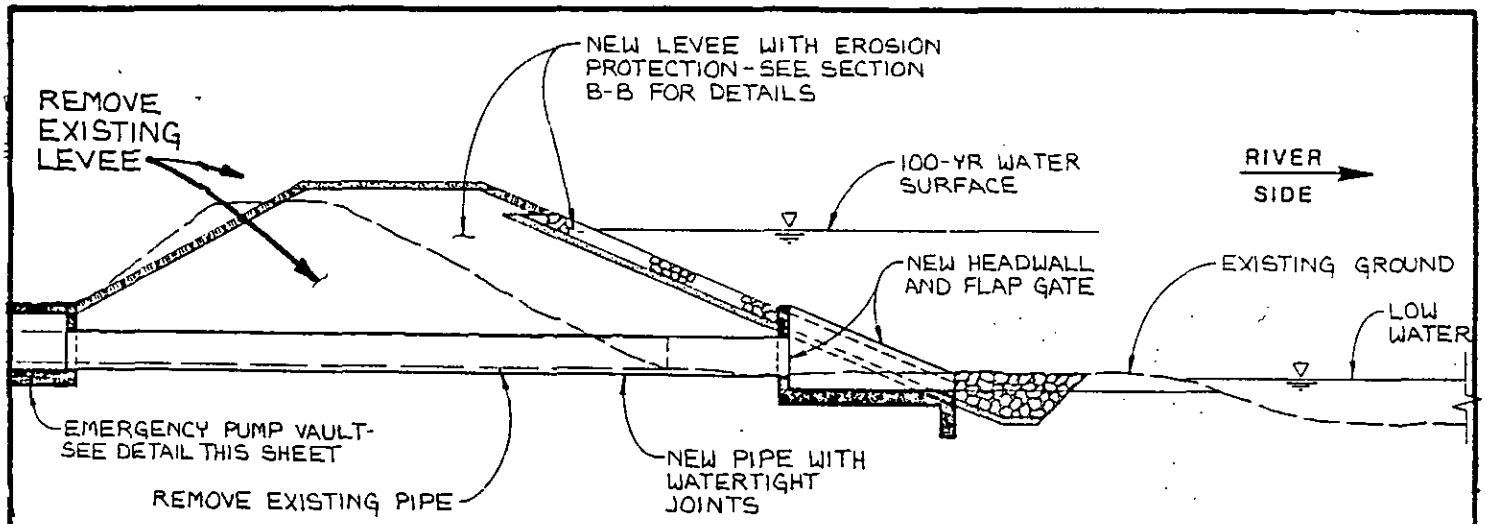
During January of 1987, Alamosa City and County authorized Muller Engineering Co. Inc. to proceed with a portion of the Phase II design of the west bank levee system on the Rio Grande from U.S. 160 to the north boundary of Cole Park.

The purpose of the Phase II design was to define anticipated construction costs and address three main problems with the existing levee system - seepage through and instability of the west bank earth levee, erosion protection of the levee face, erosion protection of the levee face, and impacts to the east bank levee (where no work was proposed as part of the Phase II construction) caused by improvements to the right bank levee. Also of major concern is the condition of the Cottonwood trees within Cole Park and how the construction will affect the life expectancy of those trees.

A major importance to the Phase II design was the geotechnical study by Chen and Associates, the surveying of existing ground conditions by Knapp Engineering and Surveying Services, and an evaluation of the life expectancy of the Cottonwood trees along the levee in Cole Park the Colorado State University Extension Service..



CWCB & DODES DAMAGE SURVEY TEAM
RECOMMENDATIONS, AUGUST 1985

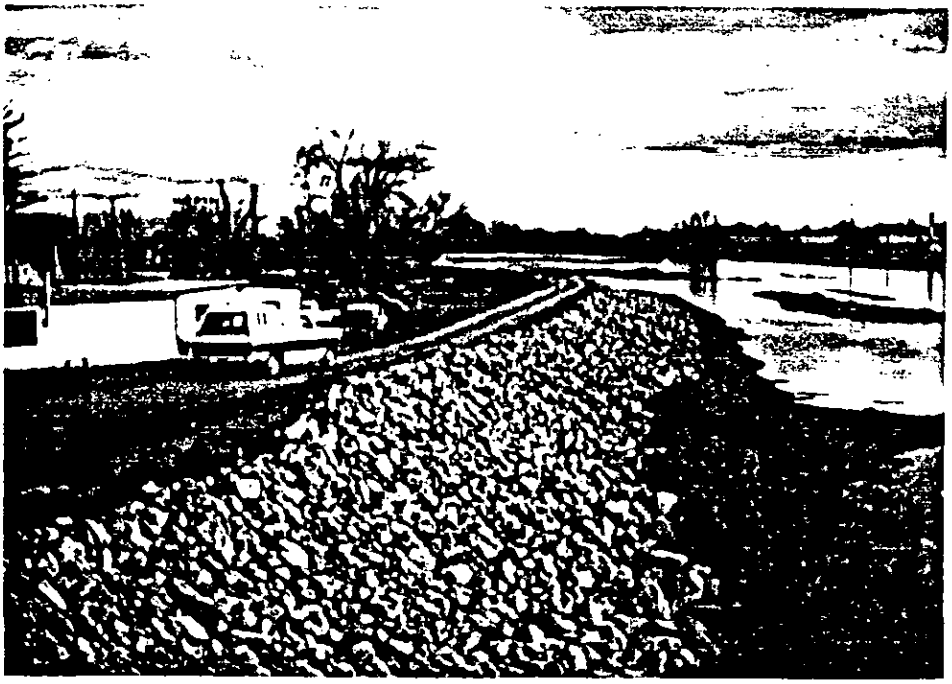


SECTION A-A

DESIGN OF NEW LEVEE PHASE I
MULLER ENGINEERING, LAKEWOOD, CO.
AUGUST 1986

COMPLETED LEVEE STATE HWY TO RAILROAD BRIDGE

PHASE I CONSTRUCTION ALAMOSA LEVEE



Photograph 5. Left Bank Construction
Southway Construction Company, Alamosa

Photograph 6
Right Bank Construction Below Highway 160

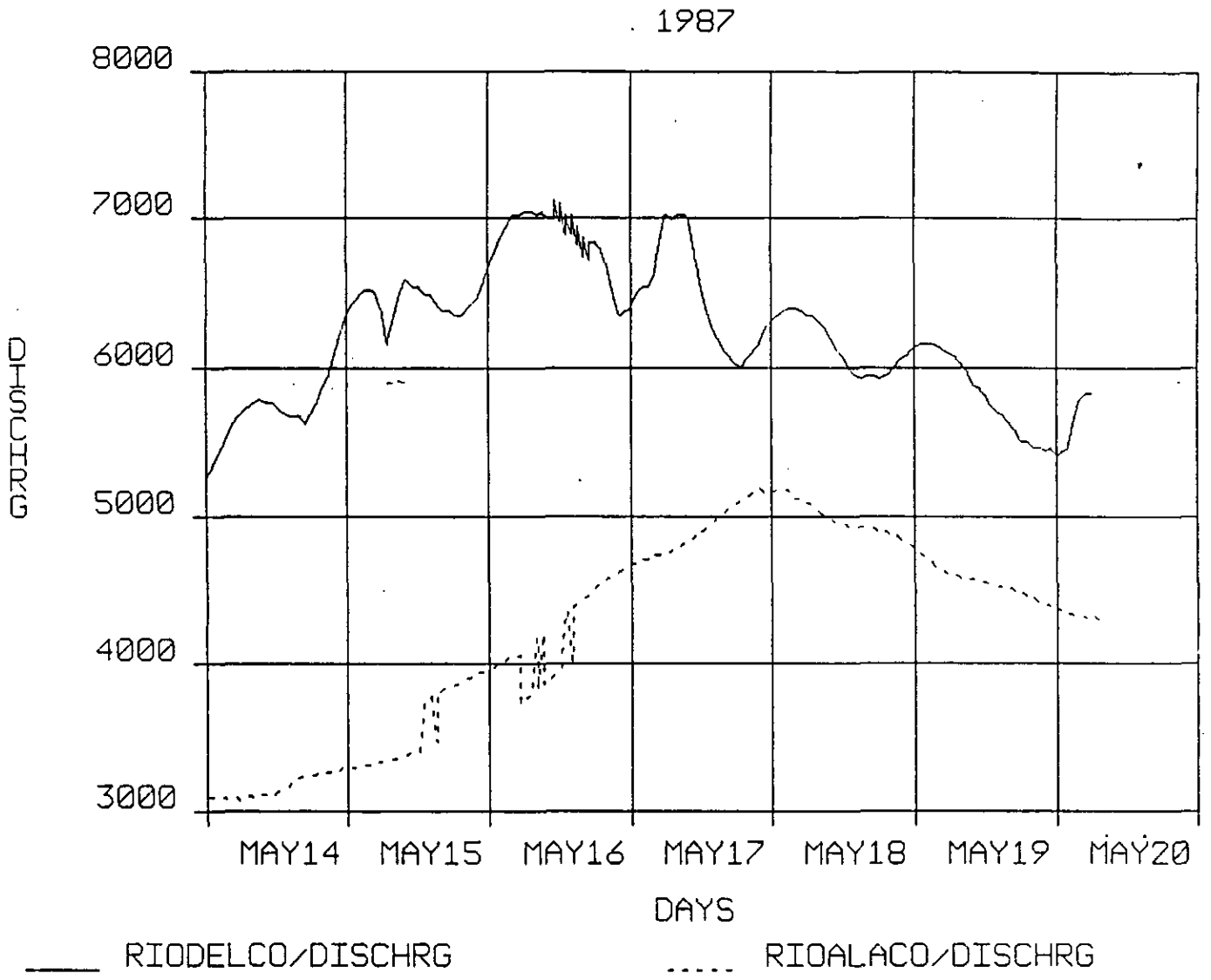


Figure 6
1987 Flood Discharge at Del Norte and Rio Grande Gages

Through hydraulic, geotechnical, and cost studies performed during preliminary analysis, the following recommendations and findings were summarized as follows:

- The entire west bank levee system along Cole Park must be rebuilt incorporating a land side pervious fill trench with an underdrain to manage seepage flows.

- Special consideration was given to the cottonwood trees in Cole Park. Local citizen groups requested that consideration be given to save as many trees as possible.

- Because cost of the existing levee configuration in Phase II produces highly erosive velocities during design flows, the new right bank levee was moved landward 20 to 30 feet from the existing levee. This approach improves conveyance, reduces velocities and erosion potential, however, about 50 cottonwood trees will require removal and replacement in Cole Park.

4.4 1987 San Luis Valley Irrigation Control Actions

Over the past years the Colorado Water Conservation Board has validated the use of irrigation ditches in the San Luis Valley in flood control efforts by diverting water from the Rio Grande above the communities of Monte Vista and Alamosa. In 1985 for example, when peak flows at Del Norte registered 9,040 cfs the irrigation company canals were able to divert as much as 3,500 cfs from the Rio Grande. This action delivered the water for the use of the irrigators, which resulted in a substantial flood control benefit to the Valley communities.

During the Spring of 1987, when predictions of high run-off from abnormally high snow pack at the headwaters of the Rio Grande were issued, the agricultural areas in the Valley were already fully saturated and consequently there was little or no demand for water to be diverted from the Rio Grande through the irrigation canals. If the water was diverted, severe flood damage to the crop lands which the ditches serve would occur.

The irrigation companies proposed an immediate program of repair and rehabilitation of the drainage systems leading east from the irrigated area into the Closed Basin. The reconstruction of these drains would permit the water currently saturating the fields to be drained into the sump to the east which, in turn, would permit the diversion of additional flows from the river.

Private interests in the valley spent over $25,000 in an attempt to open the drains while the irrigation district allocated $15,000 to this effort as well. In addition, the U.S. Bureau of Reclamation, which is constructing the Closed Basin Water Salvage Project contributed men and equipment.

In a "last ditch effort" to get the initial drains open the irrigation district requested emergency assistance from the Division of Disaster Emergency Services (DODES) in the form of a $25,000 request for funds. The funds request was to continue the team of back hoes and men working long hours in advance of the approaching flood peak prediction.

On June 4, 1987, Governor Romer declared a state of emergency based on the imminent threat of flooding on the Rio Grande River and authorized $25,000 in State assistance to permit the continuation of work by the irrigation district with coordination of all funds through Alamosa County. The cleaning of the drains continued and during the peak discharges this year, large amounts of water were diverted.

The emergency operation was a success in many ways. It has been reported that the farmers are happy due to the fact that the opened drains have lowered the water table in some areas to the extent that they can now grow an Alfalfa crop. Previously the farmers tractors would get stuck in the fields.

This combined effort of Federal, State, local government, and private interests, if not undertaken, would have allowed the Rio Grande to outflank the levee system at Alamosa. A flood at Alamosa would have caused millions of dollars in public and private damages, loss of revenue and jobs during the flood recovery period at Alamosa and at a time of an already sagging economy in the San Luis Valley.

As a follow-up to the emergency program, the 1987 Legislature authorized the Colorado Water Conservation Board to make a loan of $250,000 to the Rio Grande Water Conservancy District. These funds should be adequate for the District to complete the repair and rehabilitation of the drains in the valley so that the farmers will not have to be worried about high water tables and the towns in the valley will continue to receive flood protection benefits by diverting peak river flows into these drainage ditches.

4.5 Rio Grande Dam and Reservoir

In 1985, the owners of the Rio Grande Dam which is located at the headwaters of the Rio Grande, became concerned with the safety of the dam due to extensive problems in the gates and outlet tunnel. Consequently, the State authorized additional funding in the amount of $700,000 in 1986 (SB 27) to resolve these problems. A contract was awarded late in 1986 and the construction repairs were to have been completed by May 1, 1987. However, the contractor was not able to complete repairs before the spring run-off that started the last week of April in 1987. With inflows to the reservoir increasing each day the reservoir owners voluntarily stored an estimated 44,000 acre feet of flood waters. This action by the dam owners assisted in relieving high flood peaks from downstream communities.

5.0 FINANCIAL DATA

ALAMOSA CITY AND COUNTY PROJECT COSTS TO DATE

EXPENDITURES		COSTS
Flood Emergency Operations 1985		$ 290,000
Flood Reconnaissance Report 1985		$ 8,000
Phase I Preliminary and Final Design 1986 Muller Engineering Co.		$ 108,000
Phase I Construction 1986 Southway Construction, Alamosa		750,000
Phase II Preliminary and Final Design 1987 Muller Engineering Co.		$ 45,000
Phase II Construction (Bid process 7/87) Engineers Estimate	*	$ ---,---
Local Administration including Construction Inspection		$ 130,758
TOTAL		$1,681,758

FUNDING SOURCES		AMOUNT
DODES, Governor's Emergency Fund 1985		$ 145,000
DOLA, Community Development Block Grant (1985 use of 1984 CDBG funds)		$ 426,645
DOLA, Mineral Impact Assistance Grant 1985		$ 200,000
DOLA, Community Development Block Grant 1986		$ 760,000
Alamosa City and County cash in-kind Funds		$ 150,113
TOTAL	**	$1,681,758

* Engineer's estimate confidential until Phase II bid Opening.

** A balance of $ 350,000 remains available for construction of Phase II.

6.0 STATE AGENCY ACTIONS

6.1 COLORADO WATER CONSERVATION BOARD

The Colorado Water Conservation Board (CWCB) has served as a coordinating agency for Alamosa City and Alamosa County officials with on-site technical assistance of levee design and project coordination. Prevention of flood damages is accomplished through several activities. First, the CWCB sets engineering standards for floodplain studies and designates results of such studies for use by local governments in regulating land uses. Second, assistance is provided to communities seeking to participate in the National Flood Insurance Program. Third, the CWCB advises communities such as Alamosa on solutions to flooding problems. and Fourth, the CWCB promotes and sponsors federal flood control projects.

The CWCB also assists the Division of Disaster Emergency Services in fighting floods and obtaining federal disaster relief assistance. The CWCB is responsible for assisting in post-flood recovery efforts and drawing up the flood hazard mitigation plans required by federal law.

6.2 DIVISION OF WATER RESOURCES (OFFICE OF THE STATE ENGINEER)

An important link in the overall flood forecasting for Alamosa City and County is the Colorado satellite Linked water resources monitoring system. This system has enabled local and state government real-time water resources data on a continuous basis from key gaging stations across the State of Colorado. The computerized system can be accessed by computer terminal from any location via phone communications. These data and appropriate applications software provide for more effective water rights administration, computerized hydrologic records development, flood warning, and water resources management.

The Division has statutory responsibilities for the administration of all waters of the State, both surface and subsurface, by means of various conveyances including ditches, wells, tunnels, pipelines, reservoirs, and livestock water tanks.

Programs, assistance, and activities include, administration of "Dam Safety Program", review and approval of dam and reservoir plans, inspection of existing dams, recording and maintenance of State stream gauges, and review of subdivision and development proposals for inundation through spillway releases or dam failures.

6.3 DIVISION OF DISASTER EMERGENCY SERVICES

The Division of Disaster Emergency Services (DODES) has provided on scene disaster recovery specialists and planners to Alamosa City and County to assist and advise during times of need. The Colorado General Assembly enacted House Bill 1600, called the "Colorado Disaster Emergency Act of 1978", to address matters of disaster within the State. This act created the Division of Disaster Emergency Services (DODES) which is now under the Department of Public Safety. DODES is the primary State agency responsible for emergency preparedness

Programs, assistance, and activities in flood related activities include mitigation, preparedness, response, and recovery. DODES is responsible for coordinating the work of other State agencies in these four areas. The Division has prepared the Colorado Natural Disaster Emergency Operation Plan, which details response activities of State agencies during emergencies.

By Executive Order, dated April 1, 1978, DODES has responsibility to oversee the preparedness and emergency planning work of local governments such as Alamosa City and Alamosa County. DODES also reviews the preparedness plans of local governments to see how well they address local potential hazards.

6.4 DEPARTMENT OF LOCAL AFFAIRS

The Department of Local Affairs was created by the Administrative Act of 1968 to assist units of government--towns, cities, and counties. Two Divisions within the Department have programs dealing with drainage, flood control and floodplain management,the Division of Local Government and the Division of Housing. These Divisions have grant and lending programs which are made available to local governments by application requests. The grant program titles are, Water and Sewer Facilities, Impact Assistance, Community Development Block Grants, and State Housing Grant Funds. The Department has provided the State funding for Phase I and II of the Alamosa flood control levee system.

7.0 FEDERAL AGENCY ACTIONS

7.1 U.S. ARMY CORPS OF ENGINEERS

The Albuquerque District Corps of Engineers became involved during the month of May, 1985, when high flood peaks were predicted at Alamosa. The Corp's Emergency Operation Team was on the scene in Alamosa to assist and advise local officials in flood fight techniques during 1985-86 and 87. The Pueblo Corp's office assisted in the 1985 Flood Damage Survey.

During the early stages of the Alamosa levee project the Corp offered technical assistance and issued the emergency 404 permit for initial work along the Rio Grande.

On March 5, 1986, Colonel David Peixotto, District Engineer Albuquerque District, appeared before the Alamosa City Council and underscored the great community attitude in Alamosa. Colonel Peixotto explained that a procedure which the Corps may be able to follow for construction of the remaining levees during Phase III and IV is through Continuing Authority, the authority under which the Corps builds projects which do not exceed $4 million. The Water Resources Development Act of 1986, Pl 99-662 has increased this amount to $5 million involvement of federal funding. The Corps has stated that the benefits of the Alamosa project must exceed the costs on an annualized basis. Once the project costs are identified for Phase III and IV, cost sharing with the federal portion of the project will be established. The present cost sharing criteria is on a 25-75 percent local to federal project.

During July, 1986, Major General Jerome Hilmes, commander of the Corps of Engineers Southwest Division Dallas, Texas, appeared before the Alamosa City Council to explain the construction process if the Corps were to get involved in future work at Alamosa. General Hilmes termed the Alamosa "well defined" and both he and Colonel Peixotto expressed favorable comments about the Alamosa project. During his visit General Hilmes also announced that he was speeding up the Corps Feasibility Report due in March 1988 to October 1987.

The Corp's Albuquerque District's Status Report for the Local Protection Project was completed in December 1986 which presented the results from preliminary studies for Alamosa and served as a first draft of the feasibility report for the Alamosa segment of a potential flood control and water salvage project. The new sections of levees completed in Phase I and II will be incorporated with the possible future work of the Corps of Engineers.

7.2 U.S. SOIL CONSERVATION SERVICE

The Soil Conservation Service (SCS) instruments for forecasting flooding events in the San Luis Valley were invaluable for State and Local officials in preparing for the annual flood peaks during past years

Forecasts are made using predictions based on careful measurements of snow water equivalent at selected index points. Precipitation, temperature, soil moisture and antecedent streamflow data are viewed in conjunction with snowpack data to prepare runoff forecasts.

A monthly report presents a comprehensive picture of water supply outlook conditions for areas dependent upon surface runoff. The report includes selected streamflow forecasts, summarized snowpack and precipitation data, reservoir storage data and narratives describing current conditions.

Streamflow forecasts are cooperatively generated by SCS and the National Weather Service hydrologists. Snowpack data are obtained by using a combination of manual and automated measurement methods. Manual readings of snow depth and water equivalent are taken at locations called snow courses on a monthly or semimonthly schedule during the winter. In addition, snow water equivalent, precipitation, temperature, and other parameters are monitored on a daily basis and transmitted via radio telemetry to central data collection facilities.

7.3 FEDERAL EMERGENCY MANAGEMENT AGENCY

The National Flood Insurance Program (NFIP) is a federal program managed by the Federal Emergency Agency (FEMA) enabling property owners to purchase flood insurance. Such insurance is designed to reduce the escalating costs of property damage caused by floods and is generally unavailable from private sector companies. The program is based on an agreement between local communities and the federal government that if a community will implement programs to reduce future flood risks, the federal government will make flood insurance available within the community as a financial protection against flood losses which do occur.

At present most of the City of Alamosa is shown on the Flood Insurance Rate Map (FIRM) issued by FEMA to be within the 100 year flood plain. There are 303 flood insurance policies in effect in Alamosa City and County for a total annual premium of $52,950.

Following the completion of the levee protection work, Phase I, II, III, and IV., the chief elected official of both the City of Alamosa and Alamosa County will request a "Letter of Map Revision" to FEMA for redefining of the 100- and 500- year flood plain boundaries. The request will include the following data:

- Construction plans for as-built conditions,
- Certification that the structure will be maintained and operated by a unit of local government,
- An ordinance or official operation and maintenance plan adopted by the agency that describes the type and frequency of the maintenance activities that will be performed and the operation of any closures,

- o Either a certification from a Federal agency (Corps of Engineers) that the structure is adequately designed to provide protection from a 100-year or greater magnitude flood, or

- o Technical data to show that the structure meets adequate freeboard and stability requirements.

Following the issuance of new maps, Alamosa residents could save annual flood insurance premiums of $52,950.

7.4 U.S. BUREAU OF RECLAMATION

The U.S. Bureau of reclamation reported that their agency assisted the City of Alamosa by providing a high volume pump with a tractor to pump down the wet wells during the high water of 1987. The Bureau also assisted the Rio Grande Water Conservation District in cleaning out a section of drain ditches near the Closed Basin Project.

The purpose of the Bureau's assistance was twofold (1). to assist in the flood fight endeavors of the irrigators to release excess irrigation water to lakes east of Alamosa. and (2). self preservation due to the fact that the irrigators water moving to the east near the Closed Basin Project was endangering the Bureau's salvage wells. The Bureau sent three employees, an excavator hoe, a frontend loader, and a Cat grader to assist in opening drain laterals from highway 17 to Bachelor lake near the Closed Basin Project. This process successfully enabled the Bureau relieving a salvage well associated with their project.

These excellent intergovernmental relations between the Bureau of Reclamation, Alamosa City and County, the Rio Grande Conservancy District and the irrigators has spared the residents of Alamosa another year of flooding by shaving flood water normally used for irrigation from the peak flows of 1987 and sending the water to San Luis Lake east of Alamosa.

8.0 FUTURE ACTIONS ALAMOSA CITY AND COUNTY

The total cost of the flood project to date in Alamosa through Phase I is approximately $1.0 million. The City and County have obtained funding from the Department of Local Affairs for the expected completion of Phase II in Late 1987. It is anticipated that the state and local monies expended for phase I and II can be used as the required matching funds under a Corps of Engineers program for construction of Phase III and Phase IV in the near future. The Corps of Engineers is expected to present their results of the feasibility report to the city and county in October of 1987.

Detailed studies, by the Corps, will be accomplished in several areas such as new mapping and surveys; gross real estate appraisals; and environmental assessment; and more detailed economic and cost analysis.

At East Alamosa, four new homes constructed with Colorado Housing Authority funds have appeared in the past year. These new homes have been elevated above the 100 year flood plain. The new levees in place have cleaned up the area south of Highway 160 and along the Rio Grande. New businesses are appearing such as a restaurant, motel and office building. One of the existing motels has new paint and signs. There is a pride of ownership appearing in the East Alamosa area. All of these actions are due in part to the sense of security the levee has brought to the East Alamosa area.

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River to reach peak level

The Rio Grande River is expected to reach peak levels and sustain that level for the next four to six days, announced Alamosa officials. City and county officials are monitoring the levees and bridges.

Some precautionary measures are being taken and, although there is no immediate danger, some residences may sustain some low level flooding.

An audible warning system has been devised in case of an actual failure along the levees. This system will be the air raid siren. When activated, it will be sounded for a prolonged period of time. Tune into local radio or television news stations.

Evacuation procedure set

In the event of an evacuation, city officials announced, an emergency shelter has been established at the Alamosa High School. Households that experience high water are advised to go to the emergency shelter.

People who may have to evacuate are advised to shut off all electrical power, turn off all propane or natural gas to the house and take a pre-packed bag of necessities (such as medicines, personal toiletries and clothing for approximately two days).

Finally, when leaving the home, place a white cloth on the outside doors or windows. This should be placed in a location clearly visible to emergency personnel as the white cloth advises that the home has been vacated.

In the event of an evacuation, persons with special medical needs are advised to call Alamosa City-County Ambulance Services at 589-2882 or 589-5807.

Take precautionary steps

Additional tips for a flood emergency or evacuation were revealed during a discussion between city and county officials and emergency personnel May 9.

The key telephone number for emergencies is 589-5807. If individuals have questions about evacuation plans or procedures, call 589-2548.

Keep a pile of things needed handy in case of emergency. To minimize damage in the home, valuables such as televisions and stereos should be placed about 3 feet off the floor.

If individuals have a mobility problem and need assistance in transportation, the should notify the Alamosa Police Department (5807).

Items to bring to the emergency center include formulas or food items for small babies, table games for entertainment, dentures and eyeglasses, a change of clothing, basic bedding, hard candy and snacks, personal hygiene items, identification and a day pack.

Items that should not be brought to the center include expensive jewelry, pets, radios, excessive luggage and alcoholic beverages.

Sand bags at waterworks

Sandbags are available at the Alamosa Waterworks, Seventh and Ross streets, and can be picked up between 8 a.m. and 5 p.m. Sandbags picked up but not being used must be returned. 6-12-85

$4 million in river control could be approved for city

By RUTH HEIDE
Alamosa County Editor

After a river tour and meeting with state and federal officials Wednesday, Alamosa area residents were encouraged that outside assistance would be available to pay for part of a long-term $4 million flood-control project on the Rio Grande.

Army Corp of Engineers Col. David Petrotto said he thought the corp would approve a small-flood project for the area, and Hal Knott, Colorado Department of Local Affairs, thought the state would partially approve the city's request for community block grant funds.

Wednesday representatives from the Colorado Department of Local Affairs, Division of Disaster Emergency Services, Army Corp of Engineers, Colorado Water Conservation Board, Hugh Hallock with Rep. Mike Strang's office and Felix Cordova with Sen. Gary Hart's office toured the areas hardest hit along the river in the 1985.

The group visited the railroad crossing where last year the water was six inches below the bottom bridge beam. Larry Muller, of Muller Engineering Company Inc., said that his company's recommendation was to replace the levee embankments with "good solid impervious material".

The tour also included the West Side Ditch and Cole Park where the city cut river-side trees down to a few feet above the river with the purpose of branching the trees closer to the water level to slow the impact against the levee.

The group also stopped near the golf course where material has been pushed from the river to the banks to stabilize them. The group also looked at the levee near Anderson Subdivision where city public works director Terry Haugen said the water came the closest to breaking the dike.

The high water last year represented a 10-year flooding frequency, according to Alamosa City Manager Greg Sparks. The county and city are preparing for a 100-year flooding frequency, which would be more than double the water that came down the river last spring, he said. The chance of that type of deluge happening in the next 30 years is 25 percent, according to Sparks.

To prevent a disaster during such a flood, the county and city plan to clear debri from the river channel and reconstruct the area levees in several phases. The first phase, costing $850,000, has been completed partially with the river work done last fall.

The first phase, which primarily will be funded through state money, runs from the railroad bridge to the river bridge, with the second phase reaching from the river bridge crossing Highway 160 to state bridge. The city hopes to have community development block grant funds from this year to work on the second phase and help from the Corp of Engineers for subsequent phases, Sparks said.

Wednesday night Hal Knott, department of local affairs, said grant funds were down, but the city's rating was high, so he expected the city to receive some of the $800,000 requested community development block grant funds. Block grant funds have decreased from $9 million to $6 million in the last year, he said.

"Something will be coming but certainly not the total amount requested," Knott said.

Mineral assistance funds, which the city also has applied for, are also down, according to Knott. There are probably 40 percent less funds to disperse this year than before, he explained.

An East Alamosa resident said that if state funds were down, a grant to rehabilitate houses in East Alamosa probably would not be approved in the future. Block grant funds were allocated for housing rehabilitation last year, but when the flooding hit Alamosa, the housing grant was transferred to flood procedures.

"It seems like you people are penalizing the people from East Alamosa," the resident said. Knott answered that this obviously is most pressing, and the resident answered that it always was.

Sparks said that the city still would try to get money to renovate homes in East Alamosa.

"I agree it was a problem five years ago," Sparks said about the flooding, "but the city didn't address it because the city didn't perceive it as a problem five years ago. We see this as beneficial to the entire city because the entire city could be affected by high water."

Last spring, many city residents nearly encountered disasters due to high river water.

County administrator Gary Suiter explained the chain of events. In the early 1940s, the levees originally were constructed of river material such as sand and gravel. Last June the levees began eroding. The city purchased 10,000 sand bags, and 10,000 more came from the division of disaster emergency services. High water that flooded parts of Del Norte and Monte Vista flowed towards Alamosa where water came within a few inches of the levee tops and seeped through the tree trunks in Cole Park.

Volunteer patrols spent about 400 hours watching the river through the early June evenings, Suiter said. After the river

(Continued on page 4)

RIVER-SIDE SURVEY — Bill McDonald, director of the Colorado Water Conservation Board, looks over the Cole Park site where water from the Rio Grande seeped through tree trunks near the dike last spring. The city has built up this dike since that flooding and cut trees to within a few feet of the water so they will bush out closer to the river and slow down the water flow near the dike.

(Courier photo by Ruth Heide)

NEWSPAPER ARTICLES
ALAMOSA, COLORADO

3-9-86

(Continued from page 1)

peaked at 4,020 cubic feet per second in Alamosa and the river seemed ever, east Alamosa experienced high sub water. Two million gallons of water were pumped into the river one night to reduce the East Alamosa water level by a foot.

The mayor declared an emergency in Alamosa, and the county followed with an emergency declaration later that month, according to Suiter.

Sparks said that at first local governments simply wanted to take care of the emergency situations and improve the river's channel capacity. Then plans began taking shape to prevent problems in the future.

"The flood project has escalated into a big multi-phased, mega-dollar project to reconstruct the levees system throughout one end of the city to the other," Suiter said.

One of the first steps in the long-range plan was a study done by Muller Engineering Company Inc. last fall. Muller Wednesday told county and city officials that his company's study revealed that a long-range project could cost $4 million, but compared to damages that could occur during a large flood, the return on that $4 million would be $1 or $2 for every $1 spent.

Sparks estimated that a 100-year flood would cost the area $25 million in damages unless preventative work was done beforehand.

The cost comparison between potential damages and preventative costs will be important in determining whether or not the Alamosa area receives assistance from the Army Corp of Engineers, according to Col. Petrotto. He said that the corp also would do a study which is scheduled for completion in September.

After that corp study, according to Petrotto, the corp has two options to help the Alamosa area. It could go through another study that would take until 1988 to complete and that would be followed by several years in the U.S. Congress, or the corp could use its authority for small-flood projects. That direction would take one or two years to get into the construction phase, Petrotto said.

The local governments would have to share about 25-35 percent of the cost and have to comply with corp standards on preliminary projects. The project would have to prove that the benefits would exceed the costs, and the total project could not go over $4 million to be funded through the corp's small-flood program.

"I would predict that you would get the project approved and funded," Petrotto said. "I feel pretty good about it right now."

He encouraged the city and county to persevere and keep the project momentum going.

Later Sparks said he thought that Petrotto had been more positive about the project than any of Petrotto's staff had been in the last few months.

"The colonel at least made some kind of moral commitment," Sparks said.

Sparks said the town and special meeting with officials such as Petrotto were designed to bring them face to face with the local people who were asking for their money. Charles Manzanares, Alamosa community development director, organized the river tour and joint city/county meeting.

Other officials who spoke at the meeting Wednesday included Bill McDonald, Colorado Water Conservation Board, Pat Byrne, DODES director and Ron Cattany, Colorado Department of Natural Resources.

McDonald told the local governments that his office could not offer any financial aid but could assist in finding it. His office, which has worked through Larry Lang, can also assist with technical matters and can act as a go-between in federal and local relations, he said.

Cattany added that the governor had limited emergency funds, and his office would help the local area primarily with technical assistance.

Byrne's office helped the local area with about $145,000 emergency funds. Jack Truby is the regional disaster services official who has worked with Alamosa and Rio Grande Counties through the flooding last year.

All of the visiting officials commended the local governments for their efficiency and enthusiasm. Suiter said that he also appreciated the cooperation between government agencies. "I think all of this has demonstrated a good example of federal, state and local cooperation and what it can accomplish."

WORKING THROUGH THE NIGHT — Ed Vernetti and his crew from Ary Brothers Trucking Company, Canon City, began working at about midnight hauling dirt to build a small second dike by the Rio Grande bank in Park. Other crews have been working in Alamosa to prevent flooding. (Courier photo by John Scarffe)

6/12/86

County declares emergency; flood water recedes slightly

By TARYN TAMBURELLO
Courier Staff Writer

A city and county emergency for Alamosa flooding has been called for two reasons, according to Charles Manzanares, community development director.

Flood watches are currently in effect for the Rio Grande from Del Norte downstream to the New Mexico border and to the Alamosa River from Terrace Reservoir to the Rio Grande, according to a National Weather Service report.

Serious conditions exist as stress remains on levees, irrigation canals and bridges and dams. A break down of any of these could produce serious flooding in the next two or three days.

"The emergency was called to alert the governor's office to inform him what has developed so that, in the event we did have actual flooding, the governor could activate the national guard, for example, and financial resources. Second, the Division of Disaster Emergency Services advised us that with the saturation point we have the potential that a serious flood could occur."

At this point, outside financial help is needed to aid the city of Alamosa. Already the county has incurred some expenses at Andersen's subdivision and in constructing lower levees around Cole Park, according to Manzanares. Pumping water to stabilize the water pressure and the man hours spent so far have resulted in a costly affair both for the city and county, Manzanares stressed.

The water is subsiding, but Manzanares said volunteers will still be needed to check for any leakage. Presently, 3,740 cfs was measured, but at peak it was 4,420.

"It's too soon to say the danger point is over. We've had people out the last three nights watching and checking," Manzanares said.

Stanley Road and County Line Road are closed off for repairs presently. Flooding caused 15 feet of pavement to collapse. Rio Grande County crews are repairing the road because the damages were within their boundary lines.

"The city and county will be getting together to get damages assessed," concluded Manzanares.

6-13-86

8-86

Alamosa levee project set to start within the week

By RUTH HEIDE
Alamosa County Editor

Phase I of the levee project along the Rio Grande River through Alamosa should be underway this week.

Charles Manzanares, director of community block grant programs for the city and county of Alamosa, said Friday a notice to proceed will be issued and Southway Construction, which was low bidder on the project, will begin work.

Manzanares said he wanted to let the public know work would be commencing on the first phase, which runs from the railroad bridge to the highway bridge, because trees will be cut down in the process. This was one of the concerns voiced during public meetings this summer.

Each of the property owners in the first phase has signed an agreement with the city and county to allow this work to be done on the levee, according to Manzanares. The county approved these agreements and the city council signed them last week.

The agreements basically give the property owners guarantees that the city will live up to the permit granted for its construction work and give the city permission to enter on the property of the people along the Rio Grande River in Phase I, according to Manzanares.

Manzanares told the city council last week that an agreement was specialized for Bill Minter, who owns 1,300 feet of the levee in this phase, and other agreements were worded differently than Minter's.

He said the city probably wouldn't be out any extra money because of the agreement with Minter. "It doesn't impact on the city," Manzanares said.

The language in Minter's contract was part of his (the property owner's) requests and Manzanares said, "we felt it was incumbent upon us to grant him some of these demands."

He was asked if Minter requested a sump pump as part of his agreement, since he discussed it earlier with the city and county.

Manzanares said Minter requested a drainage from his property to adjacent properties under the condition that the other property owners agreed and the levee system did not correct the seepage problem which affects about six homes in the East Alamosa area.

The right-of-way agreements were unanimously accepted by the city council, with councilor Larry Jaramillo absent.

In addition, the city council last week approved employment of D.H. McFadden Jr. as construction inspector for the levee project, Phase I. His position will include overseeing responsibilities and making sure that work is done according to the design plans and Corps of Engineers 404 permit specifications. McFadden will be paid $25 an hour and will work 40-hour weeks unless changes are approved by city or county administration.

OK sought for improving river levees

By ERIN SMITH
The Pueblo Chieftain

ALAMOSA — The city of Alamosa has requested a permit from the U.S. Army Corps of Engineers allowing the discharge of dredged and fill material into the Rio Grande.

In order for the city to reconstruct and improve the levees adjacent to the river between the U.S. 160 bridge and the Denver and Rio Grande Western Railroad bridge, the city must obtain a permit from the Corps under Section 404 of the Clean Water Act.

The project will involve the placement of about 18,200 cubic yards of fill material within the Rio Grande channel. The fill material includes riprap, gravel bedding material and sand as well as the construction of underdrains to intercept seepage flows.

The proposed project will involve the removal of the existing levees, construction of the underdrains, construction of new levees on both sides of the river and placement of the riprap at specific locations on the levees.

The existing levees will be cleared of vegetation prior to their removal. 3-21-86

CREATIVE THINKING — Representatives from various agencies discussed ways to coordinate various grant and fund monies and work for flood control on the Rio Grande River during a special flood protection meeting Wednesday in which city and county officials were present. Pictured from left to right are Gary Sulter, county administrator, Greg Sparks, Alamosa city manager, and Larry Lang with the Colorado Water Conservation Board.

9-25-85

(Courier photo by Taryn Tamburello)

County, city work on river

10-9-86

By MELISSA MONSON
Courier Regional Editor

Alamosa city and county have joined hands in a joint river improvement project that Southway Construction Company started Monday.

The project is being done to relieve pressure on the levees where the Rio Grande has cut into them, said City Manager Greg Sparks. Willows also are being cut down and removed near the water's edge because they restrict the flow of water and build up sandbars, Sparks explained. The city and county are hoping to get the sand moving further downstream so it is not concentrated as much within city limits.

Willows growing against the levees are not being cleared away because they help prevent erosion along the dikes; however, some sandbars are being removed to redirect the water's flow, Sparks added.

He said the willows have not been cut for at least five years. It is harder to remove sandbars because the Corps of Engineers has required a permit to push the sandbars onto the levees.

An engineering firm from Denver has been contracted to rebuild the levees in some areas along the Rio Grande and to study the whole levee and river system. The firm will do this work with the help of Southway Construction.

Much of the work on the river is being done near the State Street Bridge and the West Side Irrigation Ditch, Sparks said.

The state seems to be very interested in this project and the city and county received $145,000 from state emergency funds. Presently, the two governmental entities are attempting to get $400,000 in Community Development Block Grant funds amended so this money can be used for problems that arose as a result of the early summer flooding.

By the end of this month, the city and county should know whether or not they will get $400,000 from the Mineral Impact Assistance funds, which is strictly designated for levee and river work.

Sparks hopes the river work will be complete by the end of October.

Photo by Erin Smith

Major Gen. Jerome Hilmes
... Corps could help with project

6-26-86

General believes engineers may help on Alamosa levee

By ERIN SMITH
The Pueblo Chieftain

ALAMOSA — The Alamosa City Council and County Commission received encouragement from U.S. Army Corps of Engineers Maj. Gen. Jerome Hilmes on a water project here Friday.

Hilmes told officials that if benefits of a Rio Grande levee project outweighed the cost of the project, Corps funds might be available to assist with the project.

Hilmes, who heads of the Corps' Southwest Division administered out of Dallas, Texas, was in the San Luis Valley Friday to fly over the Rio Grande and to look over the controversial Horca Subdivision in Conejos County.

He will announce Monday whether Horca developers can have a clean water permit allowing them to develop wetlands at the site.

Alamosa will not receive word until at least September whether its project is eligible for the Corps' small projects' funds. It also is awaiting a decision on whether the Corps will issue a 404 permit, allowing work on the river to replace levees to prevent flooding in the city during high-water years.

Lt. Col. David Peixotto, who heads the Corps' Albuquerque District which comes within Hilmes' purview, told the group the Corps seldom finds a situation where the city, county and state "are struggling to help themselves."

Hilmes said if the Corps approves the river levee project as a small project, construction could begin in 2 to 2½ years. Small projects are those under $4 million. However, there is a bill before Congress which would raise the limit to $7.5 million, Hilmes said.

Local governments are putting $1 million into the levee reconstruction.

Alamosa County Administrator Gary T. Suiter, asked to review the city and county's flood control efforts on the Rio Grande over the past 14 months, told Hilmes the efforts the governments, with the technical assistance from other agencies including the Corps, took to thwart a flood this year.

In June 1985, the peak flow was "the highest in 58 years" and caused quite a scare, Suiter said. However, the flow was really what could be expected in 10 or 15 years. This past year, work has been done on the river, including dredging and removal of willows and debris.

High water was not expected this year, but it came: 1,000 cubic feet per second more than last year. However, because of the flood control efforts, the high-water actually was a foot lower at Alamosa than last year, Suiter said.

What is needed now is replacement of the levee system, built about 40 years ago as a a community project of various materials such as sand and gravel which do not compact well, Suiter explained.

Work on the Rio Grande at Alamosa is proposed in stages.

Flood project cost to affect completion

By RUTH HEIDE
Alamosa County Editor

If a multi-phase long-term flood project along the Rio Grande River through Alamosa could be done for less than $4 million, construction could begin, with Army Corps of Engineers help, within two years.

If the project will take more than $4 million, construction could take twice as long to get going, if the Corps decided to help with it.

Corps Major General Jerome Hilmes, commander of the southwest division, explained the process to Alamosa city and county officials Friday after a helicopter tour of the river.

Colonel David Peixotto, who directs the Corps in this area from Albuquerque, N.M., headquarters, said that the Alamosa project is one of the top four or five projects which the Albuquerque Corps is dealing with. He said that a Corps preliminary status report is "on course" for September.

After the report comes out in September, Alamosa area residents will know how much the proposed flood control project will cost, according to the Corps, and whether or not the Corps feels it would be worth its trouble to become involved.

The first phase of the project, from the railroad to the highway bridge, is already scheduled for construction according to Corps standards but without Corps funds at this point. A 404 permit to work on the river is "on its way with conditions attached" county administrator Gary Suiter said. Some of the conditions deal with vegetation, wildlife and access concerns expressed during a public hearing last week.

Suiter said that the Corps had been involved in planning and technical assistance. The funding for the first phase, however, has come from block grant funds and emergency state assistance. So far about $960,000 has been raised to deal with the first phase, and possibly part of the second phase, Suiter told the Corps representatives Friday.

Suiter told them that one of the city/county goals with the flood project is to remove Alamosa from the 100-year flood plain.

Hilmes said that an omnibus bill is before the national legislature. If passed, the bill would allow approval of several projects that had been delayed. It would also give project coordinators more options in their share of the cost.

In addition, one part of the bill would raise the small project $4 million limit to about $7.5 million. This part of the bill was "fragile," Hilmes said and could be axed from the final version of the bill.

Small projects, under $4 million, move faster than larger projects, Hilmes said. A small project, if approved by the Corps, could begin construction in two to 2½ years, while a large-scale project might not get going until 1990.

He termed the Alamosa project "well defined" and both he and Peixotto expressed favorable comments about the local project but would not commit themselves to Corps involvement until after the September study comes out with cost/benefit analysis.

EXPLAINING THE CHANCES — Army Corps of Engineers major general Jerome Hilmes speaks to officials about the city and county chances of Corps funding and construction of a levee project in the next few years. Listening are, from left, Alamosa mayor Farris Bervig, councilors Larry Jaramillo and Ron Seybold and Alamosa county commission chairman Pat Herrera.

6-26-86 (Courier photo by Ruth Heide)

Flood project to begin

A contractor has been approved and construction will likely begin the end of this month on the first phase of the levee reconstruction project on the Rio Grande River in Alamosa.

Last week the Alamosa city council approved a $732,976 low bid for Southway Construction to work on Phase I of the flood project. This will include the north and south banks of the Rio Grande River from the railroad bridge to U.S. Highway 160.

The estimate for the bid was $842,000, according to grant director Charles Manzanares. Other bids included $778,217 from Andrew Construction, $823,889 from Stan Miller Construction and $966,176 from Kirkland Trenching.

Money for this first phase will come from block grant funds allocated in 1984 ($400,000), impact assistance funds from 1985 ($200,000) and possibly block grant funds of $360,000 from this year. The city also hopes to acquire more impact assistance funds. The council approved the bid provided this year's grant money could be used on the project.

Any money left from this year's block grant funds will be used for construction inspection and testing ($20,000-24,000), administration and engineering for Phase II. The engineering company which designed the work offered to do inspection for $68,000, according to city manager Greg Sparks, but the city will be able to save about $40,000 going locally.

Manzanares said about four property owners had not yet signed agreements with the city and county, but these must be acquired before levee reconstruction. Two public meetings were held prior to the Phase I bidding, and citizens voiced concerns dealing with environment and privacy. A permit to allow the city and county to work in the river addressed some of these concerns. Agreements with property owners also addressed some of the concerns.

9-9-86

River levees meeting topic at Alamosa

By ERIN SMITH
Chieftain Correspondent

ALAMOSA — Public meetings and hearings will be held during reconstruction of the levees along the Rio Grande, Alamosa County Administrator Gary Suiter said Wednesday.

Recently, the city and county of Alamosa became the recipient of $360,000 in Community Development Block Grant funds from the Colorado Department of Local Affairs for levee rehabilitation along the Rio Grande.

The Alamosa governments had applied for $800,000 in the funds for Phase II of the levee rehabilitation. The Alamosa grant was the second highest approved in the state. Logan County's revolving loan fund received the highest grant, $400,000.

Alamosa's request for $800,000 was the largest request from among 37 which reached the hearing stage in March. Requests totaled $14.3 million, but only about $6.2 million was available and the local governments were anticipating they would not receive the entire requested amount.

The $360,000 will be used to rehabilitate levees on the Rio Grande from the U.S. 160 bridge to the State Avenue Bridge, but Suiter said he did not know which side of the river would receive the work.

Phase I will not begin until August. That phase involves levee rehabilitation between the railroad trestle and the U.S. 160 bridge.

A final design is not complete on Phase I or II, Suiter said.

Some work has been done on the river already. The work was done last year under an emergency 404 permit and involved sandbar reduction, rechanneling and some levee reconstruction. The latter was under a 404 exemption, Suiter explained.

Willow trees along the river were cut back to four or five feet high to buffer the levees.

Work along the levee on the north river bank in the area of the golf course is necessary, not simply to protect the golf course but to keep the water from breaching the levee and flooding East Alamosa, Suiter said.

Suiter said officials frequently are in touch with property owners along the river regarding the proposed levee work.

It is unlikely the $360,000 will pay for all of Phase II, which will not begin until Phase I is completed, but the city and county are checking other sources for money, Suiter said.

Gary Suiter
. . . county administrator

5-8-86

NEWSPAPER ARTICLES
ALAMOSA, COLORADO

The Pueblo Chieftain
Wednesday, December 10, 1986

Alamosa levee project is model of cooperation

By ERIN SMITH
The Pueblo Chieftain

ALAMOSA — Alamosa's Rio Grande levee project is a model project as far as state-local cooperation are concerned, Alamosa City Manager Greg Sparks said during a tour of the levee renovation work here last week.

When the city and county of Alamosa first wanted flood-control work on the river, the state suggested a flood-control district, maintaining there might be jurisdictional squabbles between the local governments.

The local governments prevailed and proved the state wrong. The working relationship is "perfect," Sparks said.

One thing which has helped is having a community development block grant director hired by the city and county.

Phase I of the levee project stretches from the U.S. 160 bridge south to railroad bridge. Other stages, still to be tackled, stretch upriver.

Phase I involved clearing 400 trees, brush and other shrubs from the levees and widening the banks, which had been trails.

The levees can now accommodate vehicles.

Upon completion, they will be closed off with access gates allowing maintenance only.

Upstream, people have used the levees for jogging and biking trails. They will remain as such upon renovation, but the levees downstream have not been used that way.

Some residents, such as William Minter, even run fences across the levees to keep trespassers out. Where there were fences, the fences will be replaced.

The levees will be seeded with a variety of native grasses next spring.

Overseeing the work is an inspector, geologist D.H. "Mac" McFadden.

McFadden explained that the levees are may by laying a layer of earth at a time and compacting it.

Running parallel and under the levees are 8-inch perforated pipe to intercept seepage from the river. Seepage will be carried to a pump vault and pumped back into the river. The pipe runs for 5,400 feet on both sides of the river, Sparks said.

Construction cost of this phase of the levee project is $750,000. Local contractors are being used, with Southway Construction Co. of Alamosa the primary contractor and Alcon Construction a subcontractor.

The U.S. Army Corps of Engineers, the Colorado Water Conservation Board and the U.S. Bureau of Reclamation have been on site several times to make sure the project is going well.

Several unusual aspects of the project were noted by Sparks and CDBG director Charles Manzanares. This is the first time the Corps of Engineers certified a levee it hasn't built itself. This also is the first time a Corps-related project has been managed by local residents.

The project's design has met Corps criteria, local officials said.