

**LOCAL PRE-DISASTER FLOOD HAZARD
MITIGATION PLAN**

**Model Prepared By
The Colorado Water Conservation Board
Colorado Department of Natural Resources**

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Preface

There will continue to be flood disasters in Colorado in the future. Their impacts will depend largely upon where they occur. In areas of large population, the potential for damage is generally greater while in less populated rural areas the damages are usually smaller, at least in dollar amounts.

In the past, the Federal Emergency Management Agency (FEMA), the Colorado Water Conservation Board (CWCB), the Colorado Office of Emergency Management (OEM) and other organizations have responded to disasters, providing much assistance to people in terms of food, shelter, clothing and restoration of public and private facilities. Since these efforts are vitally important, they will continue.

If we do no more than respond to disasters, the problems will come back and we will not have learned from our mistakes or made anything better. Mitigation means that we are going to learn from past mistakes and that we aren't going to repeat them. FEMA's newly created Flood Mitigation Assistance Program (FMAP) will go a long ways to accomplishing just that. The program fund will allow communities to develop *Pre-Disaster Flood Hazard Mitigation Plans*. The plans will contain strategies, approaches, actions and recommendations for projects which, when implemented, will mitigate and reduce future flood losses. Long range planning is one of the key ways to break the disaster-recovery-disaster cycle. It will insure that once a Colorado community has implemented pre-disaster flood mitigation measures, it will be able to withstand the kind of economic distress, endangerment to life and environmental degradation that we have seen all too often in the past.

Acknowledgment: Parts of the information contained in this document were excerpted from the *Flood Hazard Mitigation Planning Manual*, Northeastern Illinois Planning Commission, 1995. This draft document was presented in a classroom setting by Mr. French Wetmore at the 19th Annual Conference of the Association of State Floodplain Managers in Portland, Maine on May 26, 1995. Participation in the ASFPM provides other States and agencies the opportunity to cross-share information and data to achieve the ultimate goal of flood hazard reduction in the United States. We gratefully acknowledge the use of this document in preparing Colorado's manual and the benefits that will be afforded our citizenry.

Floodplain Management

The implementation of a comprehensive program of floodplain management is necessary for the long-term success of a community's flood mitigation strategies. Floodplain management is a continuous process of making decisions about **whether and how** floodplain lands and waters will be used. It encompasses:

- 1) the choices made by owners of floodplain homes and businesses,
- 2) decisions made by officials at all levels of government,
- 3) development plans made by owners of commercial flood prone land, and
- 4) the judgments of farmers with pastures and fields stretching to the riverbanks.

The success of floodplain management at any scale depends on the collection and utilization of engineering and administrative information. The process of floodplain management draws upon that information to improve the likelihood of sound decision-making regarding the uses of floodplain land. Effective management requires prompt but careful decisions that are compatible with the risks and resources inherent to floodplains. If such decisions are not made unwise development or other uses will occur that will prove unacceptably costly in the long run. Floodplain management promotes activities on floodplain land that are compatible with the risks to human life and property from floods with the risks to the floodplain's natural functions posed by the human activities.

Local Pre-Disaster Flood Hazard Mitigation Plan

1. Introduction

In recent years, the City of La Junta and Otero County, Colorado have grown slowly but surely. This growth has included the paving of undeveloped land areas with parking lots, subdivisions, etc. These activities have increased overland run-off in the community by reducing the amount of area where heavy rainfall can be absorbed by the soil. In the past 3-5 years, heavy summer thunderstorm events have caused the Arkansas River to flow at higher levels than any of the citizens can remember. In the summer of 1997, a cooperative effort between city and county officials was launched to acquire, if necessary, then demolish vacant and unsafe structures in the floodplain. Officials contacted the Colorado Water Conservation Board and the Colorado Office of Emergency Management to seek recommendations for solutions to the identified problem. Both agencies recommended the development of a Flood Hazard Mitigation Plan. This document is the result of the subsequent planning effort.

The purpose of this Pre-Disaster Flood Hazard Mitigation Plan is to 1) identify the critical flood hazard issues for the city, county and surrounding area, and 2) identify pre-disaster mitigation activities and techniques that can be implemented to reduce future flood losses before they occur. The Colorado Water Conservation Board has developed a model Pre-Disaster Flood Hazard Mitigation Plan for Colorado's communities with support from local, county, state and federal personnel.

2. Community Description

La Junta is located in the fertile Arkansas River Valley in the southeastern section of Colorado. It is the county seat of Otero County and is located in east central Otero County. This section of the Arkansas River Valley is a rich agricultural and stock raising territory, which is the basic economy of the area. This economy has been fairly stable through the years.

The floodplains north of the Arkansas River are approximately one mile in width, very flat and bordered on the north by low bluffs or hills. Land along the north side of the river is largely agricultural, although approximately one mile, through North La Junta and La Junta Gardens, is fairly densely developed as a residential area.

Tourism is also a source of income. Eight miles east of La Junta is Bent's Old Fort National Historic Site. The fort was once important as a fur-trading post, Indian rendezvous, advance base in the war with Mexico and way station on the Santa Fe Trail. La Junta is also the home of the nationally known Koshare Indian Explorer Scouts, a group of Boy Scouts who give exhibitions of authentic American Indian dances.

Otero County entered the Regular Phase of the National Flood Insurance Program (NFIP) on August 19, 1985. Streams in the county which have the 100-year floodplain delineated by detailed engineering methods are the Arkansas River at La Junta, Anderson Arroyo and King Arroyo and, in a separate study, the Arkansas River and Timpas Creek. The floodplain studies which exists for the community were prepared by Ken O'Brien and Associates, Albuquerque, New Mexico, and MSM Consultants, Inc., of Denver, Colorado. Both contain detailed floodplain information based on topographic information and hydrology for the Arkansas River and its tributaries.

3. Past Flood Hazard Mitigation Activities

Flood hazard mitigation activities can be undertaken before, during or after a flood event. This plan focuses on pre-disaster flood hazard mitigation activities which, when implemented in La Junta and Otero County, will reduce future flood damages. First however, La Junta's and Otero County's past mitigation activities will be described to demonstrate the community's ongoing commitment to the reduction of flood damages whenever funding permits. Past and future mitigation activities will be characterized into two broad categories: 1 - Non-structural flood hazard mitigation, 2 - Structural flood hazard mitigation.

Past Flood Hazard Mitigation Activities

Non-Structural

Flood insurance
Floodplain regulations
Acquisition and relocation
Open space policies

Structural

Channel improvements
Levees
Retrofitting of flood prone buildings

The CWCB encourages Colorado's flood prone communities to seek the implementation of non-structural flood hazard mitigation activities wherever feasible. However, we realize that many

times structural activities are the only viable options a community may have because of local circumstances.

A. Non-Structural Flood Hazard Mitigation in La Junta and Otero County

Flood Insurance

There are three types of insurance one should investigate in order to reduce uninsured losses from floods.

National Flood Insurance: This is a federally-subsidized program that is available to any property owner in a participating community *whether or not* the structure is located in an identified flood hazard area on a community's Flood Insurance Rate Map (FIRM). Insurance is sold through private insurance agents. La Junta and Otero County participate in the NFIP.

Sewer Backup Insurance: This will cover water damage to a structure and contents when sewer lines back up. It is a commercial insurance policy and details will vary from company to company.

Sump Pump Insurance: Several companies will insure for damages caused if a sump fails. Check several companies to see if they carry it and what the policy covers.

More about the National Flood Insurance Program (NFIP): The NFIP is based on an agreement between local Colorado communities and the federal government. The community agrees to implement measures to reduce future flood risk to new construction and substantial improvements in identified Special Flood Hazard Areas as mapped by FEMA on a community's FIRM. Then, FEMA makes flood insurance available within the community as a financial protection against flood losses which occur. The insurance is designed to provide an alternative to disaster assistance to meet the escalating costs associated with the repair of structures and replacement of contents when they are damaged by a flood event. Until the establishment of the NFIP in 1968, flood insurance was generally unavailable from private sector insurance companies.

Flood insurance claims information indicates that 35-40% of all NFIP claims come from outside the 100-year floodplain. The 100-year floodplain, as delineated on the community's FIRM, is the area which the community has agreed to regulate in exchange for flood insurance availability in the community.

Open Space Policies

The La Junta City Council and the Otero County Commission, on Sept. 2, 1997 and Sept. 15, 1997, respectively, adopted a new provision to the city and county code as follows:

"Floodplain lands and adjacent waters combine to form a complex, dynamic physical and biological system that supports a multitude of water resources, living resources and societal resources. Floodplains provide La Junta and Otero County with natural flood and erosion control, water-filtering processes, a wide variety of habitats for flora and fauna, places for recreation and scientific study and historic and archeological sites. They are also the focus of a variety of human activities, including commerce, agriculture, residence and infrastructure. 2. It is the policy of the City of La Junta and Otero County to preserve these natural and beneficial values of floodplains through conscious land use decision making which encourages open space uses in floodplain areas."

Acquisition and Relocation

In 1997 under FEMA's Flood Mitigation Assistance Program, La Junta and Otero County applied for, and were awarded, FEMA funding to acquire and demolish one repeatedly flood damaged structure in the Arkansas River floodplain, as well as demolish an additional nine vacant and dilapidated structures without acquisition. Though a costly proposition, city and county officials are convinced it is a prudent move since this area of the floodplain has been repeatedly flooded from relatively average thunderstorms.

Floodplain Regulations

Upon entrance into the NFIP, La Junta and Otero County adopted the minimum standards of the program. Since detailed mapping, with floodways, had been prepared for the community, FEMA's "D" model ordinance was adopted. The regulations set the performance standards by which development can occur in the community's identified floodplains. La Junta and Otero County exceed the NFIP's minimum standards in one respect. All new residential development must be constructed one (1) foot above the level of the 100-year flood.

B. Structural Flood Hazard Mitigation in La Junta and Otero County

Channel Improvements

The Arkansas River has undergone channel improvements in conjunction with area agriculture, such as the addition of jetty jacks. Otero County funded the improvements and the U.S. Army Corps of Engineers performed labor. However, the preferred and recommended mitigation strategy is to dredge the riverbed, which has not yet occurred due to a lack of funds.

Retrofitting of Flood Prone Buildings

To date, only one structure in North La Junta's small business area has undergone retrofitting as recommended. The retrofitting of other structures, including the replacement of conventional windows at ground level with glass block windows is planned, pending the receipt of financial resources.

4. Current Problem\Issue Identification

A. Flood Hazard Inventory

The first step in the flood hazard inventory process is to define the flood hazard. To undertake this process, one should review the flood history of La Junta and Otero County. One important area of focus of the Flood Mitigation Assistance Program will be repetitive loss areas. Neither La Junta nor Otero County has repetitive loss properties, as is evidenced in a report dated November 6, 1997 provided by ISO. The local pre-disaster flood hazard mitigation plan should focus on such areas because of the often-disproportionate amount of flood damage that occurs here. If repetitive loss properties are identified in La Junta or Otero County, the local flood hazard mitigation plan will be revised to address these issues.

1. History of Flooding

Historical records reference many floods in the Arkansas River Valley above John Martin Reservoir. The earliest known in the area occurred in 1826. The next notable flood was in 1844. Other reported floods: floods in the 1800's occurred in 1859, 1864, 1869, and 1894. These floods were generally confined between Pueblo and the present John Martin Dam. Major floods were experienced at various localities in the subbasin in 1921, 1935, 1942, 1955, and 1965. The flood of 1921 was the greatest flood of record on the Arkansas River at La Junta.

In addition to flooding from the Arkansas River, King and Anderson Arroyos have flooded La Junta, with flooding reported to have occurred in 1886, 1965, 1969 and 1972.

2. Flood Descriptions

July 1886: A large flood occurred in the valley below the confluence of the Purgatoire River during the period of July 20-25, 1886. This flood was produced by rainfall with heavy amounts occurring in the vicinity of Las Animas and La Junta. At Las Animas there were 3.36 inches of rainfall on July 24 and 25. At La Junta water reportedly came down King Arroyo in a 12-foot wave. In Anderson Arroyo water was at least 20 feet deep and overtopped the AT&SF Railway Bridge.

June 1921: Two areas of intense rainfall were observed above Pueblo. One of these was mostly north of the towns of Florence and Canon City. The other was fairly well distributed on both banks of the Arkansas River between Portland and Pueblo. Precipitation in this latter area is reported to have been as much as 11 inches in six hours while in the other area it was reported to have been as much as nine inches in six hours. The rainfall in the upper area was reported to have occurred first so that runoff combined with that below to produce the largest flood of record at Pueblo. The peak discharge of 103,000 cubic feet per second occurred at midnight on June 3. Above La Junta the effect of valley storage on peak attrition was obscured by the inflow from tributary streams and the peak discharge at La Junta was 200,000 cubic feet per second. North La Junta was flooded; water was four to six feet deep on Second Street and reached the Otero County Jail. It was reported that 13 persons were drowned although some of the bodies were not found until June 9. Areas in the Huerfano and Purgatoire Rivers and in Timpas, Adobe, and Horse Creek were flooded. Heavy rains occurred on the main stem of the Arkansas River from La Junta to Lamar. Below La Junta tributary inflow was small.

May 1955: During the period of May 17-20, heavy precipitation occurred over the lower mountains and plains of eastern Colorado, northeastern New Mexico and western Kansas. Precipitation over the mountainous areas was principally in the form of wet snow. The storm began on the afternoon of May 17 over the entire area and continued through the 19th in New Mexico and Kansas. At Lake Moloya, near Raton, New Mexico, 13.59 inches occurred in 48 hours, with 11.28 inches measured during the 24-hour period ending at 4 p.m. on the 19th.

Major flooding occurred in the Arkansas River watershed from Pueblo to John Martin Reservoir. The Arkansas River at Pueblo peaked at 11,100 cubic feet per second and produced very little flooding. As the flood progressed downstream, the peak increased to 50,000 cubic feet per second at La Junta and caused major flood damage to North La Junta.

There were 236 residents, five businesses, one school, and one church in the flooded area of North La Junta. Streets and public utilities were heavily damaged as well as individual water supply and sewage disposal systems. A low levee to protect against minor overflows on the Arkansas River was lost and two bridges were damaged. National Guard assisted in the evacuation of 500 to 1,000 people in North La Junta.

About 300 residences were flooded in La Junta, eight to 10 blocks on the south side of town flooded. Damages were estimated at \$400,000. A county bridge west of town washed out. The Arkansas River crest at La Junta was 14.2 feet (about 54,000 cubic feet per second) at 1:30 p.m. on May 20.

May 1969: Flood flows from Anderson Arroyo damaged about 35 residences and businesses in La Junta. This flood also damaged a sanitary sewer line, city streets, farmsteads, croplands and fences. A few head of livestock were lost and some hay was damaged or washed away. The total estimated damages for this flood amounted to \$144,000. Some minor damage occurred to the Otero Canal. This canal crosses Anderson Arroyo about five miles upstream from the mouth.

Similar types of damage were experienced in 1965 and 1972, except to a lesser degree.

After several decades of work and dollar investments to address flood problems in La Junta and Otero County, the immediate threat to human life has been minimized. Other flood losses (public and private property damage, injuries, disruption and disaster relief) continue to rise, and the natural resources provided by floodplains are still being degraded. These two phenomena are due to channel problems in the Arkansas River itself, particularly possible channel aggradation currently under study by the Colorado Water Conservation Board and the U.S. Army Corps of Engineers, Albuquerque District. Also, there is increasing pressure by developers to construct residences and businesses in the floodplain.

The main area of concern in La Junta and Otero County is the 100-year floodplain in the North La Junta area. Most of the structures in this area have basements that were constructed before the community entered the NFIP. If structural and non-structural mitigation activities can be implemented it will ultimately reduce flood losses in the community.

B. Flood Situation

1. Flood Season and Flood Characteristics

Storms over the upper Arkansas Basin can be of the general type characterized by low-intensity, long-duration rainfall over a large area, and a short duration rainfall and high intensity over a small area. The former is most prevalent during the autumn, winter and spring seasons. Thunderstorms are most active during July and August, although the two largest and most destructive floods of record occurred during the month of June when general storms concentrated in a series of intense cloudbursts over the foothills and plains areas.

Floods on the Arkansas River are of two general types. "spring floods" which result from melting snow and are often augmented by storm runoff represent one type. "summer floods" which result entirely from storm runoff represent the other type. The spring floods are characterized by comparatively moderate rates of flow of long duration with large volumes of runoff. The summer floods are characterized by high peak rates of discharge with relatively smaller volumes of runoff.

2. Factors Affecting Flooding and Their Impact

Obstructions to Flood flow: Obstructions, natural and manmade, within floodways impede flood flows, creating backwater and increased heights. Debris washing downstream during floods often collects against bridges or within restricted flow areas, reducing waterway openings and impeding the flood flow. This creates a damming effect and, depending on the degree of clogging, causes greater backwater depths with increased over-bank flooding. Also, a pronounced increase in flow velocities usually occurs downstream from an obstruction, thus extending the flood damage potential. Manmade obstructions on or over the floodway such as dams, levees, bridges and culverts can also create more extensive flooding than would otherwise occur.

Flood Damage Reduction Measures: Levees have been constructed along the Arkansas River by local interests but are substandard in design and material. These levees are generally ineffective in preventing large floods and in some instances such as during the June 1965 flood, damages might have been less without the existence of these levees.

Proposed Local Protection Project: Cleaning debris vegetation to maintain capacity of King and Anderson Arroyos.

C. Flood Hazard Data

1. **Sources of Water:** Flooding on the Arkansas River results from the annual snowmelt in its headwater regions, which is augmented by periods of very heavy rain. Historical data indicates that peak discharges on the river are closely related to heavy thunderstorm rainfall originating downstream of Pueblo. This type of cloudburst flow in the river is characterized by high peak flows of short duration. Flooding due to snowmelt is usually abated as the river reaches the plains, and has had little impact upon the area. Pueblo Reservoir controls approximately 40% of the area's watershed, consisting of the upper reaches and headwaters of the Arkansas River. This major flood control structure has a large impact on flood flows in the vicinity of Pueblo, but has had only limited effect on flood flows in the La Junta/Otero County area.
2. **Depth of Flooding:** Flood depths are varied, ranging from three to more than 11 feet. For a full range of flood frequency, elevation and discharge data for the area, please see Table 1, attached.
3. **Velocities:** Local flooding is relatively low velocity flooding. For full details, please see Table 1, attached.

D. Problem Assessment

1. **Land Use and Buildings:** Developments in the floodplains include residential, commercial and industrial. The City of La Junta occupies about two miles in the central part of the southerly flood plain of the Arkansas River. North La Junta and La Junta Gardens are fairly densely developed residential areas occupying approximately one mile of the north bank floodplain of the Arkansas River. Also, the mainline of the Burlington Northern/Santa Fe Railway Company and a branch line from La Junta to Denver traverse the floodplains.
2. **Critical Facilities:** Critical facilities located in the floodplains include the City of La Junta's well fields, from which the city draws its water; the Otero County Sheriff's Office, which is the center of the county's emergency services; and Wallace Oil

Company and the Arkansas Valley Co-op, where toxic, explosive and flammable material is stored in tanks and similar floatable containers, if unrestrained, could be carried downstream to threaten areas far removed. Also considered critical is the North La Junta Bridge and Colorado 109 where, if closed, access to North La Junta and La Junta Gardens would be cut off to emergency vehicles, other than a more 'round about way via Swink, north on County Road 24.5, and back into North La Junta via County Road 28

3. **Natural Areas:** The Arkansas River floodplain lands and adjacent waters combine to form a complex system of water, living and societal resources, natural flood and erosion control, water filtering processes and a variety of habitats for flora and fauna, as well as a focus for human activities such as commerce, agriculture, residence and infrastructure.
4. **Future Development:** Planning commissions for both the City of La Junta and Otero County have developed comprehensive land use plans, which address floodplain development, zoning and other land use regulations. Additionally, upon entrance into the NFIP, La Junta and Otero County adopted the minimum standards of the program, and set regulations to monitor development. La Junta and Otero County exceed the NFIP's minimum standards in one respect: all new residential development must be constructed one (1) foot above the level of the 100-year flood.
5. **Problem Statement:** The base flood on the Arkansas River affects approximately 150 homes, 12 businesses and six light industries. This is the area mapped as the "A Zone" on the Flood Insurance Rate Map.

Flooding on the Arkansas River affects about 100 homes in the North La Junta and La Junta Gardens Subdivisions. This area faces the greatest threat and most frequent damage from flooding and is designated **Priority Area #1**. (Area identified on attached maps as plate(s) 5,6,7,8,9,10,11,12.)

Critical facilities in the Arkansas River floodplain are the City of La Junta's well fields from which it obtains its water; the Otero County Sheriff's Department, the North La Junta Bridge and Colorado Hwy 109. While flooded only twice during the last 50 years, the impact of flooding on the water well field is so great that it is designated as **Priority Area #2**. (Area identified on attached maps as plate(s) 6,11.)

The Arkansas River floodplain is a unique local asset that should be preserved and protected. It is designated as **Priority Area #3**. (Area identified on attached maps as all plate(s) 1 through 15.)

Sewer backup and poor local drainage is a problem for buildings with basements and split level homes throughout town.

Flooding and storm water problems can be expected to worsen unless corrective action is taken to straighten and dredge the Arkansas River channel. Currently, a channel restoration study is underway. Recommendations from the study will address actions that can be taken to improve channel conveyance.

5. Future Flood Hazard Mitigation Activities

1. Prevention:

Steps have already been taken by La Junta and Otero County officials as regards: planning, acquiring and demolishing vacant and unsafe floodplain structures, and in regulating the development or land use to keep problems from getting worse. The building, zoning, planning and land use offices of each entity administer preventive measures.

2. Property Protection:

Protecting individual buildings or properties from flood damage is the responsibility of property owners, although government agencies will provide information and technical or financial assistance to the owners as such assistance becomes available.

3. Flood Control:

Flood control activities for both La Junta and Otero County are outlined in this plan, including those that address both structural and non-structural abatement measures. The measures are the responsibility of both homeowners and government engineers and managed by public works staff.

4. Emergency Services:

Measures that are taken during a flood to minimize the impact. These measures are the responsibility of the Otero County Sheriff Department's emergency management staff and the owners or operators of critical facilities. All such measures will be coordinated with other departments of city and county government.

The activities listed below are those for which the City of La Junta and Otero County will seek funding from FEMA's Flood Mitigation Assistance Program (FMAP). When implemented,

they should almost totally reduce the community's flood hazard vulnerability. In addition, the natural and beneficial values of floodplains in the community will be preserved and enhanced.

Non-Structural Flood Hazard Mitigation

1. Creation of Wetlands and the Wetland Banking Program

As an integral part of La Junta and Otero County's Pre-Disaster Flood Hazard Mitigation Plan, wetlands within floodplain areas will be created. Their creation will constitute a "bank". The wetlands will be similar to "new funds". When and if, wetlands are impacted outside the 100-year floodplain due to development, these "new funds" can be used as payments for the loss.

2. Flood Insurance

Through an improved education program with local insurance agents and lenders, La Junta and Otero County proposes to increase its flood insurance policy base by 5 percent a year for the next 5 years. Current coverage is 18% of all structures in the 100-year floodplain in the community. Workshops for lenders and agents will be intensified in the community. Community officials will provide local lenders addresses and owners names located in the identified 100-year floodplain. Following the workshop, floodplain residents will be invited to a "town meeting". The advantages of purchasing flood insurance will be presented as well as retrofitting techniques that can be undertaken by individuals to reduce future flood losses.

3. Acquisition and Relocation

Acquisition is a mitigation technique whereby flood prone properties are acquired/purchased by an entity (usually governmental) and removed from the site. The property is then usually left as open space in perpetuity. Relocation is a mitigation technique whereby flood prone properties are moved out of the flood hazard area to a safe location and the site is left as open space.

When funding is available, La Junta and Otero County plan to acquire remaining homes and move them to a non-flood prone location. Once this action has been completed, the City of La Junta and Otero County will designate the area as open space by resolution. In addition, a deed restriction will be placed on the property to assure that open space will be the use of the property in perpetuity.

Structural Flood Hazard Mitigation

2. Retrofitting of Flood Prone Buildings

The City of La Junta and Otero County, long range, would like to replace all conventional ground level windows in residences and businesses with 4-inch glass blocks. Doorway entrances to lower floors will be protected by concrete block floodwalls one foot higher than the base flood elevation at each location. These entrances will require persons to step up before descending.

La Junta and Otero County will seek FMAP funding to implement the structural and non-structural flood hazard mitigation measures described above. Upon receipt of full funding, completion of all activities except increasing the flood insurance policy base will be accomplished in 12 to 24 months, per phase (i.e. 12 to 24 months for each separate mitigation measure).

6. Coordination

A. Why Coordinate?

Experience has shown that mitigation plans get implemented when flood concerns are allied with other community needs and goals and other agency's programs. Coordination insures that mitigation activities do not conflict with others' plans for an area. Coordination also facilitates the sharing of limited funds and resources to accomplish goals in the plan. There are usually citizens who want more and better parks in the community. Such funding programs for these activities might be used to pick up the cost of acquiring flood prone structures in a community's flood hazard areas when parks are proposed for these areas. Coordination also helps maintain waning interest in projects that may take a long time to accomplish. Lastly, funding programs may require applicants to have their programs coordinated with other agencies. Often other sources of funding must be exhausted before other program funding can "kick in". Both of these needs can be met through coordination among all parties.

B. Community Needs and Goals

A flood hazard mitigation plan must be consistent with, and even supported by, other plans for the community. Flood hazard mitigation planning will be integrated into existing planning efforts so that flood issues are incorporated into a community planning staff's regular duties.

C. Other Resource Agencies

There are many agencies that can impact future activities in a community's flood hazard area. A planner or community official needs to contact these agencies during the hazard inventory and problem assessment phase of plan development. This will determine if they have information that can help the planning effort and see if they are interested in participating in the effort.

Coordination with other agencies can be combined with technical assistance. For example, during the discussions on emergency services, the planner can invite the National Weather Service (NWS) to the committee meeting. The NWS can advise the planners about flood warning and who can help establish the system. At the same time, the planner can advise the NWS about the local flood situation and see if there are any plans for installing warning gages in the area.

D. Review Mitigation Measures

As part of the planning process, all proposed activities should be examined annually. The simple and inexpensive mitigation measures should be implemented as soon as possible.

7. Public Input

Public officials concerns about flooding and mitigation don't always mesh with the concerns of private citizens. The concerns of citizens must be incorporated into the Pre-Disaster Flood Hazard Mitigation Plan. This method embodies the "bottom-up partnership" approach to floodplain planning. It is important to let all citizens have an opportunity to review and comment on the draft plan. Therefore, a public meeting is recommended even when there is a planning committee that incorporates public involvement.

The public needs adequate notice and information about the plan well before the public meeting. Prior to the plan adoption process, the City of La Junta and Otero County will provide notice to the local citizenry. Either a legal notice in the community newspaper will accomplish this or notices sent to individual floodplain residents. People will be notified where they can obtain a copy of the draft plan before the public meeting. At least one public meeting to obtain public input will be held two weeks prior to submittal of the recommended plan to the community's governing body.

8. Action Plan

Recommendation 1. Flood Control Measures

What: Prepare a flood threat recognition system that uses the State Engineer's Water Talk Network to access current flow data on the Arkansas River. Determine at what flow level (cfs) emergency action measures are to be implemented. This can be accomplished by placing a staff gauge upriver of North La Junta and correlating flows from the flood profiles in the Local Flood Hazard Mitigation Plan.

Who: Otero County Sheriff and La Junta Public Works Director in conjunction with the State Engineer's Water Talk Network.

When: Have monitoring system in place by August 1998.

Supporting Agencies: Colorado Water Conservation Board, Federal Emergency Management Agency.

Budget: County, City operating funds to be reimbursed from the state, if funds are available.

Recommendation 2. Property Protection Measures

What: Notify area residents of flood threat. Use a news release with 1.) snowpack conditions and impending threat, 2.) availability of flood insurance.

Who: La Junta City Manager, Otero County Administrator, Director of Public Works.

When: Have news releases published in the next issue of the community's newspaper.

Supporting Agencies: Colorado Water Conservation Board.

Budget: Otero County, City of La Junta operating budgets.

A. Select Appropriate Measures

Some measures will fall out during the planning process. They will be obvious and easy to implement. However, the plan should still systematically review each proposed flood mitigation measure and discard it only after the following questions are answered in the negative:

- Is the measure technically appropriate for the hazard?
- Is the measure appropriate for the community's needs and goals?
- Is the measure affordable?
- Are the measure's benefits worth it compared to the cost of the measure?
- Will the measure comply with all local, state and federal regulations?
- Does the measure have a beneficial or neutral impact on the environment?

9. Adoption

Draft resolutions will be considered at public meetings of both La Junta City Council and Otero County Commissioners.

10. Implementation and Evaluation

A. Responsibility

1. City of La Junta: Assistant City Manager Rick Klein, P.O. Box 489, La Junta, CO, 719-384-3636, FAX 719-384-7231.
2. Otero County: Land Use Administrator Kathy Ehrlich, P.O. Box 511, La Junta, CO, 719-383-3035, FAX 719-383-3090.

B. Monitoring System and Evaluation Plan

In creating this flood hazard mitigation plan, Otero County and the City of La Junta will impact public safety, thus making Southeastern Colorado a more secure place in which to live, do business and raise a family.

The plan will formally structure and jointly coordinate the activities, resources and functions of participating entities. Thus, it is anticipated that the plan will herald new horizons of cooperation between local governments, resulting in expanded future efforts at collaboration.

Responsible parties for both the city and county, Klein and Ehrlich, will collect and report statistics and anecdotal data, in addition to progress in achieving the project's objectives, identifications of changes needed, challenges and obstacles identified and/or overcome and project impact on the community.

In addition, Klein and Ehrlich will identify and describe what data will be collected, from what source the data will come, how often it will be collected and how it will be collected. Based on the results of the data collected, they will jointly create a cost-benefit analysis for the project.

Bibliography and References

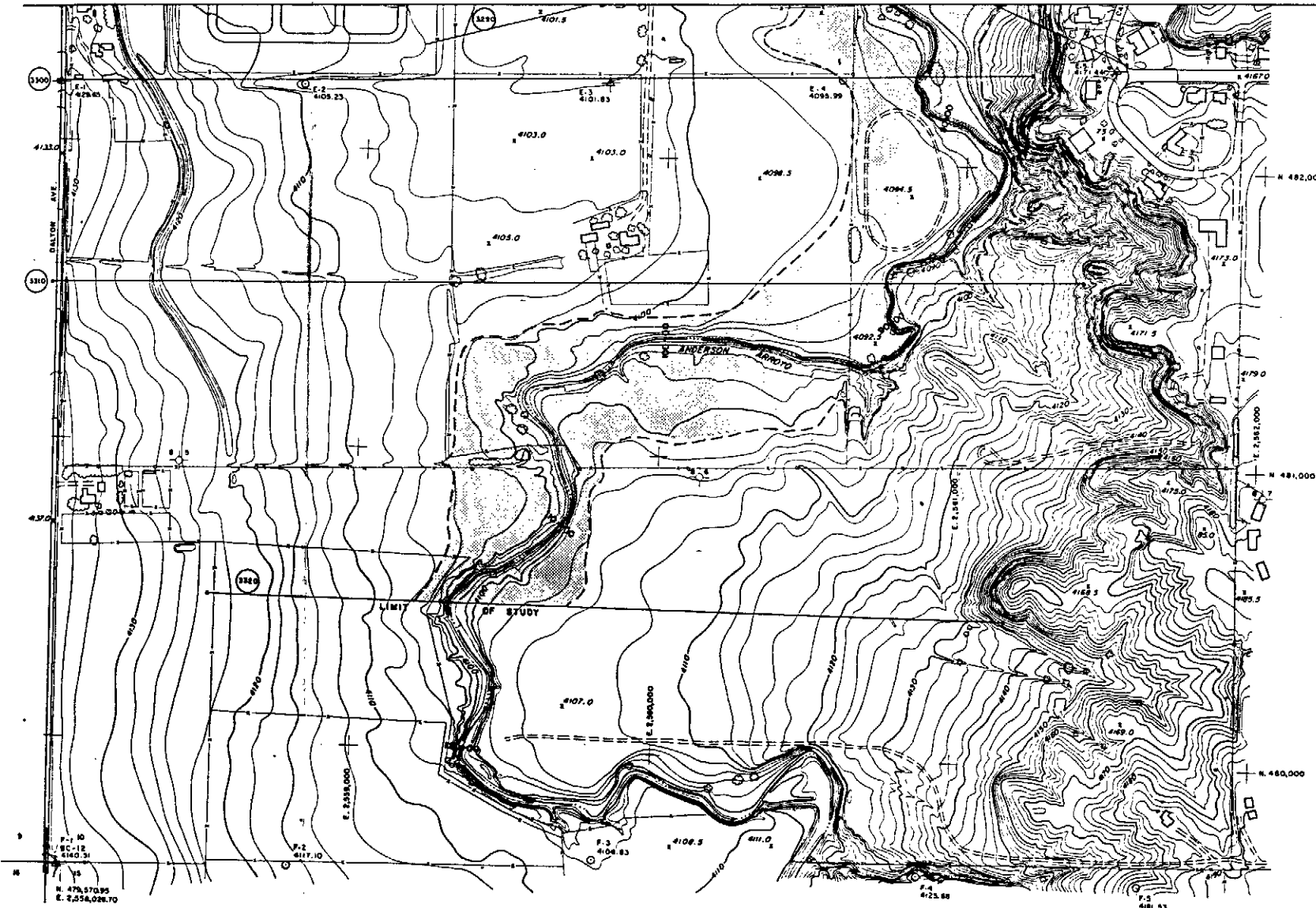
1. *City and County of Pueblo Flood Hazard Mitigation Plan*, Colorado Office of Emergency Management, August 1994.
2. *A Unified National Program For Floodplain Management*, Federal Interagency Floodplain Management Task Force, 1994.
3. *Special Flood Hazard Information*, U.S. Army Corps of Engineers, Albuquerque District, August 1977.
4. *Floodplain Information Report, Arkansas River, Timpas Creek*, Colorado Water Conservation Board, August 1981.

Table 1

FLOOD FREQUENCY - ELEVATION AND DISCHARGE DATA
ARKANSAS RIVER, OTENO COUNTY, COLORADO

CROSS SECTION	REF. POINT	IDENTIFICATION	STREAM BED ELEVATION (FT. NGVD)	10 YEAR FLOOD			50 YEAR FLOOD		100 YEAR FLOOD		500 YEAR FLOOD	
				CREST ELEVATION (FT. NGVD)	PEAK DISCHARGE (CFS)	CREST ELEVATION (FT. NGVD)	PEAK DISCHARGE (CFS)	CREST ELEVATION (FT. NGVD)	PEAK DISCHARGE (CFS)	CREST ELEVATION (FT. NGVD)	PEAK DISCHARGE (CFS)	
92	243+50	D/S Limits of Study	4063.2	4072.0	28500	4075.6	68000	4076.9	92000	4081.5	175000	
93	263+10	-	4066.4	4072.5	28500	4075.7	67000	4076.4	91000	4081.8	175000	
94	295+40	-	4069.3	4079.0	28500	4080.9	67000	4082.1	91000	4084.5	175000	
95	310+50	-	4069.0	4080.3	28500	4083.0	67000	4084.3	91000	4087.3	175000	
96	311+40	Diversion Dam	4069.0	4080.2	28500	4082.9	67000	4084.2	91000	4087.3	175000	
97	321+30	-	4072.4	4081.9	28500	4084.5	67000	4085.8	91000	4088.3	175000	
98	338+30	-	4073.6	4086.9	28500	4089.7	67000	4090.7	91000	4093.3	175000	
99	341+80	Diversion Dam	4076.3	4087.2	28500	4089.8	67000	4090.9	91000	4093.4	175000	
100	353+00	-	4075.0	4087.8	28500	4090.7	67000	4091.9	91000	4094.8	175000	
110	376+50	-	4084.0	4091.2	28500	4093.3	67000	4094.3	91000	4096.7	175000	
120	394+30	-	4087.0	4096.0	28500	4099.2	67000	4100.5	91000	4103.8	175000	
130	411+20	-	4088.0	4098.1	28500	4101.6	67000	4103.1	91000	4106.4	175000	
140	442+10	-	4089.0	4099.1	28500	4102.4	67000	4103.9	91000	4107.5	175000	
144	443+80	A.T. & S.F. Bridge	4089.0	4099.1	28500	4102.4	67000	4104.0	91000	4107.5	175000	
146	444+00	A.T. & S.F. Bridge	4089.0	4099.1	28500	4107.4	67000	4109.1	91000	4112.1	175000	
150	446+20	-	4089.0	4102.4	28500	4107.4	67000	4109.1	91000	4112.1	175000	
160	446+90	-	4089.0	4102.6	28500	4107.6	67000	4109.3	91000	4112.4	175000	
163	468+30	-	4089.5	4102.0	28500	4107.5	67000	4109.3	91000	4112.4	175000	
164	469+10	County Rd 28	4089.5	4102.9	28500	4107.6	67000	4109.3	91000	4112.4	175000	
166	469+30	County Rd 28	4089.5	4102.9	28500	4107.8	67000	4109.5	91000	4112.7	175000	
167	470+30	-	4089.9	4103.8	28500	4107.8	67000	4109.5	91000	4112.8	175000	
170	472+70	-	4090.2	4103.8	28500	4107.9	67000	4109.5	91000	4112.8	175000	
180	503+90	-	4093.8	4104.8	28500	4108.5	67000	4110.2	91000	4113.6	175000	
190	539+20	-	4099.0	4108.9	28500	4110.3	67000	4111.9	91000	4115.4	175000	
200	568+20	-	4101.0	4113.0	28500	4115.5	67000	4116.2	91000	4118.9	175000	
210	629+20	-	4109.0	4117.8	28500	4120.6	67000	4121.9	91000	4125.1	175000	
220	682+60	-	4110.0	4121.1	28500	4124.2	67000	4125.5	91000	4128.8	175000	
230	762+60	-	4121.0	4127.6	28500	4131.5	67000	4132.2	91000	4135.3	175000	
240	807+90	-	4128.0	4136.3	28500	4138.5	67000	4139.6	91000	4142.1	175000	
244	808+50	County Road F-F	4128.0	4135.7	28500	4138.5	67000	4139.6	91000	4142.1	175000	
246	809+00	County Road F-F	4129.0	4135.9	28500	4139.7	67000	4140.8	91000	4143.5	175000	
248	809+50	-	4128.0	4139.4	28500	4139.7	67000	4140.8	91000	4143.5	175000	

MATCH LINE FOR PLATE 4



GRID NORTH

13	14	15
12	11	10
9	8	7
6	5	4
3	2	1

SHEET INDEX

BASIS OF HORIZONTAL CONTROL:
THE COLORADO STATE COORDINATE SYSTEM,
SOUTH ZONE, 1927 NORTH AMERICAN DATUM

U.S.C. & G.S. "HADLEY" 1ST ORDER
X=2,560,893.14, Y=481,347.28, EL. 4407.00'
LATITUDE 37°56'10.82422"
LONGITUDE 103°32'52.95795"
SCALE FACTOR: 0.9999482, ELEVATION: 0.9997993,
COMBINED: 0.9997375

U.S.C. & G.S. "LA JUNTA" 1ST ORDER
X=2,563,948.77, Y=478,870.32, EL. 4147.00'
LATITUDE 37°56'48.782"
LONGITUDE 103°34'30.011"
SCALE FACTOR: 0.9999486, ELEVATION: 0.9997993,
COMBINED: 0.9997478

U.S.C. & G.S. "SOUTH TANK" 3RD ORDER
X=2,563,948.77, Y=478,870.32
LATITUDE 37°57'34.246"
LONGITUDE 103°32'37.278"
(AVERAGE COMBINED FACTOR: 0.9997427)

VERTICAL CONTROL BASED ON U.S.C. & G.S.
1929 SEA LEVEL DATUM

THIS MAP COMPLIES WITH NATIONAL MAP
MAP ACCURACY STANDARDS

TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC
METHODS FROM 6" C.F.L. VERTICAL AERIAL
PHOTOGRAPHY TAKEN MARCH 18, 1976

BELL MAPPING CO.
DENVER, COLORADO

LEGEND

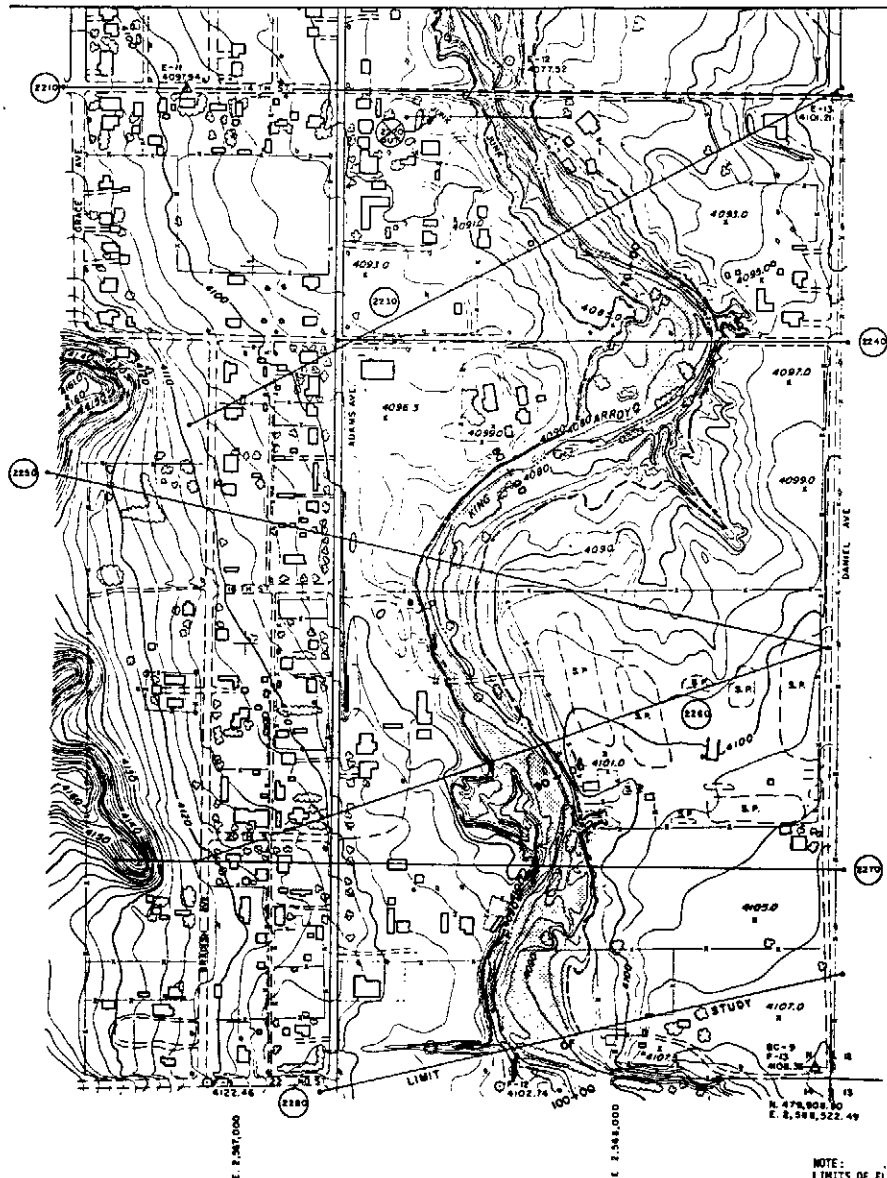
- HORIZONTAL CONTROL
- VERTICAL CONTROL
- CROSS SECTION
- 0+00 STREAM STATION IN FEET
- 100 FEET FLOOD PLAIN

200 0 200 400 FEET
SCALE IN FEET
CONTOUR INTERVAL: 2'

NOTE:
LIMITS OF FLOOD PLAIN MAY VARY
FROM ACTUAL LOCATIONS ON GROUND,
AS EXPLAINED IN THE REPORT.

DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
ALBUQUERQUE, NEW MEXICO
CITY OF
LA JUNTA
ANDERSON ARROYO
FLOODED AREAS
PREPARED FOR
OTERO COUNTY
COLORADO
IN COOPERATION WITH
COLORADO WATER CONSERVATION BOARD
DENVER, COLORADO
AUGUST 1977

MATCH LINE FOR PLATE 3



GRID NORTH

13		14	15
12	11	10	9
8	6	7	5
	4	3	
	1	2	

SHEET INDEX

BASIS OF HORIZONTAL CONTROL:
THE COLORADO STATE COORDINATE SYSTEM,
SOUTH ZONE, 1927 NORTH AMERICAN DATUM

U.S.C. & G.S. "MADLEY" 1ST ORDER
X: 2,810,893.14, Y: 481,347.28, EL. 4407.00'
LATITUDE 37° 58' 10.62422"
LONGITUDE 103° 22' 52.95796"
SCALE FACTOR: 0.9999482, ELEVATION: 0.997993,
COMBINED: 0.9997375

U.S.C. & G.S. "LA JUNTA" 1ST ORDER
X: 2,863,948.77, Y: 478,670.52, EL. 4197.00'
LATITUDE 37° 58' 48.782"
LONGITUDE 103° 34' 50.01"
SCALE FACTOR: 0.9999480, ELEVATION: 0.9997993,
COMBINED: 0.9997479

U.S.C. & G.S. "SOUTH TANK" 3RD ORDER
X: 2,863,948.77, Y: 478,870.52
LATITUDE 37° 57' 54.248"
LONGITUDE 103° 32' 37.278"
(AVERAGE COMBINED FACTOR: 0.99974271)

VERTICAL CONTROL BASED ON U.S.C. & G.S.
1929 SEA LEVEL DATUM

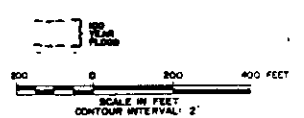
THIS MAP COMPLIES WITH NATIONAL MAP
MAP ACCURACY STANDARDS

TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC
METHODS FROM 6" C.F.L. VERTICAL AERIAL
PHOTOGRAPHY TAKEN MARCH 18, 1976

BELL MAPPING CO.
DENVER, COLORADO

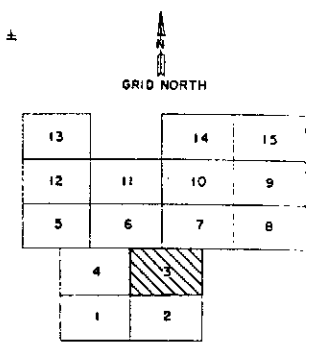
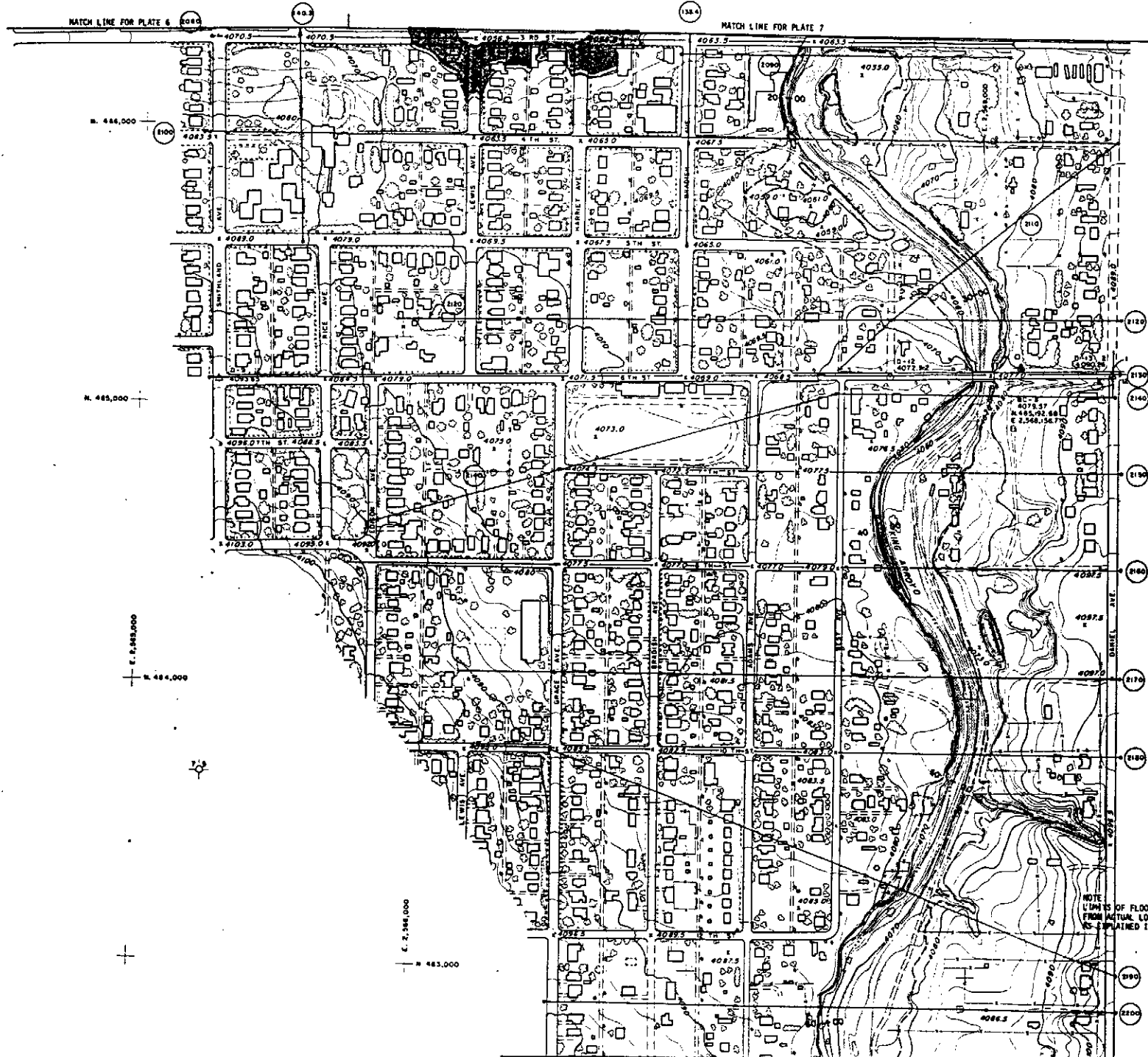
LEGEND

- ⊕ HORIZONTAL CONTROL
- VERTICAL CONTROL
- CROSS SECTION
- 0+00 STREAM STATION IN FEET



NOTE:
LIMITS OF FLOOD PLAIN MAY VARY
FROM ACTUAL LOCATIONS ON GROUND,
AS EXPLAINED IN THE REPORT.

DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
ALBUQUERQUE, NEW MEXICO
CITY OF
LA JUNTA
KING ARROYO
FLOODED AREAS
PREPARED FOR
OTERO COUNTY
COLORADO
IN COOPERATION WITH
COLORADO WATER CONSERVATION BOARD
DENVER, COLORADO
AUGUST 1977



SHEET INDEX

BASIS OF HORIZONTAL CONTROL -
THE COLORADO STATE COORDINATE SYSTEM,
SOUTH ZONE, 1927 NORTH AMERICAN DATUM

U.S.C. & G.S. "HADLEY" 1ST ORDER
 X: 2,810,893.14, Y: 481,347.28, EL. 4407.00'
 LATITUDE 37° 58' 10.82422"
 LONGITUDE 103° 22' 52.95796"
 SCALE FACTOR: 0.9999482, ELEVATION: 0.9997993,
 COMBINED: 0.9997375

U.S.C. & G.S. "LA JUNTA" 1ST ORDER
 X: 2,363,948.77, Y: 478,870.52, EL. 4197.00'
 LATITUDE 37° 58' 48.782"
 LONGITUDE 103° 34' 50.011"
 SCALE FACTOR: 0.9999486, ELEVATION: 0.9997993,
 COMBINED: 0.9997479

U.S.C. & G.S. "SOUTH TANK" 3RD ORDER
 X: 2,363,948.77, Y: 478,870.52
 LATITUDE 37° 57' 34.248"
 LONGITUDE 103° 32' 37.276"
 (AVERAGE COMBINED FACTOR - 0.9997427)

VERTICAL CONTROL BASED ON U.S.C. & G.S.
1929 SEA LEVEL DATUM

THIS MAP COMPLIES WITH NATIONAL MAP
MAP ACCURACY STANDARDS

TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC
METHODS FROM 6" C.P.L. VERTICAL AERIAL
PHOTOGRAPHY TAKEN MARCH 18, 1976

BELL MAPPING CO.
DENVER, COLORADO

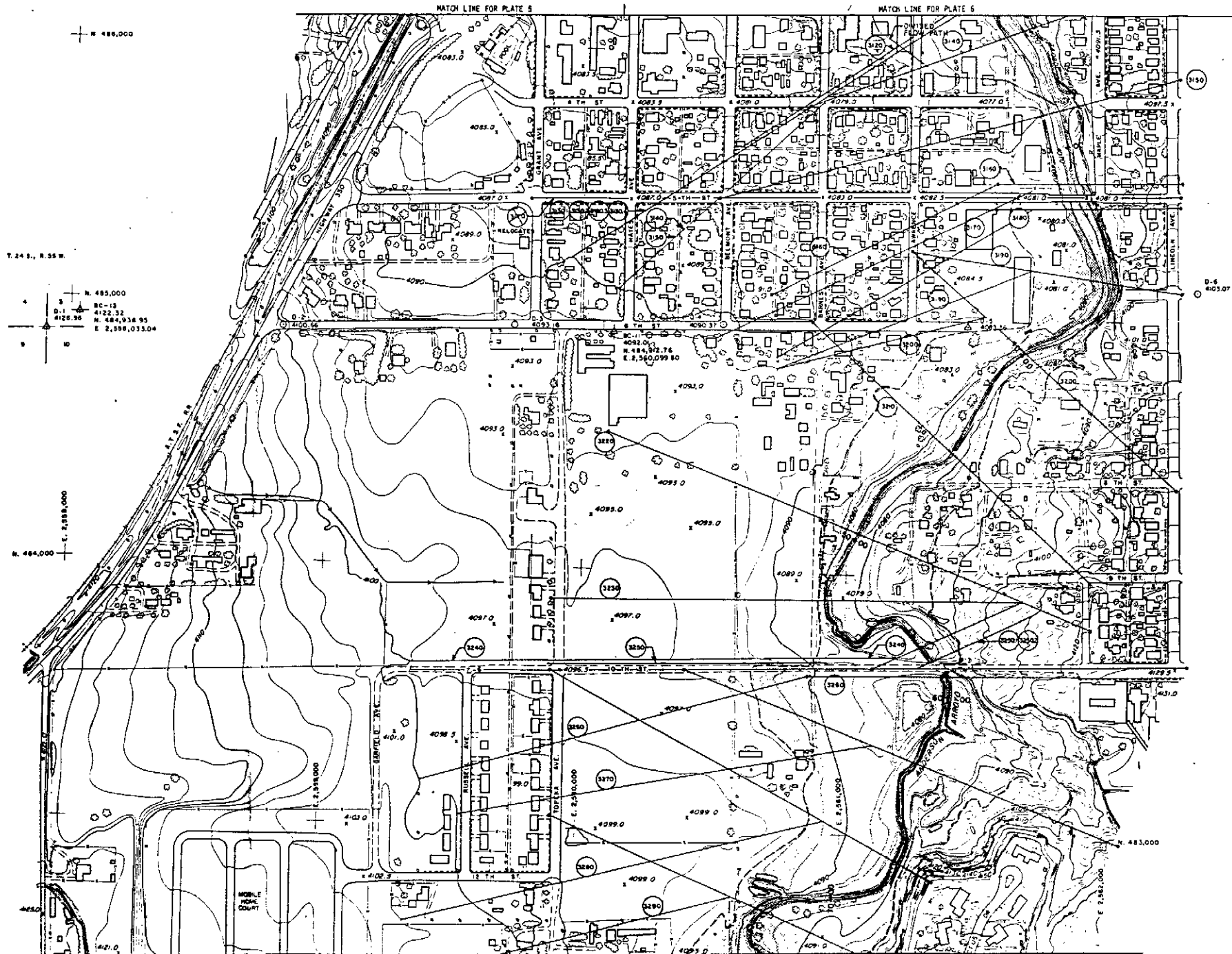
LEGEND

- HORIZONTAL CONTROL
- VERTICAL CONTROL
- CROSS SECTION
- STREAM STATION IN FEET
- FLOOD PLAN LIMITS
- 100 YEAR FLOOD
- 50 YEAR FLOOD

SCALE IN FEET
CONTOUR INTERVAL: 2'

NOTE
LIMITS OF FLOOD PLAIN MAY VARY
FROM ACTUAL LOCATIONS ON GROUND,
AS SHOWN IN THE REPORT.

DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
ALBUQUERQUE, NEW MEXICO
CITY OF
LA JUNTA
KING ARROYO
FLOODED AREAS
PREPARED FOR
OTERO COUNTY
COLORADO
IN COOPERATION WITH
COLORADO WATER CONSERVATION BOARD
DENVER, COLORADO
AUGUST 1977



N 486,000
 T. 24 S., R. 35 W.
 N. 485,000
 BC-13
 4122.32
 4126.96
 N. 484,938.95
 E. 2,590,035.04

N 484,000
 E. 2,588,000

7
 8

MATCH LINE FOR PLATE 5
 MATCH LINE FOR PLATE 6

MATCH LINE FOR PLATE 1

GRID NORTH

13	14	15
12	11	10
5	6	7
	3	
1	2	

SHEET INDEX

BASIS OF HORIZONTAL CONTROL:
 THE COLORADO STATE COORDINATE SYSTEM,
 SOUTH ZONE, 1927 NORTH AMERICAN DATUM

U.S.C. & G.S. "MADLEY" 1ST ORDER
 X=2,610,893.14, Y=481,347.28, EL. 4407.00'
 LATITUDE 37° 36' 10.82425"
 LONGITUDE 103° 32' 52.95796"
 SCALE FACTOR: 0.9999482, ELEVATION: 0.9997993,
 COMBINED: 0.9997375

U.S.C. & G.S. "LA JUNTA" 1ST ORDER
 X=2,583,948.77, Y=478,670.52, EL. 4197.00'
 LATITUDE 37° 58' 46.782"
 LONGITUDE 103° 34' 50.011"
 SCALE FACTOR: 0.9999486, ELEVATION: 0.9997993,
 COMBINED: 0.9997479

U.S.C. & G.S. "SOUTH TANK" 3RD ORDER
 X=2,563,946.77, Y=478,670.52
 LATITUDE 37° 57' 54.246"
 LONGITUDE 103° 32' 37.278"
 (AVERAGE COMBINED FACTOR = 0.9997427)

VERTICAL CONTROL BASED ON U.S.C. & G.S.
 1929 SEA LEVEL DATUM

THIS MAP COMPLIES WITH NATIONAL MAP
 MAP ACCURACY STANDARDS

TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC
 METHODS FROM 6" C.F.L. VERTICAL AERIAL
 PHOTOGRAPHY TAKEN MARCH 18, 1976

BELL MAPPING CO.
 DENVER, COLORADO

LEGEND

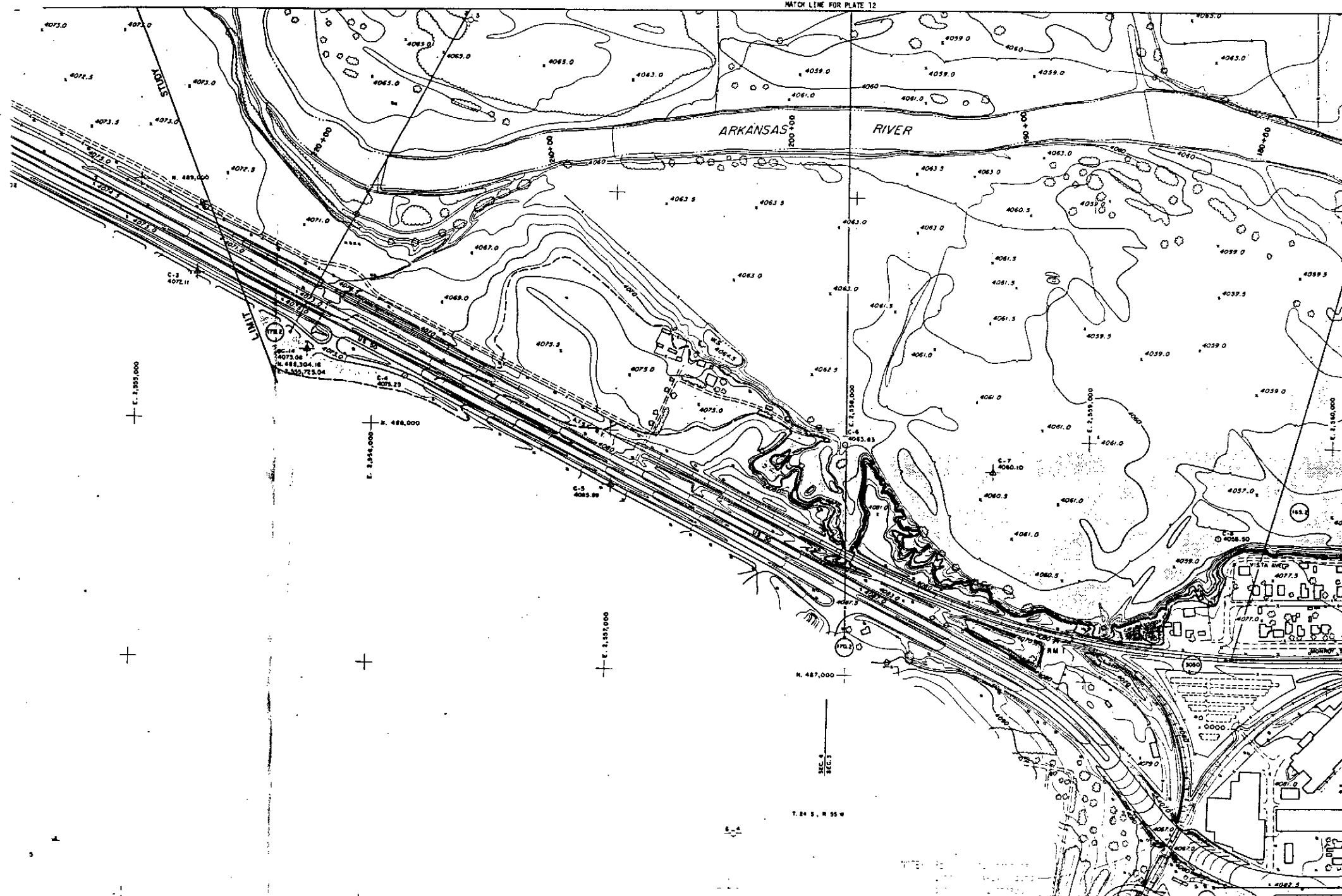
- HORIZONTAL CONTROL
- VERTICAL CONTROL
- CROSS SECTION
- 0+00 STREAM STATION IN FEET
- 100 YEAR FLOOD

200 0 200 400 FEET
 SCALE IN FEET
 CONTOUR INTERVAL: 2'

DEPARTMENT OF THE ARMY
 ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
 ALBUQUERQUE, NEW MEXICO
 CITY OF
LA JUNTA
ANDERSON ARROYO
FLOODED AREAS
 PREPARED FOR
 OTERO COUNTY
 COLORADO
 IN COOPERATION WITH
 COLORADO WATER CONSERVATION BOARD
 DENVER, COLORADO
 AUGUST 1977

NOTE:
 LIMITS OF FLOOD PLAIN MAY VARY
 FROM ACTUAL LOCATIONS ON GROUND,
 AS EXPLAINED IN THE REPORT.

MATCH LINE FOR PLATE 12



GRID NORTH

13	14	15
12	11	10
5	6	7
4	3	
1	2	

SHEET INDEX

BASIS OF HORIZONTAL CONTROL:
THE COLORADO STATE COORDINATE SYSTEM,
SOUTH ZONE, 1927 NORTH AMERICAN DATUM

U.S.C. & G.S. "HADLEY" 1ST ORDER
X: 2,810,893.14, Y: 481,347.28, EL. 4407.00
LATITUDE 37° 58' 10.62422"
LONGITUDE 103° 32' 52.98794"
SCALE FACTOR: 0.9999482, ELEVATION: 0.2997993,
COMBINED: 0.9997375

U.S.C. & G.S. "LA JUNTA" 1ST ORDER
X: 2,363,948.77, Y: 478,870.52, EL. 4197.00
LATITUDE 37° 58' 48.782"
LONGITUDE 103° 34' 30.011"
SCALE FACTOR: 0.9999488, ELEVATION: 0.9997993,
COMBINED: 0.9997479

U.S.C. & G.S. "SOUTH TANK" 3RD ORDER
X: 2,363,948.77, Y: 478,870.52
LATITUDE 37° 57' 54.246"
LONGITUDE 103° 32' 37.278"
(AVERAGE COMBINED FACTOR: 0.99974271)

VERTICAL CONTROL BASED ON U.S.C. & G.S.
1929 SEA LEVEL DATUM

THIS MAP COMPLIES WITH NATIONAL MAP
MAP ACCURACY STANDARDS

TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC
METHODS FROM 6" C.F.L. VERTICAL AERIAL
PHOTOGRAPHY TAKEN MARCH 18, 1976

BELL MAPPING CO.
DENVER, COLORADO

LEGEND

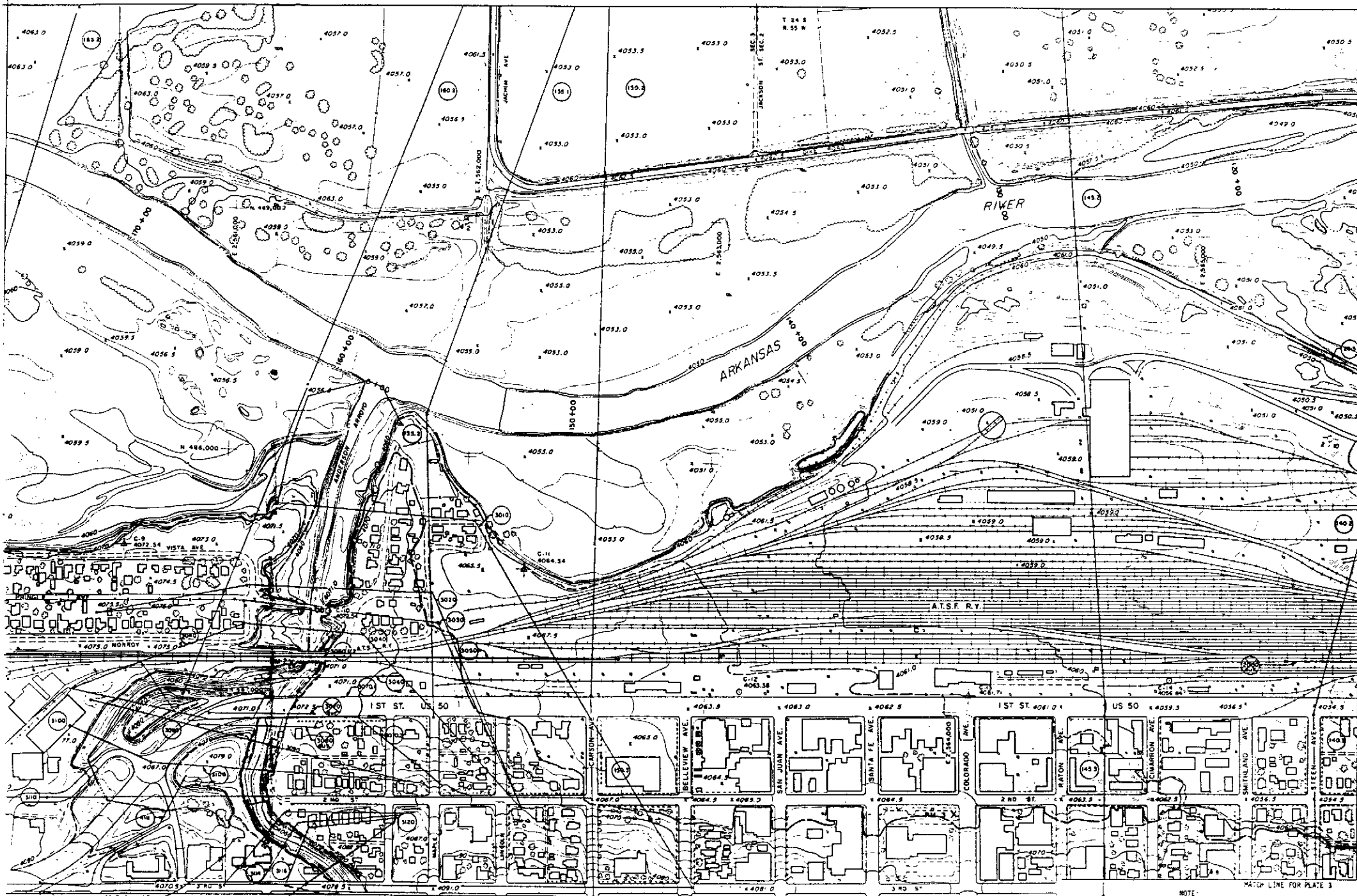
- △ HORIZONTAL CONTROL
- VERTICAL CONTROL
- CROSS SECTION
- 0+00 STREAM STATION IN FEET
- FLOOD PLAIN LIMITS
 - 100 YEAR FLOOD
 - STANDARD PROJECT FLOOD

SCALE IN FEET
CONTOUR INTERVAL: 2'

DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
ALBUQUERQUE, NEW MEXICO
CITY OF
LA JUNTA
**ARKANSAS RIVER
FLOODED AREAS**
PREPARED FOR
OTERO COUNTY
COLORADO
IN COOPERATION WITH
COLORADO WATER CONSERVATION BOARD
DENVER, COLORADO
AUGUST 1977

NOTE:
LIMITS OF FLOOD PLAIN MAY VARY
FROM ACTUAL LOCATIONS ON GROUND,
AS EXPLAINED IN THE REPORT.

MATCH LINE FOR PLATE 11



GRID NORTH

13	14	15
12	11	10
5	6	7
4	3	
1	2	

SHEET INDEX

BASIS OF HORIZONTAL CONTROL:
THE COLORADO STATE COORDINATE SYSTEM,
SOUTH ZONE, 1927 NORTH AMERICAN DATUM

U.S.C. & G.S. "HAGLEY" 1ST ORDER
X: 2,810,693.18, Y: 481,347.26, EL. 4407.00
LATITUDE 37° 58' 10.8242"
LONGITUDE 103° 32' 55.798"
SCALE FACTOR: 0.9999482, ELEVATION: 0.9997993,
COMBINED: 0.9997375

U.S.C. & G.S. "LA JUNTA" 1ST ORDER
X: 2,563,948.77, Y: 478,670.52, EL. 4191.00
LATITUDE 37° 58' 46.782"
LONGITUDE 103° 34' 50.011"
SCALE FACTOR: 0.9999486, ELEVATION: 0.9997993,
COMBINED: 0.9997479

U.S.C. & G.S. "SOUTH TANK" 3RD ORDER
X: 2,563,948.77, Y: 478,670.52
LATITUDE 37° 57' 54.246"
LONGITUDE 103° 32' 37.278"
(AVERAGE COMBINED FACTOR: 0.9997427)

VERTICAL CONTROL BASED ON U.S.C. & G.S.
1929 SEA LEVEL DATUM

THIS MAP COMPLIES WITH NATIONAL MAP
MAP ACCURACY STANDARDS

TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC
METHODS FROM 8" C.F.L. VERTICAL AERIAL
PHOTOGRAPHY TAKEN MARCH 18, 1976

BELL MAPPING CO.
DENVER, COLORADO

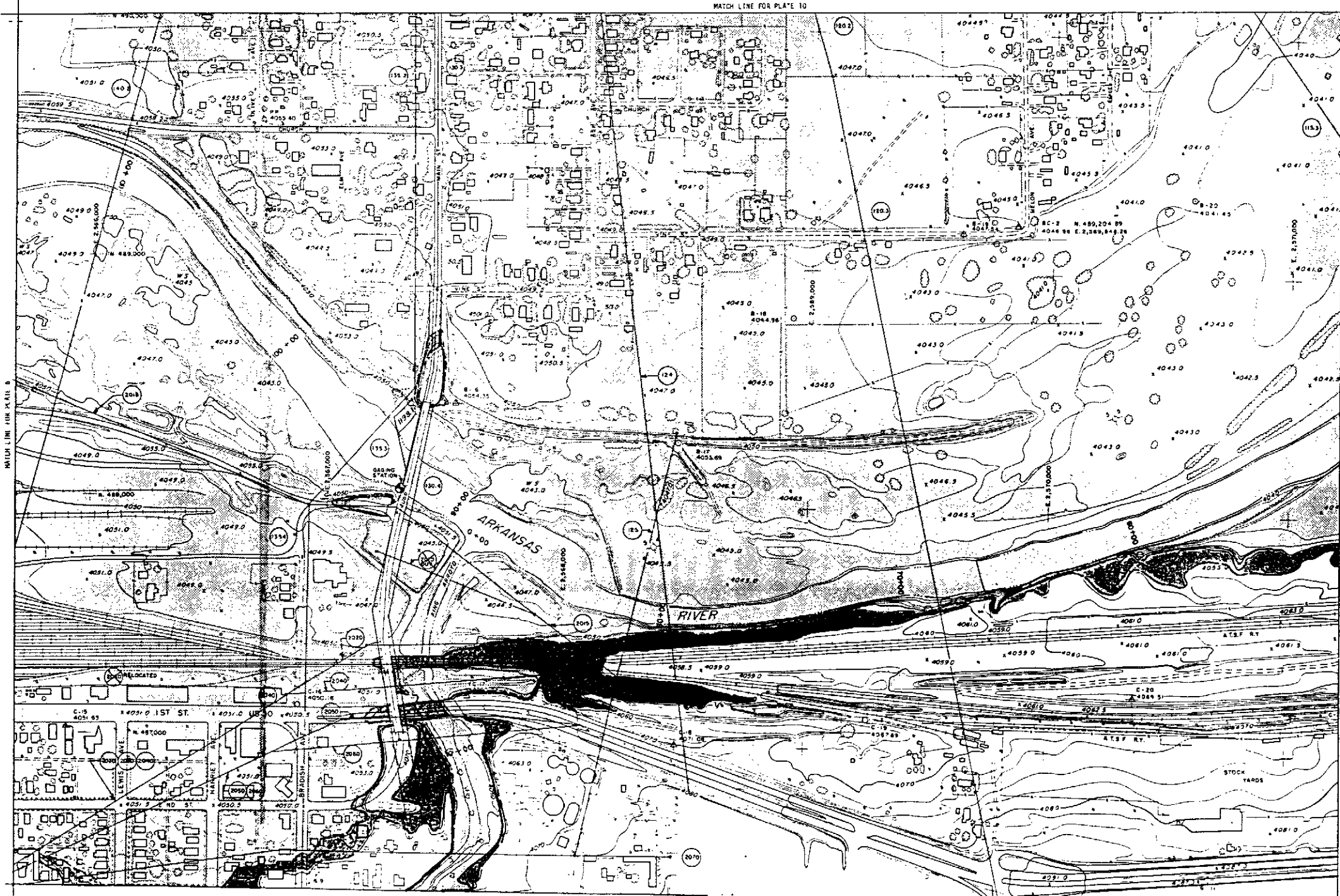
LEGEND

- HORIZONTAL CONTROL
- VERTICAL CONTROL
- CROSS SECTION
- 0+00 STREAM STATION IN FEET
- FLOOD PLAIN LIMITS
- 100 YEAR FLOOD
- STANDARD PROJECT FLOOD

SCALE IN FEET
CONTOUR INTERVAL: 5'

DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
ALBUQUERQUE, NEW MEXICO
CITY OF
LA JUNTA
ARKANSAS RIVER
FLOODED AREAS
PREPARED FOR
OTERO COUNTY
COLORADO
IN COOPERATION WITH
COLORADO WATER CONSERVATION BOARD
DENVER, COLORADO
AUGUST 1977

NOTE:
LIMITS OF FLOOD PLAIN MAY VARY
FROM ACTUAL LOCATIONS ON GROUND,
AS EXPLAINED IN THE REPORT.



GRID NORTH

13	14	15
12	11	10
5	6	8
4	3	
1	2	

SHEET INDEX

BASIS OF HORIZONTAL CONTROL:
THE COLORADO STATE COORDINATE SYSTEM,
SOUTH ZONE, 1927 NORTH AMERICAN DATUM

U.S.C. & G.S. "MADLEY" 1ST ORDER
N: 2,410,893.14, Y: 481,347.28, EL. 440' 00"
LATITUDE 37° 38' 10.82422"
LONGITUDE 103° 22' 32.95798"
SCALE FACTOR: 0.9999482, ELEVATION: 0.9997993,
COMBINED: 0.9997375

U.S.C. & G.S. "LA JUNTA" 1ST ORDER
N: 2,383,948.77, Y: 478,870.32, EL. 439' 00"
LATITUDE 37° 38' 48.782"
LONGITUDE 103° 34' 30.011"
SCALE FACTOR: 0.9999486, ELEVATION: 0.9997993,
COMBINED: 0.9997479

U.S.C. & G.S. "SOUTH TANK" 3RD ORDER
N: 2,383,948.77, Y: 478,870.32
LATITUDE 37° 37' 54.246"
LONGITUDE 103° 32' 37.278"
(AVERAGE COMBINED FACTOR: 0.9997427)

VERTICAL CONTROL BASED ON U.S.C. & G.S. 1929 SEA LEVEL DATUM

THIS MAP COMPLIES WITH NATIONAL MAP MAP ACCURACY STANDARDS

TOPOGRAPHY COMPILED BY PHOTOGAMMETRIC METHODS FROM 6" C.F.L. VERTICAL AERIAL PHOTOGRAPHY TAKEN MARCH 18, 1976

BELL MAPPING CO.
DENVER, COLORADO

LEGEND

- HORIZONTAL CONTROL
 - VERTICAL CONTROL
 - CROSS SECTION
 - STREAM STATION IN FEET
 - FLOOD PLAIN LIMITS
 - 10 YEAR FLOOD
 - STANDARD PROJECT FLOOD
- SCALE IN FEET
CONTOUR INTERVAL: 2'

DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
ALBUQUERQUE, NEW MEXICO
CITY OF
LA JUNTA
ARKANSAS RIVER
FLOODED AREAS
PREPARED FOR
OTERO COUNTY
COLORADO
IN COOPERATION WITH
COLORADO WATER CONSERVATION BOARD
DENVER, COLORADO
AUGUST 1977

NOTE:
LIMITS OF FLOOD PLAIN MAY VARY
FROM ACTUAL LOCATIONS ON GROUND,
AS EXPLAINED IN THE REPORT.

MATCH LINE FOR PLATE 9

GRID NORTH

13	14	15
12	11	10
5	6	7
	4	3
	1	2

SHEET INDEX

BASIS OF HORIZONTAL CONTROL:
THE COLORADO STATE COORDINATE SYSTEM,
SOUTH ZONE, 1927 NORTH AMERICAN DATUM

U.S.C. & G.S. "HADLEY" 1ST ORDER
X = 2,810,883.14, Y = 481,347.28, EL. 4407.00'
LATITUDE 37° 54' 10.62422"
LONGITUDE 103° 22' 52.95796"
SCALE FACTOR: 0.9999482, ELEVATION: 0.9997963,
COMBINED: 0.9997375

U.S.C. & G.S. "LA ANITA" 1ST ORDER
X = 2,863,948.77, Y = 478,870.52, EL. 4191.00'
LATITUDE 37° 58' 46.782"
LONGITUDE 103° 34' 50.011"
SCALE FACTOR: 0.9999488, ELEVATION: 0.9997933,
COMBINED: 0.9997473

U.S.C. & G.S. "SOUTH TANK" 3RD ORDER
X = 2,863,948.77, Y = 478,870.52
LATITUDE 37° 57' 54.246"
LONGITUDE 103° 32' 37.278"
(AVERAGE COMBINED FACTOR: 0.9997427)

VERTICAL CONTROL BASED ON U.S.C. & G.S.
1929, SEA LEVEL DATUM

THIS MAP COMPLIES WITH NATIONAL MAP
MAP ACCURACY STANDARDS

TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC
METHODS FROM 6" C.F.L. VERTICAL AERIAL
PHOTOGRAPHY TAKEN MARCH 18, 1976

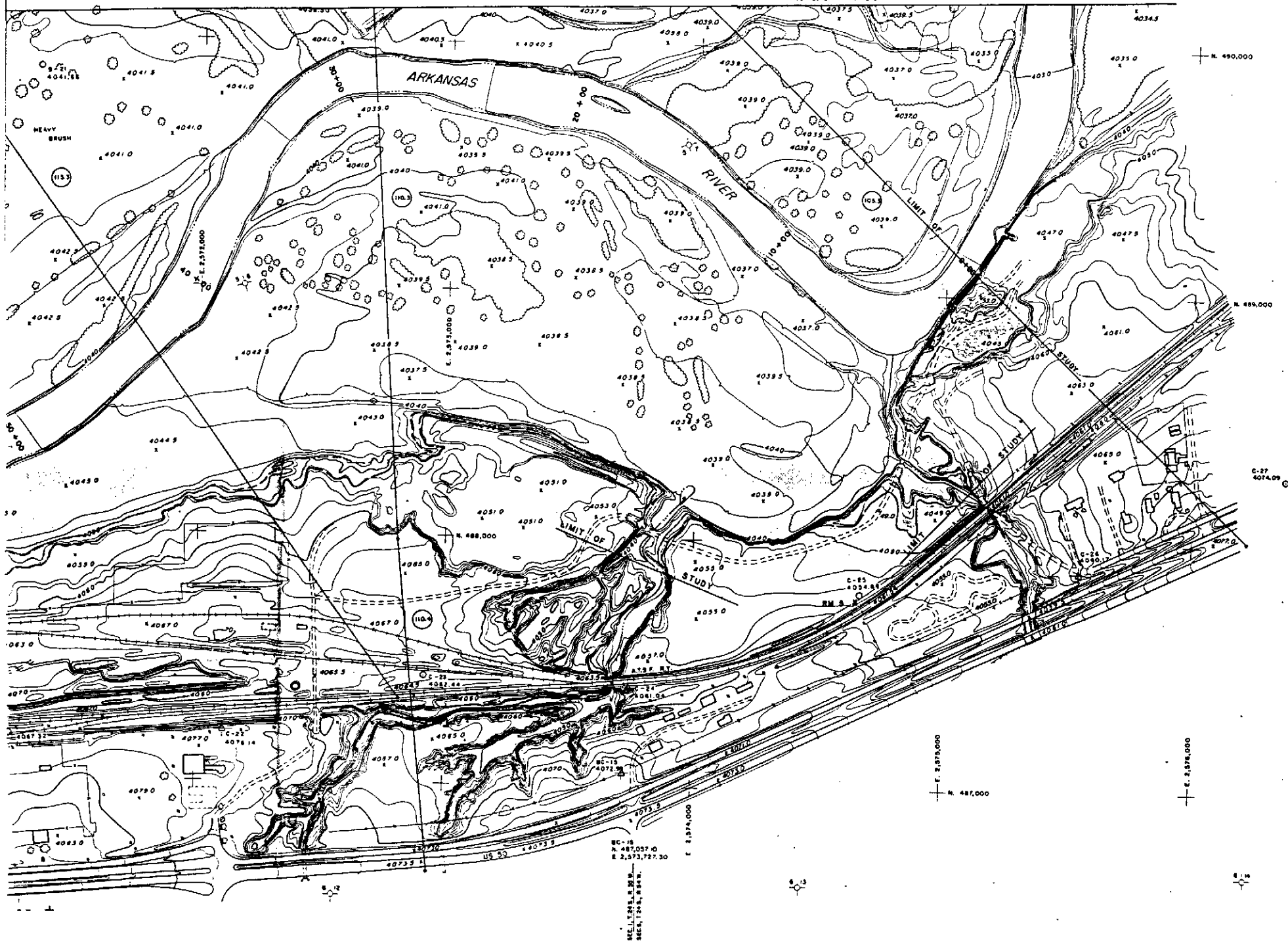
BELL MAPPING CO.
DENVER, COLORADO

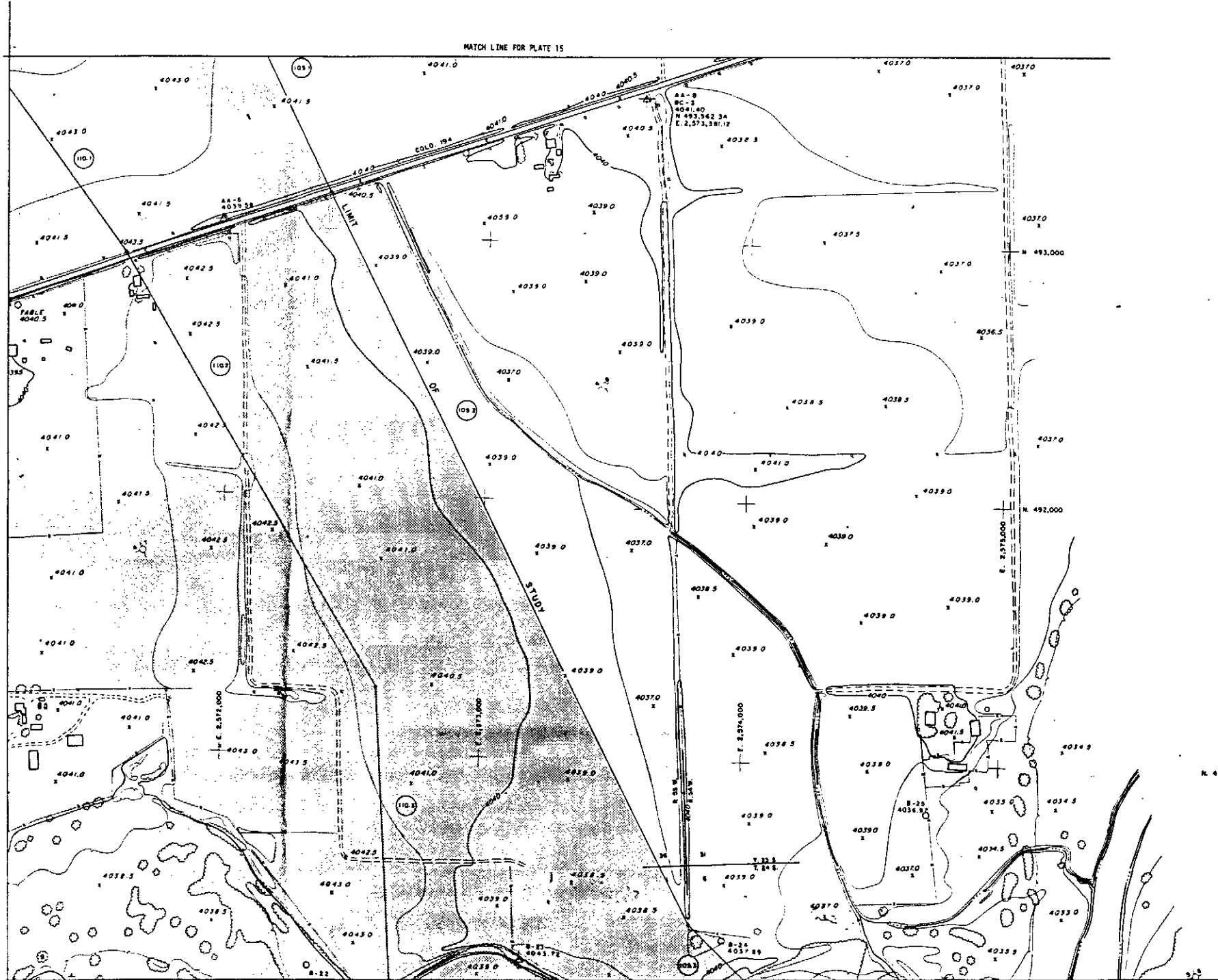
LEGEND

- ▲ HORIZONTAL CONTROL
 - VERTICAL CONTROL
 - CROSS SECTION
 - 0+00 STREAM STATION IN FEET
 - FLOOD PLAIN LIMITS
 - NO FLOOD
 - FLOODED PLAINS
- SCALE IN FEET
CONTOUR INTERVAL: 2'

DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
ALBUQUERQUE, NEW MEXICO
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FLOODED AREAS
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COLORADO
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DENVER, COLORADO
AUGUST 1977

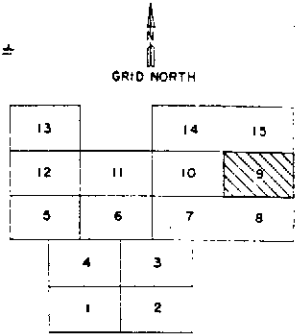
NOTE:
LIMITS OF FLOOD PLAIN MAY VARY
FROM ACTUAL LOCATIONS ON GROUND,
AS EXPLAINED IN THE REPORT.





MATCH LINE FOR PLATE 15

MATCH LINE FOR PLATE 8



SHEET INDEX

BASIS OF HORIZONTAL CONTROL:
THE COLORADO STATE COORDINATE SYSTEM,
SOUTH ZONE, 1927 NORTH AMERICAN DATUM

U.S.C. & G.S. "HADLEY" 1ST ORDER
X=2,610,893.14, Y=481,347.28, EL. 4407.00
LATITUDE 37° 58' 10.82422"
LONGITUDE 103° 22' 52.95795"
SCALE FACTOR=0.9999482, ELEVATION=0.9997993,
COMBINED=0.9997375

U.S.C. & G.S. "LA JUNTA" 1ST ORDER
X=2,562,948.77, Y=478,870.52, EL. 4197.00
LATITUDE 37° 54' 48.782"
LONGITUDE 103° 34' 50.011"
SCALE FACTOR=0.9998488, ELEVATION=0.9997993,
COMBINED=0.9997478

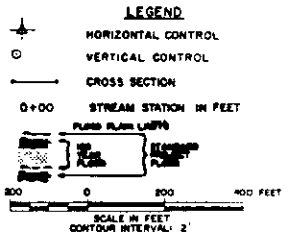
U.S.C. & G.S. "SOUTH TANK" 3RD ORDER
X=2,562,948.77, Y=478,870.52
LATITUDE 37° 57' 54.246"
LONGITUDE 103° 32' 37.278"
(AVERAGE COMBINED FACTOR=0.9997427)

VERTICAL CONTROL BASED ON U.S.C. & G.S.
1929 SEA LEVEL DATUM

THIS MAP COMPLIES WITH NATIONAL MAP
MAP ACCURACY STANDARDS

TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC
METHODS FROM 6" C.F.L. VERTICAL AERIAL
PHOTOGRAPHY TAKEN MARCH 18, 1976

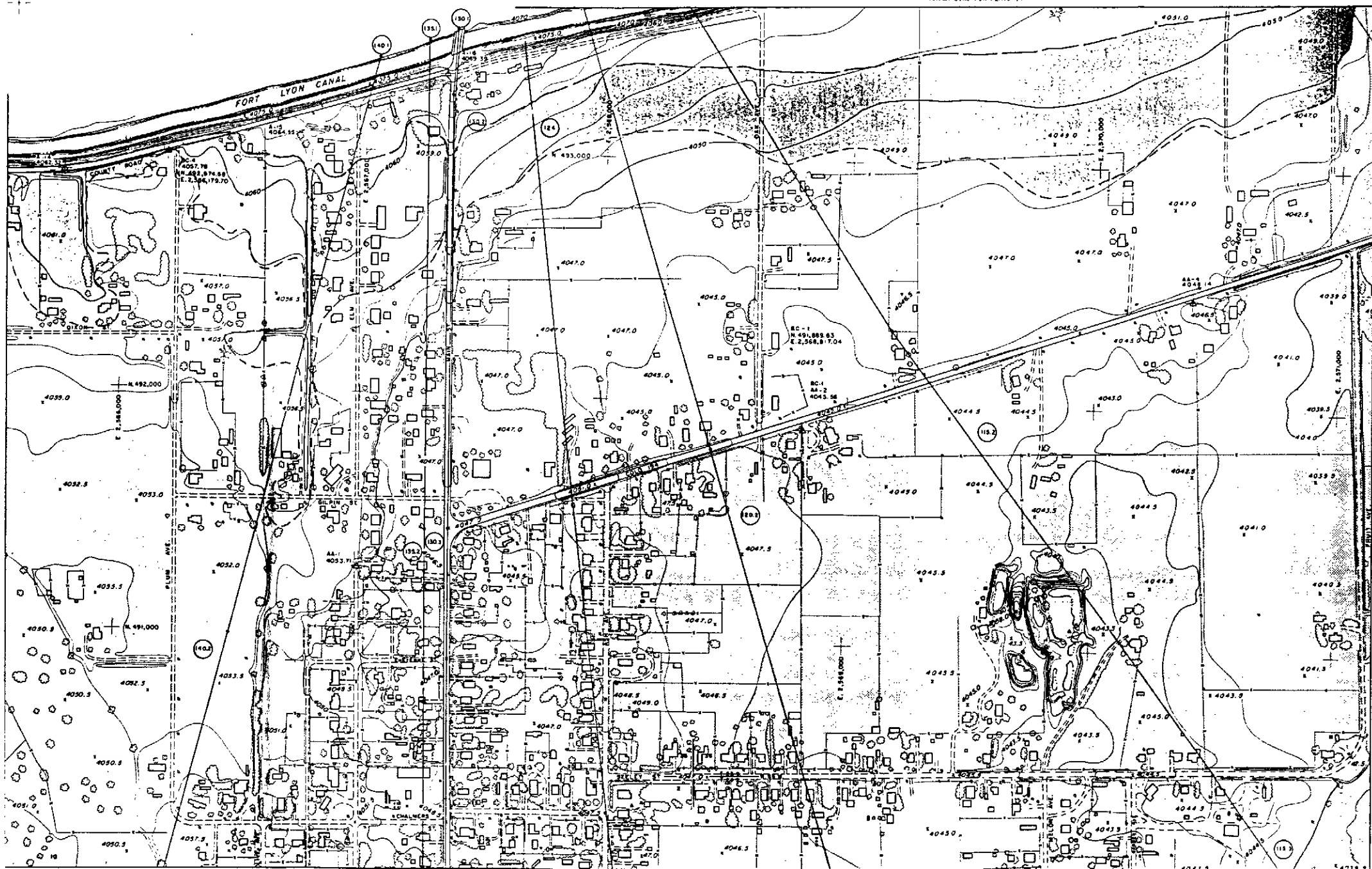
BELL MAPPING CO.
DENVER, COLORADO



NOTE:
LIMITS OF FLOOD PLAIN MAY VARY
FROM ACTUAL LOCATIONS ON GROUND,
AS EXPLAINED IN THE REPORT.

DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
ALBUQUERQUE, NEW MEXICO
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COLORADO
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DENVER, COLORADO
AUGUST 1977

MATCH LINE FOR PLATE 14



GRID NORTH

13	14	15
12	11	10
5	6	7
4	3	
1	2	

SHEET INDEX

BASIS OF HORIZONTAL CONTROL:
THE COLORADO STATE COORDINATE SYSTEM,
SOUTH ZONE, 1927 NORTH AMERICAN DATUM

U.S.C. & G.S. "HADLEY" 1ST ORDER
X: 2,810,493.14, Y: 481,347.28, EL. 4407.00'
LATITUDE 37° 56' 10.82422"
LONGITUDE 103° 34' 52.95796"
SCALE FACTOR: 0.9998482, ELEVATION: 0.9997993,
COMBINED: 0.9997375

U.S.C. & G.S. "LA JUNTA" 1ST ORDER
X: 2,943,948.77, Y: 478,870.52, EL. 4197.00'
LATITUDE 37° 58' 46.762"
LONGITUDE 103° 34' 50.011"
SCALE FACTOR: 0.9998488, ELEVATION: 0.9997993,
COMBINED: 0.9997475

U.S.C. & G.S. "SOUTH FARM" 3RD ORDER
X: 2,563,848.77, Y: 478,870.52
LATITUDE 37° 57' 54.244"
LONGITUDE 103° 32' 37.278"
(AVERAGE COMBINED FACTOR: 0.9997427)

VERTICAL CONTROL BASED ON U.S.C. & G.S.
1928 SEA LEVEL DATUM

THIS MAP COMPLIES WITH NATIONAL MAP
MAP ACCURACY STANDARDS

TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC
METHODS FROM 6" C.F.L. VERTICAL AERIAL
PHOTOGRAPHY TAKEN MARCH 18, 1976

BELL MAPPING CO.
DENVER, COLORADO

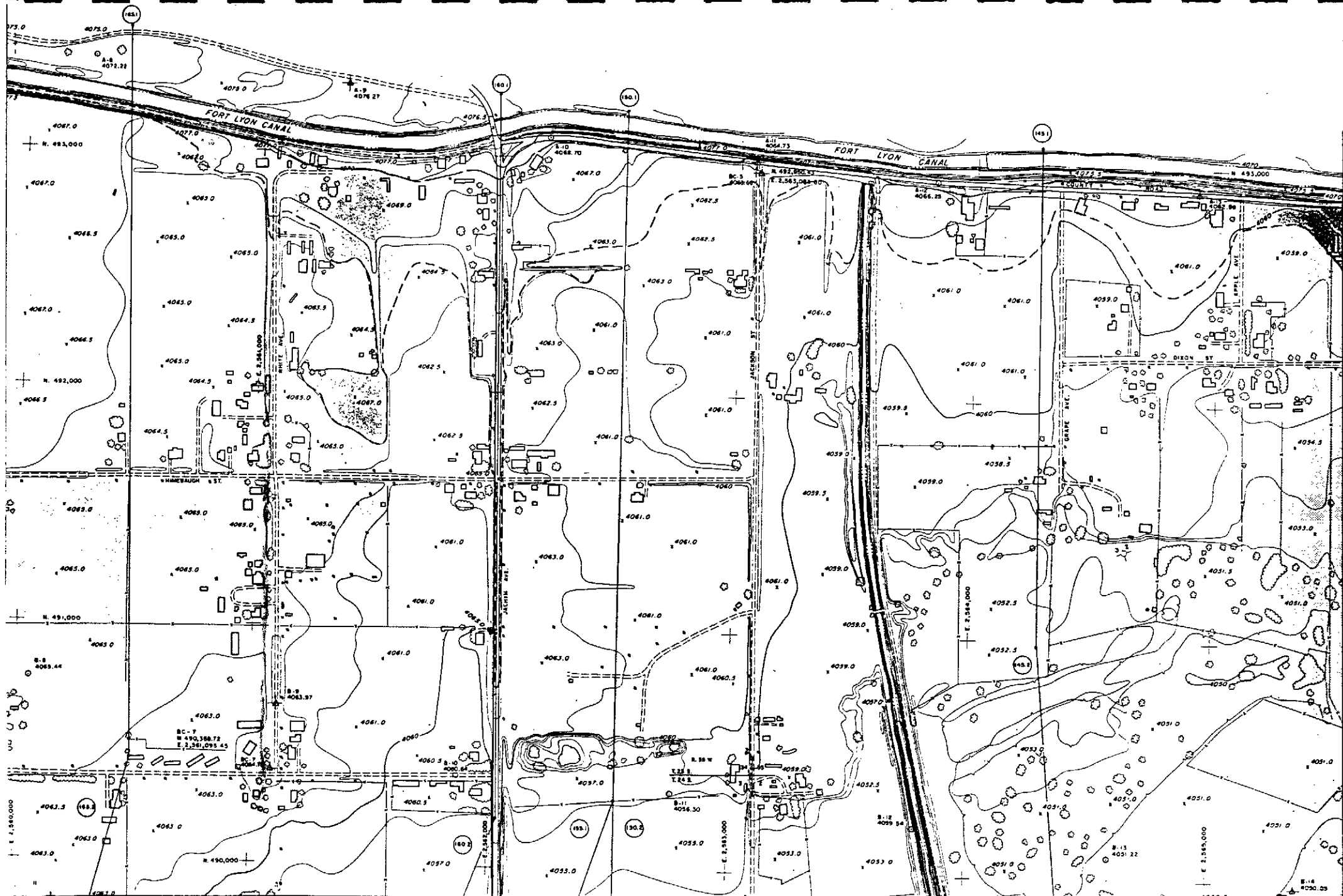
LEGEND

- HORIZONTAL CONTROL
 - VERTICAL CONTROL
 - CROSS SECTION
 - STREAM STATION IN FEET
 - FLOOD PLAIN LIMITS
- SCALE IN FEET
CONTOUR INTERVAL: 2'

DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
ALBUQUERQUE, NEW MEXICO
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COLORADO
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DENVER, COLORADO
AUGUST 1977

MATCH LINE FOR PLATE 7

NOTE:
LIMITS OF FLOOD PLAIN MAY VARY
FROM ACTUAL LOCATIONS ON GROUND,
AS EXPLAINED IN THE REPORT.



GRID NORTH

13	14	15
12	11	10
5	6	7
	4	3
	1	2

SHEET INDEX

BASIS OF HORIZONTAL CONTROL:
THE COLORADO STATE COORDINATE SYSTEM,
SOUTH ZONE, 1927 NORTH AMERICAN DATUM

U.S.C. & G.S. "HADLEY" 1ST ORDER
X: 2,610,693.14, Y: 481,347.26, EL. 4407.00
LATITUDE 37° 58' 10.82422"
LONGITUDE 103° 22' 42.95796"
SCALE FACTOR: 0.9999482, ELEVATION: 0.9997993,
COMBINED: 0.9997375

U.S.C. & G.S. "LA JUNTA" 1ST ORDER
X: 2,563,948.77, Y: 478,870.52, EL. 4197.00
LATITUDE 37° 56' 46.782"
LONGITUDE 103° 34' 50.011"
SCALE FACTOR: 0.9999486, ELEVATION: 0.9997993,
COMBINED: 0.9997475

U.S.C. & G.S. "SOUTH TANK" 2ND ORDER
X: 2,563,948.77, Y: 478,870.52
LATITUDE 37° 57' 54.244"
LONGITUDE 103° 32' 37.278"
(AVERAGE COMBINED FACTOR: 0.9997427)

VERTICAL CONTROL BASED ON U.S.C. & G.S.
1929 SEA LEVEL DATUM

THIS MAP COMPLIES WITH NATIONAL MAP
MAP ACCURACY STANDARDS

TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC
METHODS FROM 6" C.F.L. VERTICAL AERIAL
PHOTOGRAPHY TAKEN MARCH 18, 1976

BELL MAPPING CO.
DENVER, COLORADO

LEGEND

- HORIZONTAL CONTROL
 - VERTICAL CONTROL
 - CROSS SECTION
 - STREAM STATION IN FEET
 - FLOOD PLAIN LIMITS
 - FLOOD PLAIN
- 700 0 200 400 FEET
SCALE IN FEET
CONTOUR INTERVAL: 2'

DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
ALBUQUERQUE, NEW MEXICO
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DENVER, COLORADO
AUGUST 1977

NOTES:
LIMITS OF FLOOD PLAIN MAY VARY
FROM ACTUAL LOCATIONS ON GROUND,
AS EXPLAINED IN THE REPORT.

MATCH LINE FOR PLATE 13

GRID NORTH

13	14	15
12	11	10
5	6	7
4	3	
1	2	

SHEET INDEX

BASIS OF HORIZONTAL CONTROL:
THE COLORADO STATE COORDINATE SYSTEM,
SOUTH ZONE, 1927 NORTH AMERICAN DATUM

U.S.C. & G.S. "HADLEY" 1ST ORDER
X: 2,610,693.74, Y: 481,347.26, EL. 4407.00
LATITUDE 37° 58' 10.82422"
LONGITUDE 103° 22' 52.85796"
SCALE FACTOR: 0.9999482, ELEVATION: 0.9997993,
COMBINED: 0.9997375

U.S.C. & G.S. "LA JUNTA" 1ST ORDER
X: 2,583,948.77, Y: 478,870.52, EL. 4197.00
LATITUDE 37° 58' 48.782"
LONGITUDE 103° 34' 50.011"
SCALE FACTOR: 0.9999485, ELEVATION: 0.9997993,
COMBINED: 0.9997475

U.S.C. & G.S. "SOUTH TOWN" 3RD ORDER
X: 2,583,948.77, Y: 478,870.52
LATITUDE 37° 58' 34.244"
LONGITUDE 103° 32' 37.278"
(AVERAGE COMBINED FACTOR: 0.9997427)

VERTICAL CONTROL BASED ON U.S.C. & G.S.
1929 SEA LEVEL DATUM

THIS MAP COMPLIES WITH NATIONAL MAP
MAP ACCURACY STANDARDS

TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC
METHODS FROM 6" C.F.L. VERTICAL AERIAL
PHOTOGRAPHY TAKEN MARCH 18, 1976

BELL MAPPING CO.
DENVER, COLORADO

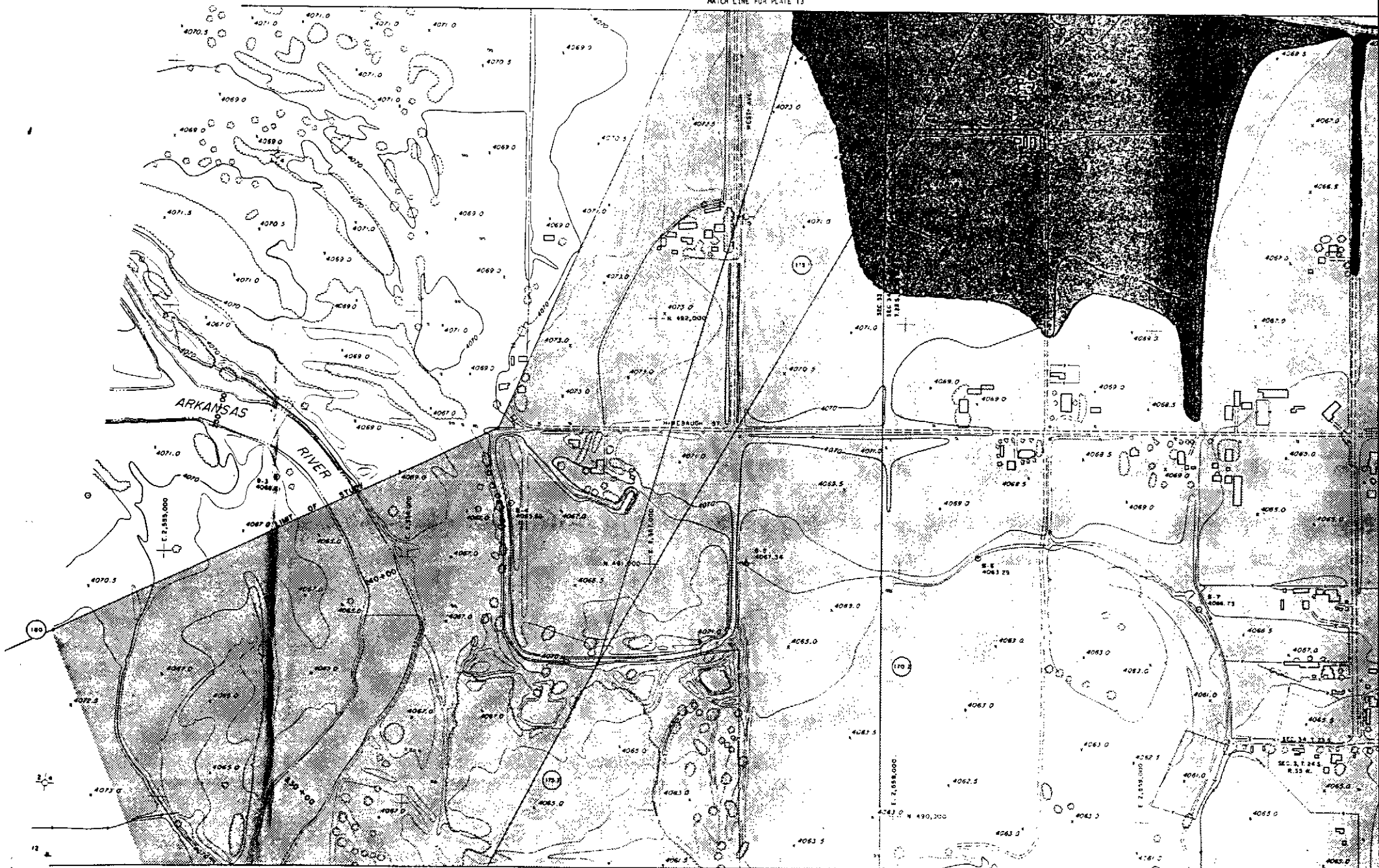
LEGEND

- ⊕ HORIZONTAL CONTROL
 - VERTICAL CONTROL
 - CROSS SECTION
 - 0+00 STREAM STATION IN FEET
 - ▭ FLOOD PLAIN LIMITS
 - ▨ 100 YEAR FLOOD
 - ▩ STANDARD FLOOD
- 0 200 400 600 FEET
SCALE IN FEET
CONTOUR INTERVAL: 2'

DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
ALBUQUERQUE, NEW MEXICO
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DENVER, COLORADO
AUGUST 1977

NOTE
LIMITS OF FLOOD PLAIN MAY VARY
FROM ACTUAL LOCATIONS ON GROUND,
AS EXPLAINED IN THE REPORT.

MATCH LINE FOR PLATE 5



GRID NORTH

13		14	15
12	11	10	9
5	6	7	8
	4	3	
	1	2	

SHEET INDEX

BASIS OF HORIZONTAL CONTROL -
THE COLORADO STATE COORDINATE SYSTEM,
SOUTH ZONE, 1927 NORTH AMERICAN DATUM

U.S.C. & G.S. "HADLEY" 1ST ORDER
X: 2,810,893.14, Y: 491,347.28, EL. 4407.00'
LATITUDE 37° 58' 10.62422"
LONGITUDE 103° 22' 52.95796"
SCALE FACTOR: 0.9999482, ELEVATION: 0.2997393,
COMBINED: 0.9997375

U.S.C. & G.S. "LA JUNTA" 1ST ORDER
X: 2,563,948.77, Y: 479,670.52, EL. 4197.00'
LATITUDE 37° 58' 48.782"
LONGITUDE 103° 34' 50.01"
SCALE FACTOR: 0.9999485, ELEVATION: 0.2997993,
COMBINED: 0.9997479

U.S.C. & G.S. "SOUTH TANK" 3RD ORDER
X: 2,563,948.77, Y: 479,670.52
LATITUDE 37° 57' 54.246"
LONGITUDE 103° 32' 37.278"
(AVERAGE COMBINED FACTOR: 0.9997427)

VERTICAL CONTROL BASED ON U.S.C. & G.S.
1929 SEA LEVEL DATUM

THIS MAP COMPLIES WITH NATIONAL MAP
MAP ACCURACY STANDARDS

TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC
METHODS FROM B" C.F.L. VERTICAL AERIAL
PHOTOGRAPHY TAKEN MARCH 18, 1976

BELL MAPPING CO.
DENVER, COLORADO

LEGEND

- HORIZONTAL CONTROL
- VERTICAL CONTROL
- CROSS SECTION
- STREAM STATION IN FEET
- FLOOD PLAIN LIMITS
- STANDARD PROJECT FLOOD
- REAL FLOOD

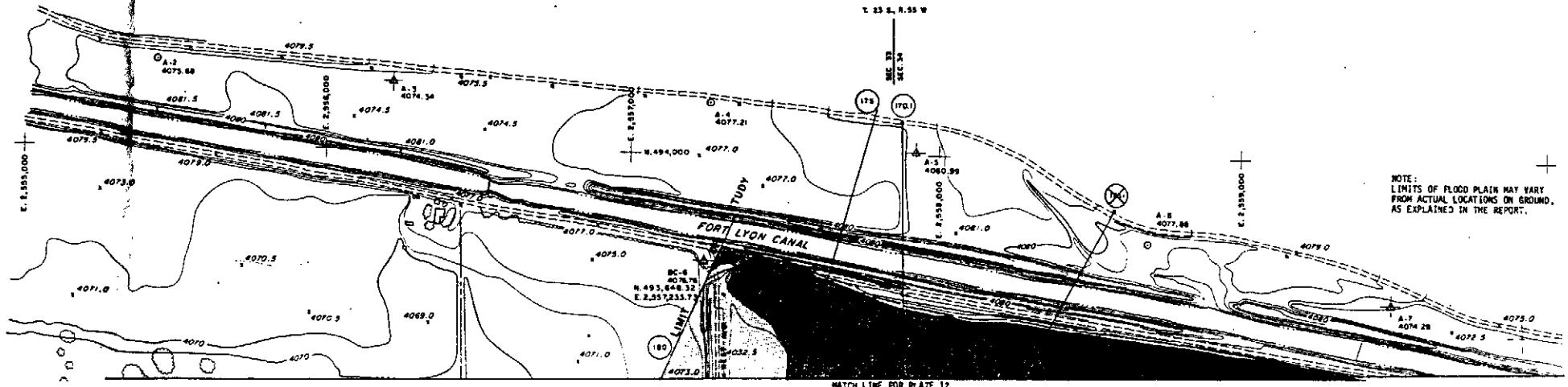
SCALE IN FEET
CONTOUR INTERVAL: 2'

NOTE:
LIMITS OF FLOOD PLAIN MAY VARY
FROM ACTUAL LOCATIONS ON GROUND,
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DEPARTMENT OF THE ARMY
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IN COOPERATION WITH
COLORADO WATER CONSERVATION BOARD
DENVER, COLORADO
AUGUST 1977





13		14	15
12	11	10	9
5	6	7	8
	4	3	
	1	2	

SHEET INDEX

BASIS OF HORIZONTAL CONTROL - THE COLORADO STATE COORDINATE SYSTEM, SOUTH ZONE, 1927 NORTH AMERICAN DATUM

U.S.C. & G.S. "HAGLEY" 1ST ORDER
X=2,810,693.14, Y=481,347.28, EL. 4407.00
LATITUDE 37° 58' 10.62422"
LONGITUDE 103° 22' 52.95796"
SCALE FACTOR = 0.9999482, ELEVATION = 0.9997993, COMBINED = 0.9997375

U.S.C. & G.S. "LA JUNTA" 1ST ORDER
X=2,563,948.77, Y=478,670.32, EL. 4197.00
LATITUDE 37° 58' 48.782"
LONGITUDE 103° 34' 50.011"
SCALE FACTOR = 0.9999486, ELEVATION = 0.9997993, COMBINED = 0.9997479

U.S.C. & G.S. "SOUTH TANK" 3RD ORDER
X=2,563,948.77, Y=478,670.32
LATITUDE 37° 57' 54.246"
LONGITUDE 103° 32' 37.276"
(AVERAGE COMBINED FACTOR = 0.9997427)

VERTICAL CONTROL BASED ON U.S.C. & G.S. 1929 SEA LEVEL DATUM

THIS MAP COMPLIES WITH NATIONAL MAP MAP ACCURACY STANDARDS

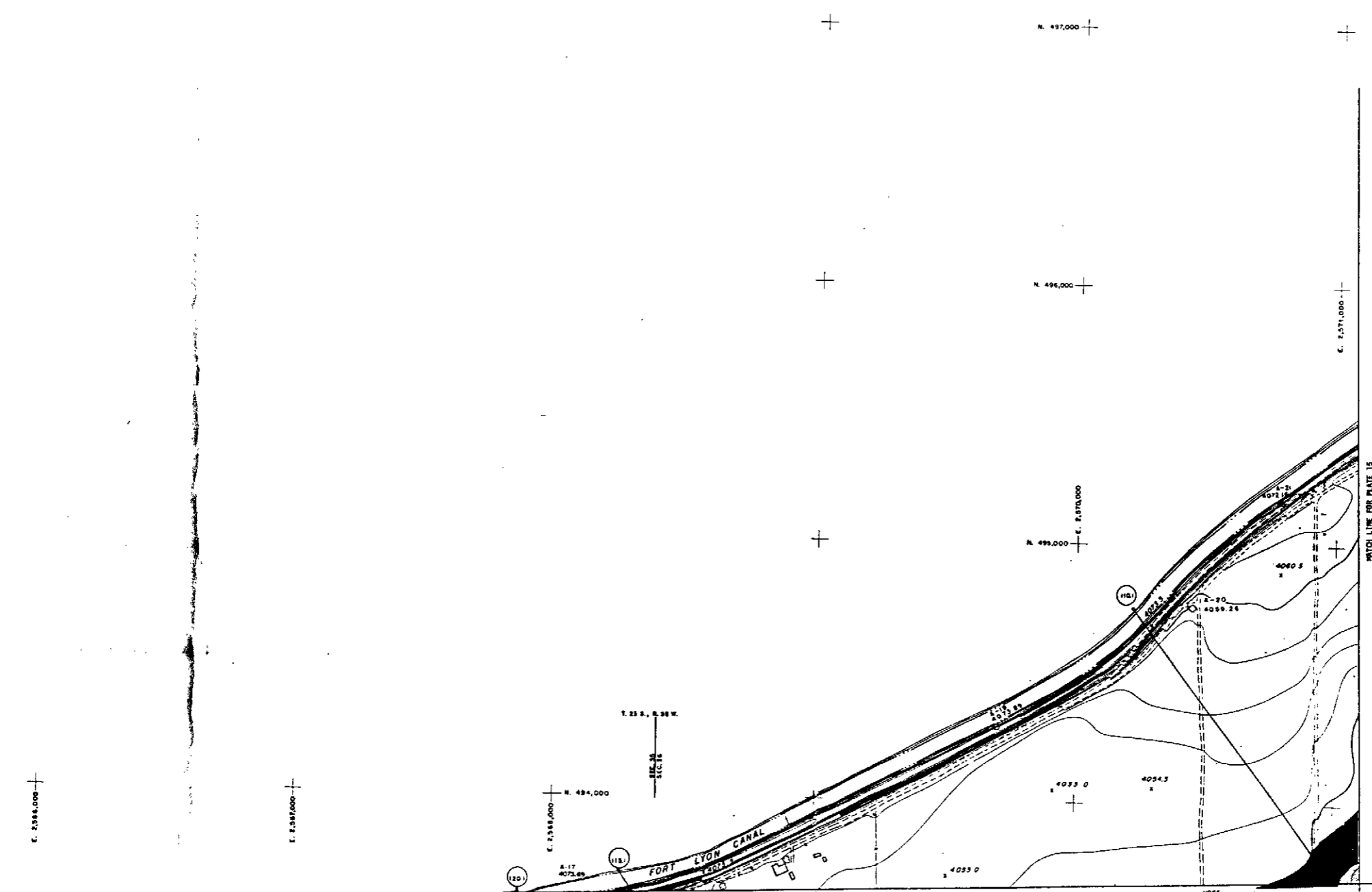
TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC METHODS FROM 6" G.F.L. VERTICAL AERIAL PHOTOGRAPHY TAKEN MARCH 18, 1976

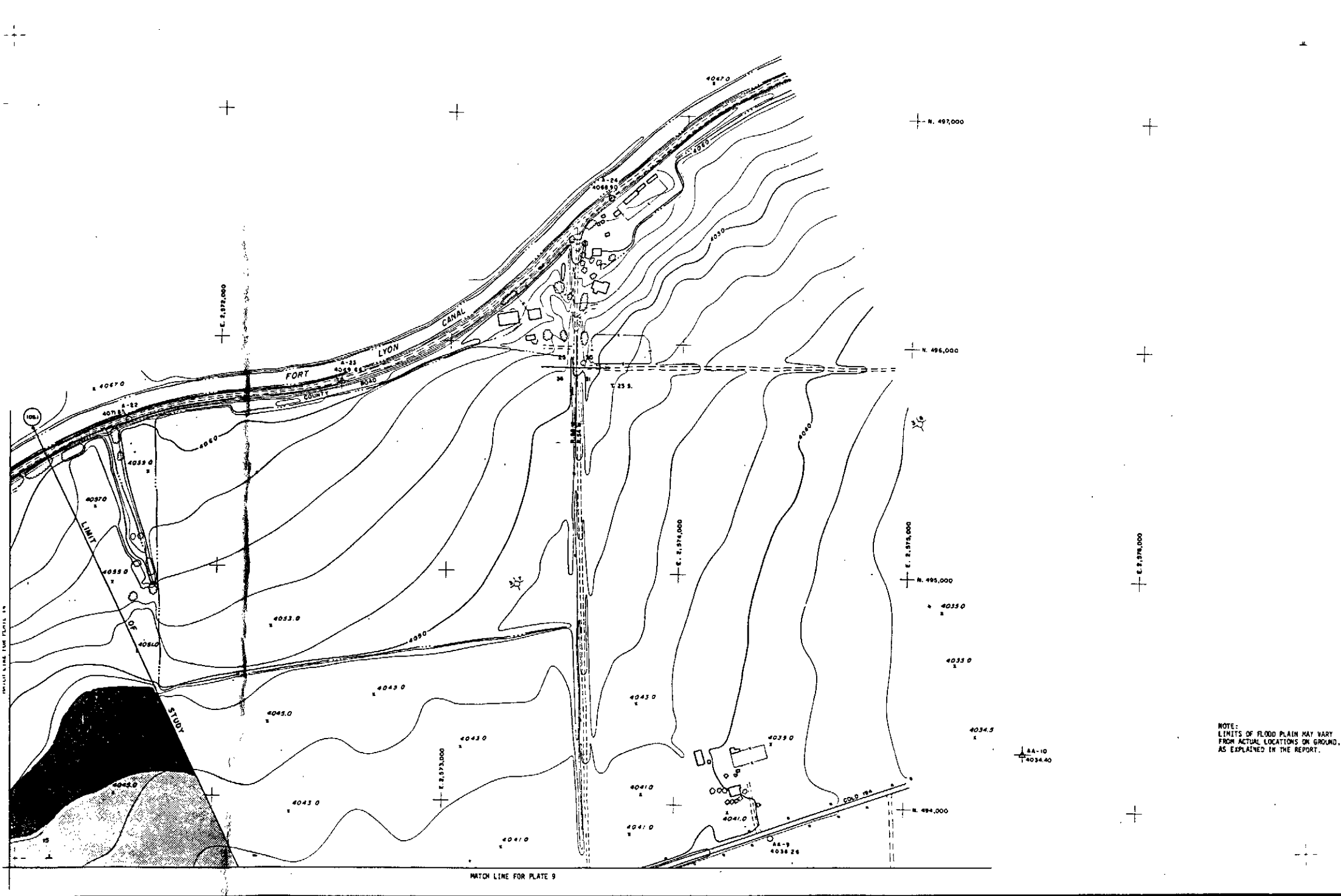
BELL MAPPING CO.
DENVER, COLORADO

LEGEND

- HORIZONTAL CONTROL
 - VERTICAL CONTROL
 - CROSS SECTION
 - STREAM STATION IN FEET
 - FLOOD PLAIN LIMITS
 - 100 YEAR FLOOD
 - STANDARD PROJECT FLOOD
- SCALE IN FEET
CONTOUR INTERVAL 2'

DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
ALBUQUERQUE, NEW MEXICO
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DENVER, COLORADO
AUGUST 1977





GRID NORTH

13		14	15
12	11	10	9
5	6	7	8
	4	3	
	1	2	

SHEET INDEX

BASIS OF HORIZONTAL CONTROL:
THE COLORADO STATE COORDINATE SYSTEM,
SOUTH ZONE, 1927 NORTH AMERICAN DATUM

U.S.C. & G.S. "HADLEY" 1ST ORDER
 X = 2,610,693.14, Y = 481,347.28, EL. 4407.00
 LATITUDE 37° 56' 10.82422"
 LONGITUDE 103° 22' 52.95796"
 SCALE FACTOR = 0.9999482, ELEVATION = 0.997993,
 COMBINED = 0.99797375

U.S.C. & G.S. "LA JUNTA" 1ST ORDER
 X = 2,563,948.77, Y = 478,670.52, EL. 4 97.20
 LATITUDE 37° 56' 48.782"
 LONGITUDE 103° 34' 50.011"
 SCALE FACTOR = 0.9999486, ELEVATION = 0.997993,
 COMBINED = 0.997479

U.S.C. & G.S. "SOUTH TANK" 3RD ORDER
 X = 2,563,948.77, Y = 478,670.52
 LATITUDE 37° 57' 54.246"
 LONGITUDE 103° 32' 37.278"
 LAVERAGE COMBINED FACTOR = 0.9974271

VERTICAL CONTROL BASED ON U.S.C. & G.S.
1929 SEA LEVEL DATUM

THIS MAP COMPLIES WITH NATIONAL MAP
MAP ACCURACY STANDARDS

TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC
METHODS FROM 6" C.F.L. VERTICAL AERIAL
PHOTOGRAPHY TAKEN MARCH 18, 1976

BELL MAPPING CO.
DENVER, COLORADO

LEGEND

- HORIZONTAL CONTROL
- VERTICAL CONTROL
- CROSS SECTION
- STREAM STATION IN FEET
- FLOOD PLAIN LIMITS
- 100 YEAR PROJECT FLOOD
- STANDARD FLOOD

SCALE IN FEET
CONTOUR INTERVAL: 2'

NOTE:
LIMITS OF FLOOD PLAIN MAY VARY
FROM ACTUAL LOCATIONS ON GROUND,
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DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
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