DRAINAGE REPORT

see letter pending

LA VILLITA EAST COURT
ALBUQUERQUE, NEW MEXICO

MARCH 1975

FLATOW, MOORE, BRYAN & FAIRBURN
ARCHITECTS-ENGINEERS-PLANNERS
ALBUQUERQUE, NEW MEXICO

DRAINAGE REPORT

LA VILLITA EAST COURT
ALBUQUERQUE, NEW MEXICO

GENERAL INFORMATION:

The site is located approximately 2000' east of Tramway Boulevard and is bounded by Candelaria Boulevard on the north, City of Albuquerque land on the east, a 150' Public Service easement on the west and privately owned land to the south.

With the completion of the Piedra Lisa interceptor channel, the heavy run-off from the southeast is diverted from the site. The continuation of Camino de la Sierra across the City land and eventually through the northeast corner of La Villita East Court will divert upstream flow from the rest of the site. Design data for the street is not available at present but diversion is assumed ample to reduce overflow to a point where Pond No.s 1 and 4 will retain it.

A preliminary drainage study, prepared by Hall Survey Co. and approved by the City Engineer, proposed to utilize the existing natural channels and, to the extent that development layout allows, this has been complied with. (See Drainage Study Plan).

METHOD:

As shown on the Plan, new watershed limits have been defined and retention ponds created within the Public Service Co. easement. These ponds will become part of a landscaped recreational area proposed for the entire easement.

Flow quantities and pond capacities have been calculated to comply with A.M.A.F.C.A. requirements for a 100 year storm.

Because of the amount of paving required for circulation and parking, the paved car ports and the dwelling units themselves, the entire area will be treated as hard-surfaced. This will give a conservative value of flow quantities.

Contour interval is 2' and based on sea level datum. Approximate finish contours are shown and will refined as development proceeds.

TREATMENT & CALCULATIONS:

Watersheds 1 and 2 will be treated together and the run-off impounded in Pond No. 3. (See Drainage Study Plan) Approximately 20% of watershed 1 is expected to drain to Candelaria. Watershed 2 is subdivided into two areas because two collection points are required.

Pond No. 1 is intended only to intercept flow coming on site and prevent downstream erosion. Pond capacity is 8000 cu. ft. A 6" C.M.P. drain with downstream riprap apron energy dissipator will be constructed. Retention time is calculated as follows by the Manning Formula:

Pipe length = 50'. Slope = 0.12'/ft.

$$Q = 0.19 \times \frac{1.486}{0.021} \times 0.346 \times 0.25 = 1.16 \text{ cfs}$$

$$\frac{8000}{1.16 \times 60 \times 60} = 1.92 \text{ hrs.}$$

Flow from the impact basin of Pond No. 1 through Subwatershed 2A will generate additional flow as follows:

A = 2.3 acres

S = 34/410 = 0.083'/ft.

K = 1424

t_c = 2.09 min.

i = 7.38

Q = 2.3 x 0.9 x 7.38 = 15.3 cfs

A riprap channel section will be required because of the excess velocity.

A section with a 4' bottom, 2 to 1 side slopes and a 1.0' depth will have capacity as follows:

$$Q = 6.0 \times \frac{1.486}{0.040} \times 0.288 \times 0.794 = 51 \text{ cfs}$$

The same section will convey flow from the upper portion of Watershed 1 to Pond No. 2.

Pond No. 2 is designed primarly as an impact basin to prevent cavitation and scour of the adjacent paved street. Flow at this point will be from Watershed 1and Subwatershed 2A.

Area = 80% (0.3) + 2.3 = 2.54 acres

S = 46/540 = 0.085'/ft.

t_c = 2.56 min.

i = 7.23

Q = 2.54 x 0.9 x 7.23 = 16.53 cfs

Pipe size required to carry flow from Pond No. 2 to Pond No. 3:

$$S = 6/125 = 0.048'/ft.$$

$$16.53 = \pi r^2 \times \frac{1.486}{0.021} \times 0.219 \times \left(\frac{r}{2}\right)^{2/3}$$

$$r = 0.79'$$

Use 18" C.M.P.

Check overflow time:

$$Q \text{ (for 18" C.M.P.)} = 1.77 \times \frac{1.486}{0.021} \times 0.219 \times 0.520 = 14.26 \text{ cfs}$$

Pond No. 2 has a capacity of 3,520 cu. ft.

$$\text{Overflow time} = \frac{3,520}{(16.53 - 14.26)\ 60 \times 60} = 2.3 \text{ hrs.}$$

Subwatershed 2B flow will be intercepted by a full-street-width inlet and conveyed by pipe to Pond No. 3.

Area = 0.9 acres

$S = 24/300 = 0.08'/ft.$

$t_c = 1.67$ min.

$i = 7.52$

$Q = 0.9 \times 0.9 \times 7.52 = 6.09$ cfs

Discharge pipe required:

$$S = 4/63 = 0.063'/ft.$$

$$6.09 = \pi r^2 \times \frac{1.486}{0.021} \times 0.252 \left(\frac{r}{2}\right)^{2/3}$$

$$r = 0.52'$$

Use 15" C.M.P.

Pond capacity required for Pond No. 3

Area = 80% (0.3) + 2.3 + 0.9 = 3.44 acres

Rainfall = 2.8"

$$\frac{3.44 \times 2.8 \times 43560}{12} = 25,000 \text{ cf}$$

Furnished = 38,400 cf

A Trapezoidal overflow section will be constructed through the berm crest and down the downstream face. Material will be 6" min. thickness, wire-tied riprap. The section will be treated as a broad-crested weir and the overflow capacity calculated as follows:

$$Q = CL \left(H + \alpha \frac{v^2}{2g}\right)^{3/2}$$

C = 3.0

α = 1.2

L = 11.0'average

v = 4 fps (assumed)

$$Q = 3 \times 11 \left(1 + 1.2 \times \frac{16}{64.4}\right)^{3/2} = 49 \text{ cfs}$$

A 6" CMP pond drain will be furnished and both the drain and the overflow weir will empty into a riprap impact basin 1'-6" deep and 12' in diameter. Pond drain calculations follow.

Pond Drain:

$$S = 10/60 = 0.167\ '/ft.$$

Use 6" C.M.P.

$$Q = 0.19 \times \frac{1.486}{0.021} \times 0.408 \times 0.250 = 1.37 \text{ cfs}$$

Drain Time:

$$\frac{38,400}{1.37 \times 60 \times 60} = 7.9 \text{ hrs.}$$

Pond No. 4 in Watershed 3 was designed to intercept flow entering the site and prevent erosion and silting. Pond capacity is 5.900 cu. ft. A 6" C.M.P. drain with an upstream riprap apron will discharge onto the pavement.

Pond Drain:

$$S = 2.5/30 = 0.833'/ft.$$

$$Q = 0.19 \times \frac{1.486}{0.021} \times 0.289 \times 0.250 = 0.97 \text{ cfs}$$

Drain Time:

$$\frac{5,900}{0.97 \times 60 \times 60} = 1.69 \text{ hrs.}$$

Watershed 3 will be retained by Pond 5. Areas not draining through hard-surfaced portions will have riprap channels provided.

Required: $\frac{6.3 \times 2.8 \times 43560}{12} = 64,000$ cu.ft.

Furnished: 68, 600 CF.

Flow through Watershed 3 is as follows:

Pond Drain:

$$S = 10/60 = 0.167\ '/ft.$$

Use 6" C.M.P.

$$Q = 0.19 \times \frac{1.486}{0.021} \times 0.408 \times 0.250 = 1.37\ cfs$$

Drain Time:

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Drain Time:

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Watershed 3 will be retained by Pond 5. Areas not draining through hard-surfaced portions will have riprap channels provided.

Required: $\frac{6.3 \times 2.8 \times 43560}{12} = 64,000\ cu.ft.$

Furnished: 68, 600 CF.

Flow through Watershed 3 is as follows:

Flow quantities for Watersheds 4 and 5 are as follows:

Watershed 4

A = 2.2 acres

S = 48/600 = 0.08

K = 2121

t_c = 2.84 min.

i = 7.14

Q = 2.2 x 0.9 x 7.14 = 14.1 cfs.

Watershed 5

A = 1.3 acres

S = 32/440 = 0.073

K = 1632

t_c = 2.32 min.

i = 7.30

Q = 1.3 x 0.9 = 7.30 = 8.5 cfs

Q for Pond 6 = 14.1 + 8.5 = 22.6 cfs.

Overflow weir as in Pond No. 3 is adequate. Riprap channels will be provided through the watersheds.

Pond Drain:

$$S = 4/65 = 0.0615'/ft.$$

Use 6" C.M.P. $$Q = 0.19 \times \frac{1.486}{0.021} \times 0.28 \times 0.250 = 0.83 \text{ cfs}$$

Drain Time:

$$\frac{37,000}{0.83 \times 60 \times 60} = 12.4 \text{ hrs.}$$

CONCLUSIONS:

Since a high percentage of the proposed development area is to be paved and since the adjacent downstream area must be retained as an easement, the construction of storm water retention ponds on natural watercourses in the easement was considered the best solution for compliance with existing requirements and protection of downstream properties.

In addition, incorporation of the ponds into the proposed landscaped recreational area will result in a pleasant visual aspect.

REGISTERED PROFESSIONAL ENGINEER STATE OF 2051 NEW MEXICO MAX FLATOW

Max Flatow

MAX FLATOW
Engineer

CITY OF ALBUQUERQUE

ALBUQUERQUE, NEW MEXICO

INTER-OFFICE CORRESPONDENCE March 31, 1983 REF. NO._____

TO: Distribution

FROM: Jim Fink, Acting Princ. Asst./City Engineer-Hydrology

SUBJECT: DRAINAGE PROBLEMS ASSOCIATED WITH LA VILLITA TOWNHOMES

There will be a meeting held on Tuesday, April 5, 1983 at 1:30 P.M. in the M.D.D. Conference Room on the 6th floor, City Hall to discuss past City dealings in the referenced area, and to formulate what the City's responsibilities are and what plan of action we are going to take.

Please search your records and memory before this meeting and bring that information to the meeting.

JF/tsl

cc: Carl Rodolph, Director of M.D.D.
Dwayne Sheppard, Deputy Director, M.D.D.
Bruno Conegliano, Hydrology Section
Fred Aguirre, Hydrology Section
George Paul, Street Maint. Engineer

City of Albuquerque
P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

September 27, 1982

Richard V. Hall
Hall Engineering & Surveying Co.
2625 Pennsylvania Ave. NE
Suite 350
Albuquerque, New Mexico 87110

Dear Mr. Hall:

Thank you for the copies of the plans on La Vita.

Sincerely,

Fred J. Aguirre, PE
Civil Engineer/Hydrology

FJA/el

596

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

RECEIVED
AUG 13 1982
CITY ENGINEER

ALBUQUERQUE NEW MEXICO 1706

RSH ____ ADM ____
ARO ____ SUR ____
DDS ____ COUN ____
DES ____ SEC ____
INSP ____ FILE ____
HYDRO ____ RETURN ____

FROM: GEORGE I. WILLIAMS, A/CAO GIW

A
INQUIRY BY: JULLIE BURCH

ADDRESS: #8 LA VILLITA TRES, N.E. 871

PHONE: 821-0412(H) 883-7411(W) DATE: 8/6/82

B
DESCRIPTION OF INQUIRY: PLEASE LET ME KNOW YOUR RESOLVING ACTIONS IN THIS MATTER. THANK YOU.

C
REFERRED TO: RICHARD S. HELLER, CITY ENG., MDD DATE: 8/12/82

D
ACTION TAKEN:

ACTION TAKEN BY: DATE:

E
RETURN REQUEST DATE: 8/20/82 CITIZEN NOTIFICATION DATE:

Fred, FYI Brian

Aug 3, 1952

Dear Mr. Heller,

Please consider this a request for you to bring under study the flooding of my property at #8 La Villita Iris NE and the property of Richard Snell, #9 La Villita Iris.

Mr. Snell and I and probably other residents of La Villita, Executive Ridge and Vista del Rey would appreciate any help you could give to relieve us all of any further flood damage that will most surely occur if no steps are taken.

The two specific properties mentioned could immediately benefit from at least some of the city's sand bags.

Please contact me at 521-0412 or 983-7111

Thank you.
Judie Burch

cc: Brian Burnett
Gee Williams

Fred, FYI Brian

Aug 3, 1982

Dear Mr. Heller,

Please consider this a request for you to bring under study the flooding of my property at #8 La Villeta Iris NE and the property of Richard Snell, #9 La Villeta Iris.

Mr. Snell and I and probably other residents of La Villeta, Executive Ridge and Vista del Rey would appreciate any help you could give to relieve us all of any further flood damage that will most surely occur if no steps are taken.

The two specific properties mentioned could immediately benefit from at least some of the city's sand bags.

Please contact me at 821-0412 or 883-7411

Thank you.
Judie Burch

cc Brian Burnett
Ed Williams

DRAINAGE COMPLAINT REPORT

Location: La Villita Sub E of Tramway Candelera Project:

Reported by: Larry Blair Phone 884-2215

Address: AMAFCA Ext.

Complainant: Phone

Address: Ext.

Taken by: B. Burnett Date 8/1/82

COMPLAINT: Exposed telephone and sanitary sewer lines in arroyo. Also, several homes flooded

Referred to: B. Montoya

INVESTIGATION — Cause: Problem area has been investigated in the past. Bruno was to take care of answering the complainants questions. Bruno intern lost file with all the information.

Recommendation: Area in question is private property and no inspection was made on any of the curb and gutter or street grades.

Investigated by: Date

Plan No. Sheet No. Drainage Map Approved Date

Wes Causey (296-3227) - Chairman of neighborhood association

9-21-82 (2:30 PM) TALKED TO MR CAUSEY'S SON AND INFORMED HIM THAT HIS COMPLAINT IS STILL UNDER INVESTIGATION. JJB

1

DRAINAGE COMPLAINT REPORT

Location: La Villita Condos Project:

Reported by: Charles Causey Phone 296-3227

Address: Ext.

Complainant: Phone

Address: Ext.

Taken by: Brian Burnett Date 8/3/82

COMPLAINT: Continuous problems – eroded wall – exposed sewer line, etc. etc.

Plan No. Sheet No. Drainage Map

Referred to:

INVESTIGATION — Cause:

Recommendation:

Investigated by: Date

Approved Date

Bernie, could you please check again. Also, please call Mr. Causey when you go out. He would like to give you a "tour." Thanks Brian

City of Albuquerque
P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

MAYOR
David Rusk

November 19, 1979

Mr. Hugh Showe
Showe Homes, Inc.
5577 Wyoming Blvd., NE
Albuquerque, New Mexico 87109

Re: Drainage in vicinity of La Villita

Dear Mr. Showe:

Recently I have become aware that uncontrolled discharge from the reference subdivision which you are currently developing, has created a significant problem for some area residents. Therefore, I request that flows east and west of the PNM easement be diverted to the detention site east of Executive Ridge, and to the temporary retaining pond east of the subdivision and south of La Gaza Road, respectively.

Your prompt attention to this matter of concern will be greatly appreciated.

Sincerely yours,

David Rusk

David Rusk
Mayor

cc: Fred Denney
2400 Comanche, NE

Mrs. Jule Box
La Villita Tres, NE, Apt. 8

Sept 1979

Diverted water plagues 4 N.E. Heights families

Four families in Albuquerque's Northeast Heights have flood problems because three construction projects have diverted rain runoff from an arroyo into their street.

The families say they have been getting the runaround and are sitting ducks for flooding until the city takes some action.

Mayor David Rusk has promised to find a solution.

THE PROBLEM surfaced Aug. 16 when four condominiums, near the mountains off Candeleria Road, were flooded, said Juel Box, one of the residents.

The water left two inches of silt in the living room and flooded the garage, said Mrs. Box.

The construction of two townhouse projects and the installation of sewer lines have resulted in piles of dirt and new curbs that force the water into three small streets where the condominiums are, she said.

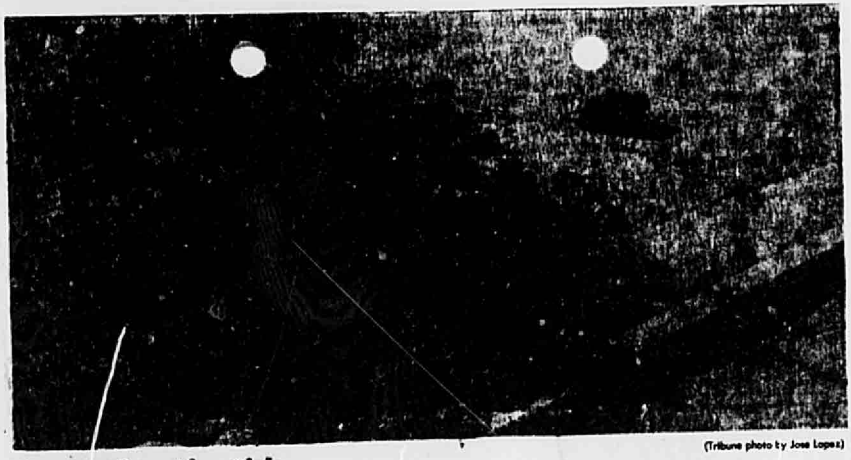
The residents called the city's Engineering Department the day after the flood, but were shuffled between departments and construction companies.

"THE CONSTRUCTION companies told us it was the city's fault and the city said the problem would eventually be taken care of," she said. "We felt we were getting the runaround."

The residents finally called the mayor's office and Rusk visited the neighborhood. He said the city would dig a ditch to divert the water if the construction companies didn't do anything, said Mrs. Box.

The city supplied the families with sand bags to put around the homes, but the residents want a better solution.

"We're just sitting ducks until they do something," she said.



(Tribune photo by Jose Lopez)

Stemming the tide

Mounds of dirt are placed in front of La Villita condominium project in the Northeast Heights to stop rain runoff from flooding the area. City crews are digging two ditches to divert the water into a nearby arroyo. Residents living in the condominiums have complained to the city since August about flooding problems.

City's digging in to ease flooding

The city is digging the long-awaited drainage ditches that it says should solve flooding problems plaguing some Northeast Heights families.

One resident who has been waiting since August for a solution said she "won't believe it" until the work is finished.

City crews began Friday digging two trenches next to La Villita condominium development off the 13000 block of Candeleria N.E., said George Paul, street maintenance engineer.

THE TRENCHES will divert runoff from the Sandia Mountains to an arroyo in the area, Paul said. Residents have complained that water from heavy rains flows into the development and floods the condominiums.

Paul said that the ditches are only a temporary solution, until Showe Homes Inc. finishes building its townhouse development next to the condominiums and permanent drainage facilities are installed.

RESIDENTS said that the Showe Homes project, along with city work on sewer lines and another townhouse development caused the flooding problems.

"You know, I won't believe it until it's actually done," said Juel Box, one of the residents.

"All I've seen is that they've dug up the road and put a pile of dirt out in front," said Mrs. Box. "That's not going to stop the water."

THE RESIDENTS complained to the city in August about the flooding, but nothing happened until Mayor David Rusk visited the area in November, she said.

City officials first told the residents that they would build the ditches, and later said Showe Homes would do the work, she said.

When Showe Homes balked, officials said they would, if the residents constructed barricades blocking off their private street, she said.

THE CITY Legal Department said that solution wouldn't work because it would block off firefighter access, so the city went back to its original idea, said Mrs. Box.

Residents, at the city's request, will put up signs on the road leading into the development reading "No Through Traffic", she said.

"I knew all along I would have to keep on them until something was finally done," said Mrs. Box.

The crews will finish digging the ditches and cleaning up the area by Wednesday, said Paul.

Legal problems may halt flood ditches in Heights

The city's newest solution to build a wall and two ditches to solve flooding problems for some Northeast Heights residents may have legal problems.

Residents have been waiting for the city to do something since August when rain runoff flooded several condominiums near the 12000 block of Candeleria N.E. next to the mountains.

THE LATEST IDEA is the third one proposed by the city.

City officials told residents last week that if they build a wall or barricade blocking off the private street leading into the condominium complex, the city would dig two ditches to divert the rain runoff from the homes to the arroyo, said Richard Heller, city engineer.

The wall would act as a second barrier against water coming off the mountains, said Heller.

"I think they're asking too much," said Joel Box, one of the residents. "We had nothing to do with the flooding in the first place."

MRS. BOX SAID she would ask the 38 home owners in the complex if they would be willing to pay for the wall.

The wall may never be built because of traffic and fire access problems caused by blocking off the street, said Fabrizio Bertoletti, mayoral aide.

"From a technical standpoint it would be a good solution," said Bertoletti, "but there would be some problems in stopping traffic flow."

THE CITY EXPECTS traffic in the area to increase after several townhouse projects are completed, he said.

There is also the problem of access to the condominium project by the Fire Department, said Heller. The Legal Department is considering both problems, he said.

The residents brought the flooding problem to the city's attention in August, said Mrs. Box. After getting the runaround for several months, they talked to Mayor David Rusk about it.

RUSK VISITED the area and promised that the city would dig some temporary ditches to divert the water, she said.

City officials, in November, changed plans and asked Showe Homes Inc. to dig the ditches on property the firm was building on. Residents claim that the Showe Homes project and two other construction projects caused the rain water to divert into their property.

Showe Homes agreed to do the work, but when the company's attorneys attached several legal conditions to the agreement, city officials gave up the idea.

"IT'S THE MOST frustrating thing," said Mrs. Box. "I've been working on this thing for over four months and we're no closer now than when we started."

The residents plan to go back to Rusk with their complaint, if a solution isn't found soon, she said.

"We'll take our lumps when they come," said Bertoletti.

G. Davenport
Visto del by

CITY OF ALBUQUERQUE

ALBUQUERQUE, NEW MEXICO

INTER-OFFICE CORRESPONDENCE

H23-D90

REF. NO.

MAY 24 1979

CITY ENGINEER

May 23, 1979

TO: Richard S. Heller, City Engineer

FROM: Rosie Elwell, Asst. Real Estate Officer

SUBJECT: LA VILLITA DEVLOPMENT

On March 16, 1979, you requested by memo that this office acquire a storm sewer easement for an existing storm sewer constructed at the time of the development through TR. 2-B, La Villita Development. Since that time, this office contacted the property owner, and he is willing to grant the easement provided the City accepted a private roadway within the development as a public street.

According to Traffic Engineering, there are no sidewalks in the area of this street, speed bumps would have to be removed and also paving will have to meet City specifications.

I am contacting Mr. Ed Beck from Transportation Department today about this situation asking him to review this request and hope to get his comments back within a few days.

RE:

5/24

From: City Engineer

To:
- ☑ Public Works Director
- ☐ Asst. Public Works Director
- ☐ Street Maintenance Engineer
- ☐ Contract & Management Division
- ☐ _____
- ☑ _____

- ☑ Asst. City Engineer-Design
- ☐ Asst. City Engineer-Field
- ☐ Asst. City Engineer-Hydrology
- ☐ [illegible] Surveyor
- ☐ [illegible]
- ☐ Secretary
- ☑ File

Rip –

Gerry –

Copies to RBA

CITY OF ALBUQUERQUE, NEW MEXICO
CITY ENGINEER'S OFFICE

MEMORANDUM - March 16, 1979

TO: Mr. Bud Ervien, Property Manager
FROM: Richard S. Heller, City Engineer
SUBJECT: LA VILLITA DEVELOPMENT

#23-D9a

Enclosed is the description of a storm sewer easement across La Villita Development. This easement covers an existing storm sewer that was constructed at the time of the development, and no dedication of this facility was made. At the present time development to the east is occurring and the City needs this easement for the conveyance of runoff waters generated from the proposed public street. I am requesting your assistance and cooperation in securing this easement at no cost to the City.

BC/RSH/fs

Enclosure
cc - H. R. Orr
Bruno Conegliano

CITY OF ALBUQUERQUE, NEW MEXICO
CITY ENGINEER'S OFFICE

MEMORANDUM - March 15, 1979

TO: Bruno Conegliano, Asst. City Engineer-Hydrology
FROM: LaMonte Urban, Chief Surveyor
SUBJECT: LAND DESCRIPTION FOR DRAINAGE EASEMENT ON TRACT 2-B LA VILLITA

Attached please find the land description to be used for acquisition or condemnation of an easement over an existing 42 inch CMP pipe for drainage purposes.

This information is pursuant to your memorandum dated December 6, 1978.

LU/fs
Enclosure

Working Drawing also on Plat file

CITY OF ALBUQUERQUE, NEW MEXICO
CITY ENGINEER'S OFFICE

MEMORANDUM - December 6, 1978

TO: Monte Urban, Chief Surveyor
FROM: Bruno Conegliano, Asst. City Engineer - Hydrology B.C
SUBJECT: LA VILLITA DEVELOPMENT

Please find enclosed a copy of a letter to Lou Gross with Fred Denney and Associates and a copy of the orthophoto map of La Villita Development. The approximate location of the 42" CMP mentioned in the letter and of the 10' drainage easement is shown on the orthophoto map. A description of a drainage easement covering these facilities within the La Villita Development is necessary to proceed with acquisition or condemnation at an early time.

Your assistance will be appreciated.

BC/fs
Enclosures
cc - Mr. Heller
Mr. Leonard
Drainage File
Mr. Sheppard

Ex. Engr. REC
Asst. Engr.
Engineer
Admin. Asst.
Rel. Est. Off.
Secretary
Foreman
Return to
File #
Init.

City of Albuquerque
P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

December 6, 1978

Mr. Lou Gross
Fred Denney & Associates, Inc.
5643 Paradise Blvd. N.W.
Albuquerque, New Mexico 87114

Subject: "Revised" Drainage Report - Vista Del Rey Subdivision

Dear Mr. Gross:

The overall drainage scheme for Vista Del Rey is acceptable contingent to the following:

a. Resolution of the question regarding the paving of Camino de la Sierra. The present understanding is that the developer is responsible for the paving of the southern half of the roadway to standards agreed upon with the Planning and Traffic Departments. Desilting of the offsite runoff is required and it is recommended that it be accomplished through ponding in the Public Service Company easement.

b. Discharge into and through the ponding areas in the Public Service Company easement must insure flow energy dissipation and erosion prevention.

c. Conveyance to the flow to the ponding areas in the southwest corner of the property is not acceptable as a permanent solution. An interim solution as indicated by the engineer is acceptable while the City endeavors to secure the R.O.W. through the Villita Development over the existing 42" CMP. If the revised R.O.W. is secured by the City expeditiously, the design will be modified by the engineer to provide positive conveyance of the flow to the existing easement between Lots 22 and 23 in Casa Grande Manor.

Signature of the plat will be granted by the City upon resolution of these questions and acceptance of the stipulations noted above.

Sincerely,

Bruno Conegliano
Assistant City Engineer-Hydrology

BC/fs
cc - Mr. Heller
Mr. Leonard
Drainage File

79 47185

Com in 31

H 23-D9

GRANT OF EASEMENT
FOR
WATER, SEWER, PUBLIC UTILITIES, AND
UNDERGROUND STORM SEWER

THIS INDENTURE, made and executed this 11th day of June, 1979, by and between La Villita Homeowners Association of Bernalillo County, New Mexico, hereinafter called the "Grantors," and the CITY OF ALBUQUERQUE, NEW MEXICO, a municipal corporation, hereinafter called the "Grantee,"

WITNESSETH:

That for a good and valuable consideration, the receipt of which is hereby acknowledged, the Grantors have this day bargained and sold, and by these presents do sell, convey and deliver, unto the Grantee a permanent easement as right-of-way, including the permanent right to enter upon the real estate hereinafter described at any time that it may see fit to construct, maintain and repair storm sewer, water lines, sanitary sewer lines and public utilities across, through and under the lands hereinafter described, and the further right to remove trees, bushes, undergrowth and obstructions interfering with the location, construction and maintenance of said utilities.

The land affected by the grant of this easement and right-of-way is located in Bernalillo County, New Mexico, and is more particularly described as follows:

SEE ATTACHED EXHIBIT "A"

The Grantors do hereby covenant with Grantee that they are lawfully seized and possessed of the real estate above described, and that they have a good and lawful right to convey it or any part thereof; that it is free from all encumbrances except those of record, and taxes due and owing the

Misc 699 31-33

32

Treasurer of Bernalillo County, New Mexico, and that they will forever warrant and defend the title thereto against the lawful claims of all persons whomsoever.

TO HAVE AND TO HOLD the said right and easement for the uses and purposes aforesaid unto Grantee, its successors and assigns, for so long as said easement shall not be abandoned for use as a right-of-way for aforesaid utilities.

As a part of the consideration for this grant, the Grantors do hereby release any and all claims for damages whatsoever cause incidental to the exercise of the rights herein granted, provided, however, that the Grantee agrees to save Grantors harmless from any and all liability that may arise as a result of the construction and use of the easement for the purposes set forth herein.

IN WITHNESS WHEREOF, the parties hereto have hereunto set their hands and seals this 17th day of June, 1979.

_____

_____

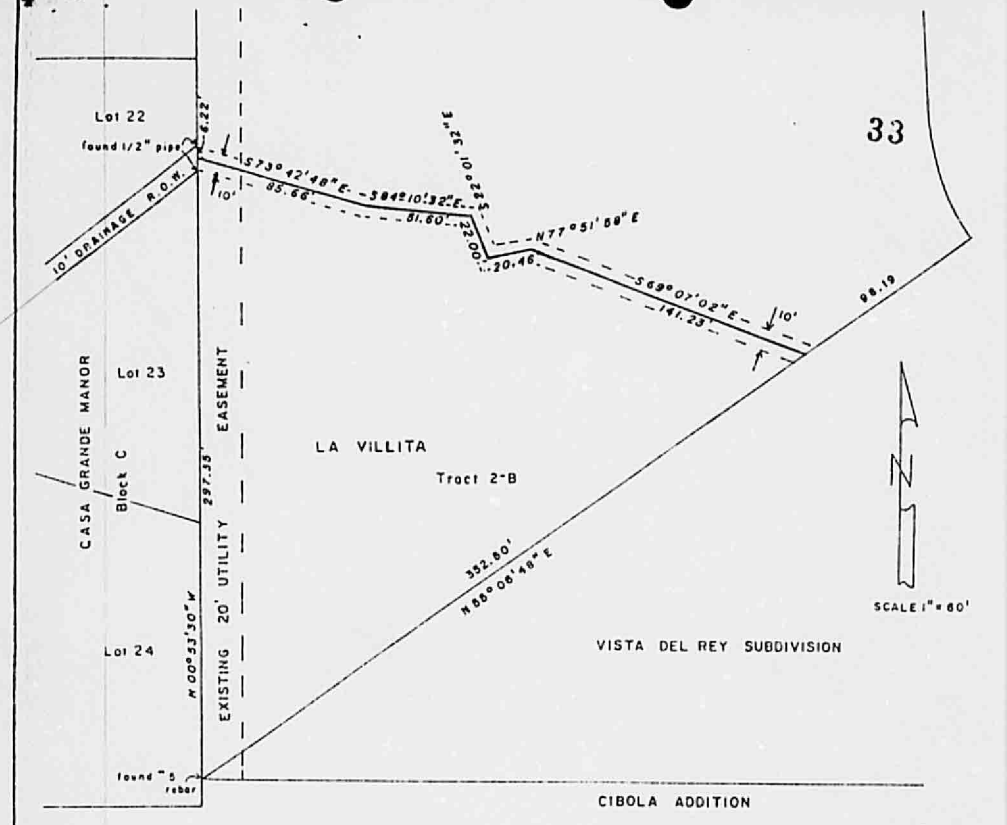
State of New Mexico)
) ss.
County of Bernalillo)

The foregoing instrument was acknowledged before me this 22nd. day of June, 1979, by La Villita Homeowners Association.

_____
Notary Public

My Commission Expires:

_____



Municipal Development Department
Engineering Division
Albuquerque, New Mexico

A 10 foot wide strip of land situate within Tract 2-B of LaVillita Planned Urban Development of the City of Albuquerque, State of New Mexico, said 10 foot strip of land being all that land lying 5 feet on each side of following described centerline.

Beginning at the southwest corner of LaVillita Planned Urban Development as said southwest corner is shown and designated on the plat filed for record in the office of the County Clerk of Bernalillo County, New Mexico on April 10, 1972; thence N00° 53'30"W along the westerly boundary of said LaVillita a distance of 297.35 feet to the True Point of Beginning, from which point the southeast corner of Lot 22, Block C of Casa Grande Manor Subdivision bears N00°53'30"W a distance of 6.22 feet, as said southeast corner of Lot 22, Block C is shown and designated on the plat filed for record in the office of the County Clerk of Bernalillo County, New Mexico on August 17, 1972;

thence, S73°42'48"E along the centerline being described a distance of 85.66 feet;

thence, S84°10'32"E a distance of 51.60 feet,

thence, S22°01'32"E a distance of 22.00 feet,

thence, N77°51'58"E a distance of 20.46 feet,

thence, S69°07'02"E a distance of 141.23 feet to a point on the southerly boundary line of said Tract 2-B and the end of the centerline being described, from which point the Point of Beginning bears S55°06'48"W a distance of 352.50 feet;

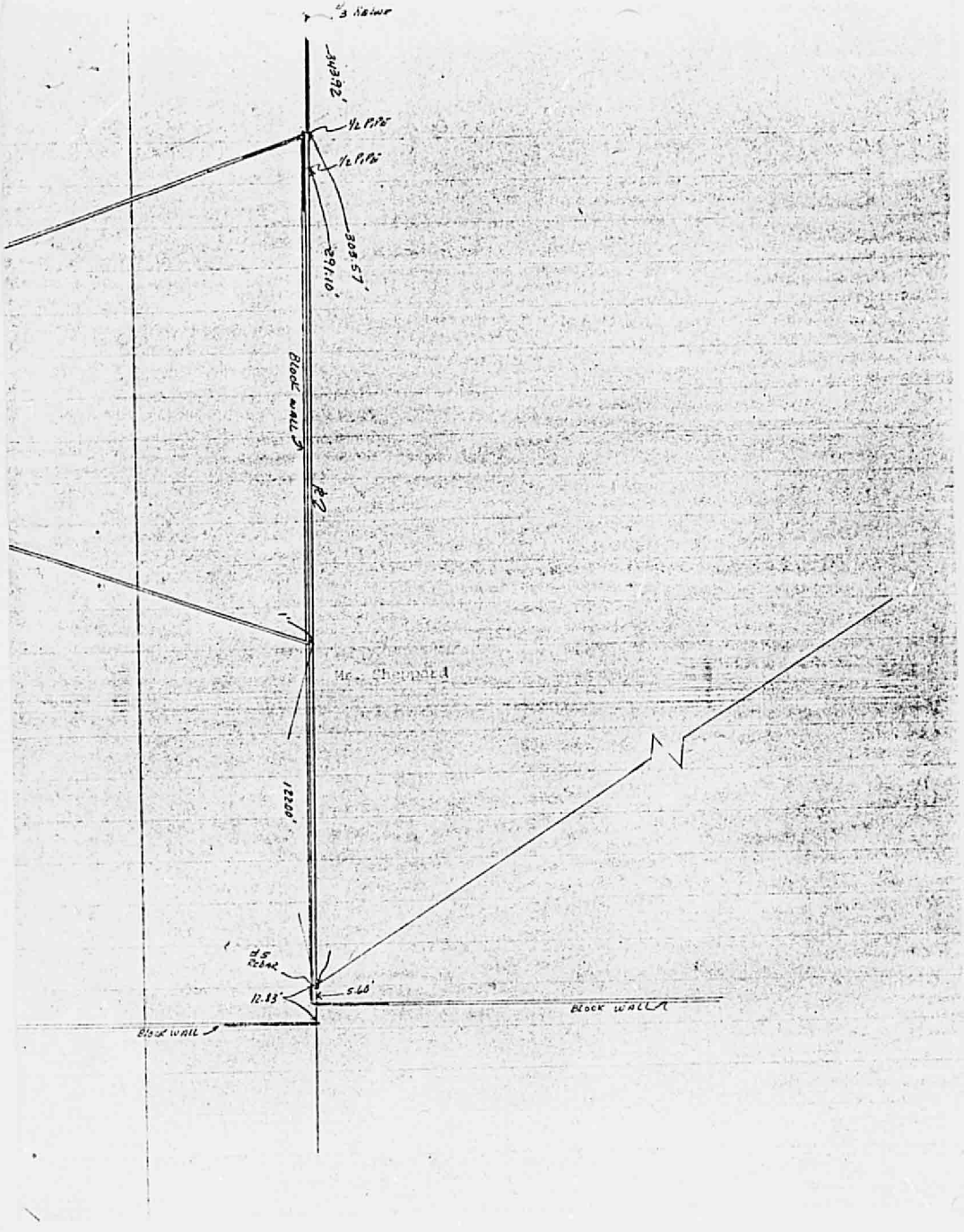
The sides of the described strip of land to be lengthened or shortened, to begin on a point on the westerly boundary line of said Tract 2-B of LaVillita and to terminate on a point on the southerly boundary of said Tract 2-B.

Said strip of land containing 3209.50 square feet more or less.

Date: 3/15/79

LaMonte Urban
N.Mex. L.S. #4257

EXHIBIT "A"



CITY OF ALBUQUERQUE, NEW MEXICO
CITY ENGINEER'S OFFICE

MEMORANDUM - July 21, 1977

H23-D9a

TO: Mr. Fred Burns, Chairman of Environmental Planning Commission
FROM: Bruno Conegliano, Assistant City Engineer-Hydrology B.C.
SUBJECT: APPROVAL OF PROPOSED DEVELOPMENT FOR TRACTS A, B, AND TRACT 3, LA VILLITA (Z-71-25-2).

Some questions have arisen regarding the adequacy of the existing and the proposed drainage facilities in La Villita Development.

I would like the opportunity for additional review of the plans of both existing and proposed development; and for an on-site inspection. Therefore, I respectfully request that the Planning Commission consider a deferral of this matter.

BC/kr

June 15, 76

Robert H. Greenlee
Bohannan, Wistman, Huston and Associates
4125 Carlisle Blvd
Albq NM 87107

Re Drainage report for La Vellita East Court

Dear Mr. Greenlee:

Plase review these comments ~~and~~ about the subject report:

1. It appears Camino de la Sierra will need to be graded much more than one foot to carry the arroyo draining into area B to Candelaria. How will this be done and why shouldn't this area continue through the La Vellita area? Section 3.1 of Subdivision Ordinance and Drainage Reduction should be ~~read~~ read on this matter.
2. Will the ponds block P.S. Co access ~~access~~ along the easement?
3. In area A & B what will keep flow from moving along the fence? If they do, what will happen?
4. No mention is made of the cattle guard type inlet shown on Plate VIII.
5. Have you calculated flow depths and velocity in the streets and driveways? Can they be adequately handled?
6. If flows are diverted to Candelaria, how will infiltration, velocities and flows be affected?
7. What about a weed and debris rack for the pond inlets?

8. The pond depths on the test do not agree with those on page 5 of 6 in the appendix.
9. Detail plans will be required prior to issuance of building permits.

If you have questions, please call.

VTY
KHL
cc John Robert

file
received
8 June 76

DRAINAGE REPORT FOR

LA VILLITA EAST COURT

ZONE ATLAS SHEET NO. H-23-Z

JUNE, 1976

DRAINAGE REPORT FOR

LA VILLITA EAST COURT

ZONE ATLAS SHEET NO. H-23-Z

JUNE, 1976

PREPARED FOR

FLATOW, MOORE, BRYAN & FAIRBURN, INC.
5301 Central, N.E., Suite 1600
Albuquerque, New Mexico 87108

PREPARED BY

BOHANNAN WESTMAN HUSTON & ASSOCIATES, INC.
4125 Carlisle Blvd., N.E.
Albuquerque, New Mexico 87107

ROBERT H. GREENLEE
N.M.P.E. NO. 5958

TABLE OF CONTENTS

LIST OF PLATES

DRAINAGE REPORT FOR

LA VILLITA EAST COURT

NARRATIVE

La Villita East Court is a multi-family development planned for construction in the near future. It consists of approximately 9 1/4 acres and is located in the northeast heights of Albuquerque, New Mexico. The property is bordered on the north by Candelaria Road, N.E., and on the east by the proposed Camino de la Sierra, N.E.

The purpose of this report is to discuss drainage facilities that will prevent La Villita East Court from being flooded by upland drainage and will prevent the development from aggravating the downstream drainage situation.

UPLAND DRAINAGE

The development is bordered on the east by two large watersheds that lie in the Sandia Mountains. Historically, water from both of these drainage basins flowed through the development. This was altered in 1974 by the construction of a system of channels to convey water from the larger of the two basins around the south end of the development and into the Piedra Lisa Arroyo. (See Plates V, VI, and VII.) These channels were designed to carry flows from the Standard Project Flood and are more than adequate to protect the development from flows resulting from the 100 year storm.

The northern watershed will continue to drain across the development area until Camino de la Sierra is constructed. Once constructed, this street will divert flows from the northern watershed to Candelaria Road

where it will continue down the mesa (see Plate I). Since Camino de la Sierra is not planned for construction in the near future, as a temporary measure to protect the development, the road section should be graded but not paved. The minimum slope of the road in this area is 1 percent; and with this slope, the 48-foot wide bladed road section will carry the 45.6 cfs at a depth of 0.41 feet resulting from a 100 year storm. In order to insure the adequacy of this temporary solution, the roadway should be cut a minimum of 1 foot below existing terrain, should have a flat cross section, and should be 48 feet wide.

CONTROL OF STORM WATER DISCHARGE FROM THE DEVELOPMENT

The La Villita development is designed so as to form 3 separate drainage areas (see Plate VIII in the back pocket of this report). These drainage basins concentrate storm water from the development at 3 points along the west edge of the property and release the water into the 150-foot wide Public Service Company easement.

Three retention ponds will be constructed to control the drainage from the development. These retention ponds are designed so that the maximum flow rate from the pond outlet will be the same during a 100 year storm as the flow from the development prior to any construction. The outlet pipe for each pond will be a 12-inch pipe and, where necessary, the flow through the pipe will be controlled by an orifice plate over the pipe inlet (see Plate III).

Each pond will be provided with a spillway to prevent the pond from being overtopped and cut if the outlet pipe were to clog during a large storm. This spillway is designed to carry the maximum 100 year flow from the developed drainage area (see Plate II).

The water from Drainage Area A will flow into Pond A (see Plate VIII).

This pond must have a minimum depth of 2.3 feet and a minimum volume of 65 cubic yards from the invert of the outlet pipe to the crest of the spillway. The outlet pipe will have an 8-inch diameter orifice over its inlet which will limit the discharge from the pond to 2.5 cfs. The spillway is designed to carry a maximum flow of 5 cfs. It is 4 feet wide and 7 feet deep.

Pond B will retard the flows from Drainage Area B. This pond must have a minimum depth of 3.5 feet and a minimum volume of 331 cubic yards from the invert of the outlet pipe to the crest of the spillway.

An orifice is not required over the outlet pipe for this pond. The outlet pipe will pass a maximum of 7.6 cfs.

The spillway will be 7 feet wide, 1 foot deep, and will pass a maximum flow rate of 18.3 cfs.

Drainage Area C will drain into Pond C. This pond should have a minimum depth of 4.35 feet and a minimum volume of 197 cubic yards from the invert of the outlet pipe to the crest of the overflow weir.

The outlet pipe will have a 9-inch orifice over the inlet which limits the flow through the outlet to 4.8 cfs.

The spillway is 6.5 feet wide, .75 feet deep, and will pass a maximum flow of 10.9 cfs.

RECOMMENDATIONS

1. Construct 3 ponds as shown on Plate VIII.

2. Grade in the portion of Camino de la Sierra that intercepts flows from the northern upland watershed.

   a. The roadway should have a flat cross section.

   b. It should be 48 feet wide.

   c. It should be cut a minimum of 1 foot below existing terrain.

d. The graded roadway should have a minimum slope of 1 percent.

CONCLUSIONS

If the preceding recommendations are followed, the site will be protected from flooding by upland flows and will not aggravate the downstream drainage situation for storms less than or equal to the magnitude of the 100 year storm.

how do you get water thru fence and not have it run along fence

AREA A 1.36 ACRES (DEVELOPED)

LAND COVER	AREA	COVER COEF.	AREA COEF.
PAVED	.60	.77	.46
HOUSING	.17	.77	.13
LAWNS	.59	2.57	1.52
TOTAL	1.36	——	2.11

AREA B 4.85 ACRES

LAND COVER	AREA	COVER COEF	AREA COEF	(DEVELOPED)
PAVED	2.08	.77	1.60	
HOUSING	1.07	.77	.82	
LAWNS	1.70	2.57	4.37	
TOTAL	4.85	——	6.79	

AREA C 3.05 ACRES

LAND COVER	AREA	COVER COEF	AREA COEF	(DEVELOPED)
PAVED	1.33	.77	1.02	
HOUSING	.55	.77	.42	
LAWNS	1.16	2.57	2.98	
TOTAL	3.05		4.43	

AVE AREA AREA COEF = AREA COEF / AREA (DEVELOPED)

AREA A = 1.55

AREA B = 1.46

AREA C = 1.45

LENGTH TO FURTHEREST POINT (DEVELOPED)

AREA A 400'

AREA B 692'

AREA C 780'

SLOPE OF AREAS (DEVELOPED)

AREA	TOP ELEV	BOTTOM ELEV	ΔELEV	LENGTH	SLOPE
A	5980	5950	30.	400	7.5%
B	5975	5924	51	692	7.4%
C	5968.5	5904	64.5	780	8.3%

PROJECT NAME La Villita East Court SHEET 1 OF 6

PROJECT NO. 76-096 BY RHG DATE 5/24/76

SUBJECT Drainage Report CH'D ____ DATE ____

TIME OF CONCENTRATION (DEVELOPED)

$Tc = LOG^{-1}\{.3641(B) + .3864 LOG(L) - .197 LOG(S) - .3673\}$

L = LENGTH TO FURTHEREST POINT
B = AVERAGE AREA COEFICIENT
C = SLOPE OF LAND IN PERCENT
Tc = TIME OF CONCENTRATION IN MINUTES

TIME OF CONCENTRATION (DEVELOPED)

AREA A	10.80 MIN
AREA B	11.80 MIN
AREA C	12.60 MIN

RUNOFF COEF. (DEVELOPED)

AREA A LAND COVER	AREA	GROUND COEF	RUNOFF COEF
PAVED	.60	.45	.27
HOUSING	.17	.95	.16
LAWNS	.59	.35	.21
TOTAL	1.36	—	.94

AREA B LAND COVER	AREA	GROUND COEF	RUNOFF COEF
PAVED	2.08	.95	1.98
HOUSING	1.07	.95	1.02
LAWNS	1.70	.35	.60
TOTAL	4.85	—	3.59

AREA C LAND COVER	AREA	GROUND COEF	RUNOFF COEF
PAVED	1.33	.95	1.26
HOUSING	.55	.95	.52
LAWNS	1.16	.35	.41
TOTAL	3.05	—	2.19

C = AVERAGE RUNOFF COEFICENT = RUNOFF COEF / AREA

AREA A	C =	.69
AREA B	C =	.74
ARE C	C =	.72

UNDEVELOPED AREA

B = AVERAGE AREA COEFF = 1.84 ALL AREAS

C = AVERAGE RUN OFF COEFF. = .35 ALL AREAS

LENGTH & SLOPE

LOCATION	HIGH ELEV	LOW ELEV	Δ ELEV	LENGTH	SLOPE %
AREA A	5976	5950	26.0	260	10%
AREA B	5974	5924	50.0	680	7.35
AREA C	5970	5904	66.0	710.	8.92

TIME OF CONCENTRATION

LOCATION		
AREA A	Tc =	11.02
AREA B	Tc =	16.97
AREA C	Tc =	16.87

MAXIMUM PONDING VOLUME AREA A

TC (MIN)	INTENSITY	Q (UNDEV)	VOL (UNDEV)	Q (DEV)	VOL (DEV)	POND VOL
11.0	5.25	2.50	1649	4.93	3252	1603
15	4.23	2.50	2250	4.44	3995	1745 *
20	4.20	2.50	3000	3.94	4729	1729
25	3.78	2.50	3750	3.55	5321	1571
30	3.44	2.50	4500	3.23	5810	1310

AREA B

TC (MIN)	INTENSITY	MAXIMUM Q (UNDEV)	PONDING VOL (UNDEV)	VOLUME Q (DEV)	VOL (DEV)	POND VOL
12.	5.11	7.64	5500	18.34	13205	7705
15.	4.73	7.64	6875	16.98	15282	8407
17.	4.50	7.64	7792	16.15	16473	8681
20	4.20	7.64	9167	15.07	18084	8917 *
25	3.78	7.64	11459	13.57	20355	8896
30	3.44	7.64	13750	12.35	22230	8480
35	3.15	7.64	16042	11.31	23751	7709
40	2.91	7.64	18334	10.44	25056	6722

AREA C

TC (MIN)	INTENSITY	MAXIMUM Q (UNDEV)	PONDING VOL (UNDEV)	VOLUME Q (DEV)	VOL (DEV)	POND VOL
13	4.97	4.80	3747	10.92	8519	4775
15	4.73	4.80	4323	10.38	9338	5018
17	4.50	4.80	4900	9.88	10079	5183
20	4.20	4.80	5765	9.22	11068	5308 *
25	3.78	4.80	7206	8.30	12451	5251
30	3.44	4.80	8647	7.55	13583	4943
35	3.15	4.80	10088	6.92	14526	4446

* MAXIMUM POND VOLUME

PROJECT NAME La Villita East Condo SHEET 3 OF 6

PROJECT NO. 76-096 BY RHG DATE 5/24/76

SUBJECT Drainage Report CH'D _____ DATE _____

THE UNDEVELOPED Q IS THE FLOWRATE FROM EACH POND. TO OBTAIN THIS FLOW RATE THE POND DEPTH AND OUTLET PIPE SIZE MUST BE SET. THE FLOW FROM A PIPE IS GIVEN BY

$$Q = CA\sqrt{2gh}$$

WHERE
- Q = FLOW RATE THROUGH PIPE
- C = ENTRANCE COEF (KING & BRATER) P 4-36
- A = AREA OF PIPE
- g = GRAVITY
- h = DEPTH OF WATER

THIS EQUATION CAN BE REARRANGED

$$Q^2 = C^2A^2 2gh$$

$$h = Q^2/2C^2A^2g$$

ASSUME A PIPE DIAMETER OF 1' WE WILL SOLVE FOR THE POND DEPTH

POND A

$Q = 2.5$ $C = .69$ $A = .79$ $g = 64.4$

$h = 6.25/(.48)(.62)(64.4) = .33$

THIS IS TOO SHALLOW SO WE WILL LOOK AT A 8" ORIFICE PLATE OVER THE PIPE ENTRANCE

$Q = 2.5$ $C = .64$ $A = .35$ $g = 64.4$

$h = 6.25/(.41)(.12)(64.4) = 1.97 \approx 2.0' + .7 = 2.7$

THIS DEPTH LOOKS OK

POND B — 12" DIA PIPE

$Q = 7.64$ $C = .69$ $A = .79$ $g = 64.4$

$h = 58.37/(.48)(.62)(64.4) = 3.05 \approx 3.0' + 1 = 4$

POND C — 8" DIA ORIFICE

$Q = 4.8$ $C = .64$ $A = .35$ $g = 64.4$

$h = 23.04/(.41)(.12)(64.4) = 7.27$

q " O.I.A $C = .47$ $A = .44$

$h = 23.04/(.45)(.20)(64.4) = 3.98 \approx 4.0 + .75 = 4.75$

PROJECT NAME La Villita East Court SHEET 4 OF 6
PROJECT NO. 76-096 BY RHG DATE 5/24/26
SUBJECT Drainage Report CH'D DATE

THE h SOLVED FOR IN THE PREVIOUS EQUATIONS WAS THE DISTANCE FROM THE CENTER OF THE ORIFICE TO THE WATER SURFACE. THE DEPTH OF THE POND WILL ADD TO THIS HALF THE ORIFICE DIAMETER PLUS THE OVERFLOW WIER DEPTH. What about spillway freeboard -

WEIR CALCULATIONS:

THE DEPTH OF THE OVERFLOW SPILLWAY OR WIER CAN BE COMPUTED USING THE MAXIMUM ANTICIPATED FLOW. THE SPILLWAY WILL NOT BE USED UNLESS THE OUTLET PIPE CLOGS.

AREA A

Q MAX = 4.93 CFS

$Q = CLH^{3/2}$ $\quad L = Q/CH^{3/2}$

LET H = .7 FEET

$L = 4.93/2.63(.7)^{1.5} = 3.20'$

LET THE WEIR BE .7' DEEP AND 4' WIDE.

AREA B

$Q_{max} = 18.34$ CFS

$L = 18.34/2.63(.5)^{1.5} = 19.72$

THIS IS TOO WIDE. INCREASING DEPTH TO 1'

$L = 18.34/2.63(1)^{1.5} = 6.97'$

LET THE WEIR BE 1' DEEP AND 7' WIDE

AREA C

Q MAX = 10.92

$L = 10.92/2.63(.75)^{1.5} = 6.39$

LET THE WEIR BE .75' DEEP AND 6.5' WIDE

POND DEPTH = ORIFICE DIA/2 + h + WEIR DEPTH

POND A = 2.0 + 8/12(2) + .7 = 3.03 ≈ 3.0' 2.3 in report

POND B = 3.0 + 10/12(2) + 1 = 4.5' 3.5

POND C = 4.00 + 8/12(2) + .75' = 5.06' ≈ 5.1' A.35

PROJECT NAME La Villita East Court SHEET 5 OF 6

PROJECT NO. 76-096 BY RHG DATE 9/25/96

SUBJECT Drainage Report CH'D _____ DATE _____

UPLAND DRAINAGE

18.5 ACRES
LENGTH 1750'
HIGH ELEV 6640
LOW ELEV 5930
ΔELEV 710'
SLOPE = 40.57 % SLOPE

RUN OFF COEF = .50
GROUND FACTOR = 1.52

Tc = 13.34

$I = \frac{189}{(Tc+25)} = 4.93$

$Q = AIC = (18.5)(.5)(4.93) = 45.60$ CFS

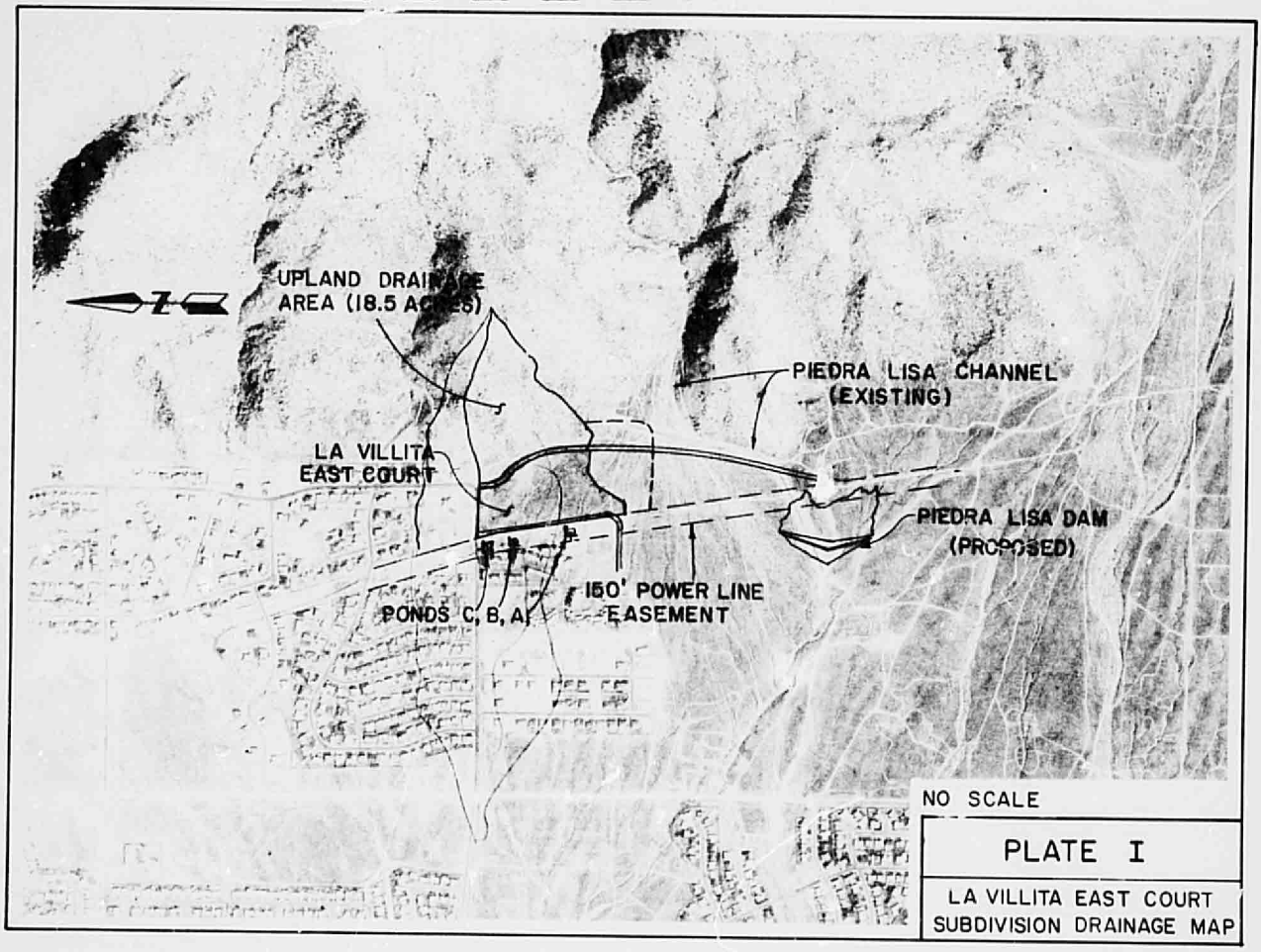
CHECK TO SEE IF BLADED CAMINO DEL LA SIERRA WILL CARRY THE WATER

MINIMUM STREET SLOPE = 1%
STREET WIDTH 48'
SIDE SLOPE 0:1
MANNINGS NUMBER UNPAVED .035
Q = 45.60 CFS
SIDE SLOPE = 0:1
WATER DEPTH = .4'
VELOCITY = 2.32'/SEC

MAX SLOPE = 10%
WATER DEPTH = .20'
VELOCITY = 4.64

THE WATER DEPTH AND VELOCITY ARE VERY COMPATABLE WITH A 48' WIDE BLADED STREET, GRADING IN PART OF THIS STREET WILL PREVENT WATER FROM FLOWING THROUGH THE DEVELOPMENT AND WILL RESULT IN A FLOW CONDITION VERY NEAR THE FINAL CONDITION.

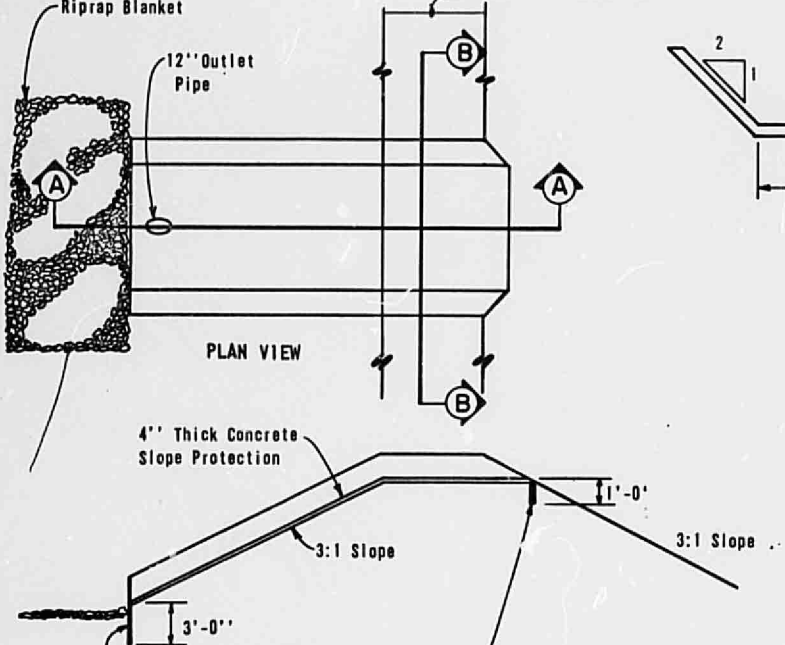
PROJECT NAME La Villita East Court SHEET 6 OF 6
PROJECT NO. 76-096 BY RAG DATE 5/25/76
SUBJECT Drainage Report CH'D DATE



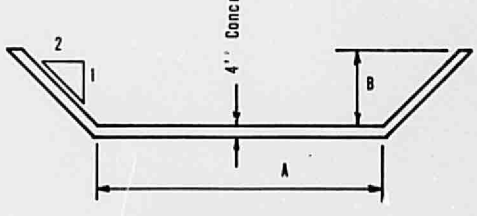
NO SCALE

PLATE I

LA VILLITA EAST COURT
SUBDIVISION DRAINAGE MAP



SECTION A-A'



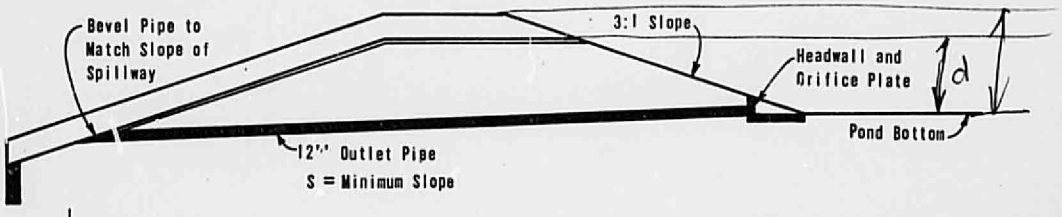
SECTION B-B

POND	DIMENSION A	DIMENSION B
A	4'-0''	9''
B	7'-0''	1'-0''
C	6'-6''	9''

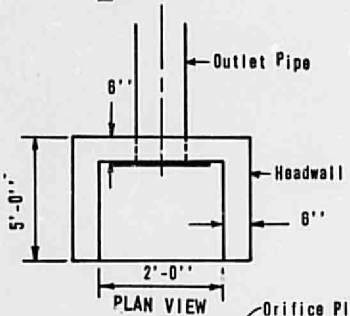
NO SCALE

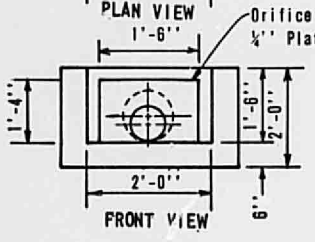
PLATE II

SPILLWAY DETAILS

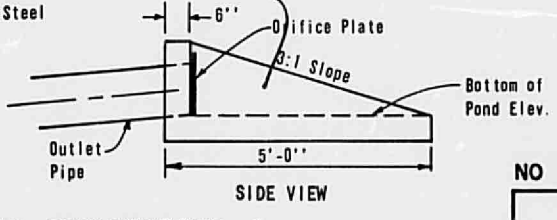


POND	S	ORIFICE DIP	d/D
A	1%	8"	
B	5%	NONE REQ'D	
C	2%	9"	





Woods 7



NOTE: ATTACH ORIFICE PLATE TO HEADWALL WITH 4 ½" J BOLTS 4" LONG.

NO SCALE

PLATE III

HEADWALL & ORIFICE PLATE DETAILS

SUMMARY OF POND DATA

	POND A	POND B	POND C
Minimum Volume of Pond Between Invert of Outlet Pipe and Crest of Weir	65 c.y.	331 c.y.	197 c.y.
Diameter of Outlet Pipe (Concrete or PVC)	12"	12"	12"
Minimum Slope of Outlet Pipe	1%	5%	2%
Diameter of Orifice	8"	No Orifice	9"
Elevation Differential Between Invert of Outlet Pipe and Crest of Weir	2.3'	3.5'	4.35'
Width of Spillway	4'	7'	6'-6"
Depth of Spillway	9"	1'-0"	9"
Maximum Discharge Rate of Outlet Pipe	2.5 cfs.	7.6 cfs.	4.8 cfs.
Spillway Capacity	4.9 cfs.	18.3 cfs.	10.3 cfs.

SUMMARY OF LA VILLITA HYDROLOGICAL PROPERTIES

	AREA A	AREA B	AREA C
Total Area (Acres)	1.36	4.85	3.05
Paved Area (Acres)	.60	2.08	1.33
Housing Area (Acres)	.17	1.07	.55
Area of Lawns (Acres)	.59	1.70	1.16
Time of Concentration - Undeveloped (Min)	11	17	17
Peak Runoff - Undeveloped (CFS)	2.5	7.6	4.8
Time of Concentration - Developed (Min)	11	12	13
Peak Runoff - Developed (CFS)	4.9	18.3	10.9

PLATE IV

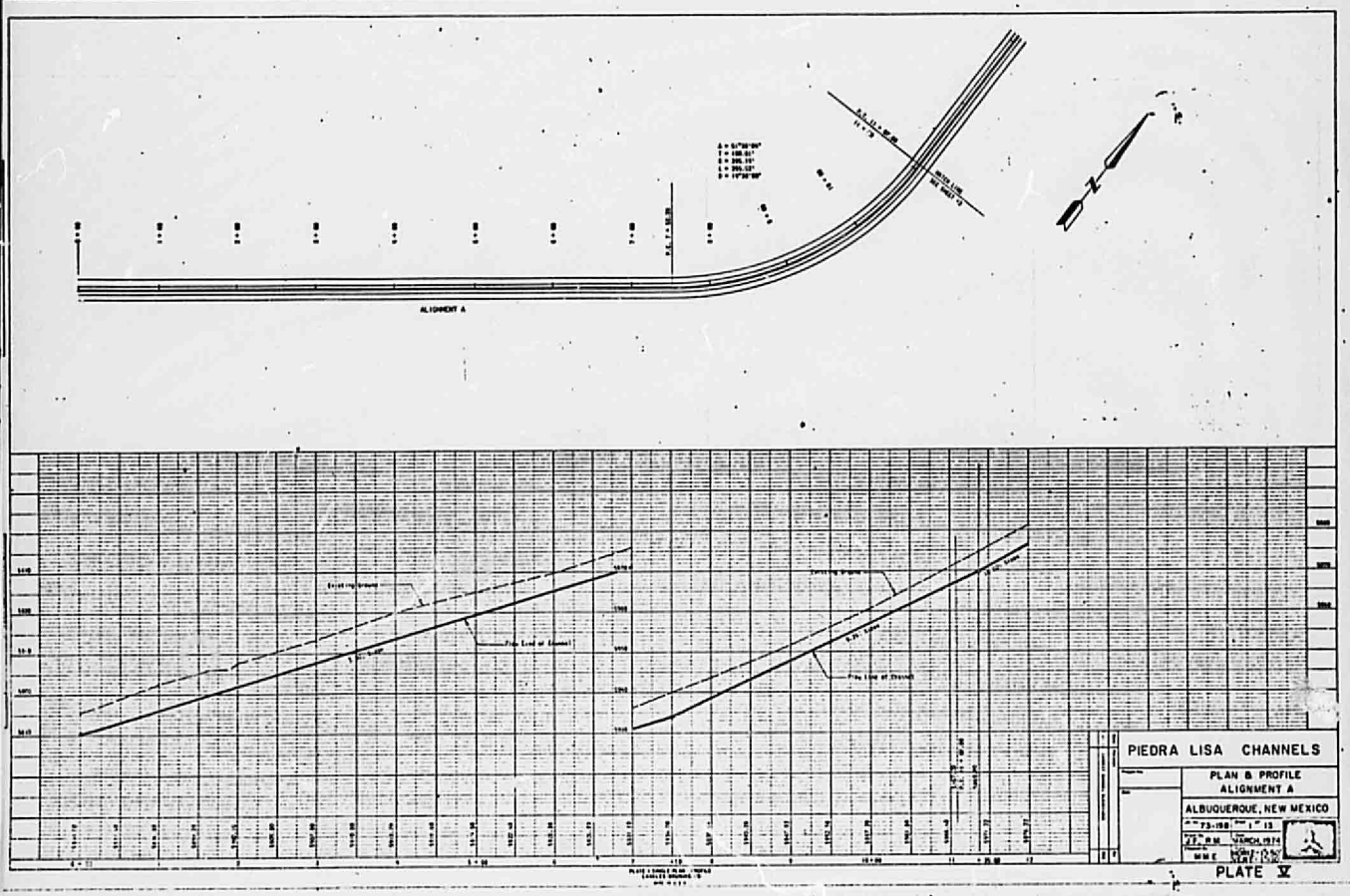
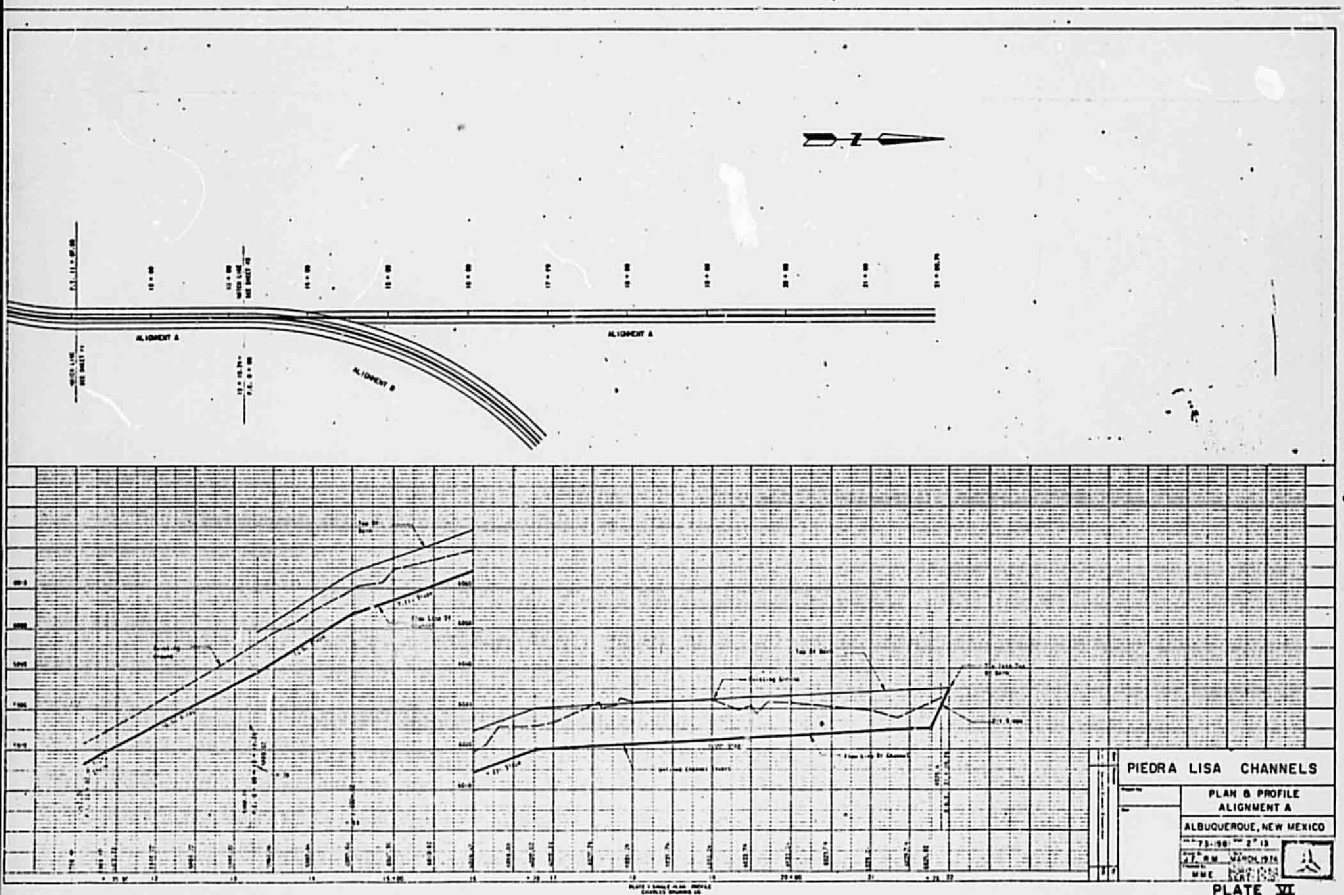

ALIGNMENT A
PIEDRA LISA CHANNELS
PLAN & PROFILE
ALIGNMENT A
ALBUQUERQUE, NEW MEXICO

PLATE V

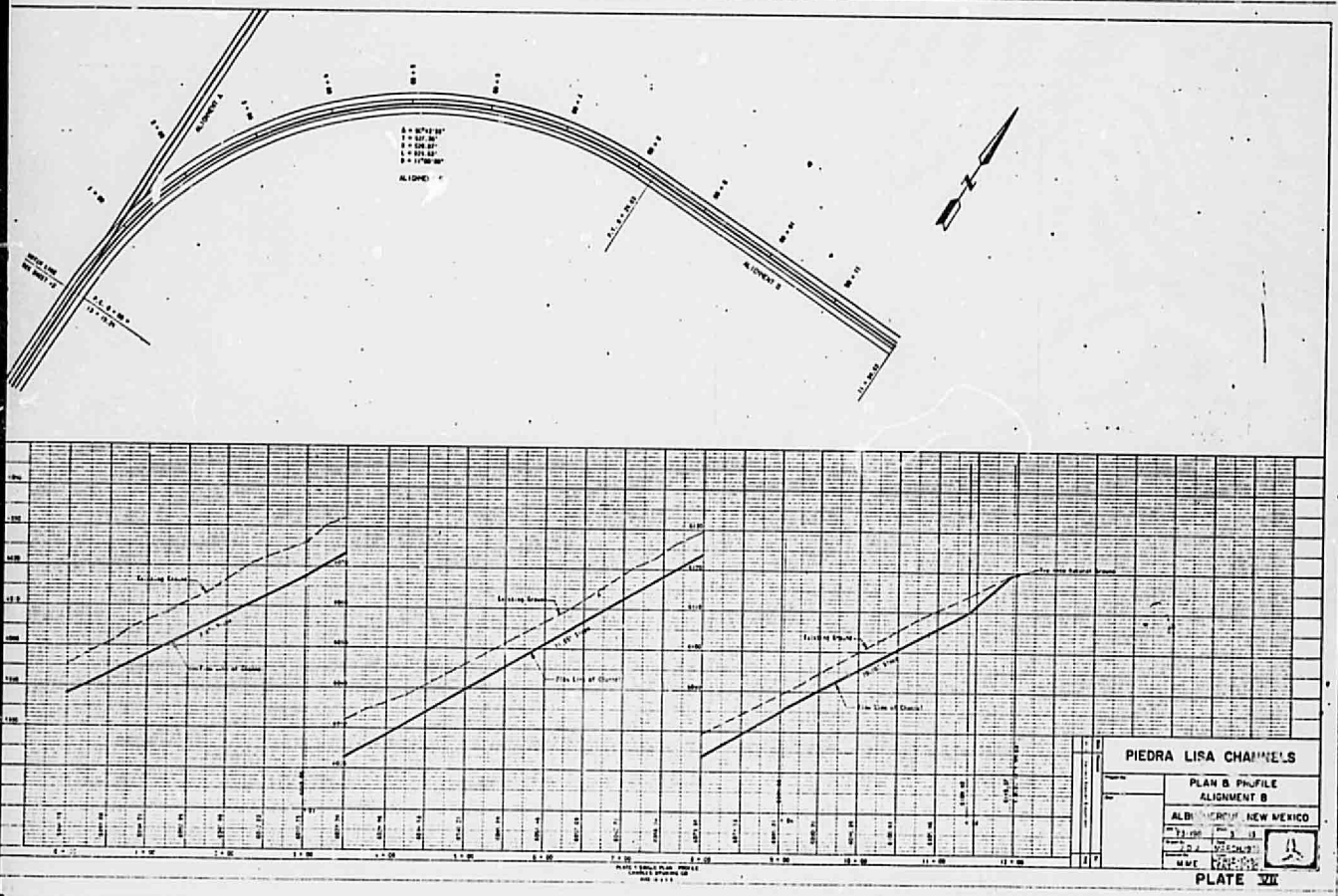


PIEDRA LISA CHANNELS

PLAN & PROFILE
ALIGNMENT A

ALBUQUERQUE, NEW MEXICO

PLATE VI


PIEDRA LISA CHANNELS
PLAN & PROFILE
ALIGNMENT B
ALBUQUERQUE, NEW MEXICO
PLATE VII