north central mortgage

2500 Louisiana, N.E., Suite 101, Albuquerque, New Mexico 87110, Telephone (505) 883-1717

February 5, 1979

Mr. Bruno Conegliano
Asst. City Engineer - Hydrology
CITY OF ALBUQUERQUE
P.O. Box 1293
Albuquerque, NM 87103

RE: Drainage plan Southerly portion of the Shores development

Dear Sir:

Should the plan as submitted by Boyle Engineering be approved on the referenced project, we will have the grading and block wall completed within 60 days. Final landscaping should follow 30 days later.

Sincerely,

Gerald S. Misurek
Senior Vice-President

GSM: cs

Boyle Engineering Corporation

1721 Girard Boulevard, N.E.
Albuquerque, New Mexico 87106

consulting engineers
505 / 266-7787

February 2, 1979

Mr. Bruno Conegliano
Asst. City Engineer - Hydrology
CITY OF ALBUQUERQUE
P.O. Box 1293
Albuquerque, New Mexico 87103

RE: Morris Manor (formerly called The Shores) and the existing The Shores planned residential development.

In response to your letter dated October 23, 1978, attached please find a site plan for the area just north of the proposed Morris Manor Addition. This site is part of the original The Shores, Phase I Development Plan that was revised on May 6, 1977.

Construction on this site began a few months ago. To date the buildings have been completed. The driveways, sidewalks, curbs, gutters, ponding areas, landscaping and the six foot high block wall have not been constructed yet.

This site plan shows that our recommendation to our client, the developer, that was made on page 2 of our Morris Manor Drainage Study is being accepted.

Grading of the area immediately to the north of Morris Manor will cause all storm runoff to flow in swales parallel to but offset from the base of the proposed six foot high block wall dividing The Shores, Phase I from Morris Manor. The runoff will flow either to the newly constructed ponding area or to the proposed ponding area in the southwest corner of The Shores. The runoff from the roofs and the proposed private roads, driveways, and sidewalks is designed to flow either into the newly constructed ponding area or to the north into Indian School Road via the private road on the west side of The Shores.

This drainage plan is the same as was originally designed and approved in the report, The Shores Drainage Report, by Bohannan, Huston & Associates, July 1972, except that with the addition of two new ponding areas now, the actual external runoff to the Indian School Road has been reduced. The revised The Shores, Phase I Development Plan of May 6, 1977 reduced the number of lots planned for the southwest corner of The Shores and left the proposed percentage of pervious to imperious areas and the average coefficient of runoff virtually unchanged.

The following calculations show that the proposed ponding area for the southwest corner of The Shores has sufficient capacity to store without overflowing the entire runoff from a 100 year storm of the 641.93 foot long strip of grassed land separating The Shores townhouses from Morris Manor:

Grassed Strip Area
642' X 35' + 50' X 40' = 24,470 S.F.

$$24{,}470 \text{ S.F.} = \frac{1 \text{ Acre}}{43{,}560 \text{ S.F.}} = .56 \text{ Acres}$$

$$\text{Average Slope} = \frac{32 - 18}{642} = .0218$$

Proposed Conditions

A. Grassed Surface, coefficient of runoff, C = .4

B. 100 Year Storm Precipitation:

From City of Albuquerque Precipitation Map 100 Year Storm — Precipitation = 2.6 inches

C. Volume Retained in S.W. Corner Ponding Area in a 100 Year Storm.

$$.4 \times 24{,}470 \text{ S.F.} \times \frac{2.6 \text{ in.}}{12 \text{ in./ft.}} = 2{,}121 \text{ C.F.}$$

D. Required Depth of Ponding Area

Area of Ponding Area is approximately 80' X 30' X h
h = .88 ft. or 10.56 inches

In conclusion the site plan for the southwest portion of The Shores, Phase I, the proposed Development Plan for Morris Manor and the proposed Grading Plan for Morris Manor all show a coordinated drainage scheme that will comply with A.M.A.F.C.A., Resolution 1972-2, provided that the southwest portion of The Shores, Phase I is constructed as shown. It is concluded that the proposed development will not create a flood hazard to surrounding properties, nor will the property itself be in danger of flooding.

BOYLE ENGINEERING CORPORATION

Steve Eagan

Steve Eagan, P.E.
Associate Civil Engineer

SE/pjf

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

October 23, 1978

Mr. Vic Chavez
Boyle Engineering Corporation
1721 Girard Boulevard, N.E.
Albuquerque, New Mexico 87106

RE: Drainage Report for "The Shores" Addition

Dear Mr. Chavez:

I have reviewed the letter amending the drainage report for the above referenced subdivision and I am in general agreement with the recommendations.

The diversion of the off site flow from that portion of "The Shores" which is being constructed at this time, is an integral part of the drainage scheme and I will have to receive, review, and approve the recommendations that you have made to your client. I will also need a letter of commitment from the owner specifying how and when the improvements will be performed.

Very truly yours,

Bruno Conegliano
Asst. City Engineer-Hydrology

BC/gw

cc: C. D. Sheppard, Acting City Engineer
Rich Leonard, AMAFCA
Drainage File

Boyle Engineering Corporation

consulting engineers

1721 Girard Boulevard, N.E.
Albuquerque, New Mexico 87106

505 / 266-7789

October 10, 1978

Mr. Bruno Conegliano
Asst. City Engineer - Hydrology
City of Albuquerque
Public Works Department
P.O. Box 1293
Albuquerque, New Mexico 87103

Subject: Drainage Report for "The Shores" Subdivision

Dear Mr. Conegliano,

This letter is in response to your questions concerning our report, STORM DRAINAGE STUDY RELATIVE TO SITE PLAN DEVELOPMENT FOR THE SHORES SUBDIVISION: ALBUQUERQUE, NEW MEXICO, that you listed in your letter dated October 6, 1978.

The topographical map of the undeveloped portion of "The Shores" Subdivision actually does not cover any part of the developed north side of the subdivision including the southwest corner of the developed parcel that is referred to on Page 2 of the report.

This southwest corner is currently under construction with two townhouses being built by the owner, as part of the final phase of construction of the northern half of "The Shores" Subdivision that was already approved by the City of Albuquerque for development.

Since the owner of "The Shores" is also the owner of the undeveloped southern half of "The Shores" Subdivision and is also our client, for whom this report was written, the recommendations to provide ponding on the southwest corner of the developed parcel is addressed to him. Actually, he is already implementing this recommendation by preparing to construct a concrete block wall on the property line between the developed and undeveloped "The Shores" parcels, which will prevent run-off draining from either parcel to the other one.

Due to a lack of coordination on our part some revisions in our drainage report calculations failed to be included in the final draft of our report. Thus, we are enclosing corrected copies of pages 4, A-2, A-3, and FIGURE 1. We have also incorporated in these revised calculations, the following revised values in order to comply with your recently promulgated STANDARD REQUIREMENTS FOR DRAINAGE PLANS:

1. Coefficient of runoff for impervious surfaces: .90

2. Six-hour rainfall in 100 year storm for "The Shores" neighborhood: 2.6 inches.

As is shown on revised page A-3 and FIGURE 1, the recomputed depth of ponding is 13.26 inches or 1.105 feet.

Your recommendation that the finished floor elevations of each building be constructed a minimum of six inches above the top elevation of the back-yard ponding area is accepted and will be so noted on the development plat.

A utility easement will be provided for water, sewer and storm drainage facilities between lots 18 and 19, and will be so indicated on the filed plat. In response to requests by local residents and the Bernalillo County E.P.C. present plans for storm runoff call for the use of a buried conduit in order to limit pedestrian access to the southeast corner of Jackson Junior High School. The final construction plans will show this system and associated grading which will be available for your review.

We accept your recommended note to be also recorded on the plat concerning minimum ponding volume for each lot, etc., except that with the minimum ponding depth recomputed to be 13.26 inches or 1.105 feet, the corresponding minimum ponding volume on each lot should be noted as:

.5 (10' X 50' X 1.105') + (5' X 50' X 1.105') = 552.5 cubic feet,

instead of the 633 cubic feet based on the 15.2 inch minimum depth of ponding that you mentioned in your letter.

We request that the development plat for the undeveloped southern portion of "The Shores" Subdivision be approved as not being presently exposed to flood hazards due to impending completion of the Embudo Dam. We have requested the Federal Insurance Adminstration to revise their boundaries of Zone "A" in their "Flood Hazard Boundary Map H-01-37, City of Albuquerque, New Mexico" and locate "The Shores" Subdivision out side of Zone "A".

Your timely response to our drainage report revisions and recommendations for notations on the development plat for this undeveloped parcel will be appreciated.

We will be happy to answer any questions you may have.

BOYLE ENGINEERING CORPORATION

Victor J. Chavez

Victor J. Chavez, P.E.

Encl.

VJC: pjf

C. Site Drainage:

As shown on the attached site plan drawing, the general pattern of the existing topography will not have to be greatly altered in order to continue to direct all on-site run-off to Hannett Avenue. Ponding will be provided on one-third of the grass lawn areas in order to retain the additional run-off generated by the parcel's development. The ponded water will be disposed of through evaporation and percolation.

As determined by the calculations shown in the APPENDIX, backyard ponding areas at least 15 ft. by 50 ft. in size are required. Likewise, it is required that downspouts from roofs and grading around each house be so designed as to direct all roof run-off to ponding areas. FIGURE 1 shows a typical house lot and how it should be graded properly for drainage.

VI. CONCLUSIONS AND RECOMMENDATIONS:

On the basis fo the study of this report, the following recommendations are proposed:

1. Re-grade the terrain surrouding the existing structures in the southwest corner of the developed The Shores parcel to cause run-off to pond on planned ponding areas on the developed tract.
2. Grade the undeveloped tract, as shown in FIGURE 1, so that the drivepads and sidewalks drain to the streets. However, the entire roof must drain to a backyard grass lawn ponding area at least 15 ft. by 50 ft. in size or some other combination of dimensions, as long as the total ponding area of the lot is not less than (15'X 50') = 750 square feet in area and approximately 13.26 inches in depth.

B. Proposed Runoff for total tract

Rate of Flow, $Q_{100} = C_{Avg.} \quad I \quad A$

$= (.715)\ (4.58)\ (11.6) - 37.98$ cfs.

Volume - 505254 (.715) (2.95/12) = 88,809 ft^3
100

Proposed		Existing
$\Delta Q = 37.98$	-	21.25 = 16.73 cfs.
$\Delta V = 88,809$	-	49687 = 39122 ft^3

C. Ponding Areas

Areas Contributing:

Roofs (2500) (64) = 160000 ft^2 (Total Roof Areas)
Ponding Areas (15' X 50') (64) = 48000 ft^2 (Part of back yards)

Roofs = 160000 ft^2 $\frac{1 \text{ acre}}{43560}$ = 3.673 acres

Ponding Areas = 48000 ft^2 $\frac{1 \text{ acre}}{43560\ ft^2}$ = 1.102 acres

D. Volume retained in ponding areas in a 100 year storm

Volume retained = ((3.673) (.90) + (1.102) (1.0)) X 43560 $\frac{2.6}{12}$ = 41600 ft^3

E. Flow Eliminated by Ponding

Q = ((3.673) (.90) + (1.102) (.4))x (4.58)

Q = 17.16 cfs

F. Final Quantities

Total Volume of runoff = 88809 − 41600 ft^3
= 47209 < 49687 (existing)

Rate of Runoff = 37.98 − 17.16 cfs = 20.82 < 21.25 (existing)

G. Important Design Criteria to be followed to comply with drainage needs.

All downspouts from roofs must be located so as to lead run-off to backyard lawn ponding areas. See FIGURE 1 for design details.

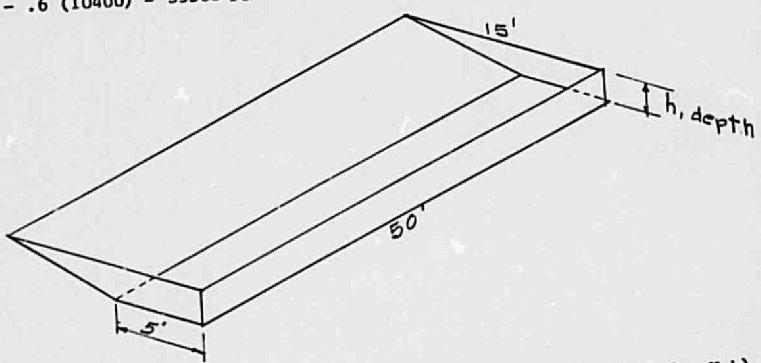
H. Required Depth of Ponding Areas

Volume retained in 100 year storm = 41600
Minus 60% immediate absortion of direct rainfall
on grass, since coefficient of runoff for grass is .4 or 40%.

Volume of Rainfall falling on ponding areas

$= 48000\ ft^2 \times 2.6\ \text{inches} \cdot \frac{1\ ft.}{12\ \text{Inches}} = 10400\ ft^3$

Net Volume of Rainfall and Runoff not immediately absorbed:
$= 41600 - .6\ (10400) = 35360\ ft^3$

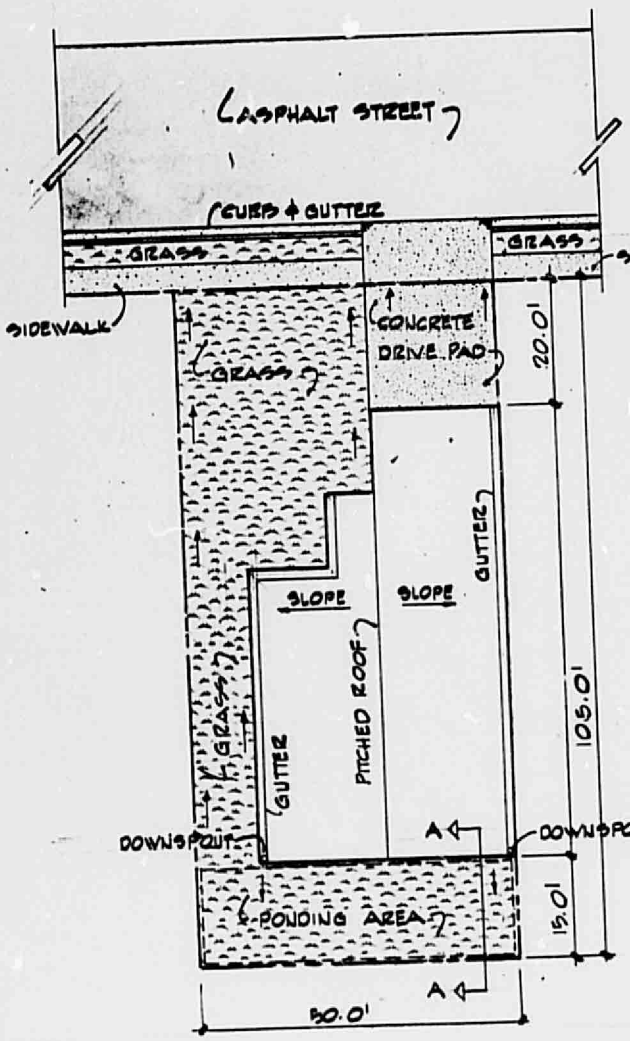


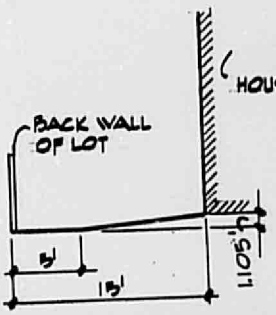
Volume of 64 Ponding areas = (50 ft. X 5 ft. X h) + ½ (50 ft. X 10 ft. X h) ·64

$35360\ ft^3 = 32000\ h\ ft^3$

$h = 1.105\ ft. \cdot \frac{12\ in.}{1\ ft.} = 13.26\ \text{inches}$

Recommended depth, h = 13.26 inches





BACKYARD PONDING AREA
SECTION A-A
SCALE: 1" = 10'

NOTE: ARROWS INDICATE DIRECTION OF FLOW

THE SHORES SUBDIVISION
(UNDEVELOPED TRACT)-
GRADING PLAN FOR TYPICAL HOUSE LOT
SCALE: 1" = 20'

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

October 6, 1978

file copy

Mr. Vic Chavez
Boyle Engineering Corporation
1721 Girard Boulevard, N.E.
Albuquerque, New Mexico 87106

Dear Mr. Chavez:

I have reviewed the drainage report for "The Shores" and I have the following comments:

On page 2, the report indicates that "local flows from the Southwest corner of the developed "The Shores" drains into the undeveloped parcel." The existing topography for the proposed development as submitted with the drainage report does not show such offsite flows. Is the statement incorrect or is the topography different from actual conditions? Further, the statement "...it is recommended that this Southwest corner of the developed parcel be regraded to pond runoff on the adjacent development" is very vague. Whom is the recommendation addressed to? Who will perform the recommended regrading? How is the regrading going to be accomplished?

Regarding the question of backyard ponding, an error is noted on page A-3. The surface of the ponding areas is indicated in 72000 sq. ft. while all the previous computations reported a surface area of 32000 sq. ft. Correspondingly, the depth of ponding should be 15.2 in. instead of the indicated 11.0 in.

Since several assumptions are made in the computations, particularly in regard to infiltration rates, it is recommended that the finished floor elevations of the buildings be established a minimum of 6 in. above the level of ponding areas.

It is further requested that an appropriate drainage easement be dedicated on the plat and that a standard City of Albuquerque rundown be constructed between lots 18 and 19 of this subdivision.

The following note must also be recorded on the plat: "This plat is approved with the condition that each lot be so graded as to provide a minimum ponding volume of 633 cu. ft. on each lot. All the roof runoff must be conveyed to the pond by suitable means. The purchasers of the individual lots will be made aware of the existence of the backyard ponds and of the necessity of preserving and maintaining them. Landscaping with underlying polyethylene film would not be in keeping with the adopted drainage scheme and not acceptable except if compensatory ponding is provided and approved by the City Engineer's Office."

Regarding the flooding conditions on this parcel: Unless an amended FIA Flood hazard map is received by this office, the property is still legally inside Zone "A" and lenders may require flood insurance. The construction underway of the Embudo dam will ameliorate the flooding conditions and this office does not consider the development of "The Shores" to be presently exposed to flood hazards. Nevertheless, for your information, I am enclosing copies of my correspondence with the Corps of Engineers (initiated prior to the awarding of the contract for the Embudo Dam) with which Mr. Cunico, Chief of the Flood Plain Management Section, indicates a change in heart from the position taken with his letter to you enclosed in the drainage report.

Satisfactory answers to the questions raised above will have to be received before plat approval will be granted.

Very Truly Yours,

Bruno Conegliano
Asst. City Engineer-Hydrology

BC/tl

Enclosures

Boyle Engineering Corporation
consulting engineers
1721 Girard Boulevard, N.E.
Albuquerque, New Mexico 87106
505 / 266-7789

August 18, 1978

Mr. Bruno Conegliano
City of Albuquerque
P. O. Box 1293
Albuquerque, New Mexico 87103

Request for Flood Hazard Reclassification

Attached is a request for a change in the Flood Hazard Classification for the area located southwest of Morris and Indian School NE which has been sent to the Office of Flood Insurance. It is our understanding that this request will require a letter from you to the FIA verifying the attached prior to any change in classification.

We would like to express our thanks for you assistance in accumulating the information on which this request for change is based.

BOYLE ENGINEERING CORPORATION

Victor J. Chavez

Victor J. Chavez, PE

VJC: pjf

Encls.

Boyle Engineering Corporation

consulting engineers

1721 Girard Boulevard, N.E.
Albuquerque, New Mexico 87106

505 / 266-7709

August 18, 1978

Engineering Division
Office of Flood Insurance
Federal Insurance Administration
U. S. Department of Housing and Urban Development
Washington, D. C. 20410

Attention: Map Amendments Section

We hereby request a change in the Flood Hazard Classification for the area indicated on the attached Flood Hazard Boundary Map, Sheet 17, Community No. 350002 A, City of Albuquerque, New Mexico, Bernalillo County.

Attached is a letter from Mr. John J. Cunico, Chief of Flood Plain Management and Hydraulics Branch, Engineering Division, Corps of Engineers, specifically excluding the site from the Intermediate work performed for Flood Plain Information, Part IV as prepared for the Albuquerque Metropolitan Arroyo Flood Control Authority by the Department of the Army, Albuquerque District, Corps of Engineers, Albuquerque, New Mexico. The flood plain at the site was erroneously shown at elevations between nine and ten feet above the anticipated water surface elevation. This can be seen in the attached copies of the topographic maps prepared in conjunction with the referenced project. The portion of Plate H-21 shows the Flood Plain Limits, as would be encountered due to anticipated water surface elevations, is well away from the study site.

As yet, only a portion of the study site has been platted. A copy of that portion is attached. We are presently preparing a plat for filing which will be forwarded upon completion.

Please call if we can be of any further assistance in this matter.

BOYLE ENGINEERING CORPORATION

Victor J. Chavez

Victor J. Chavez, P.E.

Enclosure

VJC:pjf

DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1580
ALBUQUERQUE, NEW MEXICO 87103

SWAED-P

10 April 1978

Mr. V. Chavez
Boyle Engineering
1721 Girard NE
Albuquerque, NM 87106

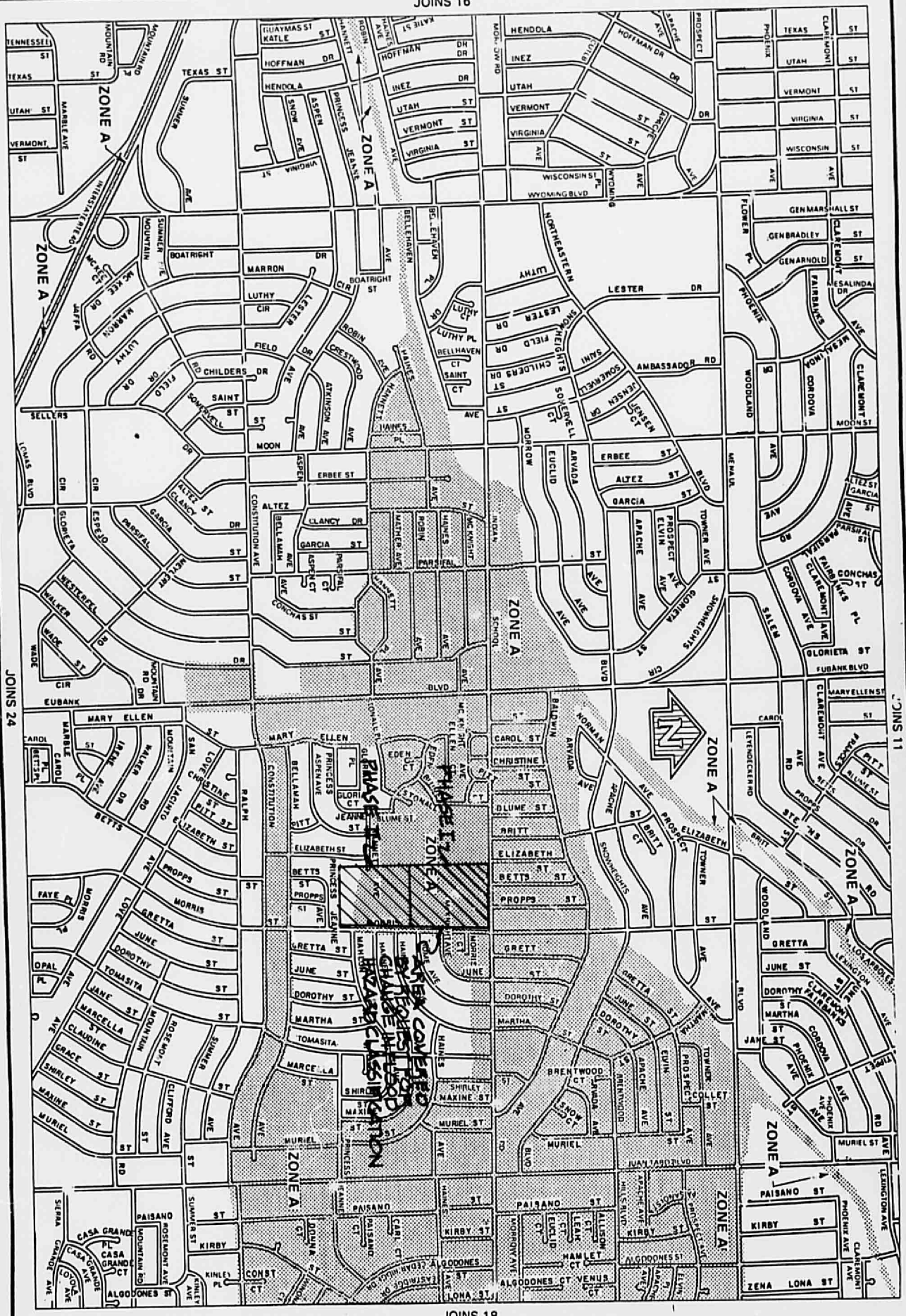
Dear Mr. Chavez:

In reply to your telephone inquiry to the FPM&H Branch on 7 April 1978, we find that the property on the southwest corner of Indian School Road and Morris Street, Albuquerque, is not in the Intermediate Regional Flood Plain.

If we can be of further assistance do not hesitate to call on us.

Sincerely,

JOHN J. CUNICO, P.E.
Chief, Flood Plain Management
and Hydraulics Branch
Engineering Division



17

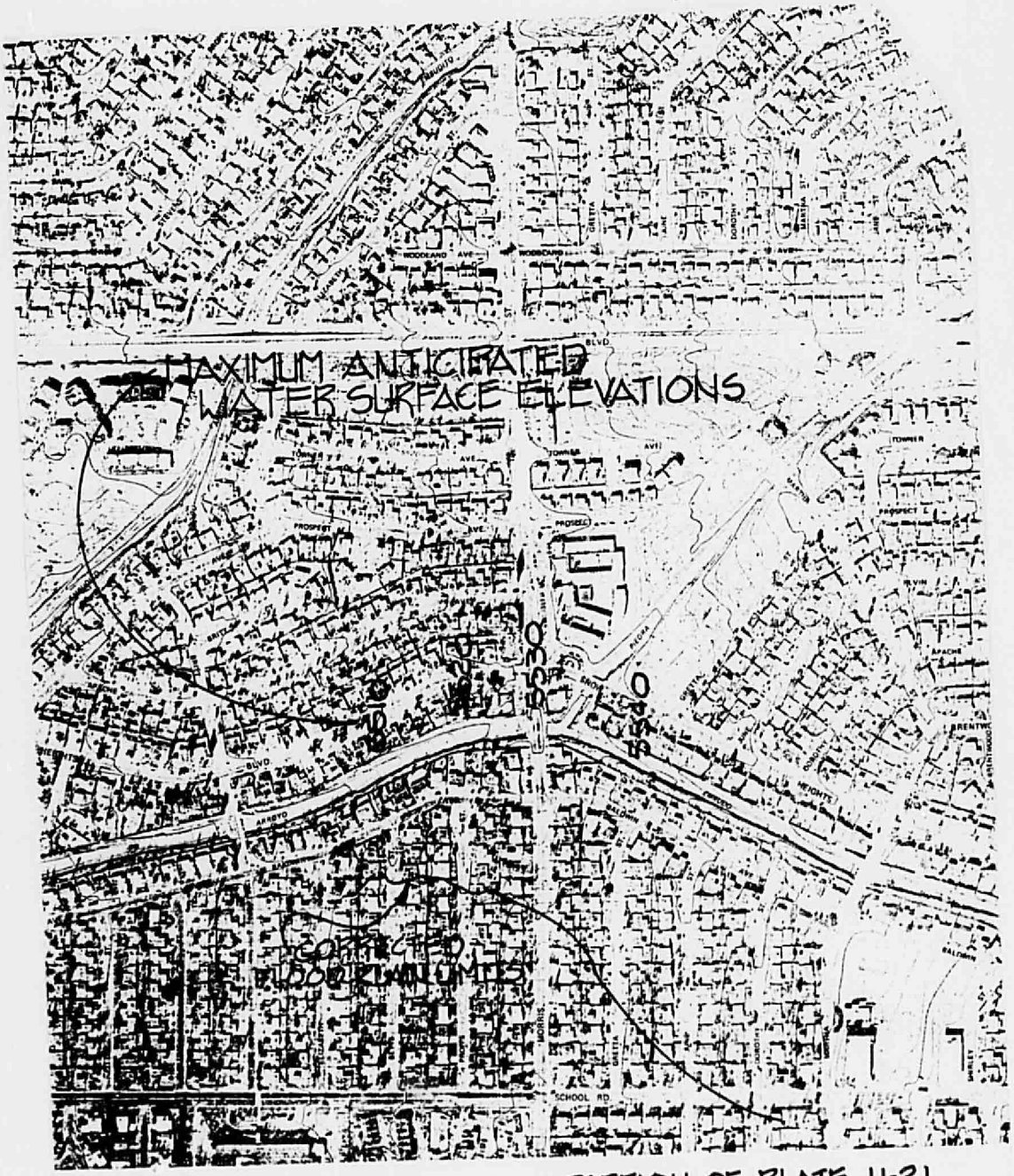
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CITY OF ALBUQUERQUE, NM
(BERNALILLO CO.)

APPROXIMATE SCALE
1000 0 1000 2000 3000 FEET

FLOOD HAZARD BOUNDARY MAP

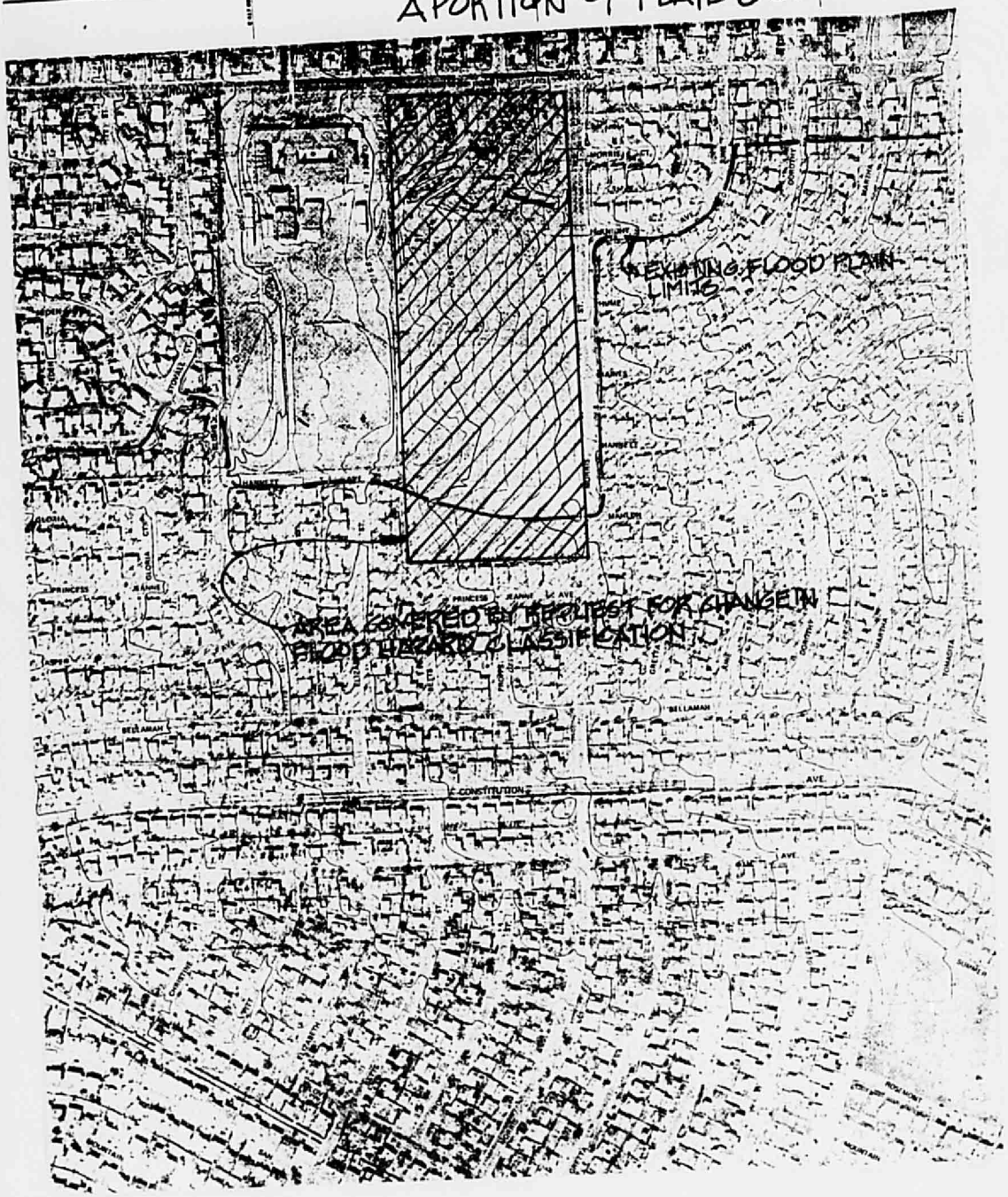
MAP REVISED
2/14/7



A PORTION OF PLATE H-21

DEPARTMENT OF THE ARMY, NA

A PORTION OF PLATE J-21



DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1580
ALBUQUERQUE, NEW MEXICO 87103

SWAED-P

10 April 1978

Mr. V. Chavez
Boyle Engineering
1721 Girard NE
Albuquerque, NM 87106

Dear Mr. Chavez:

In reply to your telephone inquiry to the FPM&H Branch on 7 April 1978, we find that the property on the southwest corner of Indian School Road and Morris Street, Albuquerque, is not in the Intermediate Regional Flood Plain.

If we can be of further assistance do not hesitate to call on us.

Sincerely,

JOHN J. CUNICO, P.E.
Chief, Flood Plain Management
and Hydraulics Branch
Engineering Division

Coreglia

June 26, 1978

Masterpiece Dwellings
3108 La Mancha Pl. N.W.
Albuquerque, N.M. 87104

The Shores of Albuquerque
Homeowners Assn. Inc.
29 Westlake Dr.
Albuquerque, N.M. 87112

ATTN: Mr. LaMont Urban
RE: Letter of June 13, 1978

Dear Sir:

In answer to your letter I would like to answer your questions paragraph by paragraph.

1. Water does not necessarily have to drain off street surfaces, it is an accepted practice to allow for a certain amount of runoff to pool and evaporate.

2. I will fix them through the normal warranty period. Each homeowner will be provided a written warranty.

3. My workmen have never turned on any sprinklers. I was called to the Shores one afternoon at about 6:00 or 7;00 p.m. to look into a flooding problem. Investigation revealed the sprinklers had been left on that afternoon (not all night as your letter states). My crews were lated questioned regarding the allegations that they turned on the sprinklers. They did not. Both your maintenance man and children from the Shores had been in the area of the sprinkler controls that afternoon. I would suggest that you not leave sprinkler keys at the valves, thus eliminating possible vandalism. I was not responsible for any water damage nor will I become the scapegoat for every problem the association has or will have. I suggest you save your attorney fees and fix the damage.

4. I recall no agreement to move the advertising sign at the entrance. It is located on property belonging to the association, not me. I do have a model which we started showing on June 25, 1978. I intend to redo the sign and use it until I have sold out the sixteen units completing Phase I, at which time I will remove the sign at no cost to the association.

5. I have no intent to increase the flow of drainage onto the association's common areas. Upon completion of all engineering for Phase II and the balance of Phase I all drainage work will comply with the appropriate laws and regulations. I might note that because of our preliminary engineering work on Phase II it now appears that the lands of the Shores will be taken out of Flood Zone A, this will mean savings of insurance monies for existing and future Shores owners. Drainage plans are submitted to the City of Albuquerque, not the association. has this happened ??

6. The association will recieve a copy of "as built" plans pertaining to exterior lighting and sprinkler systems which will become association property on completion. At this time the association will receive a normal warranty on this work. Home plans are in no way any of your concern. I do happen to know that you have on occasion helped yourself to copies of the city plans for the project, keeping them for excessively long periods of time.

Let me reiterate one point which I feel you must appreicate - a certain amount of cooperation between you (the association) and I is of prime importance in allowing me to properly integrate the areas of new construction to the existing. I will work to accomplishing this and owning up to problems (i.e. dirt in the lakes, cut wiring, etc.) I may create. I will not tolerate threats and false cries of "wolf" everytime you have problems. If I am promptly informed of conditions which you feel are my responsibility, I will weigh the facts and accept or deny responsiblity. This I did the day of the sprinkler incident.

Sincerely,

Gerald S. Misurek
dba Masterpiece Dwellings

GSM/sy

Complaints

the Shores of Albuquerque Homeowners Assn., Inc.

1 Lakeshore Drive N.E. Albuquerque, N.M. 87112

June 13, 1978

Mr. Gerald Misurek
3108 LaMancha Pl. NW
Albuquerque, NM 87104

Dear Mr. Misurek:

Thank you for the $75.00 for cleaning and refilling the south lakes. That is full compensation for the damage done.

The Shores Homeowners Association has a very real interest in the houses you are building on the south edge of the Shores complex and the association will eventually be responsible for their maintenance and repairs. Accordingly we want to call the following matters to your attention while you can still fix them relatively easily.

1. Water does not drain off of the blacktop you have put in at the east end of the new construction. This pooling of water will quickly destroy the street surface.

2. The flat roofs in the original homes have been in continuous need of repair and have cost the association a great deal of money. We wish you had not built flat roofs, but since you have we would like to know what you intend to do if they leak?

3. Last winter your workmen turned on the sprinklers on the south end of the Shores and left them on all night. As a result the concrete slab on which the air conditioner for #40 Westlake is mounted was undermined and tilted. The Association is contracting for the repair so that the air conditioner can work properly. Since your workmen negligently caused the damage, you of course should pay the reasonable cost of repair of the damage done! The sooner we communicate about this the greater our chances of not having to pay any attorney's fees. Please let us know if you don't agree with the above.

4. You agreed a long time ago to move the large advertising sign at the entrance to the Shores. We are getting a lot of complaints from homeowners. The sign causes many people to wonder through the complex looking for "model homes" which of course do not exist. Please take it down as you promised.

the Shores of Albuquerque Homeowners Assn., Inc.

1 Lakeshore Drive N.E. Albuquerque, N.M. 87112

5. We are concerned that you are changing the drainage characteristics of the land you are building on so that the flow of surface water into the association land will be increased, and may cause damage. Please send us a copy of your drainage plan. Are you in compliance with all applicable flood control laws and regulations?

6. Since, in the future, the Association is going to perform much of the normal repair of the homes, you are building, we should have copies of plans showing wiring, location of pipes and the like, so we can perform our duties efficiently and economically. Would you please send copies of all plans to LaMonte Urban
29 Westlake Dr.
Albuquerque 87112

We appreciate your help and cooperation in these matters.

Sincerely yours,

LaMonte Urban

the Shores
29 WESTLAKE DRIVE, N.E. ALBUQUERQUE, NEW MEXICO 87123 PHONE (505) 292-0666

RECEIVED
FEB 28 1978
CITY ENGINEERS

February 24, 1978

Mr. V. M. Kimmick, City Engineer
Engineering Division
Public Works Dept.
P.O. Box 1293
Albuquerque, New Mexico
87103

RE: Possible Drainage Problem

Dear Mr. Kimmick.

The Shores of Albuquerque Homeowners Association, Inc. (a townhouse development located at the southwest corner of Morris and Indian School Rd.) is concerned about the construction of 16 new units to the south and how this will effect the drainage of the entire area.

This is a request for you to investigate the above conditions to determine if the construction complies with the drainage report approved by your office.

If these and other problems that may be discovered are in violation of your approved drainage report, we would like information on what recourse is available to The Shores Homeowners Assocation, Inc.

Sincerely yours,

Shores Executive Committee
La Monte Urban, Chairman

LMU:j

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

MAYOR
Harry E. Kinney

CHIEF
ADMINISTRATIVE OFFICER
Frank A. Kleinhenz

February 9, 1976

Mr. Robert M. Gordon
The Shores of Albuquerque
Homeowners Assoc., Inc.
7100 Carniveau
Albuquerque, New Mexico 87110

Dear Mr. Gordon:

First, I regret the time interval to reply to your letter of October 8, 1975. It was an error on my part.

The problems related to lawn irrigation are quite extensive throughout the City. Traditionally we have used the streets as carriers for storm waters, due to the extensive and costly system which would be required to place it underground. What this does is to place on the street also lawn irrigation water which is being wasted by the landowner. There is no way the City can afford to construct underground facilities for all such cases. Storm water funds at our disposal are being used to eliminate danger to people or property as first priority, and there are insufficient funds to handle these matters.

This matter will be examined during the next year as design for the East Arroyo Channel System proceeds, but only from the standpoint of overall storm drainage of the area. We will specifically request the engineer assigned that

Public Works Department
Director — Erwin F. Hensch, P. E. 766-7457
Engineering 766-7441 — V. M. Kinnick, P. E.
Street Maint. 766-7755 — G. E. Paul, P. E.
Ass't. Director — Harold R. Orr, Jr. P. E.
Liquid Waste 766-7535 — R. P. Lowe, P. E.
Water 766-7437 — W. H. Otto, P. E.

project to study the drainage of your area. If I may furnish any additional information please contact either myself or Mr. Kleston Laws, at 766-7441.

Sincerely,

V. M. Kimmick
City Engineer

VMK/tl

cc: Mayor Kinney
E.F. Hensch, Director of Public Works
Pat Kneafsey, Environmental Health
Kleston Laws, Asst. City Engineer-Hydrology

STORM DRAINAGE STUDY
RELATIVE TO SITE PLAN DEVELOPMENT FOR
THE SHORES SUBDIVISION
ALBUQUERQUE, NEW MEXICO

AUGUST 1978

Boyle Engineering Corporation
consulting engineers / architects

STORM DRAINAGE STUDY
RELATIVE TO SITE PLAN DEVELOPMENT FOR
THE SHORES SUBDIVISION
ALBUQUERQUE, NEW MEXICO

AUGUST 1978

Boyle Engineering Corporation

consulting engineers

1721 Girard Boulevard, N.E.
Albuquerque, New Mexico 87106

505 / 266-7789

Mr. Gerald S. Misurek
2500 Louisiana NE
Suite 101
Albuquerque, New Mexico 87110

August 18, 1978

Drainage Report: The Shores Subdivision

Transmitted herewith is the report of studies conducted by this firm relative to storm runoff drainage considerations relative to the proposed development of the subject project.

The criteria and methods of analysis conform to standards of the Albuquerque Metropolitan Arroyo Flood Control Authority, and the City of Albuquerque, New Mexico.

We will be happy to answer any questions you may have about the conclusions and recommendations of this report.

BOYLE ENGINEERING CORPORATION

Fred Burns

Fred Burns, PE
Managing Engineer

FB: pjf
Encl.

TABLE OF CONTENTS

STORM DRAINAGE STUDY
RELATIVE TO SITE PLAN DEVELOPMENT FOR
THE SHORES SUBDIVISION
ALBUQUERQUE, NEW MEXICO

I. PURPOSE:

This report is to present data relative to a storm run-off drainage study completed for the site of 64 single family dwelling units proposed on the remaining undeveloped portion of The Shores Subdivision Tract located on Morris Street N.E., just south of Indian School Road N.E., Albuquerque, New Mexico.

II. SCOPE:

This report is to establish development plans and site grading such that the proposed development will be protected from flooding due to storm run-off and will not increase the threat of damage to contiguous properties. Estimation of the maximum run-off is based on the site being completely developed as proposed. Ponding will be provided to maintain existing run-off rates and volumes.

III. LOCATION:

The Shores Subdivision is located on 11.6 acres adjacent to the existing condominium complex, called The Shores, located just west of Morris Street and south of Indian School Road. All of the surrounding area has been developed, and single and multi-family dwelling units have been constructed on all lots to the north, east, and south of the tract. To the west of the tract is the Jackson Junior High School plant.

IV. EXISTING DRAINAGE CONDITIONS:

The tract is located in the Northeast Heights area which for the most part is fully developed. The elevation of the land at the high point is approximately 5532.00 feet. The natural soils existing at the site are products of the weathering of the Sandia

Mountains and are of decomposed granite and limestone origin. Vegetation on the site is only sparse grass covering. The present drainage is characterized by sheet and overland flow from the tract. Overall drainage is from east to west. The only upstream run-off occurs from the north where local flows from the southwest corner of the developed The Shores drains into the undeveloped parcel. However, it is being recommended that this southwest corner of the developed parcel be re-graded to pond run-off on the adjacent development. External drainage is cut off by Morris on the east, the developed The Shores on the north and by developed lots on the south. The only outlet for site run-off is to Hannett Avenue located on the west side of the undeveloped parcel. The run-off from Hannett Avenue flows to Blume Street, Eden Drive, and eventually to Eubank Boulevard in a westerly direction. There are no existing ponding areas or other forms of drainage regulations or controls on the site. Excluding the upstream run-off from the adjacent parcel to the north (because this run-off is recommended to be retained on the site) the existing rate of run-off for a 100 year storm on the undeveloped tract is 21.25 cfs. The existing volume of run-off into Hannett Avenue is approximately 49,687 cubic feet for such a 100 year storm. See APPENDIX.

V. PROPOSED DRAINAGE PLANS:

A. Criteria:

(1) General: Resolution No. 1972-2, Albuquerque Metropolitan Arroyo Flood Control Authority.

(2) Project Storm: 100-year intensity; frequency duration as shown on the Curves Chart 1, "1963 Master Plan of Drainage for the City of Albuquerque and Environs", as

prepared by Gordon Herkenhoff and Associates, Inc., Consulting Engineers.

(3) Previous Study: The Shores Drainage Report, by Bohannan, Huston, and Associates, July, 1972.

B. Flood Protection

(1) Existing Conditions: Due to both natural and constructed grading in the area, flow from contiguous properties will soon be minimal. Currently, 100% of the study site is undeveloped. The site has been included in the Special Flood Hazard Area Zone A as defined by the U.S. Department of Housing and Urban Development, Federal Insurance Administration. This apparently is erroneous as indicated in the attached letter from Mr. John J. Cunico, Chief, Flood Plain Management and Hydraulics Branch, Engineering Division, Corp. of Engineers. As a result of this communication, a request for a change in the flood hazard classification has been forwarded to the appropriate authorities. The area will not be included in Zone A following the requested change. The site is presently undeveloped with all run-off being concentrated at the intersection of Hannett Avenue and the west boundary of the property.

(2) Future Conditions: The proposed development will cover the entire site with 64 single family houses, covering approximately 35% of the area. Grass lawns will compose over 40% of the area, and asphalt residential streets, concrete sidewalks, concrete porches, and concrete drive-pads will compose approximately 25% of the 11.6 acre tract. See attached site plan.

C. Site Drainage:

As shown on the attached site plan drawing, the general pattern of the existing topography will not have to be greatly altered in order to continue to direct all on-site run-off to Hannett Avenue. Ponding will be provided on one-third of the grass lawn areas in order to retain the additional run-off generated by the parcel's development. The ponded water will be disposed of through evaporation and percolation.

As determined by the calculations shown in the APPENDIX, backyard ponding areas at least 15 ft. by 50 ft. in size. Likewise, it is required that downspouts from roofs and grading around each house be so designed as to direct all roof run-off to ponding areas. FIGURE 1 shows a typical house lot and how it should be graded properly for drainage.

VI. CONCLUSIONS AND RECOMMENDATIONS:

On the basis of the study of this report, the following recommendations are proposed:

1. Re-grade the terrain surrounding the existing structures in the southwest corner of the developed The Shores parcel to cause run-off to pond on planned ponding areas on the developed tract.
2. Grade the undeveloped tract, as shown in FIGURE 1, so that the drivepads and sidewalks drain to the streets. However, the entire roof must drain to backyard grass lawn ponding area at least 15 ft. by 50 ft. in size or some other combination of dimensions, as long as the total ponding area of the lot is not less than (15'X 55") = 825 square feet in area and approximately eleven inches in depth.

Provided the above listed recommendations are implemented prior to or concurrent with the development of the property, it is concluded that the proposed development will not create a flood hazard to surrounding properties, nor will the property itself be in danger of flooding.

Respectfully submitted:

BOYLE ENGINEERING CORPORATION

Fred Burns

Fred Burns, P.E.
New Mexico Registration No. 4000

REFERENCES

Albuquerque Metropolitan Arroyo Flood Control Authority. "Resolution No. 1972-2".

Bohannan, Huston, and Associates. The Shores Drainage Report, July, 1972.

Bohannan, Huston, and Associates. Flood Plain Information: Albuquerque Arroyos, Prepared for the Albuquerque Metropolitan Flood Control Authority.

Gordon Herkenhoff and Associates. Master Plan of Drainage: City of Albuquerque, New Mexico and Environs, 1963.

Seelye, Elwyn. Design: Data Book for Civil Engineers, 1960.

U. S. Department of Housing and Urban Development, Federal Insurance Administration, "Flood Hazard Boundary Map H-01-37, City of Albuquerque, New Mexico," February 14, 1978.

REFERENCES

Albuquerque Metropolitan Arroyo Flood Control Authority. "Resolution No. 1972-2".

Bohannan, Huston, and Associates. The Shores Drainage Report, July, 1972.

Bohannan, Huston, and Associates. Flood Plain Information: Albuquerque Arroyos, Prepared for the Albuquerque Metropolitan Flood Control Authority.

Gordon Herkenhoff and Associates. Master Plan of Drainage: City of Albuquerque, New Mexico and Environs, 1963.

Seelye, Elwyn. Design: Data Book for Civil Engineers, 1960.

U. S. Department of Housing and Urban Development, Federal Insurance Administration, "Flood Hazard Boundary Map H-01-37, City of Albuquerque, New Mexico," February 14, 1978.

Total Project Area

Length = 642' Width = 787'

Area = 642 X 787 = 505254 Sq. Ft. $\frac{1 \text{ Acre}}{43560 \text{ Sq. Ft.}}$ = 11.6 Acres

Average Slope = $\frac{(102 - 82)}{642}$ = .0312

I. Existing Conditions:

A. Determination of Concentrating Time, t c :
Undeveloped Ground - Poor grass and bare ground

From: Figure H - Overland Flow Time
Page 18-01, Data Book For Civil Engineers: Design
By Elwyn Seelye

tc = 16.3 minutes Note: tc = time of concentration

B. Determination of Intensity

For 100 year storm - From Master Plan of Drainage
City of Albuquerque - 1963
by Herkenhoff and Associates
Chart I

Intensity, I = $\frac{189}{tc + 25}$ = $\frac{189}{16.3 + 25}$ = 4.58 $\frac{\text{in.}}{\text{hr.}}$

C. Determination of Runoff
For 100 year storm.

Rate of Flow, Q_{100} = C·I·A

= (.4) (4.58) (11.6) = 21.25 cfs

C = undeveloped = .4

C = coefficient of runoff
A = Area in acres
I = intensity $\frac{\text{in.}}{\text{hr.}}$

$Vol._{100}$ = (11.6) (43560) (.4) ($\frac{2.95}{12}$) = 49,687 ft^3

II. Proposed Conditions

A. Average Coefficient of Runoff

Roof	(2500)	(64)	(.95)	= 152000.
Drivepads	(400)	(64)	(.95)	= 24320.
Street and Sidewalks	(104016)		(.95)	= 98815.2
Lawns	(215638)		(.4)	= 86255.2
				361390.4

Avg. C = 361390.4 ft^2/505254 ft^2 = .715

B. Proposed Runoff for total tract

Rate of Flow, $Q_{100} = C_{Avg.} \cdot I \cdot A$

$= (.715)\ (4.58)\ (11.6) = 37.98$ cfs

Volume$_{100}$ = 505254 (.715) (2.95/12) = 88,809 ft^3

	Proposed		Existing	
ΔQ =	37.98	-	21.25	= 16.73 cfs
ΔV =	88,809	-	49687	= 39122 ft^3

C. Ponding Areas

Areas Contributing:

Roofs (2500) (64) = 160000 ft^2 (Total Roof Areas)
Ponding Areas (10'X50') (64) = 32000 ft^2 (Part of back yards)

$$\text{Roofs} = 160000\ ft^2 \frac{1\ \text{acre}}{43560\ ft^2} = 3.673\ \text{acres}$$

$$\text{Ponding Areas} = 32000\ ft^2 \frac{1\ \text{acre}}{43560\ ft^2} = .735\ \text{acres}$$

D. Volume retained in ponding areas in a 100 year storm

Volume retained = $(3.673)(.95) + (.735)(1.0)\ \ 43560(\frac{2.95}{12}) = 45236\ ft^3$

E. Flow Eliminated by Ponding

$Q = (3.673)(.95) + .735(.4)\ \ (4.58)$

$Q = 17.33$ cfs

F. Final Quantities

Total volume of runoff = 88809 - 45236 ft^3
= 43572 < 49687 (existing)

Rate of Runoff = 37.98- 17.33 cfs = 20.65 < 21.25 (existing)

G. Important Design Criteria to be followed to comply with draiange needs.

All downspouts from roofs must be located so as to lead run-off to backyard lawn ponding areas. See FIGURE 1 for design details.

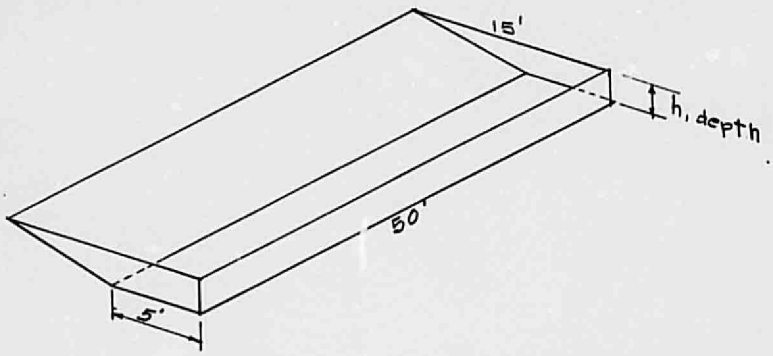
H. Required Depth of Ponding Areas

Volume retained in 100 year storm = 45236 ft^3
Minus 60% immediate absortion of direct rainfall
on grass, since coefficient of runoff for grass is .4 or 40%.

Volume of Rainfall falling on ponding areas

= 72000 ft^2 X 2.95 inches $\cdot \frac{1 \text{ ft.}}{12 \text{ Inches}}$ = 17700 ft^3

Net Volume of Rainfall and Runoff not immediately absorbed:
= 45236 - .6(17700) = 34616 ft^3

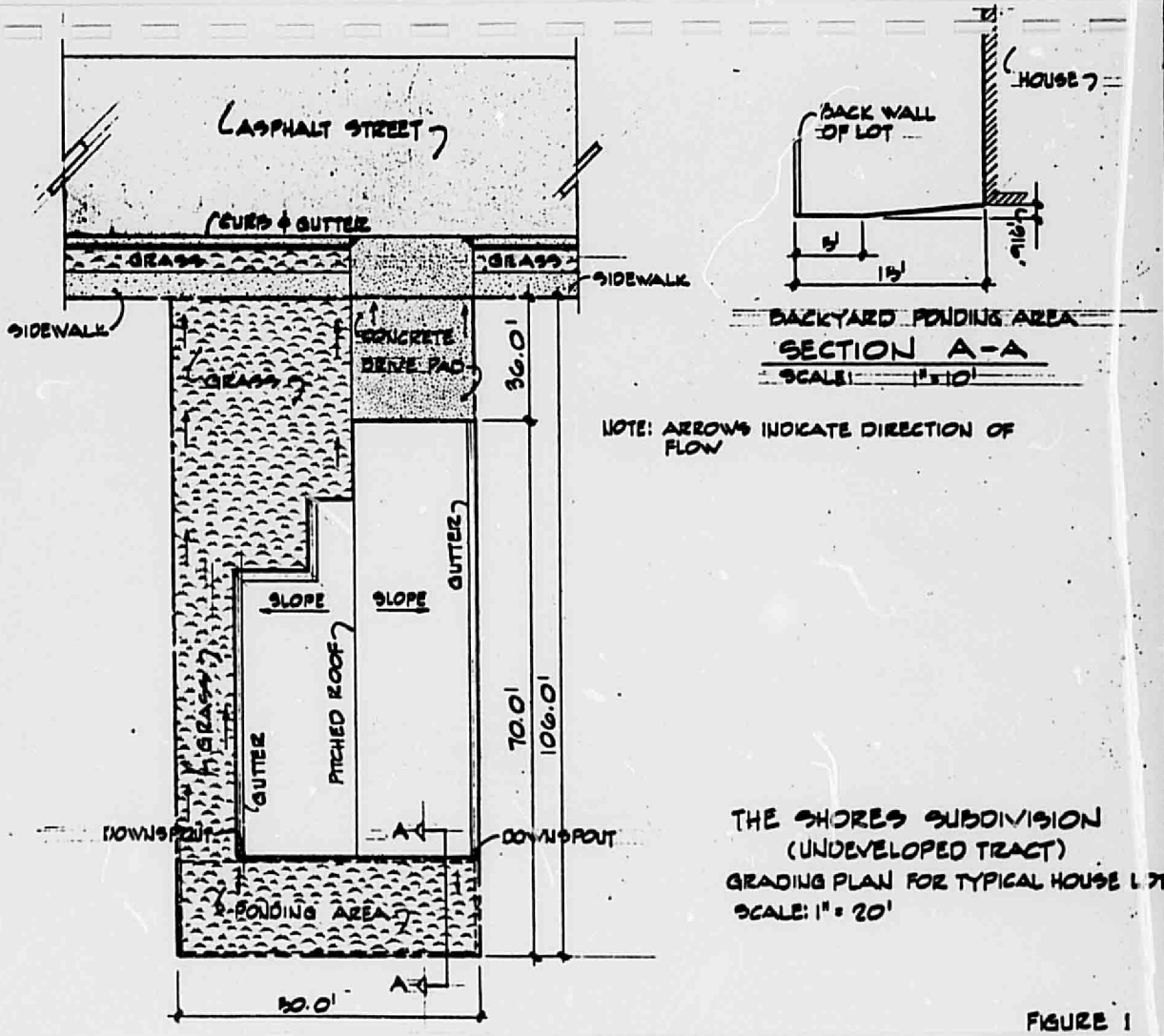


Volume of 64 Ponding areas = (50 ft. X 5 ft. X h) + ½ (50 ft. X 10 ft. X h) ·64

34616 ft^3 = 32000 h ft^3

$h = .92 \text{ ft.} \times \frac{12 \text{ in.}}{1 \text{ ft.}} = 11$ inches

Recommended depth, h = 11 inches



THE SHORES SUBDIVISION
(UNDEVELOPED TRACT)
GRADING PLAN FOR TYPICAL HOUSE LOT
SCALE: 1" = 20'

FIGURE 1

The SHORES

Albuquerque
Bernalillo County
New Mexico

DRAINAGE REPORT

The Builder's Group Ltd.
DENVER, COLORADO

BOHANNAN WESTMAN HUSTON

JULY 1972

BOHANNAN WESTMAN HUSTON & ASSOCIATES INC.
ENGINEERS & PHOTOGRAMMETRISTS
4125 CARLISLE BLVD., N.E.
ALBUQUERQUE, NEW MEXICO 87107
PHONE 505 345-2681

July 10, 1972

Mr. Richard Wall, President
The Builders' Group Ltd.
5475 Leetsdale Drive
Denver, Colorado 80222

RE: The Shores, Albuquerque

Dear Mr. Wall:

We are transmitting two (2) copies of our drainage and grading report on The Shores, Albuquerque, to you. We are also making a copy of this report available to the Albuquerque Metropolitan Arroyo Flood Control Authority and to the City of Albuquerque. We will also send a copy to Mr. Victor Salazar of this city.

Very truly yours,

Raymond R. Gibson, P.E.
Chief Engineer

RRG/teg

Enclosure

cc: Mr. Victor Salazar
Albuquerque Metropolitan Arroyo
Flood Control Authority
City of Albuquerque

DRAINAGE REPORT

THE SHORES

in

Albuquerque, New Mexico

FOR

THE BUILDERS GROUP LTD.
5475 Leetsdale Drive
Denver, Colorado 80222

JULY 1972

By Bohannan Westman Huston & Assoc., Inc.
4125 Carlisle Boulevard N.E.
Albuquerque, New Mexico 87107

Raymond R. Gibson, P.E.&L.S. Chief Engr

DRAINAGE REPORT

THE SHORES

ALBUQUERQUE

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PLATES

DRAINAGE REPORT

The Shores

- Albuquerque -

LOCATION AND DESCRIPTION

The shores will be a condominium complex located on 24 acres just west of Morris Street and South of Indian School. All of the surrounding area has been developed and single family residences have been constructed on all lots to the north, east, and south of the tract. To the west of the tract is the Jackson Junior High School plant.

PRESENT DRAINAGE

The present drainage is characterized by sheet and overland flow from the tract. External drainage is cut off by Morris on the East and developed lots on the south. Indian School Road follows a division line on the north. Dikes have been constructed on the west to contain the sheet flow and concentrate if through an undeveloped portion of the school ground. After passing through the school grounds the flow is concentrated into a

concrete structure and discharged into Eden street and thence downgrade westerly to Eubank Boulevard.

The projected runoff from the undeveloped tract for a hundred year storm is computed as follows:

Area = 24.231 acres;

High Point = 102 ft. lowpoint = 81.5

The average distance from Morris to the outlet into the school ground is 950 feet.

Slope = 20.5/950 = .022 ft per ft.

The present ground cover is poor grass and bare ground. Retention is poor and the runoff coefficient should be about .65.

Time of concentration is 20 minutes and i = 4.2 inches per hours.

Peak Runoff - (Q) = CiA = 66.15 Cfs

DEVELOPMENT

The shores will be developed by constructing 200 units of multi family housing in groups of 3 to 8 units in each building. The buildings will be served by parking lots and drives.

A unique feature of the Shores development will be a lake constructed in the interior of the tract. This lake will be a series of small ponds

connected by flowing streams. The ponds will be separated by one or two feet in elevation. The surface area of the lake is 51940 square feet. The area of the lowest lake is 3780 square feet. Freeboard on the last lake will be 4 ft. to allow storage from runoff.

The lake will be filled from city water. It is hoped that a large percentage of evaporation will be restored by runoff for the area draining into the lake.

GRADING

Grading on the site will be accomplished to place as much runoff as possible into the lake without collecting too much silt and detergents from drive ways. Drainage from the Southeast corner will be directed into Morris. Three areas will be directed into Indian School Road. A large percentage of the area will be directed to Hannet Avenue to drain westbound and into Eden and along the same path as is followed by the present drainage.

The units will have basements and garages. Grading must be such that garage entrances are accessible and protective slopes are provided to keep surface water away from footings and basement walls.

Drainage will still be in westerly direction except for the main entrance and the drainage carried by the lake group.

DEVELOPED DRAINAGE

After development the area will be divided into three cover types, paved or roofed over, grassed area with moderate slopes, and the lake surface. The runoff will be divided into six (6) areas. The coefficient of runoff for the grass area should be .3. The coefficient of runoff for the paved area should be .95 after allowing for a small amount of retention and initial evaporation from pavement surface. The lake should have a 1.0 coefficient as all water falling into it will accumulate. The landscaped area should have fair retention, although the slopes will be moderately steep.

The lake will retain all that falls into the first area. A drain culvert will take care of the overflow of the runoff above storage capacity. The drainpipe can be sized to allow only the amount of overflow needed and so minimize runoff into Hannett Avenue.

CALCULATIONS

The following tabulations of areas and calculations are given to predict the developed flows and ascertain flow conditions under a peak storm.

TABLE I

DRAINAGE AREAS AND COVER DISTRIBUTION

Area No.	Lake	Pavement	Grass	Total
1	51.940 sq. ft.	148,590	171,470	372,000
2		172,080	97,920	270,000
3		145,040	35,460	180,500
4		30,000	15,400	45,400
5		56.320	44,880	76,400
6	———	48,820	27,580	76,400
TOTALS	51,940	647,790	392,710	1,055,500

TABLE II

SLOPES AND TIMES OF CONCENTRATION

Area No.	Length	Average Slope	Tc Grass	Tc Pavement
1	280'	.046	15 min.	5 min.
2	520'	.036	22 min.	6.6 min.
3	560'	.033	25 min.	7.5 min.
4	280'	.036	17.5 min.	5.0 min.
5	560'	.014	30 min.	8.5 min.
6	280'	.004	28 min.	8.5 min.
Lake:	750'	.009	10 min.	

TABLE III

RUNOFF (Q) VALUES

Area No.	i-Grass	Q-Grass	i-pavement	Q-pavement	Total
1	4.7	5.56	6+	19.44	25.00
2	3.9	2.63	6+	22.51	25.14
3	3.7	.90	5.9	18.66	19.56
4	4.4	.46	6+	3.93	4.39
5	3.4	1.05	5.9	7.23	8.28
6	3.6	.68	5.9	6.28	6.96
Lake	5.4	6.44			6.44

PROPOSED FLOW PATTERNS

Area No. 6 will flow eastward into Morris Street and northward into Indian School Road. The tract does not contribute to flow in Morris at the present time. Morris does receive flow from eastward collector streets which dead end at Morris. Area 6 will contribute 6.96 c.f.s. to Morris Street with a 100 year storm.

Areas 3,4, and 5 will flow directly into Indian School Road. The tract does not contribute any appreciable flow into Indian School at the present time.

Area No. 5 will flow out of the main entrance into Indian school and will contribute 8.28 c.f.s. with a 100 year storm.

Area No. 4 will flow through a proposed sidewalk under drain into Indian School Road. It will contribute 4.36 cfs and will require an under drain 1 ft. - 6 inch wide and 5 inches deep which will discharge into the south flow line of Indian School Road.

Area No. 3 will drain a substantial portion of the northern segment of the tract. It will contribute 19.56 c.f.s. in a 100 year storm and will require an under drain 6 ft.-0 inches in length and 5 inches deep. It is recommended that 2 under drains 3 feet long be used.

Area No. 2 will flow into Hannet Street and then westward to Princess Jeanne Street and then northerly to Eden Street where the present flow is routed. Area 2 will contribute 24.15 c.f.s. in a 100 year storm. There is no flow in Hannet Street from the tract at the present time.

Area No. 1 will all discharge into the lake complex. The peak runoff from Area No. 1 will be 25.00 c.f.s. The peak will be softened significantly by the temporary storage in each segment of the lake. The final storage will occur in the Southwesterly segment. From this segment an overflow drain will carry the runoff into Hannet Street. The length of this drain will be 290 feet and it will have a slope of .017 ft./ft.

The last segment will have a four foot freeboard and with a low surface area of 3780 sq. ft. will store a minimum of 15,200 cubic feet of water. These lakes will store the peak runoff with allowances for the retention in the upper segments. However, a drain must be provided to bring the lake level down to prevent flooding of adjacent buildings, and to provide usuable storage in the event of a possible future storm. A subsequent storm could occur in a 6 hour period. Using the yield formula of $Q = \frac{(P - 2S)^2}{P + .8S}$ for yield in inches for runoff values the following quantities are obtained as total expected runoff from a 4" rain.

Cover:	Area	S	Q in	Volume
Paved	148,590	.05	3.98	49,285 cu.ft.
Lake	51,940	.00	4.00	46,689 cu.ft.
Grass	171,470	.7	3.27	17,313 cu.ft.
			TOTAL	113,287 cu.ft.

The drainage culvert should be able to discharge this amount in 6 hours and also carry the expected runoff after a thirty minute peak. It will require a flow of 5.25. c.f.s. to discharge the total volume in 6 hours.

Assuming a duration of 1 hour for the 4 inch rain and a runoff peak at 10-15 minutes, the runoff after 30 minutes duration should be less than 10 c.f.s. A drainage culvert of 18 inch diameter will provide a maximum discharge of 9.52 c.f.s. with 5 foot of head and an average dicharge of 5.21 c.f.s. with 1'6" of head. Therefore an 18" culvert drain should meet the requirements of relieving the peak runoff and draining the excess total volume of runoff.

The minimum runoff in Hannett Street and then in Eden will be 34.66 c.f.s.

CONCLUSIONS AND RECOMMENDATIONS

The proposed development of the Shores can proceed without endangering adjacent property. Runoff from the site itself will decrease after development, except where subsequent storms occur of greater intensity than expected in a 100 year interval. The runoff will be channeled into existing streets with sufficient grades to easily carry the additional flow. The diversion of the runoff from the school ground to Hannett Street will help the school to more fully utilize its property.

The total runoff in Eden Street will be reduced from 66.15 c.f.s. to 34.66 c.f.s. This should be of benefit to those residing adjacent to Eden Street before it joins Eubank Boulevard.

There is one problem area where Hannett intersects Princess Jeanne at right angles and on a high point. There may be some splitting of the drainage to the South on Princess Jeannne. However the grade on the northerly segment of Princess Jeanne should attract drainage in that direction and prevent a buildup against the westerly curb.

A good porportion of additional infiltration will be provided by landscaped areas. However, the lake will be sealed and runoff will be total from its area and contributing damage.

Runoff diverted to Indian School will be approximately 40 c.f.s. Indian School is on a good grade of over 3% and its runoff carrying ability should exceed 160 c.f.s. It is presently carrying approximately 65 c.f.s.

It is recommended that this grading plan and development of site drainage be approved. Although total runoff is increased on the site the diversion of a large portion to Indian School Road and the retention in the lake system should minimize any undesireable effect on surrounding developments or downstream drainage facilities. The school yard will be improved and the runoff in Eden, a minor collector street, will be reduced.

REFERENCES

KING & BRATER - HANDBOOK OF HYDRAULICS

URGUHART - CIVIL ENGINEERING HANDBOOK

EDWIN SEELYE - DESIGN

CITY OF ALBUQUERQUE - MASTER PLAN OF DRAINAGE

U.S. DEPARTMENT OF INTERIOR - TECHNICAL PAPER No.40

LINSLEY, KOHLER,PAULHUS - HYDROLOGY FOR ENGINEERS

U.S. DEPARTMENT OF INTERIOR - DESIGN SMALL DAMS

PORTLAND CEMENT ASSOC. - HANDBOOK OF CULVERT PIPE

ALBUQUERQUE
NEW MEXICO-BERNALILLO CO.

PLATE I

DRAINAGE — RUNOFF — I

FIG. A. - ONE-HOUR RAINFALL, IN INCHES, TO BE EXPECTED ONCE IN 2 YEARS.

FIG B. - ONE-HOUR RAINFALL, IN INCHES, TO BE EXPECTED ONCE IN 10 YEARS.

FIG C. - ONE-HOUR RAINFALL, IN INCHES, TO BE EXPECTED ONCE IN 50 YEARS.

FIG. D. - ONE-HOUR RAINFALL, IN INCHES, TO BE EXPECTED ONCE IN 5 YEARS.

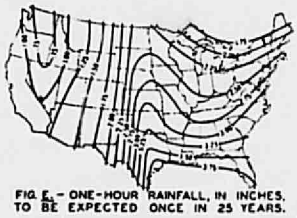


FIG E. - ONE-HOUR RAINFALL, IN INCHES, TO BE EXPECTED ONCE IN 25 YEARS.

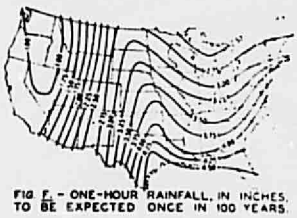


FIG F. - ONE-HOUR RAINFALL, IN INCHES, TO BE EXPECTED ONCE IN 100 YEARS.

COMPUTATION OF i IN RATIONAL FORMULA.

EXAMPLE: Assume expectancy period = 5 years, see Fig. D, assume locality, find 1 hour intensity = 1.75 in. per hour.

FIG. G - INTENSITY EXPECTATION FOR ONE-HOUR RAINFALL.*

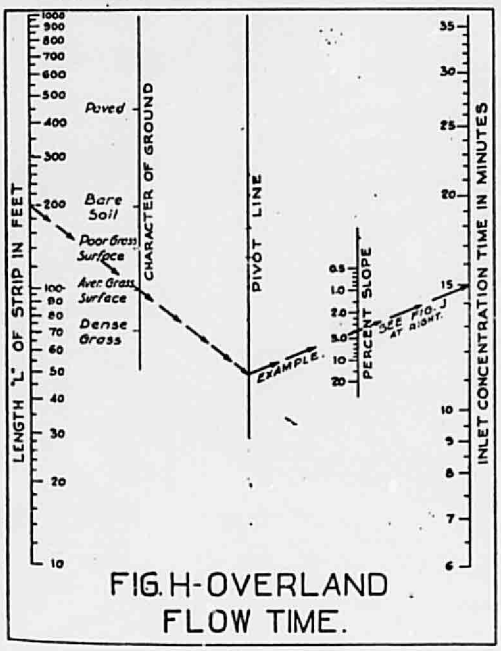


FIG. H - OVERLAND FLOW TIME.

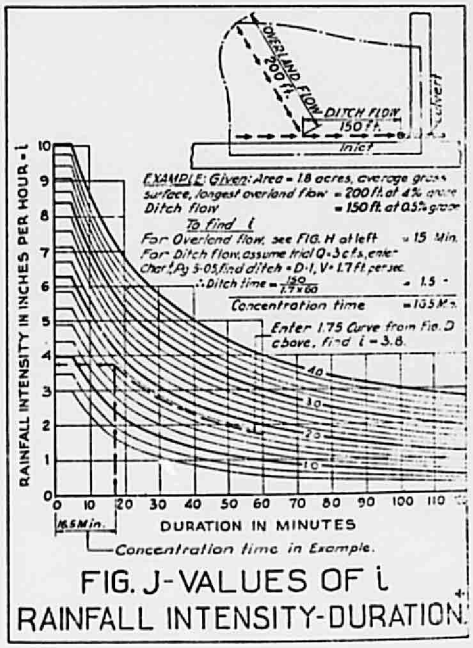
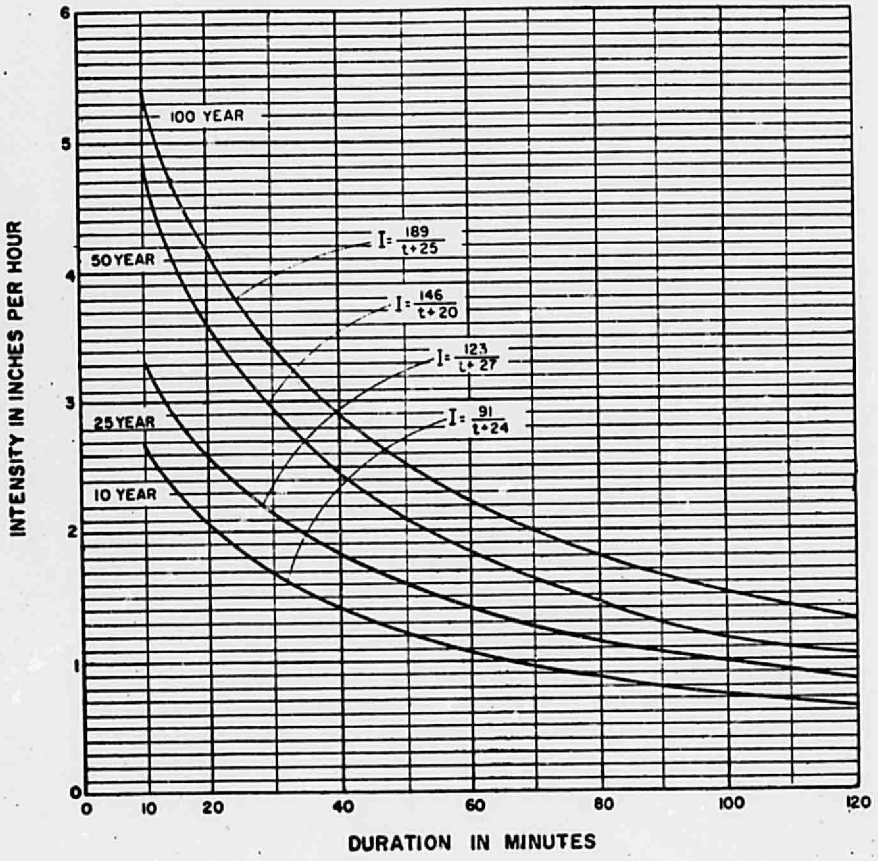


FIG. J - VALUES OF i RAINFALL INTENSITY-DURATION.†

*Reproduced from Miscellaneous Publication No 204, U.S. Dept. of Agriculture, by David L. Yarnell.

†Adapted from Engineering Manual of the War Department, Part XIII, Chap 1, Dec 45.

PLATE 3



MASTER PLAN OF DRAINAGE
CITY OF ALBUQUERQUE - NEW MEXICO
AND ENVIRONS

INTENSITY DURATION
FREQUENCY CURVES

(ALBUQUERQUE AREA - 1961)

GORDON HERKENHOFF & ASSOC
CONSULTING ENGINEERS
ALBUQUERQUE, NEW MEXICO

CHART 1

PLATE 4

J21/D6

3 Plans

north central mortgage

2500 Louisiana, N.E., Suite 101, Albuquerque, New Mexico 87110, Telephone (505) 883-1717

February 5, 1979

Mr. Bruno Conegliano
Asst. City Engineer - Hydrology
CITY OF ALBUQUERQUE
P.O. Box 1293
Albuquerque, NM 87103

RE: Drainage plan Southerly portion of the Shores development

Dear Sir:

Should the plan as submitted by Boyle Engineering be approved on the referenced project, we will have the grading and block wall completed within 60 days. Final landscaping should follow 30 days later.

Sincerely,

Gerald S. Misurek
Senior Vice-President

GSM: cs

Boyle Engineering Corporation

1721 Girard Boulevard, N.E.
Albuquerque, New Mexico 87106

consulting engineers
505 / 266-7787

February 2, 1979

Mr. Bruno Conegliano
Asst. City Engineer - Hydrology
CITY OF ALBUQUERQUE
P.O. Box 1293
Albuquerque, New Mexico 87103

RE: Morris Manor (formerly called The Shores) and the existing The Shores planned residential development.

In response to your letter dated October 23, 1978, attached please find a site plan for the area just north of the proposed Morris Manor Addition. This site is part of the original The Shores, Phase I Development Plan that was revised on May 6, 1977.

Construction on this site began a few months ago. To date the buildings have been completed. The driveways, sidewalks, curbs, gutters, ponding areas, landscaping and the six foot high block wall have not been constructed yet.

This site plan shows that our recommendation to our client, the developer, that was made on page 2 of our Morris Manor Drainage Study is being accepted.

Grading of the area immediately to the north of Morris Manor will cause all storm runoff to flow in swales parallel to but offset from the base of the proposed six foot high block wall dividing The Shores, Phase I from Morris Manor. The runoff will flow either to the newly constructed ponding area or to the proposed ponding area in the southwest corner of The Shores. The runoff from the roofs and the proposed private roads, driveways, and sidewalks is designed to flow either into the newly constructed ponding area or to the north into Indian School Road via the private road on the west side of The Shores.

This drainage plan is the same as was originally designed and approved in the report, The Shores Drainage Report, by Bohannan, Huston & Associates, July 1972, except that with the addition of two new ponding areas now, the actual external runoff to the Indian School Road has been reduced. The revised The Shores, Phase I Development Plan of May 6, 1977 reduced the number of lots planned for the southwest corner of The Shores and left the proposed percentage of pervious to imperious areas and the average coefficient of runoff virtually unchanged.

The following calculations show that the proposed ponding area for the southwest corner of The Shores has sufficient capacity to store without overflowing the entire runoff from a 100 year storm of the 641.93 foot long strip of grassed land separating The Shores townhouses from Morris Manor:

Grassed Strip Area
642' X 35' + 50' X 40' = 24,470 S.F.

$$24{,}470 \text{ S.F.} = \frac{1 \text{ Acre}}{43{,}560 \text{ S.F.}} = .56 \text{ Acres}$$

$$\text{Average Slope} = \frac{32 - 18}{642} = .0218$$

Proposed Conditions

A. Grassed Surface, coefficient of runoff, C = .4

B. 100 Year Storm Precipitation:

From City of Albuquerque
Precipitation Map
100 Year Storm
Precipitation = 2.6 inches

C. Volume Retained in S.W. Corner Ponding Area in a 100 Year Storm.

$$.4 \times 24{,}470 \text{ S.F.} \times \frac{2.6 \text{ in.}}{12 \text{ in./ft.}} = 2{,}121 \text{ C.F.}$$

D. Required Depth of Ponding Area

Area of Ponding Area is approximately 80' X 30' X h
h = .88 ft. or 10.56 inches

In conclusion the site plan for the southwest portion of The Shores, Phase I, the proposed Development Plan for Morris Manor and the proposed Grading Plan for Morris Manor all show a coordinated drainage scheme that will comply with A.M.A.F.C.A., Resolution 1972-2, provided that the southwest portion of The Shores, Phase I is constructed as shown. It is concluded that the proposed development will not create a flood hazard to surrounding properties, nor will the property itself be in danger of flooding.

BOYLE ENGINEERING CORPORATION

Steve Eagan

Steve Eagan, P.E.
Associate Civil Engineer

SE/pjf

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

October 23, 1978

Mr. Vic Chavez
Boyle Engineering Corporation
1721 Girard Boulevard, N.E.
Albuquerque, New Mexico 87106

RE: Drainage Report for "The Shores" Addition

Dear Mr. Chavez:

I have reviewed the letter amending the drainage report for the above referenced subdivision and I am in general agreement with the recommendations.

The diversion of the off site flow from that portion of "The Shores" which is being constructed at this time, is an integral part of the drainage scheme and I will have to receive, review, and approve the recommendations that you have made to your client. I will also need a letter of commitment from the owner specifying how and when the improvements will be performed.

Very truly yours,

Bruno Conegliano
Asst. City Engineer-Hydrology

BC/gw

cc: C. D. Sheppard, Acting City Engineer
Rich Leonard, AMAFCA
Drainage File

Boyle Engineering Corporation

consulting engineers

1721 Girard Boulevard, N.E.
Albuquerque, New Mexico 87106

505 / 266-7789

Mr. Bruno Conegliano
Asst. City Engineer - Hydrology
City of Albuquerque
Public Works Department
P.O. Box 1293
Albuquerque, New Mexico 87103

October 10, 1978

Subject: Drainage Report for "The Shores" Subdivision

Dear Mr. Conegliano,

This letter is in response to your questions concerning our report, STORM DRAINAGE STUDY RELATIVE TO SITE PLAN DEVELOPMENT FOR THE SHORES SUBDIVISION: ALBUQUERQUE, NEW MEXICO, that you listed in your letter dated October 6, 1978.

The topographical map of the undeveloped portion of "The Shores" Subdivision actually does not cover any part of the developed north side of the subdivision including the southwest corner of the developed parcel that is referred to on Page 2 of the report.

This southwest corner is currently under construction with two townhouses being built by the owner, as part of the final phase of construction of the northern half of "The Shores" Subdivision that was already approved by the City of Albuquerque for development.

Since the owner of "The Shores" is also the owner of the undeveloped southern half of "The Shores" Subdivision and is also our client, for whom this report was written, the recommendations to provide ponding on the southwest corner of the developed parcel is addressed to him. Actually, he is already implementing this recommendation by preparing to construct a concrete block wall on the property line between the developed and undeveloped "The Shores" parcels, which will prevent run-off draining from either parcel to the other one.

Due to a lack of coordination on our part some revisions in our drainage report calculations failed to be included in the final draft of our report. Thus, we are enclosing corrected copies of pages 4, A-2, A-3, and FIGURE 1. We have also incorporated in these revised calculations, the following revised values in order to comply with your recently promulgated STANDARD REQUIREMENTS FOR DRAINAGE PLANS:

1. Coefficient of runoff for impervious surfaces: .90

2. Six-hour rainfall in 100 year storm for "The Shores" neighborhood: 2.6 inches.

As is shown on revised page A-3 and FIGURE 1, the recomputed depth of ponding is 13.26 inches or 1.105 feet.

Your recommendation that the finished floor elevations of each building be constructed a minimum of six inches above the top elevation of the back-yard ponding area is accepted and will be so noted on the development plat.

A utility easement will be provided for water, sewer and storm drainage facilities between lots 18 and 19, and will be so indicated on the filed plat. In response to requests by local residents and the Bernalillo County E.P.C. present plans for storm runoff call for the use of a buried conduit in order to limit pedestrian access to the southeast corner of Jackson Junior High School. The final construction plans will show this system and associated grading which will be available for your review.

We accept your recommended note to be also recorded on the plat concerning minimum ponding volume for each lot, etc., except that with the minimum ponding depth recomputed to be 13.26 inches or 1.105 feet, the corresponding minimum ponding volume on each lot should be noted as:

.5 (10' X 50' X 1.105') + (5' X 50' X 1.105') = 552.5 cubic feet,

instead of the 633 cubic feet based on the 15.2 inch minimum depth of ponding that you mentioned in your letter.

We request that the development plat for the undeveloped southern portion of "The Shores" Subdivision be approved as not being presently exposed to flood hazards due to impending completion of the Embudo Dam. We have requested the Federal Insurance Adminstration to revise their boundaries of Zone "A" in their "Flood Hazard Boundary Map H-01-37, City of Albuquerque, New Mexico" and locate "The Shores" Subdivision out side of Zone "A".

Your timely response to our drainage report revisions and recommendations for notations on the development plat for this undeveloped parcel will be appreciated.

We will be happy to answer any questions you may have.

BOYLE ENGINEERING CORPORATION

Victor J Chavez

Victor J. Chavez, P.E.

Encl.

VJC: pjf

C. Site Drainage:

As shown on the attached site plan drawing, the general pattern of the existing topography will not have to be greatly altered in order to continue to direct all on-site run-off to Hannett Avenue. Ponding will be provided on one-third of the grass lawn areas in order to retain the additional run-off generated by the parcel's development. The ponded water will be disposed of through evaporation and percolation.

As determined by the calculations shown in the APPENDIX, backyard ponding areas at least 15 ft. by 50 ft. in size are required. Likewise, it is required that downspouts from roofs and grading around each house be so designed as to direct all roof run-off to ponding areas. FIGURE 1 shows a typical house lot and how it should be graded properly for drainage.

VI. CONCLUSIONS AND RECOMMENDATIONS:

On the basis fo the study of this report, the following recommendations are proposed:

1. Re-grade the terrain surrouding the existing structures in the southwest corner of the developed The Shores parcel to cause run-off to pond on planned ponding areas on the developed tract.
2. Grade the undeveloped tract, as shown in FIGURE 1, so that the drivepads and sidewalks drain to the streets. However, the entire roof must drain to a backyard grass lawn ponding area at least 15 ft. by 50 ft. in size or some other combination of dimensions, as long as the total ponding area of the lot is not less than (15'X 50') = 750 square feet in area and approximately 13.26 inches in depth.

B. Proposed Runoff for total tract

Rate of Flow, $Q_{100} = C_{Avg.} \quad I \quad A$

$= (.715)\ (4.58)\ (11.6) - 37.98$ cfs.

Volume $_{100} = 505254\ (.715)\ (2.95/12) = 88{,}809\ ft^3$

Proposed		Existing
$\Delta Q = 37.98$	-	$21.25 = 16.73$ cfs.
$\Delta V = 88{,}809$	-	$49687 = 39122\ ft^3$

C. Ponding Areas

Areas Contributing:

Roofs (2500) (64) = 160000 ft^2 (Total Roof Areas)
Ponding Areas (15' X 50') (64) = 48000 ft^2 (Part of back yards)

Roofs = 160000 ft^2 $\frac{1 \text{ acre}}{43560}$ = 3.673 acres

Ponding Areas = 48000 ft^2 $\frac{1 \text{ acre}}{43560\ ft^2}$ = 1.102 acres

D. Volume retained in ponding areas in a 100 year storm

Volume retained = ((3.673) (.90) + (1.102) (1.0)) X 43560 $\frac{2.6}{12}$ = 41600 ft^3

E. Flow Eliminated by Ponding

$Q = ((3.673)\ (.90) + (1.102)\ (.4)) \times (4.58)$

$Q = 17.16$ cfs

F. Final Quantities

Total Volume of runoff = 88809 − 41600 ft^3
= 47209 < 49687 (existing)

Rate of Runoff = 37.98 - 17.16 cfs = 20.82 < 21.25 (existing)

G. Important Design Criteria to be followed to comply with drainage needs.

All downspouts from roofs must be located so as to lead run-off to backyard lawn ponding areas. See FIGURE 1 for design details.

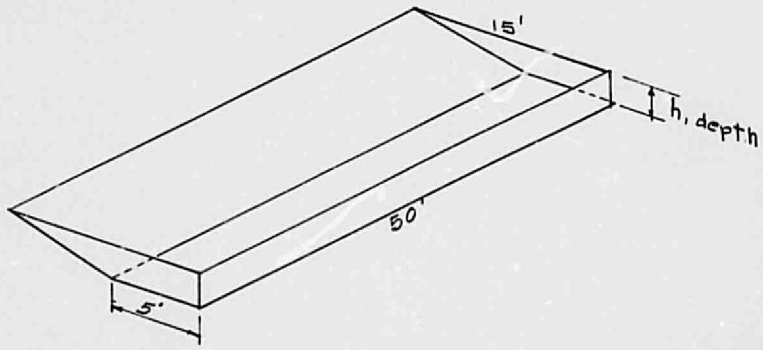
H. Required Depth of Ponding Areas

Volume retained in 100 year storm = 41600
Minus 60% immediate absortion of direct rainfall
on grass, since coefficient of runoff for grass is .4 or 40%.

Volume of Rainfall falling on ponding areas

$= 48000\ ft^2 \times 2.6\ \text{inches} \cdot \frac{1\ ft.}{12\ \text{Inches}} = 10400\ ft^3$

Net Volume of Rainfall and Runoff not immediately absorbed:
$= 41600 - .6\ (10400) = 35360\ ft^3$

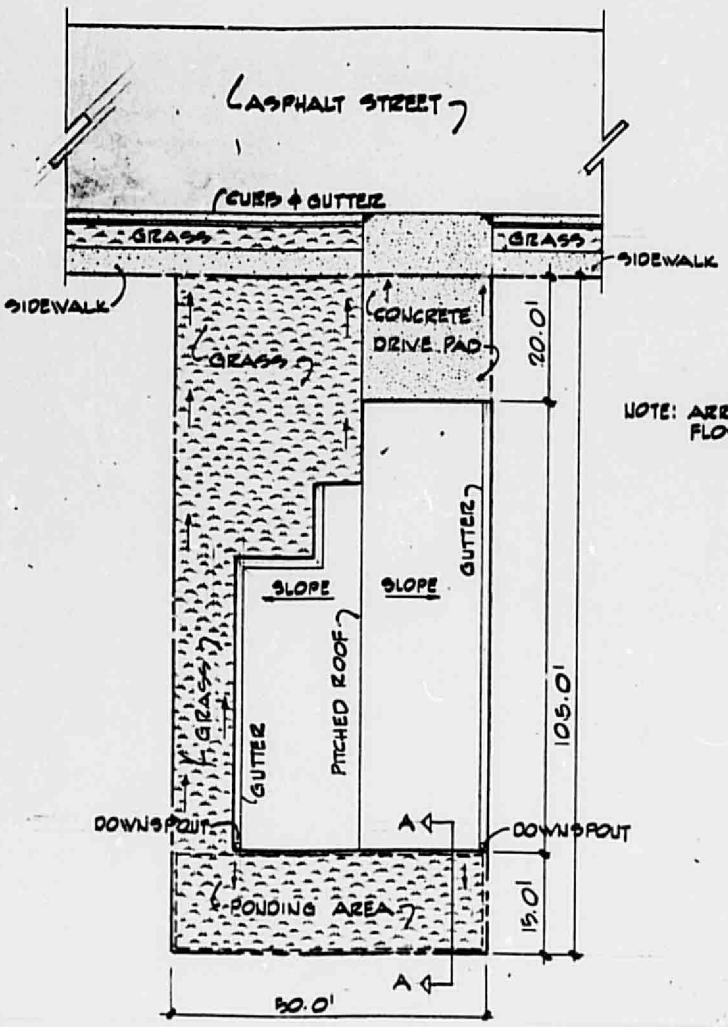


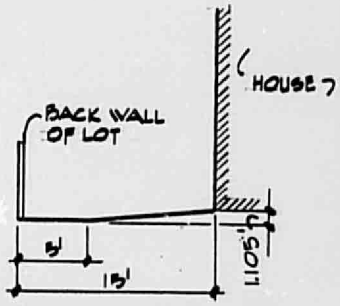
Volume of 64 Ponding areas = (50 ft. X 5 ft. X h) + ½ (50 ft. X 10 ft. X h) ·64

$35360\ ft^3 = 32000\ h\ ft^3$

$h = 1.105\ ft. \cdot \frac{12\ in.}{1\ ft.} = 13.26\ \text{inches}$

Recommended depth, h = 13.26 inches





BACKYARD PONDING AREA

SECTION A-A

SCALE: 1" = 10'

NOTE: ARROWS INDICATE DIRECTION OF FLOW

THE SHORES SUBDIVISION
(UNDEVELOPED TRACT).
GRADING PLAN FOR TYPICAL HOUSE LOT
SCALE: 1" = 20'

FIGURE 1

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

October 6, 1978

file copy

Mr. Vic Chavez
Boyle Engineering Corporation
1721 Girard Boulevard, N.E.
Albuquerque, New Mexico 87106

Dear Mr. Chavez:

I have reviewed the drainage report for "The Shores" and I have the following comments:

On page 2, the report indicates that "local flows from the Southwest corner of the developed "The Shores" drains into the undeveloped parcel." The existing topography for the proposed development as submitted with the drainage report does not show such offsite flows. Is the statement incorrect or is the topography different from actual conditions? Further, the statement "...it is recommended that this Southwest corner of the developed parcel be regraded to pond runoff on the adjacent development" is very vague. Whom is the recommendation addressed to? Who will perform the recommended regrading? How is the regrading going to be accomplished?

Regarding the question of backyard ponding, an error is noted on page A-3. The surface of the ponding areas is indicated in 72000 sq. ft. while all the previous computations reported a surface area of 32000 sq. ft. Correspondingly, the depth of ponding should be 15.2 in. instead of the indicated 11.0 in.

Since several assumptions are made in the computations, particularly in regard to infiltration rates, it is recommended that the finished floor elevations of the buildings be established a minimum of 6 in. above the level of ponding areas.

It is further requested that an appropriate drainage easement be dedicated on the plat and that a standard City of Albuquerque rundown be constructed between lots 18 and 19 of this subdivision.

The following note must also be recorded on the plat: "This plat is approved with the condition that each lot be so graded as to provide a minimum ponding volume of 633 cu. ft. on each lot. All the roof runoff must be conveyed to the pond by suitable means. The purchasers of the individual lots will be made aware of the existence of the backyard ponds and of the necessity of preserving and maintaining them. Landscaping with underlying polyethylene film would not be in keeping with the adopted drainage scheme and not acceptable except if compensatory ponding is provided and approved by the City Engineer's Office."

Regarding the flooding conditions on this parcel: Unless an amended FIA Flood hazard map is received by this office, the property is still legally inside Zone "A" and lenders may require flood insurance. The constr ction underway of the Embudo dam will ameliorate the flooding conditions and this office does not consider the development of "The Shores" to be presently exposed to flood hazards. Nevertheless, for your information, I am enclosing copies of my correspondence with the Corps of Engineers (initiated prior to the awarding of the contract for the Embudo Dam) with which Mr. Cunico, Chief of the Flood Plain Management Section, indicates a change in heart from the position taken with his letter to you enclosed in the drainage report.

Satisfactory answers to the questions raised above will have to be received before plat approval will be granted.

Very Truly Yours,

Bruno Conegliano
Asst. City Engineer-Hydrology

BC/tl

Enclosures

Boyle Engineering Corporation

1721 Girard Boulevard, N.E.
Albuquerque, New Mexico 87106

consulting engineers
505 / 266-7789

Mr. Bruno Conegliano
City of Albuquerque
P. O. Box 1293
Albuquerque, New Mexico 87103

August 18, 1978

Request for Flood Hazard Reclassification

Attached is a request for a change in the Flood Hazard Classification for the area located southwest of Morris and Indian School NE which has been sent to the Office of Flood insurance. It is our understanding that this request will require a letter from you to the FIA verifying the attached prior to any change in classification.

We would like to express our thanks for you assistance in accumulating the information on which this request for change is based.

BOYLE ENGINEERING CORPORATION

Victor J. Chavez

Victor J. Chavez, PE

VJC: pjf

Encls.

Boyle Engineering Corporation

consulting engineers

1721 Girard Boulevard, N.E.
Albuquerque, New Mexico 87106

505 / 266-7789

August 18, 1978

Engineering Division
Office of Flood Insurance
Federal Insurance Administration
U. S. Department of Housing and Urban Development
Washington, D. C. 20410

Attention: Map Amendments Section

We hereby request a change in the Flood Hazard Classification for the area indicated on the attached Flood Hazard Boundary Map, Sheet 17, Community No. 350002 A, City of Albuquerque, New Mexico, Bernalillo County.

Attached is a letter from Mr. John J. Cunico, Chief of Flood Plain Management and Hydraulics Branch, Engineering Division, Corps of Engineers, specifically excluding the site from the Intermediate work performed for Flood Plain Information, Part IV as prepared for the Albuquerque Metropolitan Arroyo Flood Control Authority by the Department of the Army, Albuquerque District, Corps of Engineers, Albuquerque, New Mexico. The flood plain at the site was erroneously shown at elevations between nine and ten feet above the anticipated water surface elevation. This can be seen in the attached copies of the topographic maps prepared in conjunction with the referenced project. The portion of Plate H-21 shows the Flood Plain Limits, as would be encountered due to anticipated water surface elevations, is well away from the study site.

As yet, only a portion of the study site has been platted. A copy of that portion is attached. We are presently preparing a plat for filing which will be forwarded upon completion.

Please call if we can be of any further assistance in this matter.

BOYLE ENGINEERING CORPORATION

Victor J. Chavez

Victor J. Chavez, P.E.

Enclosure

VJC:pjf

DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1580
ALBUQUERQUE, NEW MEXICO 87103

SWAED-P

10 April 1978

Mr. V. Chavez
Boyle Engineering
1721 Girard NE
Albuquerque, NM 87106

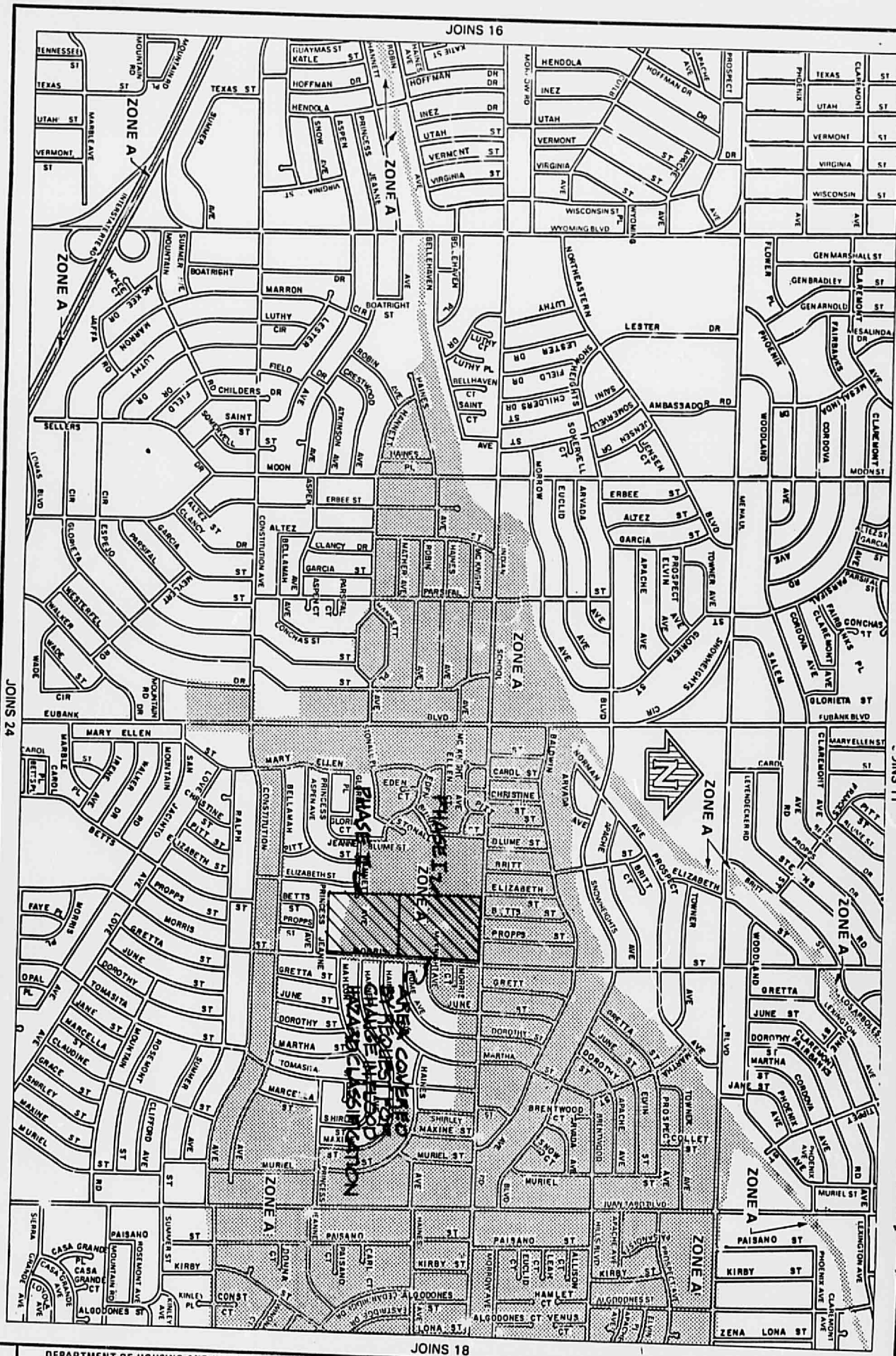
Dear Mr. Chavez:

In reply to your telephone inquiry to the FPM&H Branch on 7 April 1978, we find that the property on the southwest corner of Indian School Road and Morris Street, Albuquerque, is not in the Intermediate Regional Flood Plain.

If we can be of further assistance do not hesitate to call on us.

Sincerely,

JOHN J. CUNICO, P.E.
Chief, Flood Plain Management
and Hydraulics Branch
Engineering Division



17

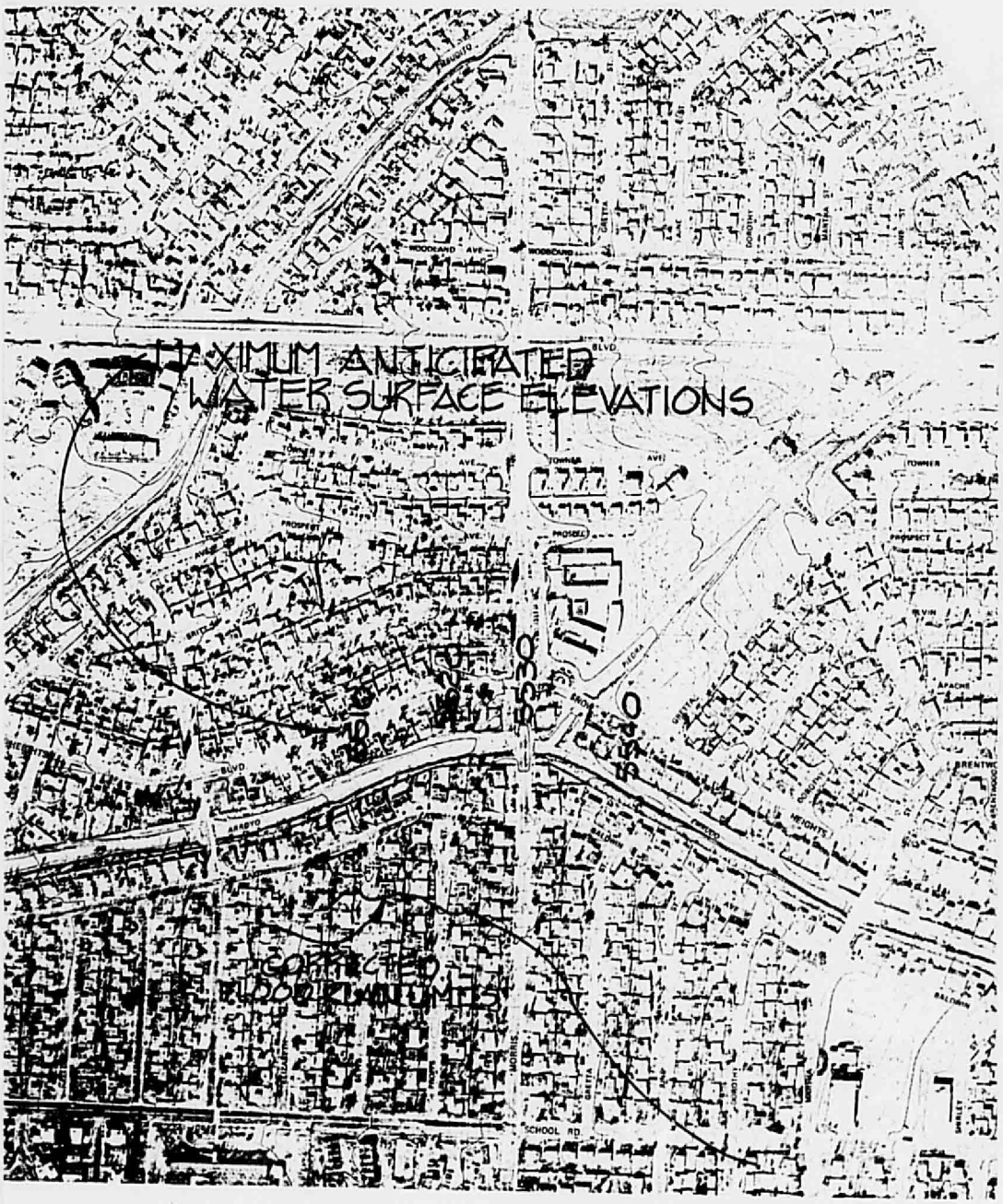
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

CITY OF ALBUQUERQUE, NM
(BERNALILLO CO.)

APPROXIMATE SCALE
1000 0 1000 2000 3000 FEET

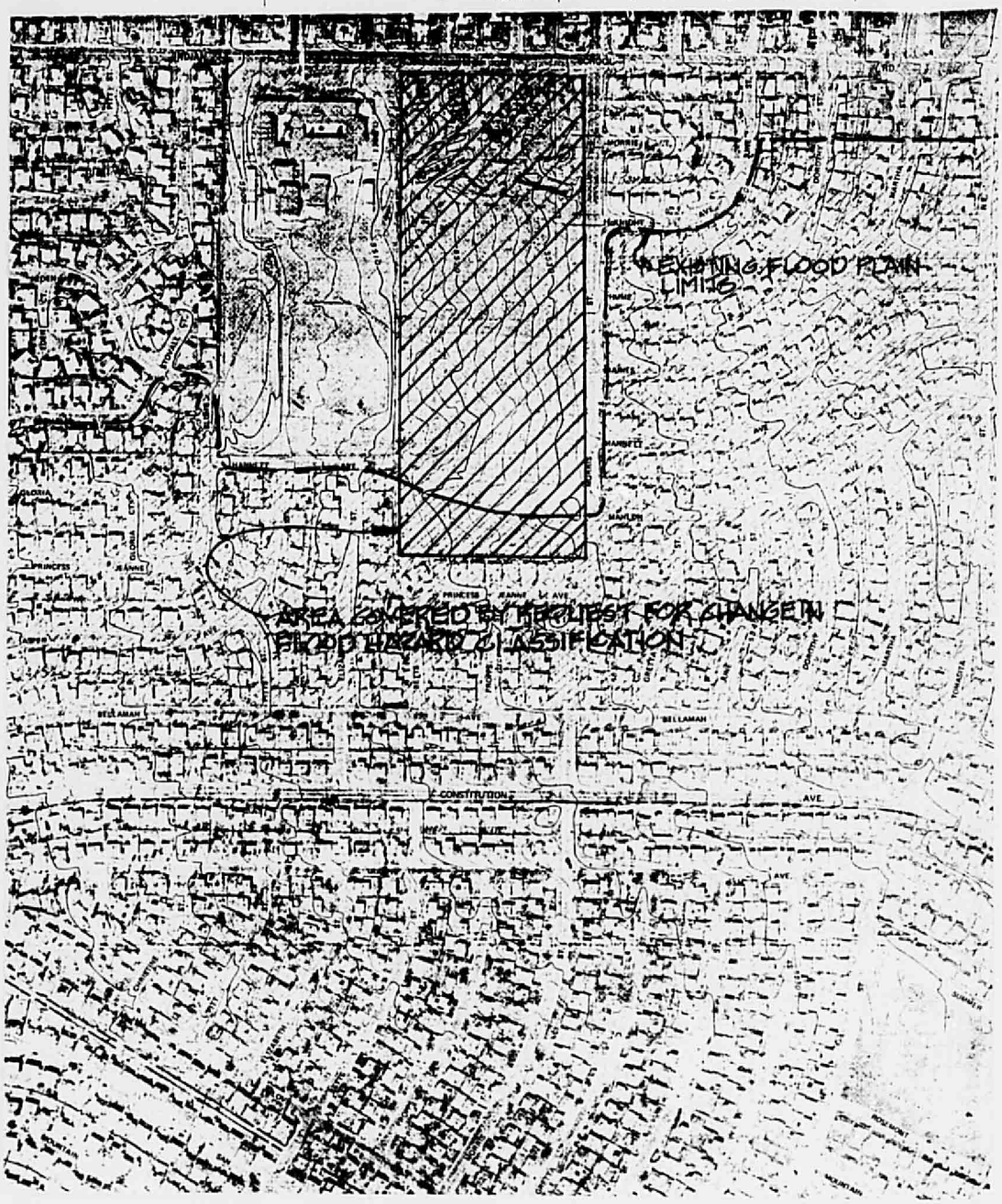
FLOOD HAZARD BOUNDARY MAP

MAP REVISED
2/14/7



A PORTION OF PLATE H-21

A PORTION OF PLATE J-21



DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1580
ALBUQUERQUE, NEW MEXICO 87103

SWAED-P

10 April 1978

Mr. V. Chavez
Boyle Engineering
1721 Girard NE
Albuquerque, NM 87106

Dear Mr. Chavez:

In reply to your telephone inquiry to the FPM&H Branch on 7 April 1978, we find that the property on the southwest corner of Indian School Road and Morris Street, Albuquerque, is not in the Intermediate Regional Flood Plain.

If we can be of further assistance do not hesitate to call on us.

Sincerely,

JOHN J. CUNICO, P.E.
Chief, Flood Plain Management
and Hydraulics Branch
Engineering Division