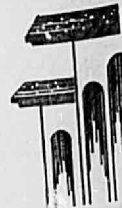


Samuel Andrade, President

Andrade
Homes
INC.



RECEIVED

OCT 12 1979

CITY ENGINEER

October 9, 1979

Mr. Richard S. Heller
City Engineer
P.O. Box 1293
Albuquerque, New Mexico 87103

Re: Lot 22, Kachina Hills 2

Dear Mr. Heller:

In response to your letter of September 20, 1979 to
Mr. Jim Haynes, owner of the above named lot, this is
to advise you that the ponding area has been restored.

Very truly yours,

Samuel Andrade
Samuel Andrade
President

SA/jg

affiliated mortgage & development company



a wholly owned subsidiary of Albuquerque Federal Savings and Loan Association

main office:
6400 uptown blvd. ne
p.o. box 3492, station D
albuquerque, n. m. 87110
(505) 883-3100

October 3, 1977

Mr. V. M. Kimmick, City Engineer
City of Albuquerque
400 Marquette Avenue, N. W.
Albuquerque, New Mexico 87102

Dear Mr. Kimmick:

This letter will confirm our conversation wherein we agreed to assume the responsibility for silt removal from Monte Largo between the northern boundary of Pablo Heights and the Embudo Arroyo.

Our responsibility will continue until such time as Valdez Street is developed south of Rebonito Boulevard.

Sincerely,

A handwritten signature in cursive script that reads 'Charles A. Haegelin'.

Charles A. Haegelin
Executive Vice President

CAH/mh

cc: Bohannon-Huston, Inc.
4125 Carlisle, N. E.
Albuquerque, New Mexico 87107

santa fe office:
3157 cerrillos road
santa fe, n. m. 87501
(505) 471-0220

building prosperity through service

branch office:
3240-C Juan Tabo Blvd. ne
p.o. box 14293, station G
albuquerque, n. m. 87111



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

October 1, 1979

Mr. Sam Andrade
Andrade Homes Inc.
4001 Ellison N.E.
Albuquerque, New Mexico

Dear Mr. Andrade:

I am enclosing a copy plat for Kachina Hills #2, the grading plan for the subdivision and a letter from Mr. Heller, City Engineer, to Mr. Jim Haines, regarding the ponding provisions of his lot.

You will note that approval of the plat was granted with the stipulation that the drainage and grading plan would be adhered to scrupulously.

This letter is written to request that you certify to the City that the lots under your control and any others which may have been sold recently, comply with the ponding and grading provisions indicated. It is also requested that in those cases where the lots are not in compliance with the approved grading plan, remedial action be taken.

Sincerely,

Bruno Conegliano
Asst. City Engineer-Hydrology

BC/lc

encl.

cc: Richard Heller, City Engineer
Drainage File



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

September 20, 1979

Mr. Jim Haynes
1705 Buffalo Dancer Trail
Albuquerque, New Mexico 87112

Dear Mr. Haynes:

I have been notified that the pond area provided by the developer in the back of Lot 22, Kachina Hills 2, which is presently under your ownership, has been obliterated. This action is in violation of City policies and of the conditions under which approval was granted for the development of Kachina Hills 2. This letter is to advise you that the pond must be restored and maintained and if no action is taken by you within the next thirty (30) days, I will instruct the City Attorney's Office for further procedures as necessary.

Very truly yours,

Richard S. Heller
City Engineer

RSH:BC:bm
CC: William Cramer, City Attorney's Office
Bruno Conegliano
Drainage File



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

September 18, 1979

Mr. Richard E. Leonard
AMAFCA
P. O. Box 25851
Albuquerque, New Mexico 87125

Dear Mr. Leonard:

I don't know if you have in your files a copy of the drainage report for Kachina Hills 2 and 3 so I'm forwarding you the enclosed information.

Very truly yours,

Bruno Conegliano
Asst. City Engineer - Hydrology

BC:bm
Enclosure

CITY OF ALBUQUERQUE

ALBUQUERQUE, NEW MEXICO

INTER-OFFICE CORRESPONDENCE

September 18, 1979

REF. NO. _____

TO: Bill Cramer, City Attorney's Office
FROM: Bruno Conegliano B.C.
SUBJECT: OBLITERATION OF PONDING FACILITIES ON R-1 LOTS

Approval of plats by myself acting for AMAFCA are based on the stipulation that the parcel of land will be developed in accordance with an approved drainage report. At this time, the City does not have the capability nor the mechanism to inspect and verify the existence of ponding areas on R-1 lots prior to acceptance of the subdivision into the City. Building permits for construction on R-1 lots do not include inspection of the property for compliance with the approved drainage plan nor are the prospective homeowners notified that it is incumbent upon them to maintain the ponding areas required by the drainage plan. I'm enclosing a plat for Kachina Hills 2 which shows that the subdivision "shall be developed in accordance with the drainage report and amendments developed by Bohannon-Huston, Inc. and approved on September 29, 1977"

Today I have received a complaint from the owner of Lot 25 who alleges that the owner of the adjacent Lot 22 has obliterated the pond thereby subjecting him to unexpected runoff. It is my opinion that in the future the note on the plats should further stipulate that the prospective lot purchasers shall be made aware of their obligation to insure the maintenance and permanence of the ponding areas provided. I'm open to suggestions on how best to address this problem.

BC:bm

CC: R. E. Leonard, AMAFCA
R. S. Heller

BOHANNAN-HUSTON INC.



505 881-2000

4125 CARLISLE BLVD., N.E. ALBUQUERQUE, NEW MEXICO 87107

December 6, 1977

Bruno

*I got only letter,
J.*

Mr. V. M. Kimmick
City Engineer
City of Albuquerque
P. O. Box 1293
Albuquerque, NM 87103

Re: Kachina Hills Unit 1, Lot 126

Dear Mr. Kimmick:

The purpose of this letter is to transmit final design plans, city comments, and quantity estimate for the above-referenced project. As requested by Mr. Fred Gomez, City Design Engineer, these plans will be submitted as a modification to the Kachina Hills Unit 1 plan set.

We would also like to have approval of the drainage for Lots 214 through 222 as a modification to Kachina Hills Unit 1 (Crestview Unit 3). Backyard ponding will be used on these lots similar to the Kachina 1 area.

A formal drainage report will be prepared at a later date for the remaining westerly portion of Lot 126, to be developed as multi-family.

If you should have any questions regarding this matter, please contact me or Michael Irwin of this office.

Sincerely,

Raymond W. Mary
for Michael M. Emery, P.E.
Chief Design Engineer

cc: Mr. Elmer Sproul
Mr. Bruno Conegliano

MJI/dlh
Job No. 77-014.7

*Creman's
Inc.*

BOHANNAN-HUSTON INC.



4125 CARLISLE BLVD., N.E. ALBUQUERQUE, NEW MEXICO 87107 505 881-2000

ENGINEERS PLANNERS PHOTOGRAMMETERISTS

November 8, 1977

RECEIVED

NOV 10 1977

CITY ENGINEERS

Mr. Bruno Conegliano
Assistant City Engineer,
Hydrology
City of Albuquerque
P. O. Box 1293
Albuquerque, NM 87103

Re: Kachina Hills Unit 3, Drainage Easement Abandonment

Dear Mr. Conegliano:

Enclosed is a copy of a letter of acceptance from Mr. Milton Lubow in which he agrees to the abandonment of the drainage easement in the Rebonito Subdivision between Lots 2 and 3, Block 2. Mr. Lubow also agrees to the reconstruction of Valdez Drive so that it drains to Rebonito Road.

This information, as you indicated in your letter of November 2, 1977, was necessary before you would be able to sign the plat for Kachina III.

If you should have any questions regarding this matter, please feel free to call me or Mr. Ray Macy, of this office.

Sincerely,

C. J. Mead, P.E.
Engineering Manager

cc: Mr. Charles Haegelin

Enclosure

RWM/dlh
Job No. 77-144

Cremans
Inc.

affiliated mortgage & development company



a wholly owned subsidiary of Albuquerque Federal Savings and Loan Association

main office:
6400 uptown blvd. ne
p.o. box 3492, station D
albuquerque, n. m. 87119
(505) 893-3100

November 7, 1977

Milton Lubow
Agent for Bankers United Inc.
1108 Alvarado NE Suite 100
Albuquerque, New Mexico

Dear Mr. Lubow:

As I explained on the telephone, we would like to request a vacation of the drainage easement between Lots 2 & 3, Block 2, Rebonito Addition, which is the 20' x 101.98' easement on the west side of Valdez Drive N.E., as indicated in "red" on the attached plat.

At this time Valdez will be graded so that the drainage from the east will be caught in Valdez and drained to the north. When Valdez is paved, the temporary solution will become a permanent one and drainage will continue to be to the north.

If you concur with this request for vacation of subject drainage easement, please indicate by signing below.

Sincerely,

Charles A. Haegelin
Executive Vice President

CAH/cs

CC: Ray Macy, Bohannon-Huston, Inc.

ACCEPTED:

Milton Lubow

santa fe office:
3137 cerrillos road
santa fe, n. m. 87501
(505) 471-0220

building prosperity through service

branch office:
3240 C. Juan Tabo blvd. ne
p.o. box 14293, station G
albuquerque, n. m. 87111

BOHANNAN-HUSTON INC.



4125 CARLISLE BLVD., N.E. ALBUQUERQUE, NEW MEXICO 87107 505 881-2000

October 12, 1977

Mr. Bruno Conegliano
Assistant City Engineer
Hydrology
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

RECEIVED
OCT 13 1977
CITY ENGINEERS

Re: Drainage Report for Kachina Hills, Units 2 and 3

Dear Mr. Conegliano:

This is to inform you that items 1 through 3 of your conditional approval letter dated September 29, 1977, for the above-referenced drainage report are presently being incorporated into the construction drawings.

It is our understanding that AMDEC has supplied you with a letter of agreement accepting the responsibility for silt removal on Monte Largo Drive as you requested.

Finish floor elevations of residences fronting onto Monte Largo Drive near Rebonito Road will be elevated as far as possible while conforming with the restraints imposed by the driveway grades.

Sincerely,

Raymond W. Macy
Raymond W. Macy, P.E.
Design Engineer

cc: Mr. Charles Haegelin

RWM/mna
Job No. 77-012
77-144

Cremans
Inc.



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

MAYOR

Harry E. Kinney

CHIEF

ADMINISTRATIVE OFFICER
Frank A. Kleinhenz

September 29, 1977

Mr. Mike Emory
Bohannon-Huston Inc.
4125 Carlisle Blvd. N.E.
Albuquerque, N.M. 87107

Dear Mr. Emory:

The drainage report for Kachina Hills, Units 2 and 3 has been reviewed and is approved with the modifications discussed and outlined below:

1. The lots adjacent to the arroyo will not drain into the proposed swale but will have backyard ponding.
2. No swale is to be constructed on the berm adjacent to the channel.
3. Valdez Drive will be graded to drain into Rebonito Rd. and will intercept the flows from offsite areas G & K.
4. The developer will supply the City with a letter of agreement accepting the responsibility of the silt removal from Monte Largo until further development to the east will have eliminated this nuisance.

Due to the 90 degree turn that the water flow will have to make at the intersection of Rebonito and Monte Largo, the silt deposition may cause the water to raise substantially above the curb. For this reason the ponding plan will have to show that the finished floor of the residences abutting on Monte Largo are substantially above the curb elevation.

Sincerely,

Bruno Conegliano
Assistant City Engineer-Hydrology

BC/fs

cc - V. M. Kimmick
Jim Smith
Wayne Sheppard
Drainage File

AN EQUAL OPPORTUNITY EMPLOYER



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

MAYOR
Harry E. Kinney

CHIEF
ADMINISTRATIVE OFFICER
Frank A. Kleinmeyer

September 7, 1977

Kent Nowlin Construction Company
4001 Bogan, N.E.
Albuquerque, New Mexico 87109

Attn: Jim Pond, Chief Engineer

Re: Curb and Gutter Grades, Kachina Hills, Unit 1

Dear Mr. Pond:

This will confirm your request to have curb and gutter grades for Kachina Hills, Unit 1 released. Please be advised that no construction is to be done on curb and gutter for Menaul Boulevard nor Rover Boulevard within the subdivision until drainage details have been resolved and approved.

Yours very truly,

C. D. Sheppard, P.E.

C. D. Sheppard, P.E.
Assistant City Engineer - Field

CDS/gm

cc: V. M. Kimmick, City Engineer
Bruno Conegliano, Hydrology Engineer
Emil Hargett, Testing and Paving Engineer
Nick Montano, Chief Paving Inspector
Joe Martinez, Curb and Gutter Inspector for Kachina Hills, Unit 1

Public Works Department

Director - Erwin F. Hensch, P. E. 766-7467
Engineering 766-7441 - V. M. Kimmick, P. E.
Street Maint. 766-7755 - G. E. Paul, P. E.

Asst. Director - Harold R. Orr, Jr. P. E.
Liquid Waste 766-7535 - R. P. Lowe, P. E.
Water 766-7437 - W. H. Otto, P. E.

AN EQUAL OPPORTUNITY EMPLOYER

BOHANNAN-HUSTON INC.



4125 CARLISLE BLVD., N.E. ALBUQUERQUE, NEW MEXICO 87107 505 881-2000

August 10, 1977

Bravo
E

Mr. V. M. Kimmick
City Engineer
City of Albuquerque
P. O. Box 1293
Albuquerque, NM 87103

Re: Drainage Report for Kachina Hills Units 2 and 3

Dear Mr. Kimmick:

Enclosed for your review are three copies of the above-referenced drainage report.

The report attempts to include many of the features requested by Mr. Conegliano, including a desilting pond in Kachina Hills Unit 3, and a swale in Kachina Hills Unit 2 to carry runoff from the north edge of the subdivision into the concrete-lined portion of the Embudo Arroyo.

Please do not hesitate to call our office if you have any questions. We are very anxious to receive your comments.

Sincerely,

Raymond W. Macy

Raymond W. Macy, P.E.
Design Engineer

Enclosures

cc: Mr. Charles Haegelin

RWM/dlh
Job No. 77-012 & 77-144



*to drainage
file*

*Kachina Hills ✓
to the City of Albuquerque
Reading, etc.*

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

MAYOR
Harry E. Kinney

CHIEF
ADMINISTRATIVE OFFICER
Frank A. Kleinhenz

*Kachina
Hills ✓*

June 27, 1977

Mr. Mike Emmery
Bohannon, Westman, Huston, & Assoc., Inc.
4125 Carlisle Blvd., N.E.
Albuquerque, New Mexico 87107

Dear Mr. Emmery:

The construction of a dike to intercept the upstream flow and allow a downstream development is not acceptable in principle. The owners of the upstream property are entitled to continue to drain their property at the natural point of discharge. Any modification of the natural drainage pattern performed for the benefit of a downstream development must not cause any hardship nor inconvenience to others be they private or public.

On the basis of the consideration above, which are clearly specified in the AMAFCA Resolution, the proposed construction of interceptor dikes concurrently with the development of "Kachina Hills Unit 2" are not acceptable. Dike alternate #1 would be constructed in public road r.o.w.--such construction would:

1. Deny access to the owners of property adjacent to the road r.o.w.
2. Subject properties adjacent to the dike to inundation and to sediment deposition.

Dike alternate #2. Same objections as alternate #1; in addition, this alternate would transfer the responsibility of the runoff management to the public by conveying the runoff to Monte Largo Drive.

Mike Emmerly
Page 2
June 27, 1977

Traditionally in Albuquerque, roadways have been used as runoff carriers but in order to perform their primary function of thoroughfare, they cannot be subject to sediment deposition. The City will, therefore, accept the runoff from a fully developed subdivision; it will not unnecessarily receive flows emanating from undeveloped land unless sedimentation facilities are provided. These facilities must be located outside public r.o.w. and must effectively remove the sediment load from the runoff.

Approval of the drainage report for the subdivision La Ultima Del La Ciudad is contingent upon approval of the drainage report for the subdivision Kachina Hills No. 2. It is also contingent upon submission of a different solution to the offsite drainage problem on the north parcel. For the reasons outlined above, collection and discharge of the offsite runoff into Menaul is not acceptable.

Very truly yours,



Bruno Conegliano
Assistant City Engineer-Hydrology

BC/kr

cc - V. M. Kimmick, City Engineer
Dwayne Sheppard, Assist. City Engineer-Field
Bob Kielich, Assist. City Engineer-Design
Drainage File ✓



City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

MAYOR
Harry E. Kinney

CHIEF
ADMINISTRATIVE OFFICER
Frank A. Kleinhenz

March 2, 1977

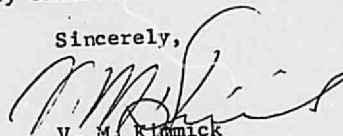
Mr. Michial M. Emery
Bohannon, Westman, Huston & Assoc., Inc.
4125 Carlisle Blvd. N.E.
Albuquerque, New Mexico 87110

SUBJECT: KACHINA HILLS - UNIT 2, DRAINAGE REPORT

Dear Mr. Emery:

The drainage report of February 1977 has been reviewed. Flows directed into the Embudo Arroyo should be slowed to 8fps or less unless arroyo is lined. The portion of the Embudo Arroyo passing through the development remains the responsibility of the developer. Information must be included in the report regarding permanent improvement of this temporary channel.

Sincerely,


V. M. Kimmick
City Engineer

VMK/fs

cc: Jim Smith
Bob Kielich
Dwayne Sheppard
Drainage File

Public Works Department

Director - Erwin F. Hensch, P. E.	766-7467	Ass't. Director - Harold R. Orr, Jr. P. E.
Engineering 766-7441 - V. M. Kimmick, P. E.		Liquid Waste 766-7535 - R. P. Lowe, P. E.
Street Maint. 766-7755 - G. E. Paul, P. E.		Water 766-7437 - W. H. Otto, P. E.

AN EQUAL OPPORTUNITY EMPLOYER



DRAINAGE REPORT
FOR
KACHINA HILLS UNIT 2
ZONE ATLAS SHEET H-23

FEBRUARY, 1977

DRAINAGE REPORT
FOR
KACHINA HILLS UNIT 2
ZONE ATLAS SHEET H-23

FEBRUARY, 1977

PREPARED FOR
AFFILIATED MORTGAGE AND DEVELOPMENT COMPANY
POST OFFICE BOX 3492, STATION D
ALBUQUERQUE, NEW MEXICO 87107

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



Michael M. Emery
MICHAEL M. EMERY, P.E.
N.M.P.E. NO. 5194

TABLE OF CONTENTS

	<u>PAGE</u>
PURPOSE -----	1
LOCATION AND PROJECT DESCRIPTION -----	1
HYDROLOGY -----	1
DRAINAGE BEFORE DEVELOPMENT -----	2
DRAINAGE AFTER DEVELOPMENT -----	2
RECOMMENDATIONS -----	4

APPENDIX COMPUTATIONS

PLATES

PLATE I	LOCATION MAP AND UPLAND DRAINAGE AREAS
PLATE II	UNDEVELOPED DRAINAGE PATTERNS AND FLOW RATES
PLATE III	DEVELOPED DRAINAGE PATTERNS AND FLOW RATES

DRAINAGE REPORT FOR KACHINA HILLS UNIT 2

PURPOSE

The purpose of this report is to determine the undeveloped and developed runoff from a 23 acre parcel and its contributory basins resulting from a 100-year storm. Recommendations for development of the parcel are made with respect to ponding and controlling the runoff from contributing basins.

LOCATION AND PROJECT DESCRIPTION

The study parcel is located between Tramway Boulevard and Monte Largo Drive, bounded on the north by the Embudo Arroyo Channel and on the south by the proposed Pablo Heights Subdivision. This is shown on Plate I at the back of this report.

The existing ground slopes from east to west on grades between five and ten percent. The soil consists of granular decomposed granite and is covered with sparse amounts of native grass.

The 23 acre parcel will be developed as a residential subdivision with a density of about 3.5 dwelling units per acre.

HYDROLOGY

The peak runoff rate for each basin resulting from a 100-year storm, was computed using the rational formula. Rainfall intensities were determined from information presented in the Master Plan of Drainage, 1963, for the Albuquerque area. Computations are given in the appendix at the back of this report.

DRAINAGE BEFORE DEVELOPMENT

The upland runoff originates in a long narrow basin extending to the east. Total area of the upland sources is about 50 acres and includes areas H, D, G, K and the South Parcel, as shown on Plate I. Plate II shows where the upland flows enter the study parcel and the anticipated peak discharge rates for the 100-year storm.

DRAINAGE AFTER DEVELOPMENT

Development of Kachina Hills Unit 2 is anticipated to precede development of the property within areas G or K. Construction of a dike east of the study parcel is recommended to intercept upland flow from these areas, allowing de-silting of the upland runoff and creation of a single point of discharge.

Two alternate locations for the 600 foot long earth dike are proposed. Alternate No. 2 places the dike at the east edge of Monte Largo Drive so all of the runoff from areas G and K are diverted and vehicular traffic is maintained on Monte Largo Drive. At this location, a portion of the dike and the ponded runoff is within area K, on private property. The runoff would move north along the dike to the intersection of Monte Largo Drive and Rebonito Road. It would then travel north on Monte Largo Drive and be released into the Embudo Arroyo Channel. This location is not encouraged because it requires the use of private property, and because development of area K is expected to follow quickly behind development of the study parcel.

Alternate No. 1 permits construction of the dike and detention area within public right-of-way, approximately 500 feet east of

Monte Largo Drive. The upland flow from area G would be diverted to Rebonito Road, then to Monte Largo Drive, and finally north to the Embudo Arroyo Channel. Area K, before its development, would drain to Monte Largo Drive then north to the Embudo Arroyo Channel. Alternate No. 1 is preferred because it uses public land for the dike, and will permit development of the land within area K.

Regardless of the alternate selected, careful design of Monte Largo Drive is required to insure adequate drainage. Lots within the study parcel adjacent to the intersection of Monte Largo Drive and Rebonito Road must be elevated sufficiently to prevent them from being flooded. A low masonry wall, approximately eighteen inches high, is recommended along the front lot line of these lots.

Internal drainage of the parcel will be reduced to back yard ponding of selected lots. Lots selected for back yard ponding, in general, will share a rear property line with a "downhill" lot without back yard ponding. This combination will have a significant reduction on the amount of retaining walls required along the rear lot lines. Lots selected for back yard ponding are shown on Plate III. Runoff will be collected in the streets and conveyed to the northwest, where it will be discharged into the Embudo Arroyo Channel through a 10 foot wide drainage right-of-way. Drainage of lots along the east side will be onto Monte Largo Drive and north to the Embudo Arroyo Channel. A water block will be constructed as shown on Plate III to prevent entry of upland runoff to the study parcel.

Improvements to the Embudo Arroyo Channel, as part of the East Side Arroyo Protection System, Phase II-1976, have increased capacity

of the system. These improvements allow for the small increase in runoff resulting from development as outlined in the AMAFCA Drainage Resolution 1972-2, Section 3, Part B, pertaining to drainage facility capacity.

RECOMMENDATIONS

The following recommendations are made for the study parcel.

1. Construct a dike for the interception of upland flow. Alternative No. 1 is preferred.
2. Back yard ponding on selected lots.
3. Construct a water block to prevent flows on Monte Largo Drive from entering the parcel's internal drainage system.
4. Construct a channel or conduit to conduct runoff from the study parcel to the Embudo Arroyo Channel.
5. Elevate lots adjacent to the intersection of Monte Largo Drive and Rebonito Road to insure protection from converging flows. Construct low masonry walls along the front of these lots.
6. Construct Monte Largo Drive with sufficient capacity to carry runoff north to the Embudo Arroyo Channel.

MONTE LARGO DRIVE

Street Width	44 feet
Minimum Slope	0.005 ft/ft
Crown Height	6 inches
Anticipated Flow	72.2 cfs
Flow Depth	0.67 ft
Velocity	3.9 ft/sec

AREA "G&K" RUNOFF

$$T_c = \log^{-1} [3.641(B) + .3854 \log L - .197 \log S - .3613]$$

WHERE

T_c = Time of Concentration

B = GROUND FACTOR

L = Length of BASIN IN FEET

S = SLOPE IN PERCENT

FOR AREA "G&K"

$S \approx 7\%$, $B = 1.8$ (POOR Vegetation), $L = 3400'$

$$T_c = \log^{-1} [3.641(1.8) + .3854(\log 3400) - .197(\log 7.0) - .3613]$$

$T_c = 30.80$ minutes

Intensity FROM Curves in City of Albuquerque
Master Plan for Drainage, 1963

$$I = \frac{189}{T_c + 25} = \frac{189}{30.8 + 25} = 3.39 \text{ inches/hour}$$

$Q = CIA$

WHERE Q = FLOW IN CFS

I = RAINFALL Intensity

C = Runoff Factor

A = AREA IN ACRES

FOR AREA "G&K" $C = .4$, $I = 3.39$, $A \approx 32.3$ acres

$$Q = CIA = (.4)(3.39)(32.3) = 43.8 \text{ cfs}$$

SPROUL TRACT #1 SOUTH RUNOFF UNDEVELOPED

$S \approx 7.5\%$, $L \approx 2500'$, $B = 1.8$, $A = 17.6$ ACRES

$$T_c = \log^{-1} [3.641(1.8) + .3854(\log 2500) - .197 \log 7.5 - .3613]$$

$T_c = 27.0$ minutes

$$I = \frac{189}{27 + 25} = 3.63 \text{ inches/hour}$$

$$Q = CIA = .4(3.63)(17.6) = 25.6 \text{ cfs}$$



PROJECT NAME ALBU Redef Property SHEET 4 OF 4
PROJECT NO. 77-012 BY AW DATE 1/17/77
SUBJECT UPLAND FLOWS CH'D DATE

RUNOFF FOR ALBUQ Rd of Ed Parcel. (UNDEVELOPED)

$S \approx 6\%$, $L \approx 1200'$, $B = 1.8$, $A \approx 20.7$

$$T_c = \log^{-1} [0.3641(1.8) + 3854(\log 1200) - 0.197(\log 6) - 361]$$

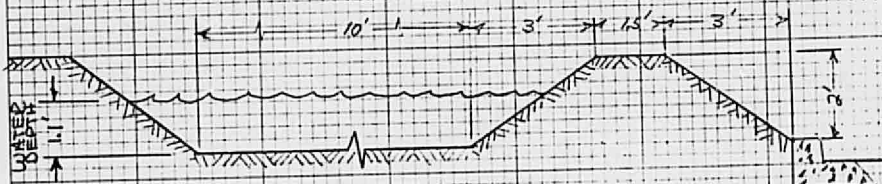
$$T_c = 21.3$$

$$I = \frac{189}{21.3 + 25} = 4.08 \text{ in/hr}$$

$$Q = CIA = 4(4.08)(20.7) = 33.8 \text{ cfs.}$$

PROPOSED INTERCEPTION OF UPLAND FLOW FROM EAST SIDE. FLOW TO BE INTERCEPTED BY DIKE and CARRIED NORTH TO BE DEPOSITED ONTO RECONITO ROAD.

PURPOSE is to Reduce velocity of flow which normally concentrates in natural channels. This will Reduce the chance of Runoff overrunning street into subdivision and also Reduce Siltng problem. Simple earth cut will be used to construct dike approximately 2' high and a slope of about .5% to North.



ASSUMING DRAINAGE STRUCTURE WILL APPROXIMATE OPEN CHANNEL FLOW IN TRAPEZOIDAL CROSS-SECTION OF SLOPE = 0.5%, Side slopes $\approx 1.5:1$,

$Q = 34.31 \text{ cfs}$, MANNING $n = .03$, Bottom width = 10'

RESULTING Velocity = 3.07 ft/sec, Depth = .97 ft

Leaving approximately 1.0' of FREEBOARD ABOVE WATER.



PROJECT NAME AMDEC- APS DRNG SHEET 3 OF 4
PROJECT NO. 77-012 BY HW DATE 1/17/77
SUBJECT DRAINAGE REPORT CHD _____ DATE _____

AREA ABOVE DIKE, Runoff

S=7%, L=2800', A=24.3 Acres.

$$T_c = \log^{-1} [1.364(1.8) + .3954 \log 2800 - .197 \log 7 - .3613]$$

T_c = 28.6 minutes.

$$I = \frac{189}{28.6 + 25} = 3.53 \text{ inches/hour}$$

$$Q = CIA = (.4)(3.53)(24.3) = 34.31 \text{ cfs}$$

"K" AREA Below DIKE AND ADJACENT TO PARCEL.

S=7%, B=1.8, L=500', A=8.0 Acres

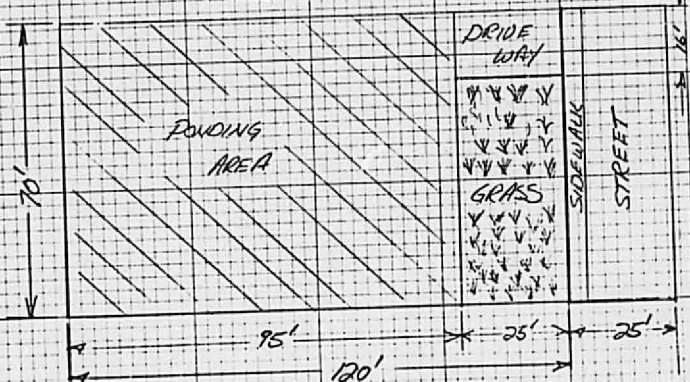
$$T_c = \log^{-1} [1.364(1.8) + .3954 \log 500 - .197 \log 7 - .3613]$$

T_c = 14.7 minutes.

$$\text{Intensity} = \frac{189}{14.7 + 25} = 4.76 \text{ inches/hour}$$

$$Q = CIA = (.4)(4.76)(8.0) = 15.2 \text{ cfs}$$

Developed AREA Runoff coefficients.



PROJECT NAME AMDEC - APS

PROJECT NO. 77-012

SUBJECT DRAINAGE REPORT

SHEET 3

BY LW

CHD

OF 4

DATE 1/17/72

DATE

DEVELOPED AREA RUNOFF FACTORS - PONDED LOTS

PAVEMENT = .95
GRASS = .20
PONDED AREA = 0.
ROOFS = .95.

TOTAL AREA = $145' \times 70' = 10,150 \text{ ft}^2$

PAVEMENT = $25' \times 70' = 1750 \text{ ft}^2$

+ $25' \times 16' = 400 \text{ ft}^2$

TOTAL = $2150 \text{ ft}^2 = 21.2\%$

GRASS = $25' \times 54' = 1350 \text{ ft}^2 = 13.3\%$

PONDING = $95' \times 70' = 6650 \text{ ft}^2 = 65.5\%$

$(.655)(0) + (.133)(.2) + (.212)(.95) = .228 \text{ (pond)}$

FULLY DRAINED LOTS.

TOTAL AREA = $10,150 \text{ ft}^2$

PAVEMENT = $2150 = 21.2\%$

GRASS = $5250 = 51.7\%$

ROOF AREA = $2150 = 27.1\%$

$(.212)(.95) + (.517)(.2) + (.271)(.95) = .56 = C_{fd}$

TOTAL LOTS IN INTERIOR = 62

PONDED = 28 = 45.2%

DRAINED = 34 = 54.8

$(.452)(.228) + (.548)(.56) = .41 = C$

$T_c = \log^{-1} [I .3641 (.77) + .3854 (\log 1500) - .197 \log 7\% - .3613]$

$T_c = 9.48 \text{ minutes}$

$I = \frac{189}{9.48 + 25} = 5.48 \text{ inches/hour}$

$Q = CIA = (41.7)(5.48)(12.5) = 41.6 \text{ cfs}$

FLOW ALONG MONTE LARGO FROM INTERNAL PARCEL.

$T_c = \log^{-1} [I .3641 (.77) + .3854 (\log 850) - .197 (\log .5) - .3613]$

$T_c = 12.8 \text{ minutes}$ $I = \frac{189}{12.8 + 25} = 5.0 \text{ inches/hr}$

$Q = CIA = (.56)(5.0)(2.24) = 6.3 \text{ cfs}$



PROJECT NAME ANDEC - APS

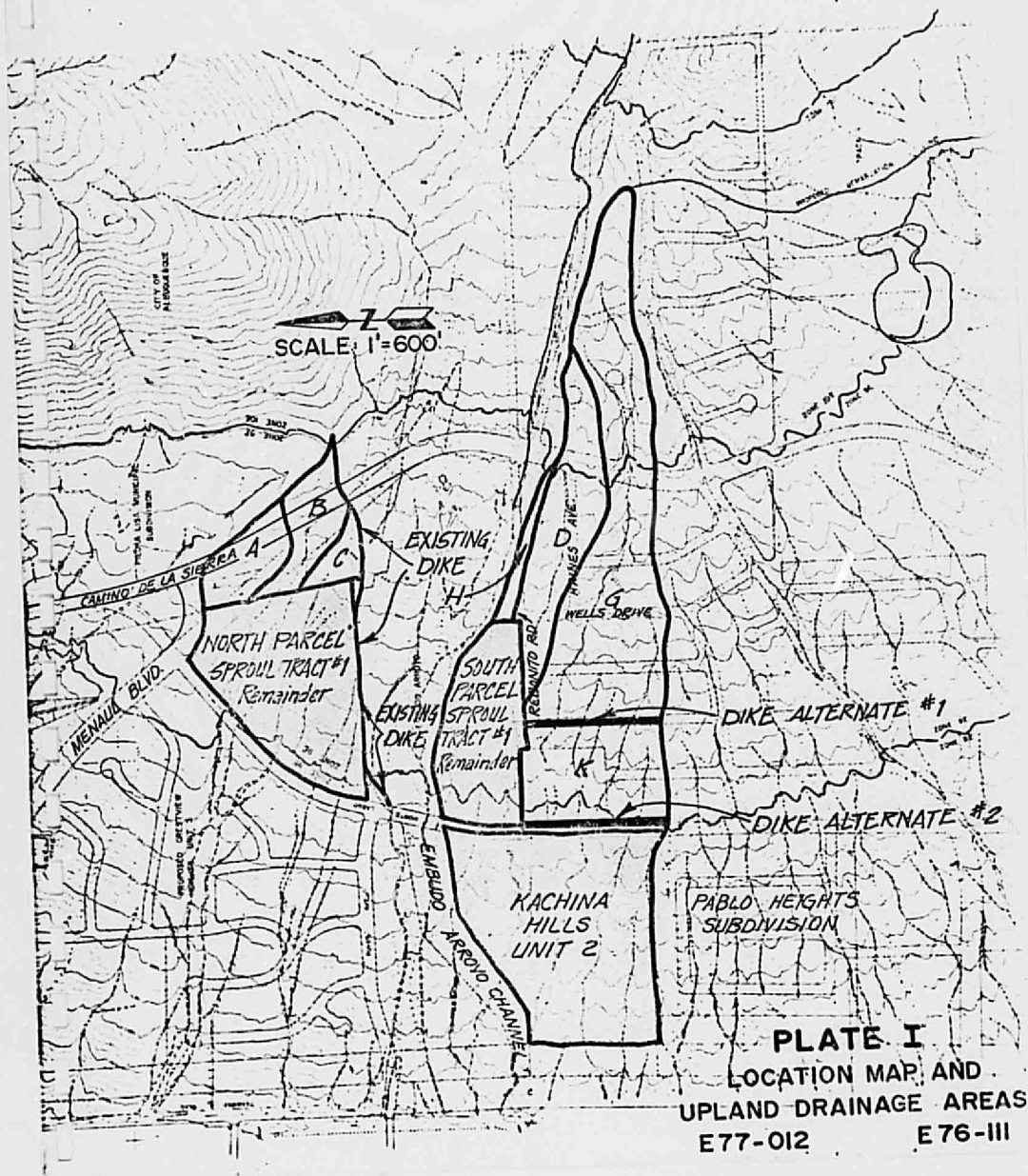
PROJECT NO. 77-012

SUBJECT DRAINAGE REPORT

SHEET 4 OF 4

BY LW DATE 1/17/77

CHD DATE





DRAINAGE REPORT
FOR
KACHINA HILLS, UNITS 2 AND 3
ZONE ATLAS SHEET H-23
AUGUST, 1977

DRAINAGE REPORT
FOR
KACHINA HILLS, UNITS 2 AND 3
ZONE ATLAS SHEET 14-23

AUGUST, 1977

PREPARED FOR
AFFILIATED MORTGAGE AND DEVELOPMENT COMPANY
POST OFFICE BOX 3492, STATION D
ALBUQUERQUE, NEW MEXICO 87107

PREPARED BY
BOHANNAN-HUSTON, INC.
4125 CARLISLE BOULEVARD, N.E.
ALBUQUERQUE, NEW MEXICO 87107



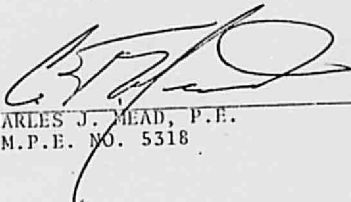

CHARLES J. MEAD, P.E.
N.M.P.E. NO. 5318

TABLE OF CONTENTS

	<u>PAGE</u>
PURPOSE	1
LOCATION AND PROJECT DESCRIPTION	1
HYDROLOGY	2
DRAINAGE BEFORE DEVELOPMENT	2
DRAINAGE AFTER DEVELOPMENT	2
RECOMMENDATIONS	4

APPENDIX

CALCULATIONS

PLATE I
PLATE II
PLATE III

LOCATION MAP AND UPLAND DRAINAGE AREAS
KACHINA II RUNOFF
KACHINA III RUNOFF

DRAINAGE REPORT
FOR
KACHINA HILLS, UNITS 2 AND 3

PURPOSE

The purpose of this report is to determine the runoff resulting from a 100-year frequency storm falling on two study parcels and their contributing areas under existing and developed conditions. Guidelines for development are established so that drainage patterns and flow rates can be defined.

LOCATION AND PROJECT DESCRIPTION

Kachina Hills Unit 2 is located between Tramway Boulevard and Monte Largo Drive, bounded on the north by the Embudo Arroyo Channel, and on the south by Pablo Heights Subdivision. This is shown on Plate I in the back of this report.

Kachina Hills Unit 2 contains approximately 23 acres and will have a density between three and four dwelling units per acre.

Kachina Hills Unit 3 is bounded on the south and the east by the proposed Rebonito Subdivision. It is bounded on the north by Rebonito Road and on the west by Monte Largo Drive. This is also shown on Plate I in the back of this report.

Kachina Hills Unit 3 contains approximately 3.5 acres and will have a density between four and five dwelling units per acre.

The existing ground in both parcels slopes from east to west on grades between five and ten percent. The soil consists of granular decomposed granite and is covered with sparse

amounts of native grass.

HYDROLOGY

The peak runoff rate for each basin resulting from a 100-year storm was computed using the rational formula. Rainfall intensities were determined from information presented in the Master Plan of Drainage, 1963, for the Albuquerque area. Computations are given in the Appendix at the back of this report.

DRAINAGE BEFORE DEVELOPMENT

Runoff originating in Kachina Hills Units 2 and 3 along with runoff from upland contributing basins flows westerly across the study parcels. This runoff discharges along the north and west boundary of Kachina Hills Unit 2. This is shown on Plates I and II.

DRAINAGE AFTER DEVELOPMENT

The upland flows which entered Kachina Hills Unit 2 before development will now be intercepted by Monte Largo Drive. The runoff will travel along the street northward and be released into the Embudo Arroyo Channel. Runoff coming off of Kachina Hills Unit 3 will also travel down Monte Largo Drive and be released into the Embudo Arroyo Channel. Lots within Kachina Hills Unit 2 adjacent to the intersection of Monte Largo Drive and Rebonito Road must be elevated sufficiently to prevent them from being flooded by runoff entering the intersection from Rebonito Road. A low masonry wall, approximately 18 inches high, is recommended along the front lot line of these lots. A water block will be constructed on Deer Dancer Trail where it intersects Monte Largo Drive to prevent any runoff from traveling

through the study parcel.

The upland runoff which enters Kachina Hills Unit 3 will be diverted by a temporary ten-foot wide drainage easement at the east edge of Lots 1, 2, and 3, and deposited into a desilting pond on Lots 4 and 5 of Block 2. Construction of the desilting pond was required by the City of Albuquerque and should be maintained by the same. The desilting pond and ten-foot drainage easement are temporary solutions which can be removed after the property to the east is developed.

Internal drainage of Kachina Hills Unit 2 will be controlled by backyard ponding of selected lots. Lots selected for backyard ponding, in general, will share a rear property line with a "down-hill" lot without backyard ponding. This combination will have a significant reduction on the amount of retaining walls required along the rear lot lines. Lots selected for backyard ponding are shown on Plate III. Runoff will be collected in the streets and conveyed to the northwest, where it will be discharged into the Embudo Arroyo Channel through a ten-foot wide drainage right-of-way. Drainage of Lots 1 through 8 will be onto Monte Largo Drive and north to the Embudo Arroyo Channel. The runoff from the lots along the north side of Deer Dancer Trail will travel in two directions. Runoff from the setback of the house to the rear lot line will be discharged out the northwest corner of each lot. A swale will be constructed along the north boundary within the Embudo Arroyo right-of-way to divert the flow westward until it is deposited in the concrete lined portion of the Embudo Arroyo Channel. The runoff

generated from the front of the setback will travel into the street proceeding westward to the proposed ten-foot drainage right-of-way.

All of the lots in Kachina Hills Unit 3 will have backyard ponding. Any runoff generated will flow on the streets to Monte Largo Drive traveling northward to be deposited into the Embudo Arroyo Channel. Any flow coming out of the desilting pond will be intercepted by Singletary Drive and directed onto Rebonito Road.

Improvements to the Embudo Arroyo Channel, as part of the East Side Arroyo Protection System, Phase II, 1976, have increased capacity of the system. These improvements allow for the increase in runoff from Kachina Hills Unit 2 resulting from development as outlined in the AMAFCA Drainage Resolution 1972-2, Section 3, Part B, pertaining to downstream drainage facility capacity.

RECOMMENDATIONS

The following recommendations are made for the development of Kachina Hills Units 2 and 3.

1. Construct a temporary desilting pond and ten-foot drainage easement in Kachina Hills Unit 3, Lots 1 through 5, Block 2, for the interception of upland flow.
2. Backyard ponding on selected lots in Kachina Hills Unit 2 and all lots in Kachina Hills Unit 3.

3. Construct a water block on Deer Dancer Trail to prevent flows on Monte Largo Drive from entering Kachina Hills Unit 2

4. Construct a channel or conduit through the drainage right-of-way to conduct runoff from Kachina Hills Unit 2 to the Embudo Arroyo Channel.

5. Construct a swale within and at the south edge of the Embudo Arroyo right-of-way to intercept the flow emanating from the rear portion of lots on the north boundary of Kachina Hills Unit 2 and to direct the flow into the concrete portion of the Embudo Arroyo Channel.

6. Elevate lots within Kachina Hills Unit 2 adjacent to the intersection of Monte Largo Drive and Rebonito Road to insure protection from converging flows. Construct 18-inch high masonry walls along the front of these lots.

UPLAND RUNOFF CALCULATIONS

AREA K

7.4 ACRES, 2000', $s \approx 7\%$ $B = 1.8$

T_c = TIME OF CONCENTRATION

B = BROAD FACTOR

L = LENGTH OF BASIN

s = FAILOID SLOPE PERCENT

$$T_c = \log^{-1} \left[36.41(B) + .3854(\log L) - .197(\log s) \right]$$

$$= \log^{-1} \left[(36.41)(1.8) + .3854(\log 2000) - .197(\log 7) + .3613 \right]$$

$$T_c = 25.11 \text{ MIN}$$

$$I = \frac{189}{T_c + 25}$$

RAINFALL INTENSITY (MASTER
PLAN OF DRAINAGE, 1962)

$$I = \frac{189}{25.11 + 25}$$

$$= 3.77 \text{ IN/HR}$$

$$Q = CIA$$

Q = FLOW IN CFS

C = RUNOFF COEFFICIENT (.35 FOR NATURAL GRASS)

A = AREA IN ACRES

I = RAINFALL INTENSITY



PROJECT NAME KACHINA II & III

PROJECT NO. 77-012 77-144

SUBJECT DRAINAGE REPORT

SHEET 1

BY MJT

CH'D

OF

DATE

DATE

7-16-77

$$Q = .35 (3.77) (7.4)$$

$$= \underline{9.8 \text{ CFS}}$$

AREA G

18.6 ACRES, $L = 2850'$, $S \approx 7\%$, $B \approx 1.8$

$$T_c = \log \left[(.364)(1.8) + .3854 (L^{.78}) + .157 (S^{.047}) + .2012 \right]$$

$$= \underline{28.78 \text{ MIN}}$$

$$I = \frac{189}{28.78 + 25}$$

$$= \underline{3.51 \text{ IN/HR}}$$

$$Q = (35)(3.51)(18.6)$$

$$= \underline{22.9 \text{ CFS}}$$

AREA D

FROM LA UCTMA DE LA CIUDAD UNIT I & II
DRAINAGE REPORT

$$Q = \underline{14.9 \text{ CFS}}$$



PROJECT NAME KACHINA II & III SHEET 2 OF
PROJECT NO. 77-144 & 77-012 BY MJJ DATE 7-17-77
SUBJECT DRAINAGE REPORT CH'D DATE

AREA H

FROM LA ULTIMA DE LA CIUDAD UNIT I & II
DRAINAGE REPORT

$Q = 1.9 \text{ cfs}$

RUNOFF FROM

SOUTH PARKWAY SPECIAL TRACT #1

FROM LA ULTIMA DE LA CIUDAD UNIT I & II
DRAINAGE REPORT

$Q = 14.4 \text{ cfs}$



PROJECT NAME KACHINA II & III

PROJECT NO. 77-012, 77-146

SUBJECT DRAINAGE REPORT

SHEET 3 OF

BY MJI DATE 7-18-77

CH'D DATE

UNIFORM VELOCITY METHOD

① KACHINA HILLS UNIT 2

Length of watershed = 1000 ft

Slope of basin in percent = 6% = S

ground factor = 1.0 (poor vegetation) = B

Time of concentration = T_c

$$T_c = \log^{-1} [(.2641(B) + .3854(\log L) - .197(\log S) - .3612)]$$

$$T_c = \log^{-1} [(.2641(1.0) + .3854(\log 1000) - .197(\log 6) - .3612)]$$

$$T_c = 21.26 \text{ minutes}$$

$$\text{Intensity } I = \frac{189}{T_c + 35} = \frac{189}{21.26 + 35} = 4.09 \text{ inches/hour}^*$$

$$Q = CIA$$

where

Q = flow in cfs

C = runoff coefficient

I = intensity in inches/hour

A = area in acres

$$C = 0.35, I = 4.09, A = 30.7$$

$$Q = (0.35)(4.09)(30.7)$$

$$Q = 21.6 \text{ cfs}$$

② KACHINA HILLS UNIT 3

L = 410 ft R = 1.3 S = 5%

$$T_c = \log^{-1} [(.2641(1.0) + .3854(\log 410) - .197(\log 5) - .3612)]$$

$$T_c = 1.15 \text{ minutes} \rightarrow \text{use 10 minutes}$$

$$I = \frac{189}{10 + 35} = 5.4 \text{ inches/hour}$$

$$Q = CIA$$

$$C = 0.35, I = 5.4, A = 3.5 \text{ acres}$$

$$Q = (0.35)(5.4)(3.5)$$

$$Q = 6.6 \text{ cfs}$$

* MASTER PLAN OF DRAINAGE, 1963

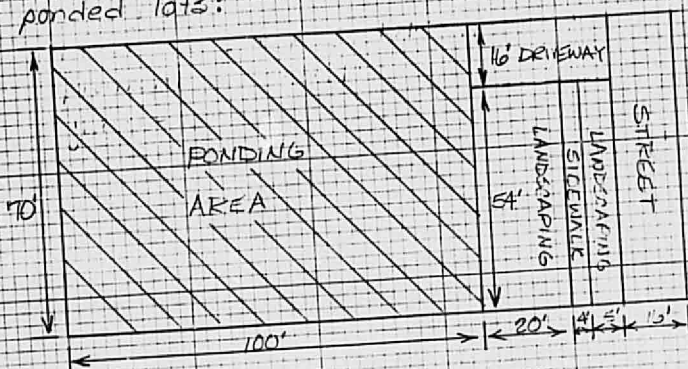


PROJECT NAME KACHINA HILLS UNITS 2 & 3
PROJECT NO. 77-012 ; 77-144
SUBJECT DRAINAGE REPORT

SHEET 4 OF
BY LH DATE 7-17-77
CHK'D MJI DATE 7-17-77

DEVELOPED RUNOFF

① Kachina Hills Unit II
runoff coefficient
ponded lots:



$$\text{total area} = 145' \times 70' = 10,150 \text{ ft}^2$$

$$\text{paved area} = 16' \times 70' = 1,120 \text{ ft}^2$$

$$16' \times 29' = 464 \text{ ft}^2$$

$$54' \times 4' = 216 \text{ ft}^2$$

$$\text{total} = 1,800 \text{ ft}^2 = 17.7\%$$

$$\text{landscaping} = 54' \times 20' = 1,080 \text{ ft}^2$$

$$54' \times 5' = 270 \text{ ft}^2$$

$$\text{total} = 1,350 \text{ ft}^2 = 13.3\%$$

$$\text{ponded} = 100' \times 70' = 7,000 \text{ ft}^2 = 69.0\%$$

$$C = (0.95)(.177) + (0.35)(.133) + (0)(.69)$$

$$C = 0.21$$

drained lots:

$$\text{paved area} = 1,800 \text{ ft}^2 = 17.7\%$$

$$\text{roof area} = 60' \times 60' = 3,600 \text{ ft}^2 = 35.5\%$$

$$\text{landscaping area} = 4,750 \text{ ft}^2 = 46.8\%$$

$$C = (0.95)(.177) + (0.95)(.355) + (0.35)(.468) = 0.67$$



PROJECT NAME KACHINA HILLS UNIT 2:3
PROJECT NO. 77-012 : 77-144
SUBJECT DRAINAGE REPORT

SHEET 5 OF
BY LII DATE 7-12-77
CHK'D MJI DATE 7-19-77

I Flow along Monte Largo from internal parcel & ponded lots

$$\text{total area} = 81200 \text{ ft}^2 = 1.9 \text{ acres}$$

$$L = 850 \quad B = .77 \quad S = .5$$

$$T_b = \log^{-1} [(.2641)(.77) + .3854(\log 850) - .97(\log .5) - .3612]$$

$$T_b = 12.8 \text{ min}$$

$$I = \frac{189}{25 + 12.8} = 5.0 \text{ inches/hour}$$

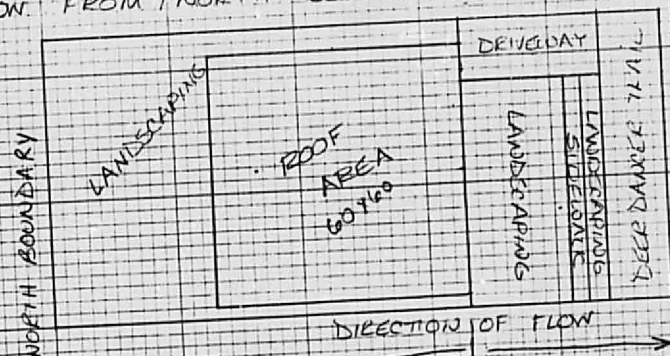
$$C = \text{CIA}$$

$$C = 0.21, I = 5.0, A = 1.9 \text{ acres}$$

$$Q = (0.21)(5.0)(1.9)$$

$$Q = 2.0 \text{ cfs}$$

II FLOW FROM NORTH BOUNDARY (KACHINA II DEEP DRAINAGE TRENCH)



$$\text{total area flowing to north boundary} = 100 \times 70 = 7000 \text{ ft}^2$$

$$\text{roof area} = 60 \times 60 = 3600 \text{ ft}^2 = 51.4\%$$

$$\text{landscaped area} = 3400 \text{ ft}^2 = 48.6\%$$

$$C = (.95)(.514) + (.25)(48.6) = 0.66$$

there are 12 lots draining to the north boundary

$$\text{total area} = 7000 \times 12 = 84,000 \text{ ft}^2 = 1.9 \text{ acres}$$



PROJECT NAME KACHINA HILLS UNIT 2 & 3 SHEET 10 OF
PROJECT NO. 77-012 ; 77-144 BY LH DATE 7-12-77
SUBJECT LANDSCAPE EROSION CHD MTI DATE 7-13-77

$$L \approx 1000' \quad \ell = 0.77 \quad S \approx 5\%$$

$$T_c = \log^{-1} [0.364 \ell (0.77) + 0.3854 (\log 1000) - 0.197 (\log S) - 0.361] = 8.7 \text{ min} \rightarrow \text{use } 10 \text{ min}$$

$$I = \frac{189}{25+10} = 5.4 \text{ inches/hour}$$

$$Q = CIA$$

$$C = 0.66, I = 5.4, A = 1.9$$

$$Q = (0.66)(5.4)(1.9)$$

$$Q = 6.8 \text{ cfs}$$

III FLOW THROUGH PARCEL TO DRAINAGE EASEMENT FROM LOTS BORDERING THE NORTH

Analysis of 1 lot:

$$\text{total area} = 43 \times 70 = 3010 \text{ ft}^2$$

$$\text{paved area} = 1500 \text{ ft}^2 = 51\%$$

$$\text{landscaped area} = 1510 \text{ ft}^2 = 49\%$$

$$C = (0.95)(.51) + (0.35)(.49) = 0.69$$

there are 12 lots

$$\text{total area} = 3150 \times 12 = 37800 \text{ ft}^2 = 0.87 \text{ acres}$$

$$T_c = 8.7 \rightarrow \text{use } 10 \text{ minutes}$$

$$I = 5.4 \text{ inches/hour}$$

$$Q = CIA$$

$$C = 0.69, I = 5.4, A = 0.87$$

$$Q = (0.69)(5.4)(0.87)$$

$$Q = 3.2 \text{ cfs}$$

FROM INTERIOR LOTS -

$$20 \text{ lots paved} = 42.5\%$$

$$26 \text{ lots draining} = 56.5\%$$

$$C = 0.21$$

$$C = 0.67$$

$$C = (0.21)(.435) + (0.67)(.565)$$

$$C = 0.47$$



PROJECT NAME KACHINA HILLS UNIT 2 & 3

PROJECT NO. 77-012 ; 77-144

SUBJECT DRAINAGE REPORT

SHEET 7

OF

BY L.H.

DATE 1-12-77

CHKD MJI

DATE 7-18-77

$$L = 2000 \text{ ft} \quad B = .77 \quad S = 7\%$$

$$T_c = \log^{-1} [L \cdot 3641 (.77) + .2854 (\log 2000) - .197 (\log 7) - .3612]$$

$$T_c = 10.6 \text{ minutes}$$

$$I = \frac{189}{2.5 \cdot 10.6} = 5.3 \text{ inches/hour}$$

$$Q = CIA$$

$$C = 0.47, I = 5.3, A = 16 \text{ acres}$$

$$Q = (0.47)(5.3)(16)$$

$$Q = 39.9 \text{ cfs}$$

$$\text{total flow from interior} = 39.9 + 3.2 = 43.1 \text{ cfs}$$

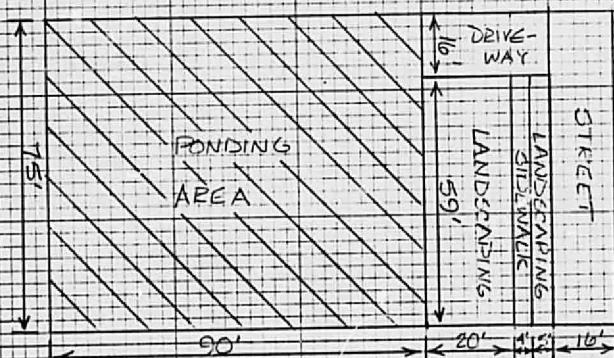
TOTAL DEVELOPED RUNOFF FOR KASHINA II:

$$6.8 + 20 + 43.1 = 51.9 \text{ cfs}$$

② KASHINA HILLS UNIT 3

RUNOFF COEFFICIENT

TYPICAL LOT



PROJECT NAME KASHINA HILLS UNITS 2 & 3

PROJECT NO. 77-012 ; 77-144

SUBJECT DRAINAGE REPORT

SHEET 3

BY LH

CH'D MJJ

OF

DATE 2-12-77

DATE 7-18-77

$$\text{Total area} = 75' \times 135' = 10,125 \text{ ft}^2$$

$$\text{pavement area} = 75' \times 16' = 1200$$

$$59' \times 4' = 236$$

$$16' \times 29' = 464$$

$$\text{Total} = 1900 = 18.8\%$$

$$\text{landscaping area} = 25' \times 59' = 1475 = 14.6\%$$

$$\text{ponding area} = 90' \times 75' = 6750 \text{ ft}^2 = 66.6\%$$

Runoff factor:

for pavement $C = 0.95$

for landscaping $C = 0.25$

for ponding $C = 0$

$$C = (0.95)(.188) + (0.25)(.146) + (0)(.666)$$

$$C = 0.23$$

$$L = 280 \text{ ft } S = 6\% \quad R = .77$$

$$T_c = \log + [.3641(.77) + .3854(\log 280) - .197(\log 6) - .2612]$$

$$T_c = 5.75 \text{ minutes} \rightarrow \text{use } 10 \text{ minutes}$$

$$I = \frac{129}{25+10} = 5.4 \text{ inches/hour}$$

$$Q = CIA$$

$$C = 0.23, I = 5.4, A = 3.5 \text{ acres}$$

$$Q = (0.23)(5.4)(3.5)$$

$$Q = 4.35 \text{ cfs}$$



PROJECT NAME KACHINA HILLS UNITS 2 & 3 SHEET 9 OF
 PROJECT NO. 77-012 ; 77-144 BY LN DATE 7-12-77
 SUBJECT DRAINAGE REPORT CHD WJI DATE 7-18-77

MAXIMUM FLOW EXPECTED FOR MONTE LARGO DRIVE

$$G + K + D + H + KACHINA HILLS III (UNDER) + \\ \text{ULTIMA II (UNDER)} = 22.9 + 9.8 + 14.9 + 1.9 + 6.6 + 1.4 \\ = 72.5$$

ADD FLOW FROM LOTS FRONTING ONTO
MONTE LARGO DRIVE = 2 CFS

TOTAL 72.5 CFS

MONTE LARGO DRIVE

STREET LIGHTS

4.4 ft

MIN. SLOPE

.005 ft/ft

CROWN W/F

6 INCHES

ANTICIPATED FLOW

72.5 CFS

FLOW DEPTH

.67 ft

VELOCITY

3.93 ft/sec



PROJECT NAME KACHINA II & III

PROJECT NO. 77-012 E77-144

SUBJECT DRAINAGE REPORT

SHEET 10

OF

BY MJI

DATE

7-18-77

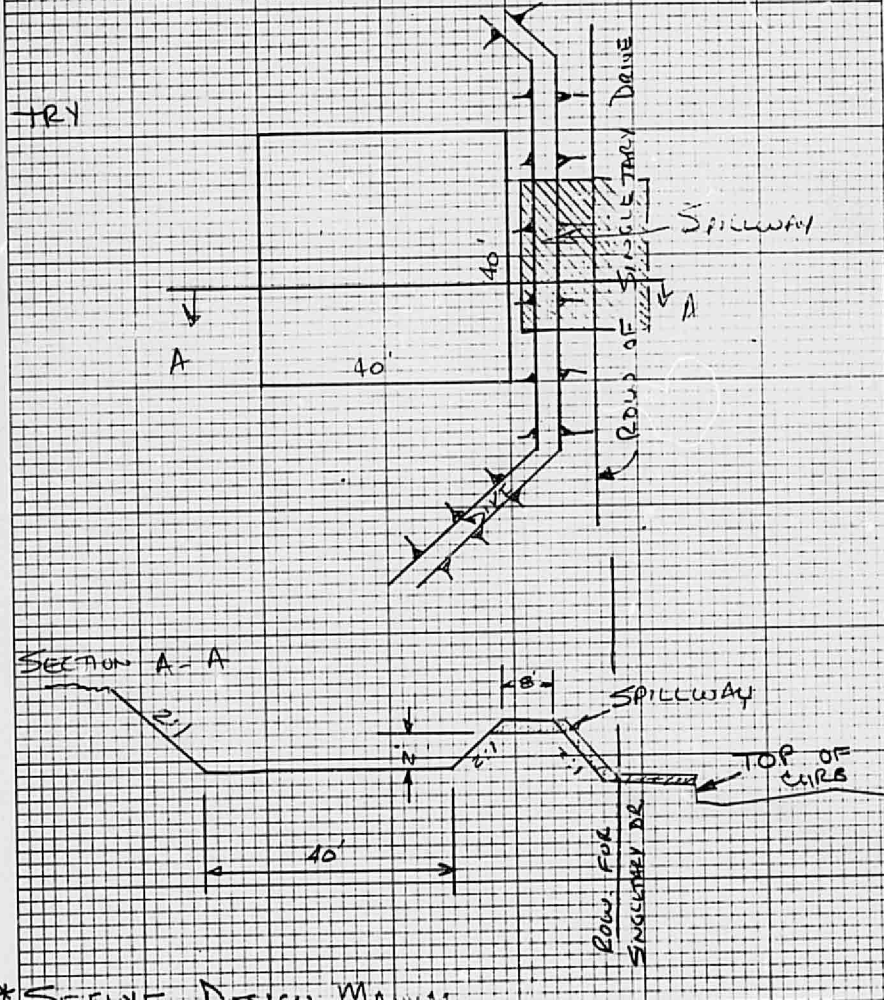
CH'D

DATE

SIZING OF DESILTING BASIN

Q = 35 CFS SETTLING VELOCITY = 4 IN / MIN *
(SILT)

VELOCITY ACROSS BASIN MAX = 1 FPS



* SEE ELYE DESIGN MANUAL



PROJECT NAME KACHINA II & III
PROJECT NO. 77-012 E77-014
SUBJECT DRAINAGE REPORT

SHEET 11 OF
BY MJT DATE 7-18-77
CHK'D DATE

CHECK BASIN FOR ADEQUATE VELOCITY + TIME

DEPTH = 2.67' WIDTH = 40' LENGTH = 40'

AREA ACROSS FLOW = $40 (2.67) = 106.67 \text{ ft}^2/\text{ft}$

Q = 35 cfs

VELOCITY = $\frac{35}{106.67} = .33 \text{ ft/sec}$ (ACTUAL) < 1 ft/sec (MAXIMUM) OK

TIME TO CROSS BASIN = $\frac{40'}{.33 \text{ ft/sec}} = 121.9 \text{ sec}$

SETTLING VELOCITY OF PARTICLE = 4" / min

TIME TO SETTLE 8" (DISCHARGE HEIGHT)

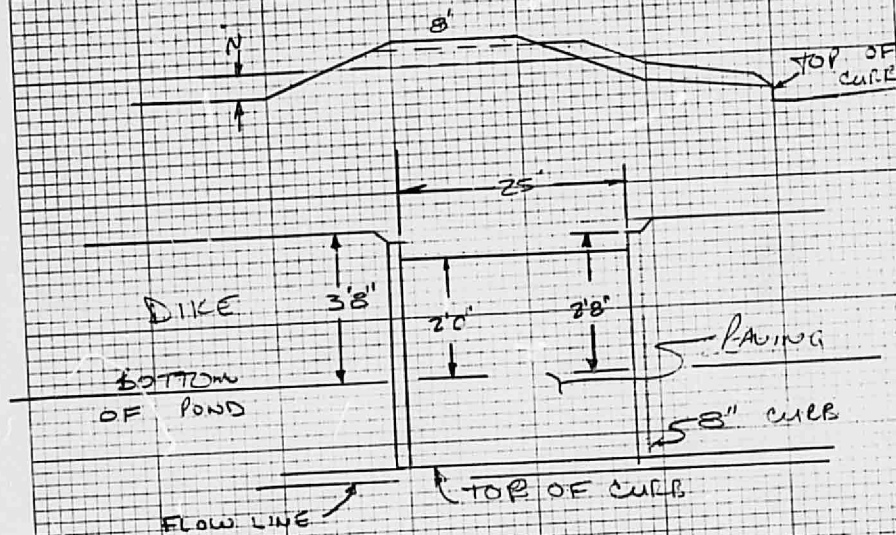
$\frac{2 \text{ min}}{(\text{ALLOWABLE})} \cdot \frac{\text{AVAILABLE TIME} = 2.03 \text{ min}}{\text{ACTUAL}} \text{ OK}$



PROJECT NAME WATER TREATMENT PLANT II & III
PROJECT NO. 77-012 & 77-144
SUBJECT DESIGN REPORT

SHEET 12 OF 12
BY MJI DATE 7-18-77
CH'D _____ DATE _____

DESIGN OF SPILLWAY



CHECK CAPACITY OF SPILLWAY

$$Q = CLH^{3/2} \quad \text{BROAD CRESTED WEIR FORMULA}$$

WHERE Q = DISCHARGE IN CFS

C = WEIR COEFFICIENT

L = LENGTH OF WEIR

H = HEAD

$$Q = 2.63 (25) (1.67)^{3/2} = 35.8 \text{ CFS } \underline{ok}$$



PROJECT NAME KARLINA II & III SHEET 13 OF
PROJECT NO. 77-012 E-77-144 BY MJI DATE 7-19-77
SUBJECT DRAINAGE REPORT CH'D DATE

HYDROGRAPH FOR DEFILTING POND

INFLOW:

PEAK RUNOFF FROM AREAS D, G & PART OF K

$$\text{Area} = 28.8 \text{ ACRES}$$

$$S \approx 7\% \quad B = 1.8 \quad L \approx 3000'$$

$$T_e = 100^{-1} [2641(1.8) + 3854(\log 3000) - 197(\log 7)]$$

$$T_e = 29.4 \text{ minutes}$$

$$I = \frac{189}{29.4 + 25} = 3.2 \text{ in/hr}$$

$$Q = CIA$$

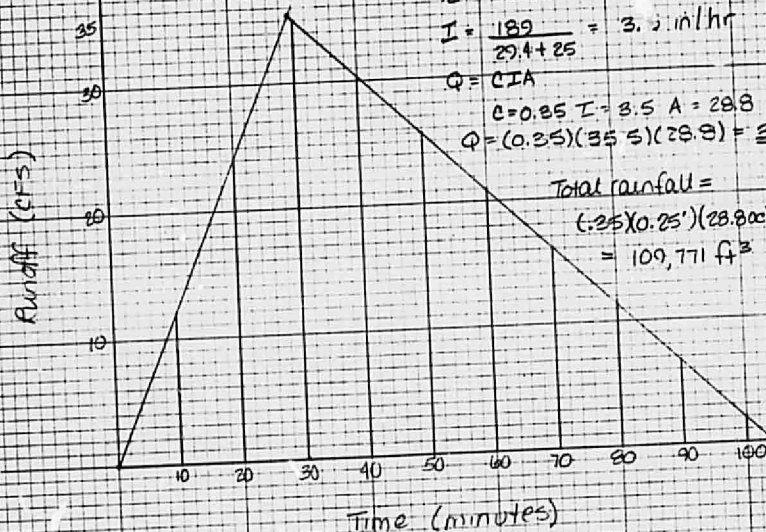
$$C = 0.25 \quad I = 3.2 \quad A = 28.8$$

$$Q = (0.25)(3.2)(28.8) = 23.04 \text{ cfs}$$

Total rainfall =

$$(0.25 \times 0.25)(28.8 \text{ ac})(43560 \text{ ft}^2/\text{ac})$$

$$= 109,771 \text{ ft}^3$$



time (min)	inflow (cfs)	volume of rainfall when Time = 29.4 (ft ³)
0	0	$(\frac{1}{2})(29.4 \text{ min})(60 \text{ sec/min})(3.2 \text{ cfs})$
10	11.8	$= 31,125 \text{ cf}$
20	24.0	volume left = $109771 - 31125$
30	35.0	$= 78646 \text{ cf}$
40	30.3	$78646 \text{ cf} = (\frac{1}{2})(35.3 \text{ cfs})(t)$
50	25.7	$t = 4455.3 \text{ sec} = 74.3 \text{ min}$
60	21.0	total time = $29.4 \text{ min} + 74.3 \text{ min}$
70	16.2	$= 104 \text{ min}$
80	11.4	
90	6.8	
100	2.0	



PROJECT NAME KARHINA HILLS UNITS 2 & 3 SHEET 14 OF

PROJECT NO. 77-144 BY LH DATE 7-17-77

SUBJECT DRAINAGE REPORT CHD DATE

PL 1

22/08/82. 12.59.55.
AT GRNH DANFLOU

DESILTING POND KACHINA HILLS UNIT 3
AUGUST 1977
100 YEAR STORM
WHAT IS THE INVERT OF THE OUTFLOW CONDUIT

- ? 10. IS THERE A WEIR
? 10. WHAT IS THE WIDTH OF THE WEIR
? 5.0 WHAT IS THE WEIR COEFFICIENT
? 2.63 WHAT IS THE ELEV OF THE WEIR CREST
? 1.0 WHAT IS THE MAXIMUM ALLOWABLE WATER SURFACE ELEV
? 10. WHAT IS THE INITIAL WATER SURFACE ELEVATION
? 1.0 WHAT IS THE DELTA TIME FOR THE ITERATIONS
? .01 IS A COMPLETE PRINTOUT WANTED
? 10.0 WHAT IS THE TIME SPACING WANTED ON THE PRINTOUT
? 3.

ELAPSED TIME	INFLOW HYDRO	CONDUIT FLOW	WEIR FLOW	SURFACE ELEV.	POOL VOLUME
5.0	3.9	0.	0.	.5	.0
10.0	11.3	0.	0.	1.7	.1
15.0	17.3	0.	17.0	2.4	.1
20.0	24.0	0.	23.0	2.5	.1
25.0	29.0	0.	29.5	2.5	.1
30.1	35.0	0.	35.0	2.5	.1
35.1	32.6	0.	32.6	2.5	.1
40.1	30.3	0.	30.3	2.5	.1
45.1	28.0	0.	28.0	2.5	.1
50.1	25.7	0.	25.7	2.5	.1
55.1	23.3	0.	23.3	2.5	.1
60.1	20.9	0.	21.2	2.5	.1
65.1	18.5	0.	18.9	2.4	.1
70.1	16.1	0.	16.5	2.4	.1
75.1	13.7	0.	14.1	2.4	.1
80.2	11.3	0.	11.7	2.3	.1
85.2	9.0	0.	9.4	2.3	.1
90.2	6.7	0.	7.1	2.2	.1
95.2	4.3	0.	4.8	2.2	.1
100.2	0.	0.	2.2	2.1	.1
105.2	0.	0.	.2	2.0	.1
110.2	0.	0.	.1	2.0	.1
115.2	0.	0.	.0	2.0	.1
120.2	0.	0.	.0	2.0	.1
125.2	0.	0.	.0	2.0	.1
130.3	0.	0.	.0	2.0	.1
135.3	0.	0.	.0	2.0	.1
140.3	0.	0.	.0	2.0	.1
145.3	0.	0.	.0	2.0	.1
150.3	0.	0.	.0	2.0	.1
155.3	0.	0.	.0	2.0	.1
160.3	0.	0.	.0	2.0	.1
165.3	0.	0.	"INTERRUPTED"		

CAPACITY OF MONTE LARGO DRIVE

$S = .005$ WIDTH = 44' CROWN = .5' $M = .015$

$Q = 72.6$ CFS *

$Q_{ACTUAL} = 72.5$ CFS ✓ IN MONTE LARGO

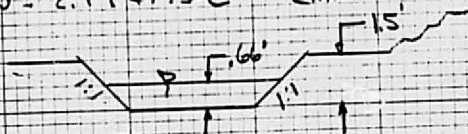
DESIGN SWALE FOR BACK LOT LINE (NORTH SIDE OF TRACT)

$S = .020$ MIN $B = 5'$ SIDE SLOPE = 1:1

$Q = 6.8$ CFS $d = .66'$ * $M = .035$

VELO. 1.81 ft/sec

@ $S = .08$ $V = 2.79$ ft/sec (MAXIMUM SLOPE)



* COMPUTER PROGRAM



PROJECT NAME KACHINA II & III

PROJECT NO. 77-012 E 77-192

SUBJECT DRAINAGE REPORT

SHEET 15 OF

BY MJI

CH'D

DATE 8-3-77

DATE

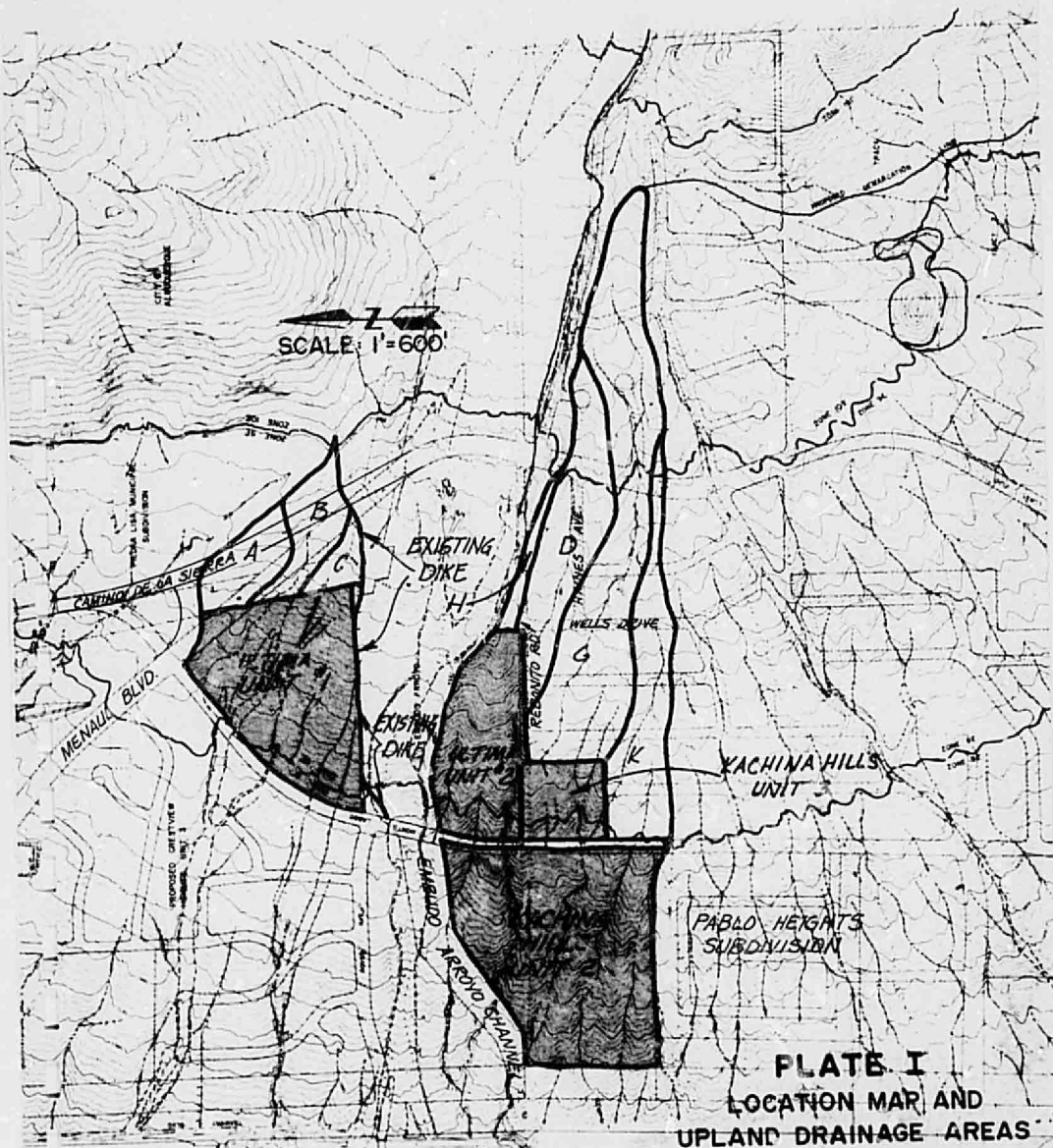


PLATE I
LOCATION MAP AND
UPLAND DRAINAGE AREAS
 E77-144, E77-012, E76-111