HYDROLOGY F21/D18 THREE PLANS

E21/D18

3 PLANS

TELEPHONE 881-3556

MORTGAGE INVESTMENT COMPANY
OF EL PASO, TEXAS

APPROVED FEDERAL HOUSING ADMINISTRATION MORTGAGEE

CAPITAL $1,250,000.00

2727 SAN PEDRO N.E., SUITE 117
P.O. BOX 3189, STATION D, 87190

ALBUQUERQUE, NEW MEXICO

March 19, 1979

RECEIVED
MAR 23 1979
CITY ENGINEERS

E 21-D18

Mr. Bruno Conegliano
City Engineering Department
400 Marquette Avenue NW
Albuquerque, New Mexico 87102

Dear Mr. Conegliano:

Re: VA Case LH 85030 NM
FHA Case 361-097128-203
Our Loan No. 624 B00 3548
Lot 8, Block 9,
Academy Place Unit 5
Albuquerque, New Mexico

Referring to our telephone conversation of March 16, 1979, it is my understanding that there is a revised flood map, which has not as yet been published.

The original Certificate of Reasonable Value on the captioned property was issued on February 28, 1977, on the captioned property, and the FHA conditional commitment was issued on April 6, 1978. According to the original flood map dated August 20, 1976, and revised February 14, 1978, the captioned property was in the flood zone, and both the FHA and VA required flood insurance on their respective commitment and CRV.

Therefore, when the residential loan closed on this property, flood insurance was required from the purchaser in accordance with FHA and VA rules and regulations.

The owner of this property has advised us that flood insurance is no longer required on the property. We will appreciate your advice in this matter.

We would also appreciate your advising us if, when the revised flood map is published, it would be possible for us to obtain copies of same.

Thank you for your assistance in these matters.

Very truly yours,

B. Floyd
Assistant Secretary

bf

cc: Veterans Administration, Federal Building, Albuquerque, New Mexico 87102
cc: Federal Housing Administration, 625 Truman NE, Albuquerque, N. M., 87110
cc: Ms. Bernice M. Isabelle, 10609 Hagen Road NE, Albuquerque 87111
cc: W. D. Royer, MICO, El Paso Office

ESTABLISHED 1920

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

February 29, 1980

Corrine Depatie
Associate Broker
Hooten/Stahl, Inc.
3733 Eubank N.E.
Albuquerque, New Mexico 87111

E21-D18

RE: Lot 30, Blk. 12, Unit 5A, Academy Place

Dear Ms. Depatie,

Please be advised that the above referenced property is not in the Flood Hazard Area as shown on latest map, dated December, 1979.

Very truly yours,

Bruno Conegliano
Asst. City Engineer-Hydrology

BC/tsl

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

April 21, 1980

E21-D18

Ms. Ginger Gallegos
c/o Albert Gallegos Realty
1023 6th St., N.W.
Albuquerque, New Mexico 87102

Reference: Property at 6008 Carruthers N.E.

Dear Ms. Gallegos:

The Flood Insurance Maps published December 4, 1979 do not incorporate any consideration of the ditch and dike provisions that were made at the time of development of Academy Place, Unit 5. It is therefore, my opinion that the referenced property is not subject to flooding and that the Flood Hazard Boundary Maps in our possession are, in this case, incorrect.

If I can be of any further assistance, please don't hesitate to call me.

Very truly yours,

Bruno Conegliano
Assistant City Engineer/Hydrology

BC/lc

MUNICIPAL DEVELOPMENT DEPARTMENT

Richard S. Heller, P.E., City Engineer ENGINEERING DIVISION Telephone (505) 766-7467

FLOOD HAZARD INQUIRIES

ADDRESS 6008 CARRUTHERS NE

SUBDIVISION ACADEMY PLACE UNIT 5

BLOCK NO. 14

LOT NO. 23

ZONE ATLAS PAGE E-21

F.H.B.M. PAGE 3

DATE RECEIVED 4-17-80

Allan Ralph

NAME GINGER GALLEGOS

ADDRESS 1023 6th N.W. 87102

TELEPHONE NO. 243-5528

IS IN A FLOOD HAZARD AREA _____

IS NOT IN A FLOOD HAZARD AREA _____

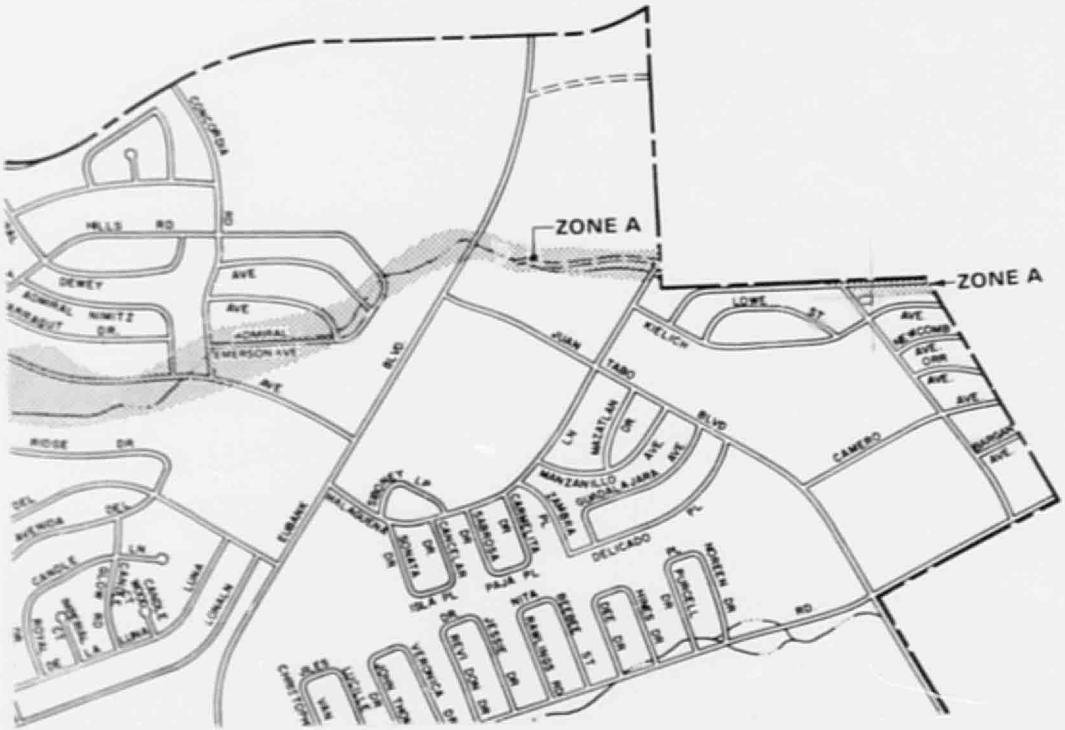
NOTIFIED BY:

LETTER _____

TELEPHONE _____

DATE NOTIFIED _____

COMMENTS _____


ZONE A
ZONE A
HILLS RD
DEWEY
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ADMIRAL
EMERSON AVE
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RIDGE DR
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CANDLE
LUNA
LOMAS
FIRBANK
BLVD
JUAN TABO
KIELICH
LOWE ST
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NEWCOMB
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DRIVE
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CAMERO
MANZANILLO
GUADALAJARA
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DELICADO
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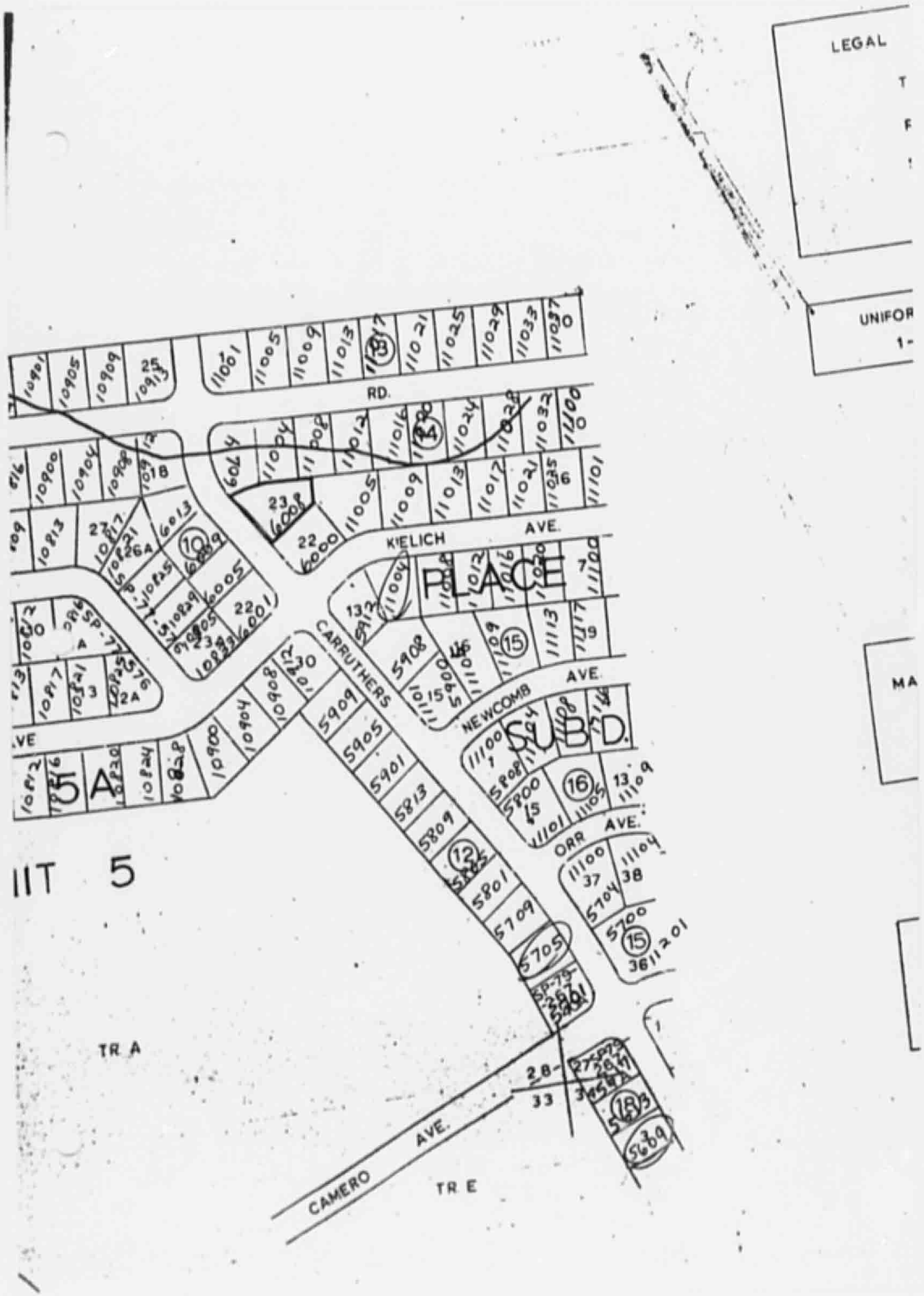
E-21-Z


LEGAL
UNIFOR
RD.
KIELICH
AVE.
PLACE
CARRUTHERS
NEWCOMB
AVE.
SUB D.
ORR
AVE.
5A
IIT 5
TR A
CAMERO
AVE.
TR E

E21-D18

Bob —

A

DRAINAGE STUDY

FOR

ACADEMY PLACE SUBDIVISION

UNIT NO. 5

APPROVED FOR DRAINAGE

22 Aug 74
DATE

G Kelleh ACE
SIGNATURE TITLE

CONTINGENCIES _____

PREPARED BY:

CHAMBERS, CAMPBELL, ISAACSON & CHAPLIN, INC.
3500 INDIAN SCHOOL ROAD, N.E.
ALBUQUERQUE, NEW MEXICO 87106

A

DRAINAGE STUDY

FOR

ACADEMY PLACE SUBDIVISION

UNIT NO. 5

PREPARED BY:

CHAMBERS, CAMPBELL, ISAACSON & CHAPLIN, INC.
3500 INDIAN SCHOOL ROAD, N.E.
ALBUQUERQUE, NEW MEXICO 87106

JULY 16, 1974

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FIGURE I	LOCATION & DRAINAGE MAP
FIGURE II	LOCATION & DRAINAGE MAP Scale 1" = 2000'
FIGURE III	LOCATION & DRAINAGE MAP Plat E-21 & F-21
FIGURE IV	TOPO MAP AND DRAINAGE IN UNDEVELOPED STATE
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FIGURE VI	TYPICAL LOT DRAINAGE PLAT
FIGURE VII	TIME OF CONCENTRATION OF SWALE BASINS
FIGURE VIII	INTENSITY - DURATION FREQUENCY CURVE

BIBLIOGRAPHY OF REFERENCES

PURPOSE

The purpose of this report is threefold - to determine the drainage characteristics of the subject property in its undeveloped conditions, analyze the internal flows in its developed state with recommendations for compliance to the Albuquerque Metropolitan Arroyo Flood Control Authority's (A.M.A.F.C.A.) requirements, and make recommendations for positive drainage control to safeguard the subdivision and expedite drainage flows across the site proper.

INTRODUCTION

Academy Place No. 5, an R-1 development, and Tracts "B", "C", and "D", are located in the Northeast Heights of Albuquerque north of Spain Road, N.E. and east of Juan Tabo Blvd., N.E. (see Figures I, II, and III).

The overall site is characterized by rolling terrain covered with a light growth of weeds and cacti. There is an approximate 110 foot drop in elevation across the site with an average slope of 5% sloping downward to the southwest. The property is surrounded on all sides by undeveloped land. The Bear Arroyo Tributary lies along the north boundary and another arroyo borders on the south boundary, which flows directly into the Bear Canyon Arroyo. The site is thus divided by the natural boundary between these arroyos and the resulting runoff feeds both drainage tributaries.

Precipitation falling on this site appears to form sheet flow with general accumulation in the valleys of the slopes before it is

discharged into the bordering arroyos. Although the surface soils on this site are predominantly of loose silty sands, there is little evidence of erosion in the valleys of these slopes. Offsite drainage intercepting the east property line will have a minimal effect on the site because of the characteristics of both the soil and of the natural topography, i.e. high permeability and upstream interception of most of the flows. Once development occurs to the east of Academy Place #5, the street systems will divert flows away from the east boundary of this site.

In the following pages, design data will be presented to verify the conclusion that runoff flows after development will not exceed runoff conditions before development. Furthermore, conclusions will be reached as regards the offsite drainage intercepting the site. Finally, general recommendations for future development of Tracts "B", "C", and "D" will be given to help the developer master-plan the grading of the entire project.

DESIGN CRITERIA

In analyzing the storm runoff, the Rational Formula, Q = CIA, was used. Where:

Q = Runoff quantity in cubic feet/second

A = Contributing area in acres

I = Intensity in inches/hour for a duration equal to the time of accumulation (duration) measured in minutes and obtained from Chart 1, Appendix A, the "Master Plan of Drainage, City of Albuquerque, New Mexico" by Herkenhoff & Associ-

ates. (Note: where a Time of Concentration [Tc] is less than ten minutes from Figure V, the Intensity value equal to ten minutes was used as shown on the curve for a 100 year storm in Figure VII.

C = Runoff Coefficient (No Unit)

Quantities of runoff were computed on a 100 year storm frequency for both the undeveloped condition and the proposed final developed form.

PHASE I

Phase I consists of first analyzing the subdivision site, and Tracts "B", "C", and "D", considering internal flows originating within their respective boundaries. The subdivision site was analyzed in two drainage patterns, A-1 and A-2 (see Figure V), while the three tracts were analyzed as individual units. Next, offsite flow affecting the different areas was considered.

Overall drainage around and through the entire project site has the characteristics of sheet flow with general accumulation in the valleys of the slopes. This runoff discharges immediately into one or the other of the arroyos bordering on the north and south of the site, depending upon the topography.

The runoff coefficient used for undeveloped areas was 0.45.[1]

---

[1]Table XII, Master Plan of Drainage, City of Albuquerque, New Mexico and Environs, 1963, G. Herkenhoff & Associates.

The following table shows runoff in the undeveloped state:

TABULATION OF RESULTS - PHASE I

Drainage Basin	Elev. Diff. Feet	Length of Flow Feet	Tc* Min.	I "/Hr.	R No. Unit	Area Acres	Q CFS
A-1	72	1900	9.0	5.4	0.45	50.38	122.42
A-2	30	825	5.0	5.4	0.45	15.00	36.45
Tract B							
B-1	32	700	3.9	5.4	0.45	3.36	8.16
B-2	16	575	4.1	5.4	0.45	4.76	11.54
Tract C	22	700	4.5	5.4	0.45	5.00	12.15
Tract D	5	120	1.0	5.4	0.45	0.92	2.23
Offsite 1	50	1450	7.8	5.4	0.45	9.3	22.6
Offsite 2	65	1600	7.8	5.4	0.45	13.9	33.8
Offsite 3	40	1100	6.3	5.4	0.45	19.7	47.9

Use 10

*From Figure VII.

PHASE II

Phase II consists of analyzing the site in its developed form. Only internal flows were considered in this phase. The resulting runoff flows and area contributing to this runoff are shown for each area on Figure VI.

As with any area of land, when development occurs, runoff increases due to the increased area of impervious surfaces. To reduce the demand on the downstream facilities, one alternative of A.M.A.F.C.A. requires that the runoff rate from the developed tract does not exceed the runoff rate from the tract in its natural state. One way to achieve this is by utilizing on-site ponding.

Three different approaches were used in analyzing the runoff from the individed lots - 1) where the lot depth is perpendicular to the contours, sloping downward to the rear, the entire lot is drained and ponded at the rear; 2) where the lot depth is perpendicular to the contours, sloping downward to the front, the entire lot is drained out onto the street; 3) where the lot depth is parallel to the contours, the ponding area used includes the back yard and side yards, starting at the middle of the house and sloping to the rear. The front yard flows to the street. Because the majority of houses built today utilize pitch roof design, the assumption was made that one-half the roof area flows to the rear yard while the other half flows to the front.

These different approaches were used to help the developed site blend into the existing topography and thus minimize the use of retaining walls and abrupt elevation changes between lots.

A composite runoff coefficient was developed for the two situations where runoff occurs from the lot based upon the percentage of different types of surfaces in the drainage area. The composite runoff coefficient was then weighed for each sub-drainage area based upon the number of lots totally drained or partially drained. The runoff coefficients used are as follows:[1]

---

[1]Table 3-2, Urban Storm Drainage Criteria Manual, Volume I, Denver Regional Council of Governments.

Streets, Walks and Drives	R = 0.90
Roofs	R = 0.90
Lawns, Sandy Soils Avg., 2 to 7% slope	R = 0.15

Because the above values are only applicable for storms of five to ten year frequencies, the Rational Formula can be adjusted by a frequency factor C_f, which is used to account for antecedent precipitation conditions. A C_f factor of 1.25 for a 100 recurrence interval was used and this adjustment was reflected in the composite runoff coefficient.[1] (See Calculation Sheet.)

SUMMARIZATION OF RESULTS - PHASE II

Drainage Basin	Elev. Diff. Feet	Length of Flow Feet	Tc Min.	I "/Hr.	R No. Unit	Area Acres	Q CFS
A (III)	17	550	3.9	5.4	0.76	3.19	4.88
B (I)	2	375	5.6	5.4	0.58	1.60	5.01
C (I)	42	1400	7.8	5.4	0.76	3.83	15.72
D (I)	33	1200	7.4	5.4	0.74	3.74	14.95
E (I)	49	1800	9.9	5.4	0.78	3.38	14.24
F (II)	39	1100	6.2	5.4	0.73	3.72	14.66
G (II)	37	1000	5.8	5.4	0.75	2.69	10.89
H (II)	33	800	4.6	5.4	0.73	2.34	9.22
I (II)	32	800	4.6	5.4	0.73	2.46	9.70
J (II)	25	700	4.5	5.4	0.71	2.48	9.51
K (II)	23	600	3.9	5.4	0.71	2.16	8.78
L (II)	10	2000	21	4.1	0.65	4.48	11.02
M (III)	2	80	1 (10)	5.4	0.90	0.09	0.44
Sub-Section I	51	2150	11.5	5.2	0.74	12.55	48.30
Sub-Section II	29	2450	17.5	4.5	0.72	20.33	65.9
Sub-Section III	17	550	3.9 (10)	5.4	0.76	1.26	5.25
Total Internal Runoff After Development - Sub-Sections I, II, and III =							119.45
Pt. I	51	2150	11.5	5.2	0.74	12.55	48.30
Pt. II	30	2750	20	4.2	.60	34.71	88.5
Pt. III	30	1200	7.7 (10)	5.4	0.49	9.31	24.63

Pt. II includes drainage from Tracts "C and D" and 10CFS from offsite Drainage Area II.
Pt. III includes offsite drainage.

[1]Section 3.7 and Table 3-3 Urban Storm Drainage Criteria Manual, Volume I, Denver Regional Council of Governments.

SUMMARY OF RESULTS FOR THE R-1 AREA

1. Runoff before development

   Area A-1 = 122.42

   Area A-2 = 36.45

   Total = 158.87 cfs

2. Runoff after development from non-ponded areas = 119.45 cfs

Therefore, summing total runoff rates under developed conditions vs undeveloped conditions, the net result is a reduction of the runoff rate by 39.42 c.f.s.

OFFSITE DRAINAGE

The Bear Arroyo Tributary, which lies north of the site, will have the status of a major drainage way. Referring to the report by Rice Engineering,[1] the preferred Alternate No. 3, as set forth by the report, would leave this particular tributary in its natural state bordering Academy Place #5. This would require a 150' drainage way under this alternate. Because a final alternate has not been chosen as of this date, it would only be fair to reserve final channel design and right-of-way criteria until such alternate is chosen. However, no matter what alternate is selected, the site is well protected on the north and positive drainage can be evidenced to this arroyo with little difficulty.

The offsite drainage intercepted by east boundary shall have to be channelized by means of a drainage swale along the east boundary and detained by means of a temporary pond and allowed to pass through the site via the drainage easement and street system (Figure VI). Academy Place No. 5 shall be relieved of the burden of these flows in the future by the proper planning of the land to the east. Such planning shall include the concept of delivering all the internal runoff directly to the north tributary without routing them through the street system of Academy Place No. 5.

---

[1]Phase A Report - Northeast Heights - Drainage Management Plan - by Rice Engineering Company.

TRACTS "B", "C", AND "D"

Tract "B", zoned SU-1, should be developed with regard to the grades of Juan Tabo Blvd.; i.e. flows to the north to the Bear Arroyo Tributary.

Tract "C", zoned SU-1, should be developed so that the allowable runoff departs the site by going north on Corruthers Avenue to the Bear Arroyo Tributary. The same criteria holds true for Tract "D". Master plan grading for these two tracts should not depend upon Spain Road for any drainage relief. The offsite drainage entering Tract "C" should be minimized by intercepting these flows upstream by diversion dikes, such as the existing one 1/2 mile to the east of the site. These diversions will phase out the use of this arroyo as per the Rice Engineering Report recommendations. Any local drainage immediately to the east of Tract "C" can then be handled by Spain Road.

Because a detailed drainage study would be impossible to develop until a development plan is designed, only general recommendations can be made at this time. It goes without saying, that the developed flows should not exceed the undeveloped flows. This can best be accomplished by a combination of on-site ponding, roof storage or retention, or a retention basin design doubling with a common use area such as a parking lot or open area well away from any structures.

In summary, the important considerations in developing these tracts is to master plan them so that the allowable runoff flows to the north by way of the adjoining streets. Before development of

these tracts, detailed drainage studies will have to be submitted to AMAFCA and the city to verify the condition that developed flows shall not exceed the undeveloped flows.

RECOMMENDATIONS

The following recommendations are made to enable the Developer of this site and the Local Government to complete this project within the design framework stated above:

1. The ponding areas in each back yard would be best situated toward the rear of the yard. There should be a minimum of a 5 foot buffer zone between the rear property lines and the edge of the pond in order to protect any fences which might be constructed. In no case should the ponded waters be allowed to stand against the fence.
2. The ponds should average 6 inches deep and the minimum surface area should not be less than 30% of the total area drained into the pond.
3. Positive steps should be taken to stabilize the back yard areas adjacent to the Bear Arroyo Tributary, regardless of which alternative is chosen. There should be a minimum of 4 feet difference in elevation between the lots bordering the channel and the flow line of the channel in this area.
4. The drainage swale along the east side of the subdivision should be placed a minimum of 5 feet away from the property line to safeguard any future fences that might be constructed.

5. The drainage easement for the retention pond on the east side of the subdivisions should be of a temproary status. When development to the east occurs, this easement shall then be vacated and returned to the ownership of the bordering lots. This will prevent an unnecessary eyesore from occurring.

SUMMARY

The R-1 development of Academy Place No. 5, by utilizing the ponding procedures outlined in Phase II, will contribute less internal runoff to the arroyos adjacent to the site than that which existed before development. In addition, the majority of the runoff which does depart the site enters the Bear Arroyo Tributary directly, thus relieving the downstream facilities of congestion.

In conclusion, the development of this site should have a beneficial effect on the drainage characteristics of the area.

Respectfully Submitted

CHAMBERS, CAMPBELL,
ISAACSON & CHAPLIN, INC.

REGISTERED PROFESSIONAL ENGINEER AND LAND SURVEYOR NO. 3895 NEW MEXICO THOMAS O. ISAACSON

Thomas O. Isaacson
R.E. N.M.
L.S. & P.E. #3895

CALCULATIONS FOR RATIONAL FORMULA

1. Sample calculation for Rational Formula Q = CIA

   Section A - where

   H = height above most remote point above outlet

   = 34' (based upon estimated development grades)

   L = distance most remote point

   = 1400'

   Tc= 8.5 min. (use 10 min.) - Figure V

   $I = \frac{189}{T+25}$ for 100 year storm = $\frac{189}{35}$ = 5.4"/Hr. (Figure VI)

   C = 0.74 (from composite calculations) no unit

   A = 2.22 Acres

   Q = CIA

   = (0.74) (5.4) (2.22) = 8.87 cfs

CALCULATIONS FOR COMPOSITE RUNOFF FACTOR

Typical Lot Drainage to Front-Pond in Rear

Typical 70' x 105' Lot Runoff Area Breakdown

R = 0.90

Street and Walk Area	=	(19.5 x 70)	=	1365
Roof Area (1/2 Total)	=	(15 x 60)	=	900
Driveway	=	(30.5 x 15)	=	458
				2723 ft.^{2}

R = 0.15

Front and Side Yard - Minus Drive and 1/2 Roof Area

= (45.5 x 70) - 1358 = 1827 ft.^{2}

Total Area Drained = 4550 ft.^{2}

Area drained under 0.90 classification

$= \frac{2723}{4550}$ = 60% of Area Drained

Area drained under 0.15 classification

$= \frac{1827}{4550}$ = 40% of Area Drained

Composite Runoff Coefficient = (0.60) (0.90) = 0.54

(0.40) (0.15) = 0.06

= 0.60

Adjusted Factor = (0.60 (C_f)

= (0.60 (1.25) = 0.75

Typical Lot Drainage - Entire Lot to Front

Typical 70' x 105' Lot Runoff Area Breakdown

R = 0.90

Street and Walk Area	=	(19.5 x 70)	=	1365
Roof Area (Total)	=	(30 x 50)	=	1500
Driveway	=	(30.5 x 15)	=	458
Typ. Patio	=	(10 x 10)	=	100
			=	3423 ft.^{2}

R = 0.15

Entire Lot - Minus Roof, Driveway and Patio

$= (110.5 \times 70) - 2058 = \underline{\underline{5677 \text{ ft.}^2}}$

Total Area Drained $= \underline{\underline{9100 \text{ ft.}^2}}$

Area Drained Under 0.90 Classification

$= \frac{3423}{9100} = 38\%$ of Area Drained

Area Drained Under 0.15 Classification

$= \frac{5677}{9100} = 62\%$ of Area Drained

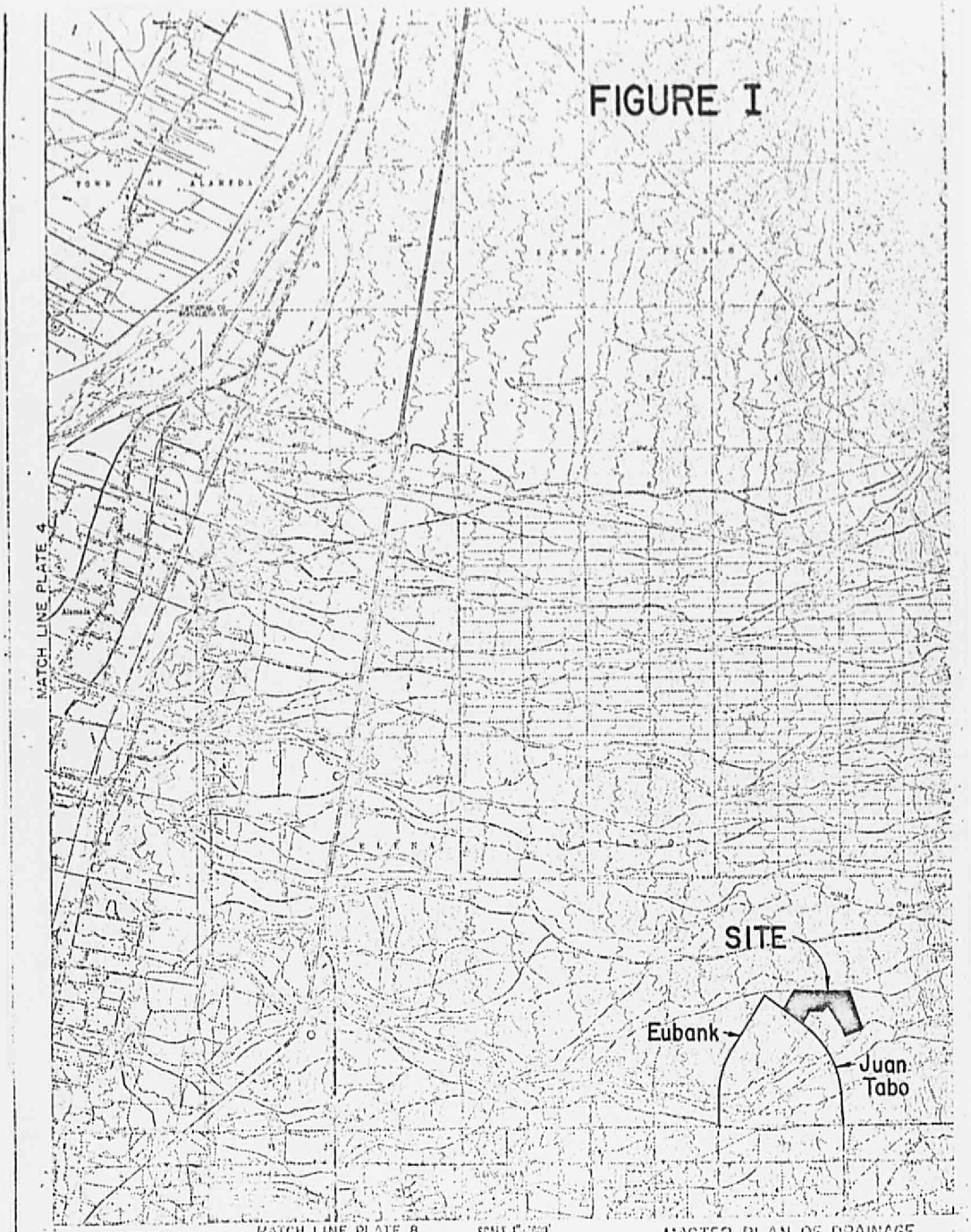
Composite Runoff Coefficient $= (0.38)\ (0.90) = 0.34$

$(0.62)\ (0.15) = \underline{0.09}$

$= 0.43$

Adjusted Factor $= (0.43)\ (C_f)$

$= (0.43)\ (1.25) = \underline{\underline{0.54}}$



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

PLATE 5

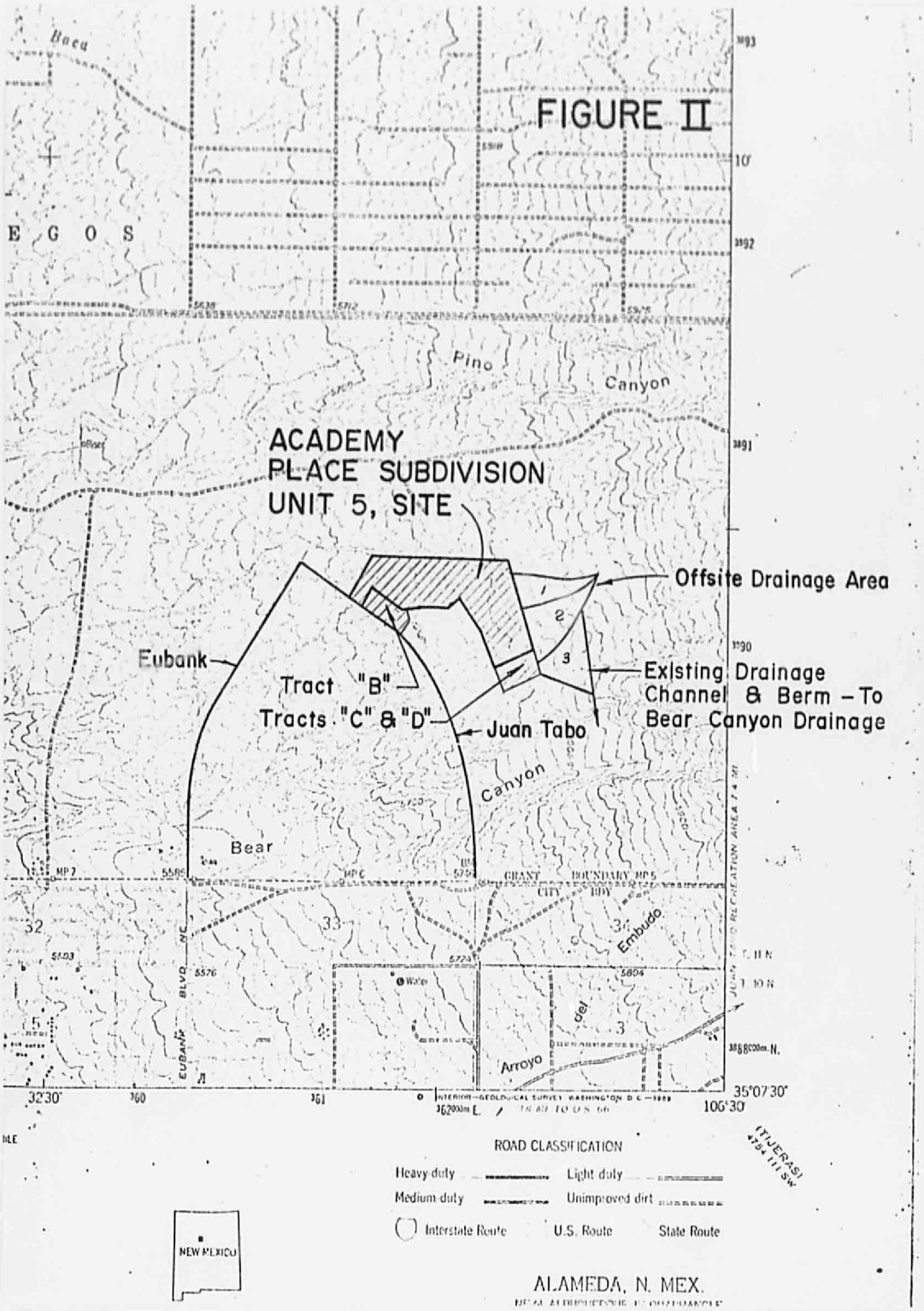


FIGURE II
ACADEMY
PLACE SUBDIVISION
UNIT 5, SITE
Offsite Drainage Area
Existing Drainage
Channel & Berm – To
Bear Canyon Drainage
Eubank
Tract "B"
Tracts "C" & "D"
Juan Tabo
Canyon
Bear
Pino
Canyon
Embudo
Arroyo del
ROAD CLASSIFICATION
Heavy duty
Light duty
Medium duty
Unimproved dirt
Interstate Route
U.S. Route
State Route
NEW MEXICO
ALAMEDA, N. MEX.

FIGURE III

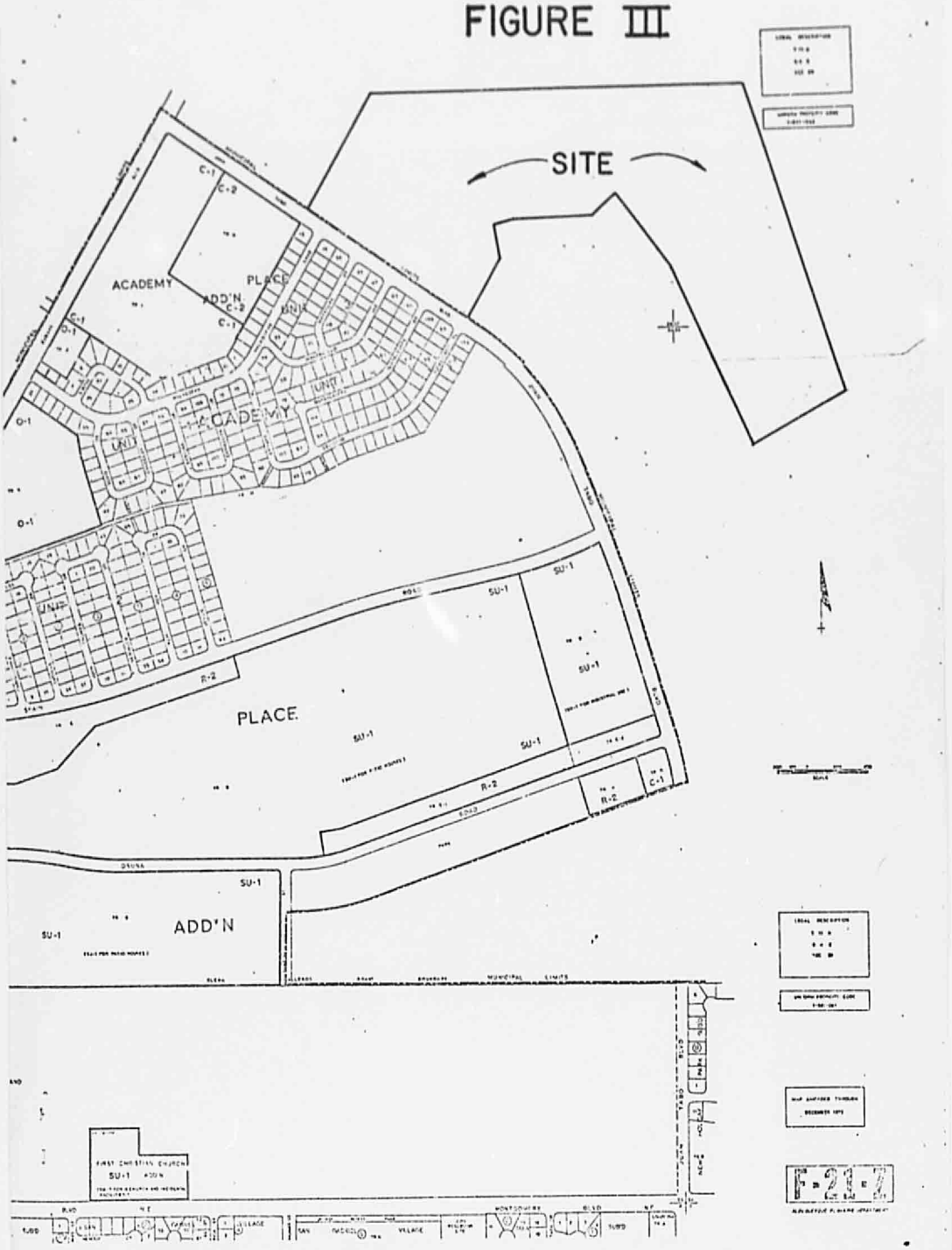
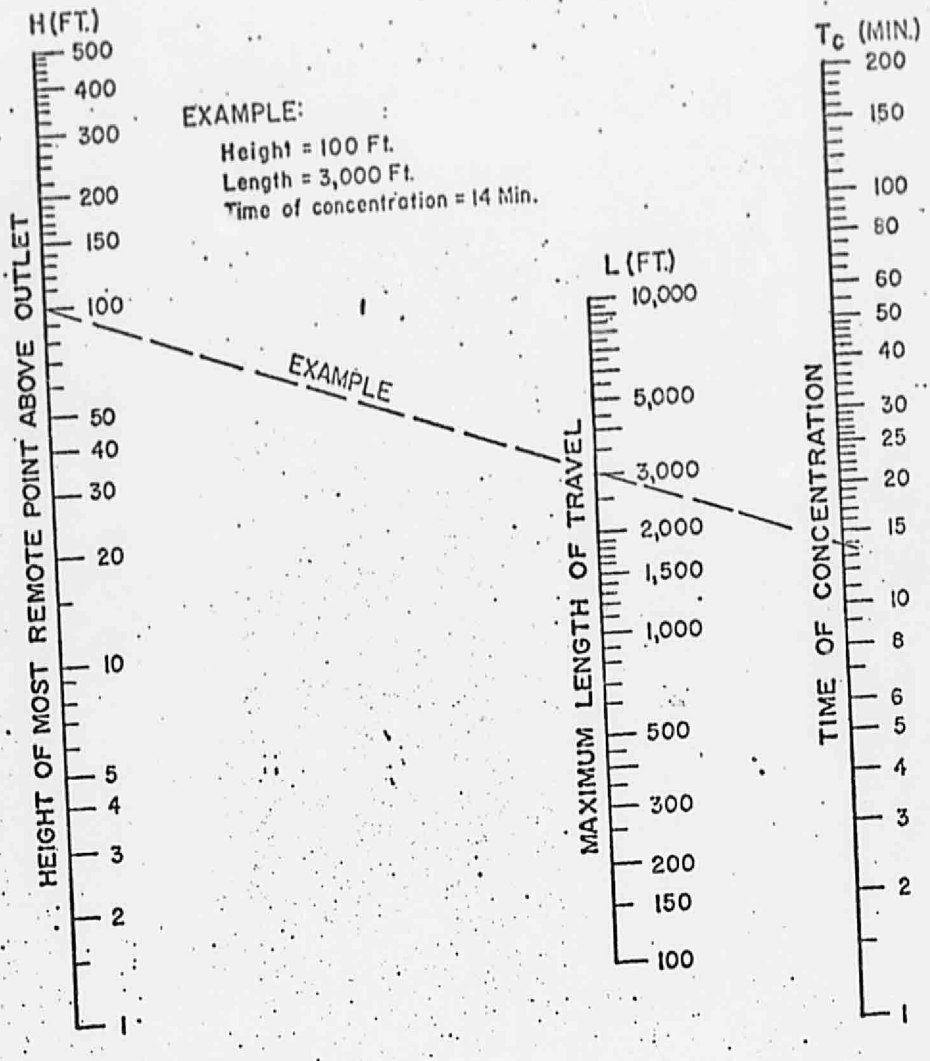

SITE
ACADEMY
PLACE
ADD'N
C-1
C-2
UNIT
O-1
R-2
SU-1
PLACE
ADD'N
FIRST CHRISTIAN CHURCH
F-21-7

FIGURE VII

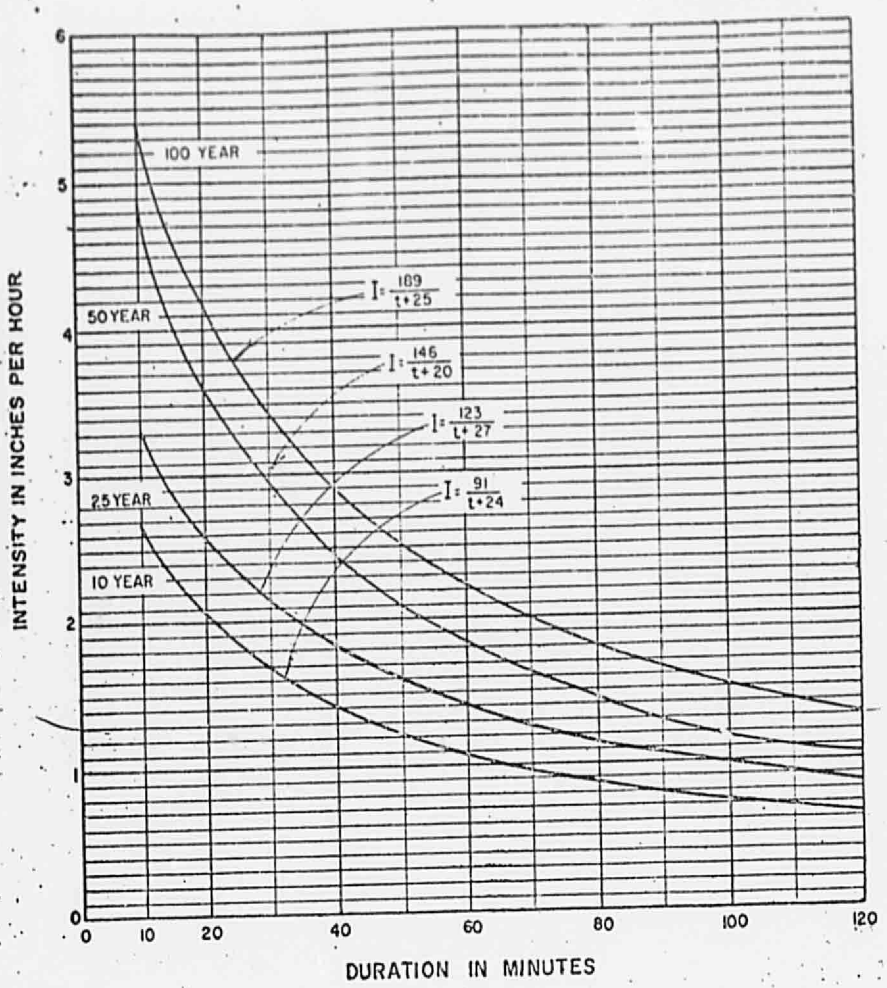


Based on study by P. Z. Kirpich,
Civil Engineering, Vol. 10, No. 6, June 1940, p. 332

FIG. 1 TIME OF CONCENTRATION OF SMALL DRAINAGE BASINS

Reprinted from "Design of Roadside Drainage Channels - Hydraulic Engineering

FIGURE VIII



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

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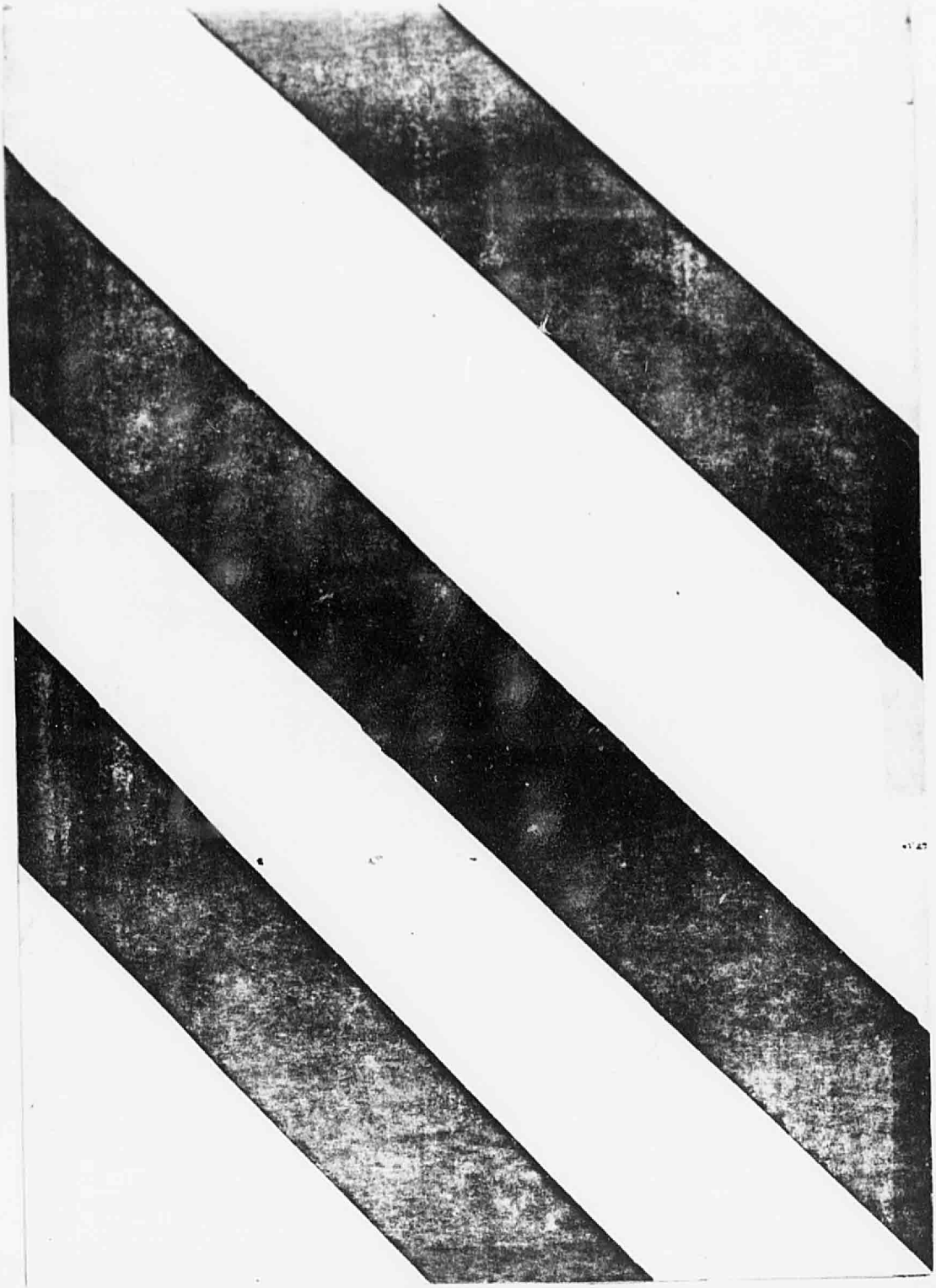
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