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Received 10/29/76

DRAINAGE REPORT

ACADEMY ACRES

UNIT - 13.

ALBUQUERQUE, NEW MEXICO

MURRAY-McCORMICK, INC.
ENVIRONMENTAL DESIGN
ECOSYSTEMS ANALYSIS • PLANNING • LAND SURVEYS • ENGINEERING

2601 WYOMING BLVD., NE. SUITE F / ALBUQUERQUE, N.M. 87110 / 505-292-1936

MURRAY-McCORMICK, INC.
ENVIRONMENTAL
ARCHITECTURE · ENGINEERING · PLANNING · SURVEYING

July 31, 1976

Mr. Kleston H. Laws
Drainage Engineer
City of Albuquerque
P. O. Box 1293
Albuquerque, New Mexico 87103

Re: Academy Acres, Unit 13 (Tract A-2)

Dear Kleston:

Enclosed is a copy of the approved preliminary plat for said subdivision and a copy of that portion of the Arroyo Del Pino as shown in the Northeast Heights Drainage Management Plan with the northerly boundary of said subdivision shown.

In our review of this site we have made the following assumptions:

1. Since the site is above the flood hazard line, the drainage in the Arroyo Del Pino will not have any adverse affect on the said subdivision development. This subdivision would, therefore, not be burdened by any major improvements concerning this arroyo.

2. All offsite drainage to the east would be intercepted by Wyoming Boulevard, N.E.

3. The historical flows onsite would not be increased and would continue to flow westerly to Truchas Drive N.E. Some flows would be directed north on Truchas Drive into the Pino and some flows will discharge on to Truchas Drive, draining south.

4. Rear walls along Wyoming Boulevard to be designed as diversion walls.

5. Drainage from Truchas Drive to be diverted west in an easement along the extension of Forest Hills Drive, behind lots in Academy Acres Unit #15.

2501 WYOMING BLVD. NE SUITE F/ALBUQUERQUE, NEW MEXICO 87110/505-292-1938
CALIFORNIA ALASKA OREGON WASHINGTON TEXAS GEORGIA FLORIDA COLORADO

We would like you to review and comment on our assumptions and also add any further comments of your own that you feel could adversely affect this development.

If these assumptions meet with your approval, please sign below and return.

Very truly yours,

Bo K. Johnson, P.E.
Vice President

Encl.

APPROVED:

CITY OF ALBUQUERQUE

_____
Kleston H. Laws, Drainage Engineer

_____
Q. R. Kielich, Asst. City Engineer-Design

MURRAY-McCORMICK, INC.
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DRAINAGE REPORT

ACADEMY ACRES, UNIT 13

PURPOSE

The purpose of this report is to analyze the drainage characteristics of the proposed development and make recommendations for controlling the drainage so that urban planning for the area can be done safely with minimum risk to life and property.

To achieve these objectives a two-phase approach was selected. In the initial phase, the subject property was analyzed in the undeveloped state. This determines the basic drainage characteristics of the area. The second phase deals with the subdivision in its developed state. Recommendations are made for compliance to the Albuquerque Metropolitan Arroyo Flood Control Authority requirements.

INTRODUCTION

Academy Acres, Unit 13, a proposed R-1 development, is located in Northeast Heights of Albuquerque, north of Bear Canyon Village No. 2, south of Arroyo Del Pino, west of Wyoming Blvd. N.E., and east of Truchas Drive N.E., or more particularly within T. 11 N., R. 4 E., Section 30, N.M.P.M. (see enclosed preliminary plat).

General information includes the following: The site, which encompasses 15.873 acres, slopes from east to west with an average slope

of 3% to 4%. The natural ground cover is generally a light growth of grasses and sage predominant in the area. The surface soils are predominantly loose, sandy soil. Surrounding terrain includes a wide natural arroyo on the north, an undeveloped parcel on the south, and single family homes across Truchas Avenue to the west. Wyoming Boulevard, a major city north-south arterial borders the property on the east.

Flow patterns crossing the subdivision include sheet flow and several small swales, with minor run-off concentrations. These minor swales were caused by storm-water run-off prior to the construction of Wyoming Blvd. Offsite flows from the east will be intercepted by Wyoming Blvd. N.E., and consequently there are no offsite flows crossing the site.

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 Figure IV, Intensity Duration Frequency Curves, Albuquerque Area 1961.

(Note: Where a Time of Concentration (Tc) is less than ten minutes from Figure III, the intensity value equal to ten minutes was used as shown on the curve for a 100 year storm in Figure IV.)

C = Runoff Coefficient (No Unit). This coefficient represents the integrated effects of infiltration, detention storage, evaporation, retention, flow routing, and interception which all affect the time distribution and peak rate of runoff.

ESTIMATED RUNOFF - UNDEVELOPED STATE

Drainage within the boundary of the site is in the form of sheet flow with general accumulation into several small swales. This runoff from the undeveloped site forms the basis of comparison with the drainage of the site in its developed state.

TABLE 1

RUNOFF IN UNDEVELOPED STATE

Drainage Basin	Elev. Diff. Feet	Length of Flow	Tc Min.	I 100 yr. In./Hr.	C[1]	Area Acres	Q c.f.s.
Site	16'	700'	10	5.4	0.45	15.87	38.56

3.86

12.01

ESTIMATED RUNOFF - DEVELOPED STATE

Table 2 shows the results of calculations of runoff in the developed subdivision state.

As development increases the area of impervious surfaces, runoff rates increase to a point which are greater than that which existed in the natural state. To offset this increase, onsite restructions of flow must be incorporated into the development of the subdivision. While this can take many forms, the most practical solution for this

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1. Table XII Master Plan of Drainage, City of Albuquerque, New Mexico and Environs, 1963. G. Herkenhoff & Assoc; C for undeveloped areas = 0.45.

type of development is to utilize onsite ponding for the lots. This approach can satisty AMAFCA's requirement that the runoff rate from the developed tract does not exceed the runoff rate from the tract in its natural state. The contributing areas to the backyard pond include the backyard, sideyard, and in the majority of cases, one-half of the roof area because of the popularity of the pitched roof concept. The area drained to the street includes the front yard, driveway, sidewalk-parkway areas, and one half the roof area.

In situations where runoff leaves the lot, a composite runoff coefficient was developed (see Appendix). This is based upon the percentage of different types of surfaces in the drainage area. The runoff coefficient used are as follows:

Streets, Walks and Drives	C = 0.90
Roofs	C = 0.90
Lawns, Sandy Soils, Average 2 to 7% Slope	C = 0.20

TABLE 2

RUNOFF IN DEVELOPED STATE

Drainage Basin	Elev. Diff. (Feet)	Length of Flow (Feet)	Tc (Min.)	I 100 yr. (in./hr.)	C	Area (Ac)	Q c.f.s.
Area A-1	16'	700'	10	5.4	0.66	4.54	16.2
Area A-2	20'	800'	10	5.4	0.66	6.12	21.8
						10.66	38.0

EXPLANATION OF RESULTS

Summary of the results for the site:

1. Runoff before development (within subdivision)

   Site = 38.56 c.f.s.

2. Runoff after development (within subdivision)

   Site = 38.00 c.f.s.

Therefore, summing total runoff rates under developed conditions vs. undeveloped conditions, the net result is no increase of the total runoff rate.

Offsite drainage from east of the site will be controlled by Wyoming Blvd. Flows from Area A-1 will be diverted north on Truchas Drive which eventually flow into Arroyo Del Pino. An existing high point is located on Truchas Drive near Vivian Drive. Flows from Area A-2 shall be collected on Truchas Drive and diverted south on Truchas Drive.

High points located on Welton Drive and Luella Avenue on west side of Truchas Drive do not allow any flows west down through the existing subdivisions.

RECOMMENDATIONS

The following recommendations are made to enable the developer of this site and the local government to complete this project with the design framework.

1. The ponding areas in each backyard would be best situated toward the rear of the yard. There should be a minimum of a five foot buffer zone between the rear property lines and the edge of the

pond. This will protect any walls which might be constructed. In no case should ponded waters be allowed to stand against the wall or house foundation.

2. Ponds should average six inches deep and the minimum surface area should not be less than 30%* of the total area drained which is drained into the pond.

3. Since the theoretical flows in Wyoming Blvd. on the east are slightly above the top of curb, it is recommended that the first course of the fence along the rear property line of those lots backing to Wyoming Blvd. be filled with grout. what if first course is below back of walk.?

4. As the site is above flood hazard line, the drainage in the Arroyo Del Pino will not have any adverse effect on this subdivision development. The subdivision would, therefore, not be burdened by any improvements of this arroyo.

5. Flows within the streets of the development are diversified enough so that no one street assumes a critical burden in carrying capacity. However, no street should be graded at less than 1.0% slope in order to insure adequate carrying capacity.

*Sizes for a 100 year 6-hour storm as per Technical Paper #40.

MURRAY-McCORMICK, INC.

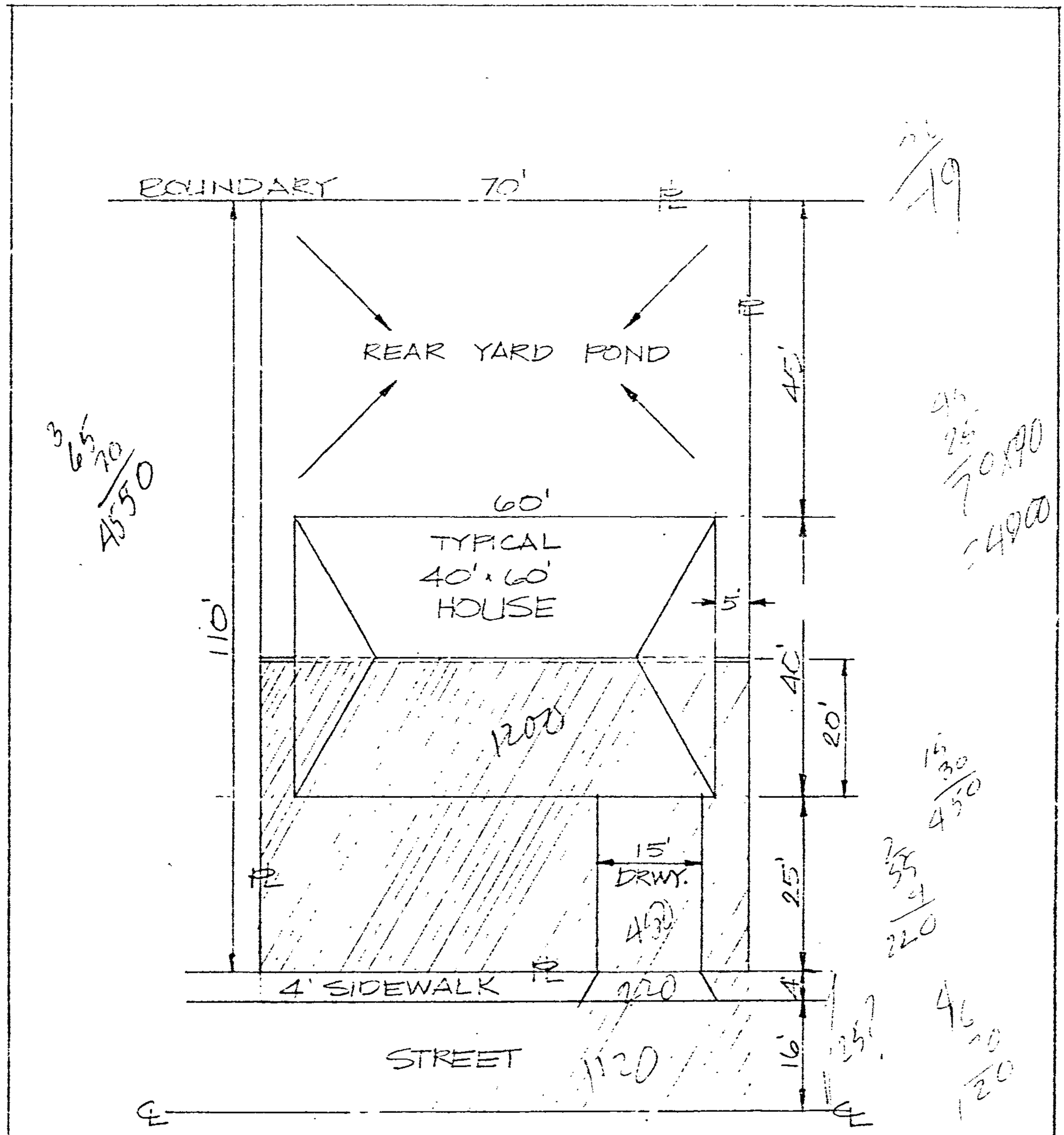
SUMMARY

The subject property, by utilizing backyard ponding, will contribute, no more internal runoff to surrounding areas than that which existed before development. In addition, some runoff which departs the site enters the Arroyo Del Pino without congesting downstream facilities.

In conclusion, the development of this site should have a beneficial effect on the drainage characteristics of this area, and can be developed safely with no harm to life or property.

Respectfully submitted,

Bo K. Johnson
N.M.P.E. No. 5922



NOTE: REFER APPENDIX FOR CALCULATION

▨ AREA DRAINED

FIGURE II
TYPICAL LOT DRAINAGE

Calculations for composite runoff factor typical lot drainage.

Typical 70' x 100' lot runoff area breakdown

R = 0.90

Streets & walk area	=	20x70	=	1400 S.F.
Roof Area	=	20x60	=	1200 S.F.
Driveways	=	25x15	=	375 S.F.
		Total		2975 S.F.

R = 0.20

Front and sideyard - minus drive and 1/2 roof area

= 45x70 -1200-375 = 1575 S.F.

Total Area Drained = 4550 S.F.

Area A-1 - 15 lots to be ponded

15 x 4550 = 68250 S.F.

Total area drained under 0.90 classification

= 2975 x 15 = 44625 S.F.

i.e. $\frac{44625}{68250}$ = 65% area drained

Total area drained under 0.20 classification

= 1575 x 15 = 23625 S.F.

i.e. $\frac{23625}{68250}$ = 35% area drained

Composite runoff coefficient

=	0.65 x 0.90	=	0.59
	0.35 x 0.20	=	0.07
	Total	=	0.66

Area A-2 - 22 lots to be ponded

22 x 4550 = 100100 S.F.

Total area drained under 0.90 classification

2975 x 22 = 65450 S.F.

i.e. $\frac{65450}{100100}$ = 65% area drained

Total area drained under 0.20 classification

1575 x 22 = 34650 S.F.

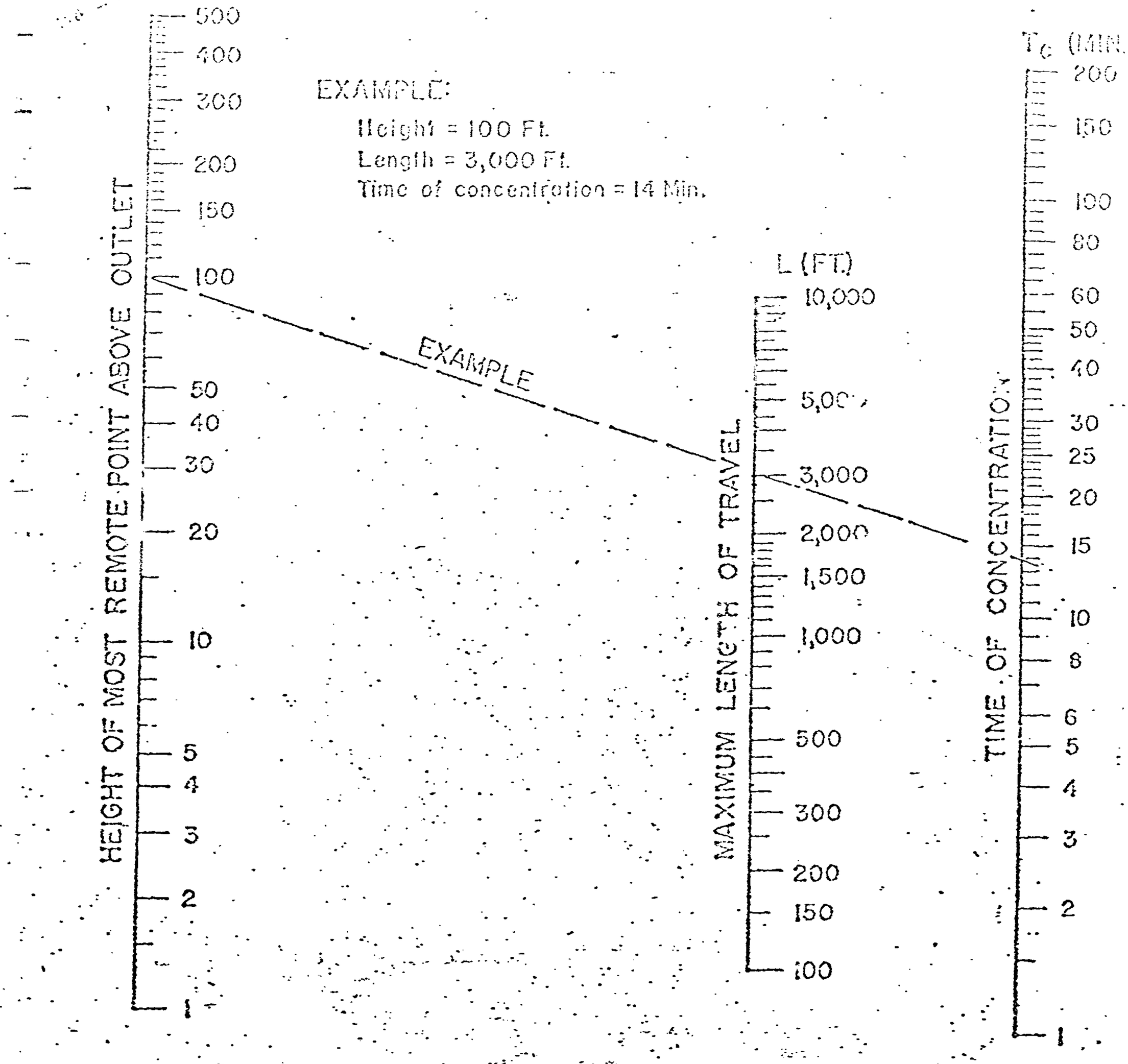
i.e. $\frac{34650}{100100}$ = 35% area drained

Composite runoff coefficient

= 0.65 x 0.90 = 0.59

= 0.35 x 0.15 = 0.07

0.66



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

TIME OF CONCENTRATION OF SMALL DRAINAGE BASINS

Reprinted from "Design of Roadside Drainage Channels - Hydraulic Engineering Circular No. 6", April 1962, U. S. Dept.

FIGURE III

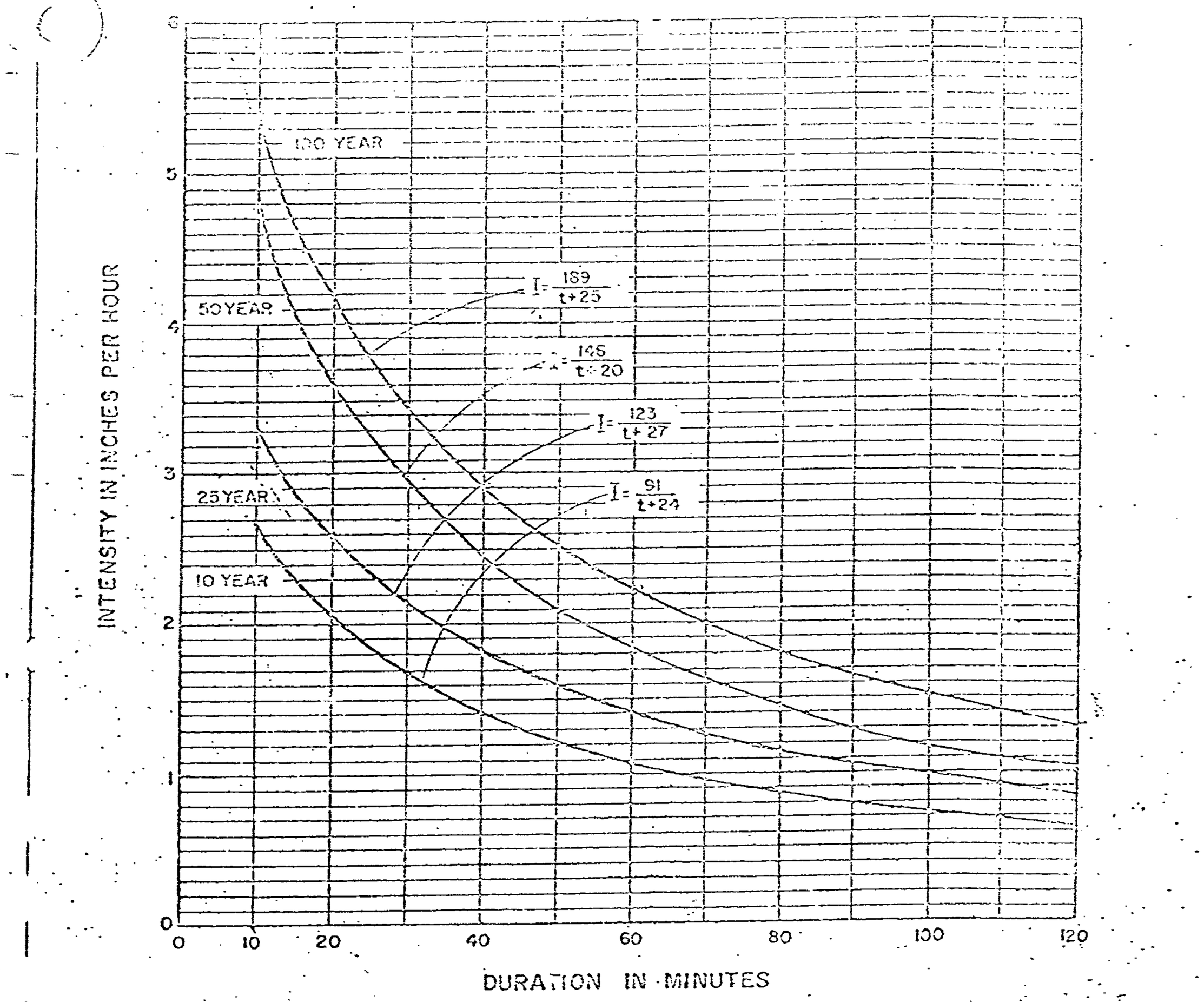
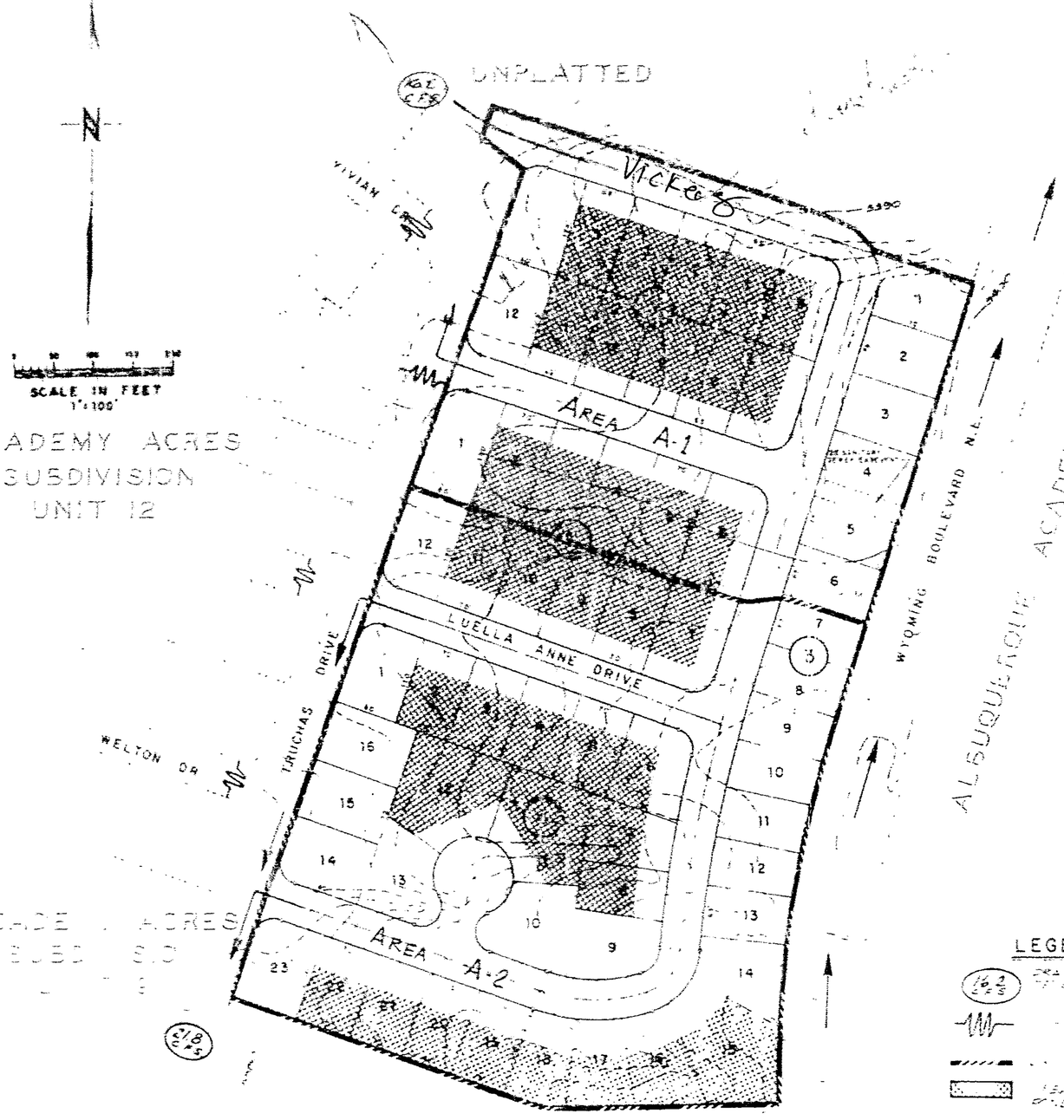


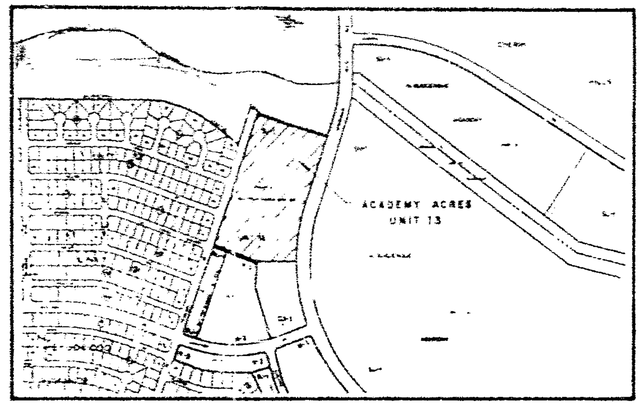
FIGURE IV

MASTER PLAN OF DRAINAGE CITY OF ALBUQUERQUE - NEW MEXICO AND ENVIRONS
INTENSITY DURATION FREQUENCY CURVES (ALBUQUERQUE AREA - 1951)
GORDON HERKENHOFF & ASSOC. CONSULTING ENGINEERS | CHART 1

ACADEMY ACRES
UNIT 13
BEING A REPLAT OF
TRACT "A-2"

ALBUQUERQUE, NEW MEXICO
MAY 1976





VICINITY MAP
SCALE 1"=800' (APPROX.)

LEGEND

DRAINAGE UNDER
WATER BLOCK
PARKWAY
SIDEWALK AND BACKYARD

SITE DATA

5.873 AC.
63 LOTS
3.97 LOTS/AC.
MILES OF STREETS=0.67

FIGURE I

DEVELOPED DRAINAGE CHARACTERISTICS

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