HYDROLOGY H15/D13 NO PLANS

H15/013

No Plans

H15-D13

DRAINAGE REPORT
for
HOLIDOME FACILITY
and
RENTAL UNIT ADDITION

Hnedak, Bobo, Gooch & Associates, Architects

August F. Mosimann
For
Engineering Associates, Inc.
2819 Claremont Place N.E.
Albuquerque, N. M. 87110

AUGUST F. MOSIMANN
STATE OF NEW MEXICO
NO. 6148
REGISTERED PROFESSIONAL ENGINEER

Site Description

The site includes tracts "A", "B", and "C" of the Koury Addition. It is bounded on the north by Menaul Blvd. N.E., on the east by Newton Place N.E., on the south by I-40, and on the west by University Blvd. N.E.

Design Guidelines

The following formulas are used throughout this study:

Rational Formula $Q = CIA$

and

Runoff Volume Formula $V = CPA$

Where

Q = Runoff Rate (CFS)

I = Intensity (IN/HR)

A = Area (Acres or ft^2)

V = Volume (Cu. Ft.)

C = Runoff Coefficient

P = Precipitation

The precipitation amount for this area is 2.3 in. for 100 year 6-hour storm (see figure 1).

The assumed runoff coefficients (C) are as follows:

Area Type	C
Paved	.90
Roof	.90
Landscaped	.40
Unimproved	.40

Existing Site Study

The site will be divided into three areas for purposes of analyzing the drainage runoff. Area No. 1 is the north parking area. Area No. 2 is a U-shaped hotel building with a court yard in the center. Area No. 3 is the north parking and landscaped area.

Area No. 1 includes 1.36 Ac. (59070 S.F.) and its runoff calculations are as follows.

The composite runoff coefficient "C" is:

Portion	Area (S.F.)	C	C X Area
Paving	57670	.9	51903
Landscaped	1400	.4	560
Totals	59070		52463

$$C = \frac{52463}{59070} = .89$$

The land slope is 2 percent
The length of runoff is 350 ft.
The concentration time is 10 min. (see figure 3)
The intensity is 189/ (10 + 25) = 5.4 in./hr. (figure 2)
The runoff flow is

$$Q = CIA = .89 \times 5.4 \times \frac{59070}{43560} = 6.52 \text{ CFS}$$

The runoff volume is

$$V = CPA = .89 \times \frac{2.3}{12} \times 59070 = 100\% \text{ Cu.Ft.}$$

The runoff from Area No. 1 is into Menaul Blvd.

Area No. 2 includes 3.69 Ac. (160724 S.F.) and its runoff calculations are as follows:

The composite runoff coefficient "C" is:

Portion	Area (S.F.)	C	C X Area
Paving	50879	.9	45791
Roof	53345	.9	48011
Landscaped	54779	.4	21912
Pool	1725	0	0
Totals	160728		115714

$$C = \frac{115714}{160728} = .72$$

The land slope is 2 percent
The length of runoff is 547 ft.
The concentration time is 10 min. (see figure 3)
The intensity is 189/(10 + 25) = 5.4 in./hr. (figure 2)

The runoff flow is

$$Q = CIA = .72 \times 5.4 \times \frac{160728}{43560} = 14.35 \text{ CFS}$$

The runoff volume is

$$V = CPA = .72 \times \frac{2.3}{12} \times 160728 - 221.80 \text{ Cu.Ft.}$$

The runoff from Area No. 2 is collected in the court yard area and drained directly into University Blvd.

Area No. 3 includes 2.35 Ac (102417 S.F.) and its runoff calculations are as follows:

The composite runoff coefficient "CP is:

Portion	Area (S.F.)	C	C X Area
Paving	61016	.9	54914
Landscaped	41401	.4	16560
Totals	102417		71474

$$C = \frac{71474}{102417} = .70$$

The land slope is 2 percent
The length of runoff is 546 ft.
The concentration time is 10 min. (see figure 4)
The intensity is 189/ (10 + 25) - 5.4 in./hr. (figure 2)
The runoff flow is

$$Q = CIA = .70 \times 5.4 \times \frac{102417}{43560} - 8.89 \text{ CFS}$$

The runoff volume is

$$V = CPA = .70 \times \frac{2.3}{12} \times 102417 - 13741 \text{ Cu.Ft.}$$

The runoff from Area No. 3 flows into University Blvd.

Offsite Flows

Offsite flows are intercepted by a curb and gutter along the east property line at Newton Avenue

Developed Site Study

Areas No. 1 and No. 3 will not be altered. The development in Area No. 2 will consist of a roof covering a portion of the courtyard and a new four story building.

The composite runoff coefficient "C" for the new development is as follows:

Portion	Area (S.F.)	C	C X Area
Paving	61525	.9	55373
Roof	84299	.9	75869
Landscaped	14900	.4	5960
Totals	160724		137202

$$C = \frac{137202}{160724} = .85$$

The land slope is 2 percent
The length of runoff is 514 ft.
The concentration time is 10 min.(see figure 4)
The intensity is 189/ (10 + 25) - 5.4 in./hr. (figure 2)
The runoff flow is

$$Q = CIA = .85 \times 5.4 \times \frac{160724}{43560} - 16.94 \text{ CFS}$$

The runoff volume is

$$V = CPA = .75 \times \frac{2.3}{12} \times 160724 - 26185 \text{ Cu.Ft.}$$

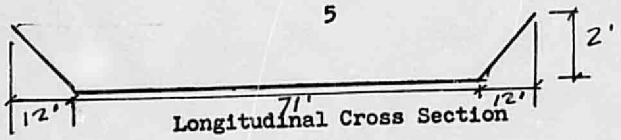
The quantity of water required to be ponded and dispersed on the developed site is:

Developed Site Runoff	26185
Less Existing Site Runoff	22180
Ponding Required	4005 Cu. Ft.

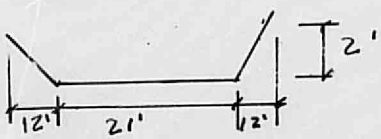
Runoff Control Summary

The required pond will be provided in the courtyard. The runoff from the new rental unit roof and the new roof covering will be routed into the ponding area in the courtyard. Overflow from the ponding area will be into west parking lot and then into University Blvd.

The pond has the following sectional properties:



Longitudinal Cross Section

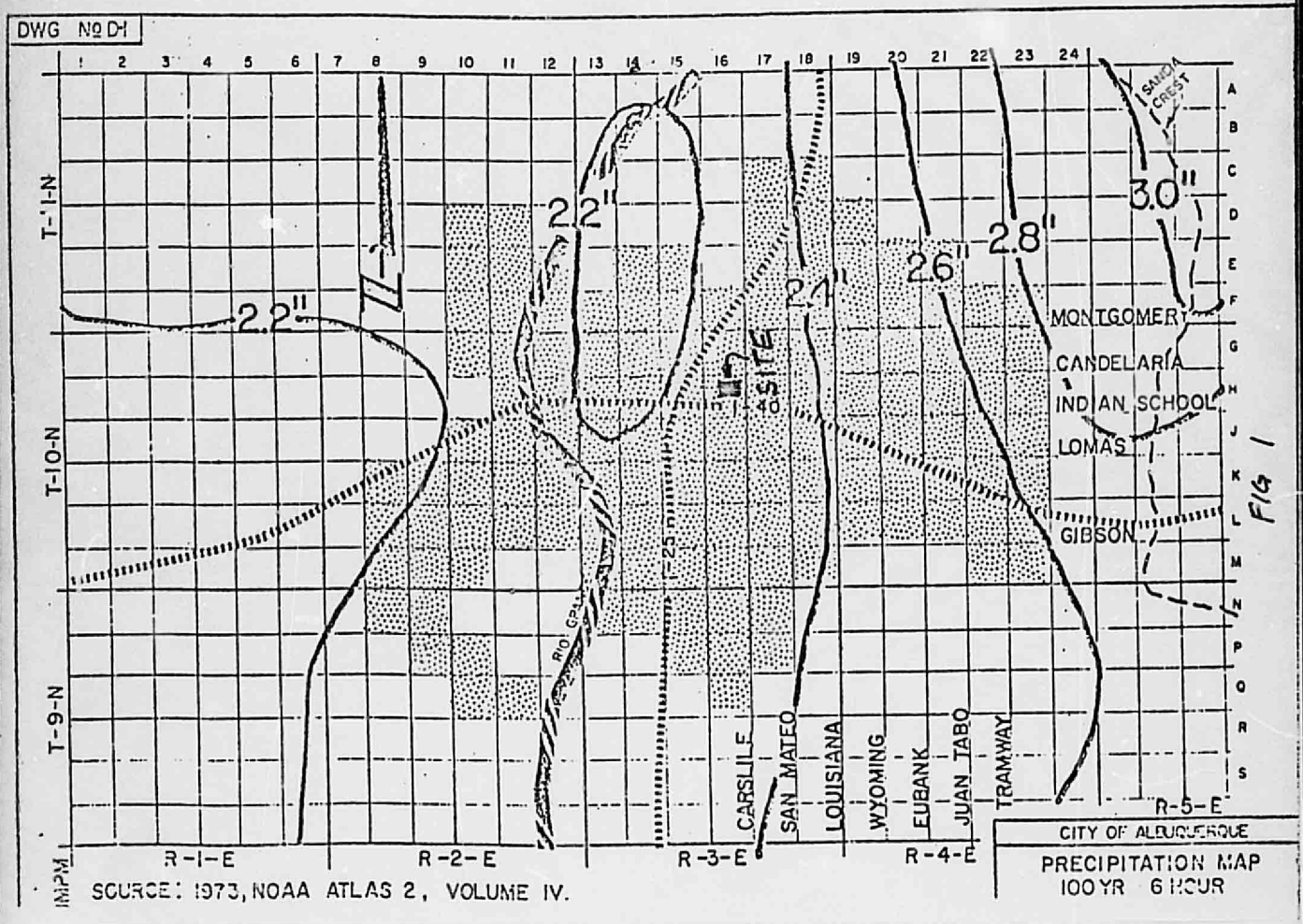


Transverse Cross Section

The total pond volume is:

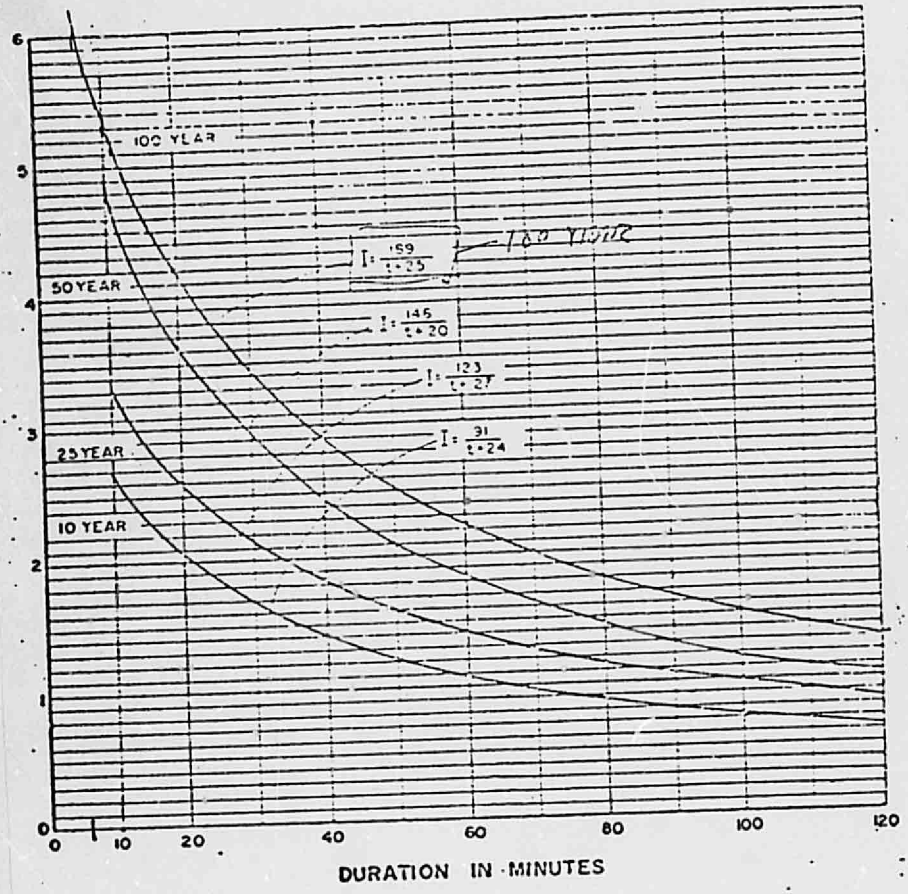
83 x 21 x 2 + 2 x 1/2 x 2 x 12 x 71 = 5190 Cu. Ft.

This exceeds the required volume of 4005 Cu. Ft.



SOURCE: 1973, NOAA ATLAS 2, VOLUME IV.

FIG 1



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

INTENSITY DURATION
FREQUENCY CURVES

(ALBUQUERQUE AREA - 1961)

GORDON KERKEN-OFF & ASSOC.
CONSULTING ENGINEERS
ALBUQUERQUE, NEW MEXICO

CHART 1

Fig 2

DRAINAGE — RUNOFF — 1

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.

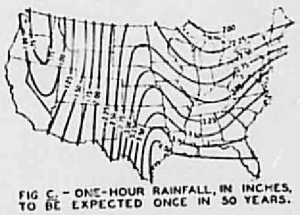


FIG C. - ONE-HOUR RAINFALL, IN INCHES, TO BE EXPECTED ONCE IN 50 YEARS.

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.

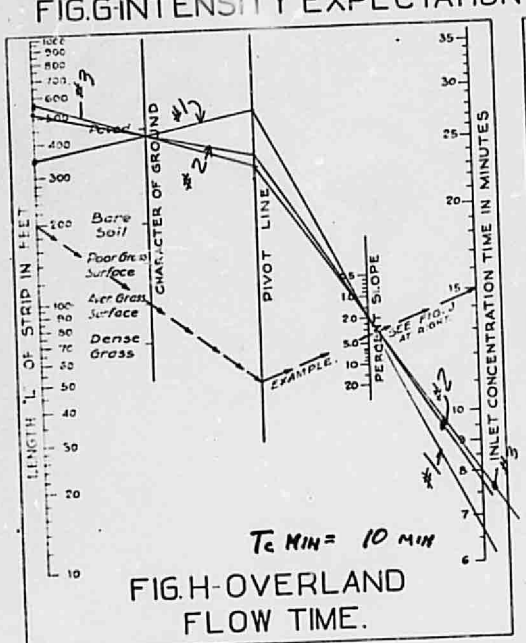


FIG. H - OVERLAND FLOW TIME.

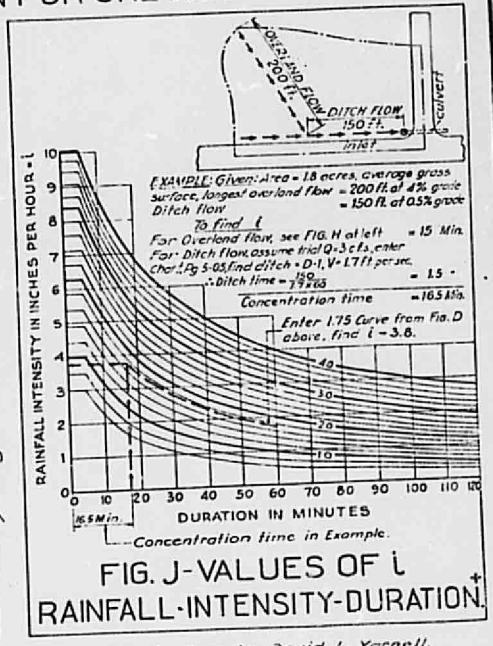


FIG. J - VALUES OF i RAINFALL-INTENSITY-DURATION.

* Adapted 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

FIG. 3