



Lab. 70

DRAINAGE REPORT

For

PLAZA MONTE VISTA MOBILE HOME PARK

ALBUQUERQUE, NEW MEXICO

RECEIVED
MAY 07 1979
GODWIN ENGINEERS

PREPARED BY:

Godwin Engineering Corporation
5/1/79 2202



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INTRODUCTION

Plaza Monte Vista is a mobile home park approved by the City of Albuquerque Planning Commission on April 19, 1979, Case Number Z-79-30. The Park is located immediately west of 102nd Street, between Central Avenue S.W. and Sunset Gardens Road, S.W. The park contains 8.8720 acres (See exhibit "A" attached).

The mobile home park will contain 90 single-wide rental spaces, 2 overnight rental spaces, an owner's space, and a park/ponding area. Access is to be from 102nd Street, with all internal streets privately owned (See exhibit "B" attached).

PURPOSE AND SCOPE

The purpose of the report is to set forth the computations and factors related to the proposed plan for drainage management. The plan will incorporate on-site retention of excess drainage generated by development of the project in accordance with AMAFCA Resolution 1972-2. This plan has been prepared in accordance with the guidelines set forth in "Standard Requirements for Drainage Plans" as promulgated by the Office of the Assistant City Engineer, Hydrology, of the City of Albuquerque, New Mexico.

DRAINAGE MANAGEMENT PLAN

Since the improvements to be placed in the project will increase the drainage run-off over that which occurs naturally from the site, some on-site retention is mandatory in order to comply with AMAFCA Resolution 1972-2. The volume of drainage retention so required is calculated as follows:

92 Typical Mobile Home Spaces

Gross Area = 2937.7 sq ft

Area at C = 0.90 = 1,988.8 sq ft

Area at C = 0.40 = 948.9 sq ft

Composite C = 0.74

Using 2.4 inches as total rainfall, the pond volume required = $(0.74-0.4) 2937.7 (0.2) 92 = 18,378$ cubic ft

Paved Streets

Total area = 87,142 sq ft

Pond volume required = $(0.9-0.4) 87,142 (0.2) = 8,714$ cubic ft

Owner's Residence

Composite C = 0.75

Total Area = 12,560 sq ft

Pond volume required = $(0.75-0.4) 12,560 (0.2) = 879$ cubic ft

TOTAL ON-SITE RETENTION REQUIRED = 27,971 CUBIC FEET

POND VOLUME PROVIDED = 28,000 CUBIC FEET

(See exhibit "B" for routing of drainage within project)

The retention pond is to be 2.00 feet in depth. Side slopes are to be 3:1. The top area of the pond is 15,800 sq ft, its bottom area is 12,200 sq ft, providing a volume of 28,000 cubic ft.

The top of pond elevation is designed at 5229.5. A berm is required along the east property line adjacent to 102nd Street. Its maximum height is 3.0 ft. The elevation of the top of the berm is 5230.0.

A 4 inch 10-flow drainpipe has been provided for positive final drainage of the pond. Under an average head of 1 ft, the pipe will discharge slightly less than 0.5 cubic ft per second, so that a full pond would be drained through such pipe in approximately 24 hours. Sizing of the ponds over spill structure requires a study of the contributing areas to determine the rate of in-flow occurring at the time when the pond reaches its capacity.

The contributing area to the pond is made up of two parts:

1. An off-site area upstream from the park.
2. The mobile home park itself (See exhibit "C" attached).

OFF-SITE AREAS

A = 10.2 acres

L = 850 feet

H = 30 feet

s = 3.5%

Tc = 21 minutes (See exhibit "D")

C = 0.42

Off-site routing through mobile home park:

L - 355 feet

H - 8 feet

s - 2.3%

Tc - 6.0 minutes

Total Tc for off-site area - 6.0 + 21 = 27.0 minutes

I = 3.1 inches per hour (See exhibit "E")

MOBILE HOME PARK

A = 8.87 acres

L = 900 feet

H = 8 feet

s = 1.1%

Tc = 27 minutes (See exhibit "D")

I = 3.1 inches per hour (See exhibit "E")

Composite C for combined areas

Composite C for off-site area and mobile home park combined:

$$C = \frac{0.76 (8.87 + 0.42 (10.2))}{8.87 + 10.2} = 0.58$$

Using the rational formula to compute the peak in-flow rate to the pond:

$$Q = ACI = (8.87 + 10.2) 0.58 (3.1) = 34.3 \text{ cubic feet/second}$$

Therefore in the time interval of Tc = 27 minutes the volume of water contributed to the pond equals $((\frac{1}{2} (34.3) 27 (60)) - ((0.5 (27) 60)) = 27,378$ cubic feet.

Therefore, the pond will be almost full at TC = 27 minutes and the overspill structure should be sized to release the peak in-flow of 34.3 cubic feet/second.

It is desirable to reduce the depth of the spilling water as much as possible and thereby reduce its flowing velocity to a minimum so as to minimize its erosion potential.

Thus, a sharp crested rectangular weir two feet in height is proposed. The crest would be suppressed into the top of the berm at elevation 5229.5, which is the designed high water level of the pond. Wing walls would be provided

at each end of the crest 6 inches higher than the crest which is equal to the top of the berm of the pond. By providing a width of 50 feet the weir would reach its intended capacity at a depth over the weir of approximately 4 inches. Riprap would be placed on the east face of the berm and on the natural grade below the weir to prevent erosion resulting from the discharge (See exhibit "B").

The unusually high discharge capacity necessary in the pond over spill structure is caused by the fact that the off-site area must be routed through the pond.

This circumstance is corroborated as follows:

Natural discharge at over spill point:

A = 8.69 acres

C = 0.42

L = 1,210 feet

H = 40 feet

s = 3.3%

Tc = 24 minutes

I = 3.5 inches/hour

Q = 8.69 (0.42) 3.5 = 12.8 cubic ft/second

However, some 600 feet downstream from the pond discharge point within the same arroyo, approximately 95% of the natural site and off-site discharge is brought together. This flow amounts to:

A = 22.3 acres

C = 0.42

L = 1,810 feet

H = 59 feet

s = 3.3%

Tc = 30 minutes

I = 2.8 inches/hr

Q = 22.3 (0.42) 2.8 = 26.2 cubic ft/second

In comparison, by taking the off-site area and the mobile home park individually routed entirely through the pond results in the following:

Off-site Contribution

$$A = 10.2 \text{ acres}$$

$$C = 0.42$$

$$L = 850 \text{ feet}$$

$$H = 30 \text{ feet}$$

$$s = 3.5\%$$

$$T_c = 21 \text{ minutes}$$

$$I = 3.7 \text{ inches/hour}$$

$$Q = 10.2 (0.42) 3.7 = 15.9 \text{ cubic feet/second}$$

Mobile Home Park Contribution

$$A = 8.87 \text{ acres}$$

$$C = 0.40$$

$$L = 900 \text{ feet}$$

$$H = 8 \text{ feet}$$

$$s = 1.1\%$$

$$T_c = 27 \text{ minutes}$$

$$I = 3.1 \text{ inches/hour}$$

$$Q = 8.87 (0.40) 3.1 = 11.0 \text{ cubic feet/second}$$

Therefore the total flow resulting from changing only the routing is

$Q = 15.9 + 11.0 = 26.9$ cubic feet/second which corresponds closely to the computations of the natural flow (with natural routing) at a point 600 feet downstream from the pond.

The effect that routing the off-site area through the pond has on the function of the pond is that within the time period $T_c = 27$ minutes the flow of

15.9 cubic feet/second which arises off-site will produce 12,900 cubic feet, or almost one-half the total volume of the pond.

The developed park, with paved streets (considered by itself) has a $T_c = 10.3$ minutes, resulting in $I = 4.75$ inches/hour. Hence, the peak discharge arising from the developed park itself is $Q = 8.87(0.74) 4.75 = 31.2$ cubic feet/second.

The large volume of the pond, coupled with the relatively short T_c (for the developed park by itself) would result in a substantial peak shaving effect on the out-flow Q from the park so that the discharge Q from the pond would be no greater or less than that which occurs naturally.

DOWNSTREAM ROUTING

Once the discharge leaves the pond, it flows eastward within a broad bottomed arroyo. A short distance before it reaches the west side of 98th Street, it fans out over a width of 100 to 200 feet. At 98th Street the natural flow is interrupted and is diverted southward along the west side of 98th Street. It is carried in a bar ditch, part of which is graded for a distance of approximately 2300 feet where it enters a substantial arroyo which crosses under 98th Street at that point.

There are at least seven 24 inch concrete pipes under 98th Street, some of which are silted and covered up on the upstream end. There is evidence of substantial flow and some erosion in this arroyo in the vicinity of 98th Street. There is also some evidence that the arroyo has spilled over 98th Street on recent occasions.

It is understood that the City of Albuquerque plans channelization and structural improvements in this arroyo near 98th Street and downstream to carry the flow from that point through a series of drainage management facilities to its

natural discharge into the Rio Grande River.

CONCLUSIONS AND RECOMMENDATIONS

As observed in the foregoing discussion, the development of this mobile home park may increase the rate of flow somewhat for a short distance in the natural channel downstream from the park during a storm event of 100 year frequency. However, such increase is caused by the necessity of ponding unregulated flow from the upstream off-site area which prevents the drainage management facilities provided in the mobile home park from functioning to their own best benefit.

At such time as the upland area is developed and has its own drainage management facilities, the early fill up of the pond in this project should be relieved. It is to be noted that this park is proposed for development over a phased 2 - 3 year period, by which time some development in the upland area may be initiated.

It is therefore recommended as follows:

1. That the foregoing analysis and drainage management plan be approved and adopted.
2. That the developed and off-site drainage be routed through the mobile home park and its pond in order to provide some regulation to downstream flow and minimize silt transport as much as possible.
3. That any upstream development be required to have its own ponding and/or drainage management facilities which will effectively alter the coincidence of concentration times of this project with that of the upstream area, thereby reducing the downstream discharge to a level more in agreement with that which occurs naturally.

STUDY AREA

Approx. 8.87 Acre



Albuquerque • Bernalillo County PLANNING DEPARTMENT

By	Date	Checked	Scale:
HT		Yes	1" = 500'
Plot:			Air Photo: L-8
Zoning:			Source: L-8
Land Use:			MR CD: NA

Description:

Lots 1 & 2, Block 2, Lands of Town of Atrisco Grant

Zone Change: RA-2 to SU-1 (Mobile Home Park)

Applicant or Agent: Mr. A. H. Bob. Turner	File Number
EPC Hearing: 4/19/79	2-79-30
EEC Hearing:	

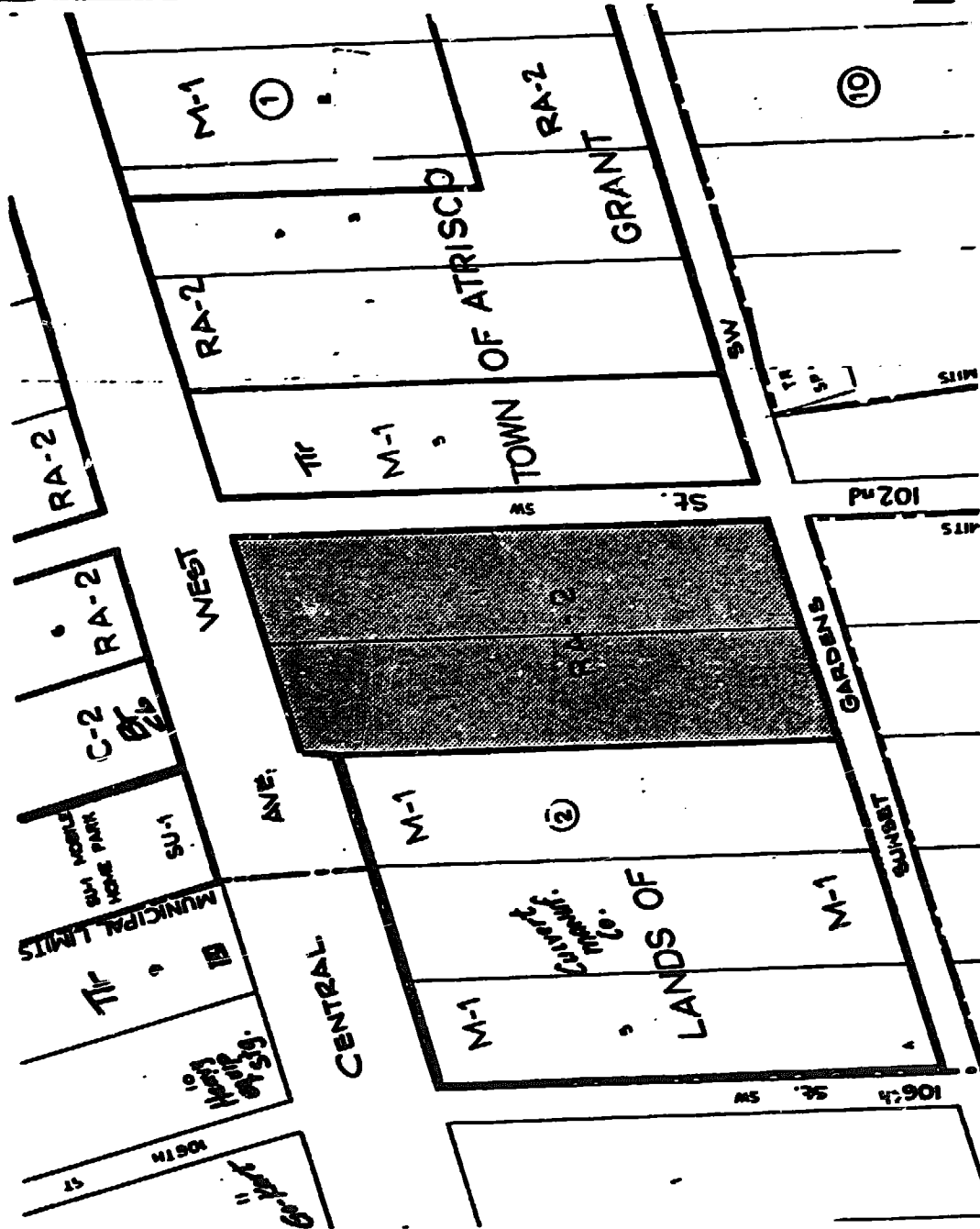


EXHIBIT "A"

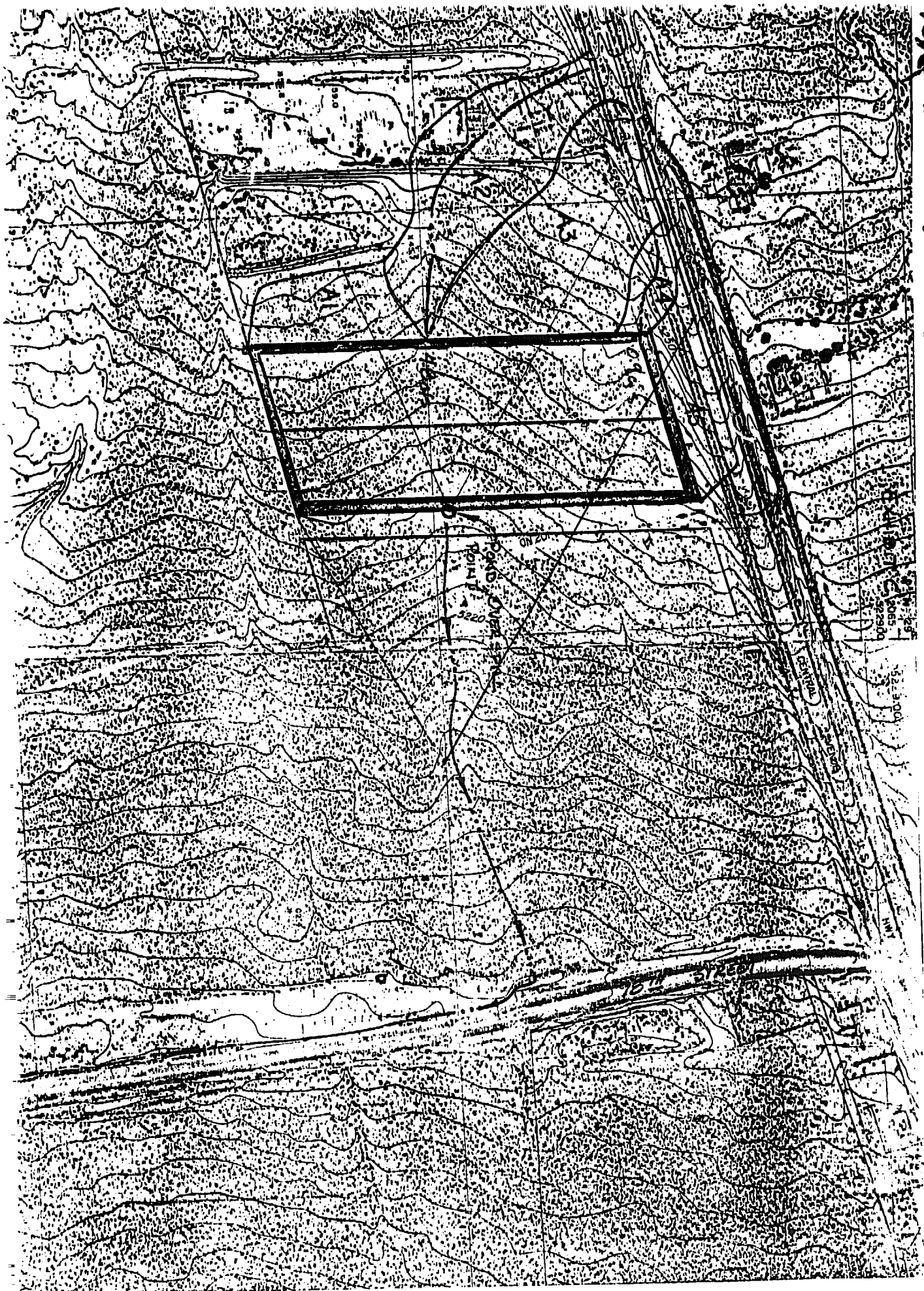
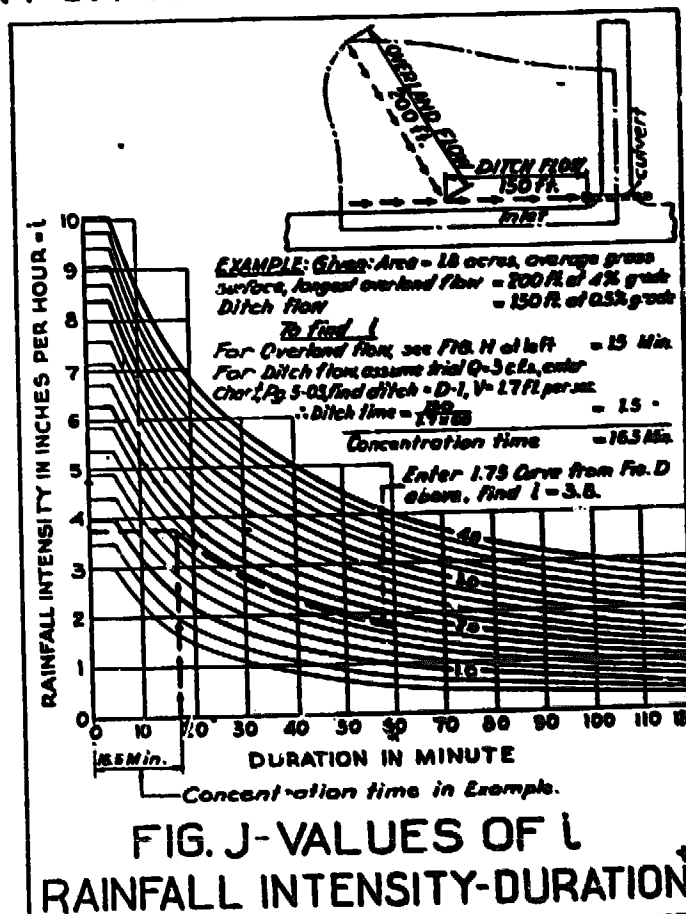


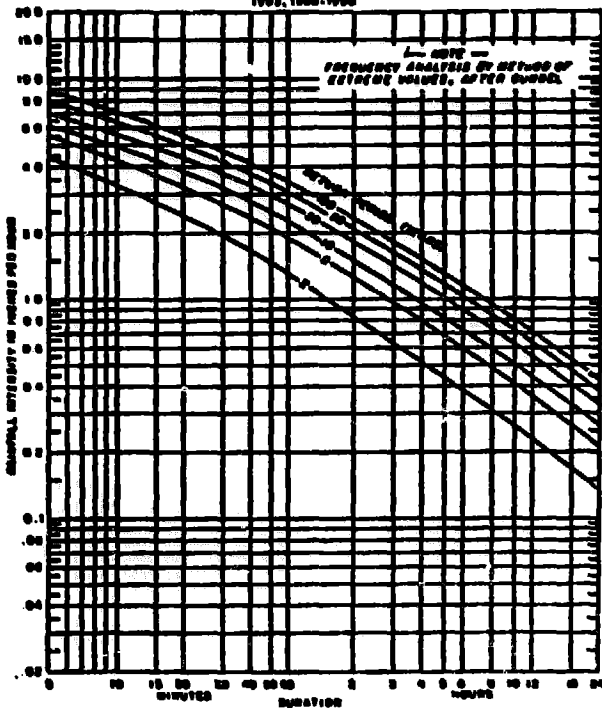
FIG. 6-INTENSITY EXPECTATION FOR ONE-HOUR RAINFALL.



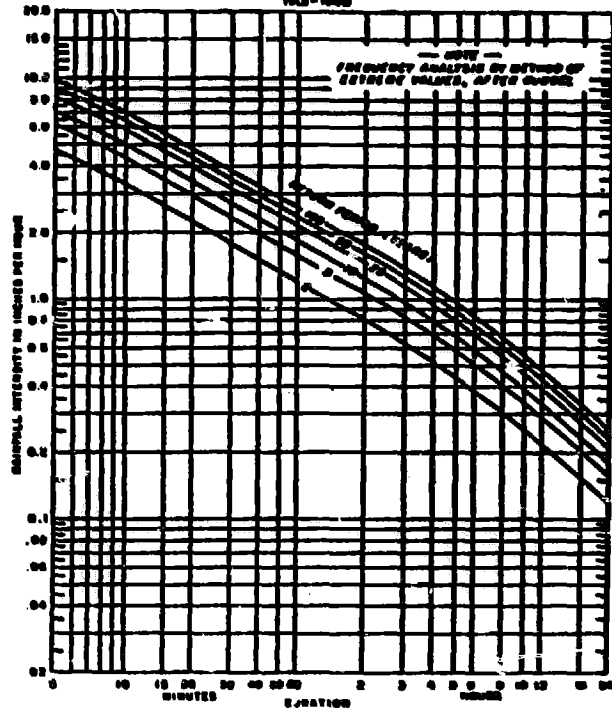
*Reproduced from Miscellaneous Publication No. 204, U.S. Dept. of Agriculture, by David L. Yarnell.
 †Adapted from Engineering Manual of the War Department, Part XIII, Chap. I, Dec. 45.

RAINFALL INTENSITY-DURATION-FREQUENCY CURVES

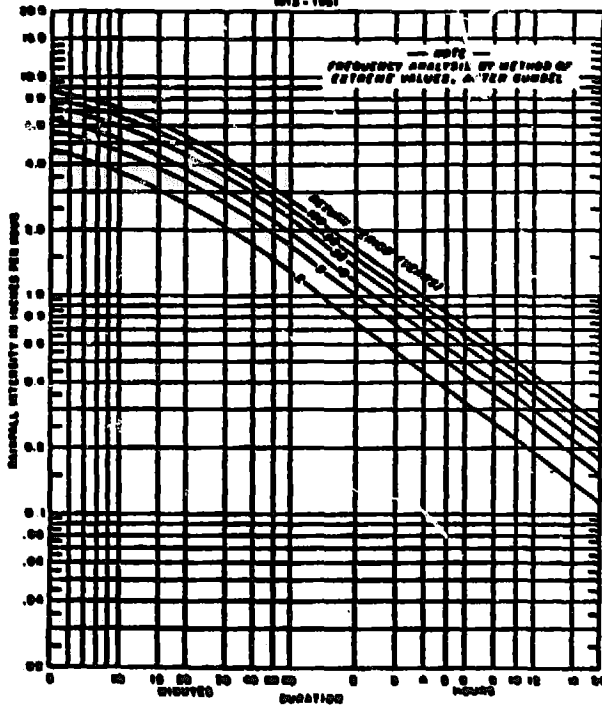
ATLANTIC CITY, NEW JERSEY
1905, 1906-1960



SANDY HOOK, NEW JERSEY
1915-1960



TRENTON, NEW JERSEY
1915-1961



ALBUQUERQUE, NEW MEXICO
1931-1960

