HYDROLOGY E21/D6 TWO PLANS

E21/D6

2 PLANS

ACADAMY PLACE
TRACT "J"

Albuquerque,
Bernalillo County, New Mexico

DRAINAGE REPORT
FOR
HOME PLANNING DEVELOPMENT CO., INC.

OCTOBER 1973

BOHANNAN WESTMAN HUSTON

ENGINEERS & PHOTOGRAMMETRISTS

BOHANNAN WESTMAN HUSTON & ASSOCIATES INC.

4125 CARLISLE BLVD. N.E.
ALBUQUERQUE, NEW MEXICO 87107
PHONE 505 345-2681

October 1973

Home Planning Development Comp. Inc.
4201 Carlisle N.E.
Albuquerque, New Mexico 87107

Gentlemen:

We are pleased to submit this Drainage Report to you covering the development of Acadamy Place, Tract"J". The control of the runoff shall comply with the requirements of the Albuquerque Metropolitan Arroyo Flood Control Authority and with present City of Albuquerque policies.

We appreciate this opportunity to serve you. If any questions arise, we will be available to assist you in your response.

Very Truly Yours,

Michial M. Emery

Michial M. Emery
Chief Engineer

MME/ku

DRAINAGE REPORT

FOR

ACADAMY PLACE

TRACT "J"

BERNALILLO COUNTY, NEW MEXICO

OCTOBER, 1973

PREPARED FOR:

HOME PLANNING DEVELOPMENT COMP. INC.

4201 CARLISLE N.E.

ALBUQUERQUE, NEW MEXICO 87107

BY

BOHANNAN WESTMAN HUSTON

4125 CARLISLE N.E.

ALBUQUERQUE, NEW MEXICO 87107

Michial M. Emery

Michial M. Emery
Chief Engineer

STATE OF NEW MEXICO
MICHIAL M.
EMERY
No. 5194
REGISTERED PROFESSIONAL ENGINEER

DRAINAGE REPORT

FOR

ACADAMY PLACE
TRACT "J"

ITEM	PAGE
Location	1
Drainage Before Development	1
Drainage After Development	1
A) Upland Drainage	1
B) On Site Drainage	2
Conclusions	3
Special Notes	4
Table I, Flow Rates and Ponding Volumes	5-6-7
Table 2 Hydraulic Control Section Calculations	8-9-10
Plate 1, Location Map	
Plate 2, Improved Drainage Facilities	
Plate 3, Miscellaneous Cross Sections	

DRAINAGE REPORT

ACADAMY PLACE

TRACT "J"

LOCATION

Tract J of the Acadamy Place Subdivision is located on the southeast side of the proposed Eubank Blvd. extention approximately one mile north of Montgomery Blvd. (see Plate 1) It covers an area of approximately 1.4 acres and is presently undeveloped. Plans call for development to take place as a large commercial warehouse-outlet combination.

DRAINAGE BEFORE DEVELOPMENT

Runoff from the subject property flows in a general westerly direction entering small localized arroyos which eventually tie into the larger Bear Arroyo. An examination of the U.S.G.S. map of the area indicates that no major upland drainage areas drain onto the parcel.

DRAINAGE AFTER DEVELOPMENT

A) UPLAND DRAINAGE:

Development is presently taking place immediately upstream of Tract J. This development is, to the best of our knowledge, based upon an approved drainage report submitted by Ralph Hicks, and Associates in which a drainage diversion wall is proposed along the southeastern

property line of the parcel. Since said drainage report indicates that runoff from the upstream development shall be taken to local streets for discharge onto Eubank Blvd., and since no major arroyos cross Tract J, upland drainage should be no problem.

B) ON SITE DRAINAGE:

Development Plans for Tract J propose "hard surfacing" virtually the entire parcel with roof and asphalt. Since such surfaces are much less permeable than native soil, increased rates of runoff can be expected. In order to comply with the recent Albuquerque Metropolitan Arroyo Flood Control Authority regulations, these increased rates of runoff must be eliminated by a system of retention ponds which will allow only an estimated natural rate of runoff to be discharged from the property. Plate 2, Improved Drainage Facilities, indicates the drainage scheme proposed to solve this problem. Due to the fact that no grading plans for surrounding developments were available at the time of this investigation, relative proposed finished grades have been shown with the lowest point being called elevation "0". This grading scheme can be "tied into" the surrounding grading schemes when they become available. It was also learned that street grades for Eubank Blvd. extention have not been established at this time, so this report is based on an assumed 2% slope for that street.

All calculations have been based on the 100 year recurrance interval design storm. Since there is no space available for a retention-pond as such, ponding requirements must be met through use of the parking lots and roof areas. Table 1 contains calculations determining runoff rates and required ponding volumes. Plate 3 illustrates the various hydraulic control sections which produce the necessary ponding volumes and allowable rates of discharge. Water depths during a 100 year storm would reach as much as one foot three inches in parking lot E and ten inches in parking lot D. Hydraulic controls for the roof areas have been sized such that maximum water depths attainable for any anticipated storm would be 6.25 inches for building A, six inches for building C, and five inches for building B. These depths would occur at the hydraulic control sections indicated on Plate 2, and depth and volume calculations are based on an eight inch per 100' pitch on the roofs in directions both parallel and perpendicular to the hydraulic control sections. Table 2 contains the pertinent calculations for these hydraulic control sections.

CONCLUSIONS

Runoff emanating from lands upland from Tract J should present no problem to the development of the parcel. Increased rates of runoff due to the "hard surfacing" of the

site must be controlled through the use of ponding area and hydraulic controls. These ponding areas can be obtained by using parking lot and roof surfaces as temporary ponds.

SPECIAL NOTES

1) The Hydraulic Control Sections proposed in this report are relatively small structures due to the relatively small flows they are controlling. They are therefore subject to being either partially or completely blocked off by debris during and after even a small storm. For this reason we are recommending as part of this report that a regular maintenance program be established to keep these structures operating correctly.

2) Since ponding volumes and discharge rates have been based on the grades shown on Plate 2 and the sections shown on Plate 3, strict control of parking lot and curb grades during construction is essential to the proper operation of the drainage scheme illustrated in this report. We therefore highly recommend "blue topping" for parking lots and similar fine control for curbs during the construction phase.

TABLE 1

FLOW RATES & PONDING VOLUMES

1) Natural Rates of Runoff:

take C = .35 , Tc < 10 min , A= 1.377 acres

Q = CIA = .35 (5.4) (1.377) = 2.6 cfs.

2) Tabulation of Contributing Areas:

Area Designation	Area (acres)	Assigned C
A	.143	.95
B	.048	.95
C	.115	.95
D	.264	.95
E	.645	.95
H	.069	.5
I	.033	.95
J	.061	.35

3) Apportioned Allowable Rates of Runoff:

We will allow areas H, I, and J to discharge freely.

Q = .5 (5.4) (.069) + .95 (5.4 (.033) + .35 (5.4) (.061)=

.47 cfs.

Remaining allowable discharge = 2.6-.47= 2.13 cfs.

Q allowable, Area D = (.264) (1.215) (2.13) = .46 cfs.

Q allowable, Area E = (1645) (1.215) (2.13) = 1.13 cfs.

Q allowable, Areas A+B+C = (.306) (1.215) (2.13) = .536 cfs.

4) Required Storage Volumes: (This is a trial and error procedure - I'll show only final calculations)

A) Area D:

Vol. = .95 (2.9) (.264) (40) (60) - .5 (40) (60) (.46)

= 1193 cf.

B) Area E:

Vol. = .95 (2.9) (.645) (40) (60) - .5 (40) (60) (1.13)

= 2908 cf.

C) Areas A+B+C:

Vol = .95 (2.9) (.306) (40) (60) - .5 (40) (60) (.536)

= 1380 cf.

5) Apportioned Storage Volumes:

A) Roof A
Vol = (.143) .306) (1380) = 644 cf.

B) Roof B

Vol = (.048) (.306) (1380) = 216 cf.

C) Roof C

Vol = (.115) (.306) (1380) = 518 cf.

Depths on Roofs:

The following depths were calculated through use of computer based on a roof pitch of 8" in 100' in both parallel and perpendicular directions to the hydraulic control sections:

Roof Designation	Volume Required	Depth Max
A	644 cf	5.25"
B	216 cf	4"
C	518 cf	5"

TABLE 2

HYDRAULIC CONTROL SECTION CLACULATIONS

1) Outlet From Parking Lot E:

Try a rectangular concrete trough;

width = 4"

slope = .01 ft./ft.

Ke = 0.1

Q = 1.13 cfs.

Max depth = 1.25'

From Manning's Equation

d_n = 1.07'

V_n = 3.17 ft/sec.

F_r = .54

$$\therefore \quad H \text{ total} = 1.07 + 1.1 \frac{(3.17)^2}{64.4}$$

= 1.24' O.K.

2) Outlet From Parking Lot D:

Try a 6" C.M.P. with 1/4" dia. bar trash screen;

slope = .01 ft/ft

Ke = 1.1

Q = .46 cfs.

Max depth = .83'

n = .026

L = 3'

$$H = (Ke = 1 = \frac{29n^2L}{R^{4/3}})\frac{V^2}{2g}$$

$$= .75' \quad O.K.$$

3) <u>Outlet, Roof A:</u>

Max. depth = 5.25" = .44'

Q = .25 cfs.

Try 4" slot

Yc = .26'

∴ Vc = 2.9 ft/sec.

$$H = .26 + \frac{1.1\ (2.9)^2}{64.4} = .403' \text{ O.K.}$$

4) <u>Outlet, Roof B:</u>

Max. depth = 4" = .33'

Q = .084 cfs.

Try 2" slot

Yc = 0.2'

∴ Vc = 2.53 ft./sec.

$$H = .2 + \frac{1.1\ (2.53)^2}{64.4} = .31' \text{ O.K.}$$

5) <u>Outlet, Roof C:</u>

Max. depth = 5" = .416'

Q = .2 cfs.

Try 3" slot:

Yc = .27'

∴ Vc = 2.95'

$H_t = .27 + 1.1\ (2.95)^2 + .419'$ O.K.

6) Emergency Overflows:

For emergency purposes, we will make overflows pass twice the 100 year storm flow.

$Q_A = .95\ (2.7)(.143) \times 2 = .74$ cfs.

$Q_B = .95\ (2.7)(.048) \times 2 = .246''$

$Q_C = .95\ (2.7)(.115) \times 2 = .58''$

Assuming water can pond no deeper than 1" above the top of the hydraulic control trough, we have

$$L = \frac{Q}{3.03\ H\ 3/2} = \frac{Q}{.07285}$$

$$L_A = \frac{.74 - .25}{.07285} = 7'$$

$$L_B = \frac{.246 - .084}{.07285} = 2.5'$$

$$L_C = \frac{.58 - .2}{.07285} = 5.5'$$

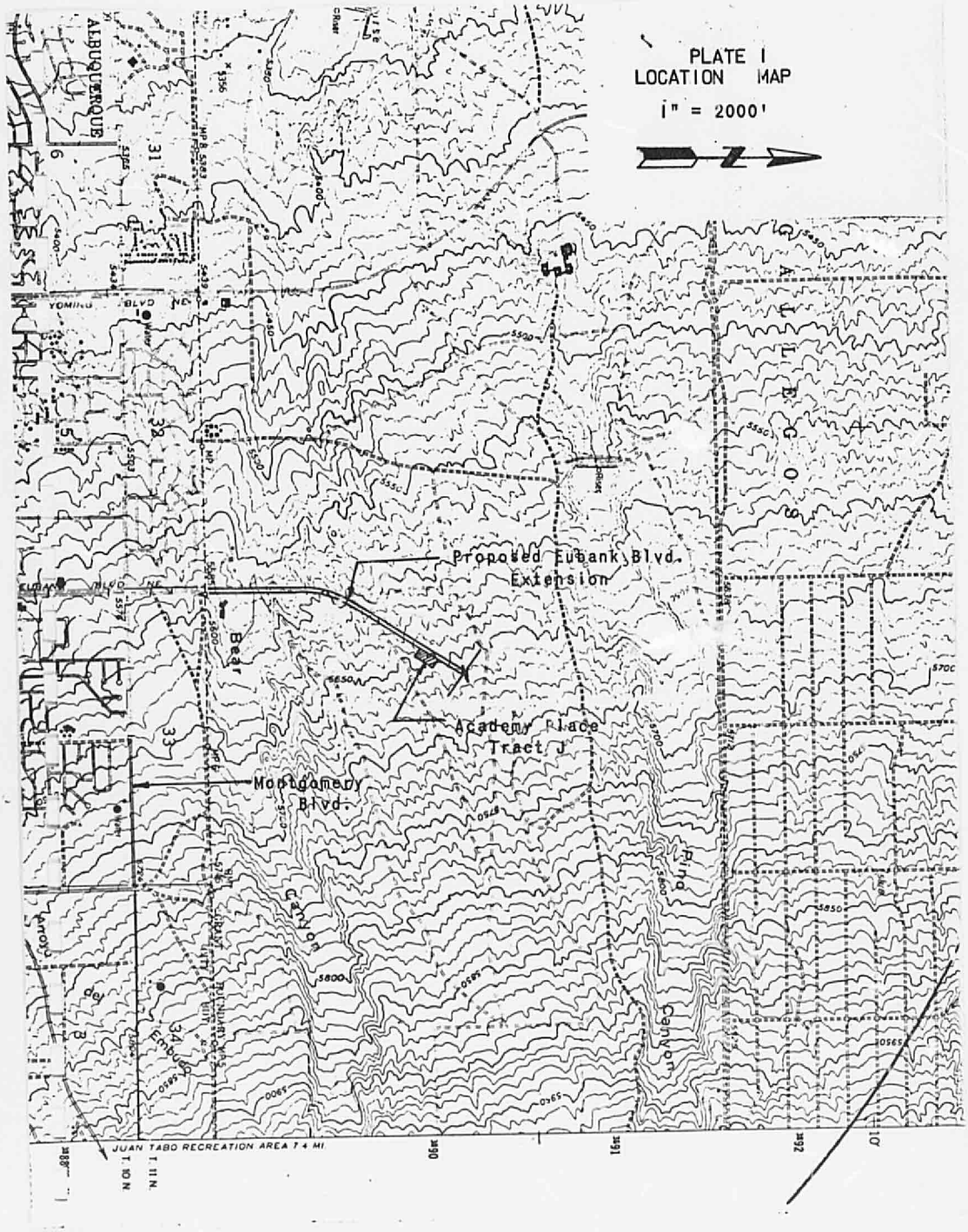
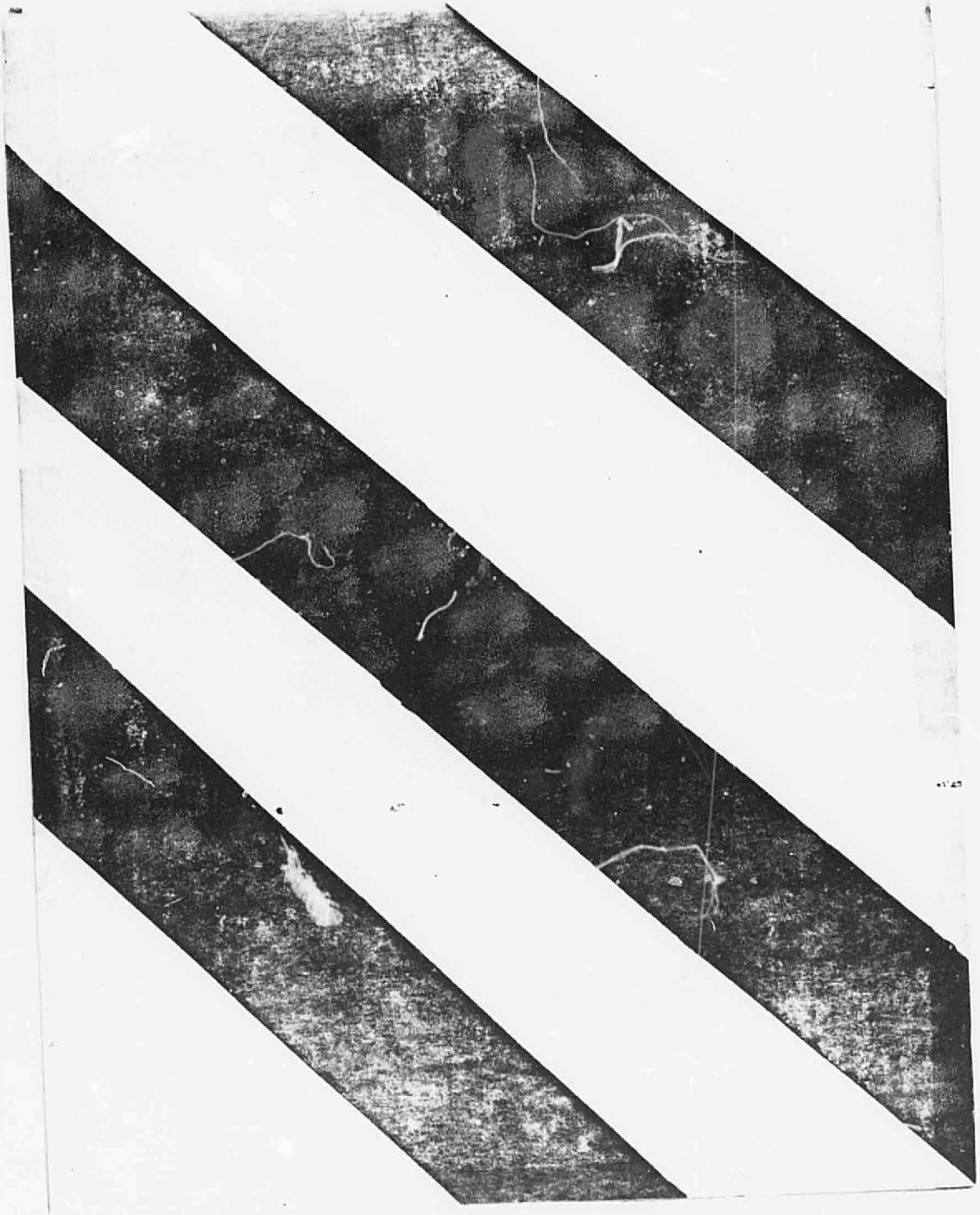


PLATE I
LOCATION MAP
1" = 2000'
Proposed Eubank Blvd.
Extension
Academy Place
Tract J
Montgomery
Blvd.
ALBUQUERQUE
YOMING BLVD NE
ELDER BLVD NE
Bear
Canyon
Pino
Canyon
Eubank
JUAN TABO RECREATION AREA 7.4 MI.
T. 11 N.
T. 10 N.
38E
39E
40E
41E
42E
10
31
33
34
5500
5550
5600
5650
5700
5800
5850
5900
5950

JOHANNAN WESTMAN HUSTON