HYDROLOGY E18/D2 3 PLANS

E18/D2

3 PLANS

DRAINAGE REPORT

FOR

TRACTS A
& A PORTION OF TRACT B

ACADEMY ACRES SUBDIVISION
UNIT 2

Prepared For

GO REALTY
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Albuquerque, New Mexico

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DRAINAGE REPORT
FOR
TRACT A & A PORTION OF TRACT B
ACADEMY ACRES SUBDIVISION
UNIT 2

PURPOSE & SCOPE

The purpose of this report is to present methods by which to limit the rate of runoff from the developed tracts to the rate that prevailed before development. By limiting the rate of runoff from the developed tract, the developer will be able to comply with the directives of the Albuquerque Metropolitan Arroyo Flood Control Authority.

THE SITE

Academy Acres Subdivision Tracts A and B-1 is located in the North-East Heights of the City of Albuquerque, and is bounded on the east by McKinney Drive; bounded on the north by a 60' drainage easement; bounded on the west by unplatted commercial land; and bounded on the south by Academy Acres Subdivision - Tract B-2, Unit 2.

GENERAL SITE CHARACTERISTICS

The site encompassing 5.18 Ac. more or less in Tract "A" for multi-family dwelling with slopes from east to west with an average slope of 2%; 3.54 Ac. more or less in Tract "B-1" for commercial development with slopes from east to west with an average slope of 1.8% to 2.0%. The site shows undulating terrain with minor swales and a partially improved but well defined natural channel along the north boundary of Tract "A."

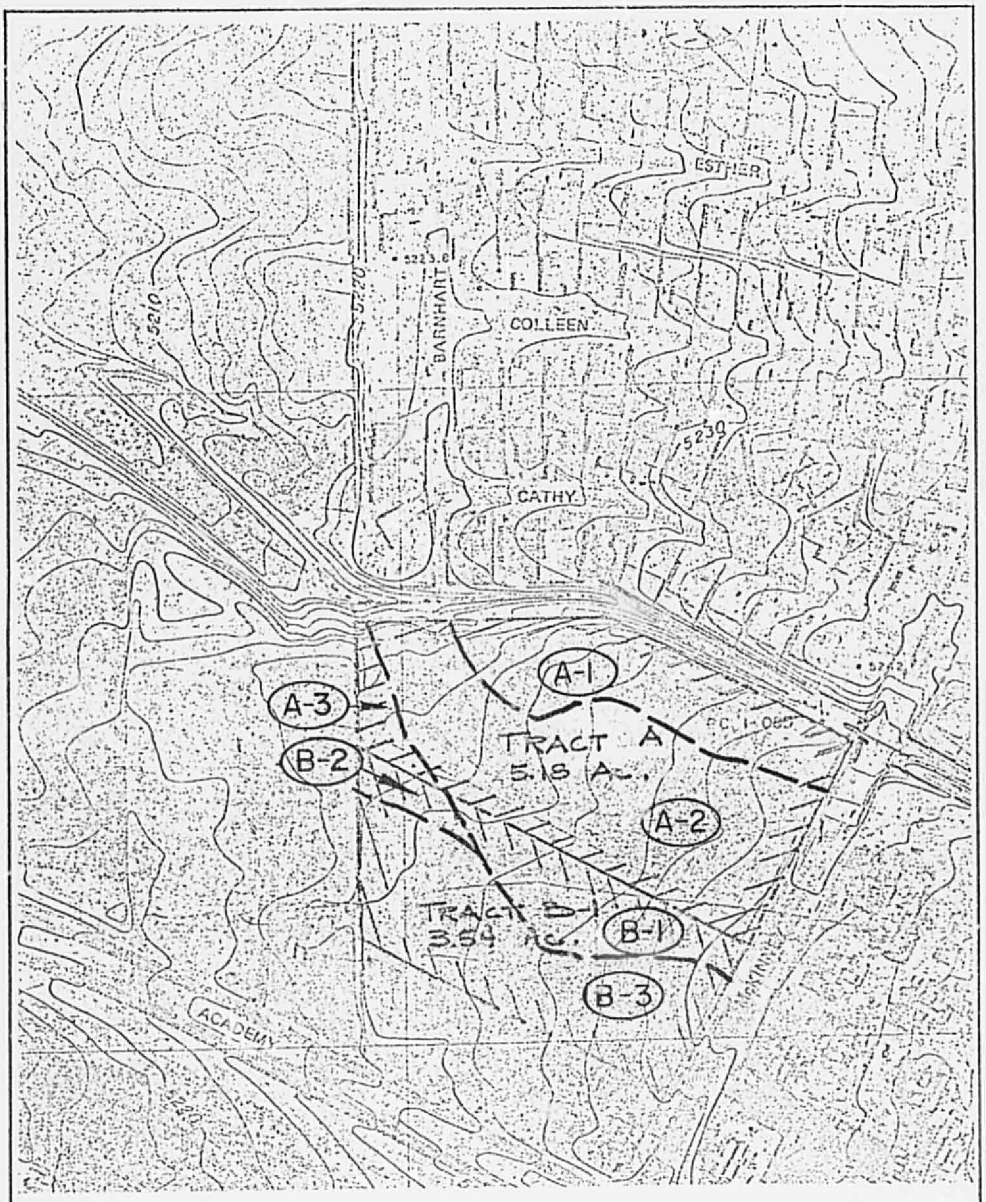

FIGURE 2

Meurer, Serafini and Meurer, Inc.
2601 Wyoming Blvd. N.E. Suite F
Albuquerque, N.M. 87110/505 292-1936

JOB NO. _____ DATE _____
PROJECT _____
SCALE _____

PROPOSED DEVELOPMENT

Academy Acres Subdivision, Tract A, Unit 2, will be developed as multi-family residences. The perimeter will be constructed as access road and parking and will be constructed with inverted crown to form main carriers for storm runoff. The developed portion will be constructed for retention of water and will retain total contribution off of all roofs. This retention or on-site ponding of waters falling on site and roofs will be infiltrated onsite and thus will not contribute to runoff.

Academy Acres Subdivision, Tract B-1, Unit 2, will be developed as commercial - mini-warehouses. A retention pond will be constructed on the west portion of the tract, and will retain total storm runoff. Waters will be carried to the retention pond by paved access to storage buildings.

DESIGN CRITERIA

In analyzing the storm runoff, the Rational Formula, $Q = C \cdot C_f \cdot I \cdot A$, was used. See Urban Storm Drainage, Criteria Manual, Vol. 1, Runoff, Section 3 "Rational Method".

Where:

Q = Runoff quantity in cubic feet/second.

A = Contributing area in acres.

C_f = Frequency Factor for Rational formula.

I = Intensity in inches/hour for a duration equal to the time of concentration (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 employed.)

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 basically overland flow with some small swales. There are no offsite flows entering the site.

TABLE 1

RUNOFF IN UNDEVELOPED STATE

Area Designation	Elev. Diff.	Length of Flow	Tc Min.	I_{100} yr. In.Hr.	C^2	Area Acres	Q C.F.S
A-1	21'	700'	4.5	5.4	.38	1.84	3.78
A-2	22'	800'	5.25	5.4	.38	3.06	6.28
A-3	14'	280'	1.6	5.4	.38	0.28	0.57
			Total Runoff Tract A. . .				10.63
B-1	12'	520'	4.1	5.4	.38	1.41	2.89
B-2	5'	250'	2.5	5.4	.38	0.30	0.62
B-3	12'	660'	5.5	5.4	.38	1.83	3.76
			Total Runoff Tract B. . .				7.27

ESTIMATED RUNOFF DEVELOPED STATE

As development occurs, the area of impervious surfaces increases and thereby the amount of runoff also increases. To offset this

increase, onsite restrictions of flows must be incorporated into the development. While this may take different forms, the most practical solution for this type of development is to utilize onsite ponding.

Tract A - The contributing area to the site ponding includes all roof area, front walk and yard area. Ponds have been scattered within the development to effectively handle all runoff. The area outside of the building limits drains to the parking access road and is routed to the northwest corner to be discharged in the drainage channel. The existing drainage channel has been constructed to adequately handle all flows and will not encroach the site.

Tract B - The contributing area to the detention pond includes all roof area and access road area. The detention pond will be located on west portion of the tract. The pond has been sized to adequately detain 100-year 6-hour rainfall. Relief will be in the form of a 3' wide French drain along western line of Tract A to the drainage channel.

This approach will satisfy AMAFCA's requirement that the runoff rate from the development not exceed the runoff rate from the tract in its natural state.

TABLE 2

RUNOFF IN DEVELOPED STATE

Area Designation	Acreage A	C[3]	Q100 (C.F.S.)
Tract A Multi-family Area	5.18	.8	11.88
Tract B Comm -mini storage	3.54	.8	8.57

SUMMARY OF RESULTS

Total Undeveloped Runoff (see Page 3)		17.90 c.f.s.
Developed Runoff:		
Multi-family Area	11.88 c.f.s	
Comm.-Mini Storage	0 c.f.s.	
Total Developed Runoff		11.88 c.f.s

CONCLUSIONS

As shown above, the development of this project, including onsite ponding, will not increase the storm runoff over that occurring in the natural and undeveloped state. Since the runoff rates and volumes do not increase, the criterion for handling storm drainage set by Albuquerque Metropolitan Arroyo Flood Control (AMAFCA) are met.

Prepared by,

Robert L. Lucero

Carl A. Tebbens, P.E.
N.M.P.E. No. 6309

CARL A. TEBBENS
6309
NEW MEXICO
REGISTERED PROFESSIONAL ENGINEER

ACADEMY ACRES SUBDIVISION, TRACT A - UNIT 2

PARKING AREA FLOWS

C = .8

A-1	.22 Ac.	V = 1.7	
L = 123'	S = 0.4%	Tc = 1.21	
A-2	.03 Ac.	V = 1.6	
L = 40'	S = 6.7%	Tc = 0.42	
A-3	.31 Ac.	V = 2.5	
L = 132'	S = 1.5%	Tc = 0.88	
A-4	.3 Ac.	V = 2.5	Area - 1.61 Ac.
L = 175'	S = 1.5%	Tc = 1.17	Tc = 7.6 min.
A-5	.23 Ac.	V = 2.8	$I_{100} = \frac{189}{T + 25} = \frac{189}{7.6 + 25} = 5.8$ Use 5.4
L = 173'	S = 2.0%	Tc = 2.89	Q100 = CIA = .8 x 5.4 x 1.61 = 6.96 cfs

- -

B-1	.04 Ac.	V = 5.25	
L = 40'	S = 7.3%	Tc = 0.13	
B-2	.11 Ac.	V = 4.0	
L = 87'	S = [illegible]	Tc = 0.36	
B-3	.24 Ac.	V = 2.75	
L = 138'	S = 1.9%	Tc = 0.84	
B-4	.18 Ac.	V = 3.2	Area = 1.14 Ac.
L = 138	S = 2.5%	Tc = 0.72	Tc = 6.06 min.
B-5	.57 Ac.	V = 1.6	$I_{100} = \frac{189}{T+25} = \frac{189}{6.06+25} = 6.08$ Use 5.4
L = 385'	S = 0.3%	Tc = 4.01	Q100 = CIA = .8 x 5.4 x 1.14 = 4.92 cfs

ACADEMY ACRES SUBDIVISION, TRACT A - UNIT 2

PARKING AREA FLOWS

$Tc = 2.76$

$I_{100} = 5.4$

$C = .8$

Total Area = 2.75 Ac.

$Q_{100} = .8 \times 5.4 \times 2.75 = \underline{\underline{11.88}}$ cfs

PONDING REQUIREMENT

ACADEMY ACRES SUBDIVISION, TRACT A - UNIT 2

A. .26 Ac.

Pervious .06 Ac. = 23% @ .35 = .08

Impervious .20 Ac. = 77% @ .8 = .62

Total Ponded Area - 11325.6 Sq. Ft. = .7

Composite Runoff $C = C \times C_1^2 = .7 \times 1.25 = .88$

100 Yr. 6 Hr. Prec. = 2.4 in.

Volume = Runoff C x Area x Prec. = .88 x 11325.6 x .2 = 1993.31 cu.ft.

Minimum area of pond = 963 sq.ft.

Depth of pond = 2.07

Pond Area as % of Area Drained - 9% Use 10%

V = 10% x 11325.6 x 2.07 = 2344.4 cu.ft. (2.43' Dp.)

B. .94 Ac.

Pervious .42 Ac. = 45% @ .35 = .16

Impervious .52 Ac. = 55% @ .8 = .44

Total Ponded Area = 40946.4 sq.ft. @ .6

Composite Runoff $C = C \times C_1^2 = .6 \times 1.25 = .75$

100 Yr. 6 Hr. Prec. = 2.4 in.

Volume = Runoff C x Area x Prec. = .75 x 40946.4 x .2 = 6141.96 cu.ft.

Minimum Area of Pond = 3150 sq.ft.

Depth of Pond = 1.95'

Pond Area as % of Area Drained - 8% Use 10%

V - 10% x 40946.4 x 1.95' = 7984.55 cu.ft. (2.53' Dp.)

PONDING REQUIREMENT Cont.

C. .36 Ac.

Pervious .13 Ac. = 37% @ .35 = 0.13

Impervious .23 Ac. = 63% @ .8 = 0.50

Total Ponded Area - 15681.60 sq.ft. @ .63

Composite Runoff $C = C \times C_1^2 = .63 \times 1.25 = .79$

100 Yr. 6 Hr. Prec. = 2.4 in.

Volume = Runoff C x Area X prec. = .79 x 15681.6 x .2 = 2477.69 cu.ft.

Minimum Area of Pond = 2142 sq.ft.

Depth of Pond - 1.16'

Pond Area as a % of Area Drained - 14% Use 15%

V = 15% x 15681.6 x 1.16' = 2728.6 cu.ft. (1.27' Dp.)

D. .40 Ac.

Pervious .16 Ac. = 41% @ .35 = .14

Impervious .24 Ac. = 59% @ .8 = .47

Total Ponded Area = 17424 sq.ft. @ .61

Composite Runoff $C = C \times C_1^2 = .61 \times 1.25 = .76$

100 Yr. 6 Hr. Prec. = 2.4 in.

Volume = Runoff C x Area x Prec. = .76 x 17424 x .2 = 2643.45 cu.ft.

Minimum Area of Pond = 2025 sq.ft.

Depth of Pond = .76'

Pond Area as a % of Area Drained = 12% Use 15%

V = 15% x 17424 x .76 = 1986.34 cu.ft. (.98' Dp.)

PONDING REQUIREMENTS Contd.

E. .47 Ac.

Pervious .16 Ac. = 35% @ .35 = .12

Impervious .31 Ac. = 65% @ .8 = .52

Total Ponded Area = 20473.2 sq.ft. @ .64

Composite Runoff $C = C \times C_1^2 = .64 \times 1.25 = .8$

100 Yr. 6 Hr. Prec. = 2.4 in.

Volume = Runoff C x Area X Prec. = .8 x 20473.2 x .2 = 3275.71 cu.ft.

Minimum Area of Pond - 2700 sq.ft.

Depth of Pond = 1.21'

Pond Area as a % of Area Drained = 13% , Use 15%

V = 15% x 20473.2 x 1.21 = 3715.89 cu.ft. (.38' Dp.)

RHA
Letter Rec'd

E18-D2

RECEIVED
JUN 18 1979
CITY ENGINEER

June 18, 1979

Mr. Richard Heller, City Engineer
City of Albuquerque
P. O. Box 1293
Albuquerque, New Mexico 87103

Subject: Drainage Report, Track A, Unit 2 of Academy Acres Subdivision

Dear Mr. Heller:

Per your request of this date, DPI agrees to certify at the completion of construction that the as-built retention ponds for Unit 2 of the Academy Acres Subdivision will retain the quantity of water stated in the drainage report referenced above. It is hoped that this will assist your office in the review and approval of the drainage report for this project.

Please advise if you have any questions.

Sincerely,

DESIGN PROFESSIONALS, INC.

Richard H. Allen

Richard H. Allen, P.E.
Vice President

RHA:dm

cc: Bruno Conegliano

DESIGN PROFESSIONALS, INC.
4125 CARLISLE BOULEVARD, NE/ALBUQUERQUE, NEW MEXICO 87107/(505) 881-6336

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RICHARD G. VAUGHAN

Drainage file

E18-D2

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

MAYOR
David Rusk

May 31, 1979

Mr. Richard H. Allen
Design Professionals Inc.
4125 Carlisle Blvd. N.E.
Albuquerque, N.M. 87107

Ref: Drainage Report Tract A - Unit 2 Academy Acres Subdivision

Dear Mr. Allen:

The drainage report for the referenced development has been reviewed and the method of handling the internal drainage is acceptable in concept. Nevertheless, before approval is granted to the development plan, the question of the protection of the south bank of the arroyo bordering the property must be resolved in a satisfactory manner as discussed by Mr. Bruno Coneliano, of our office, with your Mr. G. Bolling. Either an amendment to the drainage report will be supplied indicating that erosion protection acceptable to this Office will be provided along the north boundary of this property, or an agreement acceptable to the City Attorney's Office will have been recorded, indicating the owners will contribute 50% of the cost of the channel protection at the time of construction of the improvements by the City. In the first case, it will be required that standard plans be submitted to all City Departments for review and an AHBA contract will have to be entered into by the Developer, to insure that the construction will be executed in conformance to City standards.

At the time of submission of the construction plans, site grading plans will have to be submitted at a scale no smaller than 1"=10', with sufficient details of the ponding areas, in terms of dimensions and configuration, to allow verification of the computation submitted, correctness of execution, and ease of inspection.

If you have any questions on these matters, please do not hesitate to call on me.

Very truly yours,

Richard Heller
City Engineer

BC/RH/ms

cc - Bruno Conegliano, Assistant City Eng-Hyrdrology
Drainage File
Richard Leonard - AMAFCA

Drainage file

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

February 13, 1978

Carl A. Tebbens
Murray-McCormick Inc.
2601 Wyoming Blvd.,NE
Albuquerque, New Mexico

RE: Drainage report for Tract A and a portion of Tract B
Academy Acres Subdivision Unit 2

Dear Mr. Tebbens:

The drainage report for the above captioned development has been reviewed and approved.

Very truly yours,

Bruno Conegliano
Asst. City Engineer-Hydrology

BC/gm

cc; Jim Smith
V.M. Kiamick
Drainage file

1 8 5 3