HYDROLOGY E11/D7 SADDLE RIDGE UNIT TWO

E11 / D7

SADDLE RIDGE

UNIT TWO

DRAINAGE REPORT

FOR

SADDLE RIDGE, UNIT TWO

PREPARED FOR

AMBELL

(A JOINT VENTURE OF DALE BELLAMAH LAND COMPANY AND AMDEC)

APRIL 1977

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A. PURPOSE AND SCOPE

AMBELL, a joint venture of AMDEC and Dale Bellamah Land Company, is progressively developing lands, known as Taylor Ranch, on the Albuquerque West Mesa. Saddle Ridge, Unit Two, is a replat of Tract B and Block One of Saddle Ridge (originally filed as Equestrian Estates) and an additional small tract of 11.8 acres.

B. SITE LOCATION AND TOPOGRAPHY

Saddle Ridge, Unit Two, is located in northwest Albuquerque immediately south of Montano Road, approximately one mile west of its intersection with Coors Road (See Plate I, Location Map). Ground topography is typical of the area -- sloping generally from west to east, with irregular contour patterns. Ground elevations vary from 5121 to 5111 (MSLD). Soils typically are composed of fine to very fine silts and sands, and ground cover consists mainly of rabbitbrush, yucca and cactus.

C. DESIGN CRITERIA

1. Engineering Parameters: For calculation of composite coefficients of runoff, the following values of "C" were taken for the indicated land coverages:

a)	Streets, roofs, walks	-0.90
b)	Lawns	-0.15
c)	Southwest landscaping	-0.60
d)	Natural ground	-0.35
e)	Bare earth	-0.45

In addition, all runoff volume calculations have been based on a 100 year-6 hour rainfall of 2.2" as per AMAFCA requirements. Rate of runoff calculations have been based on the frequency-intensity-duration relationship for a 100 year storm as presented by Gordon Herkenhoff and Associates in their 1963 Master Plan of Drainage for the City of Albuquerque. This relationship is expressed by the following equation: $I = 189/(Tc + 25)$

2. Flood Control Regulations: The drainage plan presented in this report has been designed to comply with the 1972 AMAFCA Resolution in regard to rate and volume leaving the site. That resolution has been interpreted to say that the rate and volume of runoff allowed to leave the site after development shall be no greater than that prior to development.

D. COMPUTATIONAL PROCEDURES

Appendix A contains samples of the various types of hydraulic calculations. Proposed easement channels were sized based on the Manning equation for uniform flow. Hydrological flow rate calculations are based on the rational runoff method. Times of concentration were calculated using the nomograph illustrated in Plate II. Estimates were made in percents of area covered by each coverage type described above in Section C-1 for each drainage sub-area. A composite runoff coefficient was then calculated for each sub-area.

Volume calculations for sizing individual lot ponds and for determination of net volumes of discharge for the entire site in both natural and developed states were performed by multiplication of the applicable C factor times the 100 year-6 hour rainfall (0.183) times the appropriate area to obtain cubic feet of water.

E. OFFSITE DRAINAGE

There are no offsite contributing areas. All runoff from the north is controlled by Montano Road; all runoff from the west is carried by Equestrian Drive, and the easterly boundary is contiguous with the proposed AMAFCA channel.

F. ONSITE DRAINAGE

Plate IV delineates the internal patterns of drainage for the site. In order to comply with AMAFCA regulations, it will be necessary to use the back yard ponding approach to control runoff. In this approach the rear portion of a given lot (from the centerline of the structure back) drains into a self-contained ponding area, thereby contributing no runoff to the streets. Plate V shows a typical plot plan utilizing this concept.

AMAFCA has constructed the drainage channel along the southeastern boundary of the project. It is currently a graded, excavated channel with no lining extending from Montano Road on the north to Dellgre Avenue on the south, being 3000 feet in length, and serving temporarily as a large storage reservoir. Drainage from area 3 terminates at a proposed drainage easement at point A, the paved concrete channel being under construction now in conjunction with Saddle Ridge Unit 1. Drainage from area 2 terminates at another proposed easement located at point B.

Area 1 is the equestrian center, and will therefore contain only horse stables and possibly a service building. These structures will represent only a small fraction of the total land area thereby increasing the overall runoff rate very little. For this reason, area 1 will be left to follow its present pattern of "sheet flow" drainage.

Table I itemizes areas, coefficients of runoff, and volumes of discharge for each sub-area of drainage shown on Plate IV. A summary tally of volumes of discharge in both the natural state and the developed state indicates that the back yard ponding approach will, in fact, meet AMFCA requirements. Estimated runoff volume before development is equal to 48,355 cubic feet; while after development, it is estimated that the runoff volume will be 44,985 cubic feet - a decrease of 7%.

Table II itemizes flow rates for control points A and B. These flow rates were used in sizing drainage easement B as well as for checking street carrying capacities. Drainage easement A was constructed with the development of Saddle Ridge Unit One. Since none of the proposed streets will have grades less than .0040, a quick check of Table III shows that standard 32' streets with 4" mountable curb will be acceptable in all cases. Such a street at .0040 has a capacity of 23 cfs., while the maximum flow rate in Table II is 12.4 cfs.

G. SUMMARY OF RECOMMENDATIONS

In conclusion, we make the following recommendations regarding drainage for Saddle Ridge Unit Two:

1. That back yard ponding be incorporated into the drainage plan for onsite drainage.

2. That an easement and corresponding paved channel be provided at point B on Plate IV.

TABLE I

VOLUME CALCULATIONS

Area Designation	Area (acres)	Area Running Off	% Area Running Off @ .9	% Area Running Off @ .15	% Area Running Off @ .6	% Area Running Off @ .35	% Area Running Off @ .45	Composite C	Natural Volume 100 Year 6 hr. Storm cu. ft.	Developed Volume 100 Year 6 hr. Storm cu. ft.
1	7.68	7.68	6.0	0	0	94.0	0	.383	21,466	23,490
2	7.68	3.63	46	18	18	0	18	.63	21,466	18,263
3*	1.94	0.71	35	22	22	0	21	.57	5,423	3,232
							TOTAL =		48,355	44,985
4**	1.54	0.65	49	17	17	0	17	.645	4,304	3,348

* Additional flows to Equestrian Drive - Pt. A, Plate IV, Saddle Ridge Unit No. 1 (Equestrian Estates)

** Included in Saddle Ridge Unit 1 - See Plate IV, Saddle Ridge Drainage Report; therefore not included in summary.

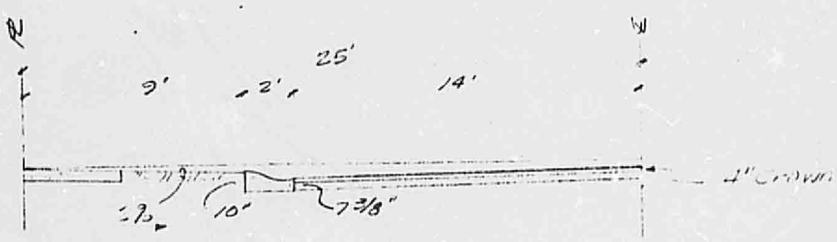
TABLE II

FLOW CALCULATIONS

POINT DESIGNATION	AREAS CONTRIBUTING	TRAVEL LENGTH (feet)	H (feet)	Tc (minutes)	I (100)= 189/T+25	Q = (CIA) c.f.s.
A	3	800	6	8.8 (use 10)	5.4	2.2
B	2	900	5	11	5.3	12.1

TABLE III

STREET CAPACITY w/ ROLL TYPE CURBS (3' overflow)



Areas

1. Outside Curb : $\frac{1}{2} \times 2 \times 9 =$ 0.90 ☐
2. Area above Curb (by planimeter) = 8.2 ☐
3. Area inside curb =

$$14 \times \left[\frac{(.22+.2)+(.09)}{2}\right] = 3.57 ☐$$

TOTAL = 5.29 ☐ (½ Street)

Total - Street = 10.58 ☐

Wetted Perimeter = 50'

n = 0.015

STREET CAPACITY TABLE

SLOPE (%)	STREET CAPACITY (C.F.S.)	VELOCITY (fps)
0.4	23	2.2
0.5	26	2.5
0.6	28	2.7
0.8	33	3.1
1.0	37	3.5

CHAMBERS, CAMPBELL, ISAACSON & CHAPLIN
ENGINEER-ARCHITECT-PLANNERS
ALBUQUERQUE, NEW MEXICO

SUBJECT SADDLERIDGE UNIT II
CLIENT Bellamah JOB NO.
BY TOJ DATE 6-19-77 SHEET NO. 1 OF 1

APPENDIX A

SAMPLE CALCULATIONS

1) Composite Runoff Coefficient - Residential Areas

(Area 1)

Total area running off = 334,540 sq. ft.

Hard surfaced area = (C = 0.90)

a) assume road
400' x 20' = 8,000 sq. ft.

b) assume stable = 12,000 sq. ft.

20,000

% = 20,000 ÷ 334,540 = 6%

Natural Ground = (C = .35)
100 - 6 = 94%

Composite C
0.90 x .06 + 0.35 x .94 = 0.38

(Area 2)

Total area running off = 158,120 sq. ft.

Hard surfaced area = (C = 0.90)

a) Streets
760' x 33' = 25,080 sq. ft.
41.5^2 x 2 ea. = 10,821
35,901

b) Sidewalks (one side of street only)
380' x 4' = 1,520

c) Driveways
18' x 36.5' x 21 ea. = 13,797

d) Roofs (1/2 producing runoff to street)
20' x 50' x 21 ea. = 21,000

Total Hard Surface = 72,218

% Hard Surfaced Area = 72,218 ÷ 158,120 = 46%

Lawns, Southwest Landscaping and Bare Earth

Total Area in % = 100 - 46 = 54

Assume 1/3 distribution of each or
1/3 x 54 = 1.8%

Composite C

0.90 x .46 + 0.15 x .18 + 0.45 x .18 + 0.60 x .18 = 0.63

(Area 3)

Total area running off = 30,930 sq. ft.

Hard surfaced area = (C = .90)

a) Streets and sidewalks = 0
(included in Saddle Ridge I Report)

b) Driveways
30' x 18' x 7 ea. = 3,780 sq. ft.

c) 1/2 Roof area
20' x 50' x 7 ea. = 7,000

10,780 sq. ft.

$\% = \frac{10,780}{30,930} = 35\%$

Lawns, Southwest Landscaping and Bare Earth

Total Area in % = 100 - 35 = 65%

Assume 1/3 distribution of each or

1/3 x 65	=	21.7%
use Lawns	=	22%
S.W. Landscape	=	22%
Bare Earth	=	21%
		65%

Composite C

0.9 x .35 + .15 x .22 + .45 x .27 + .60 x .22 = .57

2) Typical Backyard Pond Size

Typical lot = 90 x 140

Total area draining to pond = 90 x 90 = 8100 $ft.^2$

Area @ C = .9 = 1000 $ft.^2$

Area @ C = .15 = 2366 $ft.^2$

Area @ C = .6 = 2367 $ft.^2$

Area @ C = .45 = 2367 $ft.^2$

C (composite) = .46

Volume of runoff = .46 x (2.2/12) x 8100 = 683 $ft.^3$

Assume pond depth - 0.5'
Typical pond bottom length = 90 - 11.5 = 78.5'

$$\text{Typical pond bottom width} = \frac{683}{(.5)(78.5)} - 1.5 = 16'$$

NOTE: Formula for pond bottom width shown on Plate V is based on a proration of above figure according to variance of actual lot depth from 140' assumed figure.

3) Calculations for Easement Channel B
Manning Equation:

$$Q = \frac{A(1.49)(R^{2/3})(S^{1/2})}{n}$$

Bottom width = 9'-0"

Sideslopes = vertical = 0

Slope = .005 ft./ft.

d = 6" (.50 ft.)

n = .013 (concrete)

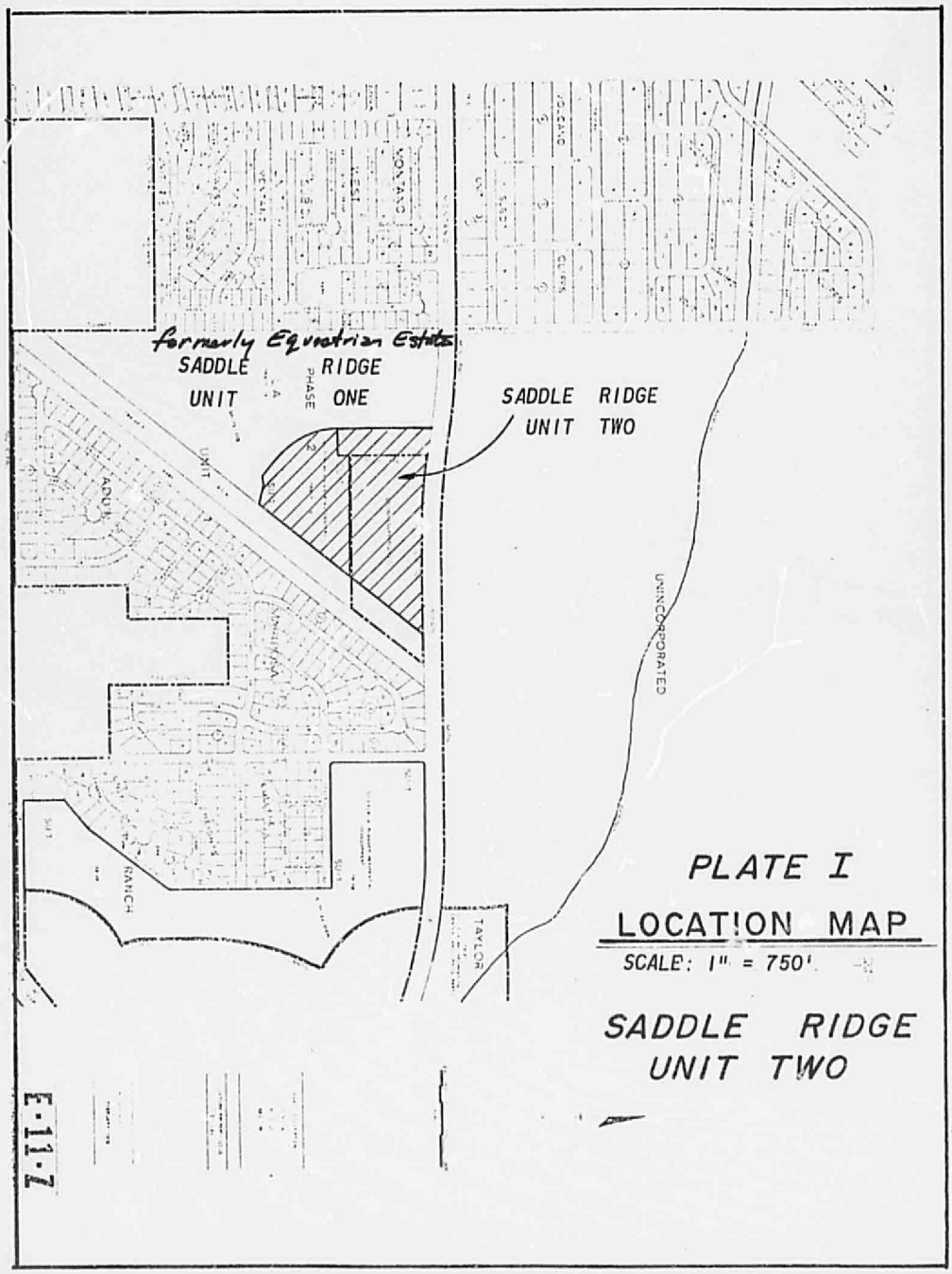
Q = 21.42 CFS: Required Capacity is 12.1 CFS

For curb widths, easement must be 10' wide.

Critical depth = $(g^2/q)^{1/3}$ = 0.39'

Critical velocity = 12.4 (.39 x 9) = 3.54 fps.

Ponding depth at entrance = 0.39 + $3.54^2/2g$ = 0.58' -- say 7"


formerly Equestrian Estates
SADDLE RIDGE
UNIT ONE
PHASE
SADDLE RIDGE
UNIT TWO
UNINCORPORATED
TAYLOR
RANCH
PLATE I
LOCATION MAP
SCALE: 1" = 750'
SADDLE RIDGE
UNIT TWO

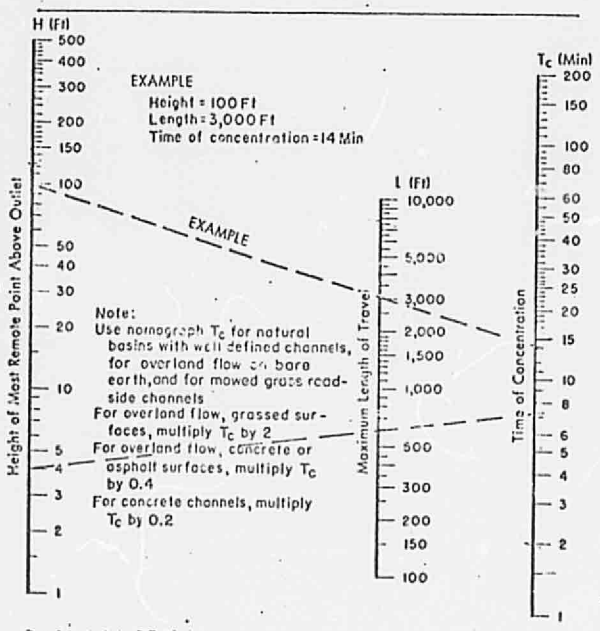
E-11-7

PLATE II

NOMOGRAPH

for determination of

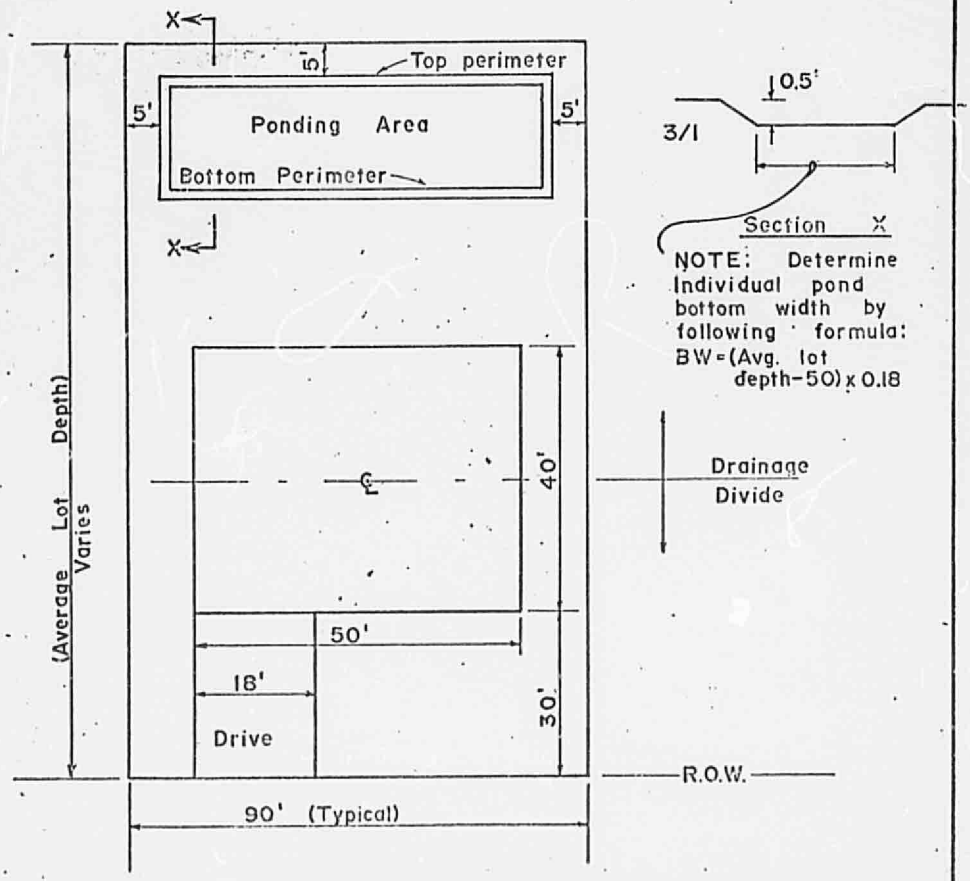
TIMES OF CONCENTRATION



Based on study by P.Z. Kirpich,
Civil Engineering, Vol. 10, No. 6, June 1940, p. 362

PLATE V

TYPICAL PLOT PLAN



SADDLE RIDGE UNIT TWO

PLATE IV

ON SITE DRAINAGE

1" = 100'

THIS MICROIMAGE IS THE BEST POSSIBLE REPRODUCTION DUE TO THE POOR QUALITY OF THE ORIGINAL DOCUMENT.

CHAMBERS - CAMPBELL
ISAACSON - CHAPLIN, INC.
ARCHITECTS · ENGINEERS · PLANNERS

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

MAYOR
Harry E. Kinney

CHIEF
ADMINISTRATIVE OFFICER
Frank A. Kleinhenz

drainage file

June 22, 1977

Tom Isaacson
Chambers, Campbell, Isaacson, Chaplin, Inc.
3500 Indian School Rd., N.E.
Albuquerque, New Mexico 87104

Dear Mr. Isaacson:

Please be advised that the drainage report for Saddle Ridge Unit 2 has been approved in its concept except for Tract Z.

When Tract Z will be developed, attention will have to be paid to the collection of the runoff in a separate drainage facility and conveyed in an appropriate manner to the Mariposa Channel in order to avoid slope erosion and possible bank failure.

If I can be of further assistance, please do not hesitate to contact me.

Very truly yours,

Bruno Conegliano
Assistant City Engineer-Hydrology

BC/kr

cc - Jim Smith AMAFCA
V. M. Kimmick, City Engineer
Dwayne Sheppard
Drainage File ✓

0410