HYDROLOGY E11/D11 TAYLOR RANCH EQUESTRIAN SUBDIVISION

E11 / D11

TAYLOR RANCH
EQUESTRIAN
SUBDIVISION

1 PLAN

CHAMBERS • CAMPBELL • ISAACSON • CHAPLIN, INC.
3500 INDIAN SCHOOL RD., N.E. / ALBUQUERQUE, NEW MEXICO 87106 / PHONE (505) 266-5521

July 15, 1976

RECEIVED
JUL 16 1976
CITY ENGINEERS

Mr. Kleston Laws
Drainage Engineer
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

REFERENCE: Taylor Ranch Equestrian Estates - Drainage Report

Dear Mr. Laws:

We are forwarding this letter as an addendum to the above referenced drainage report in recognition of the diversion plan submitted by Murray-McCormack for the arroyo crossing the southern tip of the subject property. I have been in touch with Murray-McCormack, and their plan coincides with our original report text with three minor exceptions:

1) The arroyo channel re-work indicated in our report will not be necessary since contractors working on the La Mariposa project will be constructing the improvements shown in the Murray-McCormack plan.

2) The 415 C.Y. ponding area shown in our report opposite the southerly cul-de-sac will be replaced by a larger one constructed by the same contractor. Chris Weiss assures me that the Murray-McCormack pond has been sized to accommodate runoff from our cul-de-sac and is actually oversized for that purpose.

3) The alignment of the Murray-McCormack berm crosses out of the drainage easement provided on Lot 60. This will be corrected on their plans and resubmitted to you.

Please contact us if there are any further questions.

Sincerely yours,

Kent M. Whitman

Kent M. Whitman, for
CHAMBERS, CAMPBELL,
ISAACSON & CHAPLIN, INC.

KMW:dd

cc: Mr. Joe Shipley

CHAMBERS • CAMPBELL • ISAACSON • CHAPLIN, INC.
3600 INDIAN SCHOOL RD., N.E. / ALBUQUERQUE, NEW MEXICO 87106 / PHONE (505) 266-5521

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CHAMBERS, CAMPBELL,
ISAACSON & CHAPLIN, INC.

KMW:dd

cc: Mr. Joe Shipley

CHAMBERS • CAMPBELL • ISAACSON • CHAPLIN, INC.
3500 INDIAN SCHOOL RD., N.E. / ALBUQUERQUE, NEW MEXICO 87106 / PHONE (505) 266-5521

January 26, 1976

RECEIVED
JAN 28 1976
CITY ENGINEERS

Mr. Kleston Laws
City Engineer's Office
P.O. Box 1293
Albuquerque, New Mexico 87103

RE: Drainage Report for
Taylor Ranch Equestrian Subdivision

Dear Mr. Laws:

Attached herewith please find one copy of the drainage report for the Taylor Ranch Equestrian Subdivision of Dale Ballamah Corporation. Please review this material at your leisure and advise us regarding its acceptability.

Thank you for your cooperation. Please contact us if you have any questions.

Sincerely yours,

Kent M. Whitman

Kent Whitman, for
CHAMBERS, CAMPBELL,
ISAACSON & CHAPLIN, INC.

KW:df

Enclosure

cc: Mr. Joe Shipley

CHAMBERS • CAMPBELL • ISAACSON • CHAPLIN, INC.
3500 INDIAN SCHOOL RD., N.E. / ALBUQUERQUE, NEW MEXICO 87106 / PHONE (505) 266-5521

March 4, 1976

RECEIVED
MAR 08 1976
CITY ENGINEERS

Mr. Kleston Laws
City Engineer's Office
P.O. Box 1293
Albuquerque, NM 87103

REFERENCE: Taylor Ranch Equestrian Subdivision,
Drainage Report

Dear Mr. Laws:

We are resubmitting the Drainage Report for Taylor Ranch Equestrian Subdivision with the revisions you requested. Mr. Shipley of Dale Bellamah Corporation advises me that they are presently negotiating with the State Engineer's Office to implement the previously devised plans for temporary impondment of upland flows. In light of this fact, we request that you approve subject report based on its compliance with the City of Albuquerque and AMAFCA regulations.

Thank you for your cooperation.

Sincerely yours,

Kent M. Whitman

Kent Whitman
Engineer

KW:dd

Enclosures

23 Mar 76

Chambers, Campbell, Isaacson and Chaplin, Inc
3500 Indian School Road, N.E.
Albuquerque, N.M. 87106

Re: Drainage report for Taylor Ranch Equestrian Subdivision.

Gentlemen:

The concept of the subject report is approved. Detailed construction plans and a grading plan shall be approved by the City Engineer prior to the approval of any construction in public easements.

These plans shall ~~[illegible]~~ solve these three areas of concern.

1. The 10 foot drainage easements shall have lined channels and avoid erosion into the ponds.
2. The runoff from area one shall be ponded.
3. Consideration shall be given to the arroyo crossing area 4.

The La Mariposa report assumes the proposed diversion will intercept these flows. Since that has not occurred and the same owner developed both subdivisions consideration must be given to the potential hazard.

The grading plan and detailed plans shall show ponding construction and should not be

deeper than the invert elevations shown in the West Mesa Drainage Management Plan.

If you have any question, please contact me.

VTY

KHL

cc John Robert

June 1, 1976

Memo
Celia Tomlinson
KH LAWS
Subject: Construction Plans Equestrian Estates

At a meeting held May 26, 1976 with this developer about La Mariposa decisions were made which will effect these plans. I do not believe these plans can be approved until La Mariposa is submitted and approved.

The sewer crossing on sheet 6 will have to be a permanent crossing. The 18" CMP shown will not provide for future flows.

Sheet 7: ~~[illegible]~~ references to detail sheets are not properly numbered. How does the equestrian access relate to driveways? Shouldn't we have concrete valley gutters across Arabian Drive.

Why do the equestrian accesses need to be 14 feet wide?

There are street grades less than 0.4%. Is this acceptable. It doesn't appear to be necessary on El. del Rey.

Shouldn't the cul de sacs have crown in them?

Sheet 10 doesn't appear to have matching grades and what happens

when the La Mariposa Diversion is constructed. Can a culvert be safely constructed. I think the City should carefully investigate a future culvert.

The rip rap at the end of the sundowns will fail. A new or different design is needed which gets water to invert of ponding areas.

We have no information on ponding areas in the drainage easement. La Mariposa is to furnish. If they don't it should be shown on these plans.

DRAINAGE REPORT

for

TAYLOR RANCH EQUESTRIAN SUBDIVISION

prepared for

AMBELL

(A joint venture of Bellamah Land Company and AMDEC)

by

CHAMBERS, CAMPBELL, ISAACSON & CHAPLIN, INC.
3500 Indian School Road, N.E.
Albuquerque, New Mexico 87106

THIS MICROIMAGE IS THE BEST

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PLATE V - TYPICAL PLOT PLAN

A) PURPOSE AND SCOPE

AMBELL, a joint venture of AMDEC and Dale Bellamah Land Company, is currently developing lands located along the Albuquerque West Mesa known as "Taylor Ranch". The Taylor Ranch Equestrian Subdivision is a small portion (approximately 43 acres) of the overall Taylor Ranch development project. The purpose of this report is to present a plan for controlling surface runoff from the Equestrian Subdivision in a manner acceptable to the Albuquerque Metropolitan Arroyo Flood Control Authority and to the Albuquerque City Engineer's office.

B) SITE LOCATION AND TOPOGRAPHY

The Taylor Ranch Equestrian Subdivision 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, but in random and irregular ground contour patterns. Ground elevations on the site vary from as high as 5126 MSLD to as low as 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) Southwestern landscaping - 0.6

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" 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 of runoff 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 the rate and volume running off prior to development.

D) COMPUTATIONAL PROCEDURES

Appendix A contains samples of the various types of hydraulic calculations performed. 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 of 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) OFF-SITE DRAINAGE

Offsite drainage approaches the site at two locations as shown on Plate III. A small portion of Montano West Subdivision drains onto Taylor Ranch Equestrian Subdivision near the northwest corner. This small piece of land is called area 5 and is included in the analysis of internal drainage for determination of flow rates and temporary ponding requirements only.

Runoff from a large drainage area approaches the southern tip of the property. This area has the potential to deliver 243 cfs. across lot 60 in a scantly defined arroyo located there. A drainage easement is proposed across lot 60 to insure that this runoff will have continued passage across the property. It is recommended that all house pads located in the vicinity of this arroyo be constructed at elevations no lower than 5,113 as a precaution against flooding by the arroyo.

F) ON-SITE 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 is planning to construct a drainage channel along the southeastern boundary of the project. When that facility is complete, all drainage leaving the site can be discharged into the channel. In the interim period, temporary ponding basins located within the channel easement are recommended for control of runoff from areas 2 through 5. Drainage from areas 2 and 5 terminates at a proposed drainage easement located at point A. Drainage from area 3 terminates at another proposed easement located at point B, and area 4 drains to point C via an R.O.W. extension.

Area 1 is the equestrian site, 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 AMAFCA requirements. Estimated runoff volume before development is equal to 124,850 cubic feet, while after development it is estimated that the runoff volume will be 101,690 cubic feet - a decrease of 19%.

Table II itemizes flow rates for control points A, B, and C. These flow rates were used in sizing drainage easements A & B as well as for checking street carrying capacities. Since none of the proposed streets will have grades less than .0025, a quick check of Table III shows that standard 32' crowned streets will be acceptable in all cases. Such a street at .0025 has a capacity of 37 cfs., while the maximum flow rate in Table II is 33.5 cfs.

G) SUMMARY OF RECOMMENDATIONS

In conclusion, we make the following recommendations regarding drainage for the Taylor Ranch Equestrian Subdivision:

1) That an easement be provided across lot 60 to provide continued safe passage of upland flows.

2) That house pads at the southern tip of the parcel be placed no lower than elevation 5113 as a safety precaution against flooding.

3) That back yard ponding be incorporated into the drainage plan for

TABLE I

VOLUME CALCULATIONS

2 & 5 = 2250 cy.
3 = 652
4 = 415

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	5.84	8.84	5.4	0	0	94.6	0	.38	24,709	26,780
2	22.11	8.99	49	17	17	0	17	.645	61,690	46,220
3	8.15	3.41	49	17	17	0	17	.645	22,740	17,530
4	5.65	2.17	49	17	17	0	17	.645	15,760	11,160
									Summary	Summary
									124,850	101,690
5*	-----	2.46	---	---	---	----	---	.74		14,538

1990

-23,160

116228 = 4305 cy.

* Information shown for Area 5 taken from Montano West Drainage Report. Since runoff requirements for Area 5 have been met within Montano West Subdivision, this area is not included in Summary Volume Calculations for Taylor Ranch Equestrian Subdivision.

TABLE II

FLOW CALCULATIONS

Point Designation	Areas Contributing	Travel Length (feet)	ΔH (feet)	Tc (minutes)	I 100	Q = Σ(CIA) c.f.s.*
A	2, 5	2060	15.5	18	4.4	33.5
B	3	1150	7	13	4.97	11
C	4	650	8	6 (use 10)	5.4	7.5

* L (Area 5) = 640' and ΔH (Area 5) = 6½' taken from Montano West Drainage Report.

TABLE III

STREET CARRYING CAPACITIFS
(CFS)

Slope	32' Street 6" Crown at center line or 6" sidehill with no crown	32' Street Flat Cross-section	32' Street 6" Inverted crown at center line	32' Street with 8" sidehill with no crown	32' Street with 12" sidehill with no crown	40' Street 6" Crown at center-line or 6" sidehill with no crown	44' Street 6" Crown at center-line or 6" sidehill with no crown	48' Street 6" Crown at center-line or 6" sidehill with no crown
0.0025	37	78	133	25	17	47	51	56
0.0050	53	111	189	36	23	66	72	79
0.0075	65	136	231	44	29	81	89	97
0.0100	75	156	267	51	33	93	102	112
0.0125	84	175	299	57	37	104	115	125
0.0150	92	193	328	62	41	114	126	138
0.0175	99	207	352	67	44	123	135	148
0.0200	105	221	376	71	47	131	144	158
0.0225	112	235	400	76	50	139	154	168
0.0250	118	247	422	80	52	147	162	177
0.0275	124	260	444	84	55	155	170	186
0.0300	129	271	462	88	57	161	177	193
0.0325	134	282	480	91	59	167	184	202
0.0350	139	293	499	95	62	174	191	209
0.0375	145	304	518	98	64	180	199	217
0.0400	149	313	534	101	66	186	205	224
0.0425	154	322	550	104	68	192	211	231
0.0450	158	332	566	107	70	197	217	237
0.0475	163	341	582	110	72	203	223	244
0.0500	167	350	598	113	74	208	230	251

Coefficient of Roughness = n = 0.015 for all streets.
Carrying Capacity Given in Cubic Feet per Second (C.F.S.)
Arterial Design (Stage & Final) has a +2% Slope from the Top of Curb to the top of Median Curb.
Curb Height = 8"

Reproduced from "Master Plan of Drainage for the City of Albuquerque" by Gordon Herkenhoff and Associates, 1963.

on-site drainage.

4) That easements and corresponding easement channels be provided at points A and B on Plate IV.

5) That temporary ponding basins be installed within the AMAFCA R.O.W. at points A, B, and C until the AMAFCA channel is installed.

APPENDIX A

SAMPLE CALCULATIONS

1) Off-Site Drainage Approaching Southern Corner

Matobin
269 acres

121.22 acres @ C = .47*
0.94 acres @ C = .9 *
13.73 acres @ C = .74*
12.48 acres @ C = .76*
25.37 acres @ C = .35
173.74

Tc (to south boundary Montano West Unit 2) = 29 min.*

Additional H = 2'
Additional L = 780'

Additional Tc = 13 min.

Tc total = 42 min.

I = 189/(Tc+25) = 2.82 in./hr.

Q = CIA = 243 cfs.

2) Composite Runoff Coefficient - Residential Areas

Estimated

% area running off @ .9 = 49

% area running off @ .15 = 17

% area running off @ .6 = 17

% area running off @ .45 = 17

C (composite) = (.49 x .9) + (.17 x .15) + (.17 x .6) + (.45 x .17)
= .645

---

* Taken from Drainage Report for Montano West Subdivision Unit 2.

3) 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 = 2366 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.

4) Calculations for Easement Channel A

Manning Equation:

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

Bottom width = 13'

Sideslopes = vertical = 0

Slope = .005 ft./ft.

Q = 33.5 cfs.

n = .013 (concrete)

from Manning Equation, depth = 0.52'
∴ standard 8" curb is satisfactory

Leaving 1' each side for curb widths, easement must be 15' wide.

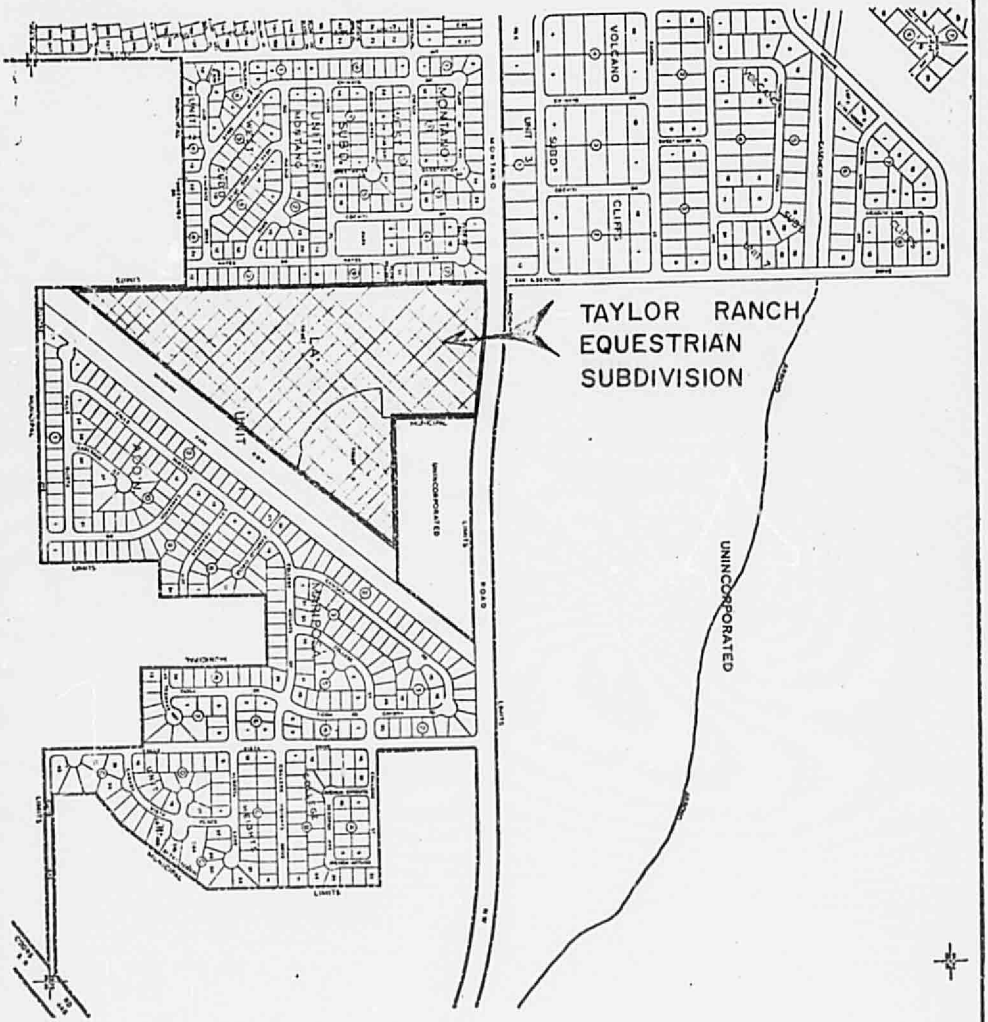
Froude = $V/\sqrt{dg}$ = 1.22

Critical depth = $(q^2/g)^{1/3}$ = 0.6'

Critical velocity = 33.5/(.6 x 13) = 4.37 fps.

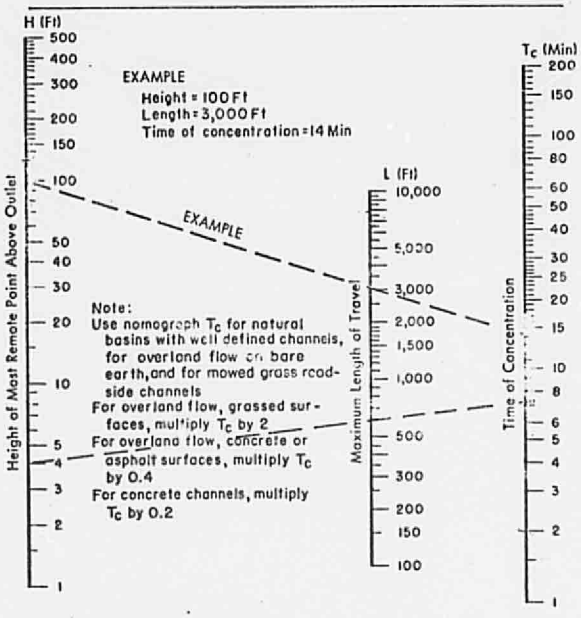
Ponding depth at entrance = $0.6 + 4.37^2/2g$ = 0.9' -- say 1'

PLATE I — LOCATION MAP



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

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

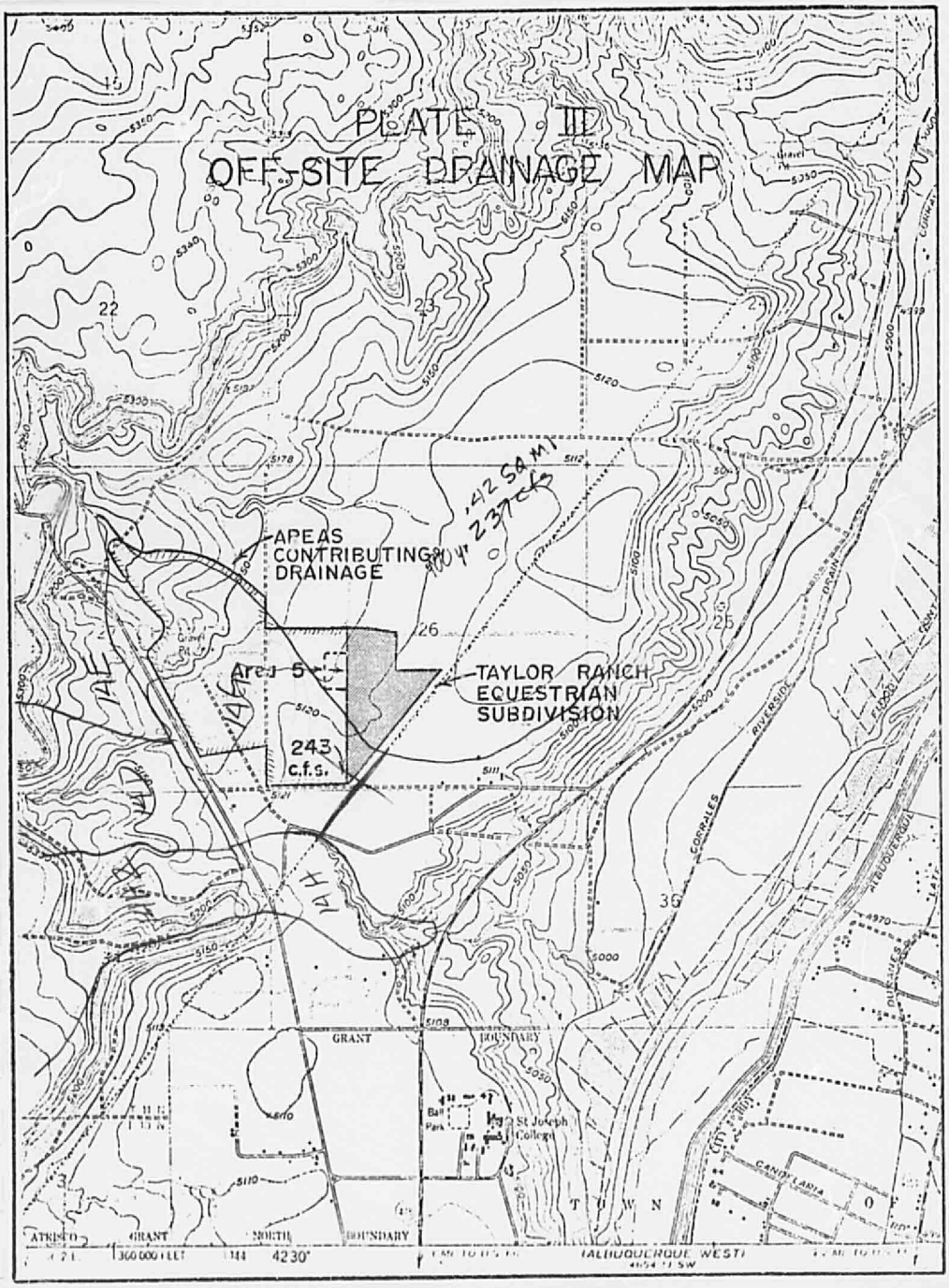
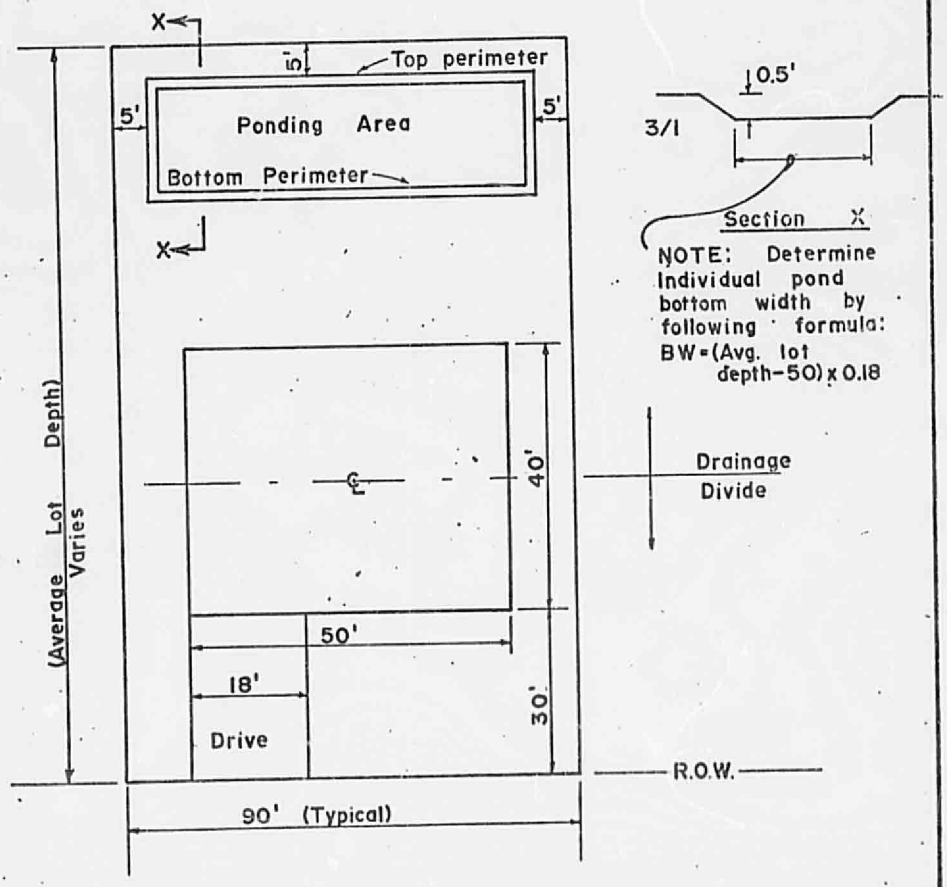


PLATE III
OFF-SITE DRAINAGE MAP
AREAS CONTRIBUTING DRAINAGE
.42 SQ MI
237 cfs
TAYLOR RANCH EQUESTRIAN SUBDIVISION
Area 5
243 c.f.s.
GRANT
BOUNDARY
St Joseph College
Ball Park
CORRALES
RIVERSIDE
DRAIN
ALBUQUERQUE
CANDELARIA
TOWN
ATRISCO
GRANT
NORTH
BOUNDARY
ALBUQUERQUE WEST

PLATE V

TYPICAL PLOT PLAN



0540