MEURER, SERAFINI AND MEURER, INC. CONSULTING ENGINEERS • SURVEYORS • PLANNERS

2601 WYOMING BLVD., N.E., SUITE F • ALBUQUERQUE, NEW MEXICO 87110 • (505) 292-1936

January 26, 1978

Mr. Bruno Conegliano
City of Albuquerque
P. O. Box 1293
Albuquerque, New Mexico 87103

Amendment to Drainage Report for Executive Ridge

1. Construct detention pond with capacity to detain 100-year storm runoff and positive outflow of 10-year storm runoff (See attached sheet for computations and Figure 2 for plan and details.)

2. La Gaza Loop East to Executive Ridge should be constructed to intercept flows from the eastern upland watershed and carry them west from the natural ridge line (see Figure 1). The roadway should have a flat cross section and it should be one foot below existing terrain. Flows north of ridge line should be allowed to pass to detention pond.

3. Downstream drainage facilities including the 20' drainage easement at Casa Grande Manor were taken into consideration. Construction of detention facilities will reduce the amount of runoff which now contribute to downstream subdivisions.

Exhibits

Figure 1 - 1 Drainage Boundaries and Location Map

Figure 2 - 2 Plan and Detail Sheet

Respectfully submitted,

MEURER, SERAFINI AND MEUERE, INC.

Robert L. Lucero

RLL:dw

Attachment

Rational Method - Overland Flow

Area = 6.51 Acres Composite "C" = .8

L = 1000'

S = 0.088

Diff. El. = 88'

Tc = 4.0 min.

I_{100} = 189/T + 25 = 189/4+25 = 189/29 = 6.5 use 5.4

Q100 = CIA = .8 x 5.4 x 6.51 = 28.12 cfs

I10 = Q10 =

Simple Method of Retention Basin Design with Positive Outflow

Area draining to pond = 6.51 Ac. Composite Runoff "C" = .8

Set allowable outflow = 16 cfs Equal to 10 year flow

$$Qo = \frac{\text{Allowable Outflow}}{\text{Area x Runoff "C"}} = \frac{16}{(6.51)(.8)} = 3.07 \text{ cfs/acre impervious}$$

$$T = -25 + \sqrt{\frac{7087.5}{Qo}} = -25 + \sqrt{\frac{7087.5}{3.07}} = 23.05 \text{ min.}$$

$$Vs = \frac{11340\ T}{T + 25} - 40\ QoT = \left[\frac{(11340)(23.05)}{(23.05)+(25)}\right] - \left[(40)(3.07)(23.05)\right]$$

$$5439.9 - 2830.54 =$$

$$2609.36 \text{ Ft}^3\text{/Acre Impervious}$$

Vt = Vs x Area x Runoff "C" = (2609.36)(6.51)(.8) = 13589.55 Ft.^3

Qo = Maximum outflow/acre imperviousness (cfs/ac.)

T = Storage Time; the instant storage begins until peak storage is attained in min.

Vs = Max. volume of water stored in retention basin/acre impervious (ft^3/ac.)

Vt = Max. Volume of water stored in retention basin (Ft^3)

Summary of Results

Area draining to pond = 6.51 ac.

100 year storm runoff = 28 cfs

10 year storm runoff = 16 cfs

Minimum volume of pond = 13600 ft^3 = 504 cu.yd.

Maximum allowable outflow = 16 cfs

Diameter of outlet pipe = 18" conc. pipe with 3.3' Hd.

Minimum slope of outlet pipe = 0.01

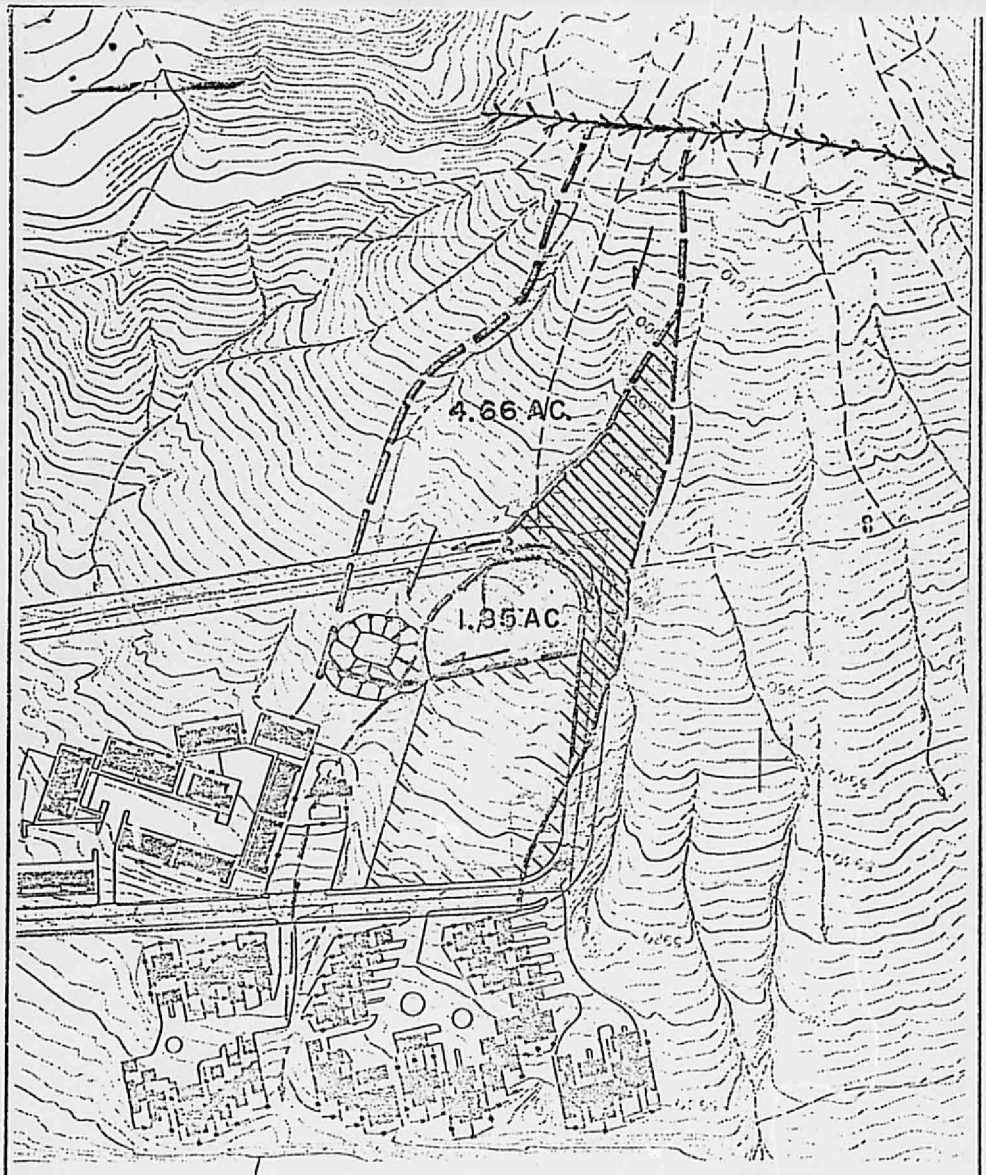

FIGURE 1

MEURER, SERAFINI AND MEURER, INC. JOB NO. 2010004 DATE 1-25-76

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2601 Wyoming Blvd., N.E. Albuquerque, New Mexico 87110

(505) 292-1935

PROJECT EXECUTIVE RIDGE DETENTION POND

SCALE 1" = 200'

MEURER, SERAFINI AND MEURER, INC. *CONSULTING ENGINEERS • SURVEYORS • PLANNERS*

2601 WYOMING BLVD., N.E., SUITE F • ALBUQUERQUE, NEW MEXICO 87110 • (505) 292-1936

October 5, 1977

City of Albuquerque
Public Works Department
Engineering Division
P. O. Box 1293
Albuquerque, New Mexico 87103

Attention: Mr. Bruno Conegliano
Asst. City Engineer-Hydrology

Re: Executive Ridge
La Villita, Tract 5

Gentlemen:

Submitted herewith are two (2) copies of the drainage report for the above townhouse development. Plans for the extension of utilities and pavement are now being prepared and therefore your early review and approval would be appreciated.

Very truly yours,

MEURER, SERAFINI AND MEURER, INC.

Thomas J. Haack

TJH:dw

cc: Tom Burlison
Bill Fanning

DRAINAGE REPORT

FOR

EXECUTIVE RIDGE

LA VILLITA - TRACT 5

MURRAY-McCORMICK, INC.
ENVIRONMENTAL DESIGN
ECOSYSTEMS ANALYSIS • PLANNING • LAND SURVEYS • ENGINEERING

2601 WYOMING BLVD., NE. SUITE F / ALBUQUERQUE, N.M. 87110 / 505-292-1936

DRAINAGE REPORT

FOR

EXECUTIVE RIDGE

LA VILLITA - TRACT 5

Prepared For

Burnside Enterprises, Inc.
P.O. Box 14807, Station G
Albuquerque, New Mexioc 87111

Prepared By

Meurer, Serafini, and Meurer, Inc.
2601-F Wyoming Blvd., N.E.
Albuquerque, New Mexico

(505) 292-1936

September 1977

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APPENDIX

EXHIBITS

DRAINAGE REPORT
FOR
EXECUTIVE RIDGE
TRACT 5, LA VILLITA

PURPOSE AND SCOPE

The purpose of this report is to present methods by which to limit the rate of runoff from the developed tract 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

Executive Ridge - Tract 5, La Villita, is located in the north-east heights of the City of Albuquerque, and is bounded on the east by a 125' Public Service Company of New Mexico utility easement; bounded on the north by La Villita - Tract #7; bounded on the west by La Villita - Tract #2; and bounded on the south by La Villita - Tract #3.

GENERAL SITE CHARACTERISTICS

The site encompassing 1.962 acres, more or less, slopes from east to west with an average slope of 8.5%-9%, and the soils are mainly granular decomposed granite.

PROPOSED DEVELOPMENT

Executive Ridge - Tract 5, La Villita will be developed as R-2 multi-family residences. Streets will be constructed to form

central drainage channels and retention of water falling on each lot will be required. This retention or onsite ponding of waters falling on each lot will be infiltrated onsite and thus not contribute to runoff.

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 primary drainage basin is in the form of sheet flow with general accumulation into several small arroyos. Offsite drainage from the east passes through the subdivision. The total runoff in the undeveloped site forms the basis for comparison with the flow in the developed state.

Table 1

RUNOFF IN UNDEVELOPED STATE

Elev. Diff.	Length of Flow	Tc[1].	I100 yr. In./Hr.	C[2].	Area Acres	Q C.F.S.
96'	1140'	7.5	5.4	.8	4.77	20.61
			Total Undeveloped Runoff			20.61

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 on-lot ponding. The contributing area to the backyard ponding includes the backyard, sideyard, and the total roof area. The area drained to the street includes the front yard, driveway, and sidewalk - parkway areas. This approach will satisfy AMAFCA's requirement that the runoff rate from the developed tract not exceed the runoff rate from the tract in its natural state.

1. See Appendix; Rational Method Calculations.
2. See Appendix; Composite "C" Computations.

Table 2

RUNOFF IN DEVELOPED STATE

Area Designation	Acreage A	C[3].	Q_{100} (C.F.S.)
Multi-Family Area	1.962	.75	5.99
O.S.1.	2.81	.8	12.14

SUMMARY OF RESULTS

Total Undeveloped Runoff (see page 3) 20.61

Developed Runoff:

O.S.1. 12.14 cfs

Multi-family area 5.99 cfs

Total Developed Runoff 18.13 cfs

CONCLUSIONS

As shown above, the development of this project including the lot 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:

Thomas J. Hauck

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

3. The runoff coefficient shown is a composite of the percentages of ponded and non-ponded lots. (See Appendix)

PROPOSED DEVELOPMENT AREA

Undeveloped Condition

Area = 1.962 ac.

L = 500'

S = 8%

C = .8

Tc = 2.4 min.

$I_{100} = \frac{189}{2.4125} = 6.9$ use (5.4)

Q = .8 x (5.4) x 1.962 = (8.48) cfs

Developed Condition

Ponded Area =

Lot Ponding = .276 ac.

Ponding Areas "A & B" = .21 ac.

Total Ponding AREa - .486 ac.

Streets, walks and drives	C = .8	.96 ac.)	) 57% = .45
Roofs	C = .8	.149 ac.)	
Lawns, Sandy Soils 5-10%	C - .35	.367 ac.	43% = .15
			.60

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

L = 470' S = 5.6%

Tc = 6 min

$I\ 100 = \frac{189}{6+25^2}$ 6.1 use (5.4)

Q = .75 x 6.1 x 1.48 = (5.99) cfs

Ponding Requirements

Typical Lot Area

Average Yard Area	602	sq.ft.
Roof Area	1082	sq.ft.
Patio Area	68	sq.ft.
Lawn Area	534	sq.ft.
Area Draining to Pond	1684	sq.ft.
Total Ponded Area	602 x 20 = .276 ac.	

Runoff Coefficient

Impervious Area	68 sq.ft.	11% @ .8 =	.088
Pervious Area	534 sq.ft.	89% @ .12 =	.107
			.195

$C \times C_1 = .195 \times 1.25 = .244$

Pond Volume Requirement

100-yr. 6-hr. precipitation = 2.7 in.

Volume = Runoff Coefficient x Area x Precipitation

V = .244 x 1684 x .225 = 92.45 cu.ft.

Minimun ARea of Pond = 184.9 sq.ft.

Depth of Pond - .6 = .5

Pond Area as a % of area drained = 11% use 15%

V = 15% x 1684 x .5 = 126.3 cu.ft.

O.S.1 2.81 ac.

L = 700'

El_h = 6004

El_l = 5946

Diff. in El = 58'

S = 8.3%

P = 2.7 in/hr

Tc = 3.2 min.

$I = \frac{189}{3.2 + 25} = 6.7$ use 5.4

C = .8

Q = .8 x (5.4) x 2.81 = (12.14) cfs

RUNOFF COMPUTATIONS

Sheet No. 1

Project: LA VILLITA - TRACT 5

Drainage Area No. A

Area = 4.38 acres

Maximum Overland Flow: L = 1140' S = 8.42%

Maximum Channel Flow:

Channel No. 1 L = _____ S = _____

Channel No. 2 L = _____ S = _____

Channel No. 3 L = _____ S = _____

Accumulation Time

Overland Flow or Inlet Time: 4.5 min.

Channel No. 1 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Channel No. 2 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Channel No. 3 Flow:

Velocity = _____ ft/sec; Time = _____ / X 60 = _____ min.

Total Accumulation Time: T = 4.5 min.

I = 189/4.5+25 = 189/29.5 = 6.4 use 5.4

Q = CIA = (.8) (5.4) (4.38) = 18.92 c.f.s.

Date: 9/23/77

Comp. by: R Juneau

Checked by: _____

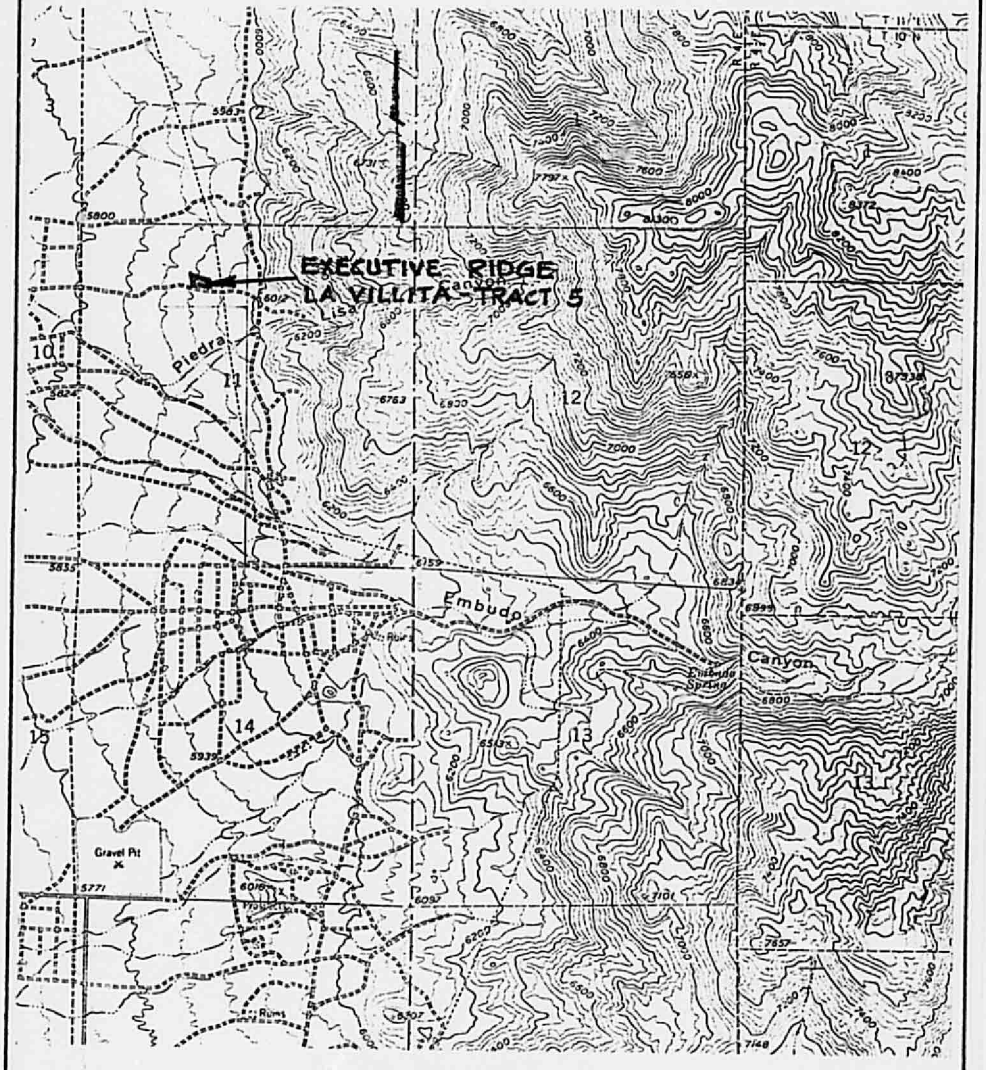
WEIGHTED RUNOFF COEFFICIENT

___ % Ponded @ ___ ___

___ % Non-Ponded @ ___ ___

___ % _____ @ ___ ___

100 % TOTAL ___



LOCATION AND VICINITY MAP

FIGURE 1

Genge/Murray-McCormick
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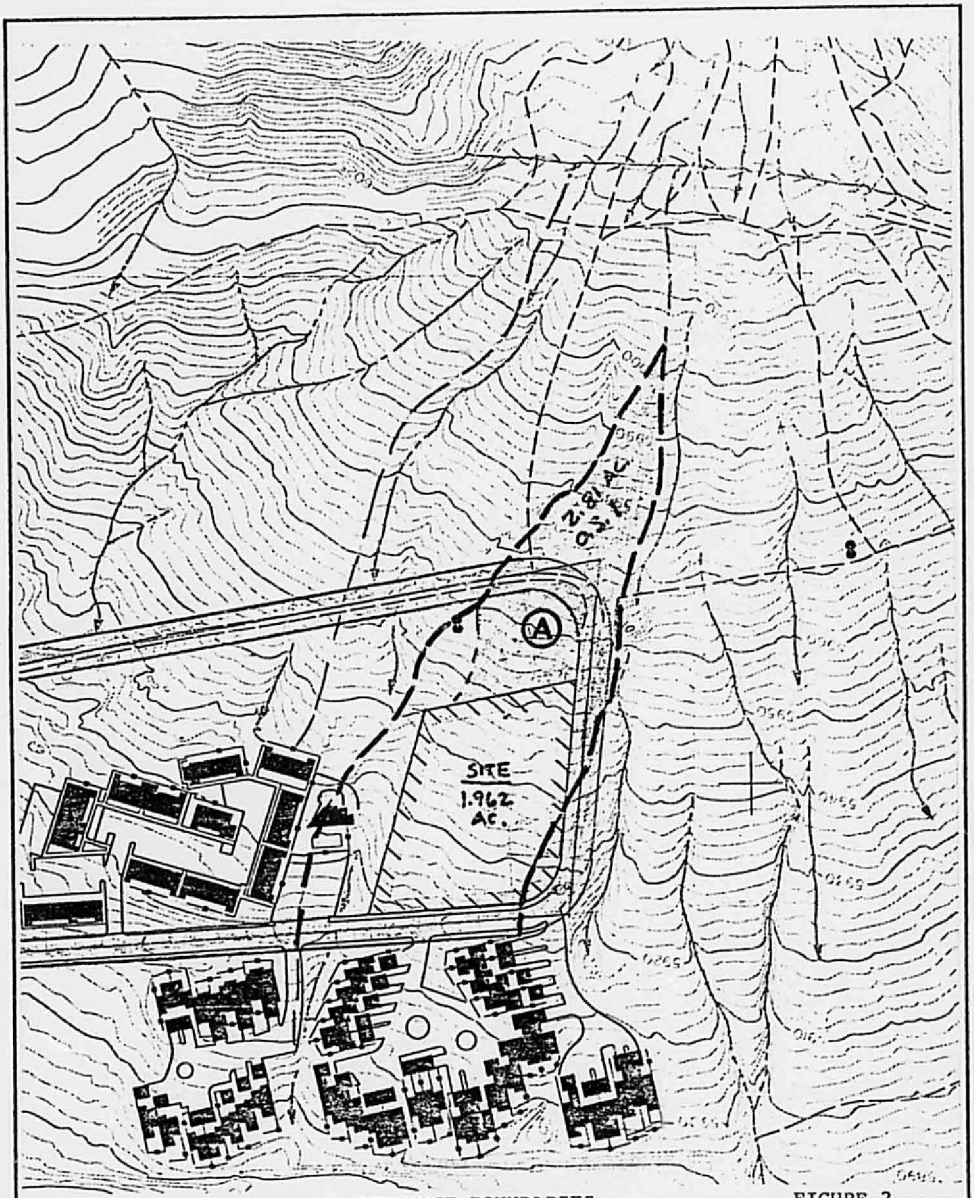
JOB NO. _____ DATE Sept. 77

PROJECT Executive Ridge

SCALE 1" = 2000'

2501 WYOMING BLVD., NE SUITE F / ALBUQUERQUE, NEW MEXICO 87110 / 505-298-1956



DRAINAGE BOUNDARIES FIGURE 2

Genge/Murray-McCormick
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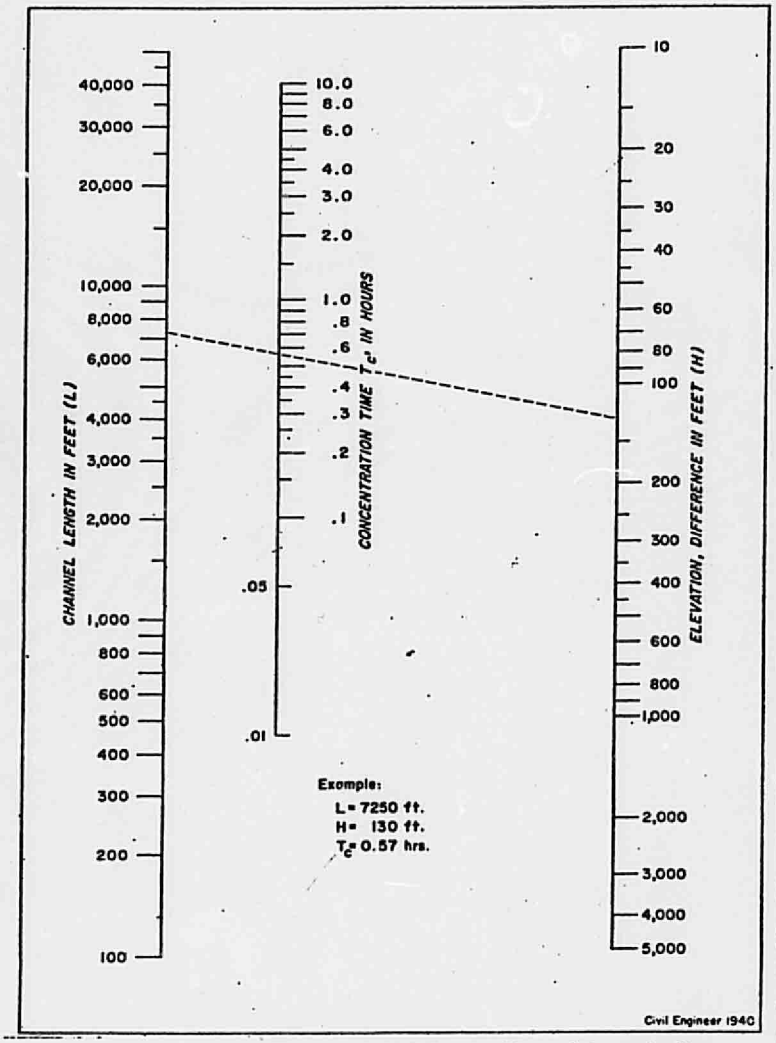
2401 WYOMING BLVD., NE SUITE F / ALBUQUERQUE, NEW MEXICO 87110 / 505-292-1538

JOB NO. _____ DATE Sept. 77

PROJECT Executive Ridge

SCALE 1" = 200'



Nomograph to Determine Time of Concentration

FIGURE 3

Genge/Murray-McCormick
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2601 WYOMING BLVD., NE SUITE F / ALBUQUERQUE, NEW MEXICO 87110 / 505-292-1936

JOB NO. _____ DATE Sept. 7

PROJECT EXECUTIVE RIDGE

SCALE N/A