

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

Ken Schultz Mayor UTILITY DEVELOPMENT DIVISION HYDROLOGY SECTION (505) 768-2650

August 19, 1987

Scott Verhines, P.E.
Scanlon & Associates
8008 Penn. Circle, NE
Albuquerque, New Mexico 87110

RE: DRAINAGE REPORT FOR FOUR HILLS WEST, UNIT ONE SUBMITTED FOR PRELIMINARY PLAT APPROVAL (M-22/D9)

Dear Scott:

Your submittal, referred to above, is approved for Preliminary Plat approval by Hydrology, subject to your attention on the following items:

- 1. As we discussed on the phone, a short description from you of the intended use of the swale ditch along the south property line would be helpful in justifying a grassed ditch as opposed to a concrete lined one.
- 2. Please include a preliminary design of the riprap to be placed at the upstream end of the concrete ditches through the property.
- 3. You will need to provide the necessary drainage easements, to include a blanket easement across the parcel to the west for flow to the Tijeras Arroyo, and a letter from the Albuquerque Open Space Department accepting the design of and maintenance responsibility for the grassed swale ditch along the south property line.

PUBLIC WORKS DEPARTMENT

Walter Nickerson, P.E., City Engineer

ENGINEERING GROUP

Telephone (505) 768-2500

Scott Verhines, P.E. August 19, 1987 Page 2

For Final Plat approval, you will need an approved Final Grading Plan, and an executed Subdivision Improvements Agreement.

For DRC approval by Hydrology, you will need to submit a final storm sewer design with profile, hydraulic grade line and HGL calculations, and the detail design of the energy dissipator at the outlet.

Thank you for your cooperation, and, if you have any questions, please call me at 768-2650.

Cordially,

G. Stuart Reeder, P.E.

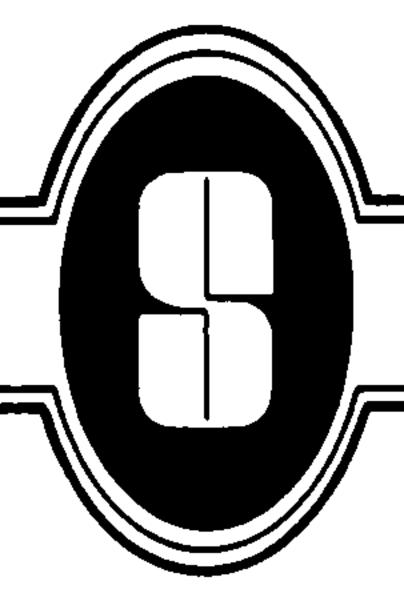
Shiant REEden

C.E./Hydrology Section

GSR/bsj

xc: Alan Ortega, BCD

LEGAL DESCRIPTION: Summary Plat for	Annexation Four Hills West
CITY ADDRESS: N/A	
ENGINEERING FIRM: Scanlon & Associate	
ADDRESS: 8008 Pennsylvania Cr.,	
OWNER: Bellamah Community Developen	
ADDRESS P.O. Box 3300	
ARCHITECT: N/A	
ADDRESS:	PHONE:
SURVEYOR: Scanlon & Associates, Inc.	CONTACT: J. Kyle
ADDRESS: 8008 Pennsylvania Cr.,	NE PHONE: 265-6941
CONTRACTOR:	CONTACT:
ADDRESS:	PHONE:
COPY OF CONFERENCE CRESETION SHEET PROVIDED	PROJECT NO
TYPE OF SUBMITTAL:	CHECK TYPE OF APPROVAL SOUGHT:
DRAINAGE REPORT	SKETCH PLAT APPROVAL
DRAINAGE PLAN	X PRELIMINARY PLAT APPROVAL
CONCEPTUAL GRADING & DRAIN. PLA	NSITE DEVELOPMENT PLAN APPROVAL
GRADING PLAN	FINAL PLAT APPROVAL
F EROSION CONTROL PLAN	BUILDING PERMIT APPROVAL
ENGINEER'S CERTIFICATION	FOUNDATION PERMIT APPROVAL
	CERTIFICATE OF OCCUPANCY APPROV
	ROUGH GRADING PERMIT APPROVAL
DATE SUBMITTED: 7-29-87	GRADING/PAVING PERMIT APPROVAL
DATE SUBMITION.	



SCANLON ASSOCIATES

CONSULTING ENGINEERS

July 24, 1987

87107.2

Mr. G. Stuart Reeder, P.E., Civil Engineer Utility Development/Hydrology Section City of Albuquerque P. O. Box 1293
Albuquerque, New Mexico 87103

JUL 30 1987

HYDROLOGY SECTION

Re: Four Hills West Unit One - Drainage Report

Dear Mr. Reeder:

Please find attached, a revised submittal incorporating the additional information you requested in your letter of June 3, 1987 and/or responses as described below. I have numbered the following responses to correspond to your letter.

- 1. A copy of the most current plat of the property entitled "Summary Plat for Annexation, Four Hills West" is included with the current submittal.
- The approximate physical location of monument ACS 5-M22 is shown on Figure 1 and a description, including X,Y,Z coordinates, is included in the current submittal.
- We have included a copy of a portion of the SKETCH PLAT for FOUR HILLS WEST in this submittal, delineating the 100 year flood boundary as taken from FIRM 35002 0037G.
- 4. A delineation of the site and contributing offsite watersheds on SCS Bernalillo County Soil Survey Maps is included in the current submittal.
- 5,7,8,11. Please refer to the Drainage Study for Vista Four Hills, prepared by Bohannan-Huston, in regard to these questions. Since we acquired a copy of the report from your office I'm sure you have the information from this accepted study. The report contains several large figures which address your questions, but are unwieldy to copy in the current submittal.
- The Plat referred to in item 1 above denotes existing easement across the property.

Mr. G. Stuart Reeder, PE July 24, 1987 Page 2

- 9. Storm sewer characteristics will be submitted prior to final plat
- 10,12,13. A copy of the proposed street grades plan showing proposed spot elevations and grades is included with the current submittal.
- There are two proposed drainage easements shown on the proposed street grades plan, each 10 ft. in width, along the south boundary.
- 14. A typical detail of the proposed swale along the south boundary is included with the current submittal.
- 15,16. Please refer to Figure 3 for the location and configuration of a temporary energy dissipator just downstream of Unit One. This is intended to be a similar installation to the existing facility at the east boundary of UNIT ONE for runoff from VISTA FOUR HILLS and upland areas. When the next Unit is developed, the west of UNIT ONE, the 30" storm drain will be extended through to the Tijeras Arroyo via a future configuration.
- The Tijeras Arroyo Drainage Management Plan prepared by Bovay Engineers for AMAFCA, indicates 100 year flood flows of 22,600 cfs for the reach of the Tijeras Arroyo east of KAFB, based on hydrology developed by the Corps of Engineers. The estimated increase in runoff from development of UNIT ONE is approximately 14 cfs which is negligible with regard to its effect on the Arroyo.
- 18. An Erosion Control Plan is being prepared as a separate document and will be submitted prior to submittal of final plat.

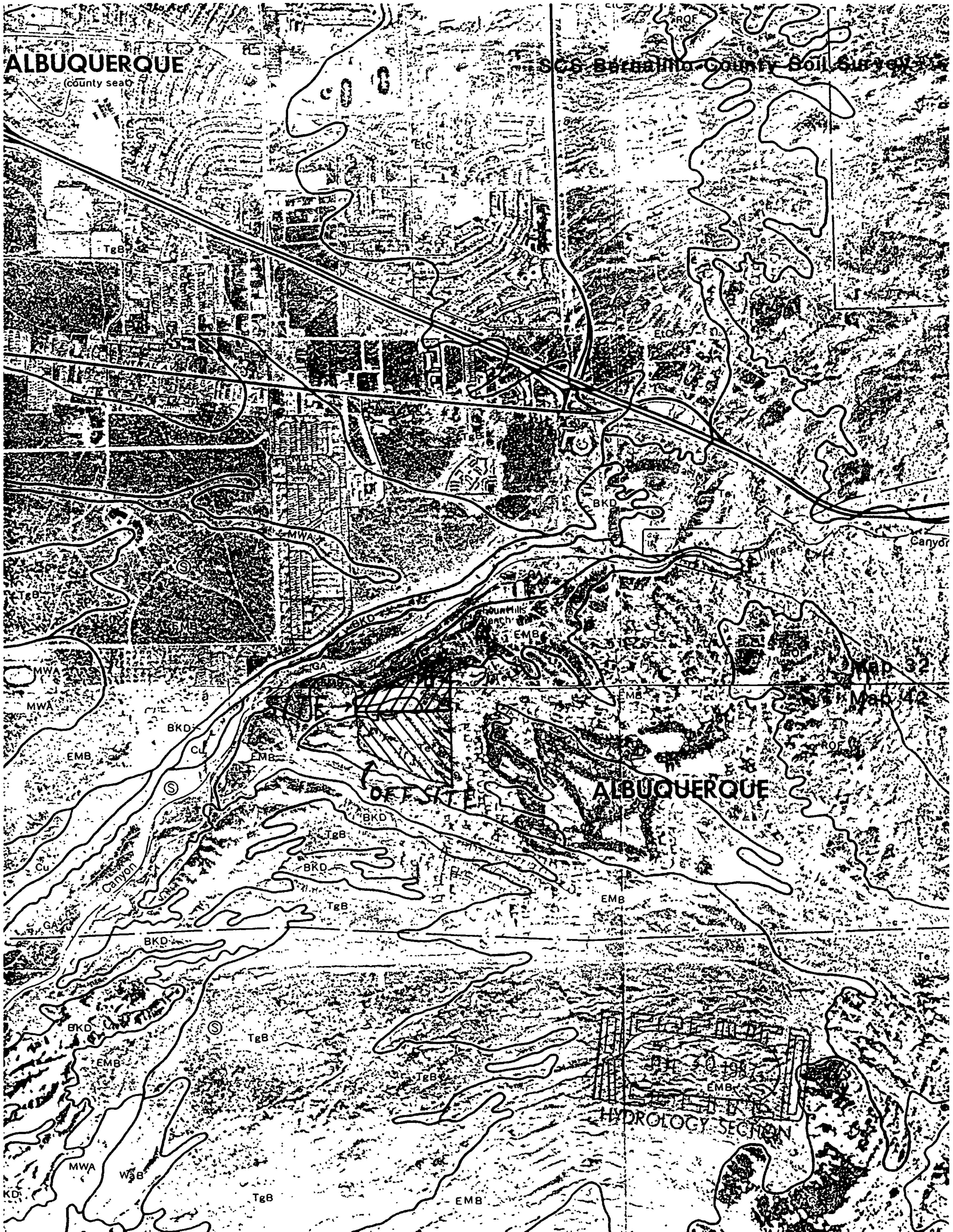
Please contact us if you have any questions. Thank you for your attention.

Sincerely,

SCANLON AND ASSOCIATES, INC.

Scøtt A. Verhines, PE

CONTROL STATION			Public Work Engineeri	rque, tiew Mexico. s Department ing Division
Name of Station 5-M22	State]	New Mexico	co. Bern.	TOPE LINE 1
Establishing Agency_ACS			artyS. Trujillo	•
SectionTownship	Range	Map No. M-22		
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City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

Ken Schultz Mayor

UTILITY DEVELOPMENT DIVISION HYDROLOGY SECTION (505) 768-2650

June 3, 1987

Scott A. Verhines, P.E. Scanlon & Associates, Inc. 8008 Pennsylvania Circle, NE Albuquerque, New Mexico 87110

RE: DRAINAGE REPORT FOR FOUR HILLS WEST, UNIT ONE - RECEIVED MAY 26, 1987 FOR PRELIMINARY PLAT APPROVAL M22/09

Dear Mr. Verhines:

The submittal referred to above is above is adequate for the areas it addresses. It does not, however, furnish enough information to be granted Preliminary Plat approval.

Would you kindly provide the following information or answers in a revised submittal:

- 1. A legal description or current plat of the property;
- Bench Mark the location, description and elevation of the nearest Albuquerque Control Survey Vertical Datum;
- 3. Flood Hazard the delineation of the site on the pertinent Flood Hazard Boundary Map: your FIGURE 1 does not address the UNIT 1 area, and the 11 x 17 copies are incorrect;
- 4. Watershed Soils the delineation of the site and contributing off-site watersheds on SCS Bernalillo County Soil Survey Maps;
- 5. Identification of all existing drainage facilities located on-site or on adjacent property and the pertinent elevations of same;

PUBLIC WORKS DEPARTMENT

ENGINEERING GROUP

Telephone (505) 768-2500

Walter Nickerson, P.E., City Engineer

- 6. An indication of all existing easements and rights-of-way on or adjacent to the site with dimensions and purpose shown;
- 7. The existing city top-of-curb and flow-line elevations fo streets abutting the property (mean sea level designations);
- Watershed Area show all areas of contributing watersheds, those to the east as well as to the south, on an Albuquerque Ortho-Topo Area Map:
- Show the proposed storm sewer characteristics including capacity and hydraulic grade line calculations;
- 10. Show the proposed contours.
- 11. Indicate all proposed easements and rights-of-way, on or adjacent to the site, with dimensions shown;
- Indicate all street grades with flow lines defined by arrows, and spot elevation with mean sea level designations;
- 13. Elevations along property lines with the relationship to the adjacent top of curb (remember that retaining walls are necessary for grade changes of eighteen inches or more);
- Details of the swale to be cut around the south side of the property;
- 15. Definition, location, and configuration of the required downstream drainage facilities, and the rights-of-way or easements necessary to accommodate them:
- 16. The method of discharging run-off into the Tijeras Arroyo with attention paid to erosion control;
- 17. Verification that the downstream capacity of the Tijeras Arroyo is adequate for the increased run-off.
- An Erosion Control Plan. 18.

Scott A. Verhines, P.E. June 3, 1987
Page 3

You will find the requirements for the Drainage Plan submittals detailed in the <u>Development Process Manual</u>, Volume II, Chapter 22, pp. 104-107.

If you have any questions, please feel free to call me at 768-2650.

Cordially,

G. Stuart Reeder, P.E. Civil Engineer/Hydrology

GSR/bsj

DRAINAGE INFORMATION SHELL

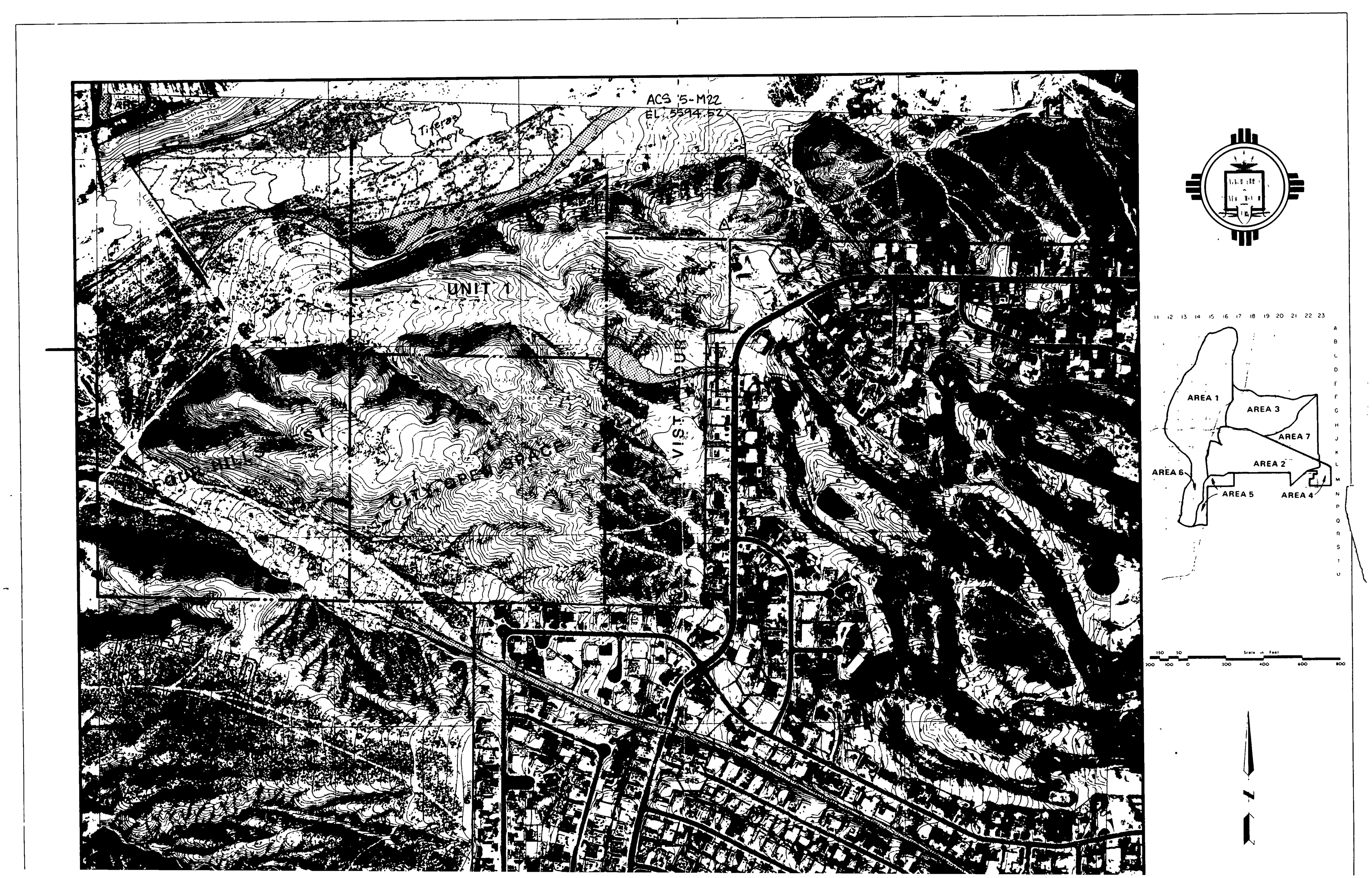
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LEGAL DESCRIPTION: Four Hills West	Sec. 34 TION R 4 E
CITY ADDRESS: Not available	
ENGINEERING FIRM: Scanlon + Associates	CONTACT: Scott Verhines
ADDRESS: BOOB Rennsylvania Cr. H	5 PHONE: 265-694/
OHNER: Bellamah Community De	v. contact: Alan Ortega
ADDRESS 6/2/ Indian School NE	PHONE: 884-6606
ARCHITECT:	CONTACT:
ADDRESS:	PHONE:
SURVEYOR:	CONTACT:
ADDRESS:	PHONE:
CONTRACTOR:	CONTACT:
ADDRESS:	PHONE:
YES NO COPY OF CONFERENCE RECAP SHEET PROVIDED	DRB NO. 87-40 EPC NO PROJECT NO
TYPE OF SUBMITTAL:	CHECK TYPE OF APPROVAL SOUGHT:
DRAINAGE REPORT	SKETCH PLAT APPROVAL
DRAINAGE PLAN	X PRELIMINARY PLAT APPROVAL
CONCEPTUAL GRADING & DRAIN. PLAN	SITE DEVELOPMENT PLAN APPROVAL
GRADING PLAN	FINAL PLAT APPROVAL
EROSION CONTROL PLAN	BUILDING PERMIT APPROVAL
ENGINEER'S CERTIFICATION	FOUNDATION PERMIT APPROVAL
	CERTIFICATE OF OCCUPANCY APPROVAL
	ROUGH GRADING PERMIT APPROVAL
DATE SUBMITTED: 5/22/87	GRADING/PAVING PERMIT APPROVAL
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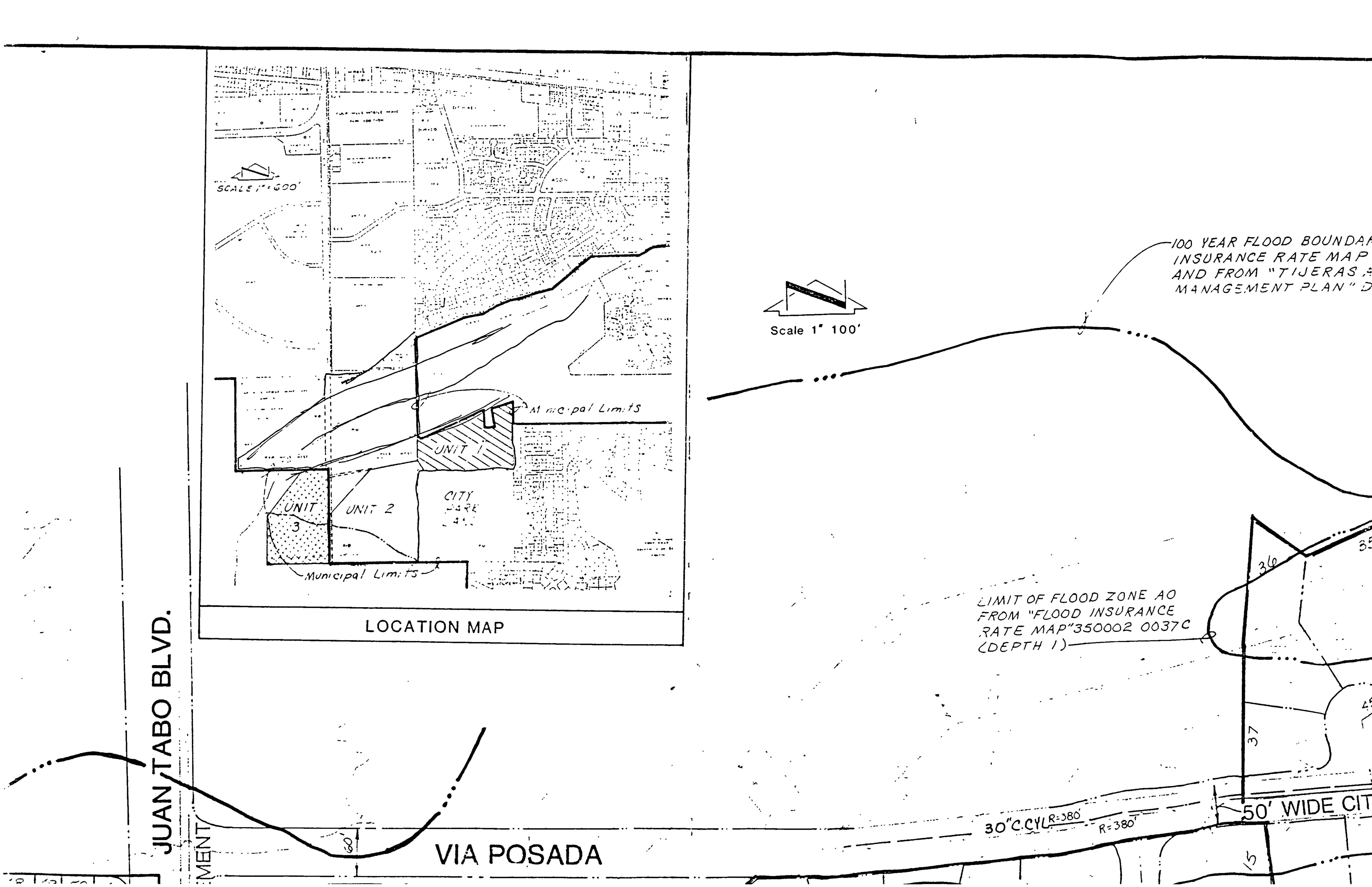
CITY OF ALBUQUERQUE MUN.LIPAL DEVELOPMENT DEPARTMENT ENGINEERING DIVISION/DESIGN HYDROLOGY SECTION

CONFERENCE RECAP

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SCANLON & ASSOCIATES, INC.

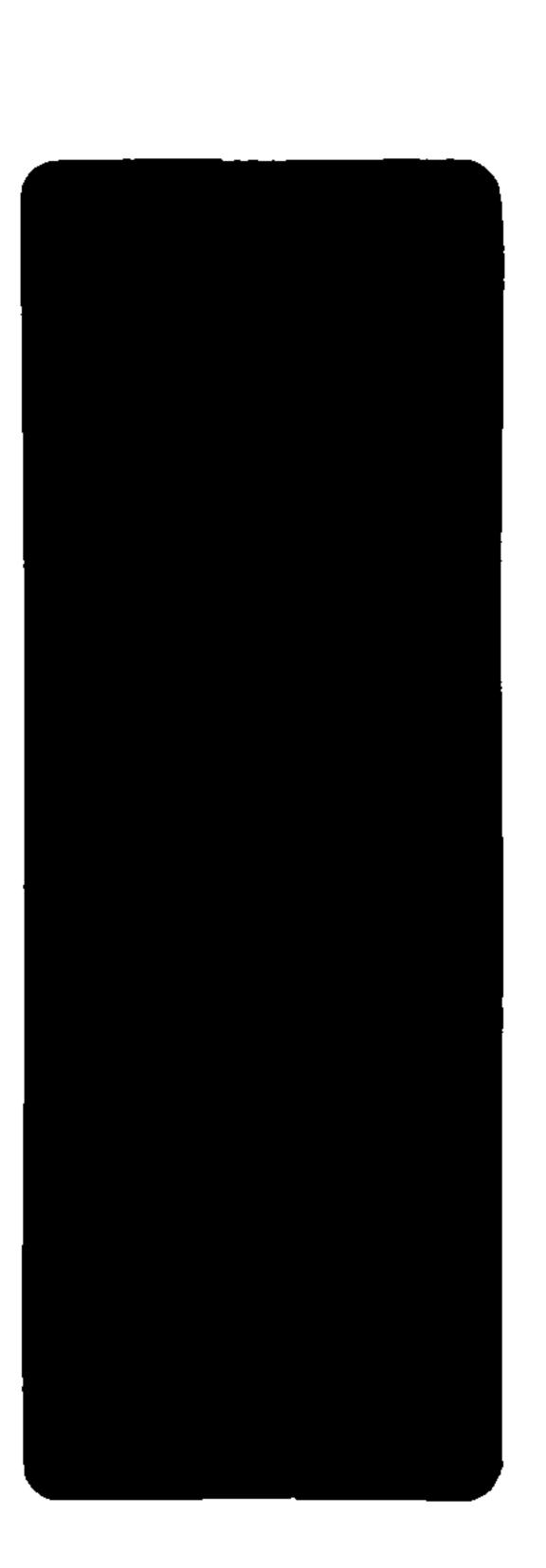


8008 Pennsylvania Circle N.E. Albuquerque, New Mexico 87110-7897 (505) 265-6941

510 West Texas Artesia, New Mexico 88210-2041 (505) 748-1010

1570 Pacheco Street, Suite A7 Santa Fe, New Mexico 87504-3981 (505) 983-3323

1700 West Albany, Suite 100-D Broken Arrow, Oklahoma 74012-1419 (918) 258-2572





DRAINAGE ANALYSIS for Four Hills West - Unit One May 1987

prepared for Bellamah Community Development

by

Scanlon and Associates, Inc. HYDROLOGY SECTION

Job No. 87107

CITY OF ALBUQUERQUE MUNICIPAL DEVELOPMENT DEPARTMENT ENGINEERING DIVISION/DESIGN HYDROLOGY SECTION

CONFERENCE RECAP

SUBJECT: FOUR HILLS WEST UN STREET ADDRESS (IF KNOWN): SUBDIVISION NAME: FOUR HILLS WEST APPROVAL RE	57 LL-1
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ATTENDANCE: Scott VERHINGS	SCANLON & ASSOC
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INTRODUCTION

The intent of this report is to present an analysis of the storm drainage generated by, accepted from off-site, and conveyed across UNIT ONE of the proposed Four Hills West Development. Unit One is the first phase to be developed, of the property as shown on the "Summary Plat for Annexation - FOUR HILLS WEST", October 1980.

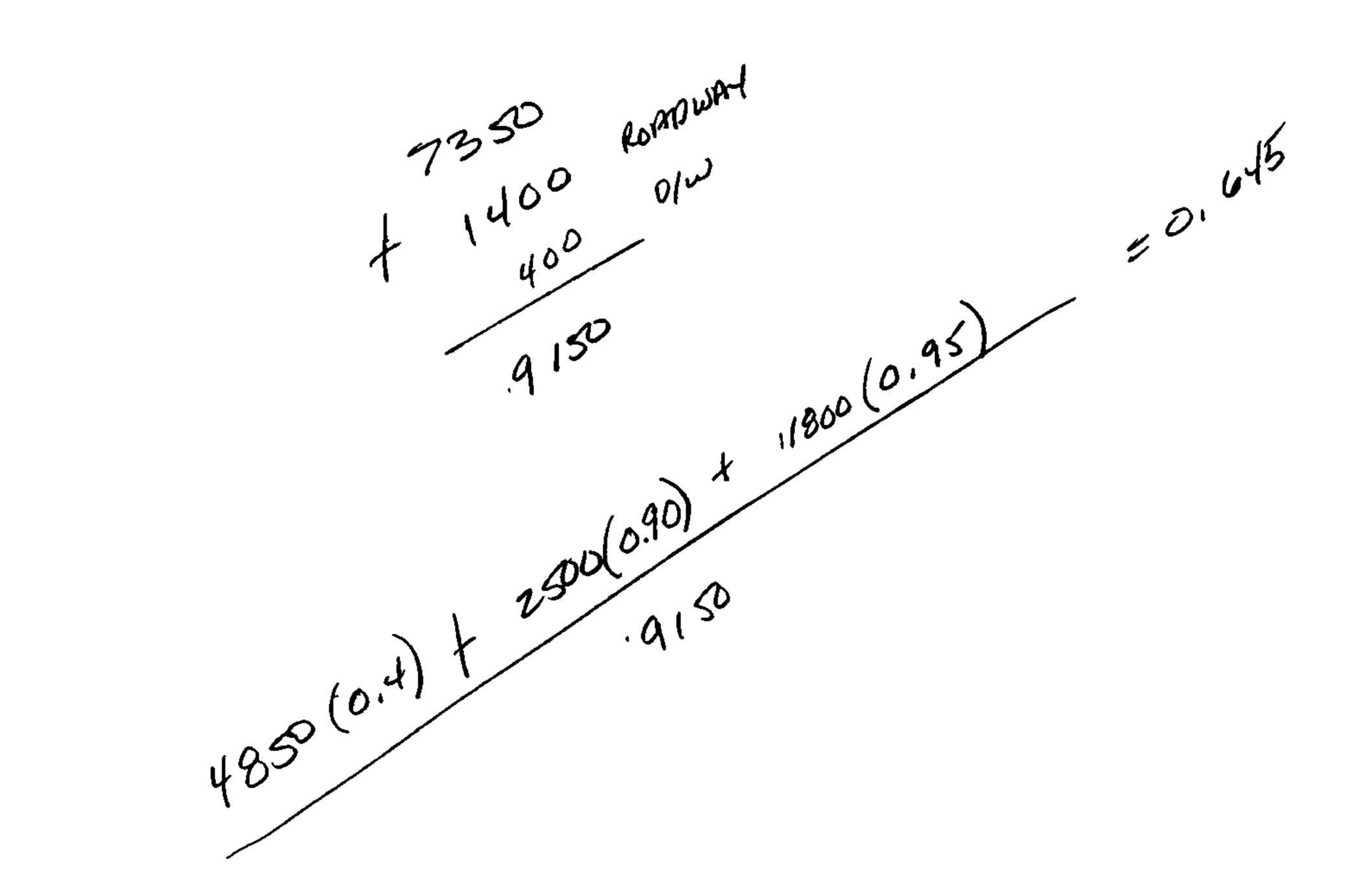
The site comprises approximately 15.3 acres and is characterized by low native grasses and brush. Unit One is bounded on the north by "Lands N/F of Roberson Const. Co.", on the east by the Vista Four Hills development, on the south by City of Albuquerque open space lands, and on the west by the remaining Four Hills West properties. The site location is shown on a copy of Zone Atlas pages M-22 of the Albuquerque Master Drainage Study (AMDS), as Figure 1 in the Appendix.

The property generally slopes from east to west, and existing grades across the site vary between 3% and 35%. There is an existing arroyo crossing the property, east to west, which accepts both surface runoff and discharge from a 30" RCP storm drain, at the east property boundary, from the Vista Four Hills development and upland basins. A drainage report, prepared by Bohannan-Huston for the Vista Four Hills subdivision, estimates those 100 year discharges at 53.9 cfs (surface) and 60.3 cfs (pipe).

Existing soils generally exhibit Hydrologic Soil Group = "B", as taken from the Soil Survey of Bernalillo County.

Off-site flows are also accepted by the site, from four small sub-basins originating within the City's open space property to the south. A delineation of those sub-basins and their respective hydrologic parameters are shown in Figure 2 in the Appendix.

Due to the relatively small drainage basins involved and short times of concentration, the "rational method" was chosen for computing peak runoff rates.



ANALYSIS

- Equations and values used:
 - Rational formula:

Q = CiA where: Q = peak runoff rate (cf)

i = rainfall intensity (in./hr.)

A = drainage area (acres)

C = runoff coefficient (c-value)

B. Time of concentration:

Kirpich Equation: Tc = $0.0078(L^0.77/S^0.385)$

where: Tc = time of concentration (min)

L = hydraulic basin length (ft) S = hydraulic basin slope (ft/ft)

Land use C-values:

1.	Undeveloped areas	0.40
2.	Roadways	0.95
3.	Roof areas	0.90

Lawns, landscaping, etc. Developed lot composite:

a. typical lot = 70' x 105'= 7350 ft² b. typical pad = 50' x 50'= 2500 ft² c. typical yard = 7350 - 2500 = 4850 ft² $+\frac{1}{2}$ of A

Composite C-value =

$$\frac{4850(0.25) + 2500 (0.90)}{7350} = 0.47$$

0.25

- Rainfall Depth:
 - From DPM Plate 22.2 D-1 100 year depth = 2.45" (6-hour)

Off-site Flows:

From south (City open space property):

20'×20' DRIVEWHY.

Sub-basin	Tc(min.)	Rainfall Intensity I100(in/hr.)	<u>C-value</u>	Area(acres)	Peak Q ₁₀₀ (cfs)
A	10	5.29	0.40	, 0.73	1.54
В	10	5.29	0.40	14.07	29.77~
C	10	5.29	0.40	3.53	7.47
D	10	5.29	0.40	0.57	1.21

$$\frac{1.486}{0.015} = 99.06 \rightarrow Q = KAR^{\frac{1}{3}}S^{\frac{1}{6}}$$

$$W = 99.06 \triangle$$

$$A = 3.0^{\#}$$
 $\omega P = 10.33$ $R_{H} = 0.871$

Assuming that the flow entering Unit One from basins A and B can be combined and those entering from basins C and D can be combined, the expected 100 year - 6 hour flowrates would be 31.3 cfs and 8.7 cfs at points A+B and C+D respectively.

- Check capacity of typical lining for drainage easements (Std. Dwg 2260) to convey off-site flows to Via Posada (See Fig.2).
 - Using Manning's Equation:

 $Q = \frac{1.486}{AR^2/3}$ S 1/2

where: Q = flowrate (cfs)

Assuming a 10 ft. drainage easement and lining bottom width = 9 feet:

By interpolation, computed flow depths are:

✓ ≯ Subareas A+B: depth = 0.33' (4")'Subareas C+D: depth = 0.17' (2")

Recommendation: Use concrete lining with side walls equivalent to a standard eurb, section with height equal to 8". $(5 \ge 1.33\%)$ for Q = 31.3ces

- From East (Vista Four Hill's-and-upland-basins):
 - Check existing capacity of Via Posada to convey 53.90 cfs of surface flow:

Assume normal crown, cross-slope = 2% Existing street grade = 0.028 ft/ft Street width = 32 ft. face-to-face.

From DPM Plate 22.3 D-1: 32'. S7.

For S = 0.028 and one-half street flows = 27 cfs, depth of flow at gutter line = 0.52 feet.

Therefore, Via Posada has capacity.

- III. Developed Condition Flowrates (on-site plus off-site)
 - 1. Figure 3 shows on-site sub-basins, discharge points from off-site, and analysis points.
 - 2. The following analysis assumes that the 100 year 6 hour flows within the existing 30" storm drain, at the east property boundary, will be conveyed across Unit One sub-surface.

y		Contributing Sub-basins	Length (Ft)	Elev. Diff. (Ft)	Slope (Ft/Ft)	Tc (Min)	I100 (in/hr.)	Composite C-Value	Total Area (acres)	Peak Q cfs
#	A	1				10.1	5.38	0.95	10.55	53.9
	В	1,2,3	1960	72	0.037	10	5.29	0.85	14.32	64.4
	C	1-6	2185	83	0.038	10.2	5.29	0.73	21.11	81.3
	D	1-8	2470	94	0.038	11.3	4.87	0.70	24.53	84.1
	E	1-10	2725	104	0.038	12.1	4.69	0.69	27.10	87.5
		1-13								
	G	1-14	3115	119	0.038	13.45	4.45	0.59	44.67	[117.1]

* Values taken from Bohannan-Huston report for Vista Four Hills.

4. Check capacity of Via Posada (major local) at the west boundary of UNIT ONE, to carry 117 cfs within roadway.

From DPM Plate 22.3 D-2: 40' ST

For S = 0.038 and one-half street flows = 58.5 cfs, depth of flow at gutter line = 0.65 feet.

Therefore, Via Posada has capacity.

5. Estimate distance required, downstream of west property line of Unit One, to "daylight" proposed 30" storm drain.

Assume pipe slope = 0.02 ft/ft. Assume depth of cover = 5' at west property line. Required distance = 400'+, based on existing contours.

25 (4.2) (18.4) (210.0) "3000 WOWINIM 006.8

RECOMMENDATIONS:

I. OFF-SITE DRAINAGE

- A. The following improvements are recommended to handle potential runoff from the City open space land to the south of UNIT ONE.
 - 1. Construct two concrete drainage liners per Std. Dwg. 2260, within proposed 10 ft. wide easements, as shown in Figure 3 (points 4 and 12), to convey storm water to Via Posada.
- Construct a small graded swale along the south boundary, on city open space, to redirect nuisance flows to the drainage easements noted in 1 above. The City of Albuquerque Open Space Department has been contacted regarding this concept and had no major objections as long as the Developer revegetated the disturbed areas.
 - B. It is proposed that the existing 30" storm drain, currently stubbed out to the east property line, be extended to approximately 200 feet west of the west boundary of UNIT ONE. At that point it would discharge to a graded earthen channel.
- C. The analysis shows that the estimated capacity of Via Posada can handle the expected 100 year surface discharge across UNIT ONE. A temporary energy dissipator should be provided at the downstream point of discharge from both surface and subsurface runoff, as shown in Figure 3, prior to release to the Tijeras Arroyo.
 - D. Unit One is protected from the Tijeras Arroyo by a high narrow ridge running east-west along the northern boundary. Channel stability along this reach is not a concern since it is confined on both the north and south sides by major land forms.

II. ON-SITE DRAINAGE

No on-site drainage improvements, other than maintaining a minimum grade of 2% on Via Posada, are necessary. 10 ft. drainage easements are required at two points along the south boundary.