September 29, 1977

Mr. Mike Emory
Bohannan-Huston Inc.
4125 Carlisle N.E.
Albuquerque, N.M. 87107

Dear Mr. Emory:

I have reviewed the drainage report for La Ultima de la Ciudad with the revisions and amendments submitted by letter dated September 7, 1977. I am in agreement with the concepts outlined. The drainage report is therefore approved.

Sincerely,

Bruno Conegliano
Assistant City Engineer-Hydrology

BC/fs

cc - V. M. Kimmick
Jim Smith
Dwayne Shepard
Drainage File

BOHANNAN-HUSTON INC.
4125 CARLISLE BLVD, N.E. ALBUQUERQUE, NEW MEXICO 87107 505 881-2000

September 7, 1977

RECEIVED
SEP 12 1977
CITY ENGINEERS

Mr. Bruno Conegliano
Assistant City Engineer,
Hydrology
City of Albuquerque
P. O. Box 1293
Albuquerque, NM 87103

Re: La Ultima De La Ciudad, Unit 2

Dear Mr. Conegliano:

A drainage report for the referenced subdivision was filed with your office in February, 1977. We request a two-part amendment to the report as follows:

1. In the report, it is recommended that a swale be constructed along the east side of the north parcel to intercept and carry upland runoff north to Menaul Boulevard. In conjunction with this, and per your request of June 27, 1977, we would like to add the following to the recommendations for the north parcel:

> "A desilting basin should be constructed at the point where the swale reaches Menaul Boulevard, extending 70' back along the swale. The basin should be approximately 12' wide and 2'-8" deep. A spillway 12' wide and 2'-8" high should be set in the exit end of the basin."

Enclosed for your reference is a location map and sketches of the proposed improvements.

The Public Service Company of New Mexico has approved sufficient easement for the basin, including permission to ingress and egress for maintenance purposes.

It is our opinion that the desilting basin will be of great value in controlling the volume and quality of flow onto Menaul Boulevard.

2. Plate V for the south parcel shows a waterblock on Archuleta Court and a drainage right-of-way between Lots 22 and 23. Under this proposal, this would be deleted because the street does not have adequate length to develop a waterblock, and area 1 would drain onto Rebonito Road. To insure that the peak flow rate onto Monte Largo Drive does not increase, the following additional lots will have backyard ponds: Nos. 1, 2, 3, 6, 8, 9, 10, 11, 16, and 23. The changes in subsequent flow are reflected as follows:

	Previous	W/Proposed Changes
Q_1	5.5 cfs	4.5 cfs
Q_D (Rebonito)	13.0 "	17.5 "
Q_2	6.4 "	5.5 "
Q_3	7.9 "	3.7 "
Q_4	3.6 "	1.2 "
Q_D (Monte Largo)	24.5 "	22.4 "

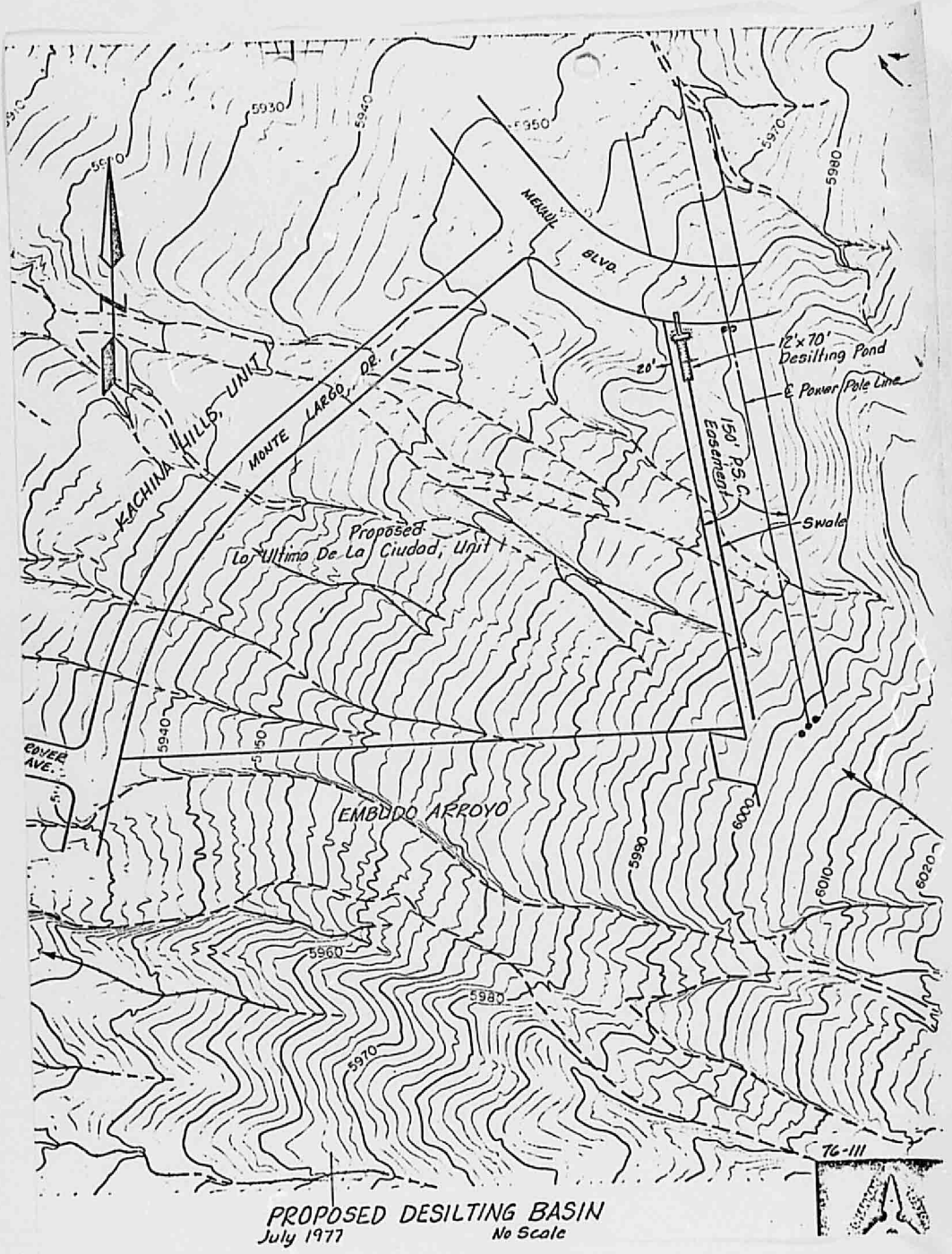
If you require further information, please feel free to contact this office.

Sincerely,

Michael J. Irwin
Design Engineer

Enclosures

JP/dlh
Job No. 76-111



PROPOSED DESILTING BASIN

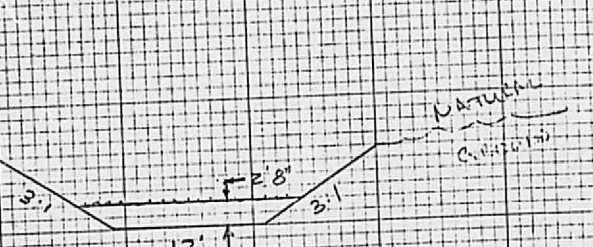
July 1977 No Scale

DESIGN OF DESILTING POND

Q = 16.6 CFS SILT @ .05 MM * SETTLING VELO 4.1 IN/MIN.

MAXIMUM VELOCITY 1 FPS * & H = 8"

TRY 1 RECTANGULAR



WITH A DISCHARGE OF 8" WE NEED A 2 MIN DETENTION TIME

LENGTH REQUIRED FOR 2 MIN DETENTION

$A = 2(12) + 6(2)\frac{1}{2} = 30 SF$

$V_{REQ} = \frac{16.6}{30} = .55 ft/sec$

LENGTH FOR 2 MIN DETENTION

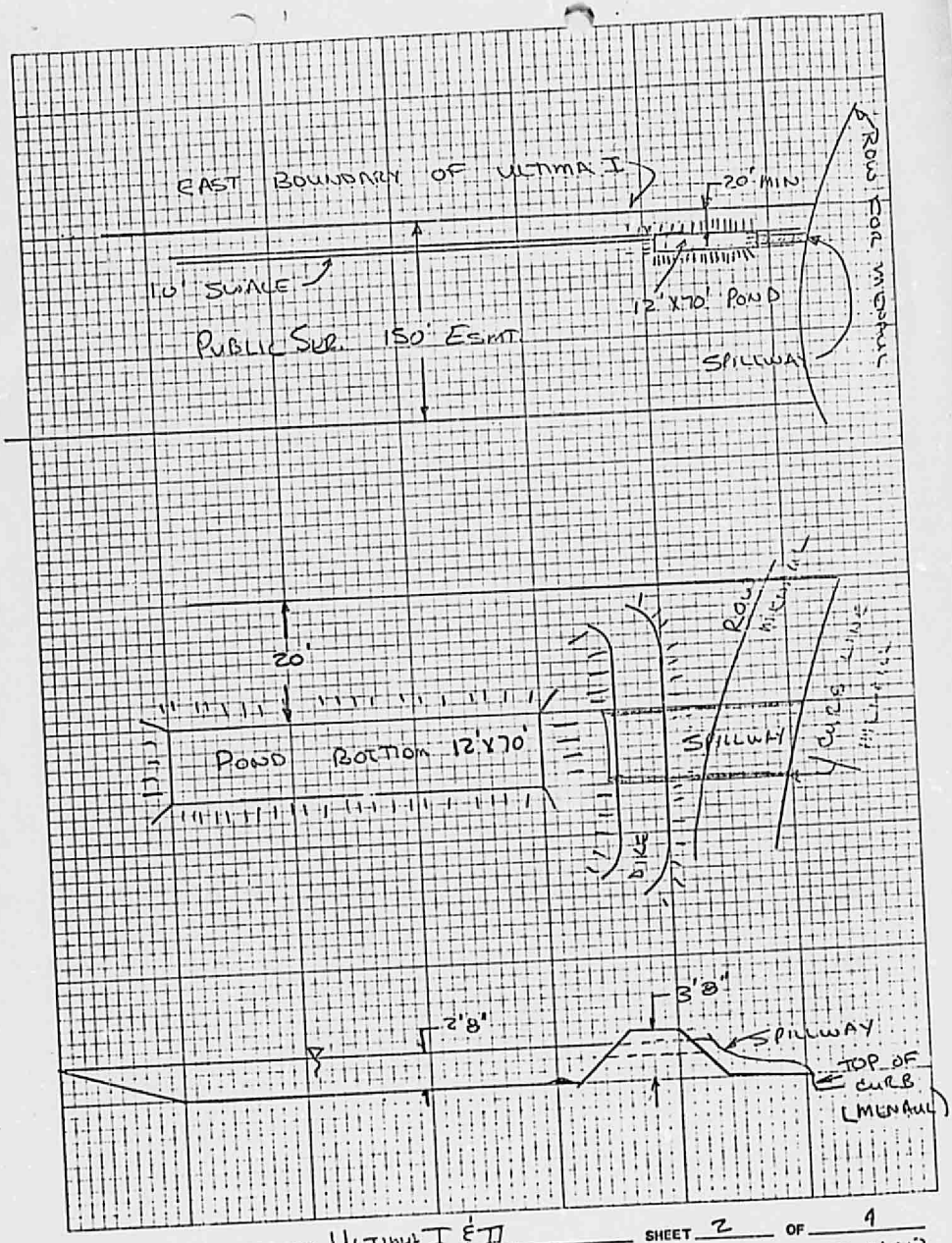
$.55(120) = 66.40'$ USE 70'

* SCS URBAN DESIGN MANUAL

PROJECT NAME ULTIMA I & II SHEET 1 OF 4

PROJECT NO. 70-111 BY MJI DATE 7-10-77

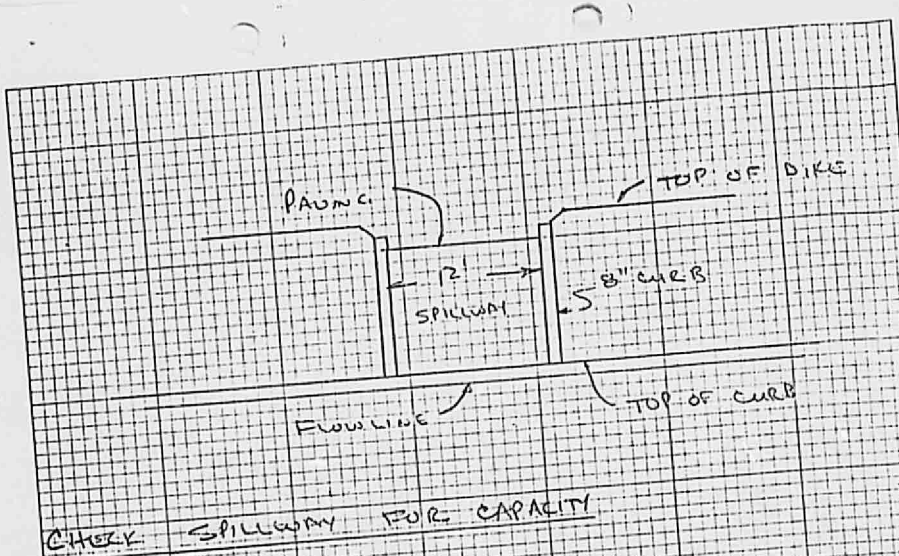
SUBJECT DRAINAGE REPORT CH'D 1 DATE 7



PROJECT NAME Ultima I & II SHEET 2 OF 4

PROJECT NO. 76-111 BY M.J. DATE 7-12-17

SUBJECT Drainage Report CH'D _____ DATE _____



CHECK SPILLWAY FOR CAPACITY

$Q = CLH^{3/2}$

$= 2.63(12)(.67)^{3/2}$

$= 17.31$ REQUIRED 16.6 OK

PROJECT NAME Ultima I & II SHEET 3 OF 4

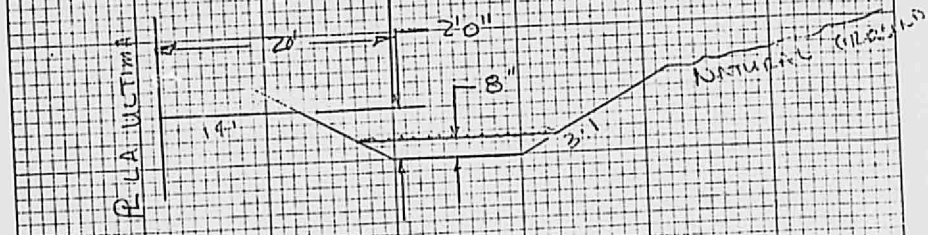
PROJECT NO. 76-111 BY MSI DATE 7-10-17

DESIGN OF SWALE TO CARRY 16.6 CFS

BOTTOM WIDTH 10'

SIDE SLOPE 3:1

MIN. SLOPE 0.5%



PROJECT NAME Ultimate IET SHEET 4 OF 4

PROJECT NO. 16-111 BY [illegible] DATE 1-15-11

SUBJECT Drainage Report CH'D _____ DATE _____

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

July 19, 1978

P/23/08

Mr. Ronald Brown
Executive Vice President
Sproul Enterprises
5115 Menaul Blvd. N.E.
Albuquerque, New Mexico 87110

SUBJECT: PAVING IN LA ULTIMA DE LA CUIDAD, UNIT I AND II.
Work Authorization No. T-9

Dear Mr. Brown:

Under the provisions of the Test Turnkey Project procedures, this letter is the Work Authorization to begin work on the project.

Sincerely,

V. M. Kimmick
City Engineer

VMK/fs

cc - H. R. Orr
Kent Nowlin Construction Inc.
Ray Dawson
Water Resources
Dwayne Sheppard
Bob Kielich
LaMonte Urban
Bruno Conegliano
Bill Mueller

drainage file

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

MAYOR
Harry E. Kinney

CHIEF
ADMINISTRATIVE OFFICER
Frank A. Kleinhenz

La Ultima de la Ciudad

June 27, 1977

Mr. Mike Emmery
Bohannan, Westman, Huston, & Assoc., Inc.
4125 Carlisle Blvd., N.E.
Albuquerque, New Mexico 87107

Dear Mr. Emmery:

The construction of a dike to intercept the upstream flow and allow a downstream development is not acceptable in principle. The owners of the upstream property are entitled to continue to drain their property at the natural point of discharge. Any modification of the natural drainage pattern performed for the benefit of a downstream development must not cause any hardship nor inconvenience to others be they private or public.

On the basis of the consideration above, which are clearly specified in the AMAFCA Resolution, the proposed construction of interceptor dikes concurrently with the development of "Kachina Hills Unit 2" are not acceptable. Dike alternate #1 would be constructed in public road r.o.w.--such construction would:

1. Deny access to the owners of property adjacent to the road r.o.w.

2. Subject properties adjacent to the dike to innundation and to sediment deposition.

Dike alternate #2. Same objections as alternate #1; in addition, this alternate would transfer the responsibility of the runoff management to the public by conveying the runoff to Monte Largo Drive.

Traditionally in Albuquerque, roadways have been used as runoff carriers but in order to perform their primary function of thoroughfare, they cannot be subject to sediment deposition. The City will, therefore, accept the runoff from a fully developed subdivision; it will not unnecessarily receive flows emanating from undeveloped land unless sedimentation facilities are provided. These facilities must be located outside public r.o.w. and must effectively remove the sediment load from the runoff.

Approval of the drainage report for the subdivision La Ultima Del La Ciudad is contingent upon approval of the drainage report for the subdivision Kachina Hills No. 2. It is also contingent upon submission of a different solution to the offsite drainage problem on the north parcel. For the reasons outlined above, collection and discharge of the offsite runoff into Menaul is not acceptable.

Very truly yours,

Bruno Conegliano
Assistant City Engineer-Hydrology

BC/kr

cc - V. M. Kimmick, City Engineer
Dwayne Sheppard, Assist. City Engineer-Field
Bob Kielich, Assist. City Engineer-Design
Drainage File ✓

BOHANNAN WESTMAN HUSTON & ASSOCIATES INC.
ENGINEERS & PHOTOGRAMMETRISTS
4125 CARLISLE BLVD., N.E.
ALBUQUERQUE, NEW MEXICO 87107
PHONE 505 881-2000

May 24, 1977

RECEIVED
MAY 26 1977
CITY ENGINEERS

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

Re: Drainage Report for La Ultima de la Ciudad Unit 2

Dear Mr. Conegliano:

We recently filed a drainage report for La Ultima de la Ciudad Unit 2, located in city zone grid H-23. Our subsequent design has been limited by traffic and grading restrictions for which we request to amend that report. Our suggested changes are as follows:

1. The water block should be eliminated on Archuleta Court and runoff from this cul-de-sac should be allowed to flow onto Rebonito Road and down to Monte Largo Drive.

2. Additional backyard ponding will be used on a total of 18 lots rather than the proposed seven lots as shown in the report. This will reduce the total developed runoff to 22.1 cfs rather than the previously adopted 23.4 cfs.

If any further information is required, please feel free to contact this office.

Sincerely,

Michial M. Emery

Michial M. Emery, P. E.
Chief Design Engineer

MME/dlh
Job No. 76-111

SPROUL ENTERPR..ES

SPROUL INVESTMENT CORP.
SECURITY SUPPLY CO.
RED ARROW CORP.
DIAMOND APARTMENTS, INC.
..HL CORPORATION
..OK CORPORATION
..NGRIFF, INC.

PLEASE ADDRESS CORRESPONDENCE TO THE UNDERSIGNED AT:
Post Office Box 3158
Albuquerque, N.M. 87110

file with drainage report
Sproul Security
E. of Tramway @ Eubank

March 4, 1976

City of Albuquerque
City Hall
Albuquerque, New Mexico

Attention: Mr. Frank A. Kleinhenz, Chief Administrative Officer

Gentlemen:

At a meeting yesterday in the office of George Carruthers, director of the planning department, at which meeting there were present Mr. Carruthers, Kleston Laws, John Robert, Bill McMillan, Jim Sutton and I, subject to ultimate approval by others the means of resolving the Embudo arroyo drainage problem was agreed upon. In order to implement so much of the agreed-upon plan as requires our participation, we hereby make the following offer:

We shall exchange with you that parcel of land within Tract 1 of Sproul-..ecurity Subdivision No. 3 shown on the accompanying photo (the parcel being approximately 20.0 acres in area) for a parcel of land within Tract A1 in Lomas Subdivision, the latter parcel to be a strip 120 feet wide, abutting and running parallel to Monte Largo Drive from Lomas Blvd., N.E. to the southerly boundary line of that Tract A1, which parcel is approximately 6½ acres in area.

Of course, we anticipate that the value of the parcel which we propose to trade to you is greater than the value of the parcel which we propose that you convey to us in the exchange. However, we propose that, to the extent the area of the property which we trade to you exceeds the value of the property we receive, our conveyance of the property to you shall constitute a dedication for open space and drainage.

A condition of this proposal is that we shall bear no part of the cost of the construction of the Embudo arroyo storm drainage protection and channel improvements.

Your prompt consideration of the foregoing proposal and approval thereof by council resolution will enable us to conclude this transaction at an early ..ate.

Yours very truly,

Elmer C. Sproul, for
Spyrok Corporation

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

MAYOR
Harry E. Kinney

CHIEF
ADMINISTRATIVE OFFICER
Frank A. Kleinhenz

March 2, 1977

Mr. Michial M. Emery
Bohannan, Westman, Huston & Assoc., Inc.
4125 Carlisle Blvd. N.E.
Albuquerque, New Mexico 87110

SUBJECT: SPROUL SECURITY SUBDIVISION, TRACT 1,
LA ULTIMA DE LA CIUDAD, UNITS 1 AND 2,
DRAINAGE REPORT

Dear Mr. Emery:

The drainage report dated February 1977 has been reviewed. The upland flows proposed to discharge storm waters to Menaul Blvd. should be directed to curb and gutter and not flow across the roadway.

In the South Parcel flows directed to the Embudo Channel shall be slowed to 8fps or less unless the arroyo is lined. The ponding of the South Parcel is not necessary and flows should be conveyed to the Embudo as rapidly as feasible.

These developments straddle the Embudo Arroyo and under the drainage policy resolution are the responsibility of the developer. Information must be included in the report regarding permanent improvement of the temporary work now in place.

Sincerely,

V. M. Kimmick
City Engineer

VMK/fs
cc: Jim Smith, Bob Kielich
Dwayne Sheppard, Drainage File

Public Works Department
Director – Erwin F. Hensch, P. E. 766-7467
Engineering 766-7441 – V. M. Kimmick, P. E.
Street Maint. 766-7755 – G. E. Paul, P. E.
Ass't. Director – Harold R. Orr, Jr. P. E.
Liquid Waste 766-7535 – R. P. Lowe, P. E.
Water 766-7437 – W. H. Otto, P. E.

AN EQUAL OPPORTUNITY EMPLOYER

DRAINAGE REPORT
FOR
TWO PARCELS OF LAND
WITHIN THE
SPROUL SECURITY SUBDIVISION
TRACT 1
LA ULTIMA DE LA CIUDAD
UNITS 1 AND 2
ZONE ATLAS SHEET H-23

DRAINAGE REPORT
FOR
TWO PARCELS OF LAND
WITHIN THE
SPROUL SECURITY SUBDIVISION
TRACT 1
LA ULTIMA DE LA CIUDAD
UNITS 1 AND 2

ZONE ATLAS SHEET H-23

FEBRUARY, 1977

PREPARED FOR

SPROUL INVESTMENT CORPORATION
1420 CARLISLE BLVD., N.E.
ALBUQUERQUE, NEW MEXICO 87110

PREPARED BY

BOHANNAN WESTMAN HUSTON & ASSOCIATES, INC.
4125 CARLISLE BLVD., N.E.
ALBUQUERQUE, NEW MEXICO 87107

Michial M. Emery

MICHIAL M. EMERY, P.E.
N.M.P.E. NO. 5194

TABLE OF CONTENTS

APPENDIX

COMPUTATIONS

PLATES

DRAINAGE REPORT FOR
LA ULTIMA DE LA CIUDAD UNITS 1 AND 2

PURPOSE

The purpose of this report is to determine the runoff resulting from a 100-year frequency storm falling on two study parcels and their contributing areas under existing and developed conditions. Guidelines for development are established so that drainage patterns and flow rates can be defined.

LOCATION AND PROJECT DESCRIPTION

The two study parcels are located east of Monte Largo Drive within the Sproul Security Subdivision. Both parcels are adjacent to the Embudo Arroyo Channel, one along the north right-of-way and the other on the south. This is shown on Plate 1 at the back of this report. The north parcel contains approximately 14 acres and the south parcel contains approximately 8.4 acres.

Natural topography in the study areas slopes from east to west on grades between five and ten percent. The soils are granular decomposed granite and grass cover is poor in its current undeveloped state.

Both study parcels are zoned SU-1, and it is anticipated that development will proceed in accordance with the typical R-1 zoning. Density is expected to be between three and four dwelling units per acre.

HYDROLOGY

Peak flow rates for the study parcels and contributing areas were determined from the rational formula for a 100-year storm. Rainfall intensities were selected from curves presented in the Master Plan of Drainage, 1963, for the Albuquerque area.

NORTH PARCEL PRE-DEVELOPMENT

The most recent topographic data available was used to determine drainage basins affecting the north parcel. This accounts for small discrepancies related to basin outlines as presented in previous reports using earlier information within the same area.

Runoff originating north and east of the study parcel is intercepted by the Piedra Lisa Basin and does not affect the property. Runoff which previously entered the property from the southeast is now intercepted by an earth dike constructed as part of the East Side Arroyo Protection System, Phase II, 1976. This flow no longer affects the property, leaving only Basins A, B, and C as upland contributors to the north parcel. This is shown on Plate I. Undeveloped area runoffs originating within the study parcel can be found on Plate II.

NORTH PARCEL AFTER DEVELOPMENT

In accordance with AMAFCA Drainage Resolution 1972-2, it is recommended that development not increase area runoff. To insure this, back yard ponding should be provided on individual lots.

The upland storm runoff will be conveyed past the subdivision by a swale constructed along the east boundary. This runoff will flow north to Menaul Boulevard. Later development of streets will intercept portions of this flow to the east, decreasing the flow along the swale but maintaining approximately the same net flow on Menaul Boulevard and the proposed Camino de la Sierra Drive.

Runoff from the study parcel will be collected by internal streets and flow onto Monte Largo Drive. From this point the water will flow south along Monte Largo and be deposited into the Embudo Arroyo Channel.

NORTH PARCEL RECOMMENDATIONS

The following recommendations are made for the north parcel.

1. Back yard ponding.

2. Construction of a swale on the east side of the study parcel to intercept and carry upland runoff north to Menaul Boulevard.

3. Monte Largo Drive be designed with sufficient capacity to carry runoff from the study parcel and contributing basins.

Recommended guidelines and results are:

MONTE LARGO DRIVE

Street Width	44 ft.
Minimum Slope	.005 ft/ft
Crown Height	6 inches
Anticipated Flow	31.6 cfs
Flow Depth	.50 ft.
Velocity	2.85 ft/sec

SOUTH PARCEL PRE-DEVELOPMENT

Upland flows contributing to the south parcel originate from a long narrow basin extending to the east. This is shown as Area D on Plate I. The approximate area of the basin is 8.2 acres and discharges 13 cfs into the south boundary of the study parcel. A small amount of runoff flows directly into the eastern boundary of the parcel from a contributing area of about one acre.

Flows originating on the south parcel total about 14.4 cfs, portions of which flow off the property toward the midpoint of the west boundary. The remaining internal flow and the majority of the upland flow leave the parcel at the southwest corner. (see Plate IV)

SOUTH PARCEL AFTER DEVELOPMENT

Development of areas surrounding the south parcel will alter existing drainage patterns and reduce the flow from upland areas onto the parcel. The eventual construction of Wells Drive, Haines Avenue, and Rebonito Road will serve to divert the flow south and west, no longer affecting the parcel.

Internal flows from Areas 1 and 2 (Plate V) will be transferred to the Embudo Arroyo Channel through 10' wide drainage rights-of-way. The flows in these channels or conduits will be minimal resulting from the construction of water blocks at the street intersections with Rebonito Road.

Recent modifications to the Embudo Arroyo Channel as part of the East Side Arroyo Protection System, Phase II, 1976, have increased the channel flow capacity. It is proposed to use this increased capacity by selecting only some of the lots to use back yard ponding. This will allow the lots to be graded in such a way to substantially reduce the height of retaining walls along back lot lines. The additional runoff resulting from

diminished back yard ponding is insignificant in comparison with the improved channel capacity. The runoff will be discharged into the Embudo Arroyo and is acceptable as outlined by AMAFCA Drainage Resolution 1972-2, Section 3, Part B, pertaining to storm drainage facility capacity. Drainage of upland basins for the interim between development of the south parcel and development of adjacent areas will be along Rebonito Road. Design should be such that runoff continues west on Rebonito Road and turns north onto Monte Largo Drive until its interception by the Embudo Arroyo Channel (See Plate V). A temporary swale will be required at the east edge of the study parcel to intercept runoff from an area of approximately one acre and divert it north to the Embudo Arroyo Channel.

SOUTH PARCEL RECOMMENDATIONS

The following recommendations are made for the south parcel.

1. Back yard ponding in selected lots as shown on Plate V.

2. Swale construction at the east edge to intercept and conduct runoff north to the Embudo Arroyo Channel.

3. Water blocks on streets intersecting with Rebonito Road just inside the parcel.

4. Design of drainage right-of-way channels or storm sewers in Areas 1 and 2 (Plate V).

5. Monte Largo Drive and Rebonito Road be designed with a sufficient capacity to carry runoff north to the Embudo Arroyo Channel. Recommended guidelines and results are:

MONTE LARGO DRIVE

Street Width	44 ft.
Minimum Slope	0.005 ft/ft
Crown Height	6 inches
Anticipated Flow	72.2 cfs*
Flow Depth	0.67 ft.
Velocity	3.9 ft/sec

REBONITO ROAD

Street Width	32 ft.
Minimum Slope	0.03 ft/ft
Crown Height	4 inches
Anticipated Flow	50.7 cfs*
Flow Depth	0.40 ft.
Velocity	7.2 ft/sec

* For conditions of greatest anticipated flow, refer to Kachina Hills Unit 2 Drainage Report, Bohannan Westman Huston & Associates, Inc., February, 1977.

UPLAND DRAINAGE CALCULATIONS

AREA "A"

Length of water course ≅ 600' = L

SLOPE of BASIN IN PERCENT ≅ 9.5% = S

GROUND FACTOR = 1.8 (Poor Vegetation) = B

AREA OF BASIN IN ACRES ≅ 3.7 = A

$T_c = \text{Log}^{-1}[.3641(B) + .3854 \text{Log}(L) - .197 \text{Log}(S) - .3613]$

T_c = Time of concentration

$T_c = \text{Log}^{-1}[.3641(1.8) + .3854 \text{Log}(600) - .197 \text{Log}(9.5) - .3613]$

$T_c = \text{Log}^{-1}[0.6554 + 1.0706 - .1926 - .3613]$

$T_c = \text{Log}^{-1}[1.1721] = 14.9$ minutes

$I = \frac{189}{T_c + 25} = \frac{189}{39.9} = 4.74$ in/hr

$Q = CIA$

C = Runoff factor = 0.4

I = Intensity in inches/hour

A = Area in Acres

Q = flow in cfs.

$Q = (.4)(4.74)(3.7) = 7.01$ cfs

AREA "B"

L ≅ 825'

S = 9.5%

B = 1.8

A = 3.6 ACRES

$T_c = \text{Log}^{-1}[.3641(1.8) + .3854 \text{Log}(825) - .197 \text{Log}(9.5) - .3613]$

$T_c = \text{Log}^{-1}[.6554 + 1.1240 - .1926 - .3613]$

$T_c = \text{Log}^{-1}[1.2255]$ $T_c = 16.8$ minutes

PROJECT NAME SPROUL TRACT 1 NORTH SHEET 1 OF 9

PROJECT NO. 76-111 BY GW DATE 1/11/77

SUBJECT DRAINAGE - UPLAND NORTH CH'D _____ DATE _____

UPLAND RUNOFF CONT'D AREA "B"

T_c = 16.8 minutes

$I = \frac{189}{16.8+25} = \frac{189}{41.8} = 4.52$ IN/HR.

$Q = CIA = (0.4)(4.52)(3.6) = 6.5$ cfs

AREA "C"

L = 400'

S = 7%

B = 1.8

A = 1.6 Acres

$T_c = \text{Log}^{-1}[.3641(1.8) + .3854 \log(400) - .197 \log(7) - .3613]$

$T_c = \text{Log}^{-1}[.6554 + 1.0028 - .1665 - .3613]$

$T_c = \text{Log}^{-1}[1.1304] = 13.5$ minutes

$I = \frac{189}{13.5+25} = 4.91$ inches / hour.

$Q = CIA = (.4)(4.91)(1.6) = 3.1$ cfs

PROJECT NAME SPPOUL TRACT 1 NORTH. SHEET 2 OF 9

PROJECT NO. 76-111 BY G.W. DATE 1/11/77

SUBJECT DRAINAGE REPORT - UPLAND CH'D _____ DATE _____

PLANIMETER READINGS - UNDEVELOPED AREAS

① 1.200 / 0.105 / 1.095 × .8895 ≅ 1 ACRE

② 2.595 / 0.100 / 2.495 × .8895 ≅ 2.2 ACRES

③ Ⓐ 1.219 / 0.109 / 1.110 × .8895 ≅ 1 ACRE

2.312 / 1.200 / 1.112 × .8895 ≅ 1 ACRE

Ⓑ 1.880 / 0.000 / 1.880 × .8895 ≅ 1.7 ACRES

3.770 / 1.880 / 1.890 × .8895 ≅ 1.7 ACRES

TOTAL = 2.7 ACRES

④ 2.370 / 0.650 / 1.72 × .8895 = 1.5 ACRES

4.070 / 2.370 / 1.700 × .8895 ≅ 1.5 ACRES

⑤ Ⓐ 2.006 / .000 / 2.006

2.804 / 0.800 / 2.004 × .8895 ≅ 1.8 ACRES

Ⓑ 2.540 / 0.500 / 2.09 × .8895 ≅ 1.9 ACRES

4.700 / 2.600 / 2.100 × .8895 ≅ 1.9 ACRES

TOTAL A+B = 3.7 ACRES

⑥ 2.850 / 0.400 / 2.450 × .8895 ≅ 2.2 ACRES

3.2005 / 2.850 / 2.455 × .8895 ≅ 2.2 ACRES

PLUS ~ .2 ACRES BETWEEN DIKE AND PARCEL = 2.4

⑦ 1.705 / .300 / 1.405

3.380 / 3.000 / 3.38 × .8895 ≅ 1.2 + .2 = 1.4

PLUS ~ .2 ACRES BETWEEN DIKE AND PARCEL

PROJECT NAME SPINDLE TRACT #1 NORTH SHEET 3 OF 9

PROJECT NO. 76-111 BY GW DATE 1/11/76

SUBJECT DRAINAGE UNDEVELOPED AREAS CH'D _____ DATE _____

COMPUTATION OF FLOWS ON PARCEL

Assume all slopes ≅ 7%

Assume Ground Surface = 1.8 (Poor Vegetation cover)

Assume all Runoff coefficients = 0.9

$T_c = \text{Log}^{-1}[.3641(1.8) + .3854 \log(L) - .197 \log(S) - .3613]$

$T_c = \text{Log}^{-1}[.3854 \log(L) + .1276]$

AREA	L	T_c	I	A (acres)	QCFS
1	350'	12.8 min	5.0 in/hr	1.0	2.0
2	575'	15.5 min	4.67 in/hr	2.2	4.1
3	750'	17.2 min	4.48 in/hr	2.7	4.8
4	650'	16.3 min	4.58 in/hr	1.5	2.7
5	1000'	19.2 min	4.28 in/hr	3.7	6.3
6	900'	18.5 min	4.34 in/hr	2.4	4.2
7	550'	15.3 min	4.69 in/hr	1.4	2.6
					26.7

PROJECT NAME NORTH PARCEL TRACT #1 SHEET 4 OF 9

PROJECT NO. SPOUL 76-111 BY GW DATE 1/14/76

SUBJECT SUMMARY OF UPLAND FLOWS CH'D _____ DATE _____

DEVELOPED RUNOFF FACTOR CALCULATION

ASSUME BACK YARD ponding ON ALL UNITS

TYPICAL LOT SIZE 85' x 110'

STREET WIDTH 25' STORM D TO SIDEWALK

SIDEWALK WIDTH 4'

DRIVE WAY 20 x 16'

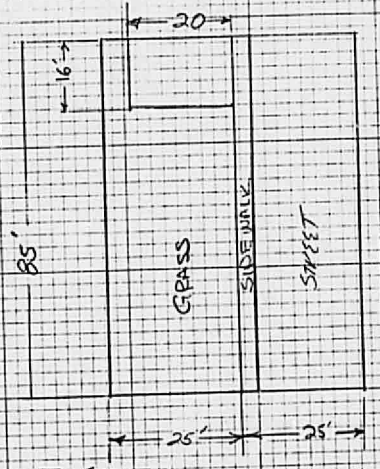
TOTAL AREA OF CONTRIBUTION PER LOT = 4250 ft²

PAVEMENT

Side walk & street = 25 x 85 = 2125 ft²
Drive = 16 x 20 = 320
TOTAL = 2445 = 57.3%

GRASS

25' x 69' = 1725'
16' x 5' = 80'
TOTAL = 1805 ft² = 42.5%



TOTAL AREA 5100 ft²

C, PAVEMENT = .95

C, GRASS = .20

.425(.2) + .573(.95) = .63

GROUND FACTORS (B) IN T_c EQUATION

GRASS = 2.16, PAVEMENT = .77

B = .77 (PAVEMENT WATER COURSE

S ≅ 5% (developed) L ≅ 1000'

$T_c = \log^{-1}[.3641(.77) + .3854\log(1000) - .197\log(5) - .3613]$

$T_c = \log^{-1}[1.1742] = 8.66$ MINUTES

Intensity = $\frac{189}{8.66+25} = 5.61$ inches/hour

PROJECT NAME NORTH PARCEL - SPRING SHEET 5 OF 9
PROJECT NO. 76-111 BY GW DATE 1/12/77
SUBJECT Developed Runoff Factors CH'D DATE
DRAINAGE REPORT

$Q = CIA$

A = Effective Area of Contributing (Total Area less Ponding), Avg Ponding Area 65'x95'

Ponding Area = $\frac{7275 \text{ ft}^2/\text{lot} \times 48 \text{ Lots}}{43560} \doteq 8.0$ Acres

Area = 14.0 - 8.0 = 6.0 Acres.

$Q = (.63)(5.61)(6.6) = 23.3$ cfs

For flow on Monte Largo assume sum of flow from parcel and half of flow going onto Menaul.

$Q = 23.3 + \frac{16.6}{2} = 31.6$ cfs

PROJECT NAME South Parcel - Sandia SHEET 6 OF 9

PROJECT NO. 76-111 BY GW DATE 1/12/77

SUBJECT Developed Area Runoff Drainage Report CH'D _____ DATE _____

UPLAND AREA DRAINAGE COMPUTATION.

AREA "D"

0.191	0.255	0.320	0.384
0.128	.191	.255	.320
.063	.064	.065	.064

AVG = .064 x 128.1 = 8.2 ACRES

AREA "H"

.009	.015	.057
.001	.008	.050
.007	.007	.007

AVG = .007 x 128.1 = .9 acres use 1 acre.

Runoff Coefficient for Ground with Poor Vegetation

C = 0.4 for use in RATIONAL EQUATION.

$Tc = Log^{-1}[.3641(B) + .3854 Log(L) - .197 Log(S) - .3613]$

WHERE B = GROUND FACTOR

S = Slope IN Percent.

L = Length of WATER COURSE to furthest point.

$I = \frac{189}{Tc+25}$

A = AREA IN Acres

AREA "H" DRAINAGE

Slope Average = 8% = S

GROUND FACTOR = 1.8 = B

Length ≒ 500' = L

$Tc = Log^{-1}[.3641(1.8) + .3854 Log(500) - .197 Log\ 5 - .3613]$

Tc = 15.7 minutes

$I = \frac{189}{15.7+25} = 4.64$ inches / hour

$Q = CIA = (.4)(4.64)(1) = 1.9 cfs$

PROJECT NAME TRACT #1 - South SHEET 7 OF 9

PROJECT NO. 76-111 SPROUL BY GW DATE 1/12/77

SUBJECT UPLAND FLOWS - DRAINAGE CH'D _____ DATE _____

Runoff from UPLAND AREA "D"

S = 7.5%, B = 1.8, L = 1600', A = 8.2 ACRES

$T_c = \text{Log}^{-1}[.3641(1.8) + (.3854)(\text{Log } 1600) - .197 \text{ log } 7.5 - .3613]$

T_c = 22.7 minutes

$I = \frac{189}{22.7 + 25}$ = 3.96 inches/hour

$Q = CIA = (.4)(3.96)(8.2) \doteq$ 13 cfs.

UPLAND TOTAL FLOW = 13.0 + 1.9 = 14.9 cfs

RUNOFF FROM PARCEL UNDEVELOPED.

S = 7%, B = 1.8, L = 1000', A = 8.41 ACRES

$T_c = \text{Log}^{-1}[.3641(1.8) + .3854(\text{Log } 1000) - .197(\text{log } 7) - .3613]$

T_c = 19.22 minutes

$I = \frac{189}{19.22 + 25}$ = 4.27 inches / hour.

$Q = CIA = (0.4)(4.27)(8.41) = 14.4$ cfs

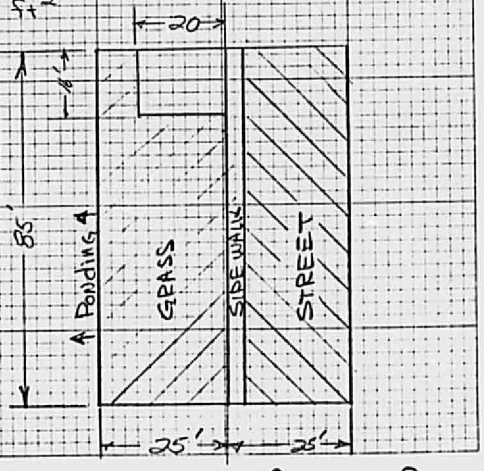
Developed Area Runoff Coefficient, Pooled

TOTAL AREA = 4250 ft²

PAVEMENT
DRIVE 20'x16' = 320
STREET & SIDEWALK = 2125
TOTAL = 2445 = 57.5%

GRASS
25'x60' = 1725 ft²
16'x5' = 80 ft²
TOTAL = 1805 ft² = 42.5%

$C_{pavement}$ = .95
C_{grass} = .20
$C = .95(.575) + .20(.425)$
$C = .63$



PROJECT NAME TRACT #1 - SOUTH SHEET 8 OF 9
PROJECT NO. 76-111 BY GW DATE 1/13/77
SUBJECT Runoff UNDEV'D & Runoff Factors CH'D DATE

Developed AREA Runoff Factor - Fully DRAINED

TOTAL AREA (AVERAGE LOT PLUS STREET).

AREA = 85 x 135 = 11,475 ft²

ROOF AREA ≅ 2750 ft² = 24%

PAVEMENT = 2125 ft² = 18.5%

GRASS = 6600 ft² = 57.5%

C = .575(.2) + .185(.95) + .25(.95) = .53

AREA #1 Runoff

Runoff factor weighted by number of ponded and fully drained.

1. AREA #1

C = $\frac{3}{6}$(.62) + $\frac{3}{6}$(.53) = .58

AREA #1 T_c computed = 4.9 minutes I = 6.32

Q = CIA = (.58)(6.32)(1.5) = 5.5

2. AREA #2 T_c computed = 6.02 minutes I = 6.09

C = $\frac{4}{8}$(.62) + $\frac{4}{8}$.53 = .58

Q = CIA = (.58)(6.09)(1.8) = 6.4 cfs

3. AREA #3 T_c computed = 5.1 minutes I = 6.28 inches/hr

C = .53 (ALL FULLY DRAINED)

Q = CIA = .53(6.28)(2.2) = 7.9 cfs

4. AREA 4 T_c = 3.72 minutes I = 6.15 in/hr

Q = CIA = .53(6.15)(1.1) = 3.6 cfs

PROJECT NAME SOUTH PARCEL SPROUL SHEET 9 OF 9

PROJECT NO. 76-111 BY GW DATE 11/3/77

SUBJECT Developed Runoff. CH'D _____ DATE _____

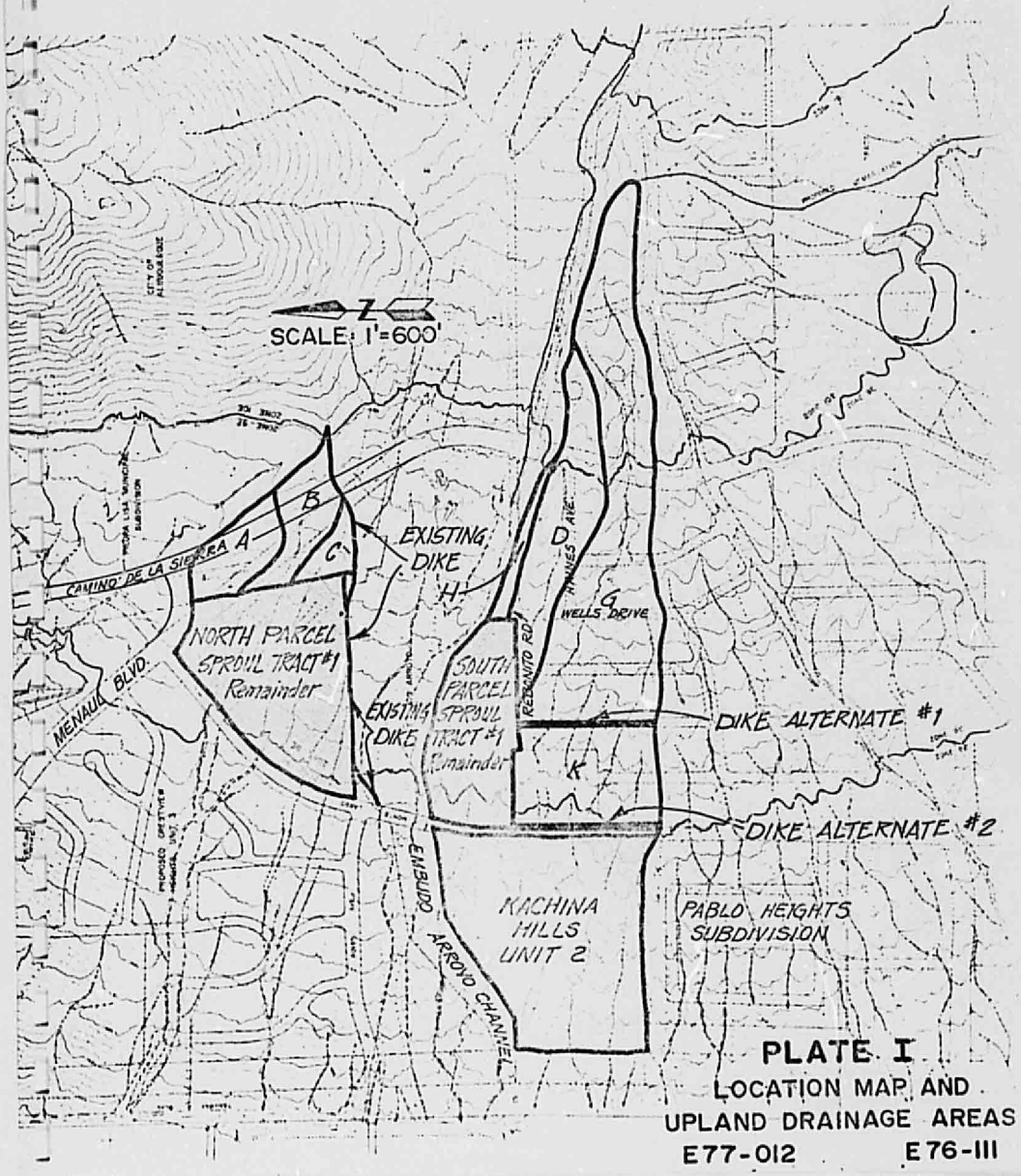


PLATE I

LOCATION MAP AND UPLAND DRAINAGE AREAS

E77-012 E76-111