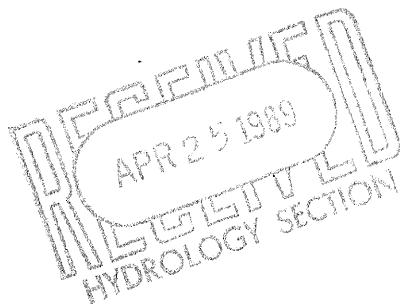**DRAINAGE REPORT**
FOR
PIEDRA VISTA SUBDIVISION
November, 1981

DRAINAGE REPORT

FOR

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November, 1981

PREPARED FOR

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DRAINAGE REPORT

FOR

PIEDRA VISTA SUBDIVISION

PURPOSE AND LOCATION

The Piedra Vista Subdivision is located east of Daskalos Drive and Oro Real. The upper Lomas Channel forms the northeast boundary of the property and the Copper Channel starts approximately 330 feet south of the property (see Plate 1). The site contains approximately 24.3 acres.

The majority of the site consists of soils which are classified by the Soils Report for Bernalillo County as gravelly fine sandy loam and sandy clay loam. The western edge of the site consists of soil classified as gravelly fine sandy loam and gravelly sandy loam. There are rock outcroppings scattered throughout the site. These soils are classified as hydrologic soil groups A, B, and D respectively. The site slopes from east to west at approximately 5% — 10%.

METHOD OF ANALYSIS

The Rational Formula was used for determining runoff quantities from within and around this parcel. Rainfall intensities were calculated using information contained in the Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) Resolution No. 1980—15. Times of concentration for the undeveloped basins were calculated using Figure 2.3 of the U.S. Department of Agriculture, Soil Conservation Services Engineering Field Manual for Conservation Practices (see Plate 6). The time of concentration for the developed basins was calculated using the Manning Equation for flow in streets and an average velocity of 1 fps for conveyance of runoff from the rear of the developed lots to the street.

The runoff coefficients and areas given for City View Estates in the approved Drainage Report for that project are included in the appendix of this report. The runoff rates generated within City View Estates have been revised to utilize the rainfall intensities from AMAFCA Resolution 1980—15.

EXISTING CONDITIONS

The Upper Lomas Channel collects the upland flows from the area to the north-east of the site (see Plate 2). The only off-site basins which might impact the site under existing conditions are Basins A and B. These basins are discussed with on-site Basin 3 below. Under present conditions, the site contains four drainage basins. These are identified as Basins 1 — 4 on Plate 2. The existing drainage conditions for these basins will be analyzed individually in this report.

Basin 1

Basin 1 is bounded by Daskalos Heights Subdivision on the west. The flows from its 6.4 acres are collected by an existing berm and channel on the west property line of the site and discharged at a rate of 13.3 cfs to a drainage easement in Daskalos Heights Subdivision (see Plate 2).

Basin 2

Basin 2 is also bounded by Daskalos Heights Subdivision on the west. It contains an area of 3.1 acres and discharges at a peak rate of 6.3 cfs onto Soula Drive.

Basin 3

Basin 3 contains 7.0 acres and is located in the southeast section of the parcel. This basin accepts off-site flows of 5.1 cfs from upland Basin B (see Plate 2). This combines with the on-site generated flow of 13.5 cfs and flows southwest into an existing earth drainage ditch. This drainage ditch discharges into the upstream end of the Copper Channel. It appears that flows from Basin A do not impact this basin. These flows appear to be collected in a small channel paralleling the southeast boundary of the site. The peak flow rate from Basin A is 13.5 cfs.

Basin 4

Basin 4 is bounded by City View Estates Unit D on the west. A concrete block wall along the east boundary of City View Estates Unit D directs a portion of the runoff from Basin 4 to La Cueva Avenue (13.8 cfs). These flows are conveyed to a drainageway which discharges into the Copper Channel at the south end of Parkside Drive (see Plate 1). The remainder of the runoff from Basin 4 (3.5 cfs) enters City View Estates Unit D through a drainage easement just south of Soula Drive. These flows are conveyed through Oro Real and Nambe Avenue to Turner Drive. Basin 4 contains 8.7 acres.

DEVELOPED CONDITIONS

Under developed conditions, the parcel will be divided into drainage basins similar to the existing drainage basins (see Plate 3). Due to topographic necessity, rear yard ponding will be required on several lots which are located on the downhill side of the streets. The area of the basins to be used in determining the developed flow rates does not include the areas which are ponded on the lots. Runoff from the basins will be handled as follows:

Basin C

The Upper Lomas Channel effectively eliminates any upland flows which might have impacted this basin in the past. The developed runoff (15.9 cfs) will be collected at the north end of Rocky Point Court. From this point, it will be conveyed through a storm drain and discharged into the Upper Lomas Channel (see Plate 3). No runoff from Basin C will be discharged to the Daskalos Heights Subdivision.

Basin D

The Upper Lomas Channel also protects this basin from any upland flows. The developed flow rate generated by Basin D is 12.2 cfs. This runoff will enter Daskalos Heights through Soula Drive. The total runoff which enters Daskalos Heights from undeveloped Basins 1 and 2 is 19.6 cfs. The only developed runoff entering

Daskalos Heights is 12.2 cfs from Basin D and 0.9 cfs from Basin H (see below). Therefore, the developed runoff entering Daskalos Heights will be less than the undeveloped runoff entering Daskalos Heights.

Basin E

The developed runoff generated by Basin E is 20.0 cfs. It will discharge from Basin E through a drainageway at the south end of Piedra Vista Avenue. An existing earth channel will convey these flows to the Copper Channel (see Appendix Page 5). A 1.5 foot high berm will be constructed along the east and southeast boundaries of Basin E. This berm will intercept the runoff from off-site Basins A and B (18.6 cfs) and convey it to the existing earth channel at the south end of the site.

Basin F

The total runoff from Basin F (25.7 cfs) will be conveyed through the streets to La Cueva Avenue. These flows leave the site through La Cueva Avenue and are conveyed to Parkside Avenue (see Plate 1). They are conveyed within Parkside Avenue to a concrete lined drainageway, at the south end of Parkside Drive, which discharges into the Copper Channel.

This flow combined with the developed flow from City View Estates amounts to 51.7 cfs. This amount is 11.9 cfs greater than the undeveloped discharge from Basin F and the developed discharge from the contributing portion of City View Estates. All of these flows are collected at the intersection of Parkside Drive and Camino Del Ray. Parkside Drive has adequate capacity to carry the increased flow rate at less than curb height. The concrete-lined drainageway to the Copper Channel has adequate capacity at the entrance and within the drainageway to handle these increased flows (see Appendix Page 4).

Basin G

The runoff from Basin G (1.7 cfs) is discharged through an existing drainage easement to Oro Real. This flow is conveyed in Oro Real to Nambe Avenue where it flows west to Turner Drive. This flow is less than the undeveloped flow of 3.5 cfs.

Basin H

The total flow from Basin H (0.9 cfs) will be discharged through the existing concrete-lined drainageway to Daskalos Heights. This and the discharge from Basin D (12.2 cfs) will be the only discharges into Daskalos Heights. This discharge rate is less than the undeveloped discharge from Basins 1 and 2 into Daskalos Heights.

RECOMMENDATIONS

1. Rocky Point Court should be designed to drain to the north. The runoff will be removed from the street by an appropriately-sized inlet and a 24" RCP and conveyed to the Upper Lomas Channel.

2. The two lots adjacent to the existing drainageway in the Daskalos Heights be graded so that the rear half of each lot drains into the drainageway. No other runoff will be directed to this easement.

3. A berm 1.5 feet in height should be constructed along the east and southeast property lines with 3:1 side slopes. This will protect the site from the runoff from Basins A and B.

4. A drainage easement should be located at the south end of Piedra Vista Avenue with a 5 foot wide type "B" lining with 1.5 foot high sides.

5. Tetilla Place be graded to drain to La Cueva Avenue.

6. All streets are to be 32' wide with a 4" crown. They shall be constructed to City of Albuquerque design standards for residential streets.

7. Mountable curb-roll type may be used throughout the subdivision except at the south end of Piedra Vista Avenue.

8. Computations are included in the Appendix for the 10-year storm runoff calculations. They indicate that the velocity times depth values are less than 4.8 in all cases.

9. Retention ponds should be constructed on those lots shown on Plate 3. They shall be designed to provide adequate capacity for the runoff generated by the areas draining to them (see Appendix Page 3). These ponds will be maintained by the individual property owners.

10. Typical lot grading is shown on Plate 3.

11. As noted on Plate 3, all lots shown to be graded similarly to the Typical 2-Story Lot Detail may be left in their undeveloped state to allow construction of custom homes. The grading indicated is one grading alternative for this area.

12. Development of the subdivision as indicated in this report will meet the requirements of AMAFCA Resolution 1980-15 and the Interim Drainage Guidelines.

BASIN RUNOFFS

PLANIMITER CONVERSION 3.5658

BASIN	PLANIMITER READING	ACREAGE	ΔELEV.	LONG RUN	SLOPE	Tc*
UNDEVELOPED						
A	1.833	6.54	370	1630	.227	5.61
B	0.689	2.457	34	730	.047	5.79
1	1.800	6.418	46	1000	.046	7.94
2	0.854	3.045	50	730	.068	4.87
3	1.959	6.985	70	1500	.047	11.90
4	2.425	8.647	44	1200	.037	10.53
DEVELOPED						
C	1.350	4.814	42	870	.048	7.00
D	0.955	3.405	50	730	.068	3.70
E	1.557	5.551	70	1300	.054	7.34
F	2.001	7.136	46	880	.052	6.50
G	0.196	0.701	10	310	.032	2.87
H	0.092	0.328	7	150	.047	1.19

* T_c IS EXPRESSED IN MINUTES

UNDEVELOPED DRAINAGE T_c WAS FOUND USING FIGURE 2.3 OF THE ENGINEERING FIELD MANUAL FOR CONSERVATION PRACTICES, US DEPT. OF AGRICULTURE SOIL CONSERVATION SERVICE.

DEVELOPED DRAINAGE T_c WAS FOUND USING n=.015 AND MANNINGS EQUATION FOR FLOW IN STREETS AND A FLOW RATE OF 1 FPS ON DEVELOPED LOTS

FLOW RATES

BASIN	ACREAGE	C	I_{10}	I_{100}	Q_{10}	Q_{100}
UNDEVELOPED						
A	6.54	.35	4.8	5.9	11.0	13.5
B	2.46	.35	4.8	5.9	4.1	5.1
1	6.42	.35	4.8	5.9	10.8	13.3
2	3.05	.35	4.8	5.9	5.1	6.3
3	6.99	.35	3.5	5.5	8.6	13.5
4	8.65	.35	4.7	5.7	14.2	17.3
DEVELOPED						
C	4.82	.56	4.8	5.9	13.0	15.9
D	3.41	.61	4.8	5.9	10.0	12.2
E	5.55	.61	4.8	5.9	16.3	20.0
F	7.14	.61	4.8	5.9	20.9	25.7
G	0.70	.40	4.8	5.9	1.3	1.7
H	0.33	.45	4.8	5.9	0.7	0.9

SEE SHEET 2 FOR C DETERMINATIONS

PROJECT NAME PIEDRA VISTA   SHEET 1 OF 5

PROJECT NO. 11670   BY XX   DATE 11/6/81

SUBJECT BASIN RUNOFFS   CH'D   DATE

DEVELOPED C DETERMINATIONS

BASIN	TOTAL AREA	PONDED LOTS	NON-PONDED LOTS	AREA OF STREET	TOTAL IMPERVIOUS	% IMPERVIOUS $c = .95$	% PERVIOUS $c = .35$	C
C	209697	10	8	700×50				
IMPERVIOUS AREA/UNIT		1650	2900					
IMPERVIOUS AREA		16500	23200	35000	74700	35.6	64.4	.56
D	148539	1.5	9.8	660×50				
IMPERVIOUS AREA/UNIT		1650	2900					
IMPERVIOUS AREA		2475	28420	33000	63895	43.0	57.0	.61
E	241758	8	16.2	910×50				
IMPERVIOUS AREA/UNIT		1650	2900					
IMPERVIOUS AREA		13200	46980	45500	105680	43.7	56.3	.61
F	3118018	9	18.6	1340×50				
IMPERVIOUS AREA/UNIT		1650	2900					
IMPERVIOUS AREA		14850	53940	67000	135790	43.7	56.3	.61
G	30492	0	2	0				
IMPERVIOUS AREA/UNIT			1250					
IMPERVIOUS AREA		0	2500	0	2500	8.2	91.8	.40
H	14375	0	2	0				
IMPERVIOUS AREA/UNIT			1250					
IMPERVIOUS AREA		0	2500	0	2500	17.4	82.6	.45

VELOCITY × DEPTH CALCULATIONS (10 YEAR STORM)

ROAD WIDTH = 32'   CROWN 4" $n = .015$ USE MANNING EQ.

BASIN	SLOPE	Q_{10}	d	V	dV
C	.0167	13.0	.27	2.94	.79
D	.0640	10.0	.20	5.71	1.14
E	.0767	16.3	.23	6.83	1.57
F	.0835	20.9	.25	7.5	1.9
CITY VIEW	.0300	42.8	.38	5.56	2.15

PROJECT NAME PIEDRA VISTA   SHEET 2 OF 5

PROJECT NO. 11670   BY DW   DATE 11/12/81

SUBJECT C DETERMINATIONS + 10 YR. VELOCITY CH'D _____ DATE _____
X DEPTH CALCULATIONS

TYPICAL LOT PONDING

AVERAGE SIZE LOT   125 × 75

IMPERVIOUS AREA

$25 \times 50 = 1250$ #   20.8%

TOTAL AREA
$80 \times 75 = 6000$ #

PERVIOUS AREA
$6000 - 1250 = 4750$ #   79.2%

$C_{EFF} = .208 \times .95 + .792 \times .35 = \underline{.47}$

6 HR 100 YR STORM 2.8 IN

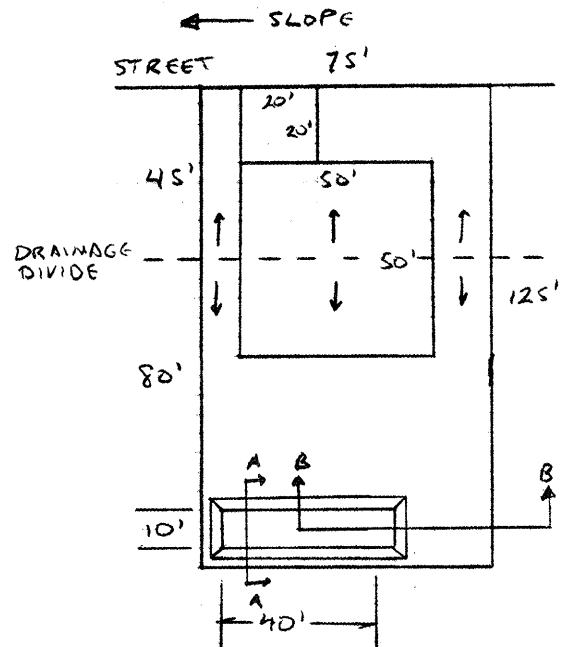$\frac{2.8}{12} \times .47 \times 6000 = \underline{664.7 \ FT^3}$

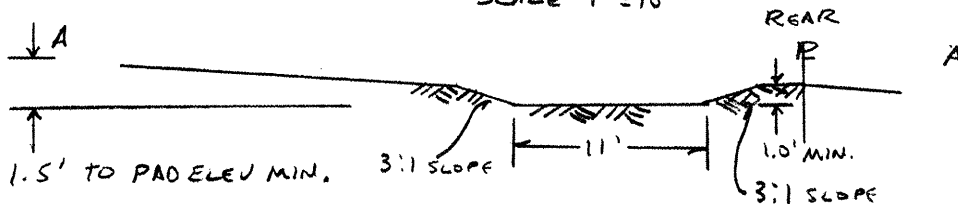USE A 1 FOOT DEEP POND WITH 3:1 SIDE
SLOPES
  USE A FLAT BOTTOM 11' × 45'
  1' DEPTH VOLUME
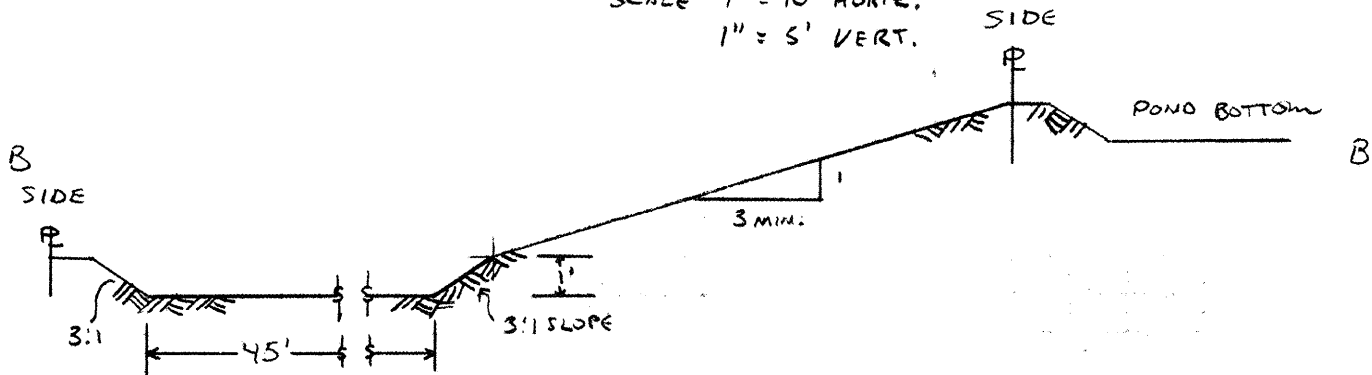 $\underline{672 \ CU \ FT}$

DESIGN DEPTH $\underline{.99'}$

NOTE: TOP OF WATER SURFACE
SHALL BE A MINIMUM
OF 15' FROM HOUSE

SECTION THROUGH A-A
SCALE 1" = 10'

1.5' TO PAD ELEV MIN.   3:1 SLOPE   11'   1.0' MIN.
3:1 SLOPE   REAR

SECTION THROUGH B-B
SCALE 1" = 10' HORIZ.
      1" = 5' VERT.

SIDE   3:1   45'   3:1 SLOPE   1'   3 MIN.   1   SIDE   POND BOTTOM

RUNOFF IN CITY VIEW ESTATES

A = 10.7   C = .66 T_c = 8.2   FROM CITY VIEW DRAINAGE REPORT   OCT. 1975
I = 5.9   AMAFCA 1980-15   (BOHANNAN-HUSTON, INC.)

Q = <u>41.67</u> CFS

ONLY NEW INTENSITIES WERE USED TO DETERMINE THE FLOW RATES. THE
AREA WAS AN EFFECTIVE AREA OBTAINED FROM AN APPROVED DRAINAGE
REPORT FOR CITY VIEW ESTATES ASSUMING THE BACK 2/3 OF EACH LOT
WAS PONDED

THE PEAK RUNOFF FROM CITY VIEW ESTATES AND BASINS F+G IS 51.7 CFS
DEVELOPED AND 39.8 CFS UNDEVELOPED.

USING AS BUILT DRAWINGS AS A REFERENCE FOR THE APPROXIMATE SLOPE
OF PARKSIDE DRIVE   S = .0300

THE DEPTH OF FLOW IN PARKSIDE DRIVE
WITH UNDEVELOPED BASIN 4
    d = .38 FEET   V = 6.2 FPS
WITH DEVELOPED BASINS F+G
    d = .41 FEET   V = 6.3 FPS

THE DEPTH OF FLOW IN THE CONCRETE LINED DRAINAGEWAY TO COPPER CHANNEL
USING MANNING'S EQ. IS:
    WIDTH = 10'   n = .015   S = .016   d = <u>.62</u> FEET

THIS GIVES .9 FEET OF FREEBOARD.

STORM DRAIN TO UPPER LOMAS CHANNEL

CAPACITY OF 24" PIPE

S = .010   R = .50   A = 3.14   n = .013   USE MANNING EQ.

Q = <u>22.6</u> CFS
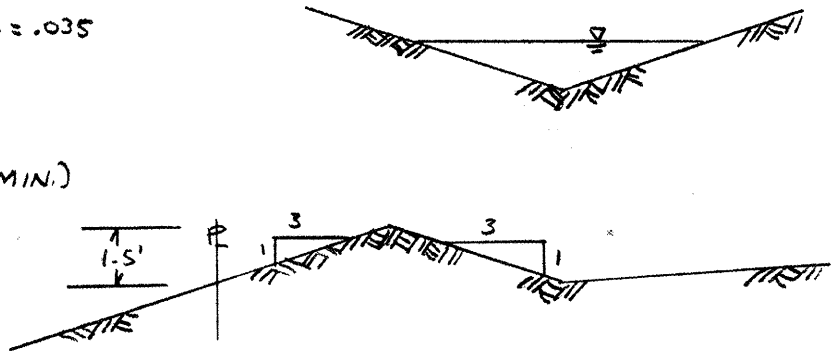
Q REQUIRED = 15.9 CFS

EAST BERM HEIGHT

EAST BOUNDARY   BASIN B FLOW   5.1 CFS

  ASSUME 3:1 SIDESLOPES, S=.035

   DEPTH OF FLOW = .7 FEET
   VELOCITY 3.4 FPS

  BUILD A BERM 1.5' HIGH (MIN.)

SOUTH-EAST BERM HEIGHT

 $Q = 5.1 + 13.5 = 18.6$ CFS   BASINS A+B COMBINED
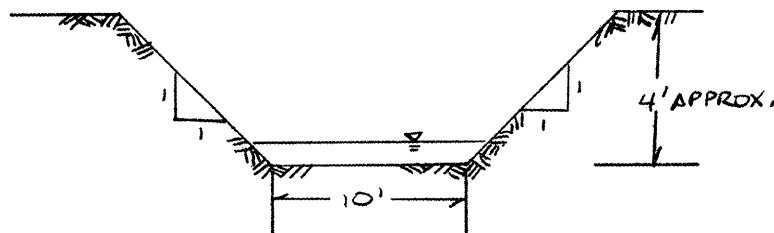
  $S = .09$

 DEPTH OF FLOW .95'
 VELOCITY 6.8 FPS

 BUILD A BERM 1.5' HIGH (MIN.)

EXISTING EARTH CHANNEL TO COPPER CHANNEL

 $Q = 18.5 + 20.0 = 38.5$ CFS $n = .025$ $S = .024$
  DEPTH OF FLOW = .6 FEET
  VELOCITY = 6.05 FPS
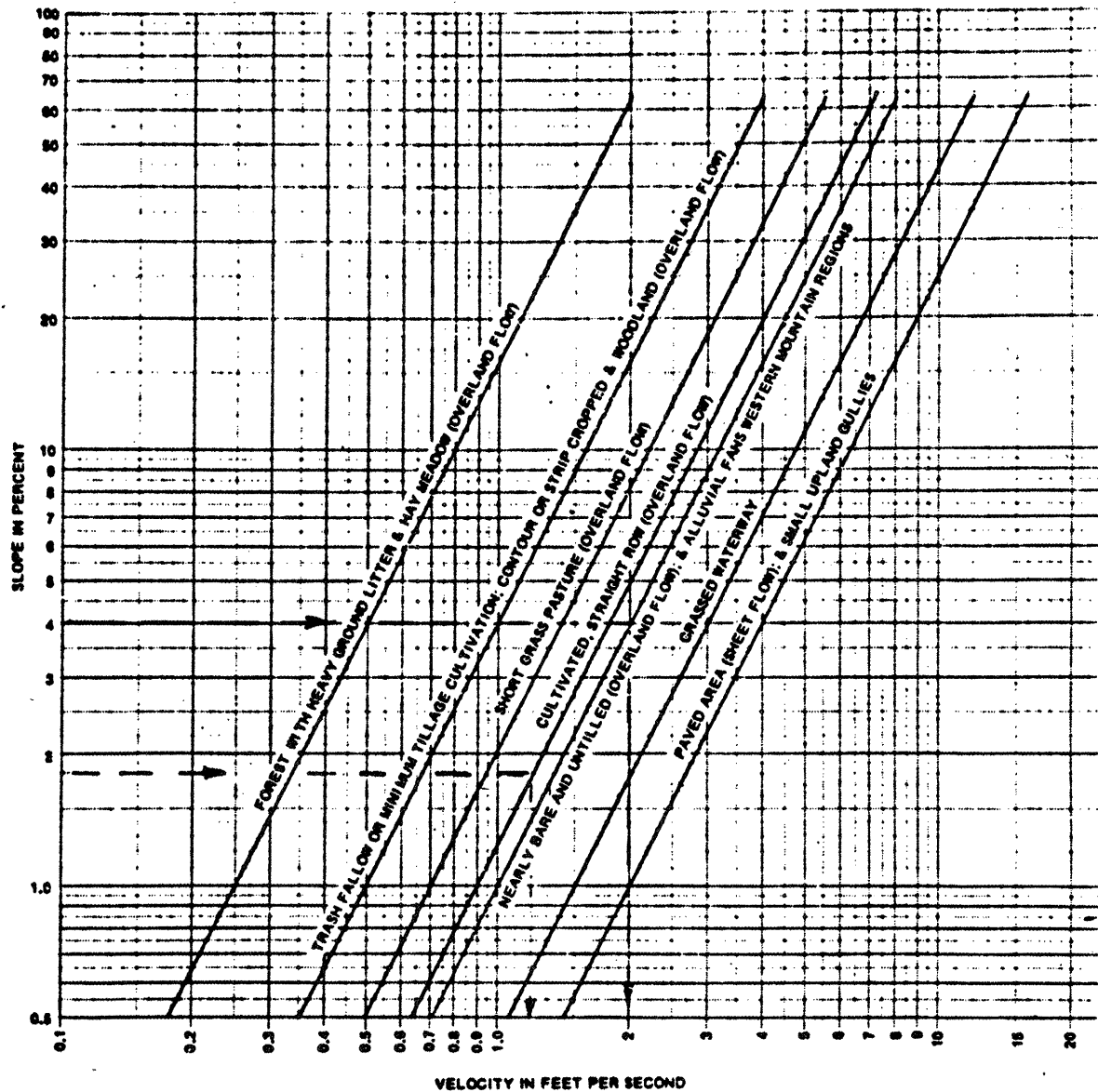
Figure 2-3 ·Velocities for upland method of estimating T_c

PLATE 6

VICINITY MAP

CITY OF ALBUQUERQUE OPEN SPACE

MUNICIPAL LIMITS

EXISTING DEMARCATION LINE

LOMAS CHANNEL

UPPER

TURNER AVE.

LOMAS DESILTING BASIN

LOMAS BLVD.

COPPER AVE.

NO SCALE   MAP K-23-Z

SCALE 1" = 100'

BASIN A

BASIN B

BASIN 3

BASIN 2

BASIN 1

BASIN 4

CHANNEL

LOMAS

UPPER

DASKALOS DR

SOULA DR.

ORO REAL

COPPER CHANNEL

COPPER AVE.

10 CFS

18.6 CFS

17.3 CFS
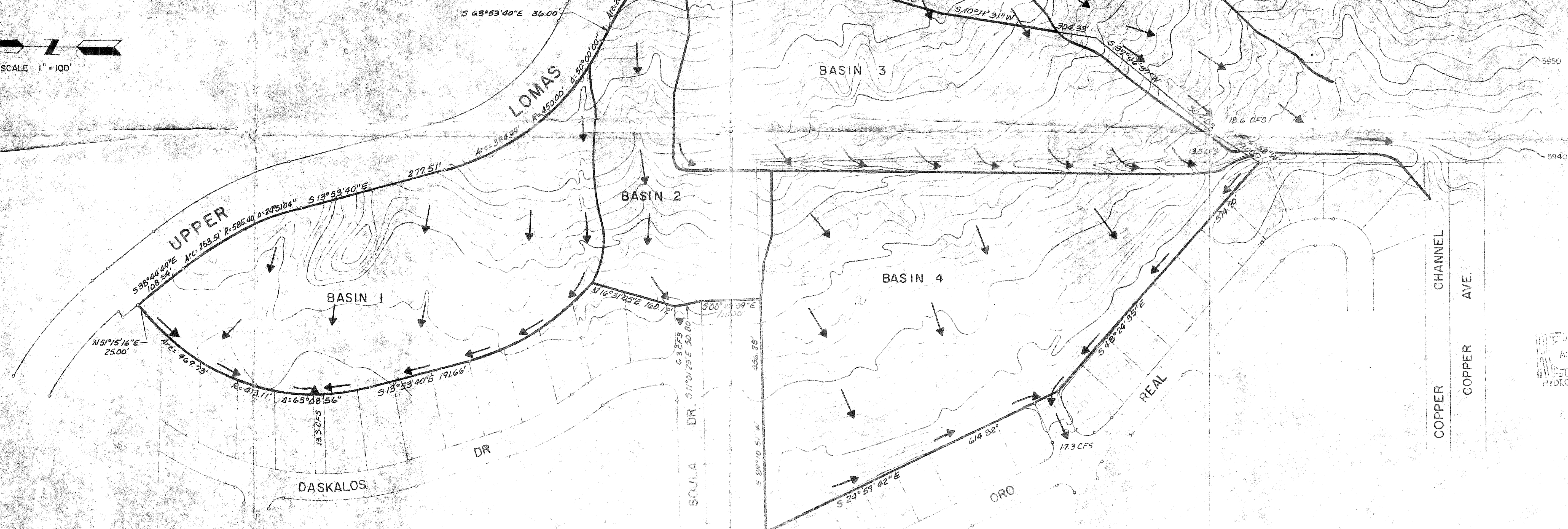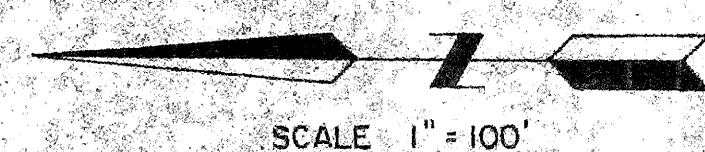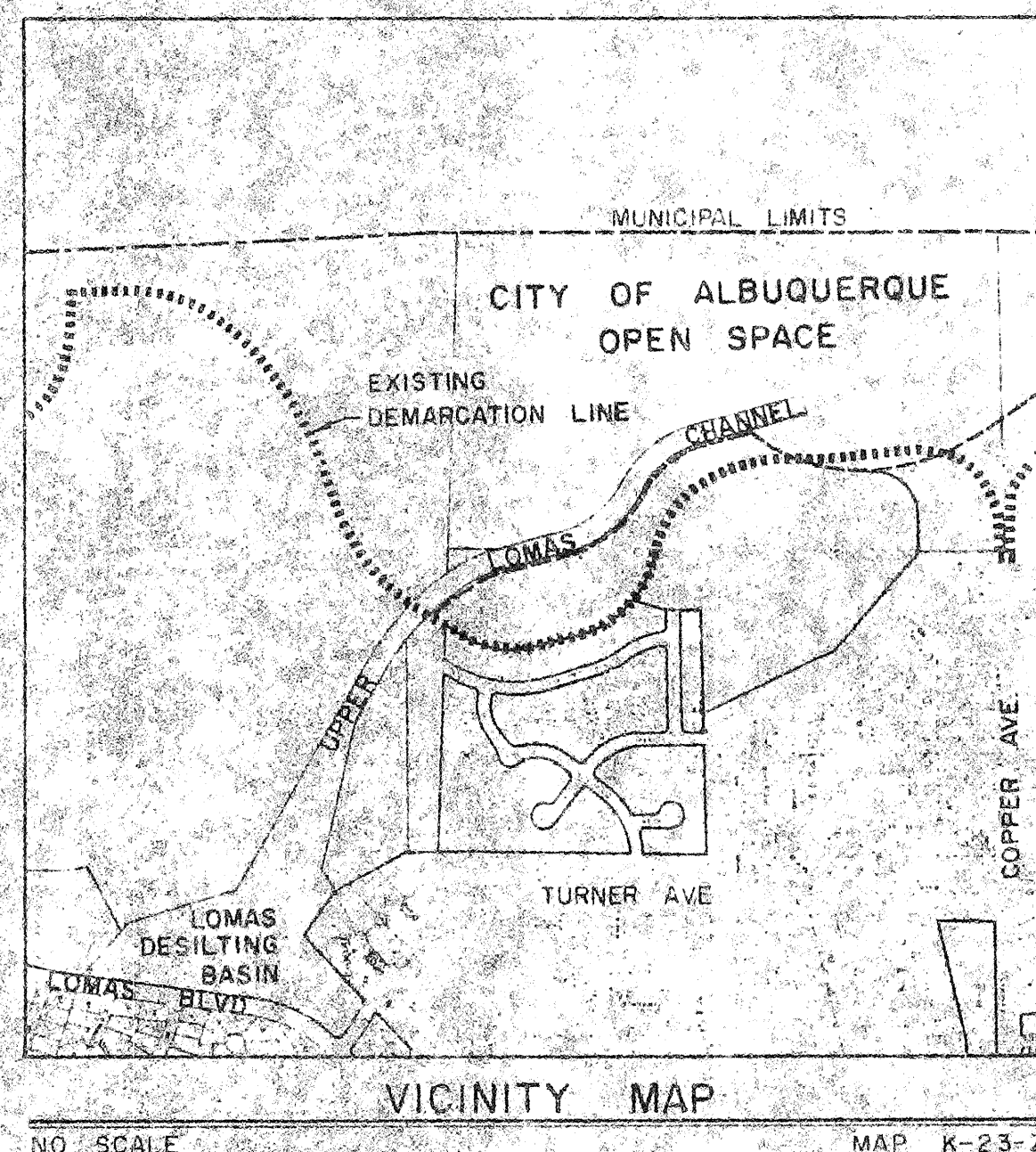
JOB 11670

LEGEND

—————— DRAINAGE BASIN BOUNDARY

——→ DIRECTION OF FLOW

PLATE 2
UNDEVELOPED DRAINAGE

PIEDRA VISTA SUBDIVISION

TYPICAL SINGLE STORY LOT
NO SCALE

DASKALOS HEIGHTS

TYPICAL 2-STORY LOT

LEGEND

DRAINAGE BASIN BOUNDARY
AREA PONDED ON LOT
DIRECTION OF FLOW

CITY VIEW ESTATES
UNIT D

HYDROLOGY SECTION
APR 23 1996

COPPER CHANNEL
COPPER AVE.

ORO

REAL

CUEVA AVE

TETILLA

BASIN G

SOULA DR

ALENA COURT

PLACE

BASIN

SOULA DRIVE

ROCKY POINT

BASIN H

BASIN G

UPPER

DASKALOS DR

DASKALOS

PIEDRA VISTA AVENUE

BASIN E

BASIN D

LOMAS

BASIN B

BASIN A

CHANNEL

N →

TYPICAL PONDED LOT
SCALE 1"=50'

VICINITY MAP

MAP K-23-Z
NO SCALE

CITY OF ALBUQUERQUE OPEN SPACE

MUNICIPAL LIMITS

COPPER AVE

LOMAS BLVD

TURNER AVE

LOMAS DESILTING BASIN

UPPER

LOMAS

CHANNEL

OLD DEMARCATION LINE