FOR THE

AMENDED SITE PLAN OF

RANCHO CABALLERO,

ALBUQUERQUE, NEW MEXICO

PREPARED FOR:

RANCHO CABALLERO, INC.

AND

LAND DEVELOPMENT GROUP, INC.

PREFARED BY:

COMMUNITY SCIENCES CORPORATION

AUGUST, 1991

MICHAEL J. YOST, F.E.

9665

CHANCER.

8/28/9

#### DRAINAGE INFORMATION SHEET

Amended Site Development ZONE ATLAS/DRNG. FILE#: F-13 & F-14 PROJECT TITLE: for Rancho Caballero LEGAL DESCRIPTION: Portion of Tract 1. Tierra del Rio Subdivision and Lots 21 through 39. Rancho Caballero CITY ADDRESS: N/A ENGINEERING FIRM: CONTACT: Community Sciences Corporation Michael Yost. P.E. PO Box 1328-Corrales, NM 87048 897-0000 PHONE: ADDRESS: CONTACT: OWNER: Rancho Caballero, Inc. Mike Anderson 2435 Zearing St., Alb., NM 87104 ADDRESS: PHONE: 247-2700 CONTACT: OWNER: Land Development Group, Inc. Larry Stroup ADDRESS: PHONE: 7820 Pan Am Fwy NE. Alb., NM 87109 <u>857-9258</u> CONTACT: ARCHITECT: N/A N/A ADDRESS: NA PHONE: N/A SURVEYOR: CONTACT: Community Sciences Corporation C. A. Spirock, L.S. ADDRESS: PO Box 1328-Corrales, NM 87048 PHONE: 897-0000 CONTRACTOR: CONTACT: N/A N/A PHONE: ADDRESS: NA N/A PRE-DESIGN MEETING: YES DRB NO. 91-245 & 91-285 NO EPC NO. Z-72-225-1 COPY OF CONFERENCE RECAP PROJ. NO. SHEET PROVIDED TYPE OF SUBMITTAL: CHECK TYPE OF APPROVAL SOUGHT: DRAINAGE REPORT SKETCH PLAT APPROVAL DRAINAGE PLAN PRELIMINARY PLAT APPROVAL CONCEPTUAL GRADING & SITE DEVELOPMENT PLAN APPROVAL DRAINAGE PLAN FINAL PLAT APPROVAL GRADING PLAN EROSION CONTROL PLAN BUILDING PERMIT APPROVAL ENGINEER'S CERTIFICATION FOUNDATION PERMIT APPROVAL CERTIFICATE OF OCCUPANCY APPROVAL ROUGH GRADING PERMIT APPROVAL GRADING/PAVING PERMIT APPROVAL OTHER (SPECIFY) DATE SUBMITTED: BY:

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

# CONFERENCE RECAP

PLANNING DIVISION NOS: EPC:  SUBJECT: Rancho Caballero Unit II  STRET ADDRESS (IF KNOLN): Montano W of Guadolupe.  SUBDIVISION NAME:   APPROVAL REQUESTED:  PRELIMINARY PLAT  SITE DEVELOPMENT PLAN  OTHER  WHO REPRESENTING  ACTION MONTANO. Hydrology Section  INDINSS:  Carlos Montano. Hydrolog	DRAINAGE FILE/ZONE ATLAS PAGE NO.: F- DA	TE: 10/20/88 @ 11:00
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**NOTE** PLEASE PROVIDE A COPY OF THIS RECAP WITH THE DRAINAGE SUBMITTAL		

KKT 245-02-030

# PUBLIC WORKS DEPARTMENT UTILITY DEVELOPMENT DIVISION/HYDROLOGY SECTION

PRE-DESIGN CONFERENCE

DRAINAGE FILE/ZONE ATLAS PAGE NO.: F/3 8 F/4 DATE: 6/24/9/
EPC NO.: DRB NO.: ZONE:
SUBJECT: Bancho Caballero Estates
STREET ADDRESS:Montono
LEGAL DESCRIPTION: Fortion of Trat, Caballero Subd.
APPROVAL REQUESTED: PRELIMINARY PLAT FINAL PLAT
SITE DEVELOPMENT PLAN BUILDING PERMIT
GRADING/PAVING PERMITOTHER
WHO REPRESENTING
ATTENDANCE: ////////////////////////////////////
CITIBERT AICIOL CITY OF AID.
FINDINGS:
1. This is a 2nd phase of Bancho Caballer
going, from RT to R-1 Zoning, an existi
retention pond on center of Tract.
2. Troposa is to willize existing retention
pond, size retention pond per emergency
- Me of 1991, and provide outtoll into
tuture Montano Road.
Sommultant desires to pond rear yards, this is acceptable if all roof drains to street
acceptable if all root drains to street
4. A drainage report and infrastructure list
required for preliminary plat.
The undersigned agrees that the above findings are summarized accurately and are only
bject to change if further investigation reveals that they are not reasonable or that they are based on inaccurate information.
SIGNED: SIGNED: SIGNED: SIGNED:
TITLE: TITLE: Ce /24/9/
DATE: 6/24/9/ DATE: Civil Engr.
**NOTE** PLEASE PROVIDE A COPY OF THIS PRE-DESIGN FORM WITH THE DRAINAGE SUBMITTAL.

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Plate 1 - Location Map

Plate 2 - Conceptual Grading and Drainage Plan

## A) Purpose and Scope

The Rancho Caballero Subdivision currently consists of 39 townhouse style lots; eleven of which have been occupied. There are currently two proposed site plan amendments before the City of Albuquerque Development Review Board. The first is to re-plat the westerly 12.6 acres into 30 large, single family home lots and is to be called "The Estates at Rancho Caballero". The other proposed amendment is for re-platting the easterly 19 townhouse lots into 15 slightly larger, "patic home" style lots. The first site plan amendment is being sponsored by Land Development Group, Inc., and the second is a Rancho Caballero, Inc. project. The entire subdivision is to be accessed via privately owned and maintained streets, and served by a combination of public and privately utilities. This report presents an overall Drainage Management and Conceptual Grading Plan for approval by the City of Albuquerque so that subsequent re-platting and development may commence.

### B) Site Location and Topography

The project site is located in the northwest valley on the south side of Montano Road between Guadalupe Trail and Rio Grande Boulevard (see Location Map, Plate 1). The project site and the surrounding area is virtually flat. Most of the area that is to be The Estates at Rancho Caballero is currently serving as a flood irrigated alfalfa field. Soils are typically fine silty sands with varying amounts of clay. The soils are classified as S.C.S. hydrologic group B.

### C) Design Criteria

## Flood Control Regulations

The drainage plan presented in this report has been designed to comply with AMAFCA resolution 80-15 which requires that proposed land development projects be designed such that no flooding of private properties will occur during any storm up to and including the 100-year frequency event.

# Engineering Parameters

In accordance with AMAFCA criteria all hydrological analysis is based on the 100-year frequency - 6-hour duration storm as represented in the NOAA Atlas for New Mexico. Because a retention pond is to be used as a part of the drainage management scheme on a temporary basis, the 100-year - 10-day duration storm is also a design event.

The three 100-year frequency rainfalls pertinent to the study are as follows:

Duration	Precipitation
One Hour	1.9"
Six Hour	2.2"
Ten Day	3.47"

# D) Computational Procedures

The analysis approach utilized follows standard engineering practice. Key points of confluence were selected, and subsequently the associated individual and aggregate contributing basins were defined.

Hydrological computations were accomplished by means of AHYMO 990 (AMAFCA's September 1990 version of the HYMO computer model) and the criteria presented in the January, 1991 version of Chapter 22.2 of the City Development Process Manual.

Times of concentration were estimated by using a combination of approximated street flow velocities and overland flow velocities (as applicable) from the upper subcatchment reaches to the confluence point of interest. A convenient formula for overland flow velocity takes the form:

0.

Vo = KY

where Vo = overland flow velocities

Y = average ground slope in percent

K = a ground cover factor

Street flow velocities and depths were estimated by use of the Manning equation for uniform flow.

All the characteristic hydrological parameters for each subcatchment are contained in Appendix A as part of the computer model output, and a summary of parameters and peak flow rates are given in Table 1.

Flow characteristics for conveyance swales, channels and streets were analyzed based on the Manning Equation for uniform flow. Streets are assumed to have a 2% cross slope from curb to crown and a standard curb depth of 6 inches.

# E) Offsite Drainage

The valley areas surrounding the project site are so flat that no definitive drainage patterns can be discerned. Generally valley areas tend to flow from northeast to southwest. Because both sides of Montano Road contain drainage swales, it is reasonable to assume that any flows finding their way to the R.O.W. from the north will be diverted by these swales.

### F) Onsite Drainage

All onsite storm runoff is to drain to the retention pond centrally located in the Rancho Caballero development. A portion of this pond was excavated and landscaped as part of the original town-home development project. The size and shape of the pond will be revised as part of the amended site development to form 115,223 cubic feet of capacity at a depth of three feet.

Basin A includes the open space/landscaped area which is to include the pond.

Drainage Basins B and C outline the two proposed major drainage patterns of The Estates at Rancho Caballero. Flows are to be collected in the private streets and conveyed to landscaped swales for discharge into the pond. Rear yard ponds are to be graded in a number of the proposed lots. No "credit" is taken for the capacity of these ponds in determining the required size of the main retention pond. Rather, these rear yard ponds are proposed because of grading constraints, and they are to collect only that rainfall which falls to the rear of the house pad.

The portion of Rancho Caballero already developed for townhomes is shown on Plate 2 as Drainage Basin E. This portion has already been paved and graded to drain storm runoff in the centrally located total retention pond. It was originally planned for scupper outlet controls to be installed on the roofs of the townhomes. However, a recent visit revealed these devices have not been installed and so their effect is not considered in the hydrologic calculations of this report.

The portion of Rancho Caballero that is to re-plat 19 townhouse lots into 15 patio home lots is designated as Drainage Basin D. Basin D is to drain through Basin E (the existing private perimeter street) and into the central retention pond.

Construction of a 66 inch RCP storm drain in the Montano Road R.O.W. as part of COA Project No. 3255 is imminent. We conceptually propose an 18 inch RCP lateral be extended from the storm drain to the bottom of the retention pond. Research of the master drainage report for COA Project No. 3255 reveals 3 cfs is the allowable discharge from the pond to the storm drain. While this release rate does not materially affect the required capacity of the retention pond, we are in concurrence with the engineers of City Hydrology Section that a drain for the pond is desirable.

Construction plans for COA Project No. 3255 also specify the realignment of the existing irrigation siphon under Montano Road. Because this siphon is used only for irrigating the alfalfa field onsite and will not be needed during and after development, possible change to the COA Project No. 3255 plans may be to abandon the existing siphon and extending an 18 inch storm lateral to the site.

# G) Erosion Control

Control of excessive soil erosion into streets and drainage improvements during construction—will be accomplished by use of temporary lot line, water-trap berms. These will be windrowed into place following mass grading operations and left in place until each home is constructed and sold. Plate 2 illustrates the dimensions of these berms, and they will be located along those boundaries of each lot which are common to streets or drainage easements.

TABLES

TABLE 1
HYDROLOGICAL FLOW PARAMETERS

								TOTAL	
AREA/POINT	AREA	Tc	LAN	TREA	TMEN	T (%)	CONTR.	AREA	Q100
DESIGNATION	(SQ. MI.)	(MIN.)	A	B	C	D	BASINS	(SQ. ML)	(CES)
A	.0016	12	0	100	0	0		.0016	2.0
В	.0097	12	0	50	20	30	مد مد شدم <b>ند بدر مدر مدر مدر مدر</b>	.0097	17.7
C	.0099	12	0	50	20	30	*****	.0099	18.0
D	.0060	12	0	48	16	42	** ** ** ** **	.0060	11.7
E	.0073	12	0	29	11	60	D, E	.0133	28.2
E		47 TT		<del></del>	~~~		C, D, E	.0232	46.2

TABLE 2
STREET FLOW CHARACTERISTICS

AREA/POINT DESIGNATION	STREET WIDTH (ET)	ESTIMATED SLOPE (ET/FT)	Q100 (CFS)	V100 (FPS)	d100 (ET)	REMARKS
. <b>B</b>	30	.002	17.7	1.81	0.40'	< 6", OK
C	30	.002	18.0	1.83	0.40'	< 6", OK
E	24	.002	28.2	2.38	0.49'	< 6", OK

# APPENDIX A AHYMO 990 OUTPUT

Thursday August 22, 1991 04:04:45 pm

HYMO PROGRAM (AHYMO990) - AMAFCA VERSION SEPT., 1990

RUN DATE (MON/DAY/YR) = 05/28/1989

START TIME (HR:MIN:SEC) = 10:29:40

START

TIME-0.0

FILE RANCOCAB.DAT

\*DRAINAGE AREA A

COMPUTE NM HYD ID=1 HYD NO= 101.0 DA=0.0016 SQ MI

PER A-0.0 PER B=100.0 PER C-0.0 PER D=0.0 TP- -0.1333

RAIN ONE # 1.9 RAIN SIX=2.2

COMPUTED RAINFALL DISTRIBUTION WITH DT=0.033333 HOURS

.0587 .1031 .0298 .0128 .0010 .0043 .0000 .9177 1.1228 .6960 .3684 .5144 .2540 .1669 1.2086 1.2810 1.3455 1.4041 1.4581 1.5082 1.5551 1.5990 1.6403 1.6793 1.7161 1.7510 1.7840 1.8153 1.8450 1.8732 1.9000 1.9044 1.9086 1.9128 1.9169 1.9209 1.9249 1.9288 1.9326 1.9363 1.9400 1.9436 1.9471 1.9506 1.9541 1.9575 1.9608 1.9641 1.9673 1.9705 1.9736 1.9767 1.9797 1.9827 1.9857 1.9886 1.9915 1.9943 1.9971 1.9999 2.0026 2.0053 2.0080 2.0106 2.0132 2.0158 2.0183 2.0208 2.0233 2.0257 2.0282 2.0306 2.0329 2.0353 2.0376 2.0399 2.0421 2.0444 2.0466 2.0488 2.0510 2.0531 2.0552 2.0573 2.0594 2.0615 2.0635 2.0656 2.0676 2.0696 2.0715 2.0735 2.0754 2.0773 2.0792 2.0811 2.0830 2.0848 2.0867 2.0885 2.0903 2.0921 2.0939 2.0956 2.0974 2.0991 2.1008 2.1025 2.1042 2.1059 2.1075 2.1092 2.1108 2.1124 2.1141 2.1157 2.1172 2.1188 2.1204 2.1219 2.1235 2.1250 2.1265 2.1280 2.1295 2.1310 2.1325 2.1340 2.1354 2.1369 2.1383 2.1397 2.1412 2.1426 2.1440 2.1454 2.1467 2.1481 2.1495 2.1508 2.1522 2.1535 2.1548 2.1562 2.1575 2.1588 2.1601 2.1614 2.1626 2.1639 2.1652 2.1664 2.1677 2.1689 2.1702 2.1714 2.1726 2.1738 2.1751 2.1763 2.1774 2.1786 2.1798 2.1810 2.1822 2.1833 2.1845 2.1856 2.1868 2.1879 2.1890 2.1902 2.1913 2.1924 2.1935 2.1946 2.1957 2.1968 2.1979 2.1990 2.2000

K = .129534 HR TP = .133300HR K/TP RATIO = .971750 SHAPE CONSTANT, N = 3.634790 UNIT PEAK = 3.9614 CFS UNIT VOLUME = .9969 B = 330.04 P60 = 1.9000 AREA = .001600 SQ MI IA = .50000 INCHES INF = 1.25000 INCHES PER HOUR RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

PRINT HYD

ID-1 CODE-10

#### PARTIAL HYDROGRAPH 101.00

TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW
HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS
.000	.0	.667	1.2	1.333	.1	2.000	.0		
.333	.0	1.000	. 2	1.667	.0	2.333	-0		

B:\RANCO.OUT
Thursday August 22, 1991 04:04:45 pm

RUNOFF VOLUME - .63656 INCHES - .0543 ACRE-FEET
PEAK DISCHARGE RATE - 2.02 CFS AT .533 HOURS

\*DRAINAGE AREA B

PER A=0.0 PER B=50.0 PER C=20.0 PER D=30.0 TF= -0.1333

RAIN --1

.133300HR K/TP RATIO = .530810 SHAPE CONSTANT, N = 7.351722 . K = .070757HR TP = P60 = 1.9000537.69 UNIT VOLUME = .9988 B = 11.738 CFS UNIT PEAK = ,04000 INCHES PER HOUR .10000 INCHES INF -IA -.002910 SQ MI AREA = RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

PRINT HYD ID=2 CODE=10

PARTIAL HYDROGRAPH 102.00

TIME	FLOW	Time HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME	FLOW CFS	TIME HRS	flow CFS
HRS	CFS	1.667	.3	3.333	.0	5.000	.0	6.667	.0
.000	.0 2.1	2.000	.2	3.667	.0	5.333	.0		
.333	9.5	2.333	.1	4.000	.0	5.667	.1		
1.000	2.9	2.667	.1	4.333	.0	6.000	.1		•
1.333	.7	3.000	.0	4.667	.0	6.333	.0		

RUNOFF VOLUME = 1.08098 INCHES - .5592 ACRE-FEET
PEAK DISCHARGE RATE = 17.65 CFS AT .500 HOURS

\* ADD AREAS A & B

ADD HYD - 102.11D-1 ID-2

PRINT HYD ID-12 CODE=10

PARTIAL HYDROGRAPH 102.10

TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW
•		HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS
HRS .000	CF\$ .0	1.667	.3	3.333	.0	5.000	.0	6.667	.0
.333	2.1	2.000	. 2	3.667	.0	5.333	.0		
.667	10.7	2.333	.1	4.000	.0	5.667	.1		
1.000	3.1	2.667	.1	4.333	.0	6.000	.î		
1.333	.8	3.000	.0	4.667	.0	6.333	•0		

B:\RANCO.OUT

Thursday August 22, 1991 04:04:45 pm

RUNOFF VOLUME = 1.01802 INCHES = .6135 ACRE-FEET
PEAK DISCHARGE RATE = 19.63 CFS AT .500 HOURS

\*DRAINAGE AREA C

COMPUTE NM HYD

ID-3 HYD NO- 103.0 DA-0.0099 SQ MI

PER A=0.0 PER B=50.0 PER C=20.0 PER D=30.0 TP+ -0.1333

RAIN = -1

K = .122942HR TP = .133300HR K/TP RATIO = .922293 SHAPE CONSTANT, N = 3.837316 UNIT PEAK = 17.893 CFS UNIT VOLUME = .9996 B = 344.17 P60 = 1.9000 AREA = .006930 SQ MI IA = .45714 INCHES INF = 1.13000 INCHES PER HOUR RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

PRINT HYD

ID=3

CODE=10

PARTIAL HYDROGRAPH 103.00

TIME HR5	FLOW	TIME	FLOW	TIME HR\$	FLOW	TIME	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	1.667	.3.	3.333	.0	5.000	.0	6.667	.0
.333	2.1	2.000	. 2	3.667	.0	5.333	.0		
.667	9.7	2.333	-1	4.000	.0	5.667	.1		
1.000	3.0	2.667	.1	4.333	.0	6.000	.1		
1.333	.7	3.000	.0	4.667	.0	6.333	.0		

RUNOFF VOLUME - 1.08098 INCHES - .5708 ACRE-FEET
PEAK DISCHARGE RATE - 18.01 CFS AT .500 HOURS

\*ADD AREAS A, B &C

ADD HYD

ID=13 HYD=103.1 ID=12 ID=3

PRINT HYD

ID=13 CODE=10

PARTIAL HYDROGRAPH 103.10

	•		•	. •	•			,	
TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW
HRS	· CFS	HRS	CFS	HR5	CFS	HRS	CFS	HRS	CFS
.000	.0	1.667	. 6	3.333	.1	5.000	.1	6.667	.0
.333	4.3	2.000	.3	3.667	.1	5.333	.1		
.667	20.4	2.333	. 2	4.000	.1	5.667	.1		
1.000	6.1	2.667	.1	4.333	.1	6.000	.1		
1.333	1.5	3.000	.1	4.667	.1	6.333	.0		

RUNOFF VOLUME = 1.01741 INCHES = 1.1843 ACRE-FEET

B:\RANCO.OUT

Thursday August 22, 1991 04:04:45 pm

PEAK DISCHARGE RATE = 37.64 CFS AT .500 HOURS

\*DRAINAGE AREA D

COMPUTE NM HYD

ID-4 HYD NO= 104.0 DA=0.0060 SQ MI

PER A-0.0 PER B-48.0 PER C-16.0 PER D-42.0 TP- -0.1333

RAIN =-1

PRINT HYD ID-4 CODE-10

PARTIAL HYDROGRAPH 104.00

TIME HRS	FLOW CFS	T IME HRS	FLOW	T IME HRS	FLOW CFS	TIME	FLOW	TIME HRS	FLOW
.000	.0	1.667	.2	3.333	.0	5.000	.0	6.667	.0
.333	1.7	2.000	.1	3.667	.0	5.333	.0		
.667	6.2	2.333	.1	4.000	.0	5.667	.0		
1.000	2.1	2.667	.0	4.333	. 0	6.000	.0		
1.333	.5	3.000	0	4.667	.0	6.333	.0		

RUNOFF VOLUME = 1.19106 INCHES = .3811 ACRE-FEET
PEAK DISCHARGE RATE = 11.70 CFS AT .500 HOURS

\*ADD AREAS A, B, C, & D

ADD HYD

ID=14 HYD=104.1 ID=13 ID=4

PRINT HYD

ID=14 CODE=10

PARTIAL HYDROGRAPH 104.10

TIME HRS	FLOW CFS	TIME HRS	FLOW	TIME	FLOW - CFS	TIME	FLOW CFS	TIME HRS	FLOW
.000	.0	1.667	.8	3.333	.1	5.000	.1	6.667	.0
.333	5.9	2.000	. 4	3.667	.1	5.333	. 1		
.667	26.6	2.333	. 3	4.000	.1	5.667	. 2		
1.000	8.2	2.667	. 2	4.333	.1	6.000	. 2		
1.333	2.0	3.000	. 1	4.667	.1	6.333	.0		

RUNOFF VOLUME = 1.07909 INCHES = 1.5654 ACRE-FEET
PEAK DISCHARGE RATE = 49.34 CFS AT .500 HOURS

B:\RANCO.OUT Thursday August 22, 1991 04:04:45 pm

\*DRAINAGE AREA E

COMPUTE NM HYD ID-5 HYD NO- 105.0 DA-0.0073 SQ MI

PER A=0.0 PER B=29.0 PER C=11.0 PER D=60.0 TP= -0.1333

RAIN =-1

K = .123189HR TP = .133300HR K/TP RATIO = .924147 SHAPE CONSTANT, N = 3.829231 UNIT PEAK = 7.5271 CFS UNIT VOLUME = .9986 B = 343.62 P60 = 1.9000 AREA = .002920 SQ MI IA = .45875 INCHES INF = 1.13450 INCHES PER HOUR RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .0333333

PRINT HYD ID=5 CODE=10

PARTIAL HYDROGRAPH 105.00

						***		# T14F	DI 013
TIME	FLOW	TIME	<b>LTOM</b>	TIME	FLOW	TIME	FLOW	TIME	FLOW
HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS
.000	.0	1.667	.3	3.333	.1	5.000	.1	6.667	.0
.333	3.0	2.000	.2	3.667	- 1	5.333	.1		
.667	8.5	2,333	.1	4.000	.1	5.667	. 1		
1.000	3.5	2.667	.1	4.333	.1	6.000 .	1		
1.333	.7	3.000	.1	4.667	.1	6.333	.0		

RUNOFF VOLUME = 1.44295 INCHES = .5618 ACRE-FEET
PEAK DISCHARGE RATE = 16.48 CFS AT .500 HOURS

\*ADD AREAS A, B, C, D & E

ADD HYD

ID-15 HYD-105.1 ID-14 ID-5

PRINT HYD

ID-15

CODE=10

PARTIAL HYDROGRAPH 105.10

TIME	FLOW								
HRS	CFS	HRS	CFS	HRS	CFS.	HRS	CFS	HRS	CFS
.000	.0	1.667	1.1	3.333	.2	5.000	.2	6.667	.0
.333	9.0	2.000	. 6	3.667	.2	5.333	.2		
.667	35.1	2.333	. 4	4.000	. 2	5.667	.2		
1.000	11.7	2.667	.3	4.333	. 2	6.000	. 3		
1.333	2.7	3.000	.2	4.667	.2	6.333	.0		

RUNOFF VOLUME - 1.15607 INCHES = 2.1272 ACRE-FEET
PEAK DISCHARGE RATE = 65.82 CFS AT .500 HOURS

APPENDIX B
CALCULATIONS

# CALCULATIONS

# 1) Check Required Curb Opening for Swales

Assume "dead" water and use broadcrested weir Formula with C=3.0. Use maximum depth of 6".

a. Swale @ Point B

$$L = 17.7$$

$$= 16.7', say 17'$$

$$3/2$$

$$(.5) (3)$$

b. Swale @ Point E

$$L = 46.2$$

$$= 43.6', say 44'$$

$$3/2$$

$$(.5) (3)$$

# 2) Size Retention Pond

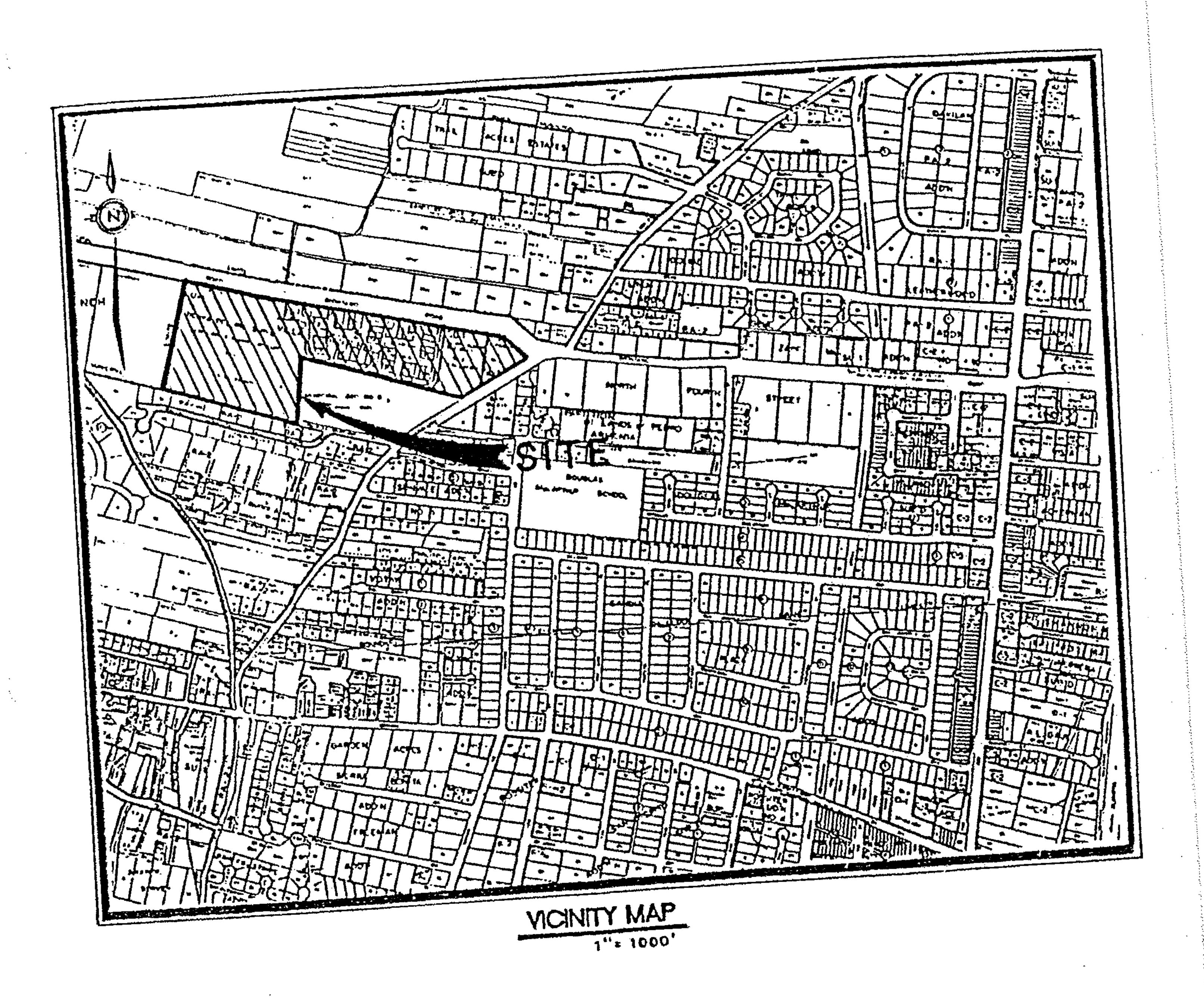
- \* Use 100-Year, 10-Day Storm
- \* V10 Days = V360 + Ad X (P10 Days P360) / 12 in/ft
- \* Composite Land Use Treatments are as follows:

$$B = 48\%$$

$$C = 15\%$$

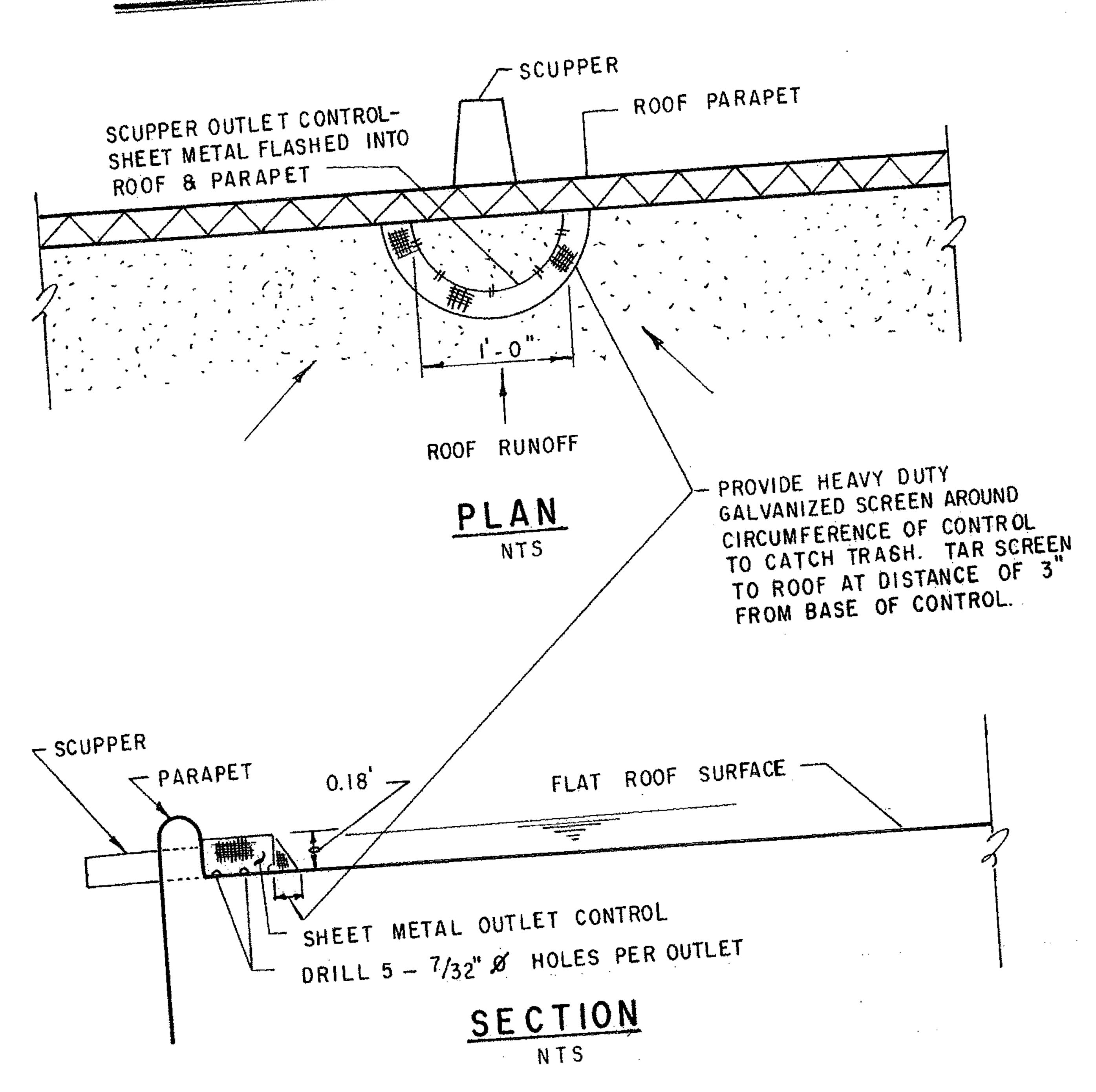
$$D = 37\%$$

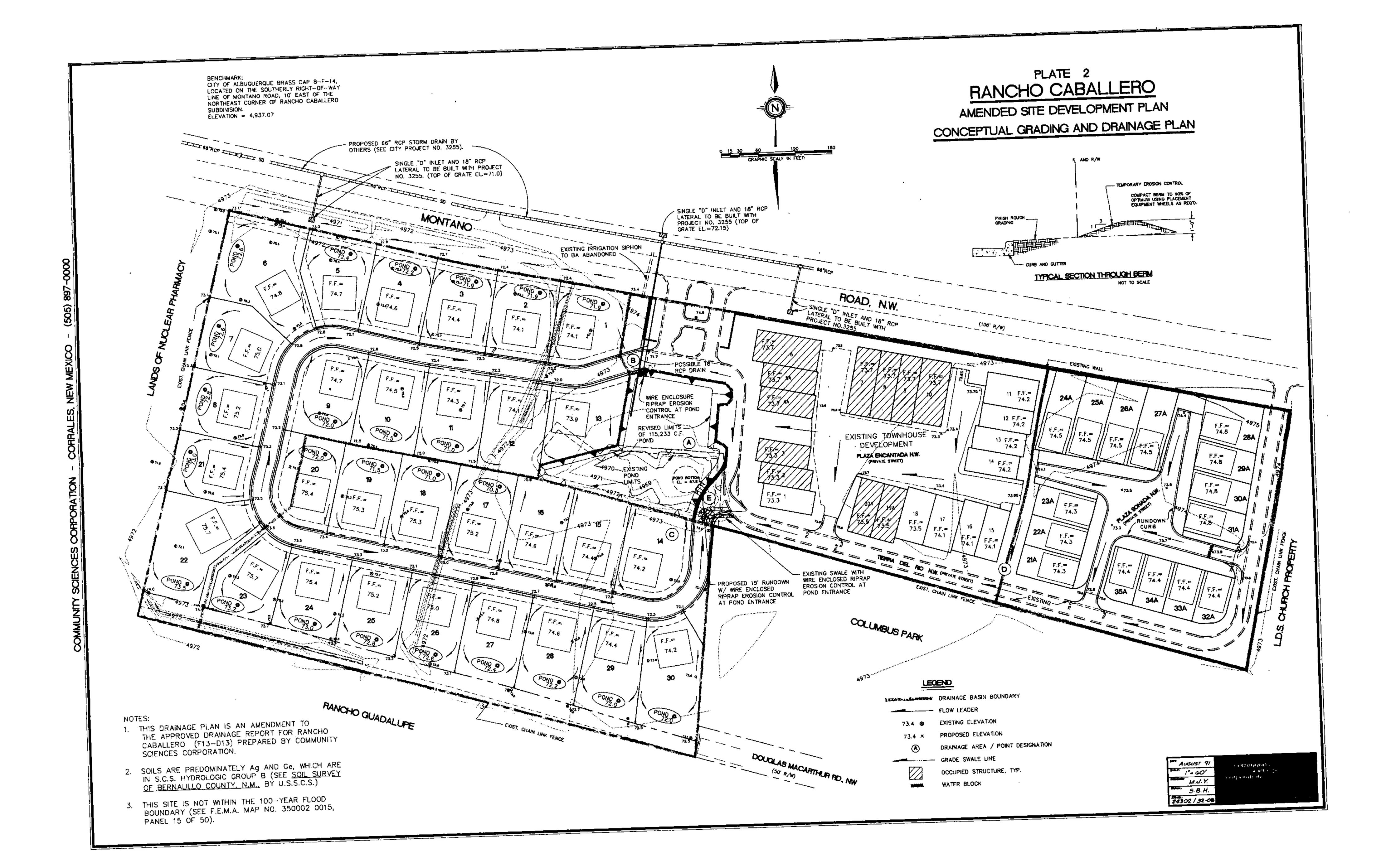
- \* Project is in Zone No. 2
- \* Weighted E = ((22.1 (.48) .72) + (22.1 (.20) 1.07) + 22.1 (.37) 2.08)) / 22.1 = 0.96"
- \* V360 = (0.96 / 12) X 22.1 = 1.78 AC FT
- \* V10 Days = 1.78 + .37 (22.1) ((3.47 2.2) / 12) = 2.65 AC FT = 115,233 CF

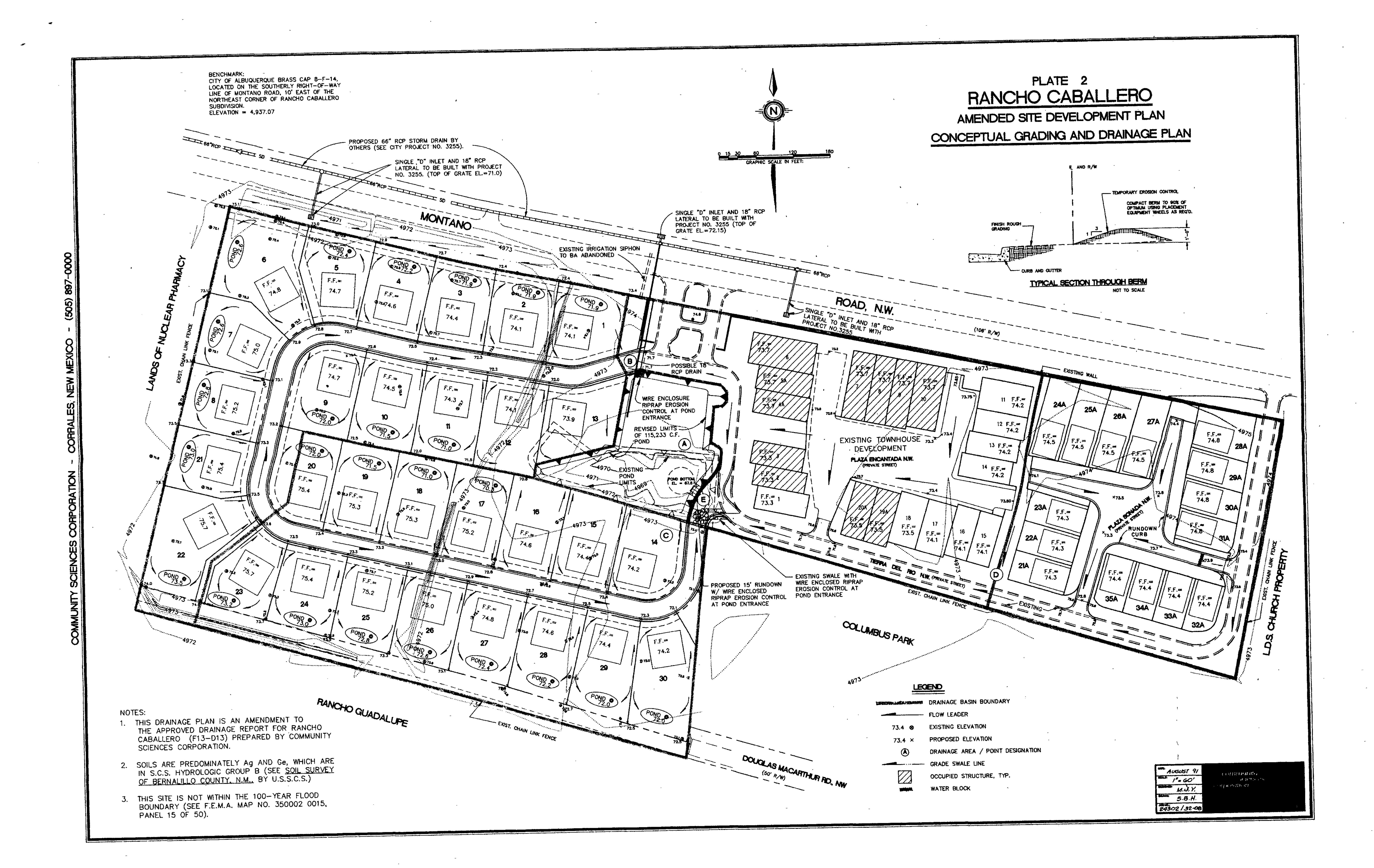


# PLATE 1 RANCHO CABALLERO

# PLATE 2 SCUPPER OUTLET CONTROL







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DRAINAGE MANAGEMENT PLAN
FOR THE
AMENDED SITE PLAN OF
RANCHO CABALLERO,
ALBUQUERQUE, NEW MEXICO

PREPARED FOR:
ANDERSON SOUTHWEST, INC.

PREPARED BY:
COMMUNITY SCIENCES CORPORATION

NOVEMBER, 1988

MICHAEL J. YOST, F.E.

RESIDENT PROFESSION LINES

SURVEYING
LAND PLANNING
CIVIL ENGINEERING
DEVELOPMENT CONSULTANTS

# DRAINAGE INFORMATION SHEET

PROJECT TITLE: for Rancho Caballero 2	ZONE ATLAS/	DRNG. FIL	E#:F-13
LEGAL DESCRIPTION: Portion of Tract 1, Tierr	ra del Rio	Subdivisi	on
CITY ADDRESS: N/A			·
ENGINEERING FIRM: Community Sciences Corpor ADDRESS: PO Box 1328-Corrales, NM 8		CONTACT: PHONE:	Michael Yost, P.E. 897-0000
OWNER: Anderson Southwest, Inc. ADDRESS: 2435 Zearing StAlbuquerque			Mike Anderson 247-2700
ARCHITECT: N/A ADDRESS: N/A			N/A N/A
SURVEYOR: Community Sciences Corpor ADDRESS: PO Box 1328-Corrales, NM 8		CONTACT: PHONE:	L.A. Carleton, L.S. 897-0000
CONTRACTOR: N/A ADDRESS: N/A		CONTACT: PHONE:	N/A N/A
PRE-DESIGN MEETING:  X YES NO X COPY OF CONFERENCE RECAP SHEET PROVIDED	DRB NO EPC NO PROJ. NO.	Z-72-2	25-1
TYPE OF SUBMITTAL:  X DRAINAGE REPORT DRAINAGE PLAN X CONCEPTUAL GRADING & DRAINAGE PLAN GRADING PLAN EROSION CONTROL PLAN ENGINEER'S CERTIFICATION	X PRE X SIT X SIT FIN BUI FOU CER ROU	ETCH PLAT ELIMINARY TE DEVELOPMENT AT LDING PERIODING PERIODING PERIODING PERIODING PERIODING PAVIL EDING/PAVIL	PLAT APPROVAL MENT PLAN APPROVAL
DATE SUBMITTED: 110/88 BY: Without J. Wast			

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

# CONFERENCE RECAP

DRAINAGE FILE/ZONE ATLAS PAGE NO.:	- DATE: 10/20/88 @ 11:00
PLANNING DIVISION NOS: EPC:	
SUBJECT: Rancha Caballero	Unit II
STREET ADDRESS (IF KNOWN): Montau	
SUBDIVISION NAME:	
	CCTEN.
APPROVAL REQUI	
PRELIMINARY PLAT	FINAL PLAT
SITE DEVELOPMENT PLAN	BUILDING PERMIT
OTHER	ROUGH GRADING
	en em en en en en em en em en
ATTENDANCE: Mike Yost	REPRESENTING Community Sciences
Canas Montoya	Hydrology Section
FINDINGS:	
O Conceptual Stange plan	tor Site Plan
approach If inforther	tue se segmed noed
a dronge place	
(2) Ketention road is appr	sprate No domina
Capter 7	
(3) When the Months Ha	La Contuited
Med to te-in	to the Storm duan
(2) $1$ $1$ $1$ $1$	$\Delta A + \Delta A $
Veed to Jamen The	Andan Draw To
de tome The release	ase:
(5) F_ P/4	
June Jacon Japan	Averal 1900 de la companya della com
(6) Montano Report indicate	11 + approved
site can ducker to Mo	Ntaro. The allowallo for
The undersigned agrees that the above findi	
are only subject to change if further in	vestigation reveals that they are not
reasonable or that they are based on inaccu	
SIGNED: (	NED: Muchael J. Joset
TITLE:TIT	LE: COMMUNIT SCIENCES
DATE: 10-70-81 DAT	E: 10/20/68
**NOTE** PLEASE PROVIDE A COPY OF THIS RE	CAP WITH THE DRAINAGE SUBMITTAL

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C)	Design Criteria	1		
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	2) Engineering Parameters	2		
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F)	Onsite Drainage	4		
G)	Erosion Control	5		
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Table	e 2 - Street Flow Characteristics	7		
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Appe	ndices			
Appendix A - MODSCS Output				
Appe	ndix B - Calculations			

# Plates

Plate 1 - Location Map

Plate 2 - Conceptual Grading and Drainage Plan

Rancho Caballero
Anderson Southwest, Inc.

# A) Purpose and Scope

Anderson Southwest, Inc. is currently planning to amend a 12.56 acre portion of the approved site plan for their Rancho Caballero development project. Rather than construct 60 townhomes as originally planned, Anderson Southwest intends to develop the property for construction of 30 single-family, detached homes. The property is to be accessed via privately owned and maintained streets and served with privately owned and operated utility lines. This report presents an overall Drainage Management and Conceptual Grading Plan for approval by the City of Albuquerque so that subsequent subdivision and development may commence.

# B) Site Location and Topography

The project site is located in the northwest valley on the south side of Montano Road between Guadalupe Trail and Rio Grande Boulevard (see Location Map, Plate 1). The project site and the surrounding area is virtually flat. The site itself is currently serving as a flood irrigated alfalfa field. Soils are typically fine silty sands with varying amounts of clay. The soils are classified as S.C.S. hydrologic group B.

# C) Design Criteria

## Flood Control Regulations

The drainage plan presented in this report has been designed to comply with AMAFCA resolution 80-15 which requires that proposed land development projects be designed such that no flooding of private properties will occur during any storm up to and including the 100 year frequency event.

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# Engineering Parameters

In accordance with AMAFCA criteria all hydrological analysis is based on the 100 year frequency - 6 hour duration storm as represented in the NOAA Atlas for New Mexico.

The four rainfalls pertinent to the study are as follows:

	100 Year
One Hour	1.9"
Six Hour	2.2"

# D) Computational Procedures

The analysis approach utilized follows standard engineering practice. Key points of confluence were selected, and subsequently the associated individual and aggregate contributing basins were defined.

Hydrological computations were accomplished by means of our MODSCS computer model. This model is based upon the Soil Conservation Service triangular unit hydrograph method, but the method has been modified to be more applicable to developed watershed conditions. The model avoids the common pitfall of grappling for an appropriate developed curve number by including percent impervious as an input variable. This fraction of the watershed is then modeled at a curve number of 95. An assigned curve number is applied to the balance of the watershed, and the runoffs are combined to yield the composite hydrograph. In addition the model has the capacity to route hydrographs through reservoirs and channels, or to translate hydrographs in time for summation with other sub-basins.

Rancho Caballero
Anderson Southwest, Inc.

November, 1988

Times of concentration were estimated by using a combination of approximated street flow velocities and overland flow velocities (as applicable) from the upper subcatchment reaches to the confluence point of interest. A convenient formula for overland flow velocity takes the form:

$$Vo = KY^{\emptyset_{\bullet}5}$$

where Vo = overland flow velocities

Y = average ground slope in percent

K = a ground cover factor

Street velocities were estimated by use of the Manning equation for uniform flow.

All the characteristic hydrological parameters for each subcatchment are contained in Appendix A as part of the computer model output, and a summary of parameters and peak flow rates are given in Table 1.

Flow Characteristics for conveyance swales, channels and streets were analyzed based on the Manning Equation for uniform flow. Streets are assumed to have a 2% cross slope from curb to crown and a standard curb depth of 6 inches.

# E) Offsite Drainage

The valley areas surrounding the project site are so flat that no definitive drainage patterns can be discerned. Generally valley areas tend to flow from northeast to southwest. Because both sides of Montano Rd. contain drainage swales, it is assumed that any flows finding their way to the R.O.W. from the north will be diverted by these swales.

The portion of Rancho Caballero already developed for townhomes is shown on Plate 2 as Drainage Basin D. This portion has already been paved and graded to drain storm runoff in the centrally located total retention pond. It was originally planned for scupper outlet controls to be installed on the roofs of the townhomes. However, a recent visit revealed these devices have not been installed and so their effect is not considered in the hydrologic calculations of this report.

# F) Onsite Drainage

All onsite storm runoff is to drain to the retention pond centrally located in the Rancho Caballero development. A portion of this pond was excavated and landscaped as part of the townhome development project. The size and shape of the pond will be revised as part of the amended site development to form 75,000 cubic feet of capacity at a depth of three feet.

Basin A includes the open space/landscaped area which is to include the pond.

Drainage Basins B and C outline the two, proposed major drainage patterns of the single-family, detached house area. Flows are to be collected in the private streets and conveyed to landscaped swales for discharge into the pond. Rear yard ponds are to be graded in a number of the proposed lots. No "credit" is taken for the capacity of these ponds in determining the required size of the main retention pond. Rather, these rear yard ponds are proposed because of grading constraints.

Rancho Caballero
Anderson Southwest, Inc.

Construction of a 66 inch RCP storm drain in the Montano Road R.O.W. as part of City Project No. 3255 is imminent. We propose an 18 inch RCP lateral be extended from the storm drain to the bottom of the retention pond. Research of the master drainage report for Project 3255 reveals 3 cfs is the allowable discharge from the pond to the storm drain. While this release rate does not materially affect the required capacity of the retention pond, we are in concurrence with the engineers of City Hydrology Section that a drain for the pond is desirable. Construction plans for Project No. 3255 also specify the realignment of the existing irrigation siphon under Montano Road. Because this siphon is used only for irrigating the alfalfa field onsite and will not be needed during and after development, possible change to the Project No. 3255 plans may be to abandon the existing siphon and extending an 18 inch storm lateral to the site.

# G) Erosion Control

Control of excessive soil erosion into streets and drainage improvements during construction will be accomplished by use of temporary lot line, water-trap berms. These will be windrowed into place following mass grading operations and left in place until each home is constructed and sold. Plate 2 illustrates the dimensions of these berms, and they will be located along those boundaries of each lot which are common to streets or drainage easements.

TABLE 1 .
HYDROLOGICAL FLOW PARAMETERS

AREA/POINT DESIGNATION	AREA (SQ. MI.)	FRACTION IMPERVIOUS	CN (PERVIOUS)	TC (MINUTES)	Qløø (CFS)	VlØØ (CF)
A	.0016	0.00	72	3	Ø.9	1,416
В	<b>.</b> ØØ97	Ø.3Ø	70	8	10.5	16,375
C	<b>.</b> ØØ99	Ø.3Ø	7Ø	8	10.7	16,712
D	.Ø133	Ø.72	72	. 8	26.1	40,549

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TABLE 2
STREET FLOW CHARACTERISTICS

AREA/POINT DESIGNATION	STREET WIDTH (FT)	ESTIMATED SLOPE (FT/FT)	Q1ØØ (CFS)	VlØØ (FPS)	dløø (FT)	REMARKS
B	24	.002	10.5	1.64	Ø.43'	< 6", OK
C	24	.002	10.7	1.65	Ø.44'	< 6", OK

APPENDIX A

MODSCS OUTPUT

AREA/POINT DESIGNATION = A
AREA = .0016 SQ MI
1 HR RAIN = 1.7 INCHES
6 HR RAIN = 2.2 INCHES
TC= 3 MIMUTES
FRAC IMPERV= 0
CN (PERVIOUS) = 72
CN (IMPERVIOUS) = 75

PEAK ONLY CUTPUTTED

TIME C:(CFS)

237

VCL == 1415.651 CF

AREA/FOINT DESIGNATION = D

AREA = 7.699999E-03 SQ MI

1 HR RAIN = 1.9 INCHES

5 HR RAIN = 2.2 INCHES

TC= 6 MINUTES

FRAC IMPERV= .3

CN (FERVIOUS) = 70

CN (IMPERVIOUS) = 95

FEAK ONLY OUTFUTTED

TIME G(CFS)

240 10.5

VOL = 15374.69 CF

AREA/FOINT DESIGNATION = C
AREA = .0099 SQ MI
1 HR RAIN = 1.9 INCHES
6 HR RAIN = 2.2 INCHES
7C= 8 MINUTES
FRAC IMPERVIOUS) = 70
CN (IMPERVIOUS) = 75

PEAK CNLY OUTFUTTED

TIME Q(CFS)

240 10.7

VOL = 16712.32 CF

AREA/FOINT DESIGNATION = DAREA = .0133 SQ MI

1 HR RAIN = 1.7 INCHES
6 HR RAIN = 2.2 INCHES
TC= B MINUTES
FRAC IMPERVIOUS) = 72
CN (FERVIOUS) = 72
CN (IMPERVIOUS) = 75

FEAR CHLY CUTEUTED

TIME G(CFS)

240 26.1

•

•

VOL = 40546.83 CF

APPENDIX B

SAMPLE CALCULATIONS

### CALCULATIONS

### 1) Check Capacity of Section A Swales

a. Swale @ Point B
Ql00 = 10.5 cfs
Sideslopes = 3:1
n = 0.03
Slope = 1%
Bottom Width = 6 ft.

From Mannings Eq.:

dn = 0.51 ft. Vn = 2.76 fps FF = 0.75

Make Swale 9" deep, min.

b. Swale @ Point C

Q100 = 10.7 cfs Sideslopes = 3:1 n = 0.03 Slope = 1% Bottom Width = 9 ft.

From Mannings Eq.:

 $dn = \emptyset.41 \text{ ft.}$  Vn = 2.53 fps  $FF = \emptyset.74$ 

Make Swale 9" deep, min.

### 2) Check Required Curb Opening for Swales

Assume "dead" water and use broadcrested weir Formula with C = 3.0. Use maximum depth of 6".

a. Swale @ Point B

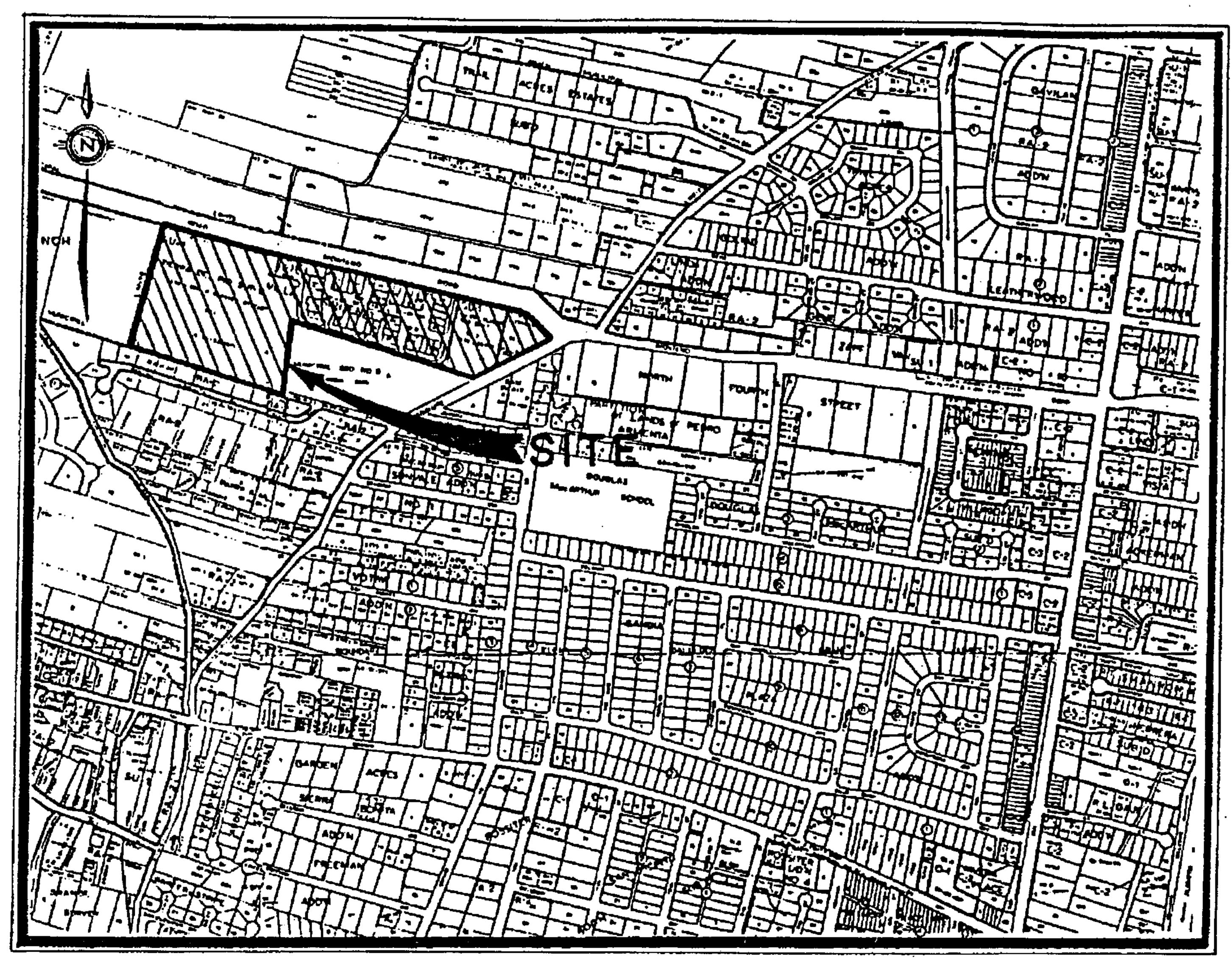
$$L = 10.5$$

$$\frac{-3/2}{(.5)^{3/2}} = 9.90', \text{ say } 10'$$

b. Swale @ Point C

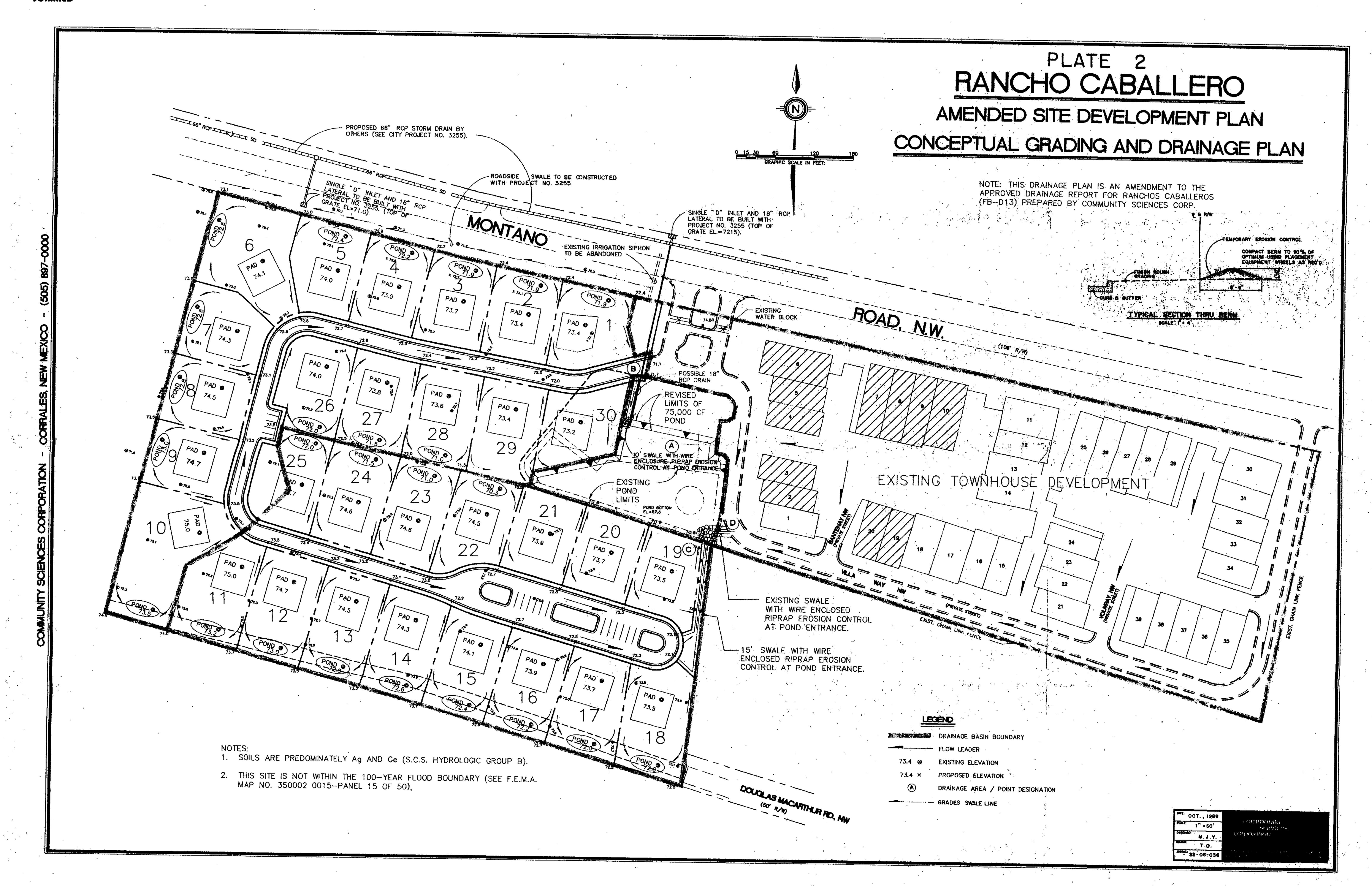
$$L = 10.7$$

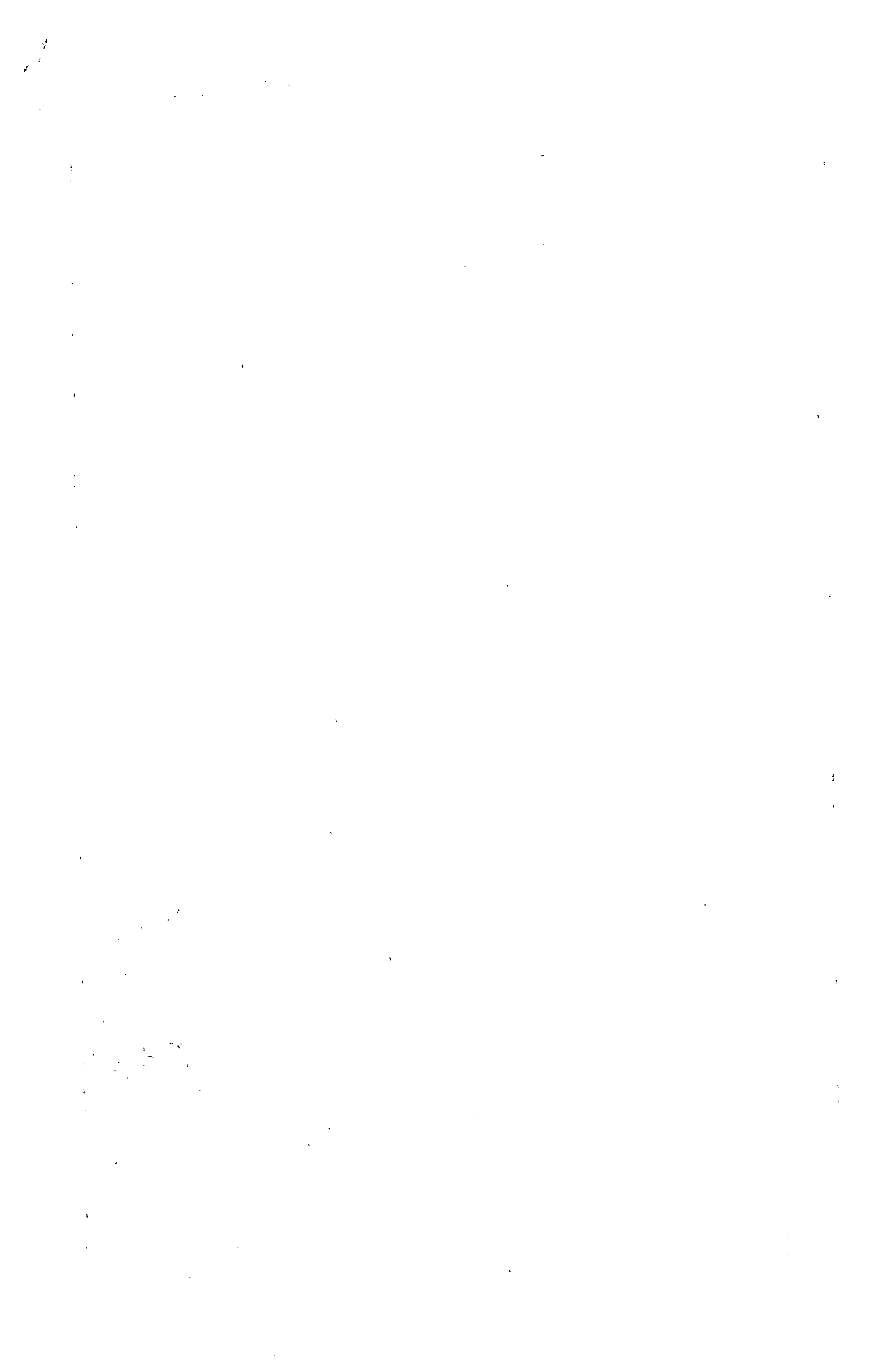
$$\frac{-3/2}{(.5)^{3/2}} = 10.09', \text{ say 11'}$$



VICINITY MAP 1"= 1000'

## PLATE 1 RANCHO CABALLERO





N32-02 F/4/D007A

FOR
TIERRA DEL RIO

(RANCHOS CABALLEROS)

PREPARED FOR:

CABALLERO FARMS, LTD.

ALBUQUERQUE, NEW MEXICO

September, 1977
(see plate #3)

(original submitted to client and signed by Kent M. Whitman, P.E. #6170)

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<b>A</b> ).	Purpose and Scope	1
B)	Site Location and Topography	1
C)	Design Criteria	1
D)	Off-Site Drainage	2
E)	On-Site Drainage	2
	Appendix A Table 1 - Flow Calculations	
	Plate 1 - Location Map and Off-Site Drainage	
	Plate 2 - Scupper Outlet Control Detail	
	Plate 3 - Drainage Plan	

### A) Purpose & Scope

Caballero Farms, Ltd. is presently planning construction of a townhouse development in northwest Albuquerque. The site contains approximately 21 acres, and will ultimately contain 99 Units to be sold individually on a fee simple basis. The purpose of this report is to propose a method of disposal for storm run-off which meets the requirements of the City of Albuquerque and the Albuquerque Metropolitan Arroyo Flood Control Authority.

### B) Site Location & Topography

The site is located in the northwest valley on the south side of Montano Road between Guadalupe Trail and Rio Grande Boulevard. (See Location Map, Plate 1) The ground in (and for some distance around) the site is virtually flat. The site itself is currently serving as a flood irrigated alfalfa field. Soils are typically fine silty sands with varying amounts of clay.

### C) Design Criteria

### (1) Engineering Parameters

Rate of run-off 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). For times of concentration equal to 10 minutes or less the value of I is taken as 5.4 inches per hour. A coefficient of run-off for the developed state equal to 0.55 has been calculated as shown in Appendix A. Volume calculations have been based on a 100 year-6 hour rainfall of 2.2".

### (2) Flood Control Regulations

The Drainage Plan presented in the report has been designed to comply with the 1972 AMAFCA Resolution in regard to rate and volume of run-off leaving the site. That Resolution has been interpreted to say that the rate and volume of run-off allowed to leave the site after development shall be no greater than the rate and volume occurring prior to development. In addition for valley areas where drainage conditions are poor the City Engineer is requiring that no run-off be allowed to leave to leave a prospective development site. The City Engineer has advised us that this requirement will apply to the Tierra del Rio project.

### D) Off-Site Drainage

The valley areas surrounding the Tierra del Rio site are so flat that no definitive drainage patterns can be discerned. Generally speaking valley areas tend to drain from north to south in conjunction with the flow of the river. Since both sides of Montano Road contain drainage swales with positive gradients, it is assumed that any flows finding their way to the R.O.W. from the north will be diverted around the site by said swales.

### E) On-Site Drainage

In order to meet AMAFCA requirements several improvements will be made to site:

- (1) Scupper Outlet Controls as shown in Plate 2 will be provided at all roof drains to dissipate roof run-off over a 24 hour period.
- (2) A 77,400 cubic foot retention pond will be provided at the center of the site.
- (3) Extensive site grading will be conducted in order to assure that all areas drain into the aforementioned pond.

Plate 3 illustrates the proposed drainage patterns and pond while Table 1 presents a detailed breakdown of drainage sub-areas and corresponding flow rates at key points of discharge. Also included in Table 1 are required swale and street sections at these key points based on the Manning equation-relating-geometry to flow capacity. Since all streets will be private, inverted crowns are used in some locations.

Appendix A contains other sample calculations pertinent to our analysis. The retention pond has been sized to hold 100% of the estimated on-site run-off not including roof discharge. Since the roof areas will be discharging their volumes over a 24 hour period, infiltration through the pond bottom will more than compensate for the roof run-off. An infiltration study was conducted by Albuquerque Testing Laboratories and is included at the end of this report. That study shows a minimum infiltration rate of 22.9 minutes/inch or 2.62 inches/hour. The gross roof-top storage is approximately 25,000 cubic feet or one third of the pond volume. Therefore this roof-top storage represents approximately 13 inches of depth in the pond. In order to dissipate 13 inches of water over a 24 hour period the pond would have to percolate at 0.54 inches per hour or a rate equal to only 21% of the reported rate. This is obviously a satisfactory safety factor.

### APPENDIX A - SAMPLE CALCULATIONS

### 1) Composite Run-off Coefficient

Area breakdown

### 2) Retention Pond Sizing

Average roof Area = 1,400 S.F.  
Gross roof Area = 99 x 1,400 = 138,600 S.F.  
Gross area = 21 acres = 914,760 S.F.  
Net area to pond = 914,760 - 138,600 = 776,160 S.F.  

$$R = 2.2'' = 0.18'$$

Required pond volume =  $0.55 \times 0.18 \times 776,160$ = 76,840 cubic feet

### 3) Oriface sizes - Scupper Outlet Controls

Assume 1,400 S.F. roof area with 2 scuppers per roof and 5 orifaces per control

Ar = 1,400 ÷ 2 ÷ 5 = 140 S.F.  
T = 86,400 sec.  
Y<sub>1</sub> = 0.18'  
Y<sub>2</sub> = 0'  
C<sub>d</sub> = 0.62  
A<sub>0</sub> = 
$$\frac{2 \text{ Ar}}{\text{Cd} \text{ T } \sqrt{2g}}$$
 ( $\sqrt{Y_1}$  -  $\sqrt{Y_2}$ )  
= .00028 S.F.  
=  $\frac{\pi}{d^2}$   
d = .0189'  
= 7/32" Ø oriface

TABLE 1		FLOW CAI	CULATIONS				REQ	JIRED CHANNE	L/SWA	\LE		REQUIR (based	EQUIRED STREET SECTION based on 24' width)				
Area/Point Designation	Area (Acres)	Areas Contributing	Gross Area Contributing (Acres)	Tc (min)	I (in/hr)	Q (cfs)	Horz/Vert Sideslope	Bot. Width (feet)	n	(feet) Depth	(ft./ft.) Slope	Crown	Curb Height	Slope			
1	24.02	1	1.38	< 10	5.4	4.1	30	0	.03	. 5	.002						
2	19.08 1.10	, 2	1.1	< 10	5.4	3.3						- 3''	N/A	.002			
3	27.30 1.57	3	1.57	< 10	5.4	4.7	· · · · · · · · · · · · · · · · · · ·					-4"	N/A	.002			
4	29.66	. 4	1.7	< 10	5.4	5.1	30	0	.03	. 5	.002						
5	53.5	5	3.07	< 10	5.4	9.1	·	·	<del> </del>			-4"	N/A	.006			
6	23.66	2,6	2.46	< 10	5.4	7.3		•				3''	8"	.002			
7	36.56 2.10	1 - 7	12.28	13	4.97	33.6						3"	8"	.002			
8	27.64 1.59	8	1.59	< 10	5.4	4.7						-3"	N/A	.002			
9	17.54	9	1.01	<b>≺</b> 10	5.4	3.0	30	· 0	.03	. 5	.002						
10	36.14 2.07	10	2.07	< 10	5.4	6.2			·			- 4"	N/A	.003			
11	9.9 0.57	11	0.57	<10	5.4	1.7						3"	811	.002			
12	38.5	8,9,10,12	6.88	15	4.73	17.9						3"	811	.002			
13	N/A	8,9,10,11,12	7.45	15	4.73	19.4	12	6	.03	.67	.005						

•

## Abupubulub

### TESTING LABORATORY

SUB SOIL INVESTIGATION - PHYSICAL TESTING - INSPECTION

532 JEFFERSON ST., N. E.

P. O. BOX 4101

PHONE 255-8916 255-1322

ALBUQUERQUE, NEW MEXICO 87106



Lab No	Date July 22, 1977
Report to Community Sciences Corp., Corrales	
Submitted By Same (Kent Whitman) Sampled By Steve Gutie	rrez, A.T.Lab. Rep.
ProjectPercolation Tests, Proposed Townhouse Project	***************************************
Source of Material Four (4) shallow depth percolation tests made	on July 20, 1977, off
Montano Road North-west.	

### TEST RESULTS

Test Data: The percolation tests were run in accordance with the procedures set forth in the U.S. Department of Health, Education and Welfare, Public Health Service Publication No. 526, "Manual of Septic Tank Practice." The tests were run at approximately 3 feet beneath the existing ground's surface in 5½ - diameter holes. The holes were allowed to saturate with water prior to running the tests.

Test Results:			- 1.	.:
Time Interval	Drop	in Water Lev	rel (inches)	
(Minutes)	Test #1	Test #2	Test #3	Test #4
0 - 10	1-5/16	1-1/4	2-3/16	1-15/16
10 - 20	1-1/8	1/2	1	7/8
20 - 30	3/4	3/8	15/16	7/8
30 - 40	5/8	3/8	13/16	13/16
40 - 50	5/8	7/16	9/16	9/16
50 - 60	1/2	7/16	9/16	1/2
*(Percolation Rate)	20.0	22.9	17.8	20.0

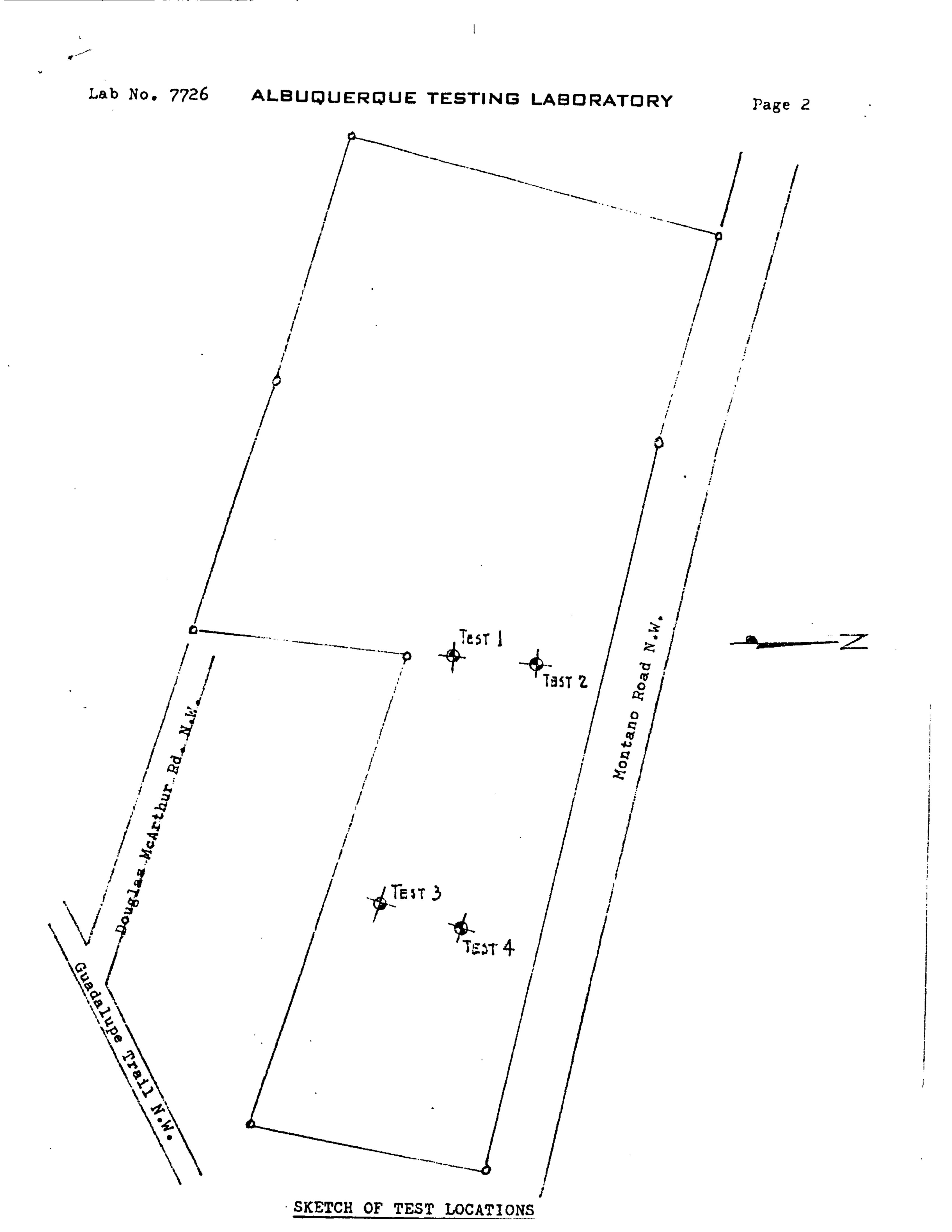
<sup>\*</sup>Percolation rate is the time in minutes required for the water level to fall one (1) inch, the drop occurring during the final 10 minute period being used to calculate the rate.

Note: All tests conducted at approximately 3' beneath present ground's surface in silty to fairly clean very fine graded sand.

Respectfully Submitted,
ALBUQUERQUE TESTING LAB.
Original Signed By

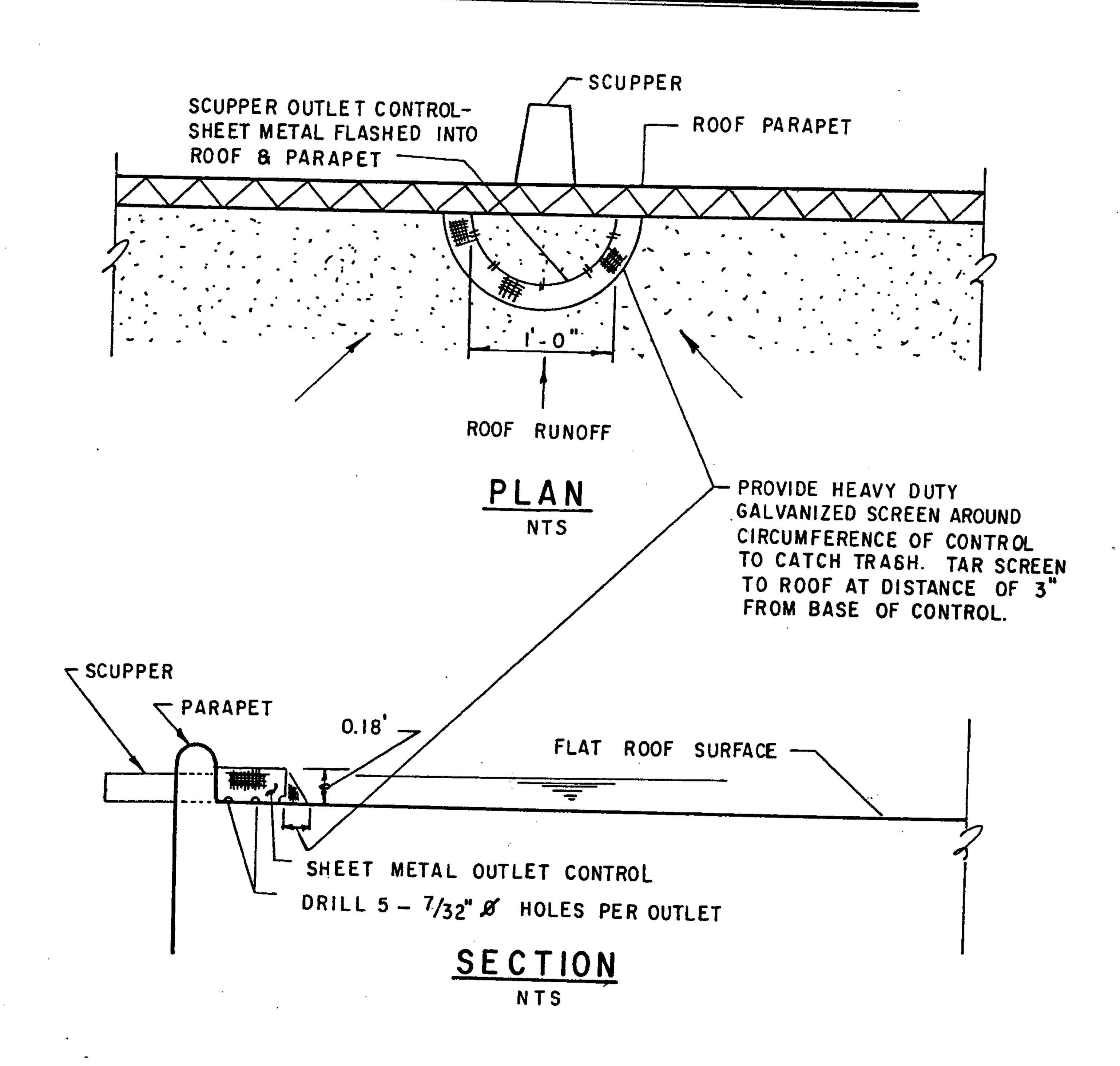
Registered Professional Engineer

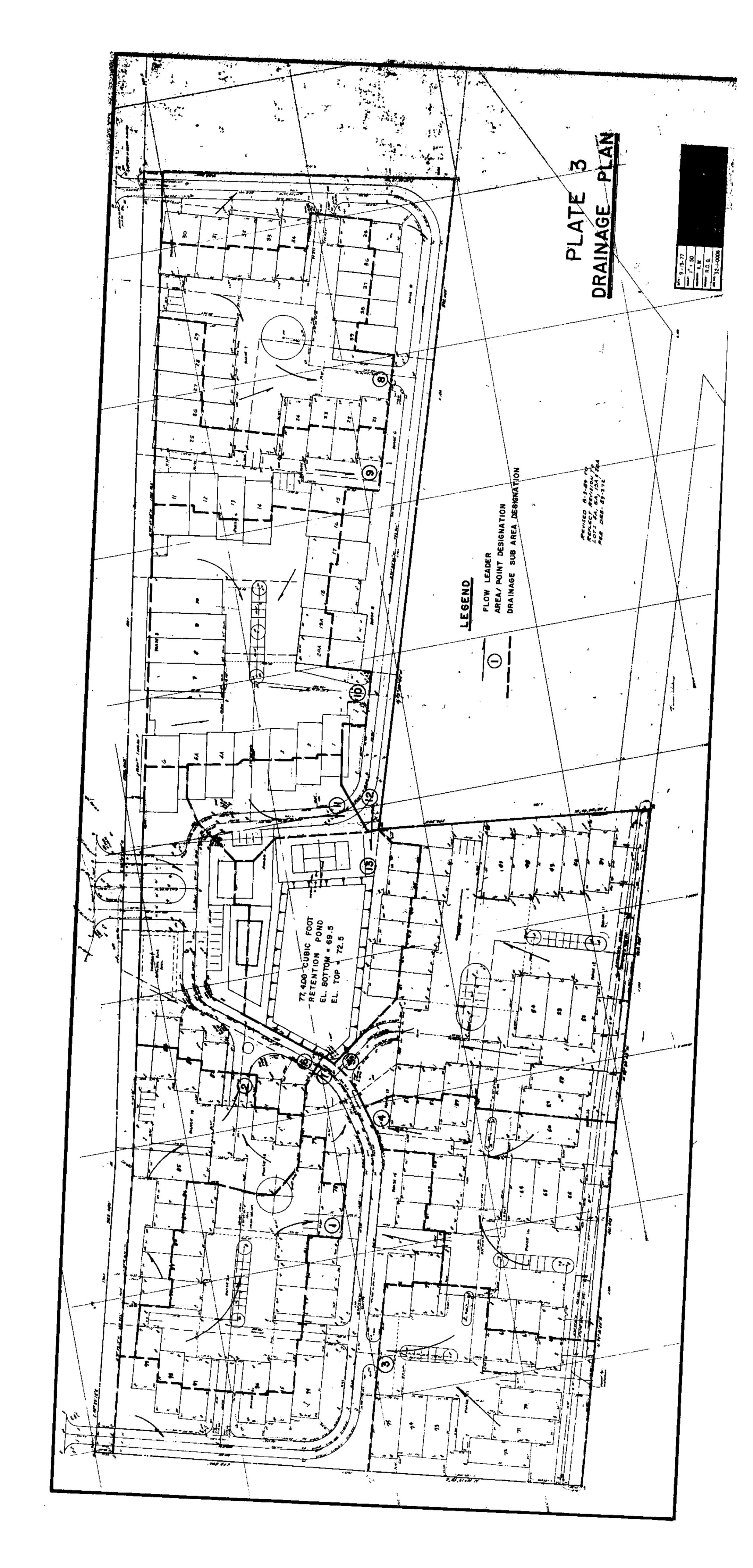
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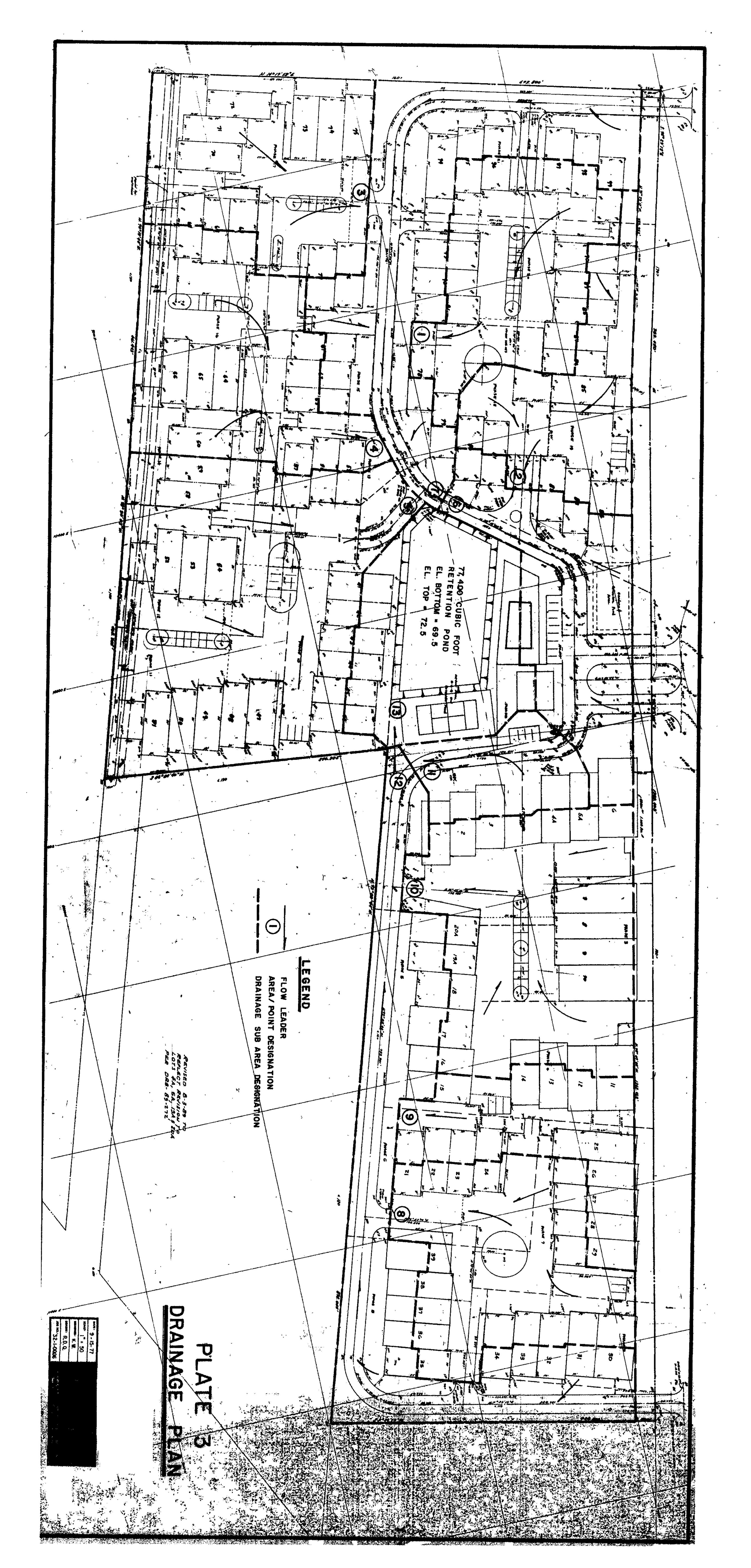


الما الما ¥ Δ. -**E**. 410 -10 0.00 Z ध 2 2 ·61-\*\*\* ADQ Θ TES. 13 40 19/197 W OAW 131000 [ he CANEL GOOD WAN P1 64 \$ ⊜ 48 13 -27 CEALBLE  $\Theta_{\tilde{\delta}}$ 2 1 Possitér Popin No vi S 13 Ard عِيْمُ فَال 2m 100 Po S CO LOS 13 mg 40. --ES ABL 105 A00 3 NP 1 0 0 35 RRA 0 ·京,这 9 GRA 0 S S .O CHANDE

# PLATE 2 SCUPPER OUTLET CONTROL









### City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

July 30, 1992

Michael J. Yost, P.E. Community Sciences Corporation, Inc. Post Office Box 1328 Corrales, New Mexico 87048

RE: GRADING PLAN FOR THE ESTATES AT RANCHO CABALLERO, PHASE II (F-14/D7) ENGINEER'S STAMP DATED JUNE 4, 1992

Dear Mr. Yost,

Based on the information provided on the referenced submittal received June 15, 1992, the plan is approved for Rough Grading for Phase II.

Please be advised that financial guarantees must be in place with DRC prior to sign-off on the Final Plat by the City Engineer designee.

If you should have any questions, please do not hesitate to call me at 768-2727.

Cordially,

John P. Curtin, P.E.

Civil Engineer/Hydrology

xc: Roger Green, DRC Chairman

Alan Martinez

JPC (WP+949)



PUBLIC WORKS DEPARTMENT



## City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

OCT - 9 ja!

October 3, 1991

Michael J. Yost, P.E. Community Sciences Corporation, Inc. Post Office Box 1328 Corrales, New Mexico 87048

RE: GRADING AND DRAINAGE PLAN FOR THE ESTATES AT RANCHO - CABALLERO, PHASE I (F-14/D7) ENGINEER'S STAMP DATED SEPTEMBER 26, 1991

Dear Mr. Yost,

Based on the information provided on the referenced submittal received September 13, 1991, the plan is approved for Rough Grading and work order for Phase I.

Please be advised that financial guarantees must be in place with DRC prior to sign-off on the Final Plat by the City Engineer designee.

If you should have any questions, please do not hesitate to call me at 768-2650.

Cordia/11y

11/1/1/1/1/1/

Gilbert Aldaz, P.E. & P.S.

Civil Engineer/Hydrology

xc: Roger Green, DRC Chairman

GA (WP+949)

PUBLIC WORKS DEPARTMENT

Walter H. Nickerson, Jr., P.E. Assistant Director Public Works

**ENGINEERING GROUP** 

Telephone (505) 768-2500

# FOR THE AMENDED SITE PLAN OF RANCHO CABALLERO, ALBUQUERQUE, NEW MEXICO

PREPARED FOR:

RANCHO CABALLERO, INC.

AND

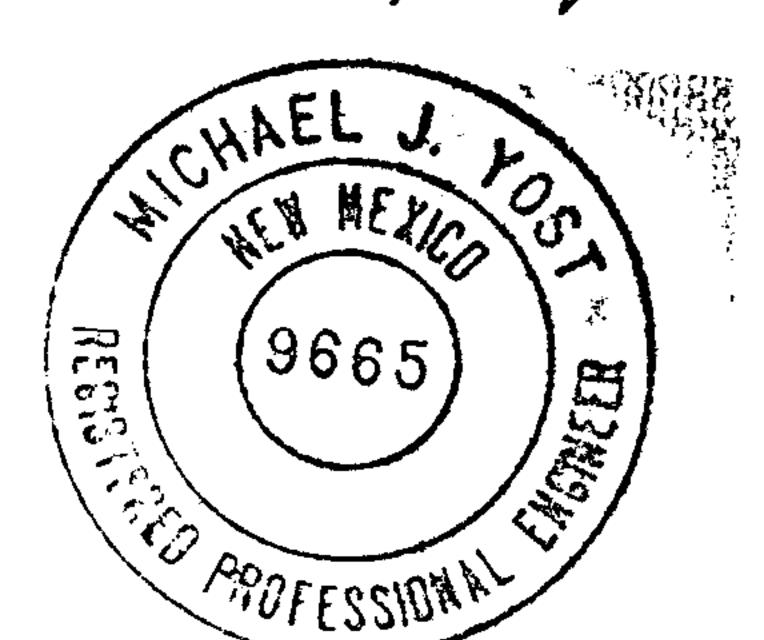
LAND DEVELOPMENT GROUP, INC.

PREPARED BY:

COMMUNITY SCIENCES CORPORATION

**AUGUST, 1991** 

MICHAEL J. YOST, P.E. 8/28/9/





### A) Purpose and Scope

The Rancho Caballero Subdivision currently consists of 39 townhouse style lots; eleven of which have been occupied. There are currently two proposed site plan amendments before the City of Albuquerque Development Review Board. The first is to re-plat the westerly 12.6 acres into 30 large, single family home lots and is to be called "The Estates at Rancho Caballero". The other proposed amendment is for re-platting the easterly 19 townhouse lots into 15 slightly larger, "patio home" style lots. The first site plan amendment is being sponsored by Land Development Group, Inc., and the second is a Rancho Caballero, Inc. project. The entire subdivision is to be accessed via privately owned and maintained streets, and served by a combination of public and privately utilities. This report presents an overall Drainage Management and Conceptual Grading Plan for approval by the City of Albuquerque so that subsequent re-platting and development may commence.

### B) Site Location and Topography

The project site is located in the northwest valley on the south side of Montano Road between Guadalupe Trail and Rio Grande Boulevard (see Location Map, Plate 1). The project site and the surrounding area is virtually flat. Most of the area that is to be The Estates at Rancho Caballero is currently serving as a flood irrigated alfalfa field. Soils are typically fine silty sands with varying amounts of clay. The soils are classified as S.C.S. hydrologic group B.

### C) Design Criteria

### Flood Control Regulations

The drainage plan presented in this report has been designed to comply with AMAFCA resolution 80-15 which requires that proposed land development projects be designed such that no flooding of private properties will occur during any storm up to and including the 100-year frequency event.

### Engineering Parameters

In accordance with AMAFCA criteria all hydrological analysis is based on the 100-year frequency - 6-hour duration storm as represented in the NOAA Atlas for New Mexico. Because a retention pond is to be used as a part of the drainage management scheme on a temporary basis, the 100-year - 10-day duration storm is also a design event.

The three 100-year frequency rainfalls pertinent to the study are as follows:

Duration	<u>Precipitation</u>
One Hour	1.9"
Six Hour	2.2"
Ten Day	3.47"

### D) Computational Procedures

The analysis approach utilized follows standard engineering practice. Key points of confluence were selected, and subsequently the associated individual and aggregate contributing basins were defined.

Hydrological computations were accomplished by means of AHYMO 990 (AMAFCA's September 1990 version of the HYMO computer model) and the criteria presented in the January, 1991 version of Chapter 22.2 of the City Development Process Manual.

Times of concentration were estimated by using a combination of approximated street flow velocities and overland flow velocities (as applicable) from the upper subcatchment reaches to the confluence point of interest. A convenient formula for overland flow velocity takes the form:

0.5

Vo = KY

where Vo = overland flow velocities

Y = average ground slope in percent

K = a ground cover factor

Street flow velocities and depths were estimated by use of the Manning equation for uniform flow.

All the characteristic hydrological parameters for each subcatchment are contained in Appendix A as part of the computer model output, and a summary of parameters and peak flow rates are given in Table 1.

Flow characteristics for conveyance swales, channels and streets were analyzed based on the Manning Equation for uniform flow. Streets are assumed to have a 2% cross slope from curb to crown and a standard curb depth of 6 inches.

### E) Offsite Drainage

The valley areas surrounding the project site are so flat that no definitive drainage patterns can be discerned. Generally valley areas tend to flow from northeast to southwest. Because both sides of Montano Road contain drainage swales, it is reasonable to assume that any flows finding their way to the R.O.W. from the north will be diverted by these swales.

### F) Onsite Drainage

All onsite storm runoff is to drain to the retention pond centrally located in the Rancho Caballero development. A portion of this pond was excavated and landscaped as part of the original town-home development project. The size and shape of the pond will be revised as part of the amended site development to form 115,223 cubic feet of capacity at a depth of three feet.

Basin A includes the open space/landscaped area which is to include the pond.

Drainage Basins B and C outline the two proposed major drainage patterns of The Estates at Rancho Caballero. Flows are to be collected in the private streets and conveyed to landscaped swales for discharge into the pond. Rear yard ponds are to be graded in a number of the proposed lots. No "credit" is taken for the capacity of these ponds in determining the required size of the main retention pond. Rather, these rear yard ponds are proposed because of grading constraints, and they are to collect only that rainfall which falls to the rear of the house pad.

The portion of Rancho Caballero already developed for townhomes is shown on Plate 2 as Drainage Basin E. This portion has already been paved and graded to drain storm runoff in the centrally located total retention pond. It was originally planned for scupper outlet controls to be installed on the roofs of the townhomes. However, a recent-visit revealed these devices have not been installed and so their effect is not considered in the hydrologic calculations of this report.

The portion of Rancho Caballero that is to re-plat 19 townhouse lots into 15 patio home lots is designated as Drainage Basin D. Basin D is to drain through Basin E (the existing private perimeter street) and into the central retention pond.

Construction of a 66 inch RCP storm drain in the Montano Road R.O.W. as part of COA Project No. 3255 is imminent. We conceptually propose an 18 inch RCP lateral be extended from the storm drain to the bottom of the retention pond. Research of the master drainage report for COA Project No. 3255 reveals 3 cfs is the allowable discharge from the pond to the storm drain. While this release rate does not materially affect the required capacity of the retention pond, we are in concurrence with the engineers of City Hydrology Section that a drain for the pond is desirable.

Construction plans for COA Project No. 3255 also specify the realignment of the existing irrigation siphon under Montano Road. Because this siphon is used only for irrigating the alfalfa field onsite and will not be needed during and after development, possible change to the COA Project No. 3255 plans may be to abandon the existing siphon and extending an 18 inch storm lateral to the site.

### G) Erosion Control

Control of excessive soil erosion into streets and drainage improvements during construction will be accomplished by use of temporary lot line, water-trap berms. These will be windrowed into place following mass grading operations and left in place until each home is constructed and sold. Plate 2 illustrates the dimensions of these berms, and they will be located along those boundaries of each lot which are common to streets or drainage easements.

TABLE 1
HYDROLOGICAL FLOW PARAMETERS

AREA/POINT DESIGNATION	AREA (SQ. MI.)					• •	CONTR. BASINS	TOTAL AREA (SQ. MI.)	Q100 (CFS)
A	.0016	12	0	100	0	0		.0016	2.0
В	.0097	12	0	50	20	30	<b>*</b>	.0097	17.7
С	.0099	12	0	50	20	30	<del></del>	.0099	18.0
D	.0060	12	0	48	16	42		.0060	11.7
E	.0073	12	0	29	11	60	D, E	.0133	28.2
E							C, D, E	.0232	46.2

TABLE 2
STREET FLOW CHARACTERISTICS

AREA/POINT DESIGNATION	STREET WIDTH (FT)	ESTIMATED SLOPE (FT/FT)	Q100 (CFS)	V100 (FPS)	d100 (FT)	REMARKS
. <b>B</b>	30	.002	17.7	1.81	0.40'	< 6", OK
C	30	.002	18.0	1.83	0.40'	< 6", OK
E	24	.002	28.2	2.38	0.49'	< 6", OK

Thursday August 22, 1991 04:04:45 pm

HYMO PROGRAM (AHYMO990) - AMAFCA VERSION SEPT., 1990

RUN DATE (MON/DAY/YR) = 05/28/1989

START TIME (HR:MIN:SEC) = 10:29:40

START

TIME-0.0

\*

\* FILE RANCOCAB.DAT

\*

\*DRAINAGE AREA A

COMPUTE NM HYD ID=1 HYD NO= 101.0 DA=0.0016 SQ MI

PER A=0.0 PER B=100.0 PER C=0.0 PER D=0.0 TP= -0.1333

RAIN ONE= 1.9 RAIN SIX=2.2

COMPUTED RAINFALL DISTRIBUTION WITH DT-0.033333 HOURS

.0000 .0010 .0043 .0128 .0298 .0587 .1031 .1669 .2540 .3684 .5144 .6960 .9177 1.1228 1.2086 1.2810 1.3455 1.4041 1.4581 1.5082 1.5551 1.5990 1.6403 1.6793 1.7161 1.7510 1.7840 1.8153 1.8450 1.8732 1.9000 1.9044 1.9086 1.9128 1.9169 1.9209 1.9249 1.9288 1.9326 1.9363 1.9400 1.9436 1.9471 1.9506 1.9541 1.9575 1.9608 1.9641 1.9673 1.9705 1.9736 1.9767 1.9797 1.9827 1.9857 1.9886 1.9915 1.9943 1.9971 1.9999 2.0026 2.0053 2.0080 2.0106 2.0132 2.0158 2.0183 2.0208 2.0233 2.0257 2.0282 2.0306 2.0329 2.0353 2.0376 2.0399 2.0421 2.0444 2.0466 2.0488 2.0510 2.0531 2.0552 2.0573 2.0594 2.0615 2.0635 2.0656 2.0676 2.0696 2.0715 2.0735 2.0754 2.0773 2.0792 2.0811 2.0830 2.0848 2.0867 2.0885 2.0903 2.0921 2.0939 2.0956 2.0974 2.0991 2.1008 2.1025 2.1042 2.1059 2.1075 2.1092 2.1108 2.1124 2.1141 2.1157 2.1172 2.1188 2.1204 2.1219 2.1235 2.1250 2.1265 2.1280 2.1295 2.1310 2.1325 2.1340 2.1354 2.1369 2.1383 2.1397 2.1412 2.1426 2.1440 2.1454 2.1467 2.1481 2.1495 2.1508 2.1522 2.1535 2.1548 2.1562 2.1575 2.1588 2.1601 2.1614 2.1626 2.1639 2.1652 2.1664 2.1677 2.1689 2.1702 2.1714 2.1726 2.1738 2.1751 2.1763 2.1774 2.1786 2.1798 2.1810 2.1822 2.1833 2.1845 2.1856 2.1868 2.1879 2.1890 2.1902 2.1913 2.1924 2.1935 2.1946 2.1957 2.1968 2.1979 2.1990 2.2000

.129534HR TP = .133300HR K/TP RATIO = .971750SHAPE CONSTANT, N = 3.634790UNIT PEAK = 3.9614 CFS UNIT VOLUME = .9969 330.04 P60 = 1.9000B = .001600 SQ MI .50000 INCHES AREA -IA = INF = 1.25000 INCHES PER HOUR RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

PRINT HYD ID-1 CODE-10

### PARTIAL HYDROGRAPH 101.00

TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW
HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS
.000	.0	.667	1.2	1.333	.1	2.000	.0		
.333	.0	1.000	.2	1.667	.0	2.333	.0		

Thursday August 22, 1991 04:04:45 pm

RUNOFF VOLUME = .63656 INCHES = .0543 ACRE-FEET
PEAK DISCHARGE RATE = 2.02 CFS AT .533 HOURS

\*DRAINAGE AREA B

COMPUTE NM HYD ID=2 HYD NO= 102.0 DA=0.0097 SQ MI
PER A=0.0 PER B=50.0 PER C=20.0 PER D=30.0 TP= -0.1333

RAIN =-1

K = .070757HR TP = .133300HR K/TP RATIO = .530810 SHAPE CONSTANT, N = 7.351722 UNIT PEAK = 11.738 CFS UNIT VOLUME = .9988 B = 537.69 P60 = 1.9000 AREA = .002910 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

K = .122942HR TP = .133300HR K/TP RATIO = .922293 SHAPE CONSTANT, N = 3.837316
UNIT PEAK = 17.531 CFS UNIT VOLUME = .9996 B = 344.17 P60 = 1.9000
AREA = .006790 SQ MI IA = .45714 INCHES INF = 1.13000 INCHES PER HOUR
RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

PRINT HYD ID=2 CODE=10

PARTIAL HYDROGRAPH 102.00

TIME	FLOW								
HRS	CFS								
.000	.0	1.667	.3	3.333	.0	5.000	.0	6.667	.0
.333	2.1	2.000	.2	3.667	.0	5.333	.0		
.667	9.5	2.333	.1	4.000	.0	5.667	.1		
1.000	2.9	2.667	. 1	4.333	.0	6.000	.1		-
1.333	.7	3.000	.0	4.667	.0	6.333	.0		

RUNOFF VOLUME = 1.08098 INCHES = .5592 ACRE-FEET
PEAK DISCHARGE RATE = 17.65 CFS AT .500 HOURS

\* ADD AREAS A & B

ADD HYD ID=12 HYD = 102.1ID=1 ID=2

PRINT HYD ID=12 CODE=10

PARTIAL HYDROGRAPH 102.10

TIME .	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW
HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS
.000	.0	1.667	.3	3.333	.0	5.000	.0	6.667	.0
.333	2.1	2.000	. 2	3.667	.0	5.333	.0		
.667	10.7	2.333	.1	4.000	.0	5.667	.1		
1.000	3.1	2.667	.1	4.333	.0	6.000	.1		
1.333	.8	3.000	.0	4.667	.0	6.333	.0		

Thursday August 22, 1991 04:04:45 pm

RUNOFF VOLUME = 1.01802 INCHES = .6135 ACRE-FEET
PEAK DISCHARGE RATE = 19.63 CFS AT .500 HOURS

\*DRAINAGE AREA C

COMPUTE NM HYD ID=3 HYD NO= 103.0 DA=0.0099 SQ MI

PER A=0.0 PER B=50.0 PER C=20.0 PER D=30.0 TP= -0.1333

RAIN = -1

K = .122942HR TP = .133300HR K/TP RATIO = .922293 SHAPE CONSTANT, N = 3.837316 UNIT PEAK = 17.893 CFS UNIT VOLUME = .9996 B = 344.17 P60 = 1.9000 AREA = .006930 SQ MI IA = .45714 INCHES INF = 1.13000 INCHES PER HOUR RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

PRINT HYD ID=3 CODE=10

### PARTIAL HYDROGRAPH 103.00

TIME .	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW
HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS
.000	.0	1.667	.3	3.333	.0	5.000	.0	6.667	.0
.333	2.1	2.000	. 2	3.667	.0	5.333	.0		
.667	9.7	2.333	.1	4.000	.0	5.667	.1		
1.000	3.0	2.667	.1	4.333	.0	6.000	.1		
1.333	.7	3.000	.0	4.667	.0	6.333	.0		

RUNOFF VOLUME = 1.08098 INCHES = .5708 ACRE-FEET
PEAK DISCHARGE RATE = 18.01 CFS AT .500 HOURS

\*ADD AREAS A, B &C

ADD HYD ID=13 HYD=103.1 ID=12 ID=3

PRINT HYD ID=13 CODE=10

### PARTIAL HYDROGRAPH 103.10

TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW
HRS	· CFS	HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS
.000	.0	1.667	. 6	3.333	.1	5.000	.1	6.667	.0
.333	4.3	2.000	.3	3.667	.1	5.333	.1		
.667	20.4	2.333	. 2	4.000	.1	5.667	.1		
1.000	6.1	2.667	.1	4.333	.1	6.000	.1		
1.333	1.5	3.000	.1	4.667	.1	6.333	.0		

RUNOFF VOLUME = 1.04741 INCHES = 1.1843 ACRE-FEET

Thursday August 22, 1991 04:04:45 pm

PEAK DISCHARGE RATE = 37.64 CFS AT .500 HOURS

\*DRAINAGE AREA D

COMPUTE NM HYD ID=4 HYD NO= 104.0 DA=0.0060 SQ MI

PER A=0.0 PER B=48.0 PER C=16.0 PER D=42.0 TP= -0.1333

RAIN =-1

K = .070757HR TP = .133300HR K/TP RATIO = .530810 SHAPE CONSTANT, N = 7.351722 UNIT PEAK = 9.5895 CFS UNIT VOLUME = .9986 B = 537.69 P60 = 1.9000 AREA = .002377 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

K = .123766HR TP = .133300HR K/TP RATIO = .928475 SHAPE CONSTANT, N = 3.810506

UNIT PEAK = 9.3034 CFS UNIT VOLUME = .9989 B = 342.33 P60 = 1.9000

AREA = · .003623 SQ MI IA = .46250 INCHES INF = 1.14500 INCHES PER HOUR

RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

PRINT HYD ID-4 CODE-10

PARTIAL HYDROGRAPH 104.00

TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW
* *1.15	I DOM	T TI'10	, t DO!!	# T1,117	1 2011		r mon	7 T.I.I.	r non
HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS
.000	0	1.667	. 2	3.333	-0	5.000	.0	6.667	.0
.333	1.7	2.000	.1	3.667	.0	5.333	.0		
.667	6.2	2.333	.1	4.000	.0	5.667	.0		
1.000	2.1	2.667	.0	4.333	.0	6.000	.0		
1.333	.5	3.000	0	4.667	.0	6.333	.0		

RUNOFF VOLUME = 1.19106 INCHES = .3811 ACRE-FEET
PEAK DISCHARGE RATE = 11.70 CFS AT .500 HOURS

\*ADD AREAS A, B, C, & D

ADD HYD ID=14 HYD=104.1 ID=13 ID=4

PRINT HYD ID=14 CODE=10

PARTIAL HYDROGRAPH 104.10

TIME	FLOW								
HRS	CFS								
.000	.0	1.667	.8	3.333	.1	5.000	.1	6.667	.0
.333	5.9	2.000	.4	3.667	1	5.333	-1		
.667	26.6	2.333	.3	4.000	.1	5.667	. 2		
1.000	8.2	2.667	. 2	4.333	.1	6.000	.2		
1.333	2.0	3.000	. 1	4.667	.1	6.333	.0		

RUNOFF VOLUME = 1.07909 INCHES = 1.5654 ACRE-FEET
PEAK DISCHARGE RATE = 49.34 CFS AT .500 HOURS

Thursday August 22, 1991 04:04:45 pm

\*DRAINAGE AREA E

COMPUTE NM HYD ID-5 HYD NO= 105.0 DA=0.0073 SQ MI

PER A=0.0 PER B=29.0 PER C=11.0 PER D=60.0 TP= -0.1333

RAIN =-1

K = .070757HR TP = .133300HR K/TP RATIO = .530810 SHAPE CONSTANT, N = 7.351722 UNIT PEAK = 17.667 CFS UNIT VOLUME = .9992 B = 537.69 P60 = 1.9000 AREA = .004380 SQ MI IA = .10000 INCHES INF = .04000 INCHES PER HOUR RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

K = .123189HR TP = .133300HR K/TP RATIO = .924147 SHAPE CONSTANT, N = 3.829231 UNIT PEAK = 7.5271 CFS UNIT VOLUME = .9986 B = 343.62 P60 = 1.9000 AREA = .002920 SQ MI IA = .45875 INCHES INF = 1.13450 INCHES PER HOUR RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT = .033333

PRINT HYD ID=5 CODE=10

#### PARTIAL HYDROGRAPH 105.00

TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW	TIME	FLOW
HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS	HRS	CFS
.000	.0	1.667	.3	3.333	.1	5.000	.1	6.667	.0
.333	3.0	2.000	.2	3.667	.1	5.333	.1		
.667	8.5	2.333	.1	4.000	.1	5.667	.1		
1.000	3.5	2.667	.1	4.333	.1	6.000 .	. 1		
1.333	.7	3.000	.1	4.667	.1	6.333	.0		

RUNOFF VOLUME = 1.44295 INCHES = .5618 ACRE-FEET
PEAK DISCHARGE RATE = 16.48 CFS AT .500 HOURS

\*ADD AREAS A, B, C, D & E

ADD HYD

\*

ID=15 HYD=105.1 ID=14 ID=5

PRINT HYD

ID=15

15 CODE=10

### PARTIAL HYDROGRAPH 105.10

TIME	FLOW								
HRS	CFS								
.000	.0	1.667	1.1	3.333	. 2	5.000	.2	6.667	.0
.333	9.0	2.000	. 6	3.667	.2	5.333	.2		
.667	35.1	2.333	. 4	4.000	. 2	5.667	. 2		
1.000	11.7	2.667	.3	4.333	. 2	6.000	.3		
1.333	2.7	3.000	. 2	4.667	. 2	6.333	.0		

RUNOFF VOLUME = 1.15607 INCHES = 2.1272 ACRE-FEET
PEAK DISCHARGE RATE = 65.82 CFS AT .500 HOURS

### CALCULATIONS

### 1) Check Required Curb Opening for Swales

Assume "dead" water and use broadcrested weir Formula with C = 3.0. Use maximum depth of 6".

a. Swale @ Point B

b. Swale @ Point E

L = 
$$46.2$$
----- =  $43.6$ ', say 44'
 $3/2$ 
(.5) (3)

### 2) Size Retention Pond

\* Use 100-Year, 10-Day Storm

\* V10 Days = V360 + Ad X (P10 Days - P360) / 12 in/ft

\* Composite Land Use Treatments are as follows:

$$A = 0\%$$

$$B = 48\%$$

$$C = 15\%$$

$$D = 37\%$$

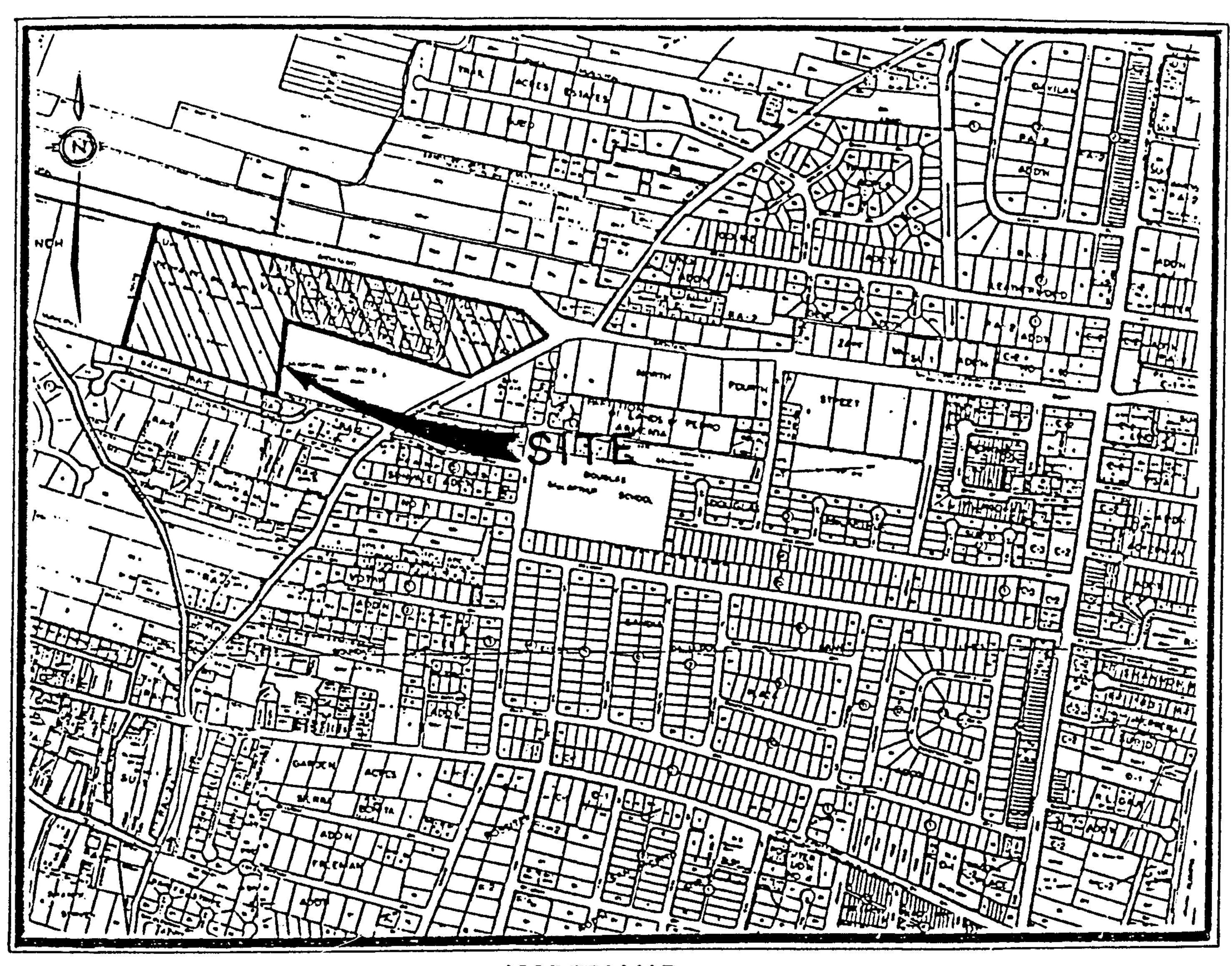
\* Project is in Zone No. 2

\* Weighted E = ((22.1 (.48) .72) + (22.1 (.20) 1.07) + 22.1 (.37) 2.08)) / 22.1 = 0.96"

\* V360 = (0.96 / 12) X 22.1 = 1.78 AC FT

1440 ROGRAPH is 2.13 Ac. FT

\* V10 Days = 1.78 + .37 (22.1) ((3.47 - 2.2) / 12) = 2.65 AC FT = 115,233 CF



VICINITY MAP
1"= 1000'

## PLATE

RANCHO CABALLERO