DRAINAGE INFORMATION SHEET

PROJECT TITLE: Montaño Vista ZONE ATLAS/DRNG. FILE #: E11/D5

DRB #: 94-636 EPC #: WORK ORDER #: 5236.90

LEGAL DESCRIPTION: Tract 18-C-2, Taylor Ranch

CITY ADDRESS: Montaño Plaza N.W.

ENGINEERING FIRM: Jeff Mortensen & Assoc CONTACT: Michele (Mike) F. DeLilla

ADDRESS: 6010-B Midway Park Blvd. NE. PHONE: 345-4250

OWNER: Hoech Real Estate CONTACT: Don Hoech

ADDRESS: 6729 Academy Rd. PHONE: 821-4440

ARCHITECT: N/A CONTACT:

ADDRESS: PHONE:

SURVEYOR: Jeff Mortensen & Assoc CONTACT: Chuck Cala

ADDRESS: 6010-B PHONE: 345-4250

CONTRACTOR: Larry Saiz/Masonry Structures CONTACT: Engineer

ADDRESS: PHONE:

F.G. expires 8-8-96 Don Hoech 8-1-96

TYPE OF SUBMITTAL:

____ DRAINAGE REPORT
____ DRAINAGE PLAN
____ CONCEPTUAL GRADING & DRAINAGE PLAN
____ GRADING PLAN
____ EROSION CONTROL PLAN
X ENGINEER'S CERTIFICATION
____ OTHER

PRE-DESIGN MEETING:

X YES (Discussions w/ Fred Aguirre)
____ NO
____ COPY PROVIDED

JUL 30 1996

CHECK TYPE OF APPROVAL SOUGHT:

____ SKETCH PLAT APPROVAL
____ PRELIMINARY PLAT APPROVAL
____ S. DEV. PLAN FOR SUB'D. APPROVAL
____ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
____ SECTOR PLAN APPROVAL
____ FINAL PLAT APPROVAL
____ FOUNDATION PERMIT APPROVAL
____ BUILDING PERMIT APPROVAL
____ CERTIFICATE OF OCCUPANCY APPROVAL
____ GRADING PERMIT APPROVAL
____ PAVING PERMIT APPROVAL
____ S.A.D. DRAINAGE REPORT
____ DRAINAGE REQUIREMENTS
X OTHER Financial Guaranty Release (SPECIFY)

DATE SUBMITTED: 7/30/96

BY: Michele (Mike) F. DeLilla

CITY OF
Albuquerque

P.O. Box 1293 Albuquerque, NM 87103

August 7, 1996

Martin J. Chávez, Mayor

Jeff Mortensen, PE
Jeff Mortensen & Assoc
6010-B Midway Park Blvd NE
Albuquerque, NM 87109

RE: ENGINEER'S CERTIFICATION FOR MONTANO VISTA (E-11/D5)
RECEIVED JULY 30,1996 FOR FINAL GUARANTY RELEASE
ENGINEER'S STAMP DATED 07-30-96

Dear Mr. Mortensen:

Based on the information included in the submittal referenced above, City Hydrology accepts the Engineer's Certification for financial guaranty release.

Contact Terri Martin to obtain the Financial Guaranty Release for City Project Number 5236.90.

If I can be of further assistance, You may contact me at 768-2727.

Sincerely,

John P. Curtin, P.E.
Civil Engineer/Hydrology

c: Andrew Garcia
Fred Aguirre
Terri Martin, CPN 5236.90
Don Hoech, Hoech Real Estate, 6729 Academy Rd NE 87109

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

DRAINAGE REPORT INFORMATION SHEET

PROJECT TITLE La Colina Compound

ZONE ATLAS PAGE NO. E-11 CITY ADDRESS N/A

LEGAL ADDRESS (See Below)

ENGINEERING FIRM Tom Mann & Associates, Inc. CONTACT Steve Cannon

ADDRESS 811 Dallas N.E. PHONE 265-5611

OWNER Solar Structures, Inc. CONTACT Wes Fitzpatrick

ADDRESS 4701 Montano N.W., Albuq., N.M. 87120 PHONE 898-7310

ARCHITECT/SURVEYOR Mazria, Schiff & Assoc. CONTACT Marc Schiff

ADDRESS 400 San Felipe Road N.W. PHONE 243-9639

DATE SUBMITTED

BY Steve Cannon

LEGAL ADDRESS: A certain parcel of land within the City Limits of Albuquerque, Bernalillo County, New Mexico, designated as "La Colina" shown on the plat filed in the Office of the County Clerk of Bernalillo County on September 13, 1979.

MUNICIPAL DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION Telephone (505) 766-7467

DRAINAGE REPORT

FOR

LA COLINA COMPOUND

DECEMBER, 1981

PREPARED FOR: SOLAR STRUCTURES, INC.
4701 MONTANO N.W.
ALBUQUERQUE, NEW MEXICO 87120

PREPARED BY: TOM MANN & ASSOCIATES, INC.
811 DALLAS N.E.
ALBUQUERQUE, NEW MEXICO 87110
(505) 265-5611

REGISTERED PROFESSIONAL ENGINEER AND LAND SURVEYOR
STATE OF NEW MEXICO
THOMAS T. MANN, JR.
3732

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LIST OF FIGURES

INTRODUCTION

This report presents a drainage management plan for the development of La Colina Compound. A previous drainage plan was prepared by this office in June 1979 for a 61-unit townhouse complex on the subject site (Entitled: Drainage Report for the La Colina Townhouse Development). That drainage plan was approved in July of 1979 by the City of Albuquerque and construction commenced that fall. Rough grading was completed and all utilities, curb and gutter, asphalt base course and drive pads were constructed. No dwelling units were started. The construction of the street and utilities built never received final acceptance from the City.

Since that time, the property has changed ownership. The new owners have revised the development concept and this report presents a drainage plan for that revised concept.

PURPOSE AND SCOPE

The purpose of this drainage report is to establish the criteria for controlling runoff resulting from a development in a manner that is acceptable to the City of Albuquerque and to the Albuquerque Metropolitan Arroyo Flood Control Authority.

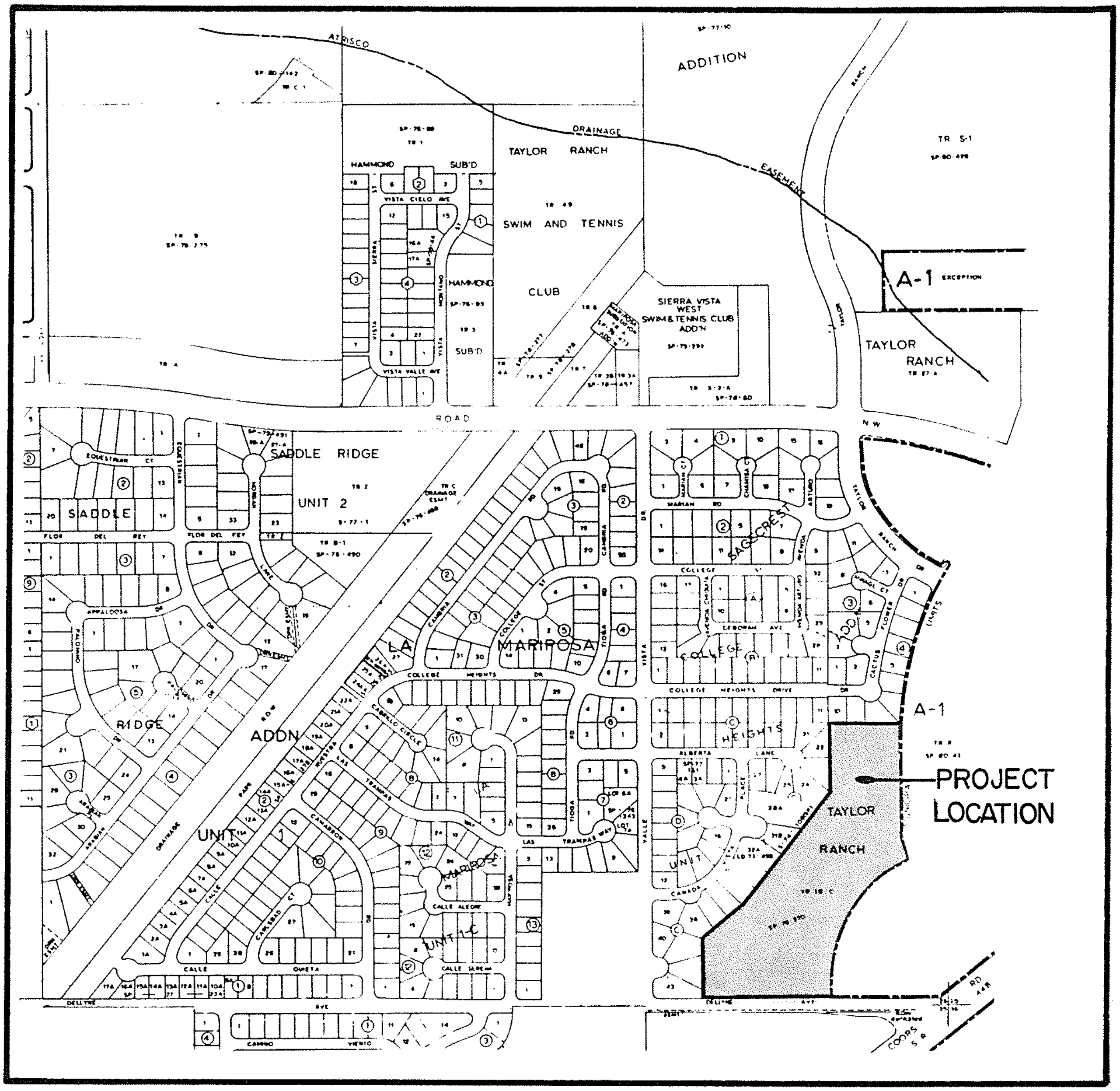
This plan determines the runoff resulting from a 100-year frequency storm falling on the site under existing and developed conditions.

The scope of this plan is to ensure that the proposed project will be protected from storm runoff and that the development will not increase the flooding potential of adjacent properties.

LOCATION AND DESCRIPTION

La Colina Compound is located in the northwest quadrant of the City of Albuquerque in the Taylor Ranch area. The parcel is located north of Dellyne Avenue N.W. and west of Coors Road. The location of the project is shown in Figure 1.

The parcel is approximately 9.6 acres in size and it will be developed as a 59-unit townhouse complex with all units to be built on individually owned lots. There will be no common areas. All buildings are designed to be substantially passive solar heated; greenhouses, south glass and massive wall and floor materials will be utilized. Dwelling units will be multi-leveled to conform to the existing severe longitudinal slope of the lot. Many roofs are to be earth-covered and planted to aid in cooling and drainage.



VICINITY MAP

SCALE: 1"=800'

E-11

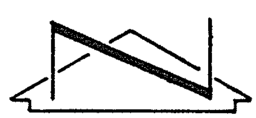


FIGURE 1

DESIGN CRITERIA

Storm runoff for the site was determined by the Soil Conservation Service (SCS) Curve Number approach for a small watershed (less than 2,000 acres). This approach determines the peak discharge and associated volume of runoff for a given frequency storm falling within the study area. The following criteria was used to determine peak discharge.

Watershed Curve Numbers: The runoff curve numbers for various watershed conditions are listed in Plate I. Using these values, a composite curve number (C_n) can be computed for an entire watershed.

Time of Concentration: The time of concentration (T_c) is the time it takes for runoff to travel from the hydraulically most distant part of the watershed area to the point of reference. Times of Concentration were estimated upon the Kirpich Equation where:

$$Tc = (0.00013) * (L^{0.77}) / (s^{0.385})$$

Rainfall: Based upon the 1973, NOAA ATLAS 2, VOLUME N, the 100-year, 6-hour precipitation = 2.2", the 10-year, 6-hour precipitation = 1.4".

Direct Runoff: The SCS runoff equation is used to determine Runoff:

```
Q = (P-(0.2 * S))^2 / (P+(0.8 * S))

Cn = 1000 / (10 + S)
```

Where Q = accumulated volume of runoff in inches depth over the drainage area.

P = accumulated rainfall in inches depth over the drainage area.

S = Potential maximum retention of water by the soil in equivalent inches depth over the drainage area.

C_n = Watershed Curve Number.

Distribution Curve: The distribution curve (DC) is based on the percent of one hour versus 24 hours precipitation and is dependent upon the location of the drainage basin. Based upon Exhibit 2-3 of the SCS Peak Rates of Discharge for Small Watersheds, DC = 75.

Peak Discharge: The peak discharge is obtained from Plate II which plots the cfs/ac/inch of runoff versus Tc for select distribution curves. This is then multiplied by the drainage area in acres and the direct runoff in inches to obtain peak discharge in cfs.

Volume of Runoff: The volume of runoff from a watershed is expressed as the direct runoff in inches multiplied by the watershed area.

Proposed conveyance swales and street sections were designed based upon the Manning Equation for uniform flow, where:

$$Q = (1.486 / n) * A * (R^{2/3}) * (s^{1/2})$$

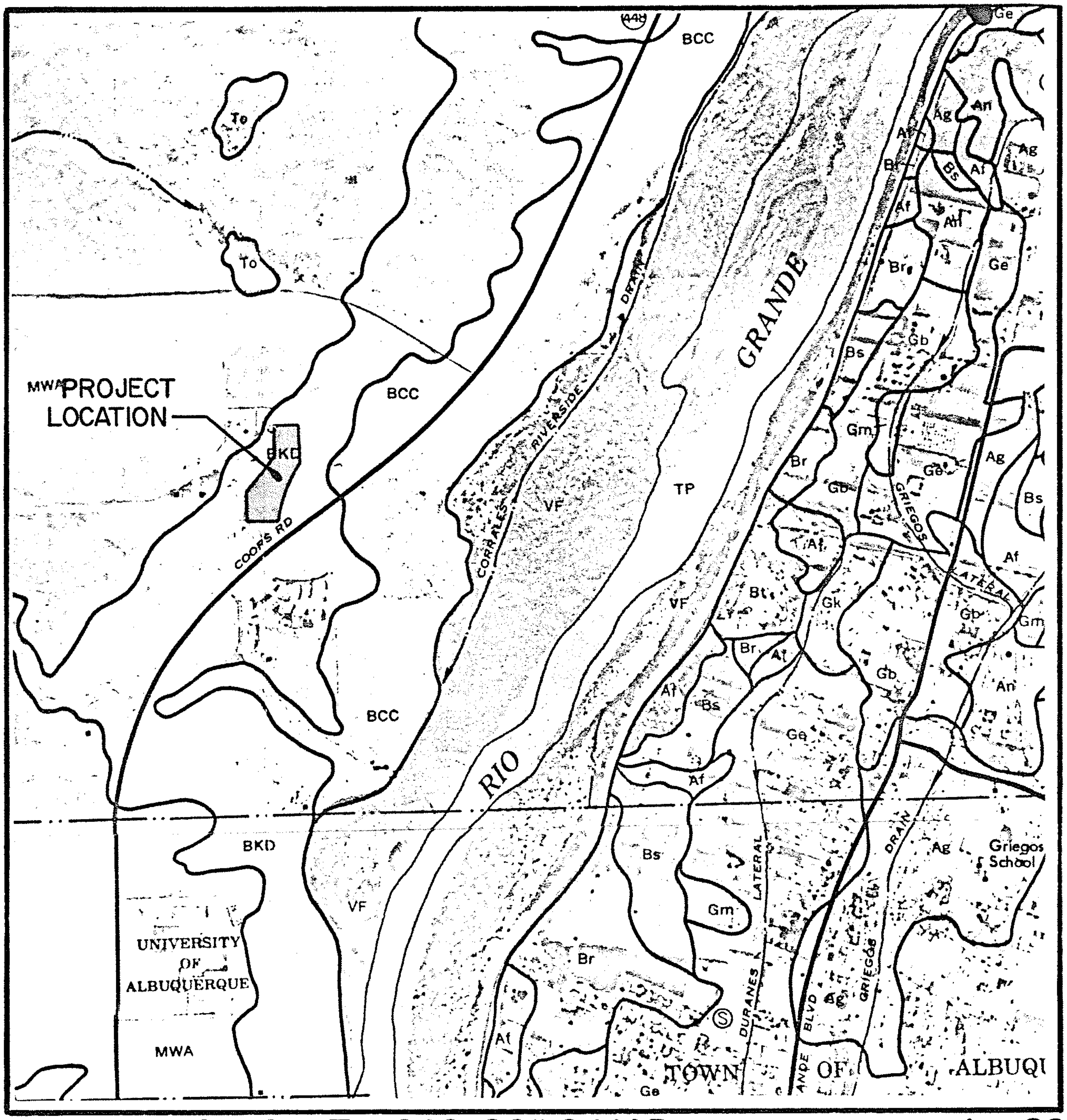
EXISTING DRAINAGE CONDITIONS

Since construction has disturbed the native or existing conditions and drainage patterns have been altered, a discussion of existing drainage conditions will be presented as follows:

1. Presentation of the native condition prior to any construction.
2. Discussion of the approved drainage concept.
3. Analysis of the drainage conditions on the site as they "currently exist".

1. Native Condition The native soil is classified by by the Soil Conservation Service as a Bluepoint-Kokan Association consisting of Bluepoint loamy fine sand and Kokan gravelly fine sand (see Figure 2). These are both deep, somewhat excessively drained soils that formed in sandy alluvial and eolian sediments on alluvial fans and terraces. The native vegetation covered approximately fifteen percent (15%) of the soil surface and consisted principally of Blackgama, giant dropseed, bushy muhly and galetta grasses. Sand sagebrush was the dominant shrub. Under this soil classification (the SCS hydrological soil group is "A"), runoff is slow and hazard of water erosion is classified as moderate to severe. The land originally sloped from west to east at a slope between six and fifteen percent. The previous drainage report calculated runoff in the native state to be 19.7 cfs for the 100-year frequency storm.

Based on Rational Method



BERNILILLO COUNTY SCS SOILS MAP

No. 20

SCALE: 1" = 2000'

FIGURE 2

Previous

2. Approved Drainage Concept The approved drainage plan calls for runoff from the front yards and garage roofs on both sides of La Colina Drive to drain into the street which then conveys the flows to Delleyne Avenue (see Figure 6 inside the back cover). The design flow at La Colina Drive and Delleyne Avenue is Q_{100} = 14.6 cfs. Rear yard ponds would be utilized to hold runoff from the roofs and back yards with an average size of 720 cubic feet of pond per lot needed to hold the runoff generated by the 100-year frequency storms.

3. Currently Existing Drainage Conditions Site topography and physical features have been changed by grading and site construction done under the approved concept. La Colina Drive has been constructed and the drive pads were built. Grading for future house pads also changes the existing topography, however, no ponds have been constructed. La Colina Drive now intercepts the flows from above and conveys the storm flows toward Delleyne Avenue. Below La Colina Drive, the lots discharge flows down the hill and towards Coors Road. No house construction ever commenced and the land has lain idle for over a year. Native grasses are beginning to reclaim the soil.

The site has been divided into several drainage basins for quantitative analysis of existing flows (see Figure 3). Offsite Basins Number 1 and 2 contribute runoff to the site from the roofs and back yards of lots in College Heights Addition. La Colina Drive intercepts flows generated in Offsite Basins 1 and 2, and On-Site Basin "A" and conveys the flows southward toward Delleyne Avenue. The flows then turn eastward, flowing

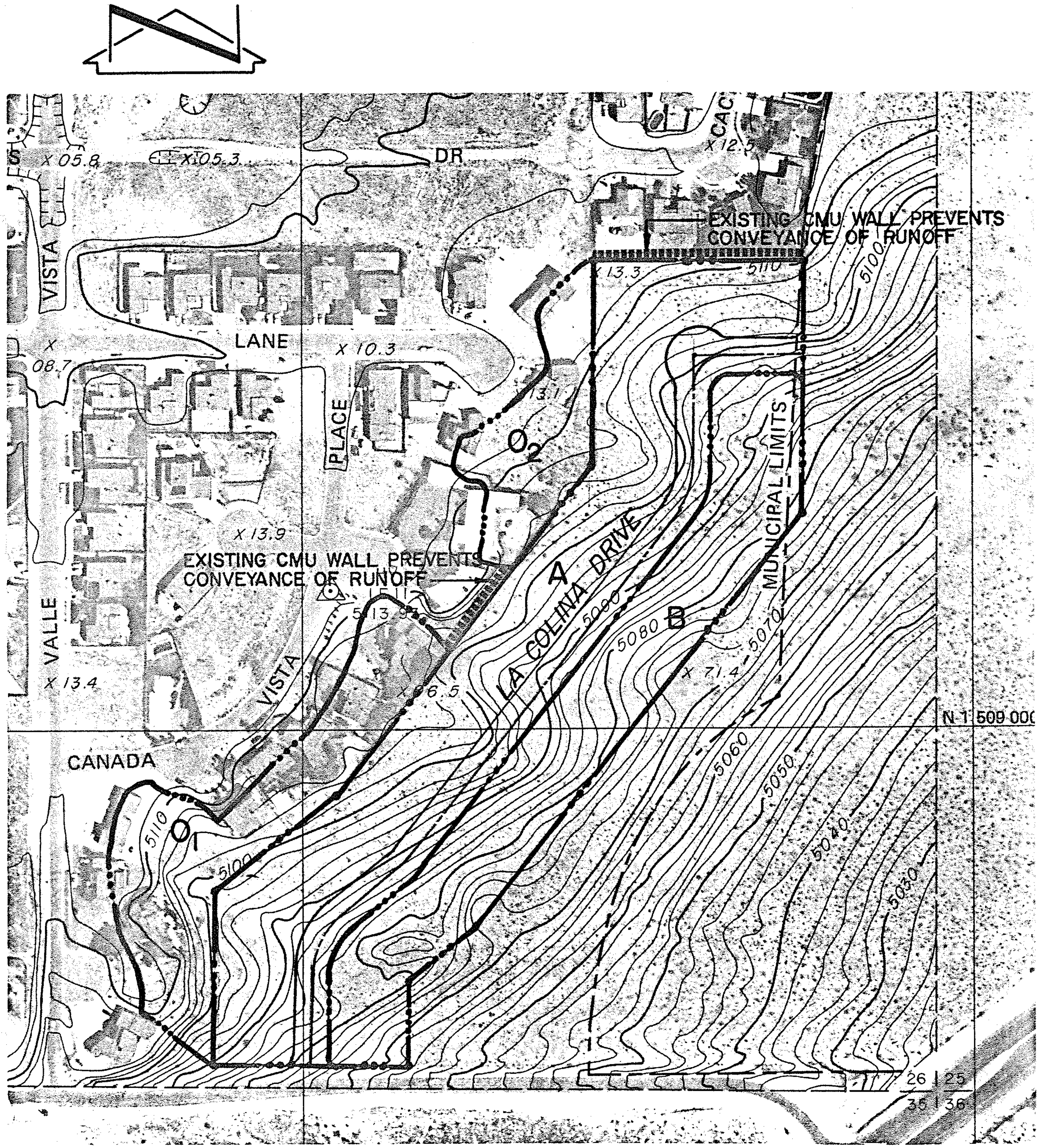


FIGURE 3
EXISTING DRAINAGE CONDITIONS

down the hill towards Coors Road. Flows generated in On-Site Basin "B" sheet flow south and east towards Coors Road. Quantitative flows are shown in the Basin Runoff Summary in Appendix A.

The Flood Hazard Map for the project site is shown in Figure 4. It can be seen that the project site does not lie within a flood hazard zone or a flood plain.

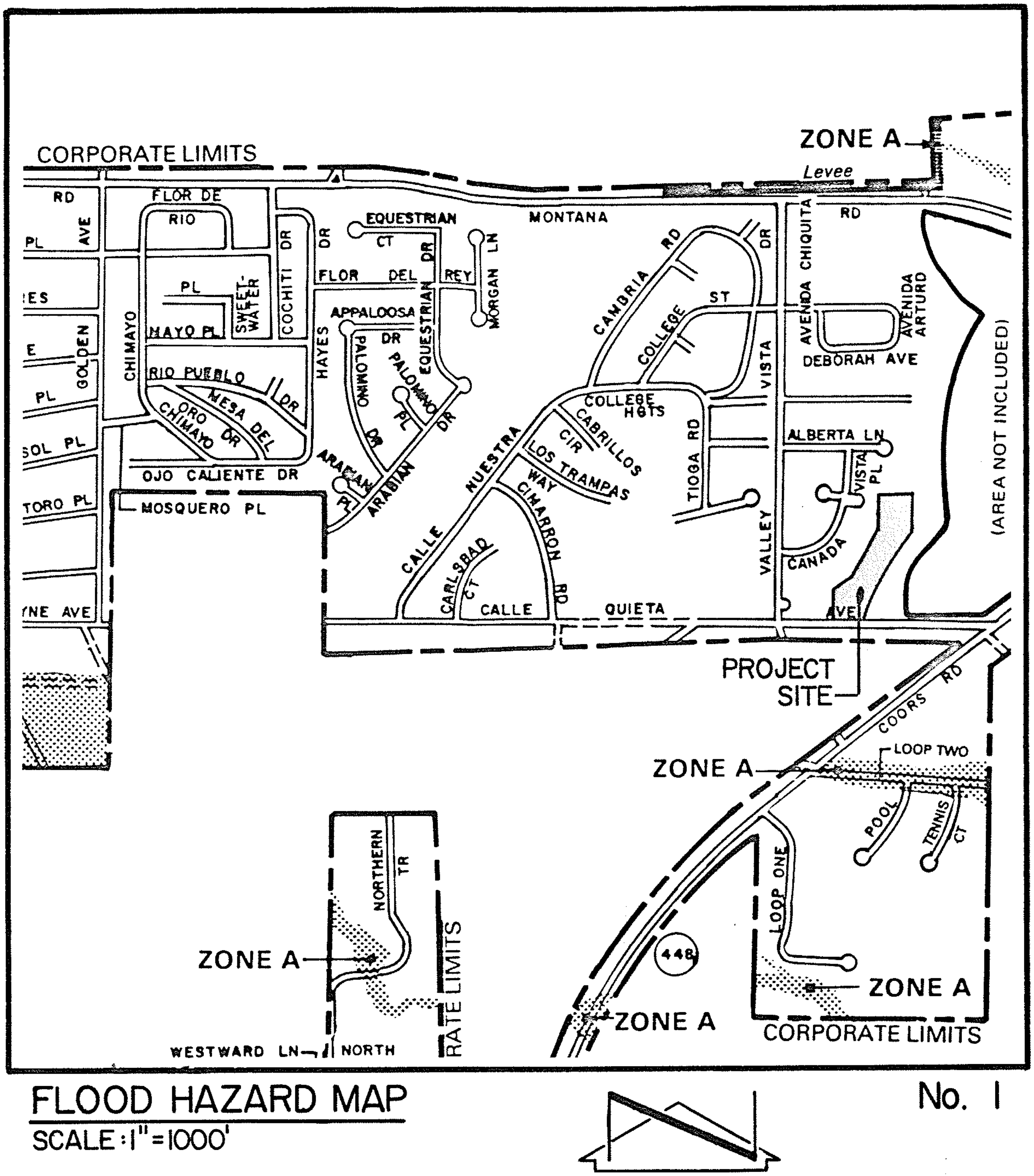

CORPORATE LIMITS
ZONE A
Levee
MONTANA
RD
FLOR DE RIO
EQUESTRIAN CT
FLOR DEL REY
MORGAN LN
APPALOOSA DR
PALOMINO DR
PALOMINO PL
EQUESTRIAN DR
COCHITI DR
HAYES DR
SWEET-WATER
MAYO PL
CHIMAYO
GOLDEN
RIO PUEBLO DR
MESA DEL ORO DR
CHIMAYO
OJO CALIENTE DR
MOSQUERO PL
ARABIAN PL
ARABIAN
CALLE NUESTRA
CAMBRIA RD
COLLEGE ST
COLLEGE HGTS CIR
CABRILLOS
LOS TRAMPAS
CIMARRON WAY
CIMARRON RD
CARLSBAD CT
CALLE QUIETA AVE
TIOGA RD
VALLEY VISTA DR
AVENIDA CHIQUITA
AVENIDA ARTURO
DEBORAH AVE
ALBERTA LN
VISTA PL
CANADA
(AREA NOT INCLUDED)
PROJECT SITE
COORS RD
LOOP TWO
POOL
TENNIS CT
LOOP ONE
448
ZONE A
ZONE A
ZONE A
ZONE A
CORPORATE LIMITS
NORTHERN TR
RATE LIMITS
WESTWARD LN
NORTH
FLOOD HAZARD MAP
SCALE: 1" = 1000'
No. 1

FIGURE 4

PROPOSED DRAINAGE CONDITIONS

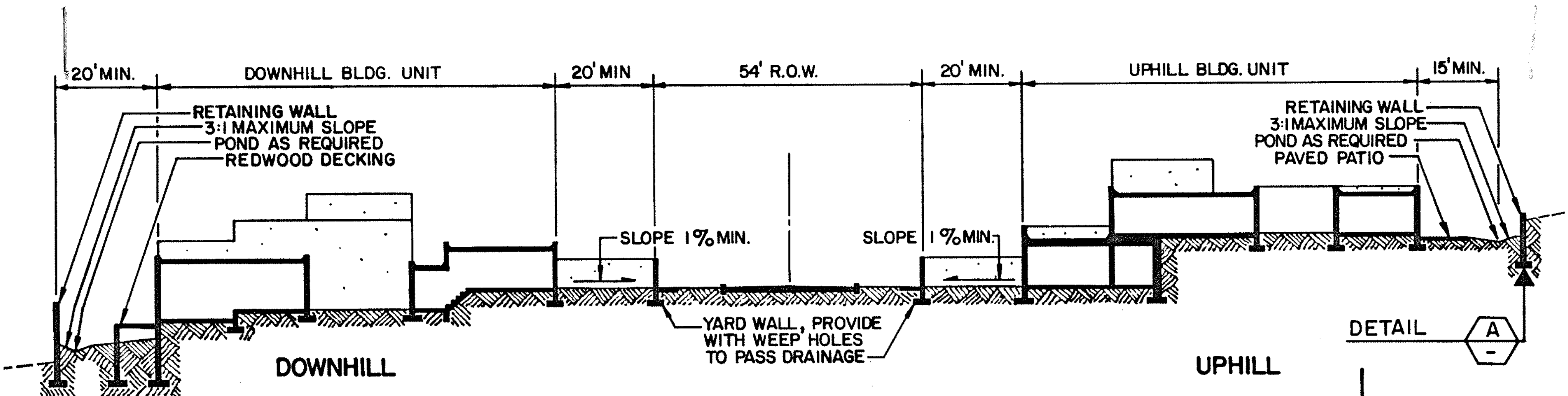
The proposed drainage scheme is shown in Figure 13 which can be found inside the back cover. The plan shows (1) proposed streets and lots, (2) proposed drainage basins, (3) existing contours at 1'-0" intervals, (4) direction and slope of proposed storm flows in the streets and (5) peak discharges for the 100-year and 10-year frequency storms at selected points.

The flow path and quantity of storm water runoff resulting from the proposed development is affected by (1) roof configurations of the individual dwelling structures, (2) individual lot improvements, (3) offsite storm flows entering the site and (4) street improvements. A further discussion of these items is presented below.

1. Dwelling Structures

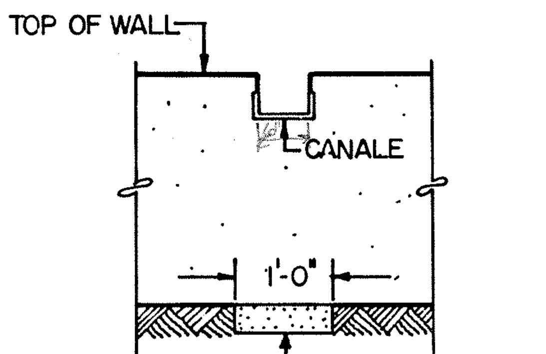
Seven different dwelling units will be utilized on the site. All units are multi-leveled, conforming to the slope of the land. These varying levels are shown in relationship to the street in Figure 5. The dwellings employ various architectural features which affect runoff.

The "downhill" units make use of an open entrance courtyard. These courtyards will consist 80 percent of impervious floor and 20 percent of landscaped areas. A ponding area will be required, probably in the landscaped area. An "overflow" 4-inch drain, with the inlet located below the finish floor of the living area and an outlet at the rear yard pond is recommended. All units have a "central courtyard" which is open to the sky. This area is treated similar to the entrance courtyard.



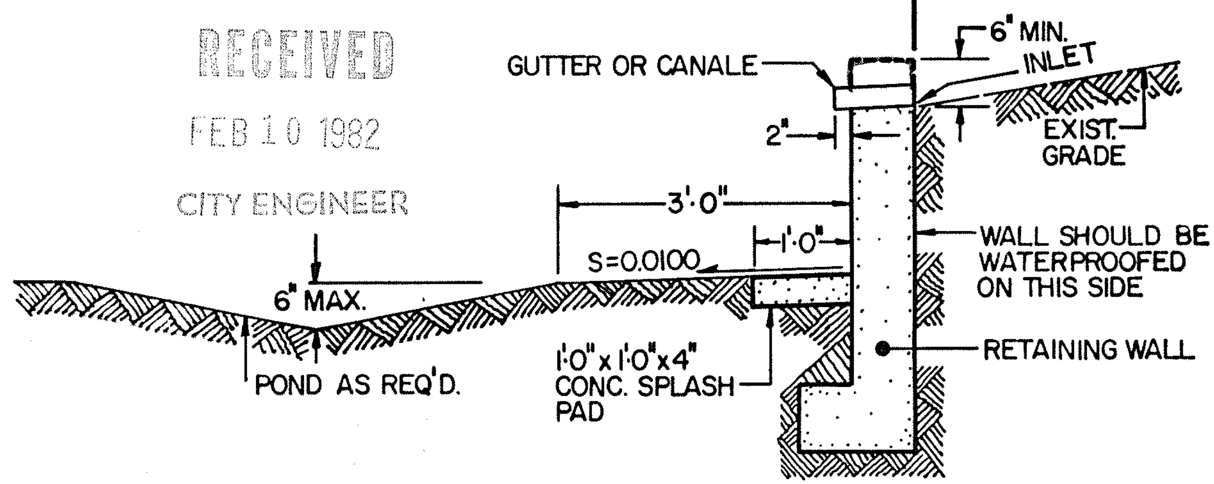
TYPICAL LONGITUDINAL SECTION

SCALE: 1" = 20'



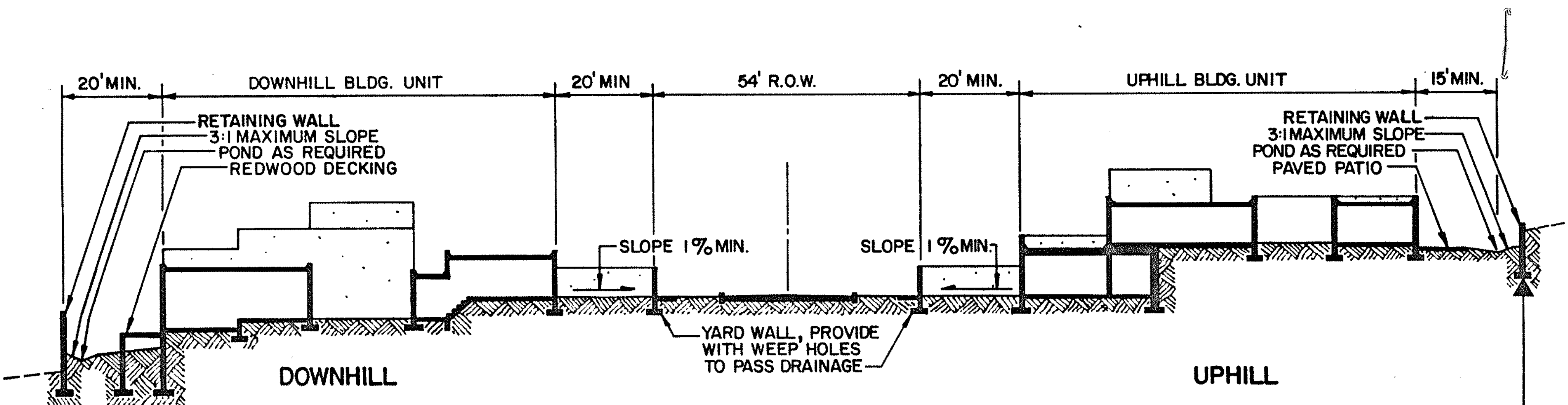
REAR WALL ELEVATION

RECEIVED
FEB 10 1982
CITY ENGINEER

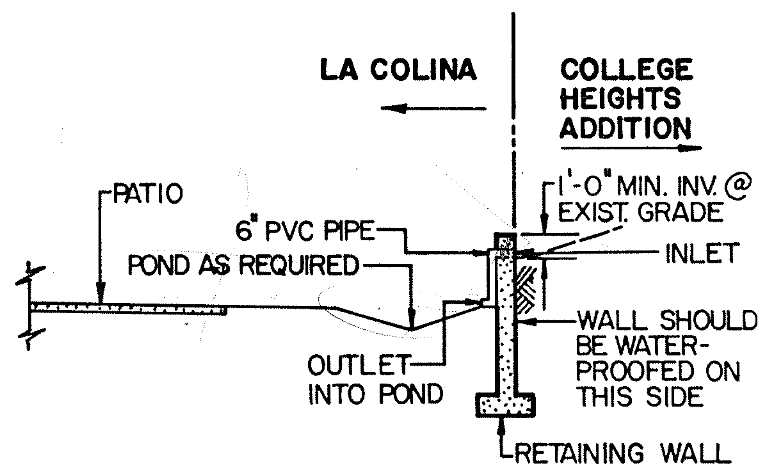


DETAIL A

1/2" = 1'-0"



TYPICAL LONGITUDINAL SECTION
SCALE: 1" = 20'



DETAIL A
1/8" = 1'-0"

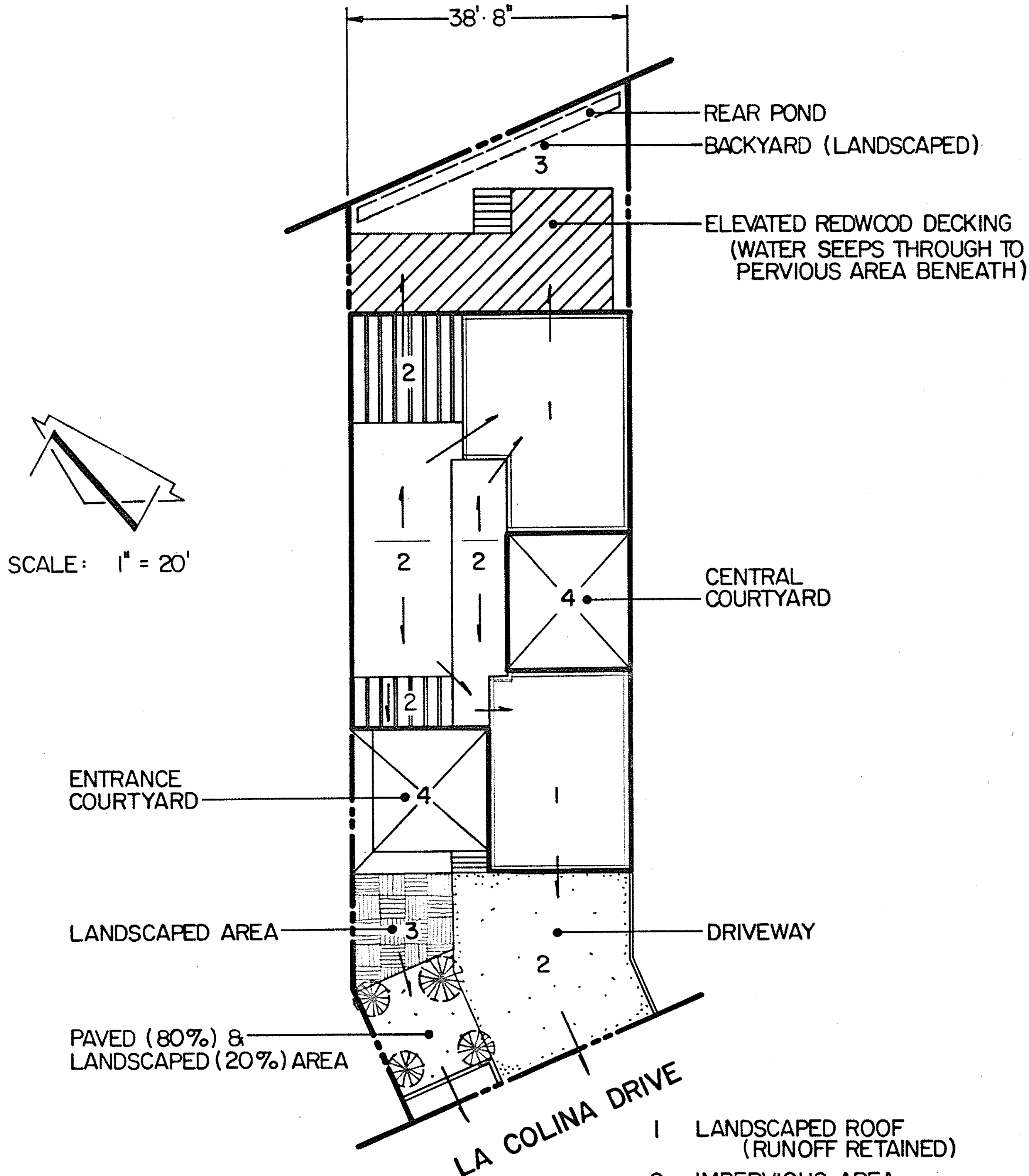
FIGURE 5

Landscaped roofs are important to the overall drainage scheme. These roofs consist of 6 inches to 8 inches of soil on top of a water-tight barrier with various forms of vegetation and ground covers utilized. For purposes of runoff calculation, the roof is considered impervious, but capable of absorbing and holding water within the soil. A void ratio of 0.25 is used for the soil, meaning that 1/5 of the soil is composed of voids, or capable of retaining water. An additional 2 inches of ponding depth above the soil will be used before providing an overflow outlet.

Each unit type handles storm water runoff in a different manner as demonstrated in Figures 6 through 12. Typical runoff quantity calculations are shown in Appendix 'B'. These calculations are summarized in Table 1 (also in Appendix 'B'). This chart gives unit type, location, the drainage area contributing runoff to each courtyard, the required pond volumes in each courtyard, the drainage area contributing runoff to the front and back yards and the "Effective Impervious Area" (E.I.A.) of each. The E.I.A. is simply the impervious area required to produce similar volumes of runoff as the existing roof after taking into account runoff that has been ponded on the roof. Sample calculations are shown in Appendix 'B'.

2. Lot Improvements

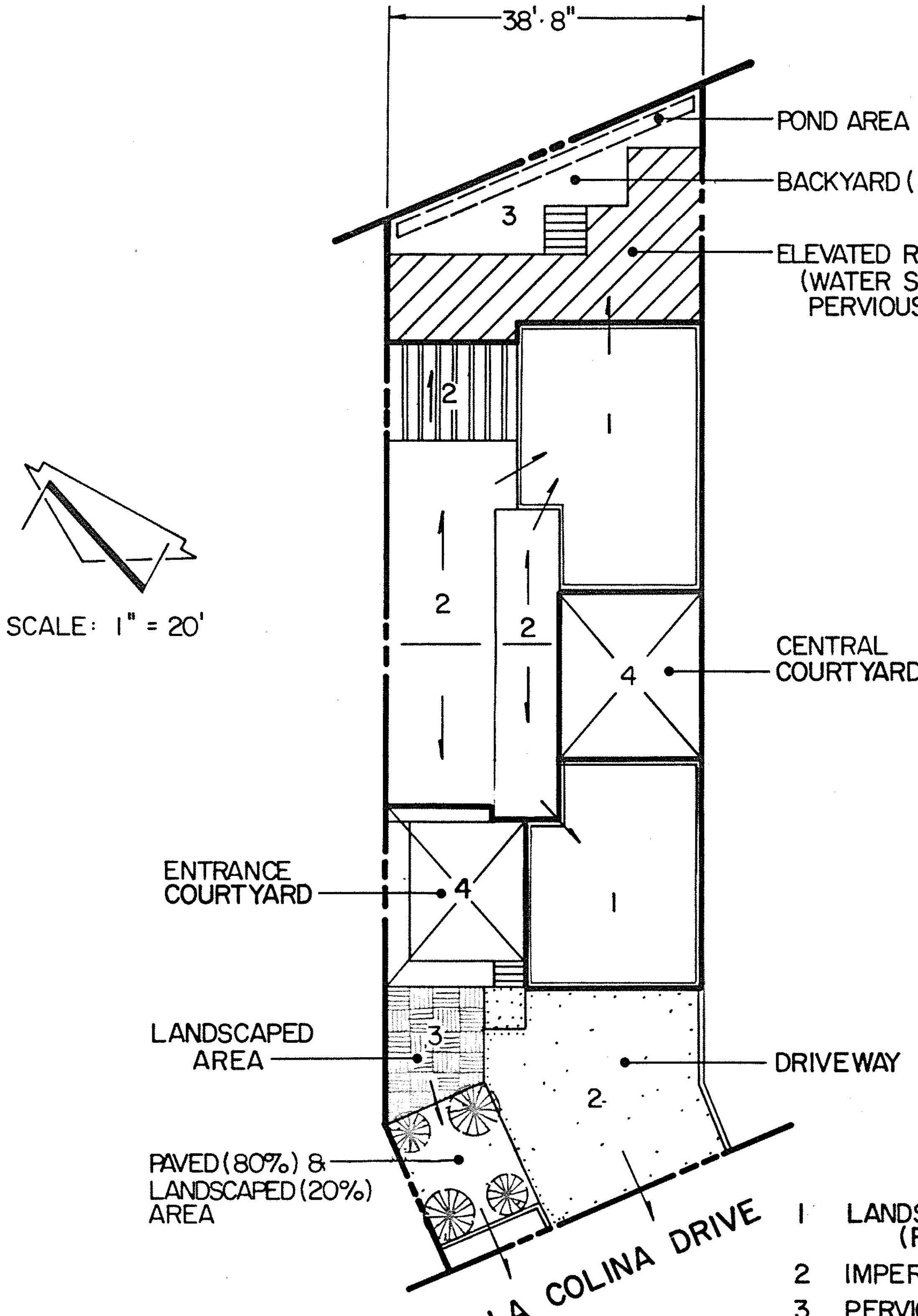
Various other lot improvements affect the storm water runoff such as driveways and front and back patios. These improvements are shown in Figures 6 through 12, and the



UNIT A

(DOWNHILL)

FIGURE 6



1 LANDSCAPED ROOF (RUNOFF RETAINED)

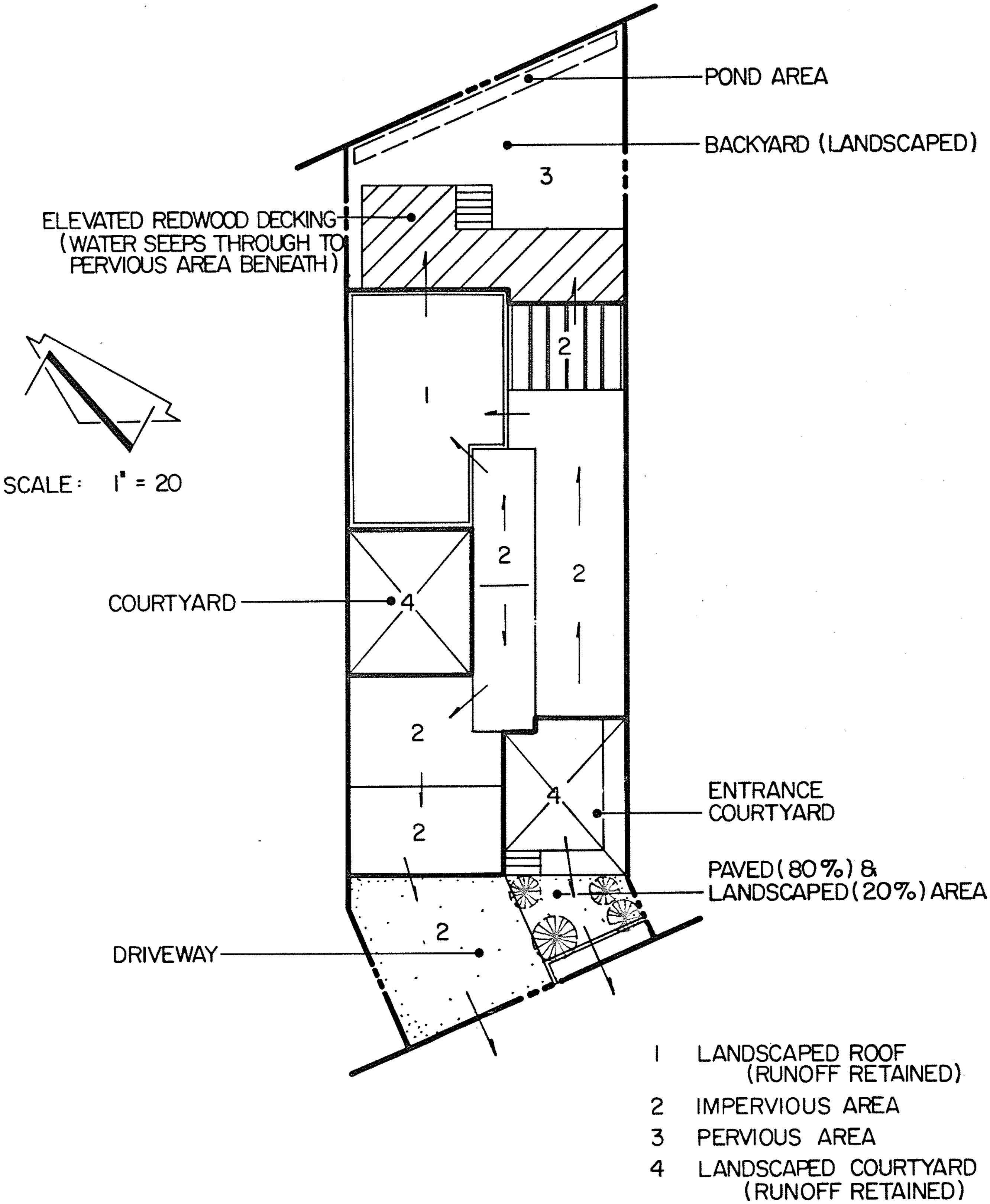
2 IMPERVIOUS AREA

3 PERVIOUS AREA

4 LANDSCAPED COURTYARD (RUNOFF RETAINED)

UNIT B
(DOWNHILL)

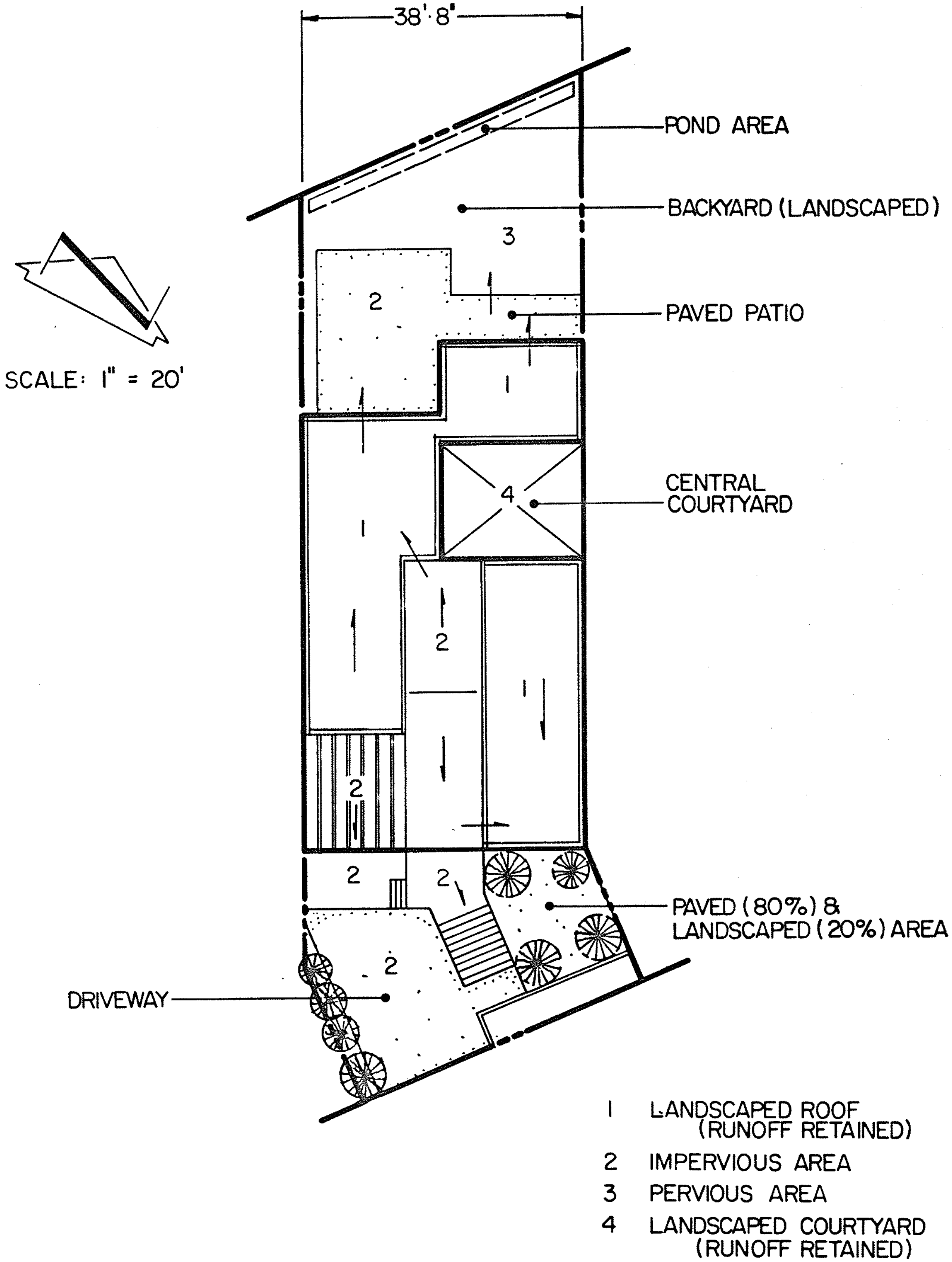
FIGURE 7



UNIT C

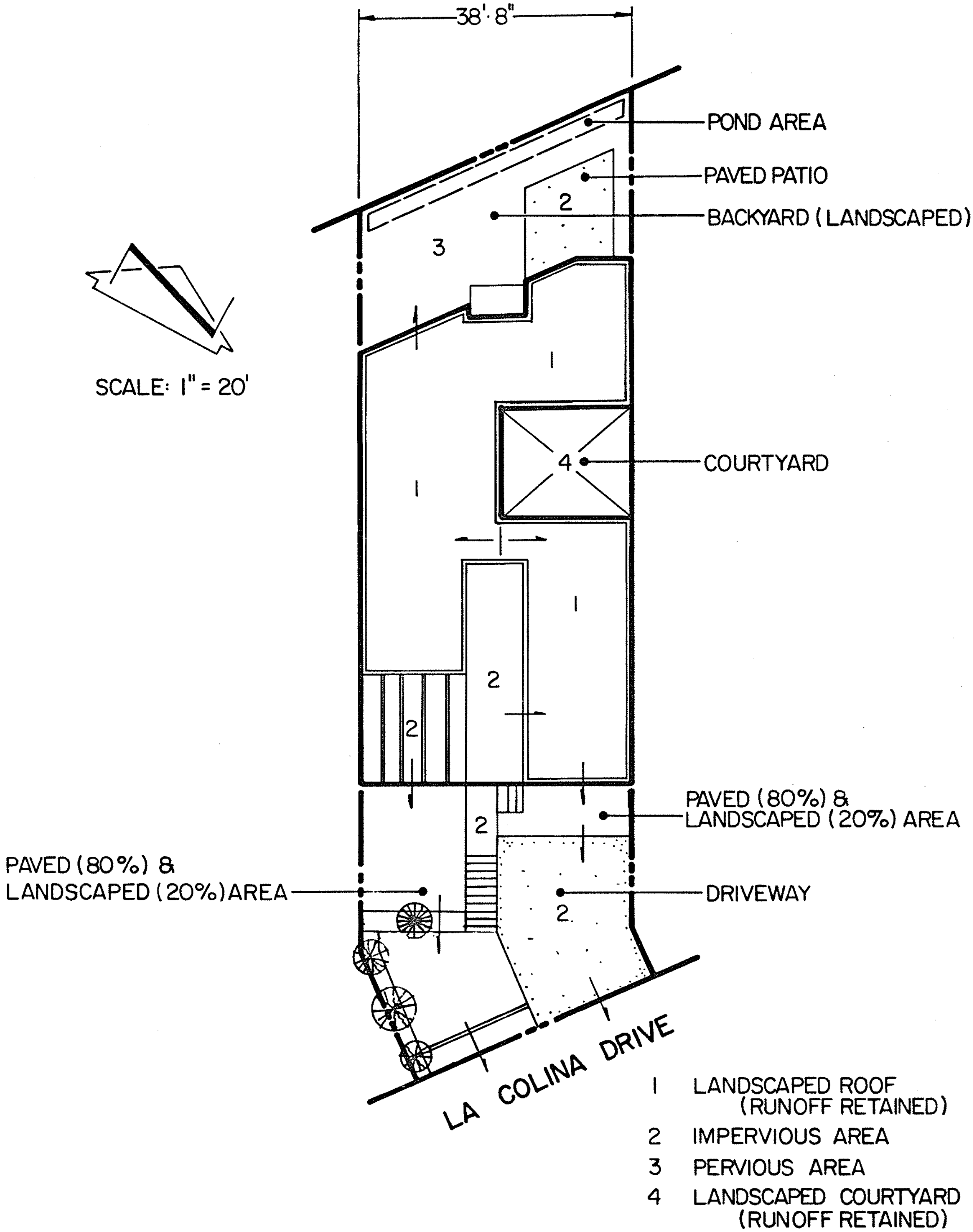
(DOWNHILL)

FIGURE 8



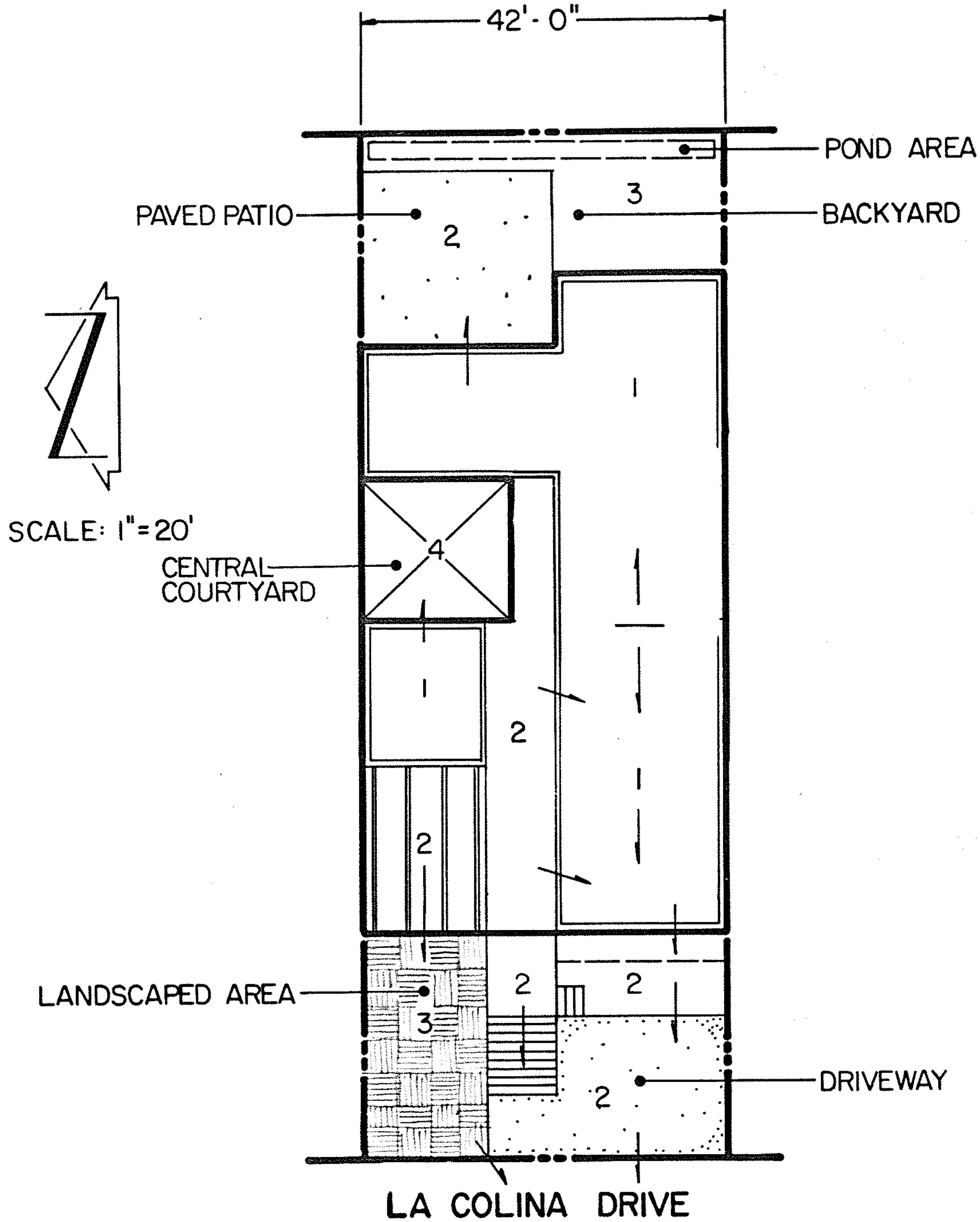
UNIT D
(UPHILL)

FIGURE 9



UNIT E
(UPHILL)

FIGURE 10



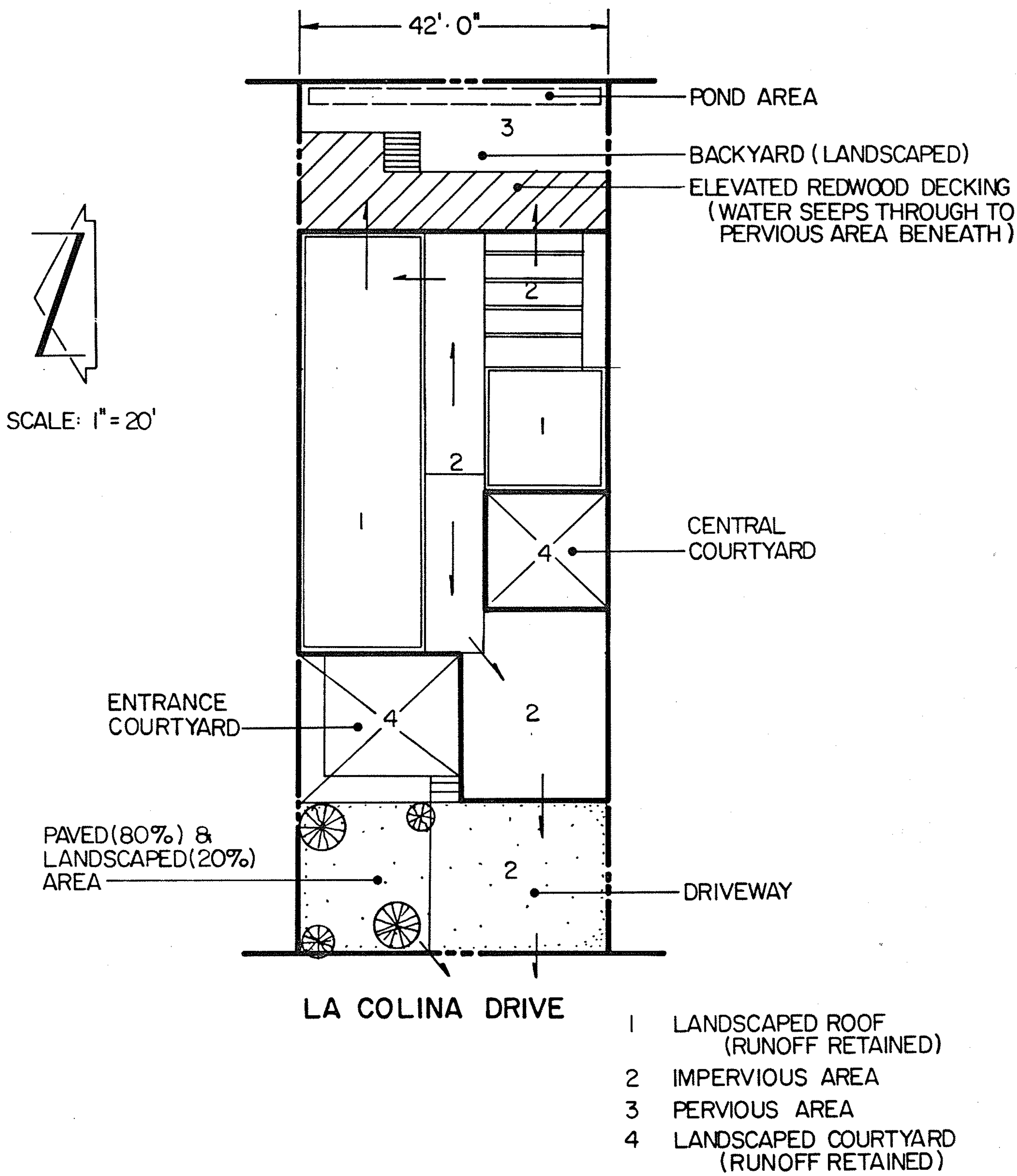
1 LANDSCAPED ROOF (RUNOFF RETAINED)

2 IMPERVIOUS AREA

3 PERVIOUS AREA

4 LANDSCAPED COURTYARD (RUNOFF RETAINED)

UNIT F
(UPHILL)



UNIT G

(DOWNHILL)

FIGURE 12

summation of impervious areas created are tabulated in the last two columns in Table I. Note that the redwood decks on the rear lots of the downhill side units are slotted, allowing storm water to seep through to the natural earth below. For this reason, these decks are not counted as impervious areas.

Tables II and III in Appendix 'C' summarize the runoff calculations for each lot. Tabulated are the total impervious and pervious areas contributing runoff toward the front street. Also shown are the calculations for the required ponding volumes in rear lots.

3. Offsite Storm Flows Entering the Site

Note in Table II, a ponding volume required to handle the offsite flows entering the uphill lots is shown. This volume is derived at by taking the volume of storm water generated in the offsite basins and dividing it among the number of lots receiving the water. A 6-inch PVC pipe will transmit the storm water from off-site, through the retaining wall and into the pond. (See Detail A, Figure 5.) The last column in each table shows the total required rear pond volume for each lot.

4. Street Improvements

The existing street (La Colina Drive) will be replaced with the street shown in the drainage plan (Figure 13). Typical street sections are shown in Appendix 'E'. The street will accept flows from the front yards and convey them to Delleyne Avenue. The

Q_{100} carried in the street is 6.8 cfs (see Appendix 'D'). Calculations in Appendix 'E' show that the street section is adequate to carry the design flows.

CONCLUSIONS AND RECOMMENDATIONS

1. The approved drainage report calculated runoff in the native state to be 19.7 cfs for the 100-year frequency storm.

2. The approved drainage concept calls for front yards to drain to La Colina Drive which then conveys the flows to Delleyne Avenue. Q_{100} exiting the site at Delleyne Avenue is equal to 14.6 cfs. Rear yard ponds are to average 720 cf to hold runoff from the roofs and rear yards.

3. As it exits right now, Q_{100} exiting the site at Delleyne Avenue is equal to 5.7 cfs. An additional 1.4 cfs exits the site in the form of sheet flow, heading south and east towards Coors Road.

4. The proposed drainage scheme calls for water to be ponded in rear yard ponds, landscaped roofs and courtyards of the various dwelling units. La Colina Drive collects the remaining runoff and conveys the flows to Delleyne Avenue. Q_{100} exiting the site is equal to 6.8 cfs. The rear yard ponds of uphill units collect the offsite runoff. The rear yard ponds will vary in size from 30 to 250 cf.

5. A 6-inch PVC pipe shall be constructed in the rear yard of Lots 1-15 and 19-28 as shown in Detail A on the drainage plan.

6. Interior courtyards shall be capable of ponding a quantity of water as shown in Table I.

7. Rear yard ponds shall be capable of ponding a quantity of water as shown in Tables II and III.

8. Street sections shall be constructed as shown in Appendix 'E'.

9. The proposed development will not increase the flooding potential of adjacent properties.

10. The site does not lie within a designated flood hazard zone as demonstrated by the Flood Hazard Map.

CALCULATION OF RUNOFF ASSOCIATED WITH DWELLING UNIT TYPE

BLDG TYPE	LOCATION	BUILDING AREA CONTRIBUTING FLOW TO : ENTR. COURTYARD DRAIN AREA (sf)	ENTR. COURTYARD POND VOL. (cf)	CENT. COURTYARD DRAIN AREA (sf)	CENT. COURTYARD POND VOL. (cf)	FRONT YARD DRAIN AREA (sf)	FRONT YARD E.I.A. (sf)	REAR YARD DRAIN AREA (sf)	REAR YARD E.I.A. (sf)	TOTAL BLDG. AREA (sf)	FRONT YARD IMPERV. AREA (sf)	REAR YARD IMPERV. AREA (sf)
A	DOWNHILL	406	45	324	34	1010	0	1280	240	3020	870	0
B	DOWNHILL	380	39	324	34	1010	0	1410	240	3124	870	0
C	DOWNHILL	380	39	324	34	765	765	1525	337	3194	640	0
D	UPHILL	***	**	324	34	780	240	1496	0	2600	990	500
E	UPHILL	***	**	324	34	1160	240	1356	0	2840	1100	200
F	UPHILL	***	**	562	66	1010	300	1528	0	3100	700	440
G	DOWNHILL	460	47	324	34	770	0	1766	310	3320	770	0

TABLE I

RUNOFF CALCULATIONS & REQUIRED POND VOLUMES FOR UPHILL LOTS

LOT #	UNIT	BLDG AREA (sf)	ACTUAL AREAS			FRONT YARD CONTRIBUTORY DRAINAGE AREAS				REAR YARD CONTRIBUTORY DRAINAGE AREA				REAR YARD PONDING CALCS				
						IMPERVIOUS				IMPERVIOUS								
			FRONT YARD (sf)	BACK YARD (sf)	TOTAL LOT (sf)	ROOF (sf)	DRIVE (sf)	TOTAL (sf)	PERV AREA (sf)	ROOFS (sf)	PATIO (sf)	TOTAL (sf)	PERV AREA (sf)	Cn	RUN-OFF (in)	SITE VOL. (cf)	OFF S VOL. (cf)	TOTAL VOL. (cf)
1	F	3100	2050	1205	6355	300	700	1000	1350	0	440	440	765	78	0.59	60	160	220
2	F	3100	840	1016	4956	300	700	1000	140	0	440	440	576	80	0.67	57	160	217
3	F	3100	840	1016	4956	300	700	1000	140	0	440	440	576	80	0.67	57	160	217
4	F	3100	840	1029	4969	300	700	1000	140	0	440	440	589	80	0.67	57	160	217
5	F	3100	3010	2125	8235	300	820	1120	2190	0	440	440	1685	74	0.43	77	160	237
6	E	2840	3293	2200	8333	240	1180	1420	2113	0	200	200	2000	70	0.33	61	160	221
7	E	2840	1450	338	4628	240	1100	1340	350	0	200	200	138	84	0.89	25	160	185
8	D	2600	1140	900	4640	240	990	1230	150	0	500	500	400	83	0.84	63	160	223
9	D	2600	1140	906	4646	240	990	1230	150	0	500	500	406	83	0.83	63	160	223
10	D	2600	4390	2381	9371	240	990	1230	3400	0	500	500	1881	74	0.44	87	160	247
11	D	2600	1140	1284	5024	240	990	1230	150	0	500	500	784	79	0.62	67	160	227
12	E	2840	1450	666	4956	240	1100	1340	350	0	200	200	466	76	0.52	29	160	189
13	E	2840	1450	599	4889	240	1100	1340	350	0	200	200	399	77	0.56	28	160	188
14	E	2840	1450	734	5024	240	1100	1340	350	0	200	200	534	75	0.50	30	160	190
15	E	2840	1450	599	4889	240	1100	1340	350	0	200	200	399	77	0.56	28	160	188
16	E	2840	1450	734	5024	240	1100	1340	350	0	200	200	534	75	0.50	30	0	30
17	E	2840	1450	599	4889	240	1100	1340	350	0	200	200	399	77	0.56	28	0	28
18	E	2840	1450	734	5024	240	1100	1340	350	0	200	200	534	75	0.50	30	0	30
19	E	2840	1450	599	4889	240	1100	1340	350	0	200	200	399	77	0.56	28	130	158
20	E	2840	1450	734	5024	240	1100	1340	350	0	200	200	534	75	0.50	30	130	160
21	E	2840	1450	666	4956	240	1100	1340	350	0	200	200	466	76	0.52	29	130	159
22	D	2600	1140	1149	4889	240	990	1230	150	0	500	500	649	80	0.68	65	130	195
23	D	2600	4025	1497	8122	240	990	1230	3035	0	500	500	997	77	0.56	70	130	200
24	F	3100	3980	1210	8290	300	700	1000	3280	0	440	440	770	78	0.59	60	130	190
25	F	3100	840	1453	5393	300	700	1000	140	0	440	440	1013	76	0.53	64	130	194
26	F	3100	840	1443	5383	300	700	1000	140	0	440	440	1003	76	0.53	64	130	194
27	F	3100	880	989	4969	300	700	1000	180	0	440	440	549	80	0.69	57	130	187
28	F	3100	4160	3507	10767	300	750	1050	3410	0	440	440	3067	71	0.36	106	130	236
29	D	2600	3000	4630	10230	240	990	1230	2010	0	500	500	4130	71	0.35	134	0	134
30	D	2600	1320	656	4576	240	1120	1360	200	0	500	500	156	89	1.17	64	0	64
31	D	2600	1350	853	4803	240	990	1230	360	0	500	500	353	84	0.88	62	0	62
32	D	2600	4120	1328	8048	240	990	1230	3130	0	500	500	828	78	0.61	67	0	67

TOTALS: 38760 29808

TABLE II

RUNOFF CALCULATIONS & REQUIRED POND VOLUMES FOR DOWNHILL LOTS

LOT #	UNIT	ACTUAL AREAS				FRONT YARD CONTRIBUTORY DRAINAGE AREAS				REAR YARD CONTRIBUTORY DRAINAGE AREA				PONDING CALCS				
						IMPERVIOUS			PERV	IMPERVIOUS			PERV	Cn	RUN-OFF (in)	SITE VOL. (cf)	OFF S VOL. (cf)	TOTAL VOL. (cf)
		BLDG AREA (sf)	FRONT YARD (sf)	BACK YARD (sf)	TOTAL LOT (sf)	ROOF (sf)	DRIVE (sf)	TOTAL (sf)	AREA (sf)	ROOFS (sf)	PATIO (sf)	TOTAL (sf)	AREA (sf)					
33	G	3320	2199	720	6239	0	770	770	1429	310	0	310	720	76	0.53	45	0	45
34	G	3320	840	796	4956	0	770	770	70	310	0	310	796	76	0.50	46	0	46
35	G	3320	1840	2831	7991	0	770	770	1070	310	0	310	2831	71	0.34	89	0	89
36	B	3124	1900	3084	8108	0	870	870	1030	240	0	240	3084	70	0.32	88	0	88
37	B	3124	1250	276	4650	0	870	870	380	240	0	240	276	81	0.71	31	0	31
38	A	3020	1250	408	4678	0	870	870	380	240	0	240	408	78	0.60	32	0	32
39	C	3194	740	1084	5018	765	640	1405	100	337	0	337	1084	74	0.46	55	0	55
40	B	3124	1250	514	4888	0	870	870	380	240	0	240	514	77	0.54	34	0	34
41	C	3194	740	1022	4956	765	640	1405	100	337	0	337	1022	75	0.47	53	0	53
42	B	3124	1250	650	5024	0	870	870	380	240	0	240	650	75	0.49	37	0	37
43	B	3124	1250	514	4888	0	870	870	380	240	0	240	514	77	0.54	34	0	34
44	A	3020	1250	754	5024	0	870	870	380	240	0	240	754	75	0.47	39	0	39
45	B	3124	1250	514	4888	0	870	870	380	240	0	240	514	77	0.54	34	0	34
46	A	3020	1250	754	5024	0	870	870	380	240	0	240	754	75	0.47	39	0	39
47	C	3194	740	954	4888	765	640	1405	100	337	0	337	954	75	0.48	52	0	52
48	A	3020	1250	754	5024	0	870	870	380	240	0	240	754	75	0.47	39	0	39
49	B	3124	1250	514	4888	0	870	870	380	240	0	240	514	77	0.54	34	0	34
50	B	3124	1250	582	4956	0	870	870	380	240	0	240	582	76	0.52	35	0	35
51	C	3194	740	1090	5024	765	640	1405	100	337	0	337	1090	74	0.46	55	0	55
52	A	3020	1250	618	4888	0	870	870	380	240	0	240	618	76	0.50	36	0	36
53	B	3124	1250	582	4956	0	870	870	380	240	0	240	582	76	0.52	35	0	35
54	B	3124	1250	565	4939	0	870	870	380	240	0	240	565	76	0.52	35	0	35
55	C	3194	800	3457	7451	765	680	1445	120	337	0	337	3457	70	0.33	105	0	105
56	G	3320	920	4702	8942	0	780	780	140	310	0	310	4702	70	0.31	130	0	130
57	G	3320	840	1212	5372	0	770	770	70	310	0	310	1212	73	0.43	55	0	55
58	G	3320	840	1212	5372	0	770	770	70	310	0	310	1212	73	0.43	55	0	55
59	G	3320	900	1630	5850	0	770	770	130	310	0	310	1630	72	0.39	63	0	63
							TOTALS:	25515	9849									

TABLE III

PROJECT: LA COLINA COMPOUND
PROJECT NO.: 1-064

DRAINAGE BASIN: BASIN 'A'
CONDITION: DEVELOPED

LAND-USE DESCRIPTION:

DESCRIPTION	SOIL GROUP	AREA (ac)	Cn	% OF TOTAL
R.O.W. PERVIOUS AREA	A	0.27	68	6 %
R.O.W. IMPERVIOUS AREA		1.57	95	37 %
LOT PERVIOUS AREA	A	0.91	68	22 %
LOT IMPERVIOUS AREA		1.48	95	35 %
COMPOSITE:		4.22	87	100 %

2.39 AC LOTS

1.84 AC STREET

WATERSHED CHARACTERISTICS:

FLOW TYPE: GULLIED
LENGTH: 1440 ft.
DROP: 21 ft.
SLOPE: 1.4 %
TIME OF CONCENTRATION: 0.18 hr.

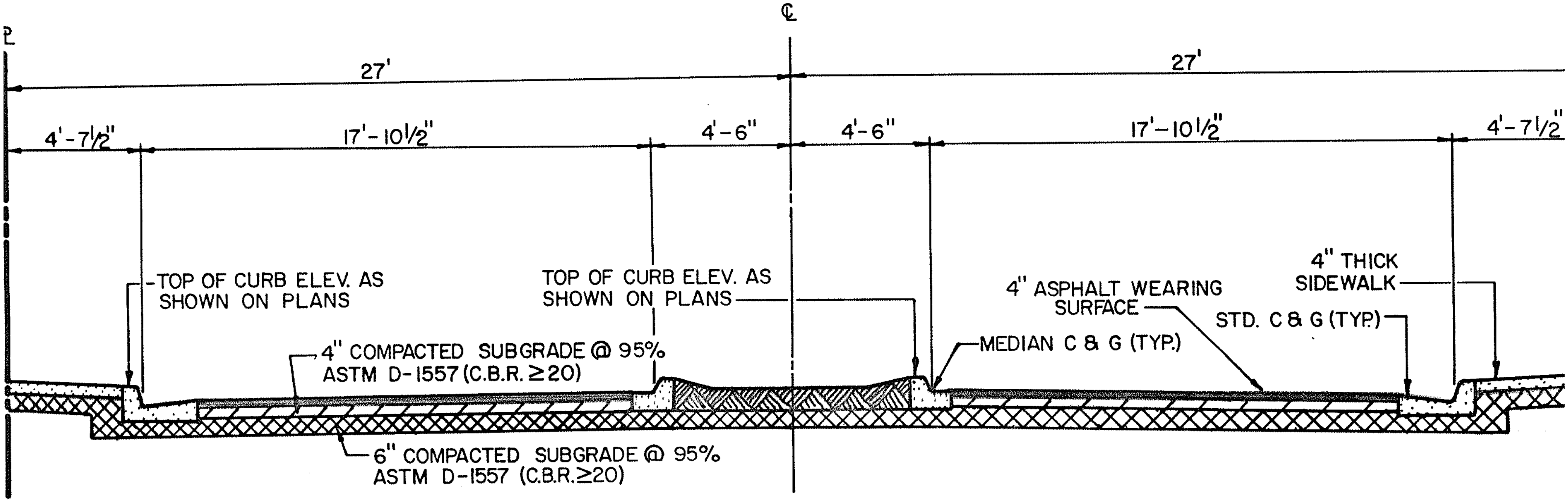
STORM CHARACTERISTICS:

FREQUENCY: 100 yr.; 6 hr.
RAINFALL: 2.2 in.
RUNOFF: 1.09 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.48 cfs/ac/in
PEAK DISCHARGE (Q): 6.8 c.f.s.

VOLUME: 16,700 c.f. 0.38ac.ft.

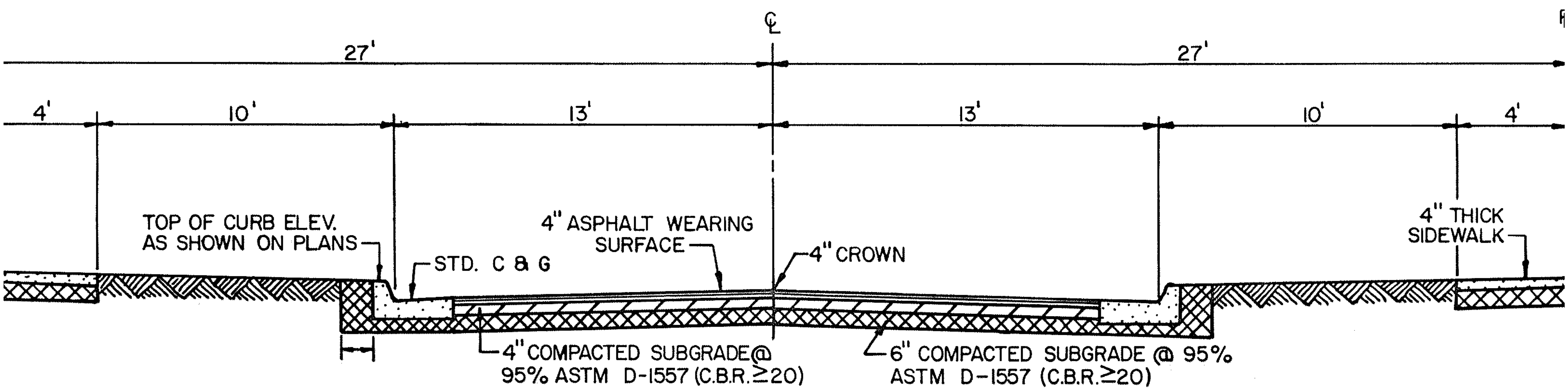
FREQUENCY: 10 yr.; 6 hr.
RAINFALL: 1.4 in.
RUNOFF: 0.49 in.
DISTRIBUTION CURVE: 75
DISCHARGE: 1.48 cfs/ac/in
PEAK DISCHARGE (Q): 3.0 c.f.s.

VOLUME: 7,400 c.f. 0.17ac.ft.



SECTION 1/—

SCALE: 1"=5'



SECTION 2/–

SCALE: 1" = 5'

STREET STORM FLOW CAPACITIES

MANNING EQUATION: Q = (1.486/n) * A * (R^0.67) * (S^0.5)

STREET	n	AREA (sf)	P (ft)	R (ft)	SLOPE (ft/ft)	Q/2 (cfs)	Q (cfs)	V (fps)
STREET SECTION #1	0.020	11.60	23.6	0.49	0.0040	34.0	67.9	2.9
STREET SECTION #1	0.020	11.60	23.6	0.49	0.0050	38.0	75.9	3.3
STREET SECTION #1	0.020	11.60	23.6	0.49	0.0060	41.6	83.2	3.6
STREET SECTION #1	0.020	11.60	23.6	0.49	0.0070	44.9	89.8	3.9
STREET SECTION #1	0.020	11.60	23.6	0.49	0.0080	48.0	96.0	4.1
STREET SECTION #1	0.020	11.60	23.6	0.49	0.0090	50.9	101.9	4.4
STREET SECTION #1	0.020	11.60	23.6	0.49	0.0100	53.7	107.4	4.6
STREET SECTION #2	0.020	9.63	27.3	0.35	0.0040	22.6	45.2	2.3
STREET SECTION #2	0.020	9.63	27.3	0.35	0.0050	25.3	50.5	2.6
STREET SECTION #2	0.020	9.63	27.3	0.35	0.0060	27.7	55.3	2.9
STREET SECTION #2	0.020	9.63	27.3	0.35	0.0070	29.9	59.8	3.1
STREET SECTION #2	0.020	9.63	27.3	0.35	0.0080	31.9	63.9	3.3
STREET SECTION #2	0.020	9.63	27.3	0.35	0.0090	33.9	67.8	3.5
STREET SECTION #2	0.020	9.63	27.3	0.35	0.0100	35.7	71.4	3.7

LAND USE DESCRIPTION	Hydrologic Soil Group				Present Area				Future Area			
	A	B	C	D	A	B	C	D	A	B	C	D
Cultivated land 1/: without conservation treatment	72	81	88	91								
: with conservation treatment	62	71	78	81								
Pasture or range land: poor condition	68	79	86	89								
: fair condition	54	70	80	85								
: good condition	39	61	74	80								
Meadow: good condition	30	58	71	78								
Wood or Forest land: thin stand, poor cover, no mulch	45	66	77	83								
good cover 2/	25	55	70	77								
Open Spaces, lawns, parks, golf courses, cemeteries, etc. good condition: grass cover on 75% or more of the area	39	61	74	80								
fair condition: grass cover on 50% to 75% of the area	49	69	79	84								
Commercial and business areas (85% impervious)	89	92	94	95								
Industrial districts (72% impervious)	81	88	91	93								
Residential 3/												
Average lot size — Average % Impervious 4/ — 1/8 acre or less — 65	77	85	90	92								
1/4 acre — 38	61	75	83	87								
1/3 acre — 30	57	72	81	86								
1/2 acre — 25	54	70	80	85								
1 acre — 20	51	68	79	84								
Paved parking lots, roofs, driveways, etc. 5/	98	98	98	98								
Streets and roads: paved with curbs and storm sewers 5/	98	98	98	98								
gravel	76	85	89	91								
dirt	72	82	87	89								

1/ For a more detailed description of agricultural land use curve numbers, refer to National Engineering Handbook, Section 4, Hydrology, Chapter 9, August 1972.

2/ Good cover is protected from grazing and litter and brush cover soil.

3/ Curve numbers are computed assuming the runoff from the house and driveway is directed towards the street with a minimum of roof water directed to lawns where additional infiltration could occur.

4/ The remaining pervious areas (lawn) are considered to be in good pasture condition for these curve numbers.

5/ In some warmer climates of the country, a curve number of 95 may be used.

Present CN ________
Runoff Volume = ________ in.
$= DA(AC) \times \frac{RO(in.)}{12} =$ ________ ac.ft.

Future CN ________
Runoff Volume = ________ in.
$= DA(AC) \times \frac{RO(in.)}{12} =$ ________ ac.ft.

Area, Acres ________ Date ________
Project ________
Approved By ________

PLATE I

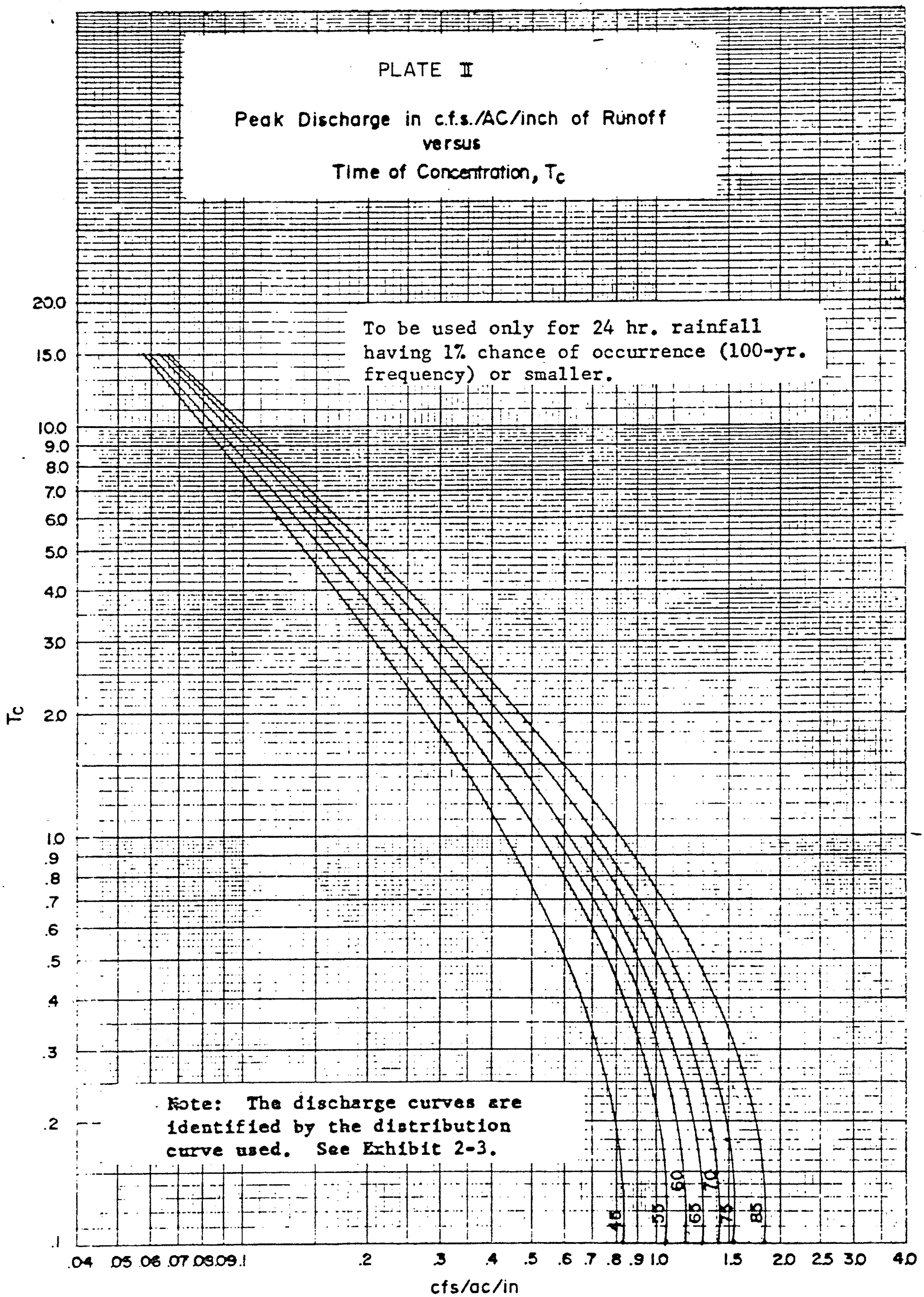


PLATE II
Peak Discharge in c.f.s./AC/inch of Runoff
versus
Time of Concentration, T_c
To be used only for 24 hr. rainfall having 1% chance of occurrence (100-yr. frequency) or smaller.
Note: The discharge curves are identified by the distribution curve used. See Exhibit 2-3.
Tc
20.0
15.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
45
55
60
65
70
75
85
.04 .05 .06 .07 .08 .09 .1 .2 .3 .4 .5 .6 .7 .8 .9 1.0 1.5 2.0 2.5 3.0 4.0
cfs/ac/in

PURPOSE AND SCOPE

The purpose of this drainage report is to establish a criteria for controlling surface runoff from a particular development in a manner that is acceptable to the City of Albuquerque and to the Albuquerque Metropolitan Arroyo Flood Control Authority.

This report will determine the runoff resulting from a 100 year frequency storm falling on the site under existing and developed conditions.

The scope of this report is to ensure that the proposed project will be protected from storm runoff and that the construction of the project will not increase the flooding potential of the adjacent properties.

LOCATION AND DESCRIPTION

The La Colina Subdivision, being tract 18-C-1 of Taylor Ranch is located within the corporate limits of the City of Albuquerque in the northwest quadrant. The parcel is located north of Dellyne Avenue N.W. and west of Coors Boulevard. The location of the project is shown in Figure 1, the vicinity map.

The parcel is approximately 9.63 acres in size and it will be developed as a 61-unit townhouse complex. The natural toporgraphy of the area slopes from west to east.

DESIGN CRITERIA

In analyzing the storm runoff, the Rational Formula, Q = CIA, is used.

Where:

Q = Runoff quantity in cubic feet/second

A = Contributing area in acres

I = Intensity in inches/hour for a duration equal in minutes and obtained from Figure 2, Intensity Duration Frequency Curves, Albuquerque Area 1961. (Note: Where a Time of Concentration (Tc) is less than ten minutes, the intensity value derived from a Tc of ten minutes is employed.)

C = Runoff Coefficient (No Units) This coefficient represents the integrated effects of infiltration, detention storage, evaporation, retention, flow routing, and interception which all affect the time distribution and peak rate of runoff.

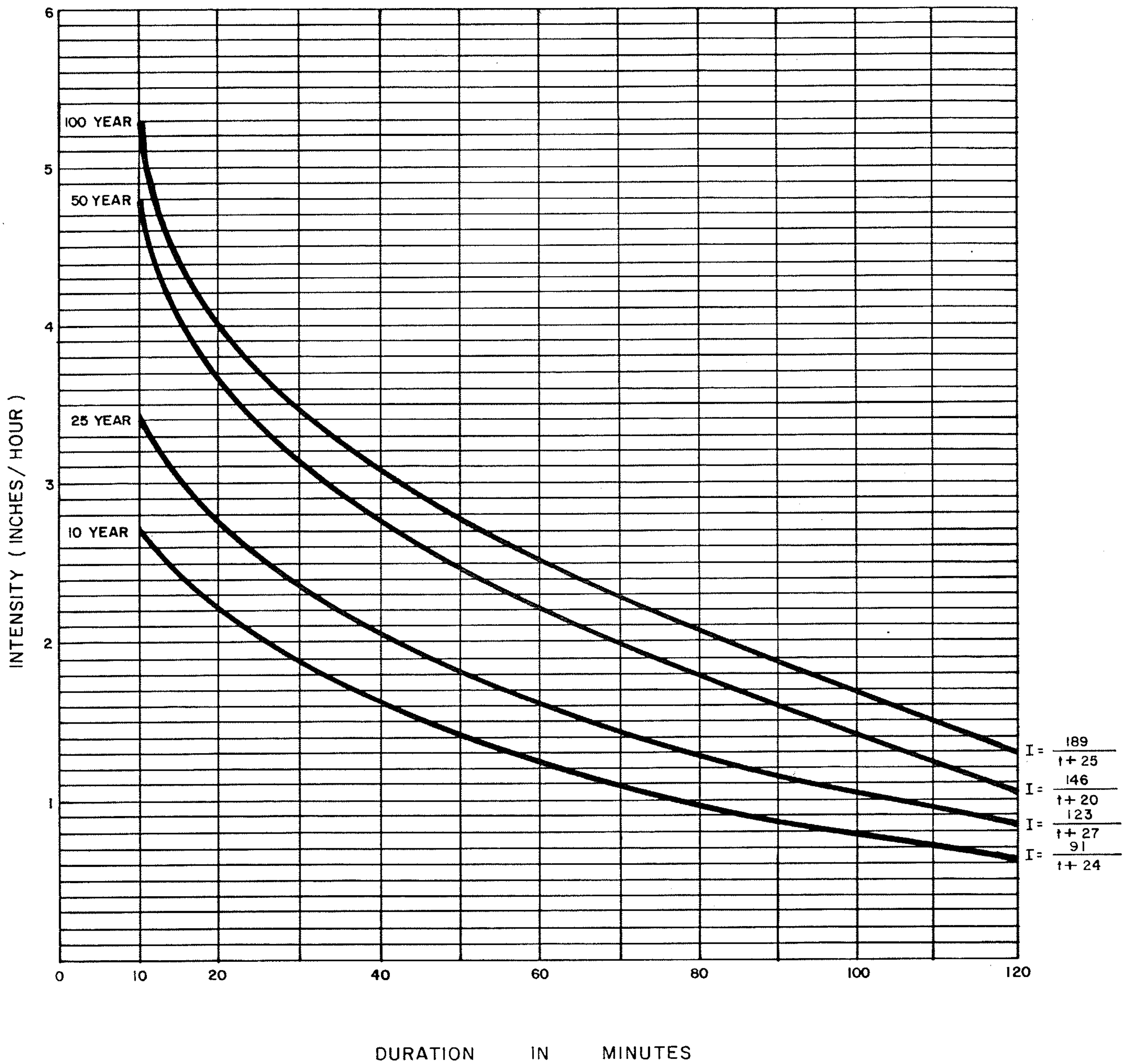


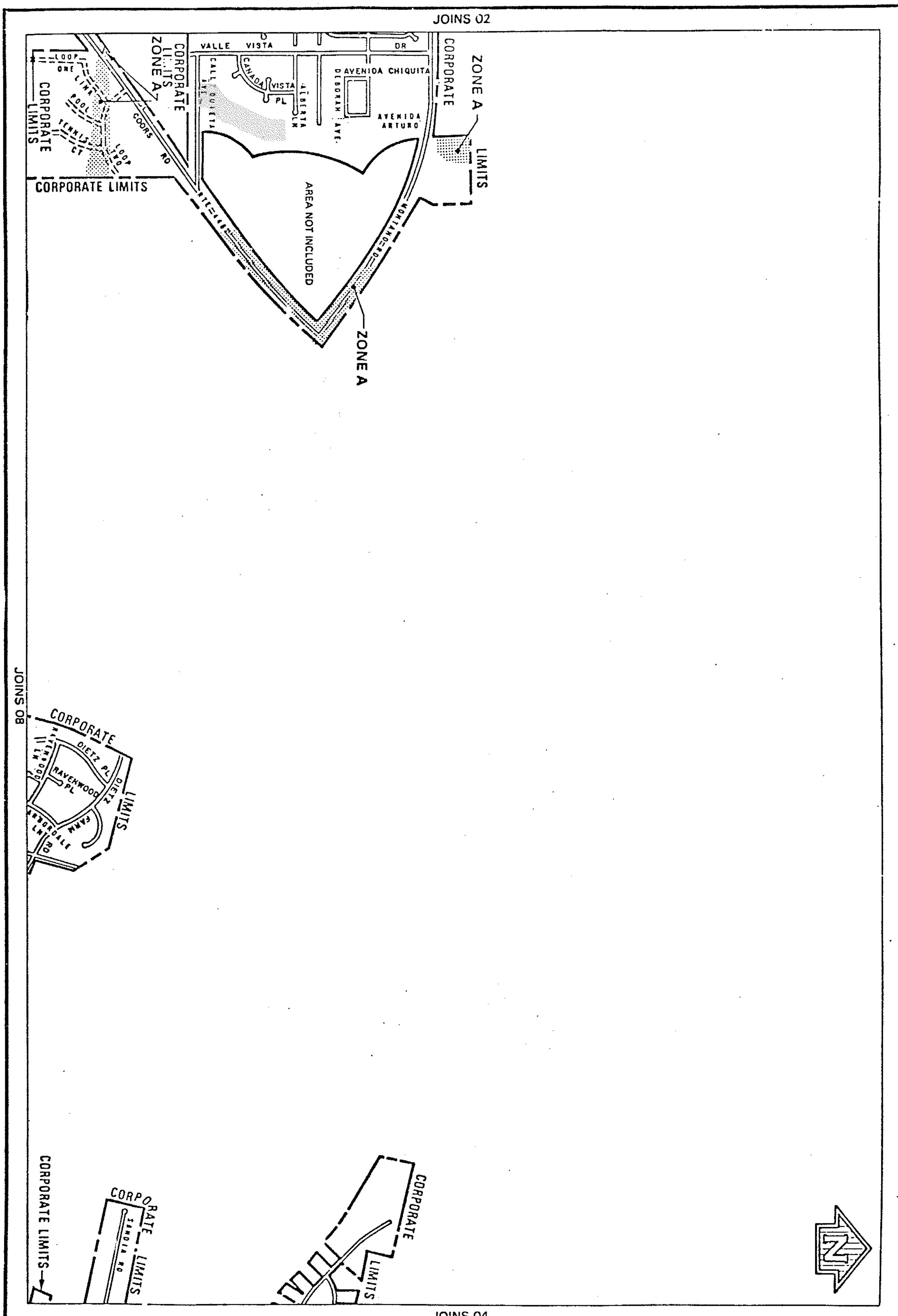
FIGURE 2

INTENSITY DURATION FREQUENCY CURVES

EXISTING DRAINAGE CONDITIONS

The Flood Hazard Map is shown in Figure 3. The project (1) does not lie in a flood plain, (2) does not lie adjacent to a natural or artificial water course and (3) has no drainage easements on the property.

The existing contours are shown on the drainage plan Figure 4. The parcel shopes from west to east and is bounded on the north and west by College Heights Addition. The land to the east and south is undeveloped at this time. Runoff from the north and west would be from those lots adjacent to the La Colina Subidivision. Canada Vista Place and College Heights Drive both intercept the water from the north and west and convey it to the south around the subject property. Since the offsite flows affecting the project are only from the rear yards of adjacent lots, the offsite flow is negligible. Erosion will not result from upland runoff or from the proposed construction activities.



03	DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT Federal Insurance Administration CITY OF ALBUQUERQUE, NM (BERNALILLO CO.)	APPROXIMATE SCALE 1000 0 1000 2000 3000 FEET FLOOD HAZARD BOUNDARY MAP	MAP REVISED 2/14/78

FIGURE 3

PROPOSED DRAINAGE CONDITIONS

The proposed drainage plan is shown in Figure 4. Runoff from front yards and garage roofs will drain into La Colina Drive which will convey the flow in a southerly direction to Dellyne Avenue.

The lots are deeper than normal in order to provide sufficient rear yard ponding. The majority of the runoff from the roofs will be conveyed to the rear yards and ponded. The rear yard ponds have been designed to retain 100 percent of the runoff from a 100 year frequency storm (except for lots 31 and 32 which, due to inadequate backyard depth, will retain only 50 percent of the runoff). Overflows will be constructed in the ponds of the uphill lots in order to allow larger than 100 year frequency storms to overflow into a drain system and flow into the streets. The average pond volume is approximately 720 c.f.

CONCLUSIONS

The following conclusions and recommendations are made for the development of the La Colina Subdivision.

1. Drain La Colina Drive south into Dellyne Drive.
2. Construct rear yard retention ponds.
3. The average rear yard pond volume shall be 720 c.f. (except for lots 31 and 32, which will be 360 c.f.).
4. Slope the majority of the roof to drain into rear yard ponds.
5. Allow the garage roof to drain through the front yard into the street.

CALCULATIONS

Undeveloped State Runoff

Area of Parcel = 9.63 acres

Coefficient of Runoff = 0.40

Length = 1,400 feet

Slope = 0.01

Assume velocity - 2 f.p.s.

Time of Concentration = $\frac{1,400}{2 \times 60}$ = 11.67 min.

Intensity = $\frac{189}{12 + 25}$ = 5.11 inches/hour (Figure 2)

Q = CIA = 0.40 (5.11) 9.63 = 19.7 c.f.s.

Developed State Runoff

Area = (90) (1,400)/43,560 + (24) (20)/43,560 = 3.56 acres

Pervious Area = [4 (22) + 20 (20)] x [61] /43,560 = 0.68 acres

Runoff Coefficient = $\frac{(0.68)\ (0.40) + (2.88)\ (0.90)}{3.56}$ = 0.80

Q = CIA = (0.80) (5.11) (3.56) = 14.6 cfs

Typical Pond Volumes

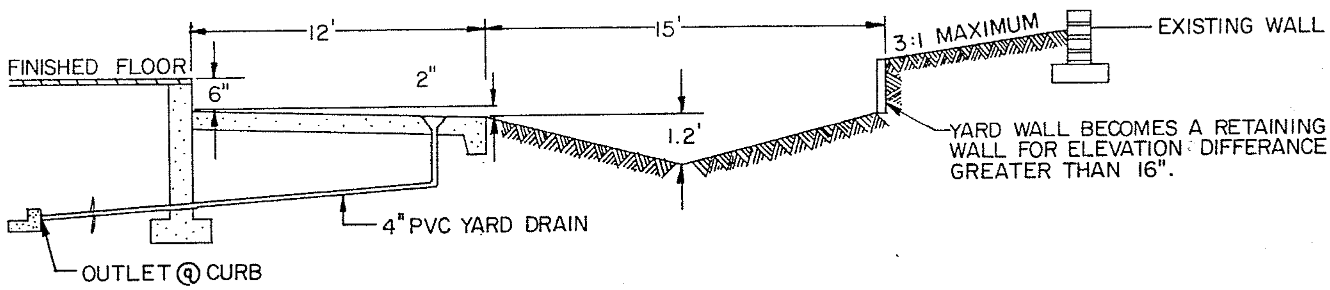
Area of Lot = 120 x 42 = 5,040 s.f.

Area to Rear Yard Pond = 100 x 42 - 600 = 3,600 s.f.

Required Rear Yard Pond = 0.1 x 3,600 = 360 c.f.

Required Pond Volume without Overflow = 0.2 (3,600) = 720 c.f

Uphill Pond

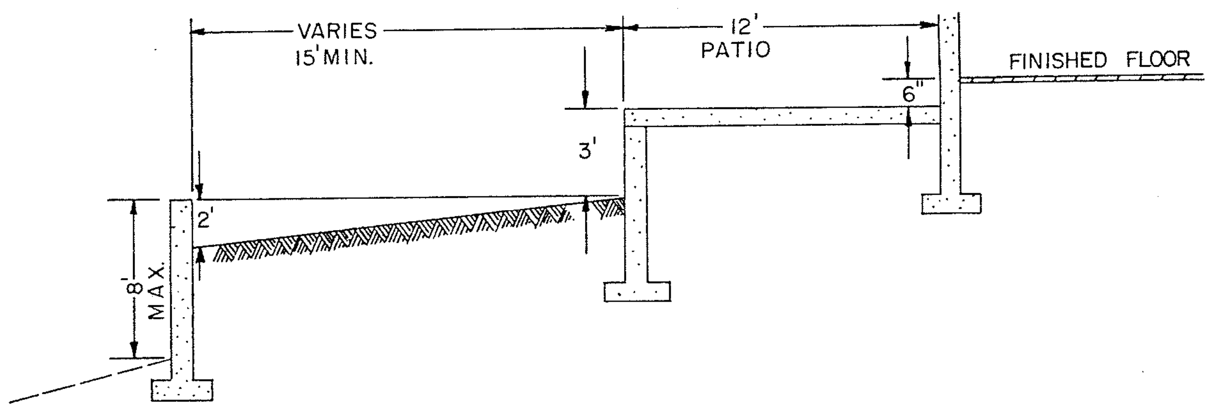


2 [(7.5) (1.2) (0.5) (42)] = 378 c.f.

[(27) (0.5) (42)] = 567 c.f. freeboard

Total Potential Volume = 945 c.f.

Downhill Pond



1.5 (15) 42(½) = 4,72.5 c.f.

0.5 (15) 42 = 315 c.f. freeboard

Total Potential Volume = 787 c.f.

ALLOWABLE TOTAL DISCHARGE, BASED ON PRORATED LAND AREA (AFTER DEDUCTING FOR FREE DISCHARGE OF PUBLIC R/W - DELLYNE & MONTANO) IS AS FOLLOWS:

from SCANLON PLAN: Design Discharge = 57.7 CFS

MONTANO: 17.6
DELLYNE: 14.5
* TOTAL 32.1 CFS

57.7
- 32.1
25.6 CFS (REMAINDER) ←

TOTAL CONTRIBUTING AREA

N.C.D.M.P. AREA	ACRES	
20.1 W	22.59	151.5 Ac, Q = 38.3 cfs → .25 cfs/Ac
20.2 W	45.12	
20.3 W	62.77	
20.4 W	21.02	
20.6 E	33.00	
TOTAL	184.5 ACRES	

TRACT R-1 (& OFFSITE) AREAS

AREA	ACRES
TRACT R-1	62.34
OFFSITE	5.33
TOTAL	67.67 AC

0.14 cfs/Ac

INITIAL ALLOWABLE DISCHARGE: $25.6\text{CFS}\left(\frac{67.67}{184.50}\right) = 9.4\text{ CFS}$ ←

* STREET AREAS WILL DRAIN QUICKLY, WITHIN 0.3-0.5 HOURS, AS THE TIME OF CONCENTRATION FOR THESE AREAS IS THE MINIMUM. AFTER STREET R/W AREAS HAVE DISCHARGED, RELEASE RATE MAY INCREASE ACCORDINGLY TO:

0.31 cfs/Ac

MAX. ALLOWABLE DISCHARGE: $57.7\text{CFS}\left(\frac{67.67}{184.50}\right) = 21.2\text{ CFS}$ ←

DETENTION POND OUTLET STRUCTURE SHALL BE DESIGNED TO DISCHARGE BETWEEN 9.4 CFS & 21.2 CFS WITH INCREASING POND DEPTH (HEAD).

CRITERIA FOR SUBBASIN STORMWATER DISCHARGE

SUBBASIN NO.	AREA ac	SEDIMENT STORAGE REQUIRED	ALLOWABLE MAXIMUM DISCHARGE cfs	MAXIMUM DISCHARGE PER ACRE cfs/acre	PROJECTED DETENTION POND VOLUME	
					ac ft	ac ft/acre
2.1 W	362.40	0.85	n/a	n/a	n/a	n/a
3.1 W	33.18	0.08	6.0	0.18	2.60	0.078
4.1 W	82.56	0.19	20.0	0.24	5.50	0.067
4.2 E	15.08	0.04	74.0	4.91	0.00	0.000
5.1 W	124.60	0.46	184.0	1.48	0.53	0.004
5.2 E	13.68	0.03	64.0	4.68	0.00	0.000
6.1 E	38.11	0.09	78.0	2.05	0.00	0.000
8.1 W	14.12	0.03	20.0	1.42	0.24	0.017
8.2 W	48.26**	--	0.0	0.00	--	--
8.3 E	70.00	0.16	110.0	1.57	0.00	0.000
10.1 W	124.43	0.56	71.6	0.58	6.52	0.052
10.2 E	40.19	0.09	85.8	2.13	0.00	0.000
11.1 W	46.39	0.25	44.3	0.95	1.47	0.032
11.2 E	7.79	0.02	30.7	3.94	0.00	0.000
12.1 W	34.19	0.08	35.0	1.02	0.33	0.010
12.2 W	14.35	0.03	20.0	1.39	0.17	0.012
12.3 E	13.28	0.03	31.9	2.40	0.00	0.000
13.1 W	12.78	0.03	20.5	1.60	0.00	0.000
13.2 E	9.47	0.02	29.1	3.07	0.00	0.000
14.1 W	29.25	0.07	13.4	0.46	0.00	0.000
14.2 E	4.26	0.01	16.7	3.92	0.00	0.000
15.1 W	16.37	0.04	9.0	0.55	0.00	0.000
15.2 W	40.80	0.10	21.3	0.52	0.00	0.000
15.3 E	13.90	0.03	36.9	2.65	0.00	0.000
16.1 W	21.30	0.05	11.6	0.54	0.00	0.000
16.2 W	42.54	0.10	21.4	0.50	0.00	0.000
16.3 E	30.99	0.07	83.3	2.69	0.00	0.000
17.1 W	6.56	0.02	4.2	0.64	0.00	0.000
17.2 W	30.94	0.07	15.0	0.48	0.00	0.000
17.3 W	26.62	0.06	11.9	0.45	0.00	0.000
17.4 E	48.37	0.11	112.8	2.33	0.00	0.000
18.1 W	224.57	0.53	17.2/70.0	0.08/0.31	10.55/4.76	.047/.021
18.2 W	93.32	0.22	12.0/69.0	0.13/0.74	5.13/1.37	.055/.015
18.3 E	44.84	0.11	12.6/61.0	0.28/1.36	1.66/0.00	.037/.000
19.1 W	39.01	0.09	6.3/31.0	0.16/0.79	2.59/0.85	.066/.021
19.2 W	75.33	0.18	35.0	0.46	4.06	0.054
19.3 E	35.54	0.08	9.9/49.0	0.28/1.38	1.30/0.00	.037/.000
19.4 E	29.88	0.07	15.0/14.0	0.50/0.47	1.36/3.50	.046/.117
20.1 W	22.59	0.05	35.0	1.55	0.18	0.008
20.2 W	45.12	0.11	16.9/35.0	0.37/0.78	1.41/0.50	.031/.011
20.3 W	62.77	0.15	14.8/63.0	0.25/1.00	2.64/0.00	.042/.000
20.4 W	21.02	0.05	3.4/14.0	0.16/0.67	0.21/0.00	.010/.000
20.5 E	92.83	0.22	28.0/145.0	0.30/1.56	3.41/0.00	.037/.000
20.6 E	33.00	0.08	11.0/52.0	0.33/1.58	0.36/0.00	.011/.000
21.1 E	101.72	0.24	28.0/112.0	0.28/1.10	3.35/0.00	.033/.000

**AREA FLOWS TO CALABACILLAS ARROYO AT DEVELOPED CONDITIONS

NOTE: WHERE TWO NUMBERS ARE SHOWN, THE FIRST NUMBER INDICATES CRITERIA FOR OPTION A-1 OR A-2, AND THE SECOND NUMBER INDICATES CRITERIA FOR OPTION B OR OPTION C.

TABLE 1

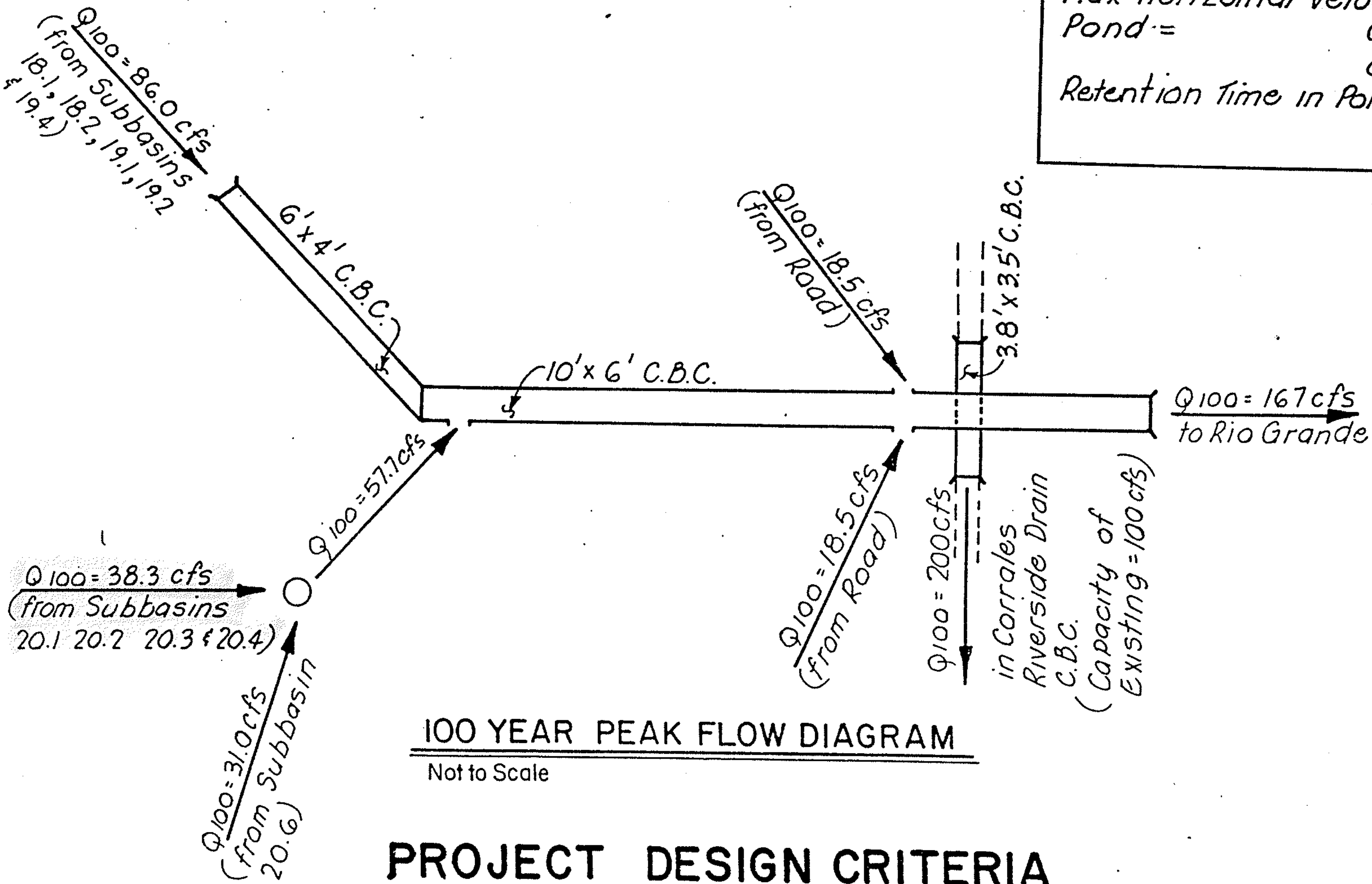
DESIGN REQUIREMENTS FOR UPSTREAM SEDIMENT CONTROL.

Min. Pond Storage = 0.0024 Ac ft. per Acre of Upstream Drainage Basin.

Velocity of Sediment Fall = 0.002 ft/Sec. @ 50% of Q100 (Course Silt)

Max Horizontal Velocity in Sediment Pond = 0.5 ft/Sec @ 50% of Q100

Retention Time in Pond (Sec) = Depth of Pond (ft)/0.002 f

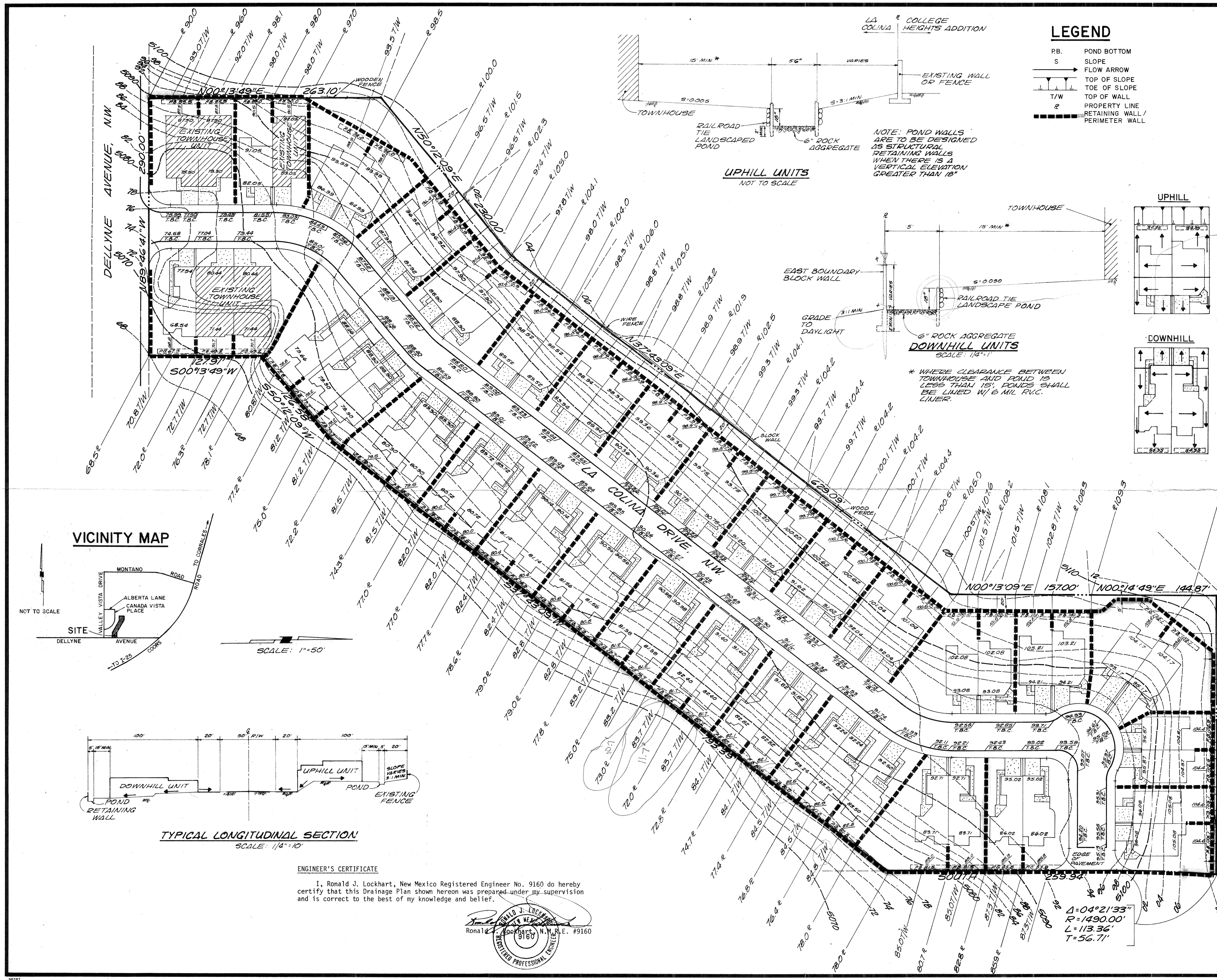


100 YEAR PEAK FLOW DIAGRAM

Not to Scale

PROJECT DESIGN CRITERIA

:HIBIT 5B



TYPICAL LOT DRAINAGE

HYDROLOGY

USCS Soils Group "A"

Frequency = 100 Yr., 6 Hr.

Rainfall = 2.2 In.

tc = 10 Min.

i100 = 4.65 In./Hr.

METHODOLOGY

City of Albuquerque Development Process Manual, Book 2, Chapter 22, March 1982

DEVELOPMENT CONDITION (1 Unit - 2 Lots)

UPHILL

REAR

Drainage Area = 0.15 Ac. Impervious = 0.05 Ac. (33%)
Pervious = 0.10 Ac. (67%)
CN Composite = 79 C Composite = 0.47
V100 = 0.01 A.F. Q100 = 0.33 cfs
Ponding Req.* = 704 cft per unit
Pond Size = 5'-6" x 84' x 1'-6" Deep

FRONT

Drainage Area = 0.08 Ac. Impervious = 0.05 Ac. (63%)
Pervious = 0.03 Ac. (37%)
CN Composite = 87 C Composite = 0.67
V100 = 0.01 A.F. Q100 = 0.25 cfs

DOWNHILL

FRONT

Drainage Area = 0.04 Ac. Impervious = 0.02 Ac. (50%)
Pervious = 0.02 Ac. (50%)
CN Composite = 83 C Composite = 0.59
V100 = 0 A.F. Q100 = 0.11 cfs

REAR

Drainage Area = 0.19 Ac. Impervious = 0.12 Ac. (63%)
Pervious = 0.07 Ac. (37%)
CN Composite = 87 C Composite = 0.67
V100 = 0.02 A.F. Q100 = 0.59 cfs
Ponding Req. = 690 cft per unit
Pond Size = 5'-6" x 84' x 1'-6" Deep

RUN-OFF EXITING DEVELOPMENT (DELLYNE AVENUE)

Q total 100 = (28)(.36 cfs) + (3)(.50 cfs)** = 11.6 cfs > 6.8 previously approved
V total 100 = (28)(.01) + 3(.01) = 0.31 A.F. < 0.38 " "
∴ OK

11.6 cfs / 9.6 Ac = 1.2 cfs/Ac
6.8 / 9.6 = 0.7

CONCLUSIONS:

The above analysis of storm run-off quantities generated from the new lot configurations of the proposed development demonstrates that the proposed drainage scheme outlined in previously approved drainage report, "Drainage Report for La Colina Compound", Tom Mann & Associates, Inc., December 1981 is still applicable. The majority of run-off will be retained within ponds located within the rear of the lots. The balance of the run-off from the front yard will be collected in La Collina Drive and conveyed to Dellyne Avenue. The new lot configurations will not increase the flooding potential on the street section and adjacent properties.

* Includes off-site flow - See "Drainage Report for La Colina Compound", Tom Mann & Associates, Inc., December 1981.

** Estimated run-off from existing townhouse units.

APPROVED FOR DRAINAGE 8/7/86
DATE
Roger A. Green, PE Hydrology
SIGNATURE TITLE

RECEIVED AUG 06 1986 HYDROLOGY SECTION

ENGINEER'S CERTIFICATE

I, Ronald J. Lockhart, New Mexico Registered Engineer No. 9160 do hereby certify that this Drainage Plan shown hereon was prepared under my supervision and is correct to the best of my knowledge and belief.

Ronald J. Lockhart, N.M.R.E. #9160

LA COLINA COMPOUND

NO.	DATE	BY	REVISIONS & REMARKS
1	8-5-86	RJL	Per City Comments

CINFRAN ENGINEERING INC.

DRAINAGE STUDY

DATE: JULY 17, 1986

96287

CALCULATIONS

Site Characteristics

1. Precipitation Zone = 1
2. $P_{6,100} = P_{360} = 2.20$ in.
3. Total Area (A_T) = 132,721 sf/3.05 ac (site)
   1,866,800 sf/42.86 ac (watershed+Basin A)
4. Existing Land Treatment

A. Watershed

Land Use	Area (sf/ac)	% B	% C	% D
Single Family	*662,480/15.2	30	30	40 (N = 3.85)
Windmill Manor	229,600/05.3 (evaluate at 0.25 cfs/ac discharge)			
Collector/Arterial Streets	175,000/04.0	0	10	90
Basin A	87,735/02.0	0	100	0
**	925,215/21.2			

*Total single family area = 1,324,965 sf
Applying 50% reduction for rear yard ponding yields 662,480

**Does not include Windmill Manor

$A_B = 0.30(662,480) = 198,744$ sf/4.6 ac

$A_C = 0.30(662,480)+0.10(175,000)+1.00(87,735) = 303,979$ sf/7.0 ac

$A_D = 0.40(662,480)+0.90(175,000) = 416,492$ sf/9.6 ac

B. Basin A (Lots 1–9) $A_T = 87,735$ sf/2.01 ac

Treatment	Area (sf/ac)	%
C	87,735/2.01	100.0

C. Basin B (Lots 10–16) $A_T = 44,985$ sf/1.04 ac

Treatment	Area (sf/ac)	%
C	44,985/1.04	100.0

5. Developed Land Treatment

A. Watershed

Land Use	Area (sf/ac)	% B	% C	% D
Single Family	*662,480/15.2	30	30	40 (N = 3.85)
Windmill Manor	229,600/05.3 (evaluate at 0.25 cfs/ac discharge)			
Collector/Arterial Streets	175,000/04.0	00	10	90
Basin A	87,735/02.0	35	35	30
**	925,215/21.2			

*Total single family area = 1,324,965 sf
Applying 50% reduction for rear yard ponding yields 662,480

**Does not include Windmill Manor

$A_B = 0.30(662,480) + 0.35(87,735) = 229,451$ sf/5.3 ac

$A_C = 0.30(662,480)+0.10(175,000)+0.35(87,735) = 246,951$ sf/5.6 ac

$A_D = 0.40(662,480)+0.90(175,000)+0.30(87,735) = 448,813$ sf/10.3 ac

A. Basin A (Lots 1–9) $A_T = 87,735$ sf/2.01 ac

Treatment	Area (sf/ac)	%
B	11,325/0.26	12.9
C	49,840/1.14	56.8
D	26,570/0.61	30.3

B. Basin B (Lots 10–16) $A_T = 44,985$ sf/1.04 ac

Treatment	Area (sf/ac)	%
B	6,970/0.21	15.5
C	20,115/0.46	44.7
D	17,900/0.41	39.8

Existing Condition

A. Watershed

1. Volume

$E_W = (E_A A_A+E_B+E_C A_C+E_D A_D)/A_T$

$E_W = [0+0.67(4.6)+0.99(7.0)+1.97(9.6)]/21.2 = 1.36$ in

$V_{100} = (E_W/12)A_T$

$V_{100} = 2.40$ ac.ft. $= 104,660$ cf

2. Peak Discharge

$Q_p = Q_{PA}\ A_A + Q_{PB}A_B + Q_{PC}A_C + Q_{PD}A_D$

$Q_p = 2.03(4.6)+2.87(7.0)+4.37(9.6) = 9.3+20.1+42.0 = 71.4$ cfs

$Q_{Windmill} = 0.25(5.3) = 1.3$ cfs

$Q_{100} = Q_p + Q_{Windmill} = 72.7$ cfs

B. Basin A

1. Volume

$E_W = (E_A A_A+E_B+E_C A_C+E_D A_D)/A_T$

$E_W = [(0.99)(2.01)]/(2.01) = 0.99$ in

$V_{100} = (E_W/12)A_T$

$V_{100} = (0.99/12)(2.01) = 0.1658$ ac.ft.; 7,225 cf

2. Peak Discharge

$Q_p = Q_{PA}\ A_A + Q_{PB}A_B + Q_{PC}A_C + Q_{PD}A_D$

$Q_p = Q_{100} = (2.87)(2.01) = 5.8$ cfs

C. Basin B

1. Volume

$E_W = (E_A A_A+E_B+E_C A_C+E_D A_D)/A_T$

$E_W = [(0.99)(1.04)]/(1.04) = 0.99$ in

$V_{100} = (E_W/12)A_T$

$V_{100} = (0.99/12)(1.04) = 0.0858$ ac.ft.; 3,740 cf

2. Peak Discharge

$Q_p = Q_{PA}\ A_A + Q_{PB}A_B + Q_{PC}A_C + Q_{PD}A_D$

$Q_p = Q_{100} = (2.87)(1.04) = 3.0$ cfs

Developed Condition

A. Watershed

1. Volume

$E_W = (E_A A_A+E_B+E_C A_C+E_D A_D)/A_T$

$E_W = [0+0.6](5.3)+0.99(5.6)+1.97(10.3)]/21.2 = 1.39$ in

$V_{100} = (E_W/12)A_T$

$V_{100} = 2.46$ ac.ft. $= 106,970$ cf

2. Peak Discharge

$Q_p = Q_{PA}\ A_A + Q_{PB}A_B + Q_{PC}A_C + Q_{PD}A_D$

$Q_p = 2.03(5.3)+2.87(5.6)+4.37(10.3) = 10.8+16.1+45.0 = 71.9$ cfs

$Q_{Windmill} = 0.25(5.3) = 1.3$ cfs

$Q_{100} = Q_p + Q_{Windmill} = 73.2$ cfs

B. Basin A

1. Volume

$E_W = (E_A A_A+E_B+E_C A_C+E_D A_D)/A_T$

$E_W = [(0.67)(0.26)+(0.99)(1.14)+(1.97)(0.61)]/(2.01) = 1.25$ in

$V_{100} = (E_W/12)A_T$

$V_{100} = (1.25/12)(2.01) = 0.2087$ ac.ft.; 9,090 cf

2. Peak Discharge

$Q_p = Q_{PA}\ A_A + Q_{PB}A_B + Q_{PC}A_C + Q_{PD}A_D$

$Q_p = Q_{100} = (2.03)(0.26)+(2.87)(1.14)+(4.37)(0.61) = 6.5$ cfs

C. Basin B

1. Volume

$E_W = (E_A A_A+E_B+E_C A_C+E_D A_D)/A_T$

$E_W = [(0.67)(0.16)+(0.99)(0.46)+(1.97)(0.41)/(1.04) = 1.37$ in

$V_{100} = (E_W/12)A_T$

$V_{100} = (1.37/12)(1.04) = 0.1188$ ac.ft.; 5,175 cf

2. Peak Discharge

$Q_p = Q_{PA}\ A_A + Q_{PB}A_B + Q_{PC}A_C + Q_{PD}A_D$

$Q_p = Q_{100} = (2.03)(0.16)+(2.87)(0.46)+(4.37)(0.41) = 3.4$ cfs

Comparison

A. Watershed

1. $\Delta V_{100} = 106,970 - 104,660 = 2,310$ cf (increase)
2. $\Delta Q_{100} = 73.2 - 72.7 = 0.5$ cfs (increase)

B. Basin A

1. $\Delta V_{100} = 9,090 - 7,225 = 1,865$ cf (increase)
2. $\Delta Q_{100} = 6.5 - 5.8 = 0.7$ cfs (increase)

C. Basin B

1. $\Delta V_{100} = 5,175 - 3,740 = 1,435$ cf (increase)
2. $\Delta Q_{100} = 3.4 - 2.0 = 0.4$ cfs (increase)

STREET HYDRAULICS

$Q = (1.49/n)AR^{2/3}S^{1/2}$

Where: $n = 0.017$
$S = 4/74 = 0.054$
$A, R = f(d)$

a. Let $d = 0.5$ ft $\simeq$ crown height

$A_{0.5} = 2[1/2(24)(0.5)] = 12$ sf

$P_{0.5} = 0.5 + 48 + 0.5 = 49$ ft

$R = A/P = 0.25;\ R^{2/3} = 0.39$

Then $Q_{0.5} = 95$ cfs < 147 cfs

b. Let $d = 0.46$ ft

$A_{0.46} = 2[1/2(23)(0.46)] = 10.6$ sf

$P_{0.46} = 0.46 + 23 + 23 + 0.46 = 46.9$ ft

$R = A/P = 0.23;\ R^{2/3} = 0.37$

Then $Q_{0.46} = 79.9$ cfs $> Q_{100}$

c. Let $d = 0.45$ ft

$A_{0.45} = 2[1/2(22.5)(0.45)] = 10.1$ sf

$P_{0.45} = 0.45 + 22.5 + 22.5 + 0.45 = 45.9$ ft

$R = A/P = 0.22;\ R^{2/3} = 0.36$

Then $Q_{0.45} = 74.1$ cfs $< Q_{100}$

d. Let $d = 0.44$ ft

$A_{0.44} = 2[1/2(22.0)(0.44)] = 9.7$ sf

$P_{0.44} = 0.44 + 22.0 + 22.0 + 0.44 = 44.9$ ft

$R = A/P = 0.22;\ R^{2/3} = 0.36$

Then $Q_{0.44} = 71.1$ cfs $> Q_{100}$

$\Delta Q_{0.01} = Q_{0.45} - Q_{0.44} = 3.0$ cfs

It therefore takes a $\Delta Q = 3.0$ cfs to produce a 0.01 ft in normal depth.
A $\Delta Q = 0.7$ cfs will produce a $\Delta d \ll 0.01$ ft

DRAINAGE PLAN

The following items concerning the Montano Vista Subdivision Drainage Plan are included in this submittal.

1. Vicinity Map
2. Watershed Map & Analysis
3. Existing Conditions Plan
4. Grading Plan
5. Retaining Wall Plan & Profile Designs
6. Retaining Wall Sections
7. Grading Notes
8. Calculations

As shown by the Vicinity Map, the site is located on the north side of Dellyne Avenue N.W. At present, the site is undeveloped. The land immediately to the west is developed as the La Colina Subdivision, a townhouse development. The lands to the north and east are currently being developed as the Taylor Ridge projects. As stated above, Dellyne Avenue N.W. lies to the south of the site. Dellyne Avenue is currently improved as a collector street.

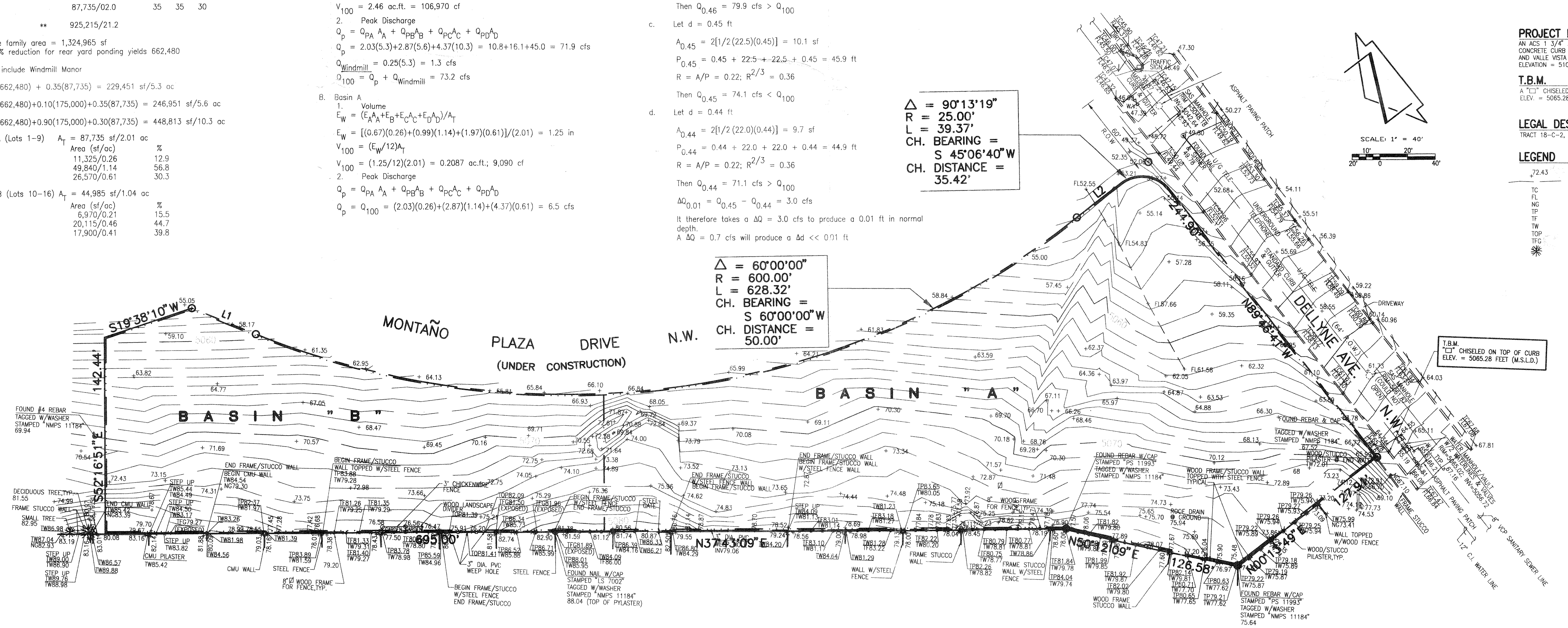
As shown by Panel 14 of 50 of the National Flood Insurance Program Flood Insurance Rate Maps published by F.E.M.A. for the City of Albuquerque, New Mexico dated October 14, 1983, this site does not lie within a designated flood hazard zone. Review of Panel 15 of 50 does not reveal the presence of downstream flood hazard zones. At present, the site drains from west to east. The northerly portion of the site, Basin B, drains in a northeasterly direction. The southerly portion of the site, Basin A, drains in a southeasterly direction toward Dellyne Avenue N.W. Runoff generated by the subdivision will be intercepted by Montano Plaza Drive N.W. which is under construction as part of the Taylor Ridge projects. The Basin B runoff will drain through Taylor Ridge and has been accounted for in the drainage report prepared for that project (Hydrology File No. E12/D8). Basin A, via Montano Plaza Drive N.W. drains south to Dellyne Avenue N.W. Dellyne Avenue N.W. slopes from west to east with its runoff collecting at the intersection with Coors Boulevard N.W. Existing public storm drain facilities (storm inlets) have been constructed at this intersection to intercept and convey public stormwater north along the west edge of Coors Boulevard N.W.

The Grading Plan shows: 1) existing and proposed grades indicated by spot elevations and contours at 1'0" intervals, 2) the limit and character of the existing improvements, 3) the limit and character of the proposed improvements, and 4) the limit of the proposed retaining walls, 5) a proposed 5' private drainage easement within Lot 16 and 6) continuity between existing and proposed grades. As shown by this plan, it is proposed to develop this site in a single family residential manner. Proposed zoning is RLT which allows for a 15' front yard setback. Each lot will drain in its entirety to the adjacent street(s). Lots 1 through 9 lie within Basin A, while Lots 10 through 16 lie within Basin B. As indicated above, the Taylor Ridge Subdivision has accounted for the developed runoff from the Basin B lots. Although Montano Plaza Drive N.W. was designed and is now being constructed as part of the Taylor Ridge projects, the drainage of that portion of the street within Basin A was not addressed in a detailed manner. This is probably due to the fact that a relatively small contributing area drains to this part of roadway which discharges into Dellyne Avenue N.W.

Private drainage easements are not required for this project with the exception of Lot 16, which provides for the release of runoff from the New Tract O–1. Tract O–1 is "Open Space" and will not be developed. Regardless, it is recognized that a reasonable means to receive runoff from Tract O–1 is needed. The existing topography parallels the north lot line of Lot 16, thereby making it difficult, if not impossible, for Tract O–1 to drain across Lot 16 to discharge its runoff to Montano Plaza Drive N.W. It is anticipated that Tract O–1 will continue to sheetdrain from west to east in its historic manner. Regardless, provisions have been made so that Tract O–1 could drain its runoff through a new private drainage easement to Montano Plaza Drive N.W.

Limited public infrastructure is anticipated as part of this project. In order to limit the number of driveways exiting directly onto Montano Plaza Drive N.W., one "knuckle" and one modified "knuckle" are proposed. The paving associated with these "knuckles" will drain to Montano Plaza Drive N.W. These improvements will be constructed by City Work Order. Private retaining walls and one drainage rundown (Section B–B) are proposed as part of the grading of this site. The retaining walls have been presented in plan and profile form. Typical sections have also been incorporated into this submittal.

The Calculations which appear hereon analyze both the existing and developed conditions for the 100–year, 6–hour rainfall event. Calculations have been prepared for the site itself, as well as the Watershed. The purpose for these Calculations is to quantify the increase in runoff anticipated due to the development of this site. The Procedure for 40–acre and Smaller Basins, as set forth in the Revision of Section 22.2, Hydrology of the Development Process Manual, Volume 2, Design Criteria, dated January, 1993, has been used to quantify the peak rate of discharge and volume of runoff generated. As shown by these calculations, very minor increases in runoff are anticipated from both Basins A and B. The Calculations performed for the Watershed are discussed in more detail on the preceding page under the heading of "Watershed Analysis".



PROJECT BENCHMARK

AN ACS 1 3/4" ALUMINUM DISK STAMPED "ACS BM, 11–E11" SET ON TOP OF THE CONCRETE CURB AT THE ENE RETURN OF THE INTERSECTION OF DELLYNE AVE. AND VALLE VISTA DRIVE N.W.
ELEVATION = 5103.70 FEET (M.S.L.D.)

T.B.M.

A "□" CHISELED ON TOP OF CURB
ELEV. = 5065.28 FEET (M.S.L.D.)

LEGAL DESCRIPTION

TRACT 18–C–2, TAYLOR RANCH, ALBUQUERQUE, N.M.

LEGEND

+72.43	EXISTING SPOT ELEVATION
——	EXISTING CONTOUR
TC	TOP OF CURB
FL	FLOW LINE
NG	NATURAL GROUND
TP	TOP OF PYLASTER
TF	TOP OF WOOD FRAME
TW	TOP OF WALL
TOP	TOP OF PIPE
TFG	TOP OF FOOTING (EXPOSED)
✳	EXISTING DECIDUOUS TREE

JEFFREY G. MORTENSEN
NEW MEXICO
8547
REGISTERED PROFESSIONAL ENGINEER
05-05-95

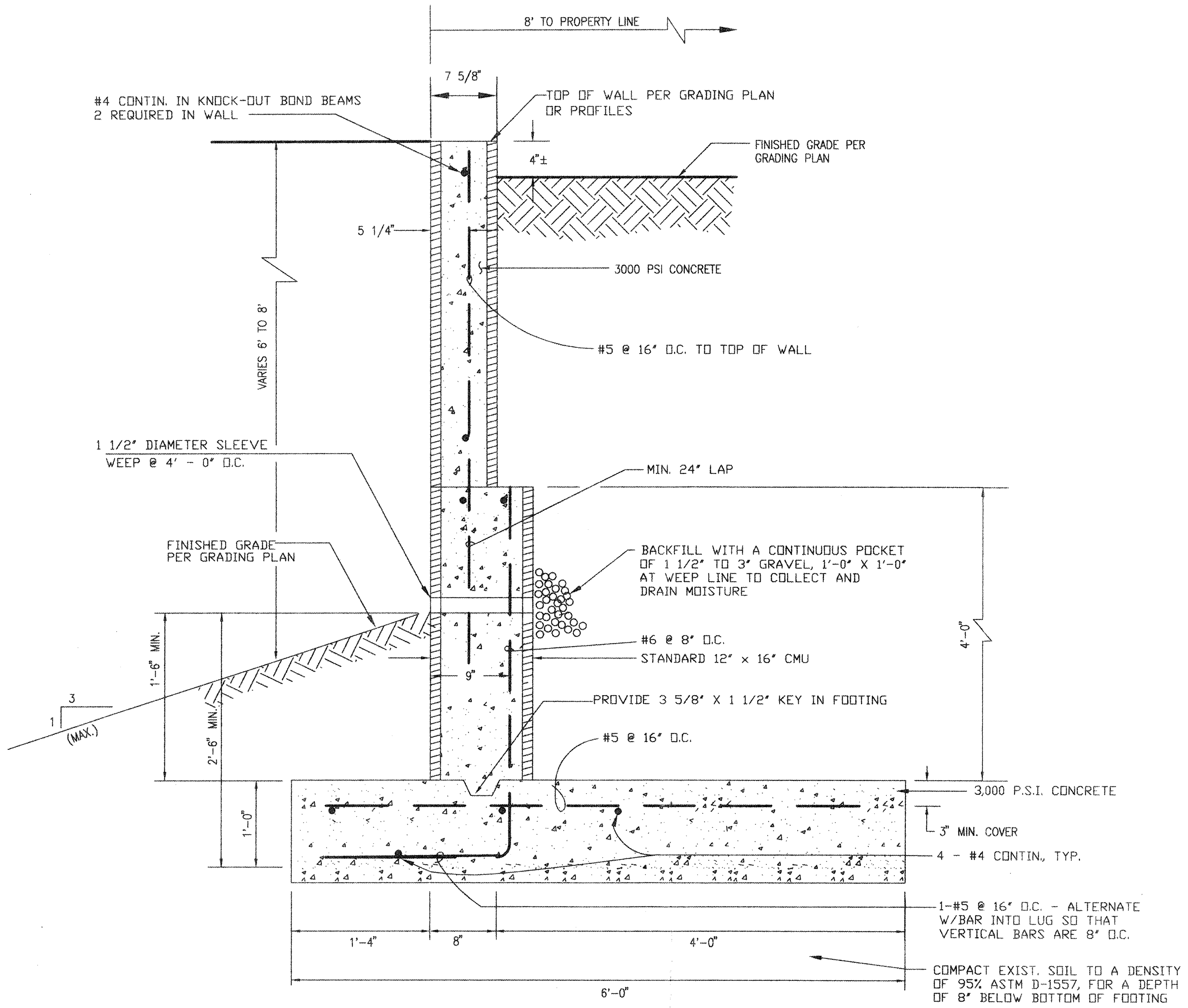
jma
JEFF MORTENSEN & ASSOCIATES, INC.
6010-B MIDWAY PARK BLVD. N.E.
ALBUQUERQUE, NEW MEXICO 87109
ENGINEERS SURVEYORS (505) 345-4250

EXISTING CONDITIONS, DRAINAGE PLAN AND CALCULATIONS
MONTAÑO VISTA SUBDIVISION

DESIGNED BY	J.G.M.
DRAWN BY	C.J.H.
APPROVED BY	J.G.M.

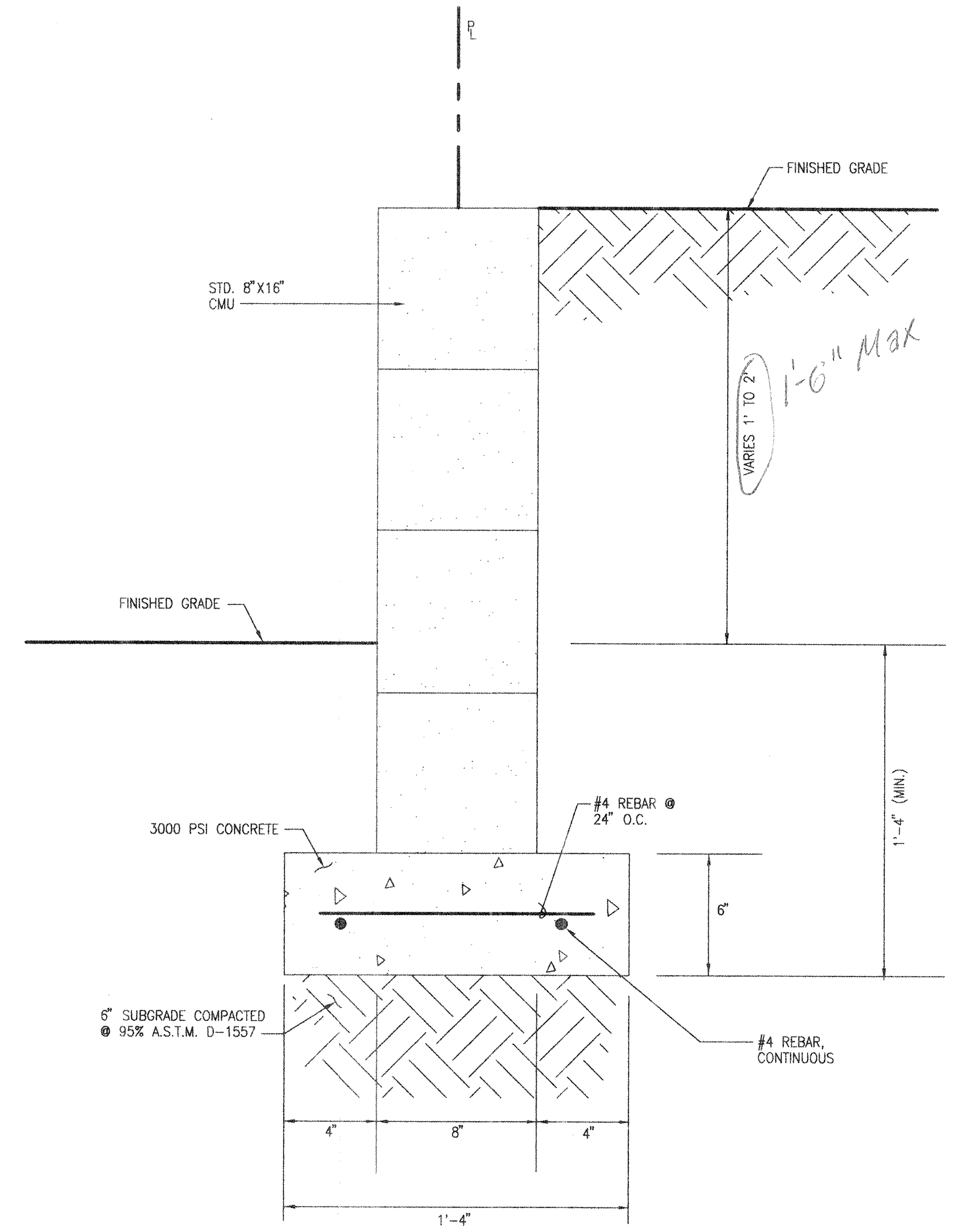
NO.	DATE	BY	REVISIONS

JOB NO.	941111
DATE	03-1995
SHEET	2 OF 6



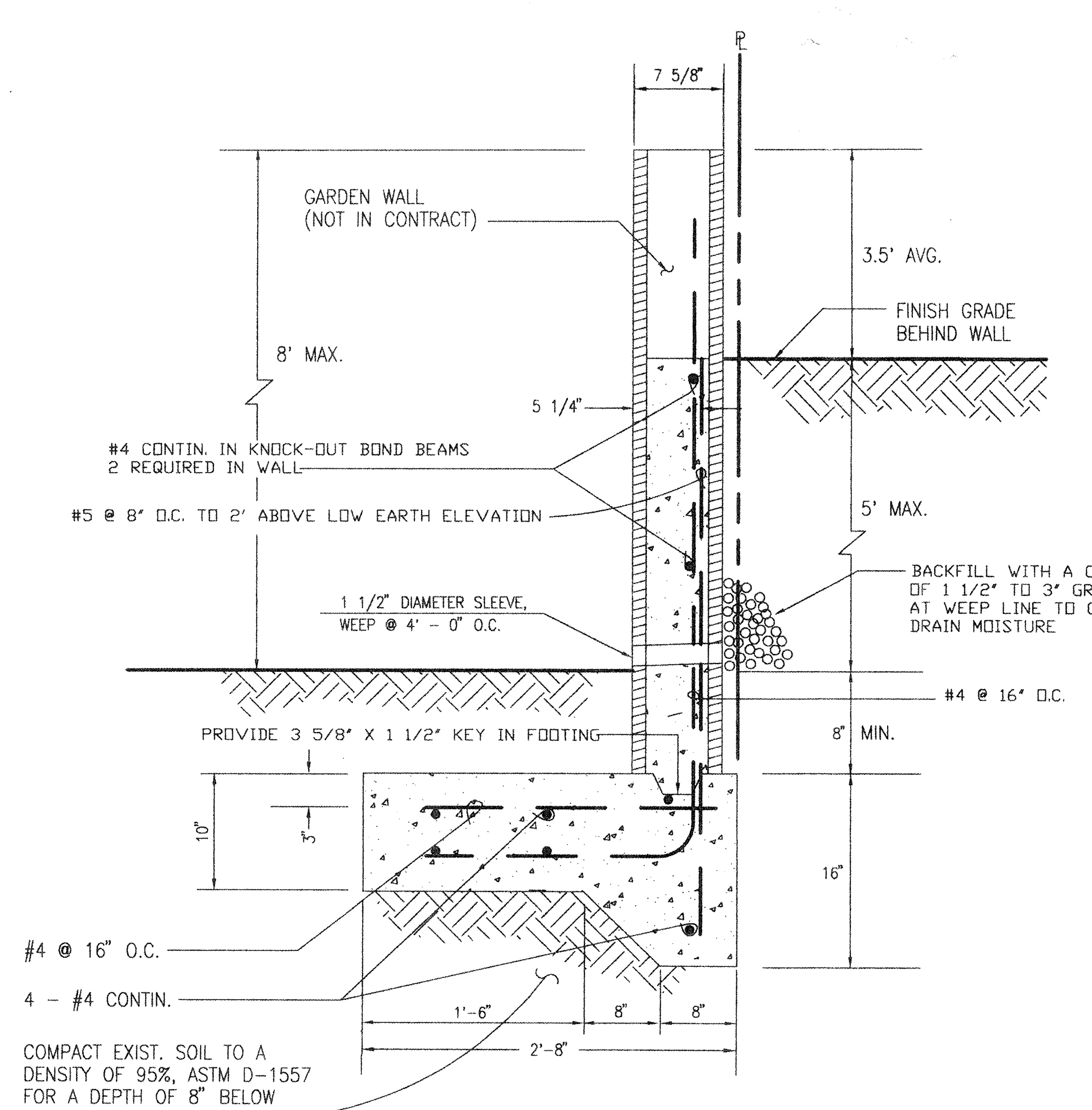
RETAINING WALL SECTION – TYPE I

SCALE: 1" = 1'



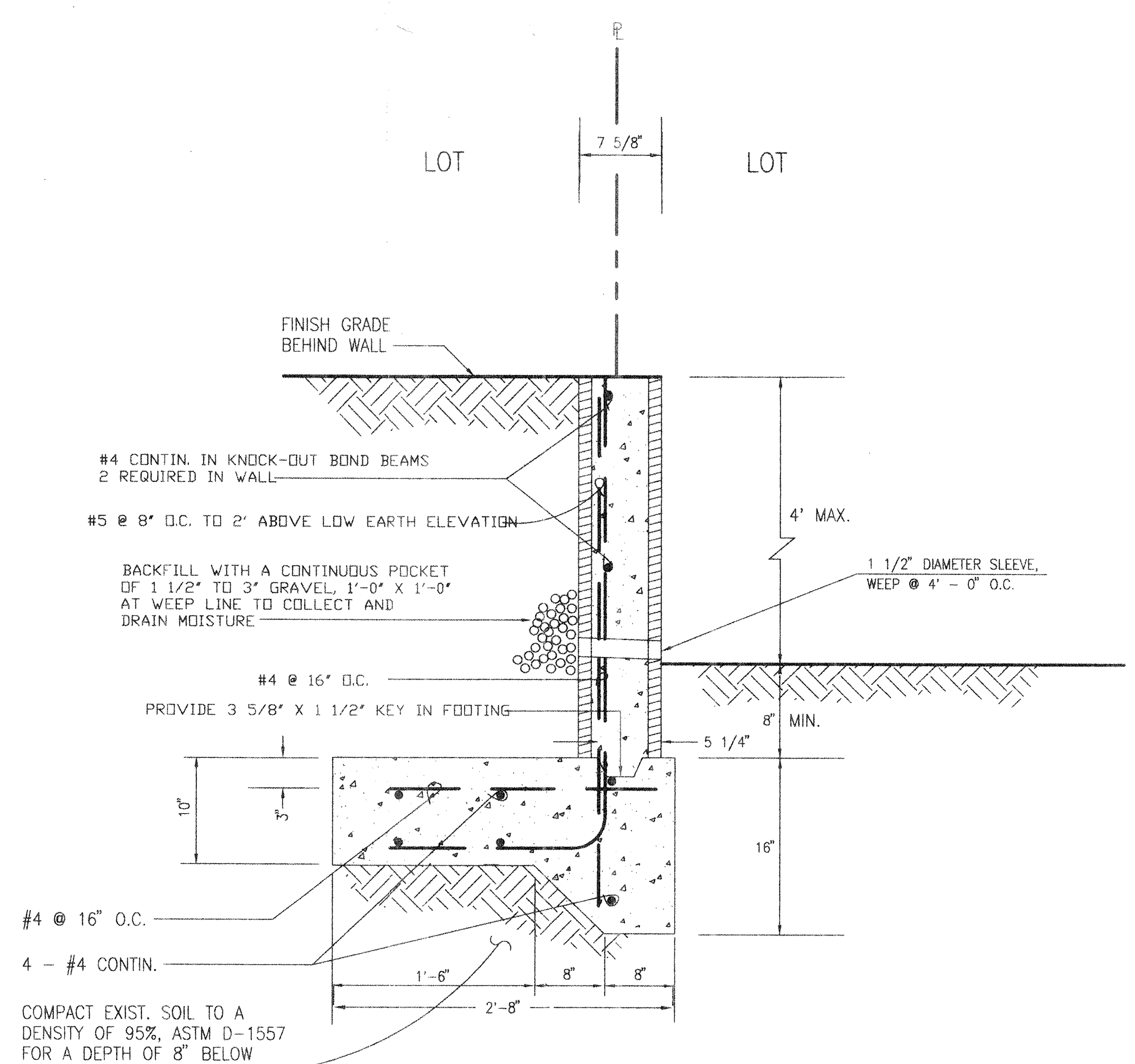
TYPICAL GARDEN WALL SECTION

SCALE: 1" = 0'-6"



RETAINING WALL SECTION – TYPE II

SCALE: 1" = 1'



RETAINING WALL SECTION – TYPE III (COMMON LOT LINE)

SCALE: 1" = 1'

GRADING NOTES:

1. ALL FILL SHALL BE COMPACTED TO A MINIMUM OF 90% ASTM D-1557; HOUSE PADS SHALL BE COMPACTED AT 95% ASTM D-1557.
2. THE PAD ELEVATIONS SHOWN HEREON ARE FOR ROUGH GRADING PURPOSES.
3. FINISHED FLOOR ELEVATIONS MAY VARY FROM THE PAD ELEVATIONS AND WILL BE DETERMINED AS A FUNCTION OF INDIVIDUAL HOUSE DESIGN.
4. FINISHED FLOOR ELEVATIONS SHOULD BE ESTABLISHED AT A MINIMUM OF 6 INCHES ABOVE PAD ELEVATIONS; DEVIATIONS FROM THESE GUIDELINES MUST BE BASED ON THE RECOMMENDATIONS AND/OR DESIGN OF A COMPETENT DESIGN PROFESSIONAL.
5. NO CROSS-LOT DRAINAGE WILL BE ALLOWED.
6. RETAINING WALLS SHALL BE CONSTRUCTED BY THE DEVELOPER.
7. YARD (GARDEN) WALLS SHALL BE CONSTRUCTED BY THE LOT OWNER OR ITS BUILDER.
8. THE FINISHED GRADING OF EACH LOT SHALL BE ACCOMPLISHED BY THE LOT OWNER OR ITS BUILDER. RUNOFF SHALL BE DIRECTED TO THE STREETS.
9. MAXIMUM SLOPES SHALL BE 3:1; MINIMUM SLOPES SHALL BE 1%.
10. TWO (2) WORKING DAYS PRIOR TO ANY EXCAVATION, CONTRACTOR MUST CONTACT NEW MEXICO ONE CALL SYSTEM, 260-1990, FOR LOCATION OF EXISTING UTILITIES.
11. IF ANY UTILITY LINES, PIPELINES, OR UNDERGROUND UTILITY LINES ARE SHOWN ON THESE DRAWINGS, THEY ARE SHOWN IN AN APPROXIMATE MANNER ONLY, AND SUCH LINES MAY EXIST WHERE NONE ARE SHOWN. IF ANY SUCH EXISTING LINES ARE SHOWN, THE LOCATION IS BASED UPON INFORMATION PROVIDED BY THE OWNER OF SAID UTILITY, AND THE INFORMATION MAY BE INCOMPLETE, OR MAY BE OBSOLETE BY THE TIME CONSTRUCTION COMMENCES. THE ENGINEER HAS CONDUCTED ONLY PRELIMINARY INVESTIGATION OF THE LOCATION, DEPTH, SIZE, OR TYPE OF EXISTING UTILITY LINES, PIPELINES, OR UNDERGROUND UTILITY LINES. THIS INVESTIGATION IS NOT CONCLUSIVE, AND MAY NOT BE COMPLETE, THEREFORE, MAKES NO REPRESENTATION PERTAINING THERETO, AND ASSUMES NO RESPONSIBILITY OR LIABILITY THEREFORE. THE CONTRACTOR SHALL INFORM ITSELF OF THE LOCATION OF ANY UTILITY LINE, PIPELINE, OR UNDERGROUND UTILITY LINE IN OR NEAR THE AREA OF THE WORK IN ADVANCE OF AND DURING EXCAVATION WORK. THE CONTRACTOR IS FULLY RESPONSIBLE FOR ANY AND ALL DAMAGE CAUSED BY ITS FAILURE TO LOCATE, IDENTIFY AND PRESERVE ANY AND ALL EXISTING UTILITIES, PIPELINES, AND UNDERGROUND UTILITY LINES. IN PLANNING AND CONDUCTING EXCAVATION, THE CONTRACTOR SHALL COMPLY WITH STATE STATUTES, MUNICIPAL AND LOCAL ORDINANCES, RULES AND REGULATIONS, IF ANY, PERTAINING TO THE LOCATION OF THESE LINES AND FACILITIES.

EROSION CONTROL MEASURES

1. THE CONTRACTOR SHALL ENSURE THAT NO SOIL ERODES FROM THE SITE INTO PUBLIC RIGHT-OF-WAY OR ONTO PRIVATE PROPERTY.
2. THE CONTRACTOR SHALL PROMPTLY CLEAN UP ANY MATERIAL EXCAVATED WITHIN THE PUBLIC RIGHT-OF-WAY SO THAT THE EXCAVATED MATERIAL IS NOT SUSCEPTIBLE TO BEING WASHED DOWN THE STREET.
3. THE CONTRACTOR SHALL SECURE "TOPSOIL DISTURBANCE PERMIT" PRIOR TO BEGINNING CONSTRUCTION.
4. ANY AREAS OF EXCESS DISTURBANCE (TRAFFIC ACCESS, STORAGE YARD EXCAVATED MATERIAL, ETC.) SHALL BE RE-SEEDED ACCORDING TO C.O.A. SPECIFICATION 1012 "NATIVE GRASS SEEDING". THIS WILL BE CONSIDERED INCIDENTAL TO CONSTRUCTION, THEREFORE, NO SEPARATE PAYMENT WILL BE MADE.

RETAINING WALL NOTES:

1. 8"X8"X16" CMU OF UBC STD. 24-4 OR 24-5, EXCEPT AS NOTED.
2. USE KNOCK-OUT BOND BEAM BLOCK AT 4'-0" MAX C.C., VERTICALLY, AND 1 #4 CONTINUOUS.
3. FILL ALL BLOCK VOIDS WITH 3000 PSI CONCRETE.
4. REINFORCING TO BE INTERMEDIATE GRADE STEEL. fs=20,000 psi
5. IN LIEU OF CONTINUOUS KNOCK-OUT BOND BEAMS, CONTRACTOR MAY INSTALL DUR-O-WALL REINFORCING EVERY SECOND COURSE.
6. SPLICE SHALL BE 40 BAR DIA. MINIMUM FOR VERTICAL BARS. ALL OTHER SHALL BE 20 BAR DIA. MINIMUM.
7. CONCRETE FILL SHALL BE 21 DAYS OLD PRIOR TO BACKFILLING.
8. THE TYPICAL GARDEN WALL SECTION IS REQUIRED ON THE UPHILL SIDE OF THE WEST TYPE I WALL WHERE STEPS IN THE WALL ARE SHOWN.

JEFFREY G. MORTENSEN NEW MEXICO 8547 REGISTERED PROFESSIONAL ENGINEER

05-05-95

JMA

JEFF MORTENSEN & ASSOCIATES, INC.
6010-B MIDWAY PARK BLVD. N.E.
ALBUQUERQUE NEW MEXICO 87109
ENGINEERS SURVEYORS (505) 345-4250

RETAINING WALL SECTION AND GRADING NOTES

MONTANO VISTA SUBDIVISION

DESIGNED BY J.G.M.

DRAWN BY E.M.S.

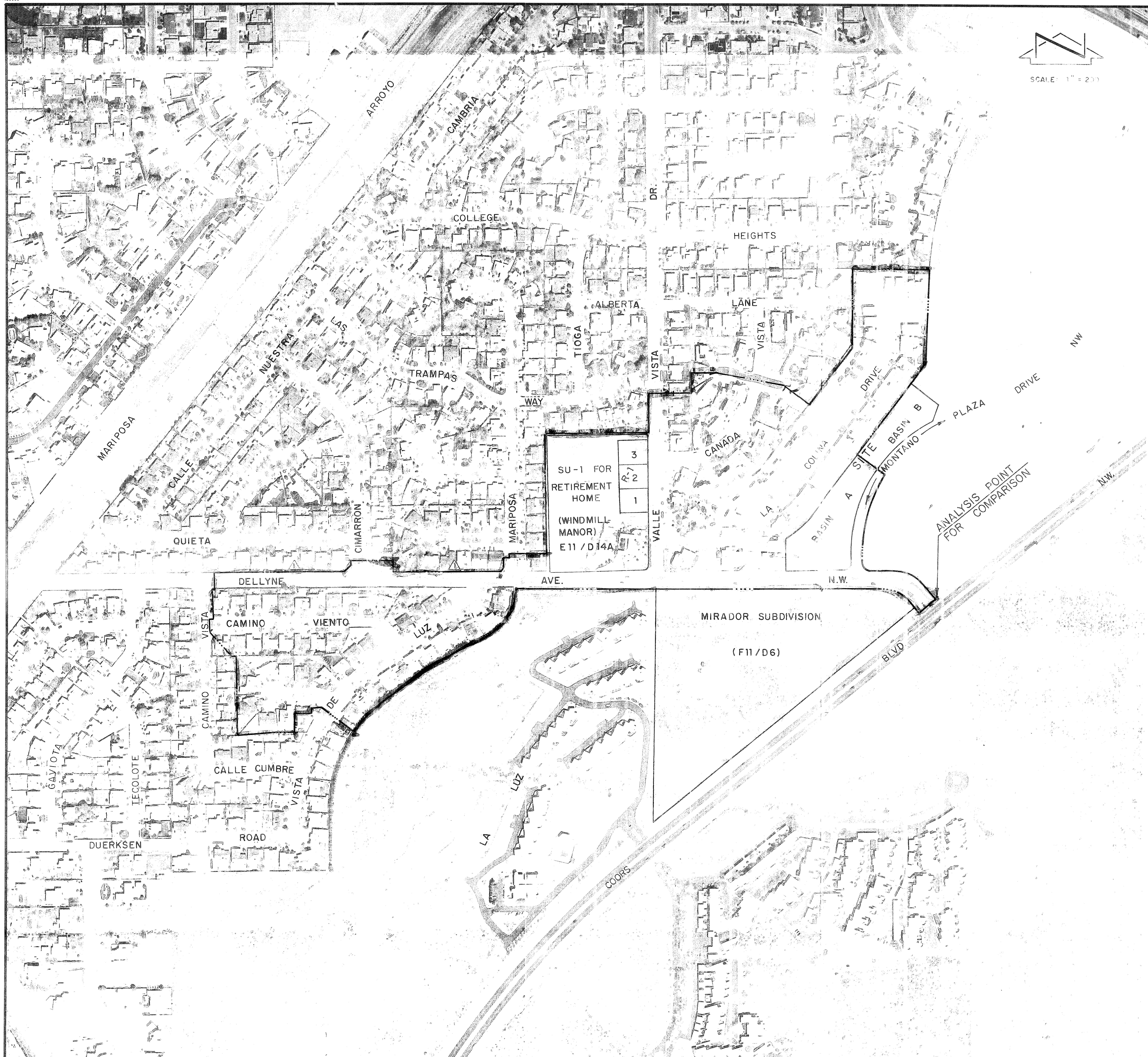
APPROVED BY J.G.M.

NO.	DATE	BY	REVISIONS

JOB NO. 941111

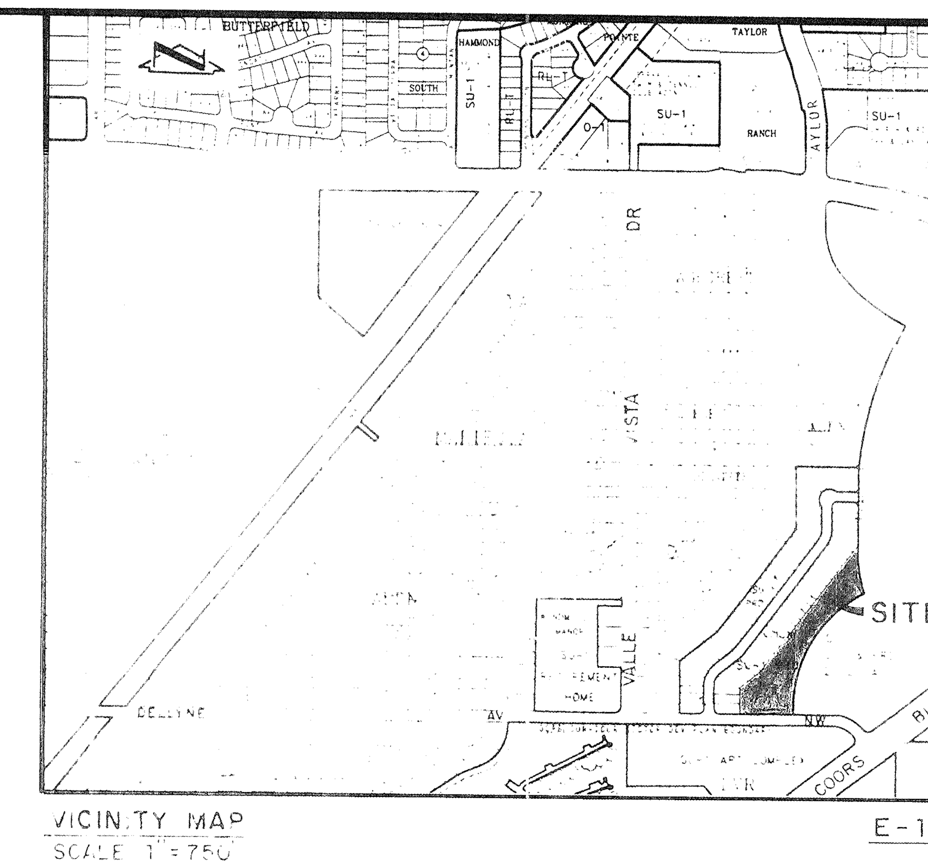
DATE 03-1995

SHEET 5 OF 6



LEGEND

DRAINAGE BASIN BOUNDARY



WATERSHED ANALYSIS

Basin A of the Montano Vista Subdivision, lies within a larger watershed which is delineated on the photobase plan at left. The majority of the upstream contributing area is developed as single family residential. Windmill Manor (E11/D14A) is currently only partially developed. Plans have been prepared and approved to develop this property as a multi-family residential site. The approved plan proposes interim retention ponding. In the Calculations which follow, this site has been evaluated as multi-family residential with controlled discharge. The same is true for the three residential lots which are part of the Windmill Manor submittal. Land uses and densities have been approximated from the photobase mapping. Lots which are currently undeveloped have been analyzed as fully developed for the purpose of this analysis. The exception to this is the Montano Vista Subdivision site designated as "Basin A".

The photography, dated January, 1995, clearly indicates that the grading of Taylor Ridge is in progress. Drainage basin boundaries have been superimposed based upon visual site inspection. All of the watershed drains its runoff to the intersection of Dellyne Avenue N.W. and Coors Boulevard N.W. via Dellyne Avenue N.W. This point of intersection has been selected as the Analysis Point for comparison and is so shown on the mapping. One additional site (Mirador), which is currently undeveloped, can discharge its runoff to this point. That discharge will not, due to existing topography, utilize the Dellyne Avenue N.W. right-of-way. The proposed scenario for Mirador (F11/D6) is that of residential development utilizing detention ponding to mitigate the increases in runoff due to development. The fact that this is a large parcel allows for the integration of detention ponding into the overall development. Detention ponding is proposed at the lower portion of Mirador, where the grades are not as steep and are considerably gentler. The upper portions of that site are rather steep and not conducive to ponding. At present, that plan is approved for preliminary plat. Because of this that site has not been included in this evaluation of downstream capacity. The size of that project lends itself to onsite detention ponding which is consistent with the plan already on file.

Basin A lies at the bottom of the watershed. This is depicted graphically at left. The watershed currently drains from west to east. Those lands which lie to the west of the watershed drain west and outfall to the Mariposa Arroyo. The size of the watershed, as mapped, is approximately 40 acres. Basin A is approximately two acres and represents approximately five percent of the watershed. At present, Basin A is undeveloped, however, is quite steep and characterized as Land Treatment C. The development of Basin A will include Land Treatments B, C, and D. The increase in runoff will be minimal as demonstrated by the Calculations. The Calculations indicate less than 1 cfs increase in developed runoff for the 100-year, 6-hour rainfall event is anticipated from Basin A. This will have negligible impact on existing downstream conditions.

The Calculations which follow analyze the existing and developed conditions within the watershed for the 100-year, 6-hour rainfall event. All presently undeveloped land, with the exception of Basin A, has been considered as developed and discharging its runoff to the adjacent streets. Many of the lots "backyard pond". This has been taken into consideration in the calculation of peak discharge from that portion of the watershed. The Land Treatments approximated from the photobase mapping, with projections for development of the undeveloped lands, are tabulated on Sheet 2. As shown by these Calculations, considerable percentage of D Land Treatment has been assessed. Effectively, only half of the residential properties, including the fronting streets, generate runoff which may impact downstream conditions. Much of the roof areas and sideyards drain to the rear yards where runoff is contained. For the basis of this plan, the front portion of the roofs, the front yards and the street have been considered as "runoff" producing. Therefore, the effective area of the existing single family residential land has been adjusted by a factor of 50%.

That portion of Dellyne which lies adjacent to the site, is 48 feet in width. This is a paved street with a normal crown. The longitudinal slope of the roadway is approximately 5.4 percent. This is measured from the topographic information which appears on Sheet 2 and noted as "Existing Conditions". Although the street width begins to widen, as it approaches Coors Boulevard N.W., the minimal width of 48 feet face-to-face has been used for comparative analysis. The Calculations use the Manning Equation to determine the normal flow depth for various discharge values. These Calculations begin with an evaluation with flow at the crown elevation. These Calculations demonstrate that the design flow of 73.2 cfs will result in a normal depth between 0.44 and 0.45 feet. These Calculations further demonstrate that an increase of approximately 3 cfs is required to produce a 0.01 feet increase in normal depth. The increase in runoff calculated for Basin A is only 0.7 cfs. This demonstrates that the impact of the development of this site will be negligible.

The Coors Boulevard Storm Drain (Montano to Dellyne) has a subsurface design capacity of 52 cfs. This has been determined by review of City Project 3163 drawings. The drawings further indicate linear grading along the west shoulder of Coors Boulevard N.W. creating a drainage ditch above the storm drain. Per the criteria shown on the plans, the ditch is approximately 5 feet deep as measured from the edge of paving. This creates additional surface capacity to accept and convey stormwater. Analysis of Detail 'D' (City Project 3163) reveals a nominal cross sectional area of 54 sf and a wetted perimeter of 19 feet ($R = A/P = 2.8$; $R_{2/3} = 2.0$) at a flow depth of three (3) feet. Using the Manning Equation with $n = 0.030$ (DPM Plate 22.3) and $s = 0.004$ (#3163); $Q_{capacity} = 339$ cfs. The combined capacity is therefore approximately 390 cfs. This far exceeds the discharge calculated from the watershed analyzed herein, 73.2 cfs.

Runoff reaching the Analysis Point will first enter the existing storm inlets located at that intersection. Bypass runoff will turn and flow northeast along the west edge of Coors Boulevard where it will enter the storm drain system via the beehive grates. The excess overland flow of 21 cfs will easily be carried by the ditch which lies above the Coors Storm Drain. This will provide additional time and length over which the overland flow can "work" into the system.

The free discharge of runoff from this small site is appropriate for the following reasons:

1. The majority of the watershed is already developed (prior to the North Coors Drainage Management Plan) with release rates exceeding 0.25 cfs/ac.
2. This site is located at the bottom of the watershed.
3. This is the last infill site remaining in the watershed for which an approved plan does not exist.
4. This site is a small remnant parcel never addressed by previous planning or platting actions.
5. Ponding on single family residential lots is not practical or desirable.
6. Ponding on a steeply sloping site is not feasible.
7. The increase in runoff anticipated by this development will not have an adverse impact on downstream conditions.
8. Downstream capacity is available in the Coors Storm Drain.

JEFF MORTENSEN & ASSOCIATES, INC
6010-B MIDWAY PARK BLVD. N.E.
ALBUQUERQUE NEW MEXICO 87109
ENGINEERS (505) 345-4250

WATERSHED MAP & ANALYSIS

MONTAÑO VISTA SUBDIVISION

JEFFREY G. MORTENSEN NEW MEXICO 8547 REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY	JGM
DRAWN BY	KPE
APPROVED BY	J.G.M.

NO	DATE	BY	REVISIONS
1	05/95	JGM	REVISE TEXT AND WATERSHED BOUNDARY

JOB NO	941111
DATE	03 / 1995
SHEET	1 OF 6