County of Bernalillo

State of New Mexico

ONE CIVIC PLAZA, N.W.
ALBUQUERQUE, NEW MEXICO 87102
ADMINISTRATION (505) 768-4000
COMMISSION (505) 768-4217
FAX (505) 768-4329

August 9, 1993

Jake Bordenave, P.E.
Bordenave Designs
Post Office Box 91194
Albuquerque, New Mexico 87199

RE: DRAINAGE PLAN FOR DENNY RESIDENCE LOT 357, SANDIA HEIGHTS SOUTH, (C-23/D30), ENGINEERING MODIFICATIONS TO DRIVEWAY DATED AUGUST 28, 1993

Dear Mr. Bordenave:

Based on the Engineer's Certification provided that the referenced modified driveway will floodproof the structure, the Certification of Occupancy release is acceptable.

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

Cordially,

Gilbert Aldaz, P.E. & P.S.
City/County Floodplain Administrator

xc: Clifford E. Anderson, AMAFCA
Bob Foglesong, Bernalillo Co.
J. Denney, Owner
Andrew Garcia, Hydrology
Tom Burlison, County Building Dept.
File

GA/wp+3014

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ONE CIVIC PLAZA, N.W.
ALBUQUERQUE, NEW MEXICO 87102
ADMINISTRATION (505) 768-4000
COMMISSION (505) 768-4217
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May 19, 1993

Jake Bordenave, P.E.
Bordenave Designs
Post Office Box 91194
Albuquerque, New Mexico 87199

RE: DRAINAGE PLAN FOR DENNY RESIDENCE LOT 357, SANDIA HEIGHTS SOUTH RECEIVED MAY 12, 1993 FOR MODIFICATIONS TO DRIVEWAY, (C-23/D30)

Dear Mr. Bordenave:

It appears that your proposal to retrofit the existing driveway is a much better solution than leaving the existing driveway as is. Please proceed to retrofit the driveway. When completed, submit for Certification of Occupancy release.

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

Cordially,

Gilbert Aldaz, P.E. & P.S.
City/County Floodplain Administrator

xc: Clifford E. Anderson, AMAFCA
Bob Foglesong, Bernalillo Co.
File

GA/wp+3014

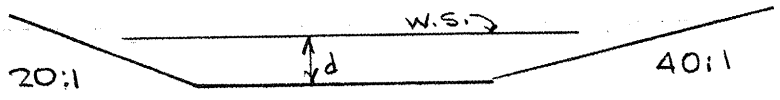
BORDENAVE DESIGNS	LOT 357 SANDIA HGTS	JWB	10/12/92

AS-BUILT DRAINAGE

DRIVEWAY DRAINAGE

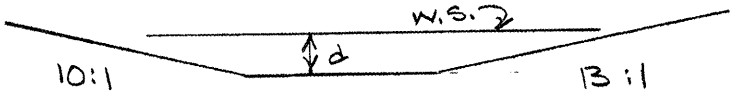
from original report Q = 126 cfs

channel section from as-built contours



b = 23

EAST OF GARAGE S = 9.4 %



b = 16'

WEST OF GARAGE S = 3.1 %

$$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$$

EAST	WEST
n = 0.035	n = 0.021
s = 0.094	s = 0.031
d = 0.50'	d = 0.65'
v = 6.63 fps	v = 7.43 fps
$\frac{v^2}{2g} = 0.68'$	$\frac{v^2}{2g} = 0.86$
F.L. + d + h_v	F.L. + d + h_v
37.84 + 0.50 + 0.68 = 39.02	36.85 + 0.65 + 0.86 = 38.36
F.L + d = 38.34	F.L. + d = 37.47

9205334

Gilbert Aldaz, P.E.
Hydrology Section
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

0001014

Re: Lot 357, Sandia Heights South - Hold Harmless Agreement

Dear Gilbert:

The purpose of this letter is to provide the requested Hold Harmless Agreement and request a variance from Section 7.F.1 of the Flood Hazard Ordinance for the approval of the Building Permit for the subject lot. The undersigned lot owner agrees to save the City of Albuquerque, County of Bernalillo and AMAFCA (the authorities) harmless from any and all liability arising from the Authorities approval of this drainage plan. It is understood that the Authorities do not agree to save the undersigned owner harmless from any liability which may arise from the owner's negligent use of the property and drainage facilities constructed with the approved plan.

The undersigned lot owner fully understands that a portion of this property is within a 100-year floodplain as shown on the National Flood Insurance Program "Flood Insurance Rate Map" and may be subject too flooding. Any development of this property must conform to the Bernalillo County Flood Damage Prevention Ordinance. For financing purposes, the property may be subject to the flood insurance requirements of the Federal Emergency Management Agency (FEMA) and until such time that a map revision is approved by FEMA for existing drainage improvements, flood insurance is likely to be required.

The agreements and obligation of this letter of the owner as set forth herein shall be binding on the owner, his heirs, assigns and successors and on the owner's property and constitute covenants running the owner's property until released by the Authorities.

WITNESS its hand and seal this 21st day of January, 1992.

Lot Owner

Lot Owner

ACKNOWLEDGEMENT FOR NATURAL PERSONS

STATE OF NEW MEXICO)
SS
COUNTY OF BERNALILLO)

The foregoing instrument was acknowledged before me this 21st day of January, 1992 by John Denny & Jean Denny

Notary Public

My commission expires: April 5, 1992

STATE OF NEW MEXICO
COUNTY OF BERNALILLO
FILED FOR RECORD

92 JAN 22 PM 1:32

BK BCR 92-2 PG 1014
GLADYS M. DAVIS
CO CLERK & RECORDER
DEPUTY

	LOT 357 SANDIA HEIGHTS SOUTH	9131	1/6
		WB	01/02/92

UPLAND FLOWS - ARROYO

JAN 22 1992

PROCEDURE

ARROYO FLOW RATES WILL BE ESTABLISHED BY USING AHYMO891 HYDROLOGY ON BASINS DELINEATED ON USGS QUAD MAP. TWO OF THE THREE BASINS WERE PREVIOUSLY DEFINED BY OTHERS IN THEIR DESIGN OF LOT 133 OF SANDIA HEIGHTS SOUTH. INPUT DATA FOR THOSE BASINS WILL BE CONSISTENT BETWEEN THE REPORTS AND BASIN 3 WILL BE ASSIGNED VALUES IN A LIKE MANNER.

FLOWS AT THE INTERSECTION OF JUNIPER HILL AND THE ARROYO WILL HAVE A 25% BULKING FACTOR ADDED TO THEM TO ACCOUNT FOR SEDIMENT AND DEBRIS. SINCE THE FLOWS AT THIS POINT ARE LARGER THAN THE CAPACITY OF THE CULVERTS THE SECTION WILL BE ANALYZED AS A COMBINATION CULVERT & WEIR FLOW. CULVERT FLOWS ARE THEN ASSUMED TO CONTINUE IN THE CHANNEL SECTION ACROSS THE LOT IN QUESTION. WEIR FLOWS ARE SPLIT BASED ON LENGTH AND DEPTH (I.E. AREA). THIS SPLIT FLOW IS THEN DISTRIBUTED TO DOWNSTREAM ANALYSIS POINTS EACH OF WHICH IS ANALYZED AS A WEIR.

UPSTREAM BASIN DATA

BASIN 1

Area = 217 Acres = 0.339 S.M.
Treatment Type
A = 13%
B = 0
C = 85
D = 2

Length = 7500', Slope = 18%

$t_c = 4300/(1)\sqrt{\frac{8120-6600}{43}} + 3900/(2)\sqrt{\frac{6600-6260}{39}}$

$= 723 + 660 = 1383$ sec
$= 23$ minutes
$T_p = 2/3\, t_c = 15.3$ min $= 0.256$ hr

BASIN 2

Area = 76 Acres = 0.119 S.M.
Treatment Type
A = 75%
B = 0
C = 20
D = 5

Length = 4250', Slope = 17%

$t_c = 1400/(1)\sqrt{\frac{7100-6660}{14}} + 3400/(2)\sqrt{\frac{6660-6260}{34}}$

$= 225 + 573 = 798$
$T_p = 532$ sec $= 0.148$ hr

BASIN 3

Area = 80 Acres = 0.125 S.M.
Treatment Type
A = 64 %
B = 34
C = 0
D = 2

Length = 5700', Slope 13%

$t_c = 1900/(1)\sqrt{\frac{7280-6680}{19}} + 4200/(2)\sqrt{\frac{6680-6260}{42}}$

$= 338 + 664 = 1002$ sec
$T_p = 668$ sec $= 0.186$ hr

UPLAND FLOWS · OVERLAND

ANALYSIS POINT 2

23' weir @ elev. 43.0, 3' road, 20' drive
38' weir @ elev. 43.5, 7' road, 8' drive
53' weir @ elev. 44.0, 7' road, 8' drive
70' weir @ elev. 44.5, 8' road, 9' drive
84' weir @ elev. 45.0, 5' road, 9' drive
99' weir @ elev. 45.5, 5' road, 10' drive
110' weir @ elev. 46.0, 5' road, 6' drive

@ water surface elev 43.5
weir flow = $(2.6)(23)(0.5)^{1.5}$ = 21 cfs

@ W.S. elev 44.0
weir flow = $(2.6)\left((23)(1.0)^{1.5} + (15)(0.5)^{1.5}\right)$ = 74 cfs

@ W.S. elev 44.5
weir flow = $(2.6)\left((23)(1.5)^{1.5} + (15)(1.0)^{1.5} + (15)(0.5)^{1.5}\right)$ = 163 cf

@ W.S. elev 45.0
weir flow = $(2.6)\left((23)(2.0)^{1.5} + (15)(1.5)^{1.5} + (15)(1.0)^{1.5} + (17)(0.5)^{1.5}\right)$ = 295 cfs

@ W.S. elev 45.5
weir flow = $(2.6)\left((23)(2.5)^{1.5} + (15)(2.0)^{1.5} + (15)(1.5)^{1.5} + (17)(1.0)^{1.5} + (14)(0.5)^{1.5}\right)$ = 475 cfs

@ W.S. elev 46.0
weir flow = $(2.6)\left((23)(3.0)^{1.5} + (15)(2.5)^{1.5} + (15)(2.0)^{1.5} + (17)(1.5)^{1.5} + (14)(1.0)^{1.5} + (15)(0.5)^{1.5}\right)$ = 707

@ W.S. elev 46.2
weir flow = $(2.6)\left((23)(3.2)^{1.5} + (15)(2.7)^{1.5} + (15)(2.2)^{1.5} + (17)(1.7)^{1.5} + (14)(1.2)^{1.5} + (15)(0.7)^{1.5} + (11)(0.2)^{1.5}\right)$
= 813 cfs > 763

THE ABOVE ASSUMES NO APPROACH VELOCITY. AVERAGE VELOCITY OF FLOW AT AP1 AND AP2 CAN BE USED TO REDUCE THE ELEVATION HEAD REQUIRED. HOWEVER THE INTENT OF THESE ANALYSIS POINTS IS TO COMPUTE A DISTRIBUTION OF FLOW AND ESTABLISH THE SOUTH OVERBANK FLOW RATE, BY OBSERVATION THAT PORTION OF THE FLOW CROSSING AP2 ALONG THE ROAD WILL BE INTERCEPTED BY THE CHANNEL.

ROADWAY % OF TOTAL AT AP2

$$\% = \left[(3)(3.2) + (7)(2.7) + (7)(2.2) + (8)(1.7) + (5)(1.2) + (5)(0.7)(5)(0.2)\right] / \left[(23)(3.2) + (15)(2.7) + (15)(2.2) + (17)(1.7) + (14)(1.2) + (15)(0.7) + (11)(0.2)\right] = 33\%$$

$\therefore$ (0.33)(763) = 252 cfs to channel &
511 cfs to overbank

LOT 357 SANDIA HEIGHTS SOUTH	7151	4/6
	JJB	01/15/92

UPLAND FLOWS - OVERLAND

ANALYSIS POINT 3

10' weir @ 41.5 ,	0' road ,	10' drive	
32' weir @ 42.0 ,	0' road ,	22' drive	
66' weir @ 42.5 ,	22' road ,	12' drive	
110' weir @ 43.0 ,	25' road ,	19' drive	
117' weir @ 43.5 ,	0' road ,	7' drive	note: overlaps AP 2 on road
124' weir @ 44.0 ,	0' road ,	7' drive	"
131' weir @ 44.5 ,	0' road ,	7' drive	"

@ W.S. elev. 43.5
weir flow = $(2.6)((10)(2)^{1.5} + (22)(1.5)^{1.5} + (34)(1.0)^{1.5} + (44)(0.5)^{1.5}) = 307$ cfs

@ W.S. elev 44.0
weir flow = $(2.6)((10)(2.5)^{1.5} + (22)(2.0)^{1.5} + (34)(1.5)^{1.5} + (44)(1.0)^{1.5} + (7)(0.5)^{1.5}) = 547$ cfs

547 cfs > 511 cfs

ROADWAY % OF TOTAL AT AP3 (see reasoning under AP2)

$\% = [(2.5)(0) + (2)(0) + (1.5)(22) + (1.0)(25) + (0.5)(0)] / [(2.5)(10) + (2)(22) + (1.5)(34) + (1.0)(44) + (0.5)(7)] = 35\%$

∴ $(0.25)(511) = 179$ cfs to channel &
332 cfs to over bank

ANALYSIS POINT 4

THIS POINT WAS SELECTED TO COINCIDE WITH THE EXISTING RIDGE LINE ON LOT 357. THE PROPOSED RESIDENCE IS ALSO ON THIS RIDGE LINE.

8' weir @ 40.5 ,	0' road,	8' drive	
28' weir @ 41.0 ,	0' road,	20' drive	
51' weir @ 41.5 ,	6' road,	17' drive	
116' weir @ 42.0 ,	60' road,	5' drive	
121' weir @ 42.5 ,	0' road,	5' drive	note: overlaps AP3 on road

@ W.S. elev. 42.5
weir flow = $(2.6)((8)(2.0)^{1.5} + (20)(1.5)^{1.5} + (23)(1.0)^{1.5} + (65)(0.5)^{1.5}) = 273$ cfs

@ W.S. elev. 42.6
weir flow = $(2.6)((8)(2.1)^{1.5} + (20)(1.6)^{1.5} + (23)(1.1)^{1.5} + (65)(0.6)^{1.5} + (5)(0.1)^{1.5}) = 316$ cfs

UPLAND FLOWS - ARROYO

ANALYSIS POINT 1

5-30" culvert pipes - flowline elev = 43.0

40' weir @ elev. 47.0, 15' road, 25' bank
75' weir @ elev. 47.5, 25' road, 10' bank
105' weir @ elev. 48.0, 20' road, 10' bank
125' weir @ elev. 48.5, 15' road, 5' bank
140' weir @ elev 49.0, 10' road, 5' bank
160' weir @ elev 49.5, 15' road, 5' bank
195' weir @ elev 50.0, 30' road, 5' bank
205' weir @ elev 50.5, 5' road, 5' bank

FLOW from AHYMO 991 (attached)
Q = 848 cfs

FLOW with bulking - 25%
Q = 1060 cfs

@ W.S. ELEV. 47.5
pipe flow = 5 x 45 = 225 cfs HEC 5 inlet control
weir flow = $(2.6)(40)(0.5)^{3/2}$ = 36 cfs
total = 261 cfs

@ W.S. ELEV. 48.0
pipe flow = 5 x 50 = 250 cfs
weir flow = $(2.6)\left[(40)(1)^{3/2} + (35)(0.5)^{3/2}\right]$ = 132 cfs
total = 382 cfs

@ W.S. ELEV 48.5
pipe flow = 5 x 53 = 265 cfs
weir flow = $(2.6)\left[(40)(1.5)^{3/2} + (35)(1)^{3/2} + 30(0.5)^{3/2}\right]$ = 297 cfs
total = 562 cfs

@ W.S. ELEV 49.0
pipe flow = 5 x 56 = 280 cfs
weir flow = $2.6\left[(40)(2)^{3/2} + (35)(1.5)^{3/2} + (30)(1)^{3/2} + (20)(0.5)^{3/2}\right]$ = 557 cfs
total = 837 cfs

@ W.S. ELEV 49.4
pipe flow = 5 x 59 = 295 cfs
weir flow = $2.6\left[(40)(2.4)^{3/2} + (35)(1.9)^{3/2} + (30)(1.4)^{3/2} + (20)(.9)^{3/2} + (15)(0.4)^{3/2}\right]$ = 808 cfs
total = 1103 cfs

APPROX. W.S. ELEV. 49.4

FLOW DISTRIBUTION
45% ROAD, 27% SOUTH BANK, 28% CULVERTS
477 cfs ROAD, 286 cfs SOUTH BANK, 295 cfs CULVERTS

LOT 357 - SANDIA HEIGHTS SOUTH	9151	3/6
	JJB	01/15/92

UPLAND FLOWS - OVERLAND

ANALYSIS POINT 4 (cont.)

ROADWAY % OF TOTAL AT AP 4 (see reasoning under AP2)

$\%=[(2.1)(0)+(1.6)(0)+(1.1)(6)+(0.6)(60)+(0.1)(0)]/[(2.1)(8)+(1.6)(20)+(1.1)(23)+(0.6)(65)+(0.1)(5)] = 38\%$

$\therefore (0.38)(332) = 126$ cfs to channel

206 cfs to overbank

NOTE: THE REMAINING 206 cfs will cross the roadway over A WEIR THAT IS APPROXIMATELY 190' LONG AND BE ROUTED SOUTH AND WEST OF THE PROPOSED RESIDENCE BY EXISTING CONDITIONS. THE CHANNEL FLOW OF 1060 - 206 = 854 cfs WILL BE USED TO ESTABLISH THE BUILDING SETBACK AND FOOTING DEPTH.

BUILDING SETBACK

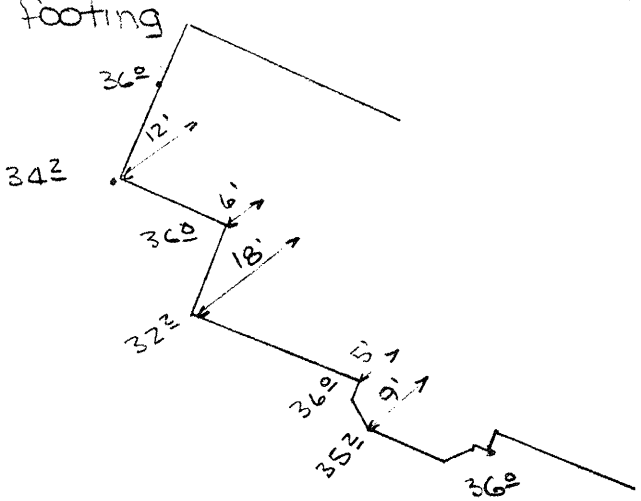
setback = (flow/100)(6) note: remove bulking for setback

$=[(854)/(100)(1.25)](6) = 41$ feet

footing depth

grade ground house 38.2

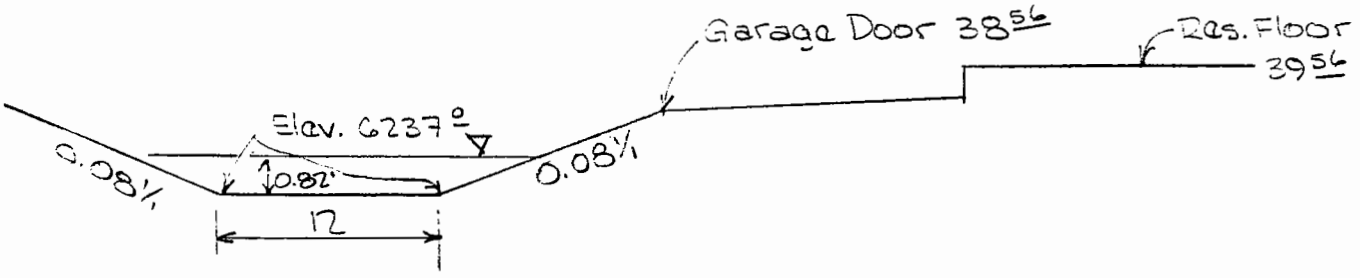
per Cliff Anderson use 3:1 earth slope from surface to top of footing



	LOT 357 SANDIA HEIGHTS SOUTH	4151 JJB	6/6 01/16/92

SITE FLOWS

NORTH SIDE OF HOUSE



DRIVEWAY PROFILE

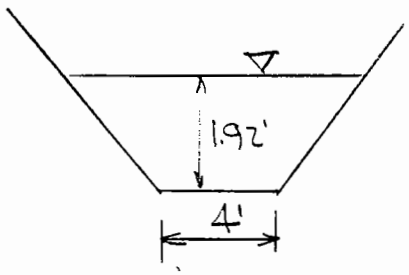
Flow Rate = 126 cfs (from AP4 sheets/6)
Bed Slope = 0.057 %
Bottom Width = 12'
Side Slope = 12.5 : 1
Roughness = 0.035 (downstream from drive)

Normal Depth = 0.82'
Velocity = 6.9 fps
Velocity head = 0.74'

per agreement with C. Anderson - AMAFCA
B. Fogelsong - County PWD
G. Aldaz - Flood Plain Admin.

set garage floor @ max. wave height
set res. floor 1' above max. wave height

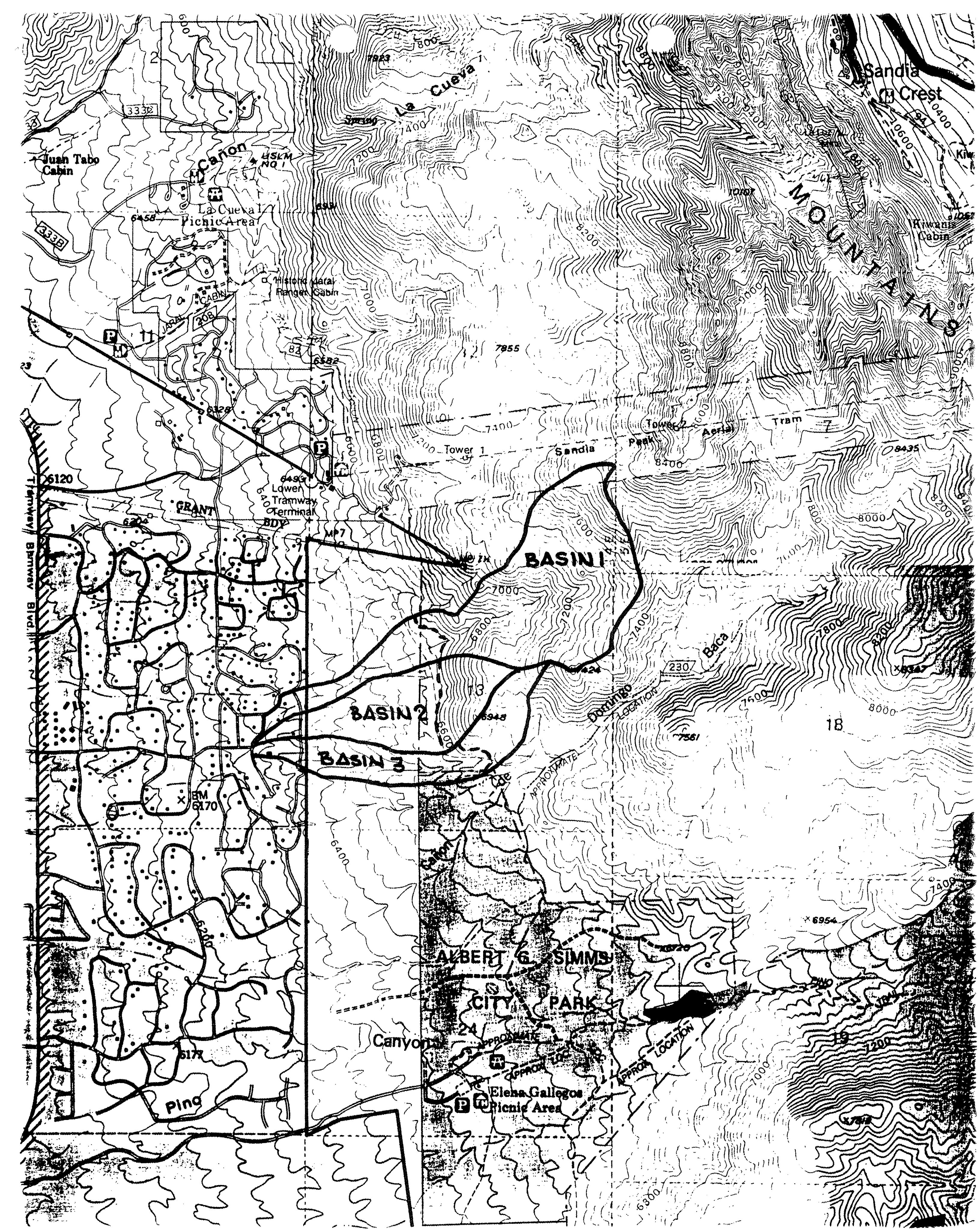
SOUTH SIDE OF HOUSE



ARROYO SECTION

Flow Rate = 206 cfs (from AP4 sheet 5/6)
Bed Slope = 0.066%
Bottom Width = 4'
Side Slope = 7 : 1
Roughness = 0.045

Normal Depth = 1.92' contained in channel
Velocity = 9.8 fps
Velocity Head = 1.48'
@ front corner of residence FE 31.0 + 1.92 + 1.48 + 1 = 35.4 < 39.56

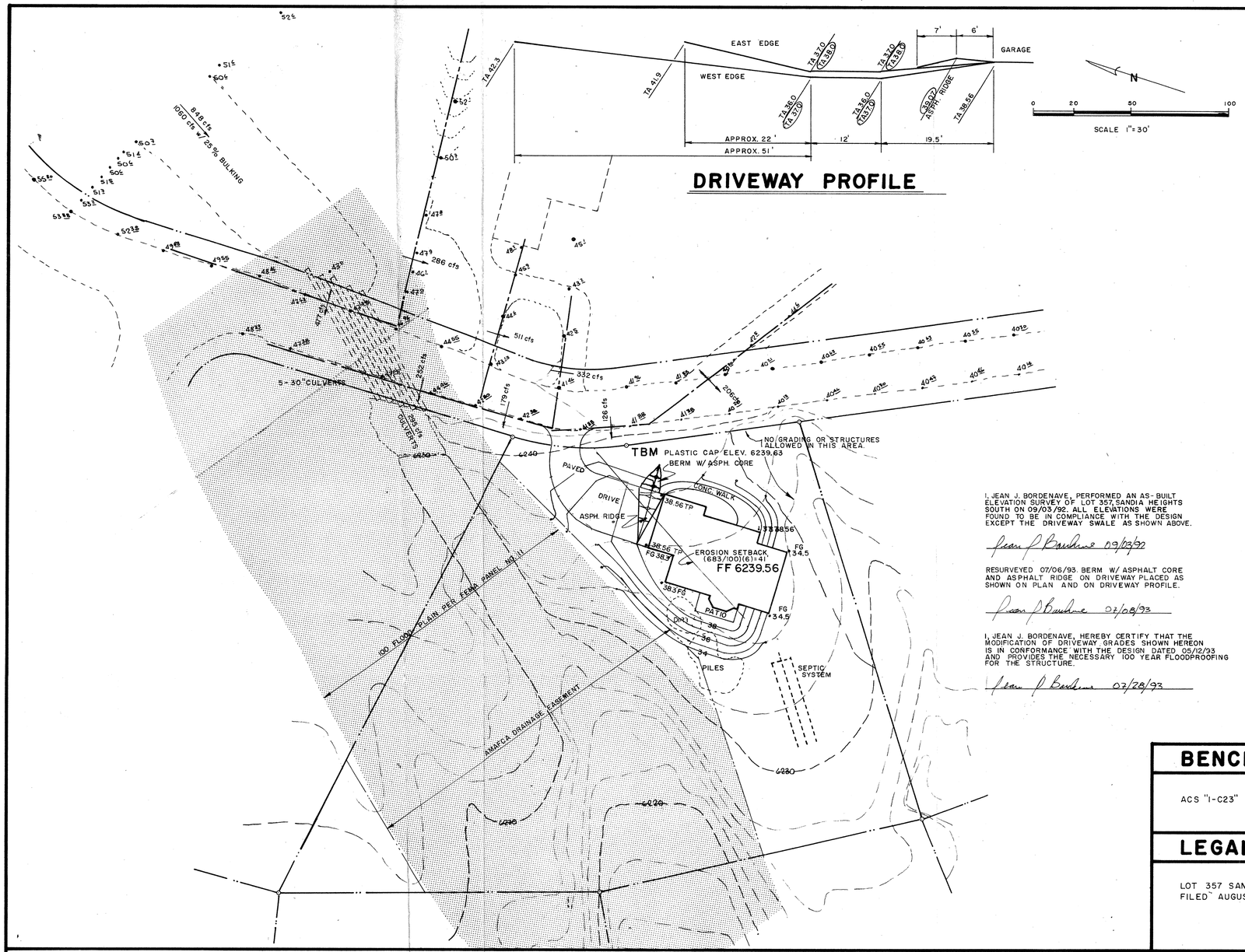


Juan Tabo Cabin
Canon
La Cueva Picnic Area
La Cueva
Spring
Historic Jaral Ranger Cabin
Sandia Crest
MOUNTAINS
Kiwanis Cabin
Lower Tramway Terminal
GRANT BDY
Tower 1
Tower 2
Sandia Peak Aerial Tram
BASIN 1
BASIN 2
BASIN 3
Domingo Baca
APPROXIMATE LOCATION
BM 6170
ALBERT G. SIMMS CITY PARK
Canyon
Elena Gallegos Picnic Area
APPROX LOCATION
Pino
Tramway Blvd

```
   AHYMO PROGRAM (AHYMO991) - AMAFCA VERSION OF HYMO - SEPTEMBER, 1991
        RUN DATE (MON/DAY/YR) = 01/14/1992
        START TIME (HR:MIN:SEC) = 14:45:25     USER NO.= BORDENNM.I01
        INPUT FILE = C:\QEDIT\357SH


START              TIME=0.0
*COMPUTE HYDROGRAPH FOR SOUTH DOMINGO BACA AT JUNIPER HILL
*BASIN NO  1
RAINFALL           TYPE=1   RAIN QUARTER=0.0   RAIN ONE= 2.23 RAIN SIX=2.9
                   RAIN DAY=0.0   DT=0.033333

              COMPUTED 6-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2 - PEAK AT 1.40 HR.
              DT =    .033333 HOURS       END TIME =     5.999940 HOURS
                 .0000   .0055   .0110   .0167   .0225   .0284   .0345
                 .0406   .0470   .0534   .0600   .0668   .0738   .0809
                 .0882   .0958   .1035   .1115   .1198   .1283   .1370
                 .1461   .1555   .1653   .1755   .1860   .1971   .2086
                 .2207   .2335   .2469   .2611   .2760   .2917   .3081
                 .3258   .3479   .4428   .5450   .6793   .8505  1.0637
                1.3239  1.5646  1.6653  1.7504  1.8260  1.8948  1.9582
                2.0171  2.0720  2.1236  2.1721  2.2178  2.2611  2.3020
                2.3407  2.3775  2.4124  2.4455  2.4769  2.4850  2.4928
                2.5002  2.5074  2.5143  2.5210  2.5275  2.5339  2.5400
                2.5460  2.5518  2.5575  2.5631  2.5685  2.5738  2.5790
                2.5841  2.5891  2.5940  2.5989  2.6036  2.6083  2.6129
                2.6174  2.6218  2.6262  2.6305  2.6348  2.6390  2.6431
                2.6472  2.6512  2.6552  2.6591  2.6630  2.6668  2.6706
                2.6744  2.6781  2.6817  2.6854  2.6890  2.6925  2.6960
                2.6995  2.7029  2.7064  2.7097  2.7131  2.7164  2.7197
                2.7230  2.7262  2.7294  2.7326  2.7357  2.7388  2.7419
                2.7450  2.7481  2.7511  2.7541  2.7571  2.7600  2.7630
                2.7659  2.7688  2.7716  2.7745  2.7773  2.7802  2.7829
                2.7857  2.7885  2.7912  2.7939  2.7967  2.7993  2.8020
                2.8047  2.8073  2.8099  2.8125  2.8151  2.8177  2.8203
                2.8228  2.8254  2.8279  2.8304  2.8329  2.8354  2.8378
                2.8403  2.8427  2.8451  2.8476  2.8500  2.8524  2.8547
                2.8571  2.8595  2.8618  2.8641  2.8664  2.8688  2.8711
                2.8733  2.8756  2.8779  2.8801  2.8824  2.8846  2.8868
                2.8891  2.8913  2.8935  2.8957  2.8978  2.9000

COMPUTE NM HYD     ID=1   HYD NO=101.1   DA=0.339 SQ MI
                   PER A=13  PER B=0  PER C=85  PER D=2
                   TP=-0.256  MASSRAIN=-1

    K =   .142296HR    TP =   .256000HR    K/TP RATIO =   .555844     SHAPE CONSTANT, N =  6.929753
    UNIT PEAK =   13.717    CFS   UNIT VOLUME =    .9992      B =   517.92      P60 = 2.2300
    AREA =      .006780 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


    K =   .196583HR    TP =   .256000HR    K/TP RATIO =   .767902     SHAPE CONSTANT, N =  4.689905
    UNIT PEAK =   517.55    CFS   UNIT VOLUME =    1.000      B =   398.81      P60 = 2.2300
    AREA =      .332220 SQ MI    IA =    .38980 INCHES    INF =    .94143 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

*      COMPUTED RAINFALL DISTRIBUTION WITH DT=0.033333 HOURS
PRINT HYD          ID=1   CODE=1
```

```
    RUNOFF VOLUME =     1.36911 INCHES          24.7533 ACRE-FEET
    PEAK DISCHARGE RATE =     539.78 CFS  AT   1.633 HOURS   BASIN AREA =   .3390 SQ. MI.



*BASIN NO 2
COMPUTE NM HYD      ID=2   HYD NO=101.2   DA=0.119 SQ MI
                    PER A=75  PER B=0  PER C=20  PER D=5
                    TP=-0.148  MASSRAIN=-1

    K =   .081023HR    TP =   .148000HR    K/TP RATIO =   .547451     SHAPE CONSTANT, N =  7.065712
    UNIT PEAK =   21.081    CFS   UNIT VOLUME =    .9994       B =   524.36      P60 = 2.2300
    AREA =      .005950 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


    K =   .158162HR    TP =   .148000HR    K/TP RATIO =  1.068666     SHAPE CONSTANT, N =  3.304816
    UNIT PEAK =   233.58    CFS   UNIT VOLUME =    1.000       B =   305.80      P60 = 2.2300
    AREA =      .113050 SQ MI    IA =    .58684 INCHES    INF =   1.49316 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

*       COMPUTED RAINFALL DISTRIBUTION WITH DT=0.033333 HOURS
PRINT HYD           ID=2   CODE=1

                                PARTIAL HYDROGRAPH   101.20


    RUNOFF VOLUME =      .99204 INCHES     =       6.2961 ACRE-FEET
    PEAK DISCHARGE RATE =     191.01 CFS  AT   1.533 HOURS   BASIN AREA =   .1190 SQ. MI.



*TOTAL OF BASINS 1 & 2
ADD HYD             ID=3   HYD=102   ID I=1   ID II=2
PRINT HYD           ID=3    CODE=1

                                PARTIAL HYDROGRAPH   102.00


    RUNOFF VOLUME =     1.27114 INCHES     =      31.0494 ACRE-FEET
    PEAK DISCHARGE RATE =     691.04 CFS  AT   1.600 HOURS   BASIN AREA =   .4580 SQ. MI.



*BASIN NO 3
COMPUTE NM HYD      ID=4   HYD NO=101.3   DA=0.125 SQ MI
                    PER A=64  PER B=34 PER C=0   PER D=2
                    TP=-0.186  MASSRAIN=-1

    K =   .101874HR    TP =   .186000HR    K/TP RATIO =   .547711     SHAPE CONSTANT, N =  7.061425
    UNIT PEAK =   7.0451    CFS   UNIT VOLUME =    .9981       B =   524.16      P60 = 2.2300
    AREA =      .002500 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333


    K =   .200051HR    TP =   .186000HR    K/TP RATIO =  1.075542     SHAPE CONSTANT, N =  3.284204
    UNIT PEAK =   200.37    CFS   UNIT VOLUME =    1.000       B =   304.23      P60 = 2.2300
    AREA =      .122500 SQ MI    IA =    .59796 INCHES    INF =   1.52429 INCHES PER HOUR
    RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .033333

*       COMPUTED RAINFALL DISTRIBUTION WITH DT=0.033333 HOURS
PRINT HYD           ID=4   CODE=1
```

```
    RUNOFF VOLUME =      .92028 INCHES          6.1352 ACRE-FEET
    PEAK DISCHARGE RATE =     161.05 CFS  AT   1.567 HOURS   BASIN AREA =   .1250 SQ. MI.



*TOTAL OF BASINS 1 2 & 3
ADD HYD            ID=5   HYD=103       ID I=3   ID II=4
PRINT HYD          ID=5   CODE=1

                                PARTIAL HYDROGRAPH   103.00


    RUNOFF VOLUME =     1.19591 INCHES     =      37.1846 ACRE-FEET
    PEAK DISCHARGE RATE =     847.82 CFS  AT   1.600 HOURS   BASIN AREA =   .5830 SQ. MI.



FINISH

             END TIME (HR:MIN:SEC) = 14:46:55
```



I, JEAN J. BORDENAVE, PERFORMED AN AS-BUILT ELEVATION SURVEY OF LOT 357, SANDIA HEIGHTS SOUTH ON 09/03/92. ALL ELEVATIONS WERE FOUND TO BE IN COMPLIANCE WITH THE DESIGN EXCEPT THE DRIVEWAY SWALE AS SHOWN ABOVE.

Jean J Bordenave 09/03/92

RESURVEYED 07/06/93. BERM W/ ASPHALT CORE AND ASPHALT RIDGE ON DRIVEWAY PLACED AS SHOWN ON PLAN AND ON DRIVEWAY PROFILE.

Jean J Bordenave 07/06/93

I, JEAN J. BORDENAVE, HEREBY CERTIFY THAT THE MODIFICATION OF DRIVEWAY GRADES SHOWN HEREON IS IN CONFORMANCE WITH THE DESIGN DATED 05/12/93 AND PROVIDES THE NECESSARY 100 YEAR FLOODPROOFING FOR THE STRUCTURE.

Jean J Bordenave 07/29/93

I, JEAN J. BORDENAVE, HEREBY CERTIFY THAT THE PROPOSED STRUCTURE SHOWN HEREON WILL NOT ADVERSELY ALTER THE EXISTING FLOWS IN THE MINOR TRIBUTARY ALONG THE SOUTHERLY SIDE LOT LINE.

Jean J Bordenave

APPROVALS

BERNALILLO COUNTY PWD — DATE 1/17/92

AMAFCA — DATE 1/17/92

8/6/93

LEGEND

TBM	TEMPORARY BENCH MARK
FF	FINISH FLOOR
FG	FINISH GRADE
FL	FLOW LINE
TA	TOP OF ASPHALT
TC	TOP OF CURB
TP	TOP OF PAD
TS	TOP OF SIDEWALK
TW	TOP OF WALL
FH	FIRE HYDRANT
MH	MAN HOLE
PP	POWER POLE
RD	ROOF DRAIN
PED	POWER OR TEL. PEDESTAL
WV	WATER VALVE
——5250——	EXISTING CONTOUR
——XX——	PROPOSED CONTOUR
×X	EXISTING ELEVATION
XX	PROPOSED ELEVATION
(XX)	AS-BUILT ELEVATION

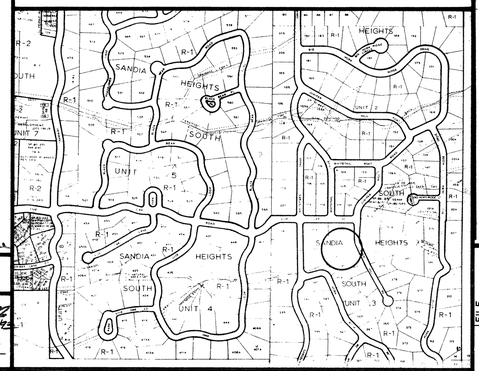
BENCHMARK

ACS "1-C23" ELEVATION 6062.97

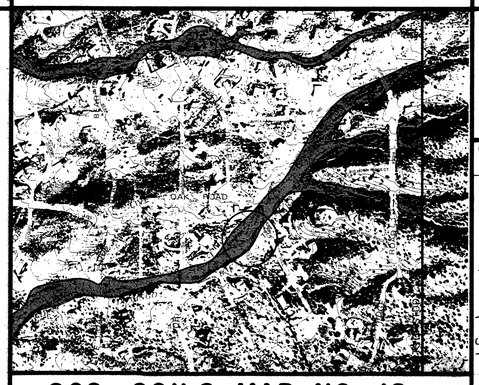
LEGAL DESCRIPTION

LOT 357 SANDIA HEIGHTS SOUTH, UNIT 3
FILED AUGUST 3, 1971, BOOK D4, PAGE 141

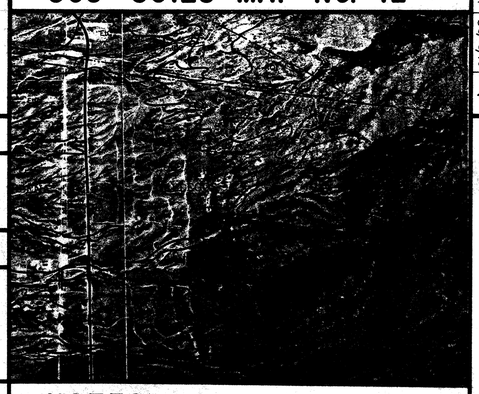
VICINITY MAP C-23



FEMA FHBM NO. 11



SCS SOILS MAP NO. 12



BORDENAVE DESIGNS
P.O. BOX 91194
ALBUQUERQUE, NM 87199-1194
(505) 823-1344

JOB FILE — DESIGNED — DATE — DRAWN — DATE — REVIEWED — DATE

REGISTERED PROFESSIONAL ENGINEER AND LAND SURVEYOR — JEAN J. BORDENAVE — 10119 — NEW MEXICO

NO.	DATE	REVISIONS BY	REMARKS
1	01/20/92		Add certification change Emish
			Floor elevation driveway configuration

SCS SOILS DATA

SOIL SERIES	DEPTH FROM SURFACE	% PASSING SIEVE #4	#10	#40	#200	DEPTH TO BEDROCK	DEPTH TO SEASONAL HIGH WATER	PLASTICITY INDEX	PERMEABILITY	SHRINK/SWELL POTENTIAL	DEGREE AND KIND OF LIMITATION FOR: SEPTIC TANK ABSORPTION FIELD	DWELLING WITHOUT BASEMENT	LOCAL ROADS	HYDROLOGIC SOIL GROUP
–	in.	%	%	%	%	ft.	ft.	–	in./hr.	–	–	–	–	–
•Tesajo: Te——— For Millett part, see Millet series.	0-60	55-80	30-55	20-40	10-25	>5	>5	NP	6.0-20.0	Low——	Slight if slope is less than 8 percent, moderate if 8 to 15, severe if more than 15.	Slight if slope is less than 8 percent, moderate if 8 to 15, severe if more than 15.	Slight if slope is less than 8 percent, moderate if 8 to 15, severe if more than 15.	

Tesajo Series

The Tesajo series consists of deep, well drained soils that formed in alluvium derived from decomposed, coarse grained granitic rocks on alluvial fans. Slopes are 3 to 20 percent. The native vegetation is principally black grama, blue grama, sand dropseed, sacahuista, oneseed juniper, and small soapweed. Elevations range from 6,000 to 7,000 feet. The mean annual precipitation is 10 to 14 inches, the mean annual air temperature is 51° to 54° F, and the frost-free season is 145 to 185 days. Tesajo soils are associated with Millett, Embudo, and Tijerns soils.

In a representative profile, the surface layer is dark grayish brown stony sandy loam about 9 inches thick. Next is about 18 inches of dark grayish brown very gravelly loam. Below this to a depth of 60 inches or more is brown very gravelly loamy sand. The soil is non-calcareous and neutral or mildly alkaline.

Permeability is rapid. Available water capacity is 3 to 3.5 inches. Effective rooting depth is 60 inches or more.

Tesajo soils are used for range, wildlife habitat, watershed, recreation, and community development.

DRAINAGE DATA

CONDITION	STORM RETURN PERIOD (TABLE 4)	TREATMENT TYPE	TREATMENT AREA	EXCESS PRECIPITATION (TABLE 8)	PEAK RUNOFF (TABLE 9)	RUNOFF VOLUME	RUNOFF RATE
–	year	–	sq. ft.	in.	cfs/acre	cu. ft.	cfs
Existing	100	A	52882	0.66	2.26	2909	2.74
	10	A	52882	0.27	0.99	1190	1.20
Developed	100	A	47372	0.66	2.26	2605	2.46
		C	2400	1.13	3.94	226	0.22
		D	3110	2.57	5.74	666	0.41
		TOTAL	52882			3497	3.09
	10	A	47372	0.27	0.99	1066	1.08
		C	2400	0.55	2.29	110	0.13
		D	3110	1.60	3.91	415	0.28
		TOTAL	52882			1591	1.49

NOTES

1. There is a flow increase of 0.35 and 0.29 cfs for the 100 and 10 year storms respectively. The 6 hour runoff volume for the two storms increases by 588 and 401 cubic feet.
2. Runoff from the developed portion of the site will be directed toward the South Domingo Baca Tributary.
3. The site is designed to accept offsite flows in both sheet and concentrated flow conditions.
4. The South Domingo Baca Tributary is in Flood Zone AO (depth of 2 feet) per FEMA FIRM Panel 11, dated Oct. 14, 1983.
5. Topography shown hereon is based on City of Albuquerque ortho-topo maps and amendments in the arroyo based on field survey.
6. Earth surfaces disturbed in the construction process shall be kept to a minimum and shall be planted with native plant material upon completion.

RECEIVED AUG – 3 1993

TITLE: LOT 357 SANDIA HEIGHTS SOUTH

SHEET 1 OF 1