HYDROLOGY

L18/D18

ONE PLAN

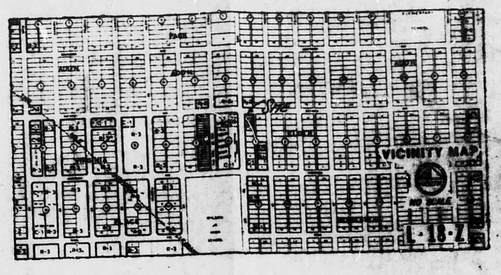
1 PLAN FOR

FOUR PLEX APTS.

L18-D18

DRAINAGE PLAN

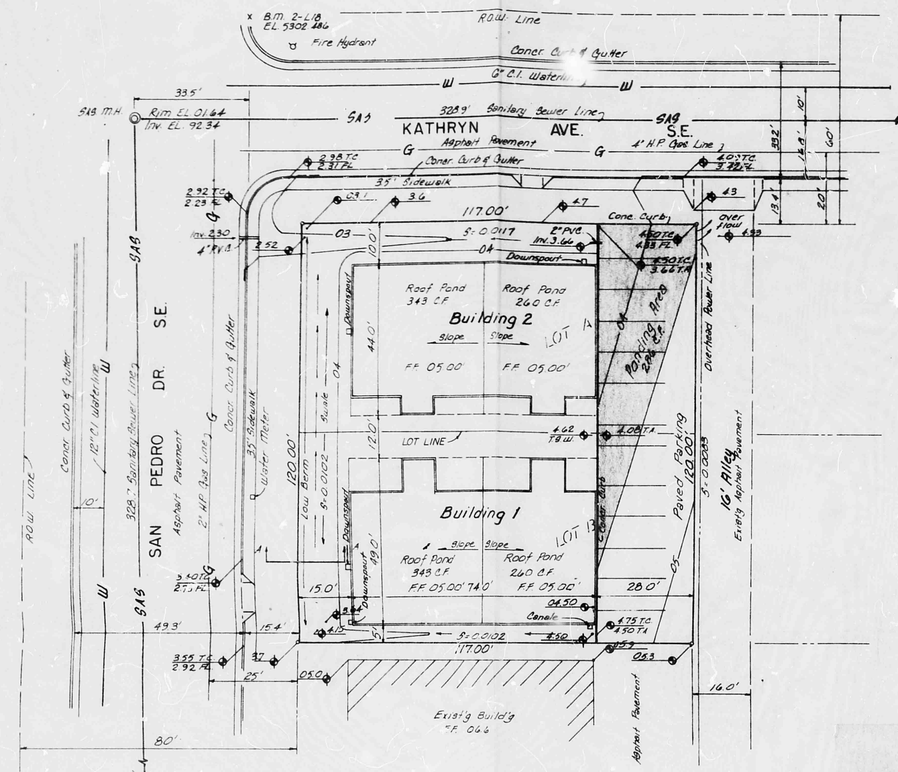
LOTS A & B, BLOCK 1
ELDER HOMESTEAD ADDITION
Albuquerque, New Mexico



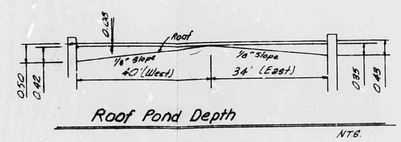
APPROVAL

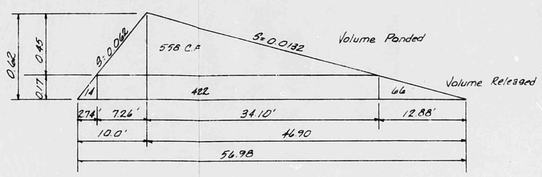
APPROVED FOR DRAINAGE
6/26/84
SIGNATURE TITLE
ADVISE DRAINAGE INSPECTOR
WHEN GRADING EXECUTED

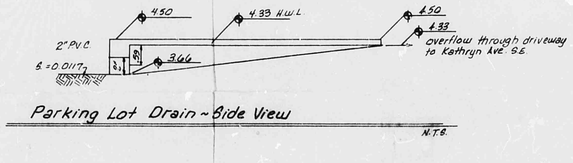
RICHARD V. HALL
NEW MEXICO
REGISTERED PROFESSIONAL ENGINEER
Richard Hall
June 8th 1984

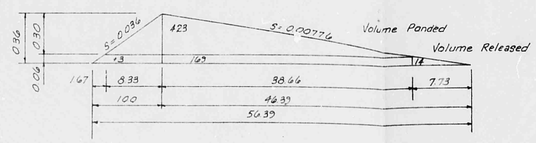


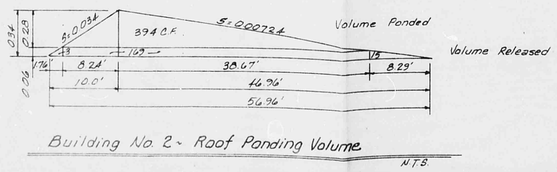
SCALE: 1" = 20'











DRAINAGE CALCULATIONS

I. AREA:

			Square Feet	Acres
A.	Buildings	Building No. 1	3,110	0.072
		Building No. 2	2,967	0.068
		Sub total	6,077	0.140
B.	Entry Slabs	Building No. 1	508	0.012
		Building No. 2	265	0.006
		Sub total	773	0.018
C.	Sidewalk	4 ft. wide x 108	432	0.010
D.	Landscaping and other unpaved area.			
		Court yard 4 ft. wide x 61 x 2	488	0.011
		North side of buildings 74 x 10	740	0.017
		West side of buildings 15 x 120	1,800	0.041
		South side of building 5 x 74	370	0.008
		Sub total	3,398	0.077
E.	Asphalt Parking lot 28 x 120		3.360	0.077
F.	Total lot area 117' x 120'		14,040	0.322

II. PERCENT IMPERVIOUS:

A. Undeveloped 0% impervious.
B. Developed (14,040 - 3,398)/14,040 = 0.76 or 76% impervious

III. SOIL TYPE:

From SOIL SURVEY OF BERNALILLO COUNTY and PARTS OF SANDOVAL AND VALENCIA COUNTIES, NEW MEXICO, Sheet No. 30, the soil association is MWA - Madurez - Wink Association, gently sloping; The soil is Hydrologic Soils Group B.

IV. RUNOFF COEFFICIENT:

See Plate 22.2 C-1 Undeveloped overall "C" Factor = 0.34
Developed overall "C" Factor = 0.73

V. TIME OF CONCENTRATION:

$T = 0.0078\ (L^{0.77}/S^{0.385})$ L = 160 S = 3/160 = 0.0188 '/'

$T = 0.0078\ (160^{0.77}/0.0188^{0.385}) = 1.79$ min. use 10 minutes

VI. INTENSITY:

See Plate 22.2 D-1 The 100-year, 6-hour precipitation is 2.35 inches.

$I = I_6 \times 6.84 \times 10^{-0.51} = 4.97$ inches per hour

VII. PONDING REQUIREMENTS:

A. Buildings. Ponding required for building roofs.

1. Building No. 1. Area = 3,110 sq.ft. C = 1.0
   I = 4.97 in/hr
   Q_{100} = CIA = 1.0 x 4.97 x 0.072 = 0.36 cfs Devel.
   Q_{100} = CIA = 0.34 x 4.97 x 0.072 = 0.12 cfs Undev.
   Q_5^{100} = 0.541 Q_{100} = 0.541 x 0.12 = 0.06 cfs

   V_{100} = 1.0 x 2.35/12 x 3,110 = 609 cubic feet

   Duration T = 2V/60Q = 2 x 609 / 60 x 0.36 = 56.39

   See Detail A for unit hydrograph based on Plate 22.2 E-1
2. Building No. 2. Area = 2,967 sq.ft.
   Q_{100} = 1.0 x 4.97 x 0.68 = 0.34 cfs developed
   Q_{100} = 0.34 x 4.97 x 0.68 = 0.12 cfs undeveloped
   Q_5^{100} = 0.541 x Q_{100} = 0.541 x 0.12 = 0.06 cfs

   V_{100} = 1.0 x (2.35/12) 2,967 = 581 cubic feet

   Duration T = 2 x 581/60 x 0.34 = 56.96 min.
   See Detail B for unit hydrograph based on Plate 22.2 E-1
3. Actual roof pond volumes.

East side	volume below high point = 39 x 34 x .35/3	=	154
	volume above high point = 39 x 34 x .08	=	106
West side	volume below high point = 39 x 40 x .42/3	=	218
	volume above high point = 39 x 40 x .08	=	125

Summary of roof pond volumes:

	Area	Required Volume	Q_5 Disch.	Actual Volume
Building No. 1				
West side	1679	228	0.03	343
East side	1431	195	0.03	260
Building No. 2				
West side	1600	212	0.03	343
East side	1367	182	0.03	260

See Detail C for roof pond depths.

4. Ponding for non-building areas of site.
   Weighted "C"

$$C = \frac{773 \times 1.0 + 432 \times 1.0 + 3398 \times 0.34 + 3360 \times 0.9}{7963}$$

$$= 0.68$$

Developed Q_{100} = 0.68 x 4.97 x (7963/43560) = 0.62 cfs

Undevel. Q_{100} = 0.34 x 4.97 x (7963/43560) = 0.31 cfs

Undevel. Q_5 = 0.541 x 0.31 = 0.17 cfs

Volume = 0.68 (2.35/12) 7963 = 1060 cubic feet

Duration; T = 2V/60Q = 56.98 (see Detail D)

5. Fullfill this ponding requirement by ponding in the parking lot. Excess roof ponding counts toward the parking lot requirement.

   Non-building ponding - excess roof ponding =PL pond
   558 - 389 = 169 cf

   Actual PL pond volume((95 x27)/2 x .67)/3= 289cf

6. Parking lot pond discharge. Total Q_5 undeveloped discharge from site allowed is

   0.17 + 0.03 + 0.03 + 0.03 + 0.03 = 0.29cfs

   Discharge that will occur downstream from PL pond is as follows:

   South and west sides Q = 0.34x4.97x 0.049 = 0.08cfs
   north side Q = 0.34x4.97x 0.017 = 0.03
   West roof drains 2 ea. at 0.03 = 0.06
   Total 0.17cfs

   Therefore, Parking lot discharge should be limited to 0.12 cfs. By orifice equation, $Q = Ca\sqrt{2gH}$

   Try 2" $Q = 0.6 \times 0.0218 \sqrt{2 \times 32.2 \times 0.59}$
   = 0.08cfs is less than 0.12 cfs

VIII. DITCHES:

A. Ditch on south and west side. Q = 0.14 cfs s = 0.0102'/'
   Try V-ditch 6:1 slopes n=0.03 depth 0.16
   By HP 41CV program for Mannings equation, Q = 0.14
   A = 0.15 sf and velocity = Q/A = 0.14/0.15 = 0.93 fps

B. Ditch on north side. Q = 0.03 + 0.08 = 0.11cfs
   Try V-ditch 3:1 side slopes n = 0.03 depth = 0.19
   slope = 0.0117 '/'
   By HP 41CV program for Mannings equation, Q = 0.11cfs
   A = 0.11 V=Q/A = 1 fps.

IX. DISCHARGE UNDER SIDEWALK (SEE CITY STANDARD DETAIL K-15)

Q = 0.25 cfs By orifice equation try one 3" and one 2".

$Q = 0.6 \times 0.0491 \sqrt{2 \times 32.2 \times 0.54} = 0.17$cfs for 3" dia.

$Q = 0.6 \times 0.0218 \sqrt{2 \times 32.2 \times 0.59} = 0.08$cfs for 2" dia.

Total Q = 0.25 cfs

L18/D18

HALL ENGINEERING