HYDROLOGY L18/D3 TWO PLANS

L18-D3

2 PLANS

City of Albuquerque
P.O. BOX 293 ALBUQUERQUE, NEW MEXICO 87103

MAYOR
Harry E. Kinney

CHIEF
ADMINISTRATIVE OFFICER
Frank A. Kleinhenz

July 28, 1977

L18-D3

Mr. Jake Bordenave
T. T. Burnett Engineering, Inc.
120 Morningside Dr., NE
Albuquerque, New Mexico 87108

RE: LOTS 1-5, BLOCK 4, VIRGINIA PLACE ADDITION.

Dear Mr. Bordenave:

I have reviewed the drainage plan for the Lots 1-5, Block 4, Virginia Place Addition, and it is approved with the revisions that we have discussed in my office.

Very truly yours,

Bruno Conegliano
Assistant City Engineer-Hydrology

BC/kr

DRAINAGE REPORT

FOR

COOK CONSTR. CO. DEVELOPMENT

LOTS 1 - 5, BLOCK 4, VIRGINIA PLACE ADDITION

JULY, 1977

Prepared By:

T.T. Burnett Engineering, Inc.
120 Morningside Dr. NE
Albuquerque, New Mexico 87108

Prepared For:

Cook Construction Co.
116 Headingly NW
Albuquerque, New Mexico 87107

Jean J. Bordenave, N.M.P.E. & L.S. # 5110

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DRAINAGE REPORT

FOR

COOK CONSTR. CO. DEVELOPMENT

LOTS 1 - 5, BLOCK 4, VIRGINIA PLACE ADDITION

PURPOSE

The purpose of this report is to present to governing agencies a reasonable method of complying with Drainage Resolution 1972 - 2 and thereby limit runoff from the proposed development to an amount not in excess of the flow to be expected from the property in its present state. The report is composed of a narrative of existing and proposed conditions and computations and plans to determine and sonstruct necessary control structures.

LOCATION AND TERRAIN

The proposed development is located between Palomas and Alvarado Streets and abuts the south side of Kathryn Ave, in the southeast quadrant of the City (see Plate I for the exact location).

The property slopes from east to west at approximately one percent and is quite uniformly graded. The soil is composed of silty sand with small gravel. Infiltration, due to the type of landscaping, can be expected to be no more than one-half inch per hour. Vegetation, composed of prarie grasses, is sparse with scattered common weeds.

PROPOSED DEVELOPMENT

The proposed development is defined by three plates as follows:

Plate II – Site Plan indicating building locations, sidewalk and parking lot construction and materials.

Plate III – Grading Plan indicating final grading and retention pond areas.
pond areas.

Plate IV – Landscaping Plan indicating type and location of planting and ground cover.

UPLAND DRAINAGE

The area considered in the upland drainage computations is as outlined on Plate I. This area is difficult to define due to very flat north south grades and is most probably larger than the actual drainage area. Computations indicate that Kathryn Ave. is more than large enough to carry storm flow past the proposed development without entering the property.

INTERNAL DRAINAGE

A portion of the flows developed internally will be stored in retention ponds located along the east and north sides of the property. The ponds shall be so constructed as to retain the flow for approximately one hour, at which time the entire flow will be allowed to exit the property at a flow rate that is less than that now generated. The stored runoff will be dissipated by infiltration and evaporation.

CONCLUSIONS

Flows generated by the proposed development will be partially stored on site. Those flows in excess of storage capacity will be allowed to exit the property, as will all flows from the parking area, to Kathryn Ave. Downstream flow rates will be slightly less than those now experienced, but for an extended period of time.

METHODS AND EQUATIONS

Rainfall Intensity

from "Master Plan of Drainage - Albuquerque, New Mexico and Environs, 1963"

$$i = 189/(t + 25), \text{ inches/hour}$$

where, t - time of concentration, min.

Runoff Rate

Rational Formula

$$Q = CiA, \text{ cubic feet/second}$$

where, C - runoff coefficient dependent on physical characteristics of the drainage area.
i - rainfall intensity, in./hr.
A - drainage area, acres

Channel Velocities and Depths

Manning's Equation

$$Q = \frac{1.486}{n} AR^{\frac{2}{3}} S^{\frac{1}{2}}, \text{ cubic feet/second}$$

where, A - cross sectional area of flow, sq. ft.
R - hydraulic radius, feet
S - hydraulic gradient, feet/foot
n - Manning's roughness coefficient, dependent on channel surface

$$V = Q/A, \text{ feet/second}$$

where, Q - as defined above
A - as defined above

Job No. 7721 DRAINAGE REPORT WB 7/13/77

1/4

L-18-Z
NOAA Atlas #2 - N.M.

EXISTING CONDITIONS

Total Land Area

$(270)(100) - (25)(50) + \pi(50)^2/8 = 26{,}732\ \text{ft}^2 = 0.61$ Acres

Total 6-Hour Run-off

$(2.6)(0.40)(26{,}732)/12 = 6{,}683$ cu.ft.

Maximum Run-off Rate

overland flow time grade 1+% bare earth, 250' travel 14 min

time of concentration 14 min

$= (0.61)(0.40)(189/(25+14)) = 1.2$ cfs

DEVELOPED CONDITIONS

Buildings & Walks (C=0.95)

5 buildings @ 35'x58' = 2,030 ft² each

walks $(3.5)(22+22+18+16+22+22+15+15) = 532\ \text{ft}^2$

Parking Lot (C=0.95)

$27' \times 255' = 6{,}885\ \text{ft}^2$

Landscaped Area (C=0.35)

$26{,}732 - [(5)(2030) + 532 + 6{,}885] = 9{,}165\ \text{ft}^2$

NOAA Atlas #2 - N.M.

Retention - Detention Ponds

Retention Period

$1.2 \text{ cfs} = i\left[(5)(2030) + 532 + 6885)(.95) + (9165)(.35)\right]/43560$

$= 0.457\, i$

$i = 2.627$ in/hour

$i_{100} = 187/(t+25)$

$t+25 = 189/2.627$

$t = 47$ min. $= 0.78$ hr.

∴@ t=47 min. the flow from the developed area will be equivalent to the flow from the existing area @ t=0 min.

max. flow from parking area

use t = 6 min.

$i = 189/(t+25) = 6.10$ in/hr

$Q = (0.95)(6.10)(6885)/43560$

$= 0.92$ cfs < 1.2 cfs existing condition

Storage Req'd for 47 min. total Rainfall=2.0

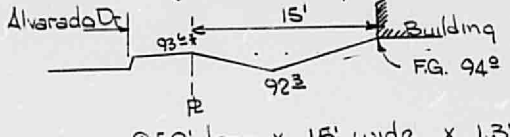
$\text{Vol.} = \frac{(2.0)}{12}\left[((5)(2030) + 532)(0.95) + (9165)(0.35)\right]$

$= 2225 \text{ ft}^3$ total

Building A

(see grading plan for building design)

$(2)(2030)(.95)/12 = 321 \text{ ft}^3$



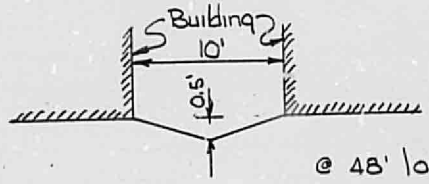
@ 50' long x 15' wide x 1.3' deep

Vol. = ft³ > 321 ft³

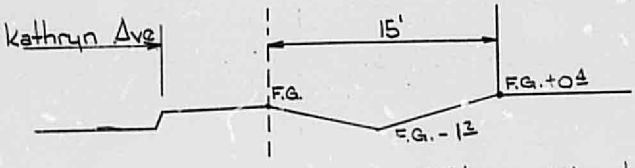
Retention - Detention Ponds

Buildings B&C or D&E

$[(2)(2030)+200](.95)(2/12) = 675\ ft^3$



@ 48' long x 10' wide
x 0.5' deep
Vol = 120 ft^3



@ 80' Long x 15' wide x 1.3' deep
Vol = 780 ft^3

total = 120+780 = 900 ft^3
> 675 ft^3

Flow Rates

Max. flow rate before development

from sheet 1/3 Q = 1.2 cfs

Max. flow rate after development

$(t/60)(189/(t+25)) = (900)(12) / (((2)(2030+532/3)(0.95)+(9165/3)(0.35)$

$t = 52$ min. ; $\lambda = 189/(52+25) = 2.45$ in/hr

$Q = ((5)(2031)+532+6885)0.95 + (9165)(0.35))2.45/435$
$= 1.1$ cfs

KATHRYN AVE

Drainage Area 66 Acres @ C=0.5 single fam. Res.
20 Acres @ C=0.7 comm. & multi-fam

Time of Concentration
overland flow use 10 min
channel flow (use 3fps for 4500') 25 min
35 min

Flow

$$I = 189/(25+35) = 3.15 \text{ in/hr}$$

$$Q = \left((0.5)(66) + (0.7)(20)\right) 3.15 = 148 \text{ cfs}$$

Street Capacity @ d = curb + 0.2'
Use 32' street width

$$Q = \frac{1.486}{0.022}(32)(.87)\left(\frac{(30)(.87)}{32+2(.87)}\right)^{2/3}(.013)^{1/2}$$

$$= 188 \text{ cfs}$$

BOHANNAN-HUSTON INC.
4125 CARLISLE BLVD., N.E. ALBUQUERQUE, NEW MEXICO 87107 505 881-2000

December 20, 1978

Mr. Chris Inman
Chris Inman Corporation
1001 Medical Arts N.E.
Albuquerque, NM 87102

Dear Mr. Inman:

Based on the results of the Albuquerque Master Drainage Study, it is my opinion that lots B-1, B-2, B-3, B-4 and B-5 block of Virginia Place Addition are not in danger of flooding from the 100-year flood. The results of the Master Drainage Study show that the 100-year flood elevation is at or below the top of curb on both Madiera Drive and Eastern Avenue at that location. If provisions for street access prevent water at curb height from entering the property, then floor elevations for structures along Madiera Drive may be .5 feet above the top of curb elevation taken perpendicular to the street from the southern most point on said structures.

If you should have any questions concerning this matter, please call me.

Sincerely,

Charles M. Easterling, P.E.
Department Head, Hydrology

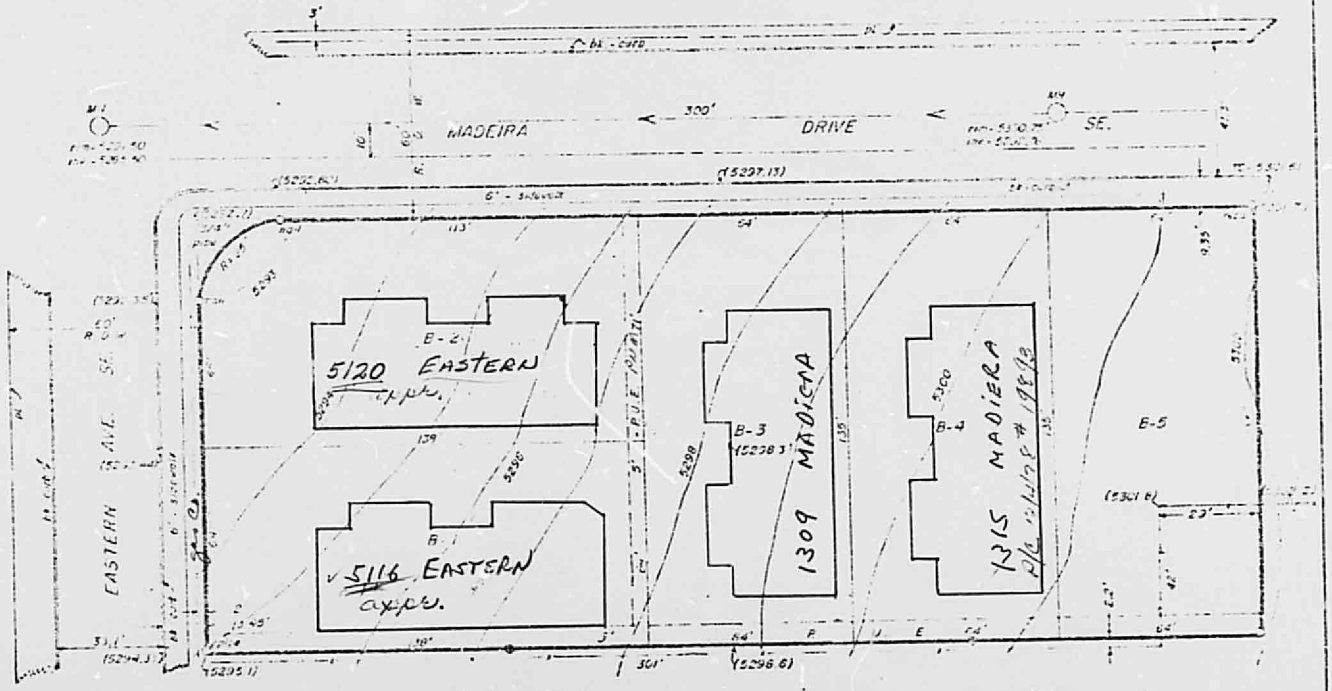
CME/nd
Job No. 78-012.4

SURVEY AND
TOPOGRAPHIC MAP OF
LOTS B-1 THUR B-5, BLOCK-26

VIRGINIA PLACE ADDITION

ALBUQUERQUE, NEW MEXICO

1" = 40'



Legend:

Water line

power line & poles

gas line 2"-Rp

Note:

All elevations are referenced to City of Albuquerque B.M. San Mateo B08-C-125 Elev.-5312.41, S.L.D.-1929, located S.W. quad. int. San Mateo & Gibson SE.