HYDROLOGY G22/D1 1 of 2 1 PLAN

G22/D1

6 PLANS

DALE BELLAMAH CORPORATION

POST OFFICE BOX 3325
6400 UPTOWN BOULEVARD, N.E.
EAST TOWER, SUITE 600

ALBUQUERQUE, NEW MEXICO 87110
TELEPHONE (505) 299-7631

Memo — file with Mr. Study. L.

December 8, 1977

Mr. V. M. Kimmick
City Engineer,
P. O. Box 1293
Albuquerque, N.M. 87103

Dear Mr. Kimmick: Re: Cibola Subdivision

As we discussed on December 7, 1977, the improvements which have been made to the Piedra Lisa channel adjacent to the south side of Cibola Subdivision seem to protect the subdivision to the extent that the 100-year flood plain would be reduced to, and confined within the channel which has been excavated. In light of this protection for the subdivision, I request that you review the drainage report prepared for this subdivision and make application to the Flood Insurance Agency to have Cibola removed from the Flood Hazard Map.

If you concur with this analysis that there is no longer any flood hazard to the subdivision, I would appreciate your signature on the lower left hand corner of this letter. I have enclosed two copies of the letter, one to be returned to me and the other for your files.

If you have any other questions I would be more than glad to answer them. Bohannon-Huston was the consulting engineer who prepared the drainage report for Cibola and any questions of a technical nature should be addressed to Mr. Michial Emery at 881-2000.

Sincerely,
DALE BELLAMAH LAND CO. INC.,

Joseph E. Shipley P.E.

Joseph E. Shipley, P.E.
Manager of Engineering

To the best of my knowledge, Cibola Subdivision should not be designated to be within the Flood Hazard Insurance Area and upon final review of the drainage report, application will be made to remove it from the Flood Hazard Map.

V. M. Kimmick

V. M. Kimmick, City Engineer

jes:j

BUILDERS—DEVELOPERS—REALTORS
Builders Owners and Managers of Residential Homes Apartment Properties Shopping Centers Motels
Mobile Home Parks, Free-Standing Commercial Properties
MEMBERS
National Association of Home Builders, International Council of Shopping Centers, National Association of Realtors

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

MAYOR
Harry E. Kinney

CHIEF
ADMINISTRATIVE OFFICER
Frank A. Kleinhenz

January 12, 1976

Mr. Michial M. Emery
Bohannan, Westman, Huston & Assoc., Inc.
4125 Carlisle Blvd. NE
Albuquerque, New Mexico 87107

RE: CIBOLA VILLAGE SUBDIVISION APARTMENT COMPLEX
DRAINAGE AMENDMENT

Dear Mr. Emery:

The concept of the subject amendment is acceptable. Construction plans shall be approved by the City Engineer. This approval does not constitute approval of the details presented or construction on anothers property.

Very truly yours,

Kleton H Laws

K. H. Laws
Assist. City Engineer-Hydrology

KHL/fs

cc: Mr. John Robert

Public Works Department
Director — Erwin F. Hensch, P. E. 766-7467
Engineering 766-7441 — V. M. Kimmick, P. E.
Street Maint. 766-7755 — G. E. Paul, P. E.
Ass't. Director — Harold R. Orr, Jr. P. E.
Liquid Waste 766-7535 — R. P. Lowe, P. E.
Water 766-7437 — W. H. Otto, P. E.

BOHANNAN WESTMAN HUSTON & ASSOCIATES INC.
ENGINEERS & PHOTOGRAMMETRISTS
4125 CARLISLE BLVD., N.E.
ALBUQUERQUE, NEW MEXICO 87107
PHONE 505 345-2681

January 5, 1976

City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

Attention: Mr. Kleston H. Laws

Re: Amendment to the Drainage Report, Cibola Village Subdivision and Apartment Complex

Gentlemen:

Enclosed is the referenced amendment to the subject drainage report. The amendment concerns only the apartment complex area of the Cibola Village Subdivision. In the original report it was assumed that permanent ponding on the roofs of the apartment complex would be accomplished. Federal Housing Administration funding was attempted for the complex, and their review indicated that they would not accept total retention on the rooftops. For this reason, we have reanalyzed the area with the assumption of no retention on the rooftops and provided preliminary grading plans and preliminary designs for the outlet works for the ponding area to be constructed in the apartment complex.

If you should have any questions concerning this amendment, please feel free to contact this office.

Sincerely yours,

Michial M. Emery

Michial M. Emery
Chief Design Engineer

Enclosures

cc: Hooten & Stahl, Inc., Realtors
Attention: Mr. Bill Hooten

MME/sh
Job Number E75-182

ENGINEERS & PHOTOGRAMMETRISTS

BOHANNAN WESTMAN HUSTON & ASSOCIATES INC.

4125 CARLISLE BLVD. N.E.
ALBUQUERQUE, NEW MEXICO 87107
PHONE 505 345-2681

January 5, 1976

City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

Attention: Mr. Kleston H. Laws

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If you should have any questions concerning this amendment, please feel free to contact this office.

Sincerely yours,

Michial M. Emery

Michial M. Emery
Chief Design Engineer

Enclosures

cc: Hooten & Stahl, Inc., Realtors
Attention: Mr. Bill Hooten

MME/sh
Job Number E75-182

ENGINEERS & PHOTOGRAMMETRISTS

BOHANNAN WESTMAN HUSTON & ASSOCIATES INC.

4125 CARLISLE BLVD. N.E.
ALBUQUERQUE, NEW MEXICO 87107
PHONE 505 345-2681

January 5, 1976

City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

Attention: Mr. Kleston H. Laws

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If you should have any questions concerning this amendment, please feel free to contact this office.

Sincerely yours,

Michial M. Emery

Michial M. Emery
Chief Design Engineer

Enclosures

cc: Hooten & Stahl, Inc., Realtors
Attention: Mr. Bill Hooten

MME/sh
Job Number E75-182

GARY L. WATSON COMPANY

July 29, 1975

RECEIVED

JUL 31 1975

CITY ENGINEERS

G22

Mr. Laws
City Engineering Department
City of Albuquerque
400 Marquette N. W.
Albuquerque, NM 87102

RE: Proposed Drainage Plan
Cibola Village

Dear Mr. Laws:

We formally request that you delay approval of the above referenced drainage plan until such a time as we can ascertain that it does not adversly affect La Charles Townhouse Subdivision tract. We have been working the past few weeks to provide Cibola with a 25' drain and sewer easement along our southerly boundry to facilitate their needs. Our engineering is in the process for the dedication of easement to the city but we cannot give dedication without full knowledge of the affects to our property.

If there is a formal method of protesting the proposed Cibola plan please let us know how we should proceed.

Yours very truly,

GARY L. WATSON COMPANY

Gary L Watson

GARY L. WATSON

GLW:cjt

4015 Carlisle Blvd., N.E. Suite C • Albuquerque, New Mexico 87107
(505) 345 3658 • (505) 345 6000

ENGINEERS & PHOTOGRAMMETRISTS

BOHANNAN WESTMAN HUSTON & ASSOCIATES INC.

4125 CARLISLE BLVD. N.E.
ALBUQUERQUE, NEW MEXICO 87107
PHONE 505 345-2681

July 24, 1975

Mr. Kleston Laws
Assistant City Engineer, Hydrology
City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

G 2

Re: Amendment #3 - Cibola Village Subdivision Drainage Report

Dear Mr. Laws:

Enclosed is Amendment #3 to the Cibola Village Subdivision Drainage Report. We would greatly appreciate your review and approval of this enclosure. If you should have any questions, please feel free to contact this office.

Sincerely yours,

Michial M. Emery

Michial M. Emery
Chief Design Engineer

Enclosure

cc: Mr. Bill Biffle, Hooten & Stahl

MME/sh
Job Number E74-171

June 30, 1975

G22-01

Mr. Michial M. Emery
Bohannon, Westman, Huston & Assoc.
4125 Carlisle Blvd. N.E.
Albuquerque, New Mexico 87107

SUBJECT: DRAINAGE REPORT CIBOLA VILLAGE SUBDIVISION

Dear Mr. Emery:

Amendment No. 2 is accepted and you may proceed with detailed plans to implement platting and development, subject to restraint of building permits along the Randy Tract as mentioned in your report.

Very truly yours,

Kleston H. Laws
Asst. City Engineer - Hydrology

KHL: yc

cc: John B. Robert, AMAFCA

ENGINEERS & PHOTOGRAMMETRISTS

BOHANNAN WESTMAN HUSTON & ASSOCIATES INC.

4125 CARLISLE BLVD. N.E.
ALBUQUERQUE, NEW MEXICO 87107
PHONE 505 881-2000

June 25, 1975

Mr. Kleston H. Laws
Assistant City Engineer, Hydrology
City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

Dear Mr. Laws:

Enclosed is Amendment #2 to the drainage report for Cibola Village Subdivision. We will be anxious to receive your response to this amendment so that work can proceed on the subdivision.

Sincerely yours,

Michial M. Emery

Michial M. Emery
Chief Design Engineer

cc: Mr. Bill Biffle,
Hooten & Stahl

MME/sh
Job Number E75-060

ENGINEERS & PHOTOGRAMMETRISTS

BOHANNAN WESTMAN HUSTON & ASSOCIATES INC.

4125 CARLISLE BLVD. N.E.
ALBUQUERQUE, NEW MEXICO 87107
PHONE 505 881-2000

June 25, 1975

Mr. Kleston H. Laws
Assistant City Engineer, Hydrology
City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

Dear Mr. Laws:

Enclosed is Amendment #2 to the drainage report for Cibola Village Subdivision. We will be anxious to receive your response to this amendment so that work can proceed on the subdivision.

Sincerely yours,

Michial M. Emery

Michial M. Emery
Chief Design Engineer

cc: Mr. Bill Biffle,
Hooten & Stahl

MME/sh
Job Number E75-060

May 14, 1975

Mr. Michael M. Emery
Bohannon,Westman,Huston & Assoc., Inc.
4125 Carlisle Blvd. N.E.
Albuquerque, New Mexico 87107

SUBJECT: DRAINAGE REPORT CIBOLA VILLAGE SUBDIVISION
AS AMENDED BY AMENDMENT #1

Dear Mr. Emery:

The above-referenced drainage report is approved subject to the following conditions:

1. Providing a drainage easement to the west of the subject subdivision for the drainage channel between Lots 9 and 10, Block 1 prior to signing the plat.

2. Permission to construct a drainage swale on the Edmond L. Rady tract prior to receiving building permits on Lots 1 through 8 inclusive of Block 2.

3. Design of the swale running south to the drainage channel to insure erosion in the park area will not occur and drainage will not flow west to Glen Canyon Road.

Very truly yours,

Kleston H. Laws
Assistant City Engineer-Hydrology

KHL/fs
cc: Mr. John Robert, AMAFCA

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

May 1, 1975

City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

Attention: Mr. K. H. Laws

Re: Amendment #1 to the Drainage Report for Cibola Village Subdivision and Apartment Complex

Gentlemen:

Enclosed is the amendment to the referenced drainage report. Essentially, the amendment deals with analysis of the subdivision considering ponding on each lot from the setback line to the rear lot line. Results of the analysis indicated that the runoff from the subdivision under these conditions after development approximates that before development.

If you should have any questions concerning the analysis, please feel free to contact this office. We will be anxious to receive your response concerning the approval of the subdivision.

Sincerely yours,

Michial M. Emery
Chief Design Engineer

Enclosures

cc: Mr. Bill Biffle, Hooten & Stahl

MME/sh
Job Number E75-060

BOHANNAN WESTMAN HUSTON & ASSOCIATES INC.
ENGINEERS & PHOTOGRAMMETRISTS
4125 CARLISLE BLVD., N.E.
ALBUQUERQUE, NEW MEXICO 87107
PHONE 505 881-2000

May 1, 1975

RECEIVED
MAY 5 1975
AMAFCA

Albuquerque Metropolitan Arroyo Flood
Control Authority
P.O. Box 25851
Albuquerque, New Mexico 87125

Attention: Mr. John Robert

Re: Amendment #1 to the Drainage Report for Cibola Village Subdivision and Apartment Complex

Gentlemen:

Enclosed is the amendment to the referenced drainage report. Essentially, the amendment deals with analysis of the subdivision considering ponding on each lot from the setback line to the rear lot line. Results of the analysis indicated that the runoff from the subdivision under these conditions after development approximates that before development.

If you should have any questions concerning the analysis, please feel free to contact this office. We will be anxious to receive your response concerning the approval of the subdivision.

Sincerely yours,

Michial M. Emery

Michial M. Emery
Chief Design Engineer

Enclosures

cc: Mr. Bill Biffle, Hooten & Stahl

MME/sh
Job Number E75-060

ENGINEERS & PHOTOGRAMMETRISTS

BOHANNAN WESTMAN HUSTON & ASSOCIATES INC.

4125 CARLISLE BLVD., N.E.
ALBUQUERQUE, NEW MEXICO 87107
PHONE 505 881-2000

RECEIVED
APR 2 1975
CITY ENGINEERS

April 21, 1975

City Engineers Office
City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

Re: Drainage Report for the Cibola Village Subdivision and Apartment Complex

Gentlemen:

Enclosed for your review, comment, and approval is the drainage report for the subject development on the southwest corner of the Montgomery and Tramway Boulevard intersection.

If you should have any questions or comments concerning the report, please feel free to contact this office. We will be anxious to hear from you concerning your approval.

Sincerely yours,

Michial M. Emery

Michial M. Emery
Chief Design Engineer

Enclosure

MME/sh
Job Number E75-060

DRAINAGE

CIBOLA VILLAGE

OCT. 5, 1973

APPROVED FOR DRAINAGE

10/17/73
DATE

Donald P. Campbell HYDROLOGIST
SIGNATURE TITLE

CONTINGENCIES

ROOF PONDING UNDESIRABLE BUT
SATISFACTORY - EXPENSIVE

ENCHANTMENT ENGINEERING INC

DESCRIPTION OF AREA

CIBOLA VILLAGE IS A 32.16 ACRE TRACT OF LAND LOCATED ON THE SOUTH WEST CORNER OF MONTGOMERY BOULEVARD N.E. AND TRAMWAY BOULEVARD N.E.

THE LAND CONSISTS OF POOR GRASS AND SANDY SOIL. PRESENTLY THE LAND DRAINS FROM THE NORTHEAST CORNER TO THE SOUTHWEST CORNER WITH AN AVERAGE SLOPE OF 4.4%.

IT IS THE PLAN OF THIS REPORT TO SHOW THAT THE RUNOFF AFTER DEVELOPMENT WILL NOT BE GREATER THAN THE NATURAL RUNOFF. THIS WILL BE ACCOMPLISHED BY STORING THE INCREASED RUNOFF ON THE PROPERTY.

Natural Runoff from Property

A = 32.16 acres
C = 0.283
I = 4.72 in/hr

Q = CIA = 36.22 cfs

Developed Runoff from Property

Roads & Parking = 8.49 acres
Walks & Patios = 1.69 acres
Jogging Trails = 0.36 acres
Miscellaneous Paving = 0.29 acres

Total Paving = 10.83 acres
C = 0.92
I = 5.4 in/hr

Q = CIA = 53.80 cfs

Landscaped Area = 14.91 acres
C = 0.22
I = 5.4 in/hr

Q = CIA = 17.71 cfs

10.83
14.91
25.74

32.16
25.74
6.42 – what happened to this 6.4 acres?

ROOF TOP PONDING will BE USE TO STORE THE RUNOFF FROM THE ROOFED AREAS, THEREFORE THE ROOFS WILL NOT ADD TO THE DEDELOPED VOLUME.

TOTAL DEVELOPED VOLUME = 71.51 CFS

INCREASED VOLUME = DEVELOPED - NATURAL = 35.29 CFS.

PONDING ON PROPERTY

VOLUME OF NATURAL RUNOFF

$32.16\ ac \times 43560\ FT^2/ac \times 2.8^*\ in \times 1/12 \times 0.283$

$= 92505\ FT^3$

VOLUME OF DEVELOPED RUNOFF

PAVED AREA

$10.83\ ac. \times 43560 \times 2.8^* \times 1/12 \times 0.92$

missing 6 Ac.

$= 101270\ FT^3$

LANDSCAPED AREA

$4.91 \times 43560 \times 2.8 \times 1/12 \times .22$

$= 33340\ FT^3$

TOTAL DEVELOPED VOL. $= 134610\ FT^3$

REQUIRED PONDING VOL. = DEVEL. VOL - NATURAL VOL.

$= 42105\ FT^3$

AVAILABLE PONDING VOLUME $= 42790\ FT^3$
(FROM POINDING PLAT)

THEREFORE THE PONDS WILL CONTAIN THE RUNOFF

*100 YEAR - 6 HOUR PRECIPITATION STORM (AMAFCA)

Roof Top Ponding

In order to prevent uncontrolled discharge from the roof areas it will be necessary to raise the roof scuppers 3 inches. This will provide the necessary volume to contain the storm water runoff for a 100-year 6 hour precipitation project storm.

The ponded roof water will be discharged from the roof by letting it drain through pipes placed below the roof scupper inlets. Details of the roof scupper are shown on a following sheet.

Total release of the roof ponded runoff is to be accomplished in a minimum of 6 hours and a maximum of 24 hours. Discharge time for a falling head reservoir is given by the equation:

$$t = -\frac{1}{C_d A_o \sqrt{2g}} \int_{y_1}^{y_2} A_R \, y^{-1/2} \, dy$$

where t = discharge time (sec)
A_o = area of orifice (FT^2)
C_d = discharge coefficient
A_R = horizontal area of reservoir as related to depth
y_1 & y_2 = limits through which head falls (FT)

FOR THE SPECIAL CASE OF A TANK WITH A CONSTANT CROSS-SECTION THIS EQUATION REDUCES TO:

$$t = \frac{2A_R}{C_d A_o \sqrt{2g}} \left(\sqrt{y_2} - \sqrt{y_1}\right)$$

THERE ARE FOUR DIFFERENT ROOF CLASSIFICATIONS IN CIBOLA VILLAGE; (1) SINGLE STORY STRUCTURES, (2) LARGE TWO-STORY STRUCTURES, (3) SMALL TWO STORY STRUCTURES, (4) GARAGES. THE SINGLE STORY STRUCTURES HADE AN ADJOINING GARAGE WHICH GIDES THEM A ROOF AREA OF 2000 FT². THE LARGE TWO STORY STRUCTURES HAVE A ROOF AREA OF 650 FT². THE SMALL TWO STORY STRUCTURES HADE A ROOF AREA OF 520 FT². ALL TWO STORY STRUCTURES HADE AN ADJACENT, BUT NOT AN ADJOINING, GARAGE WHICH RESULTS IN THE FOURTH ROOF CLASSIFICATION OF GARAGES. ALL GARAGES HAVE A ROOF AREA OF 460 FT²

CALCULATIONS OF RELEASE TIMES

(1) SINGLE STORY STRUCTURES

$$t = \frac{2A_R}{C_d A_o \sqrt{2g}} \left(\sqrt{y_2} - \sqrt{y_1}\right)$$

where $A_R = 2000\ FT^2$

$y_2 = 2.8$ in, $y_1 = 0$

$C_d = 0.6$

$A_o = 2 - 3/4''$ pipes $= .00614$ FT

$t = 65491$ SEC $= 18.19$ hr.

(2) LARGE TWO-STORY STRUCTURES

$$t = \frac{2A_R}{c_d A_o \sqrt{2g}} \left(\sqrt{y_2} - \cancel{\sqrt{y_1}}\right)^{\to 0}$$

WHERE $A_R = 650$ FT^2
$y_2 = 2.8$ in
$c_d = 0.60$
$A_o = 1\text{-}3/4''$ PIPE
$= .00307$ FT^2

$t = 42451$ SEC $= 11.79$ hr.

(3) SMALL TWO-STORY STRUCTURES

$$t = \frac{2A_R}{c_d A_o \sqrt{2g}} \sqrt{y_2}$$

WHERE $A_R = 520$ FT^2
$y_2 = 2.8$ in
$c_d = 0.60$
$A_o = 1\text{-}3/4''$ PIPE
$= .00307$ FT^2

$t = 33965$ SEC $= 9.43$ hr.

(4) GARAGES

$$t = \frac{2 A_R}{C_d A_o \sqrt{2g}} \sqrt{y_2}$$

WHERE $A_R = 460 \text{ FT}^2$

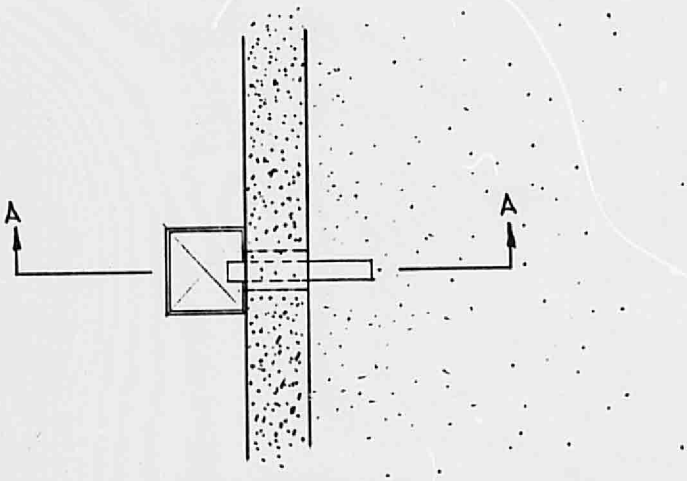
$C_d = 0.60$

$y_2 = 2.8 \text{ in}$

$A_o = 1\text{-}3/4''$ PIPE

$= 0.00307 \text{ FT}^2$

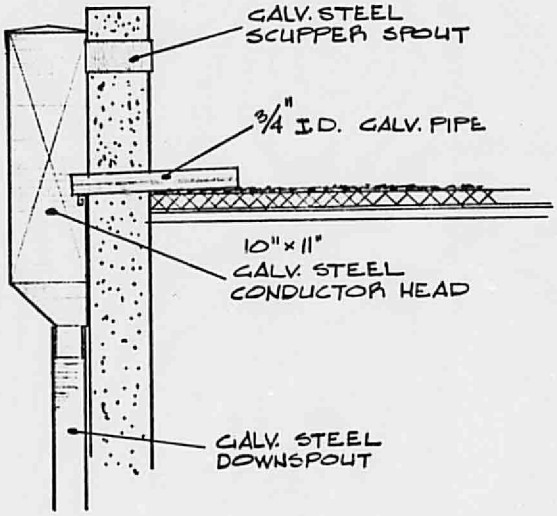
$t = 30046 \text{ SEC} = 8.34 \text{ hr.}$



TOP ELEVATION

DETAIL: TYPICAL ROOF OUTLET

scale - 3/4" = 1'



SECTION A-A
TYPICAL ROOF OUTLET

Drainage from Outside Property

Outside drainage that might cross the property in question exists on the east boundaries only. Elevation differences keep water from entering on the south and west property lines. Storm water runoff that is produced in subdivisions lying to the north of Montgomery is channeled past the property by Montgomery. Storm water runoff that might cross the east boundary of this tract is minimal due to the channeling effects of Tramway Boulevard. Therefore the only outside drainage considered was the vacant lot on the northeast corner of this tract, and a small one acre area lying on the east of Tramway. The total generated runoff from these areas is 5.98 cfs.

DRAINAGE AFTER DEVELOPMENT.

DRAINAGE AFTER DEVELOPMENT is similiar to that shown on the plat.

BIBLIOGRAPHY

1. DATA BOOK FOR CIVIL ENGINEERS, DESIGN
Vol. 1; SEELYE, ELWYN E. 1948
P 5-00, 5-25

2. 1963 MASTER PLAN OF DRAINAGE FOR CITY OF ALBUQUERQUE AND ITS ENVIRONS
HERKENHOFF AND ASS. GORDEN . 1963

3. FLUID MECHANICS 4TH EDIT; McGRAW HILL;
STREETER, VICTOR L. ; 1966
P 423-426

4. CIVIL ENGINEERING HANDBOOK 2ND EDIT
URQUHART
P 290.

BIBLIOGRAPHY

1. DATA BOOK FOR CIVIL ENGINEERS, DESIGN Vol. 1; SEELYE, ELWYN E. 1948
P 5-00, 5-25

2. 1963 MASTER PLAN OF DRAINAGE FOR CITY OF ALBUQUERQUE AND ITS ENVIRONS
HERKENHOFF AND ASS. GORDEN . 1963

3. FLUID MECHANICS 4th EDIT.; McGRAW HILL; STREETER, VICTOR L. ; 1966
P 423-426

4. CIVIL ENGINEERING HANDBOOK 2ND EDIT
URQUHART
P 290.

Pa Monroney Westman 4125 Carlisle

78731 GRANT OF EASEMENT FOR DRAINAGE, WATER, SEWER AND PUBLIC UTILITIES

D - 654

THIS INDENTURE made and executed this 11th day of August, 1975, by and between GARY L. WATSON COMPANY, INC in the County of Bernalillo and State of New Mexico hereinafter called the Grantors and THE CITY OF ALBUQUERQUE, NEW MEXICO, a municipal corporation, hereinafter called Grantee.

WITNESSETH, that for good and valuable consideration the receipt of which is hereby acknowledged the Grantors have this day bargained and sold by these presents do sell, convey and deliver unto the City of Albuquerque a permanent easement as right-of-way including the permanent right to enter upon the real estate hereinafter described at any time that it may see fit and construct, maintain and repair, drainage ditches, water lines, sanitary sewer lines and public utilities across, through, and under the lands hereinafter described and the further right to remove trees, bushes, undergrowth and obstructions interfering with the location, construction and maintenance of said utilities.

The land affected by the grant of this easement and right-of way is located in the County of Bernalillo and State of New Mexico and is more particularly described as follows:

The southerly twenty-five (25) feet of La Charles Townhouses, as the same is shown and designated on the replat thereof, filed in the office of the County Clerk of Bernalillo County, New Mexico, on January 8, 1975.

TO HAVE AND TO HOLD the said right and easement for the uses and purposes aforesaid, unto Grantee its successors and assigns for so long as said easement shall not be abandoned for use as a right-of-way for aforesaid utilities.

The Grantors do hereby covenant with Grantee that they are lawfully seized and possessed of the real estate above described and that they have a good and lawful right to convey it or any part thereof, that it is free from all encumbrances except those of record and taxes due and owing the Treasurer of Bernalillo County and that they will forever warrant and defend the title thereto against the lawful claims of all persons whomsoever.

Page Two
Grant of Easement

As a part of the consideration for this grant, the Grantors do hereby release any and all claims for damages for whatsoever cause incidental to the exercise of the rights herein granted provided, however, that the Grantee agrees to save Grantors harmless from any and all liability that may arise as a result of the construction and use of the easement for the purposes set forth.

Said easement is subject to, and in conjunction with, other grants of easements heretofore granted over the above described real estate.

IN WITNESS WHEREOF, the parties have set their hands and seals this 11 day of August, 1975.

ATTEST:

Carol E. Watson, Secretary

GARY L. WATSON COMPANY, INC.

Gary L. Watson, President

STATE OF NEW MEXICO
COUNTY OF BERNALILLO } ss.

The foregoing instrument was acknowledged before me this 11 day of August, 1975, by Gary L. Watson and Carol E. Watson

Notary Public

My Commission expires:
May 5, 1977

State of New Mexico
County of Bernalillo } SS
This instrument was filed for record on
3:51 AUG 11 1975
At ...o'clock ... recorded in Vol. 434
of records of said County Folio. 654-655
.....Clerk & Recorder
..... Deputy Clerk

DRAINAGE REPORT

CIBOLA VILLAGE

SUBDIVISION AND APARTMENT COMPLEX

APRIL 1975

BOHANNAN WESTMAN HUSTON

DRAINAGE REPORT

CIBOLA VILLAGE

SUBDIVISION AND APARTMENT COMPLEX

APRIL 1975

BOHANNAN WESTMAN HUSTON

DRAINAGE REPORT

CIBOLA VILLAGE

SUBDIVISION AND APARTMENT COMPLEX

APRIL 1975

BOHANNAN WESTMAN HUSTON & ASSOCIATES INC.

Received Jan 5, 76

AMENDMENT TO DRAINAGE REPORT

CIBOLA VILLAGE

SUBDIVISION AND APARTMENT COMPLEX

(DATED APRIL, 1975)

DECEMBER 15, 1975

STATE OF NEW MEXICO
MICHIAL M. EMERY
No. 5194
REGISTERED PROFESSIONAL ENGINEER

Michial M. Emery

MICHIAL M. EMERY
N.M.P.E. NO. 5194

AMENDMENT TO DRAINAGE REPORT

This Amendment concerns only the apartment complex.

The original report assumed that all water falling on the apartment complex roofs was totally retained and evaporated. Federal financing for the complex was applied for and the reviewing agency objected to this approach. The following analysis revised the original assumptions by assuming all water from the roofs reached the ponding area.

Included are the revised inflow hydrograph analysis, the analysis of the retention pond outlet, the grading plan for the retention pond, and details of the retention pond outlet structures.

COMPUTATIONS

SIZING OF PONDING AREA – CIBOLA VILLAGE APTS.

ASSUMPTIONS: NO RETENTION IN ANY AREA
C = .95 (ASPHALT, CONCRETE & ROOFS)
C = .35 (GRASS & PERVIOUS AREA)

SITE PARAMETERS:

TOTAL DRAINAGE AREA = 6.22 ACRES
IMPERVIOUS AREA = 4.48 ACRES
PERVIOUS AREA = 1.74 ACRES

WEIGHTED RUN-OFF FACTOR:

$$C_w = \frac{(.95)(4.48) + (.35)(1.74)}{6.22} = .78$$

485

PROJECT NAME Cibola Village Apts
PROJECT NO. 75-137
SUBJECT [illegible]
SHEET 1 OF 4
BY MMC DATE Dec 75
CH'D ____ DATE ____

POND OUTLET DESIGN

USE ORIFICE CONTROL FOR OUTLET DESIGN.

$Q = C a \sqrt{2gh}$

Q = Desired flow rate (4 CFS)

C = orifice discharge coefficient (.82)

g = 32.2

h = head above ℄ of outlet (4.5 feet)

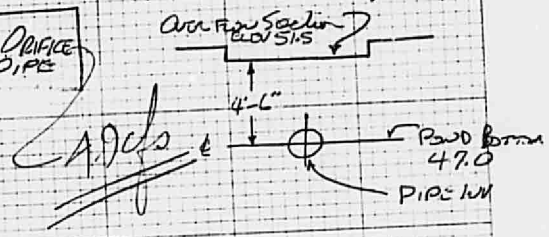
$a = \frac{Q}{C\sqrt{2gh}} = .2865 \text{ FT}^2$

$a = \pi R^2$

$R = \sqrt{a/\pi} = .302 \text{ FT}$

DIA = .604 FT = 7.25 IN.

USE 3" DIA OUTLET ORIFICE
1-1/2" DIA OUTLET PIPE

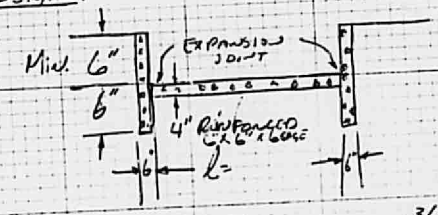


OVER FLOW SECTION DESIGN

ASSUME THE OUTLET CLOGS, THE POND FILLS WITH WATER AND THE OVER-FLOW SECTION MUST PASS THE RESULTING PEAK FLOW.

SEE POND VOLUME CALCULATIONS:
THE POND FILLS IN APPROXIMATELY 20 MIN., WITH AN INFLOW OF 20.13 CFS AT THAT TIME.

DESIGN A BROAD CRESTED WEIR LENGTH TO PASS 20. CFS.



$Q = 3.037 L H^{3/2}$

$L = \frac{Q}{3.037 H^{3/2}}$

$= \frac{20}{(3.037)(.5)^{3/2}}$

$= 18. \text{ FT}$

PROJECT NAME _____ SHEET ____ OF ____
PROJECT NO. _____ BY ____ DATE ____
SUBJECT _____ CH'D ____ DATE ____

COMPUTE CONCENTRATION TIME

Slope Ave = $\frac{72 - 48}{260 + 460} = \frac{24}{720} = 3.3\%$

For 720 Feet @ 3.3% on Paved Area

T_c = 7.6 Minutes (From Seelye)

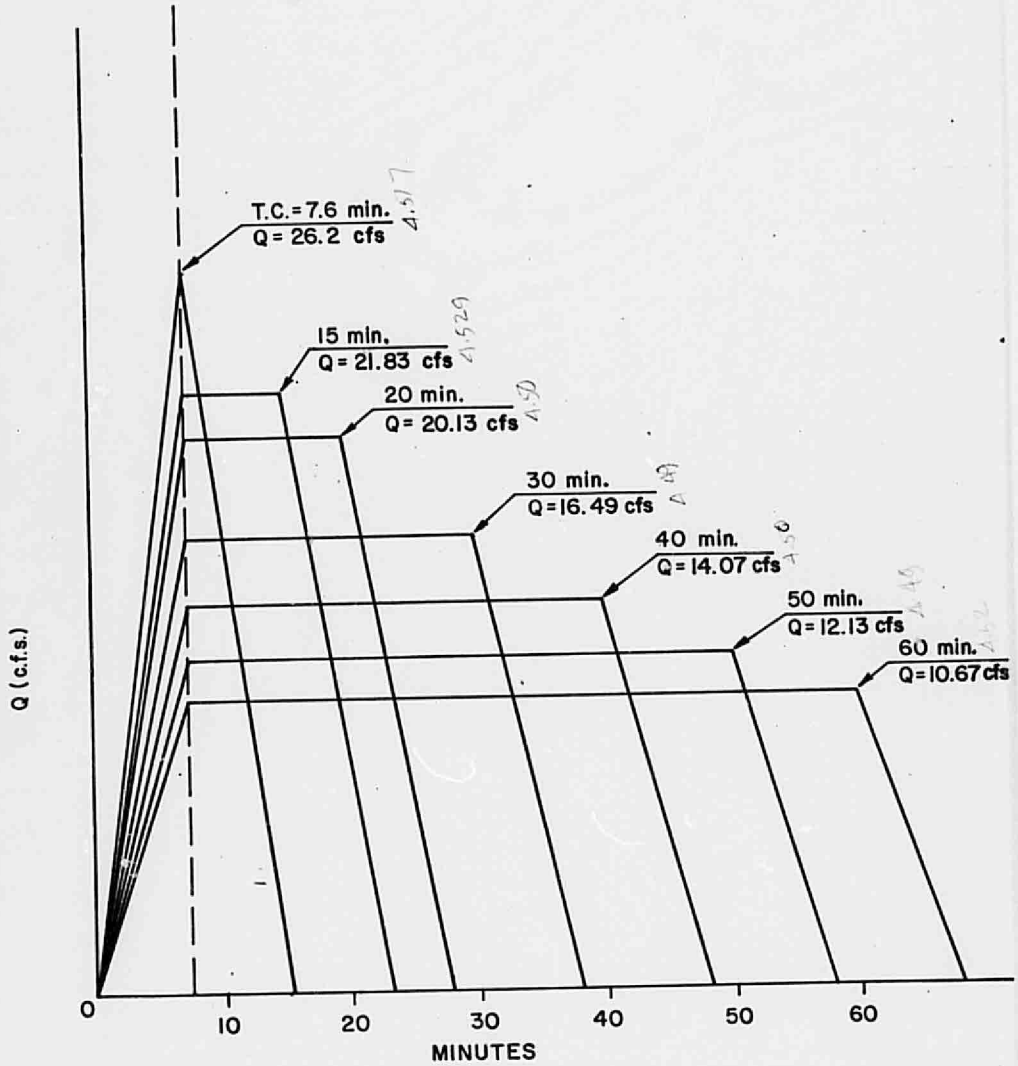
POND VOLUME REQUIREMENTS

100 YR. STORM DURATION (min.)	INTENSITY[1.] (in./hr.)	PEAK[2.] FLOW RATE (cfs)	STORM[3.] RUNOFF VOLUME (ft.^{3})	RELEASE FLOW[4.] (ft.^{3})	REQUIRED STORAGE VOLUME (ft.^{3})
7.6 (T_c)	5.40	26.20	11,947	1,824	10,123
15	4.50	21.83	19,647	3,600	16,047
20	4.15	20.13	24,156	4,800	19,356
30	3.40	16.49	29,682	7,200	22,482
40	2.90	14.07	33,768	9,600	24,168
*50	2.50	12.13	36,390	12,000	24,390
60	2.20	10.67	38,412	14,400	24,012

*(Critical Storm Duration)

1. From Chart I, Intensity Duration Curve, Master Plan of Drainage, City of Albuquerque.
2. Q = CIA = (.78) (I) (6.22) = 4.85 I.
3. See attached graph of Flow vs. Time used to compute volume.
4. Based on a 4 cfs release rate. This rate is less than existing flows but can still be accomodated in area available for ponding.

∴ Provide 24,400 feet^3 storage with free board to control discharge to 4 cfs.



INFLOW HYDROGRAPH
TO RETENTION POND

AMENDMENT #1

DRAINAGE REPORT

FOR

CIBOLA VILLAGE
SUBDIVISION AND APARTMENT COMPLEX

Discussions with Mr. John Robert of AMAFCA, and Mr. Kleston Laws of the city of Albuquerque indicated that the magnitude of drainage coming off the subdivision portrayed in the original drainage report was not acceptable or in compliance with the 1972 Drainage Resolution. Analysis of methods which could be used to reduce flows to approximate those coming off the original property indicated that lot ponding from the setback line to the rear lot line would adequately control flows from the subdivision to existing values.

Enclosed is Table I which indicates the total resulting flows from the undeveloped property. Also enclosed is Amended Table II, indicating flows coming from the property in the developed condition with lot ponding throughout the subdivision from the setback line to the rear lot line. Comparison of the flows from each table indicates that the flow rates from the subdivision after development will be approximately the same as those before development. Enclosed is Amended Plate III displaying the results of the above analysis.

Along the east boundary of the subdivision adjacent to Tramway Boulevard and along the north boundary of the subdivision abutting the Rady Property, swales will be cut to insure storm waters will not undermine walls before improvements in these two areas are made.

Improvements to the easement running to the south off Cibola Drive will be designed and constructed to insure erosion through the area affected by the easement will not occur and that water will not flow to the west along the existing dedicated access.

The easement which discharges to the west from Glen Canyon Court empties into a 50' recreation buffer strip and 7' utility easement dedicated on a plat recorded May 4, 1972. It is proposed that storm runoff be discharged to this area. In the alternative, the drainage easement location can be moved to the central portion of what is now Lot 8 of Block 1 Cibola Village and deposit the storm water into Delmar Avenue. The plan as shown on the Amended Plate III is felt to be preferable. no damage

TABLE 1

RUNOFF FROM UNDEVELOPED PROPERTY

AREA I.D.	AREAS (acres)	CONC. TIME[1.] (min.)	INTENSITY[2.] (in./hr.)	RUNOFF[3.] COEFF.	RESULTING FLOW cfs
I 2.28	2.65	12.20	5.00	.27	3.60
II 7.40	8.45	24.00	3.85	.27	8.80
III 12.01	10.40	27.80	3.60	.27	10.10
IV	10.90	28.30	3.50	.27	10.30
V	8.80	23.40	3.85	.27	9.20
TOTAL					42.00 cfs

Q25 (Charles) = (23.67)(3.3)(.45) = 35.18

Q100 = (23.69)(5.1)(.41) = 57.56

1. Concentration times determined from method outlined in Seelye, Page 18-02. relating slope, distance, and surface type.

2. Intensity from intensity duration curves for the Albuquerque Area Master Plan of Drainage, City of Albuquerque.

3. Runoff coefficients as recommended by Seelye.

AMENDED

TABLE II

RUNOFF FROM DEVELOPED PROPERTY

AREA I.D.[1]	TOTAL AREA (acres)	AREA LESS[2] BACK YARD PONDING (acres)	CONC. TIME (min.)	INTENSITY (in./hr.)	RUNOFF COEFF.	RESULTING FLOW (cfs)
I	4.80	4.80	13.40	4.90	.27	6.40
II	12.40	6.55	8.80	5.40	.59	20.90
I + II	17.20	11.35	22.20	4.00*	.47	21.30
III	(See Sample Calculation for Pond Sizing)					4.00
IV	11.60	6.05		4.00*	.59	14.30
V	1.78	.88		4.00*	.59	2.10
TOTAL - AREAS I-V COMBINED						41.70 cfs

* Intensity for basin of longest concentration time was used to allow peaks from drainage basins to be additive and comparable to existing runoff conditions.

1. Area designations for developed and undeveloped property are not related.

2. Runoff area is reduced by (70' x 95'/43,560) = .15 acres, for each lot on which storm water is ponded.

.15 = .04(43560)

AMENDMENT #2

DRAINAGE REPORT

CIBOLA VILLAGE

SUBDIVISION & APARTMENT COMPLEX

ORIGINAL REPORT PREPARED

APRIL 1975

STATE OF NEW MEXICO
MICHIAL M. EMERY
No. 5194
REGISTERED PROFESSIONAL ENGINEER

Michial M. Emery

MICHIAL M. EMERY, P.E.

AMENDMENT #2

DRAINAGE REPORT
FOR
CIBOLA VILLAGE SUBDIVISION
AND APARTMENT COMPLEX

The purpose of this Amendment is to respond to items listed in the May 14, 1975, letter from the city of Albuquerque concerning the Cibola Village Subdivision Drainage Report. Items will be covered in the order in which they appeared in the referenced letter.

1. Negotiations are presently proceeding with the property owner to the west to obtain an easement for storm waters running out of Glen Canyon Court between Lots 9 & 10, Block 1. If these negotiations are not successful, Lots 8, 9, 10, & 11 will be platted as a tract. This will retain the option to locate the easement at any location along the south 280± feet of the west boundary line at some future date when development plans for the parcel to the west are formulated.

In the interim, drainage flowing west from Glen Canyon Court will be placed in the existing drainage swale that runs through proposed Lot 8, Block 1. This will be accomplished by providing a temporary earth channel within proposed Lot 8 to divert the flow to the existing swale. Flows will be carried to the west in this existing swale.

2. Permission to construct the drainage swale on the Edmond S. Rady Tract will be obtained prior to obtaining building permits.

3. Item #3 was covered in Amendment #1 as to the purpose and intent that will direct the design of the swale running to the south from Cibola Drive.

AMENDMENT #3

DRAINAGE REPORT

CIBOLA VILLAGE

SUBDIVISION AND APARTMENT COMPLEX

ORIGINAL REPORT PREPARED

APRIL 1975

MICHIAL H. EMERY, P.E.

AMENDMENT #3

DRAINAGE REPORT

CIBOLA VILLAGE SUBDIVISION AND APARTMENT COMPLEX

The purpose of this Amendment is to modify plans associated with Item 1 in Amendment #2.

Negotiations with the property owner to the west have been unsuccessful and construction on Lots 8, 9, 10, and 11 of Block 1 can proceed by running sewer lines to the existing manhole in Glen Canyon Road. To accomplish this end, it is requested that the following modifications to the drainage plan be approved:

1. Construct a single C drop inlet and drain line to discharge along the lot line between Lots 5 and 6, Block 1 into the existing arroyo to the west. Under undeveloped conditions, this arroyo receives 10.1 cfs (see Plate 1, enclosed). The single C inlet will deliver approximately 5 cfs to this arroyo, which is less than it would experience at the present time.

2. Allow the remainder of the flow to proceed along Glen Canyon Road to Glen Canyon Court. Realign the easement from Glen Canyon Court to discharge along the lot line between Lots 8 and 9 into the existing arroyo to the west. A residual flow of 9.3 cfs will exit the subdivision at this point. Under undeveloped conditions, the arroyo experiences a flow of 10.3 cfs, which is greater than the developed condition flow.

These modifications meet criteria stated in the 1972 AMAFCA Drainage Resolution.

AMENDMENT #2

DRAINAGE REPORT

CIBOLA VILLAGE

SUBDIVISION & APARTMENT COMPLEX

ORIGINAL REPORT PREPARED

APRIL 1975

STATE OF NEW MEXICO
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MICHIAL M. EMERY, P.E.

AMENDMENT #2

DRAINAGE REPORT
FOR
CIBOLA VILLAGE SUBDIVISION
AND APARTMENT COMPLEX

The purpose of this Amendment is to respond to items listed in the May 14, 1975, letter from the city of Albuquerque concerning the Cibola Village Subdivision Drainage Report. Items will be covered in the order in which they appeared in the referenced letter.

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2. Permission to construct the drainage swale on the Edmond S. Rady Tract will be obtained prior to obtaining building permits.

3. Item #3 was covered in Amendment #1 as to the purpose and intent that will direct the design of the swale running to the south from Cibola Drive.

APPROVED FOR DRAINAGE

14 May 1975
DATE

R H Lewis
SIGNATURE

ACE, Hyd.
TITLE

CONTINGENCIES per attached letter.

AMENDMENT #1

DRAINAGE REPORT

CIBOLA VILLAGE

SUBDIVISION AND APARTMENT COMPLEX

ORIGINAL REPORT PREPARED

APRIL 1975

STATE OF NEW MEXICO
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MICHIAL M. EMERY, P.E.

DRAINAGE REPORT

CIBOLA VILLAGE

SUBDIVISION AND APARTMENT COMPLEX

PREPARED FOR

HOOTEN & STAHL INC., REALTORS
2051 Wyoming Blvd., N.E.
Albuquerque, New Mexico 87112

PREPARED BY

BOHANNAN WESTMAN HUSTON & ASSOCIATES, INC.
4125 Carlisle Blvd., N.E.
Albuquerque, New Mexico 87107

APRIL 1975

STATE OF NEW MEXICO
MICHIAL M. EMERY
No. 5194
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MICHIAL M. EMERY, P.E.

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PLATE II - APARTMENT DRAINAGE MAP

PLATE III - SUBDIVISION DRAINAGE MAP, DEVELOPED CONDITIONS

DRAINAGE REPORT

CIBOLA VILLAGE
SUBDIVISION AND APARTMENT COMPLEX

PURPOSE

The purpose of this report is to provide an acceptable means of developing the property at the southwest corner of Montgomery Boulevard and Tramway Boulevard so that it meets drainage criterion established by AMAFCA and the city of Albuquerque, and so that the subdivision can be developed and graded in an acceptable and economically feasible manner. The subdivision will consist of two types of development. The northwest corner of the subdivision will be developed into a multi-family housing complex. The remainder of the subdivision will be developed as single family residences on lots of approximately 120' deep and 70' wide. A portion of the property immediately adjacent to the intersection of Montgomery and Tramway Boulevards is not to be developed at the present time. Provisions for accepting the drainage from this property have been made in this report. Drainage from this property must be controlled such that flow rates do not exceed those which would be experienced at the present time if flows tabulated in this report are to be valid.

A preliminary plat of the subdivision is shown on Plate I and III. A preliminary layout of the multi-family apartment complex is shown on Plate II.

METHOD

Several methods for the control of flow rates from the property are used. The basic end result to be achieved is to insure that no greater increase in flow rates will be experienced along the west boundary of the

property and that other storm waters will be discharged into drainage facilities which have adequate capacity to handle the additional flows. In achieving these two end results, the basic philosophy of the AMAFCA Drainage Resolution of 1972 will be essentially adhered to.

To achieve this end result in the multi-family housing area, the concept of a controlled discharge ponding area is analyzed. The controlled discharge ponding area in conjunction with long term retention on the apartment house roofs is felt to be an adequate solution to the problem. Throughout the rest of the subdivision where lot ponding is mandatory due to topography, such a design will be employed to insure that the back 70' of each of these lots will be totally retained and infiltrated on the lot itself. Reference to Plate III will indicate which lots will be ponded in this manner.

As much of the flow as possible from the easterly half of the subdivision is transported to the drainage facility that carries water from the Glenwood Hills Subdivision and eventually deposits this water into the I-40 Freeway Channel at Winrock. This result is achieved by carrying water in a southerly direction on Cibola Drive and intercepting all flows from Area 1 and 2 as detailed in Plate III. A small number of lots designated as Area V on Plate III will be allowed to drain down Glen Canyon Road to the south. This drainage does not substantially increase the flows that are experienced on Glen Canyon Road and these flows will very shortly end up in the drainage easement in which Area 1 and 2 discharge. The remainder of the subdivision designated as Area IV is analyzed to determine the flow rates that are experienced by lands to the west from this area.

RESULTS

Demonstrated on Plates I, II, and III are the drainage patterns that will be experienced before and after development. Listed in Table I and II are the flow rates determined in the analysis of these various drainage patterns.

Drainage from the multi-family area can be adequately controlled under the influence of the 100 year storm by providing two features. The first feature is a ponding area on the southwest corner of the complex containing a volume of 12,800 cubic feet below the overflow elevation. A controlled outlet from this pond, which releases 4 cfs, will insure the ponding area can handle flows for the critical 100 year storm duration. (See the sample calculations for the determination of this ponding volume.) In conjunction with this ponding volume, it will also be necessary to insure that long term retention of storm waters on top of the roofs of the apartment and community building complex will be accomplished.

Flows from the easterly half of the subdivision can safely and adequately be carried south on Cibola Drive and discharged through a drainage easement into the facility that carries storm water from Glenwood Hills. Reference to Plate I and III indicates that the discharge at this point was increased from 9.2 cfs under undeveloped conditions to 41.1 cfs under developed conditions. The facility receiving this discharge should have the capacity to handle this small increase in flow rate.

Area V will discharge a maximum of an additional 5 cfs into Glen Canyon Road which will be carried to the south into the drainage facility which services the Glenwood Hills area. This small increase in flow rate should have little or no effect on these facilities.

Reference to Plate III indicates the discharge onto lands to the west from Area 3 and Area 4 totals 33 cfs. Reference to Plate I indicates that the summation of the discharges to the west under undeveloped conditions is 32.8 cfs or approximately the same value that will be experienced under developed conditions. Therefore, the lands to the west will not experience any increase in flow rates due to the proposed development.

CONCLUSIONS

From the above analysis, it is seen that the overall drainage conditions of each area will not be substantially changed and that they essentially meet the requirements of the AMAFCA Resolution. Therefore, we recommend that this drainage master plan be accepted and that further development of the tract be conducted under criterion which it establishes.

TABLE 1

RUNOFF FROM UNDEVELOPED PROPERTY

AREA I.D.	AREAS (acres)	CONC. TIME[1] (min.)	INTENSITY[2] (in./hr.)	RUNOFF[3] COEFF.	RESULTING FLOW cfs
I	2.65	12.20	5.00	.27	3.60
II	8.45	24.00	3.85	.27	8.80
III	10.40	27.80	3.60	.27	10.10
IV	10.90	28.30	3.50	.27	10.30
V	8.80	23.40	3.85	.27	9.20
	41.20				

1. Concentration times determined from method outlined in Seelye, Page 18-02, relating slope, distance, and surface type.

2. Intensity from intensity duration curves for the Albuquerque Area Master Plan of Drainage, City of Albuquerque.

3. Runoff coefficients as recommended by Seelye.

TABLE II

RUNOFF FROM DEVELOPED PROPERTY

AREA I.D.[1]	TOTAL AREA (acres)	AREA LESS[2] BACK YARD PONDING (acres)	CONC. TIME (min.)	INTENSITY (in./hr.)	RUNOFF COEFF.	RESULTING FLOW (cfs)
I	4.80	4.80	13.40	4.90	.27	6.40
II	12.40	10.90	8.80	5.40	.59	34.70
I + II						41.10
III	(See Sample Calculation for Pond Sizing)					4.00
IV	11.60	9.60	12.00	5.10	.59	29.00
V	1.78	1.56	<10 min.	5.40	.59	5.00

30.58
6.36
36.94

dev II + = under V or 41 = .9
dev V appears larger than undeveloped
dev III is under II + I 4 = 12
IV = under III + V 29 = 20

1. Area designations for developed and undeveloped property are not related.

2. Runoff area is reduced by (70' × 70'/43,560) = .11 acres. For each lot on which storm water is ponded, see Plate III.

SAMPLE CALCULATIONS

The following sample calculations are for the multi-family area of the Cibola Village Subdivision. Methods of determining weighted runoff coefficients and concentration times are typical of those used throughout the report. The rational method used for sizing the retention pond is outlined in Special Report No. 43, Practices in Detention of Urban Storm Water Runoff, American Public Works Association, June 1974.

Total Area = 440 x 630 = 6.36 Acres *Includes some of area IV?*
Portion that Drains to South St. = (120) (225) = .62 Acres

Total Roof Retention (Apts.)	52,140 Feet^2
Less Two Unit A	2,040
Net	50,100 Feet^2
Plus Clubhouse	4,000 Feet^2
Total Roof Ponding	54,100 Feet^2 = 1.24 Acres

∴ Total Area	= 6.36 Acres
Less Area that Drains South	= - .62 Acres
Less Rooftops	= -1.24 Acres — *can you just leave water on roofs to evaporate*
Total Runoff Area	4.50 Acres

Breakdown of Runoff Area

Asphalt and Sidewalks ≅ 75' x 1,570' = 117,750 Feet^2
= 2.70 Acres

Grass Area = 4.5 - 2.7 = 1.8 Acres

DETERMINE WEIGHTED RUNOFF COEFFICIENT

Asphalt and Concrete C = .95 } From Seelye
Grass C = .35 }

Weighted $C_w = \frac{(.95)\ (2.7) + (1.8)\ (.35)}{4.5}$

$C_w = .71$

HYDROLOGY G22/D1 2 of 2 1 PLAN

COMPUTE CONCENTRATION TIME

Slope Ave = $\frac{72 - 48}{260 + 460} = \frac{24}{720} = 3.3\%$

For 720 Feet @ 3.3% on Paved Area

T_c = 7.6 Minutes (From Seelye)

POND VOLUME REQUIREMENTS

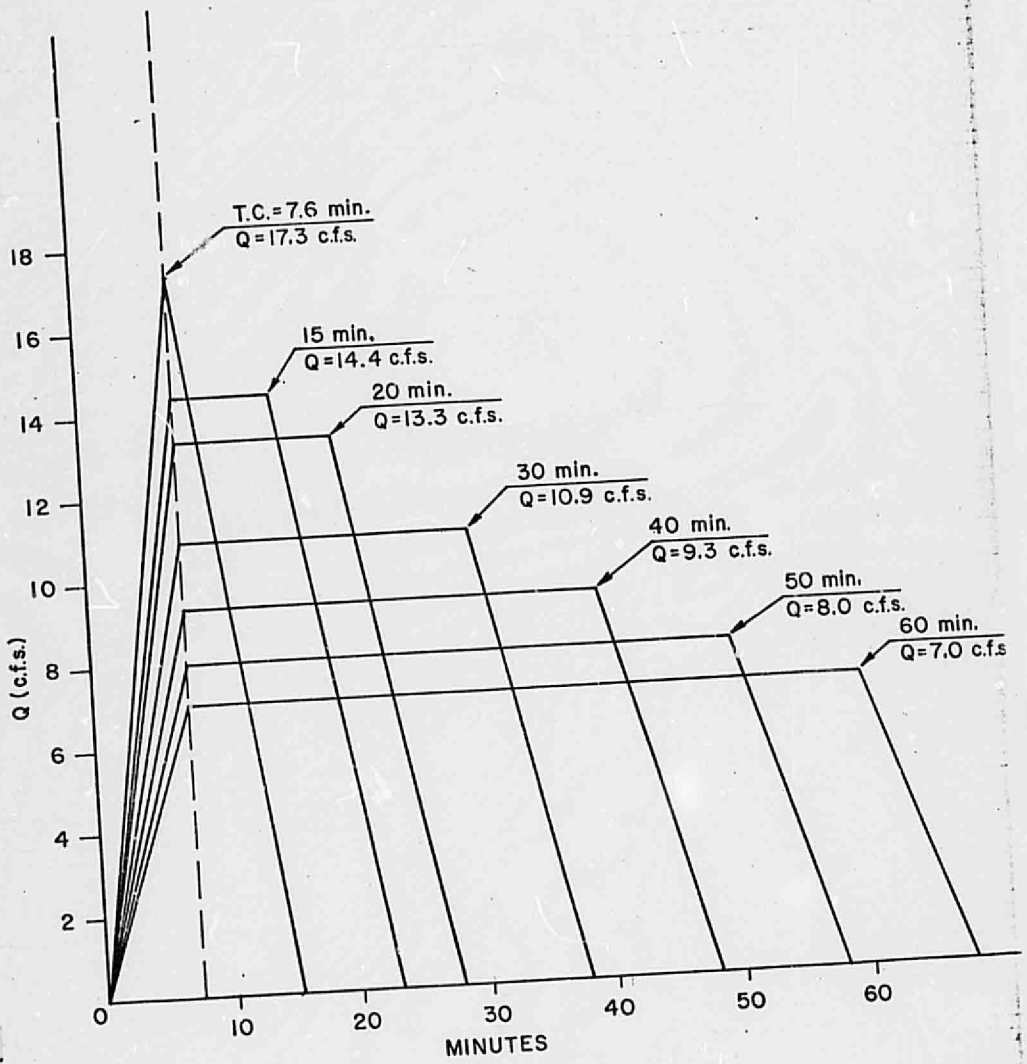
100 YR. STORM DURATION (min.)	INTENSITY[1]. (in./hr.)	PEAK[2]. FLOW RATE (cfs)	STORM[3]. RUNOFF VOLUME (ft.3)	RELEASE FLOW[4]. (ft.3)	REQUIRED STORAGE VOLUME (ft.3)
7.6 (T_c)	5.40	17.30	7,889	1,824	6,065
15	4.50	14.40	12,960	3,600	9,360
20	4.15	13.30	15,960	4,800	11,160
30	3.40	10.90	19,620	7,200	12,420
*40	2.90	9.30	22,320	9,600	12,720
50	2.50	8.00	24,000	12,000	12,000
60	2.20	7.00	25,200	14,400	10,800

*(Critical Storm Duration)

1. From Chart !, Intensity Duration Curve, Master Plan of Drainage, City of Albuquerque.
2. Q = CIA = (.71) (I) (4.5)
3. See attached graph of Flow vs. Time used to compute volume.
4. Based on a 4 cfs release rate. This rate is less than existing flows but can still be accomodated in area available for ponding.

∴ Provide 12,800 feet^3 storage with free board to control discharge to 4 cfs.

how that really determines what you say will work.



INFLOW HYDROGRAPH
TO RETENTION POND

BOHANNAN WESTMAN HUSTON & ASSOCIATES, INC.