



## City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

August 28, 1979

H19-05

Mr. Ron Ray Bohannon  
Bohannon-Huston, Inc.  
4125 Carlisle Blvd. N.E.  
Albuquerque, N.M. 87107

Re: Home Planning Office Drainage Report

Dear Ron:

The above-referenced drainage report is approved.

Sincerely,

Fred Aguirre  
Assistant Hydrology Engineer

FA/ls

cc - Dick Heller  
Richard Leonard  
Bruno Conegliano  
Drainage File

MUNICIPAL DEVELOPMENT DEPARTMENT

Richard S. Heller, P.E., City Engineer

ENGINEERING DIVISION

Telephone (505) 786-7441

RECEIVED

JUL 24 1979

July 23, 1979

CITY ENGINEER

LRF

Mr. Bruno Conegliano  
City Hydrologist  
City of Albuquerque  
P.O. Box 1293  
Albuquerque, NM 87103

H 19 - DS

Re: Home Planning Office Drainage Report

Dear Mr. Conegliano:

In reply to your letter dated July 9, 1979, the following items are being transmitted at your request.

1. The map indicating the upland basin in which the said office site is located.
2. The input information used in the HP65 program for street depth and a xerox of the HP65 program.
3. The new calculations using a grassed landscaping area with sheet flow onto the respective street.
4. The revised grading plan.

We also offer the following comments: In the letter, you stated that the volume required for required ponding was estimated at 2000 cu. ft. which is true if the difference between developed runoff and predeveloped runoff was totally ponded. The drainage report, however, was stated as using a control discharge solution and the APWA modified rational method was employed to determine the maximum volume retained during the 100-year storm, as determined in the original drainage report. As shown in the calculations, the maximum volume was determined at 730 cu. ft. The revised calculations utilize 1930 cu. ft. of detention volume with discharge of 1.35 cfs from the site. This discharge is less than the original predeveloped flow rate of 2.78 cfs.


The revised grading plan indicates the limits of pond and the volume of the pond in accordance with your request.

During the 100-year event, the 36" storm sewer in Candelaria will be full as you stated, but during the 10-year flow it will be able to pick up the flow rate off the site and convey the water into the storm sewer.

Mr. Bruno Conegliano  
July 20, 1979  
Page 2

If there are any questions, please contact Ron R. Bohannon or me at this office.

Sincerely,

A handwritten signature in cursive script, reading "Michial M. Emery". The signature is written in dark ink and is positioned above the printed name and title.

Michial M. Emery, P.E.  
Vice President

Enclosures

cc: Mr. Jim Stephens

RRB/rv  
Job No. 79-077



## City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

MAYOR

David Rusk

July 9, 1979

*Drainage  
Site  
Home Planning*

Mr. Ron Roy Bohannon  
Bohannon-Huston, Inc.  
4125 Carlisle Blvd. N.E.  
Albuquerque, N.M. 87107

Re: Home Planning Office Drainage Report

Dear Mr. Bohannon:

A review of the drainage report has resulted in the following observations:

Since only 3664 sq. ft. of the 22,000 sq. ft. presently undisturbed ground will be landscaped (the remainder being paved or impervious) sufficient ponding volume must be supplied to compensate for the increased imperviousness. The ponding volume required is estimated in 2,000 cu. ft. rather than the 730 cu. ft. indicated in the report; this volume can be provided with a detention area in the parking lot, if the release rate will allow the emptying of the pond in no less than 24 hours. Alternatively, a french drain as shown in the attached sketch, can supply the ponding requirement. A combination of the two alternatives would also be acceptable.

Secondly, the depth and velocity data for the 100 year flow in Candelaria seem inconsistent with the estimated discharges. Please supply a verification of the computed 25.5 ft. per second velocity for the anticipated flow. Please submit also a map outlining the watershed that has been considered to be draining in Candelaria. With regard to the details that have been supplied with the report, I note that the ponding area is not clearly identified to allow the verification of the computations for ponding capacities. Additionally, geometric configuration of the ponding area will be needed for both sections and computations to demonstrate required pond volume.

The site grading plan indicates the proposed landscaped area on the west and north sides of the building drains directly to the adjoining streets. However, the calculations use this area in adjusting "C" value of the area contributing to the pond area. The use of this landscaped area in determining the complete "C" is inappropriate. Additionally, the drainage report must account for southwestern landscaping underlain with polyethylene film, or should state the intended type of landscaping.



Mr. Bohannon

-2-

July 9, 1979

In general, since the main purpose of the storm sewer in Candelaria Road is for the provision of public drainage, no part of its capacity can be preempted for the rapid drainage of the overflow from the pond area within private property.

The title page of the report incorrectly states the location of the site.

Very truly yours,

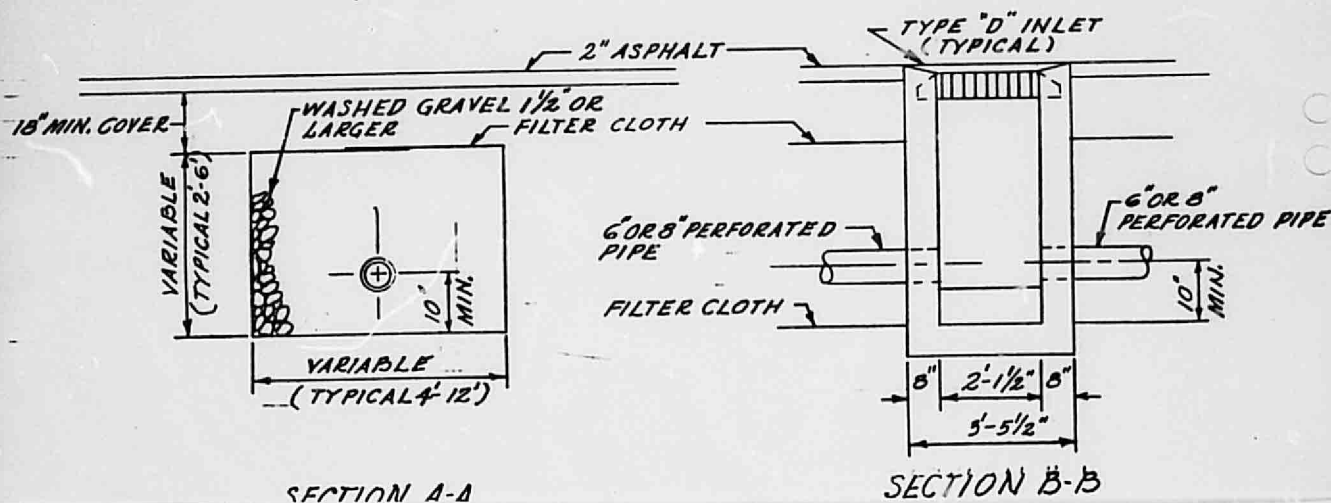
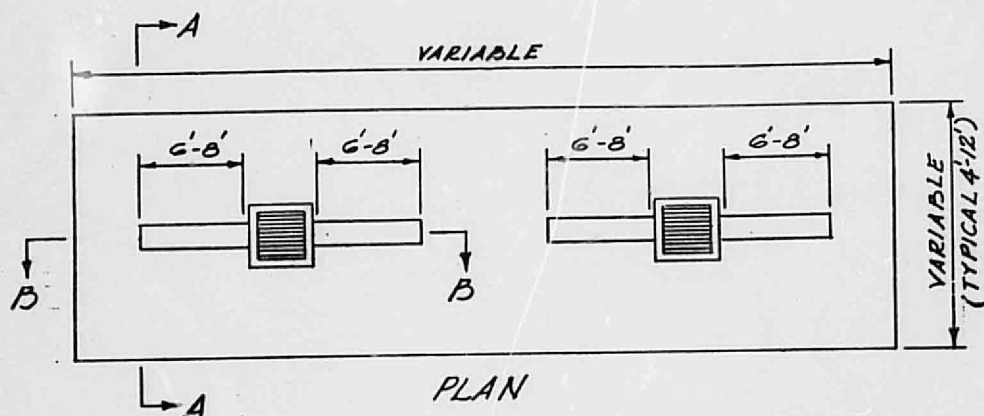


Bruno Conegliano  
Assistant City Engineer-Hydrology

BC/fs

cc - Richard Heller  
Rich Leonard  
Drainage File

NOT TO SCALE



BOHANNAN-HUSTON INC.



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

ENGINEERS & PHOTOGRAMMETRISTS

July 2, 1979

RECEIVED  
JUL 12 1979  
CITY ENGINEER

Mr. Bruno Conegliano  
City Hydrologist  
City of Albuquerque  
P.O. Box 1293  
Albuquerque, NM 87103

Re: Home Planning Office Drainage Report

Dear Mr. Conegliano:

This is to remind you that the above-referenced drainage report was submitted to your office on May 23, 1979, and to this date we have not received either verbal or written comments.

If there is anything that would expedite the review process, please do not hesitate to call either Ron R. Bohannon or me of this office.

Sincerely,

Michial M. Emery, P.E.  
Vice President

cc: Mr. Jim Stephens  
Mr. Jim Stremel

RRB/rv  
Job No. 79-077

BOHANNAN-HUSTON INC.



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

ENGINEERS & PHOTOGRAMMETRISTS

June 18, 1979

**RECEIVED**

**JUN 19 1979**

**CITY ENGINEER**

Mr. Bruno Conegliano  
City Hydrologist  
City of Albuquerque  
P.O. Box 1293  
Albuquerque, NM 87103

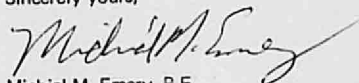
RE: Home Planning Office Drainage Report

Dear Mr. Conegliano:

It is our understanding that the City Engineering staff is under a tremendous workload. With this understanding, we would just like to remind you that the above-referenced subdivision has been in for review for three (3) weeks. If it would save time, or reduce your workload, a meeting could be scheduled to review the referenced drainage report with the appropriate action taken thereafter.

If there are any questions or you need to schedule a meeting, please contact Ron R. Bohannan of this office.

Sincerely yours,

  
Michial M. Emery, P.E.  
Vice President

cc: Mr. Jim Stephens  
Mr. Jim Stemel

RRB/mn  
Job No. 79-077

### New Developed Drainage

Assume the flow resulting from the grass pervious area will flow directly to the street and the road drainage will flow through the control discharge pond.

Weighted C factor = 95 total impervious

Area to be serviced by pond will equal  
32336 sq. ft. or .74 acres.

New developed flows using rational formula.

$$Q_{dev} = (.74 \times .95) (5.46)$$

$$Q_{dev} = 3.81 \text{ cfs}$$

Volume required to pond as control discharge  
the difference between developed and predeveloped.

$$\frac{(.95 - .62) (2.8) (32336)}{12} = 2490 \text{ cu. ft.}$$

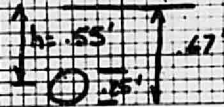
### Outlet condition

Using minimum of 3" diameter determine  
flow rate and ponding drainage time for  
pond to end up completely dry.

$$Q = C_a \sqrt{2gh} \quad \text{from King & Brater 4-10}$$

$$Q = 0.63 \pi \left(\frac{3}{4}\right)^2 \sqrt{64.4 (55)}$$

$$Q = .183 \text{ cfs}$$



PROJECT NAME Home Planning  
PROJECT NO. 77-077  
SUBJECT Drainage Addendum

SHEET 1 OF 2  
BY RLB DATE 7/16/79  
CHK'D \_\_\_\_\_ DATE \_\_\_\_\_

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

$$C = .63 \quad H = .85$$

$$Area = 74$$

$$C = .95$$

$$Q_0 = 3.12$$

$Q_0$   
(cks)

$\Delta S$   
(cu. ft.)

$T_L$   
(min)

Weir  
(ft.)

.35

4404

75

1.36

.50

3827

60

1.95

.75

3096

45

2.92

1.0

2505

30

3.89

→ 1.35

1918

30

5.25

1.50

1756

25

5.84

2.00

1143

20

7.78

2.5

739

15

9.73

2.70

649

15

10.12

\* Volume available from cross sections is approximately 1930 cu. ft. with the modified rational method of flood routing a discharge of 1.35 cks with maximum storage of 1918 cu. ft and a weir 5.25 long will be implemented.

Time to Drain Storage

$$\frac{1918}{1.35} = 1420 \text{ secs or } 24 \text{ min}$$



PROJECT NAME Home Planning  
PROJECT NO. TR-077  
SUBJECT Drainage Addendum

SHEET 2 OF 2  
BY RLB DATE 7/12/76  
CHD DATE



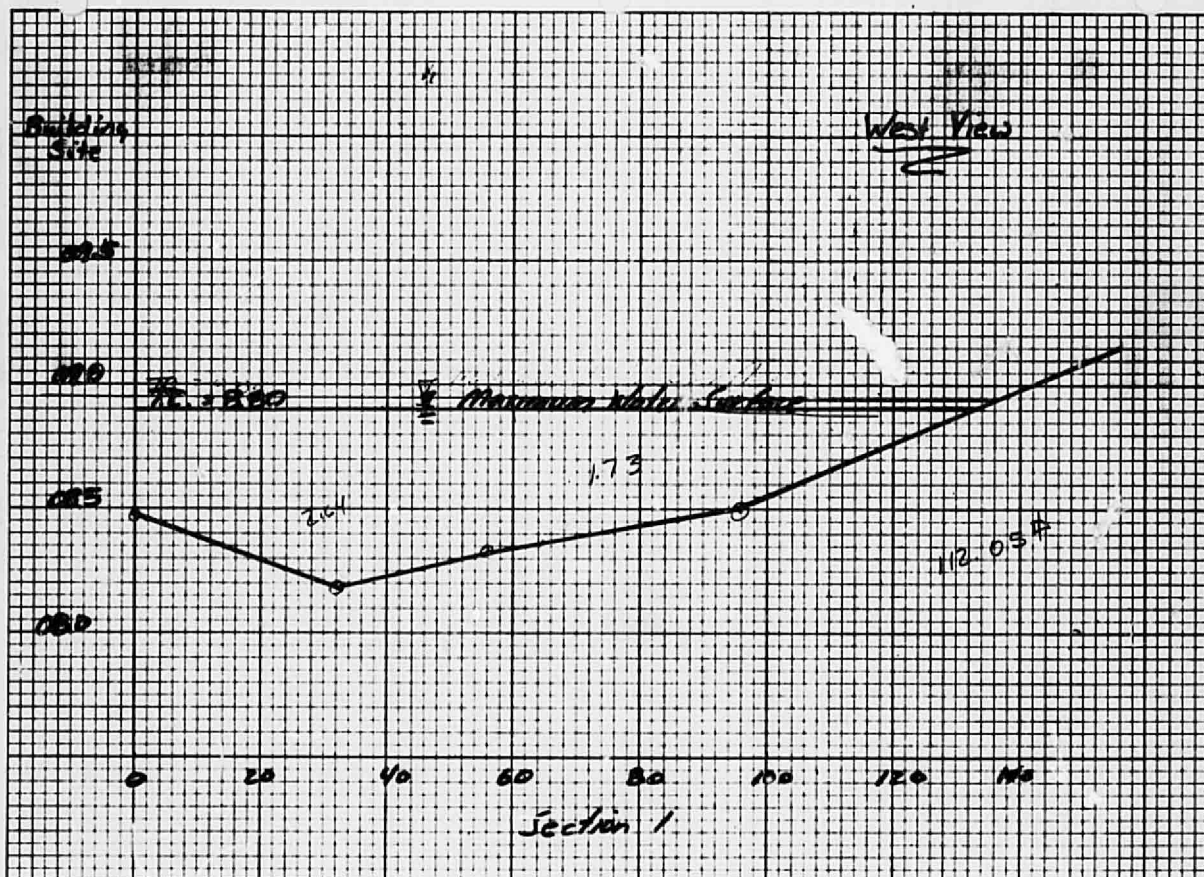
| Section | Area<br>sq. ft. | Area<br>Sq. ft. | Vol.<br>cu. ft.   |
|---------|-----------------|-----------------|-------------------|
| 0+00    | 112.05          | 67.21           | 1348              |
| 0+20    | 22.57           | 16.45           | 329               |
| 0+40    | 10.53           | 7.64            | 152               |
| 0+60    | 4.71            | 3.82            | 76                |
| 0+80    | 2.89            | 1.45            | 29                |
| 1+00    | 0               |                 |                   |
| Total   |                 |                 | 1930 cu. ft.<br>E |



PROJECT NAME Home Planning Ofc SHEET 1 OF 1  
 PROJECT NO. 79-077 BY LRD DATE 7/6/79  
 SUBJECT Volume Cal CHD \_\_\_\_\_ DATE \_\_\_\_\_



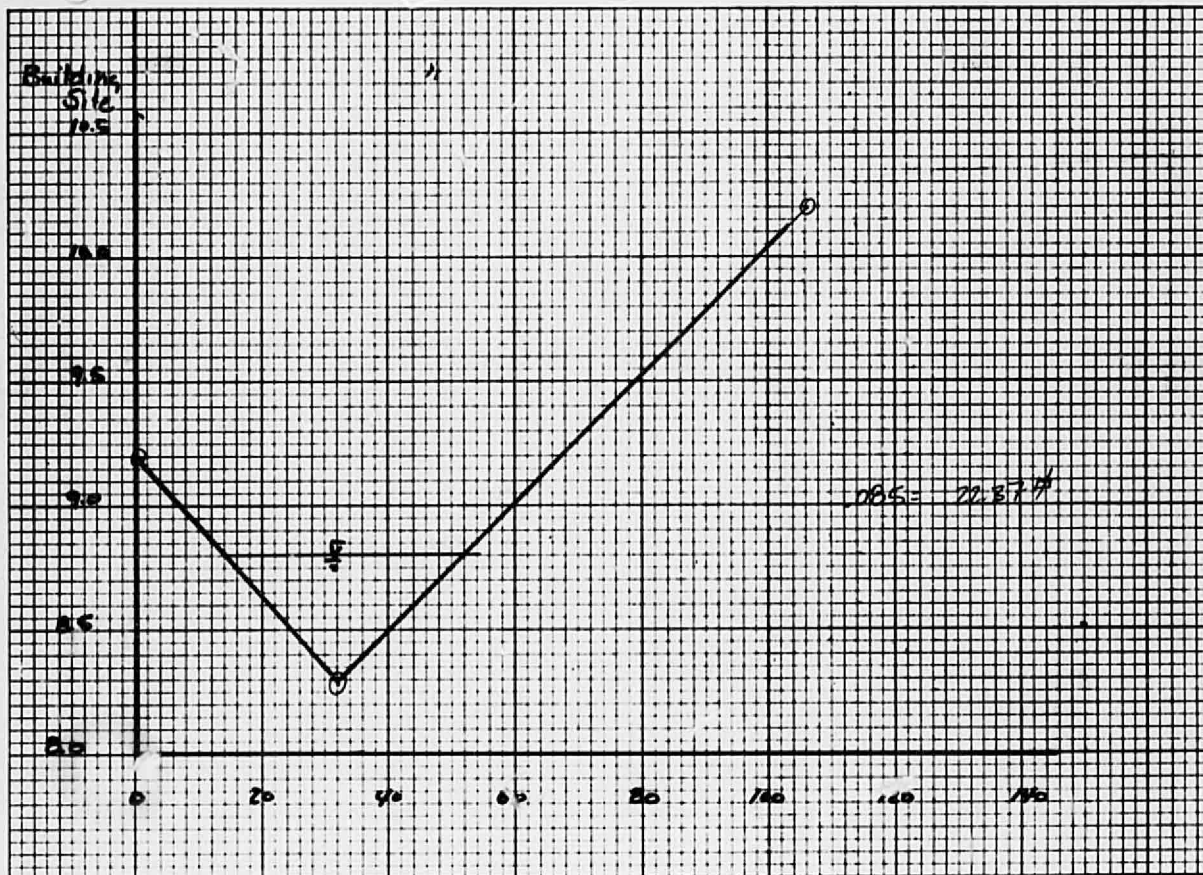
PROJECT NAME Howe Dam, At Spent Street OF 5  
PROJECT NO. 7007 BY RRB DATE 7/1/79  
SUBJECT Reservoir Analysis CND \_\_\_\_\_  
DATE \_\_\_\_\_







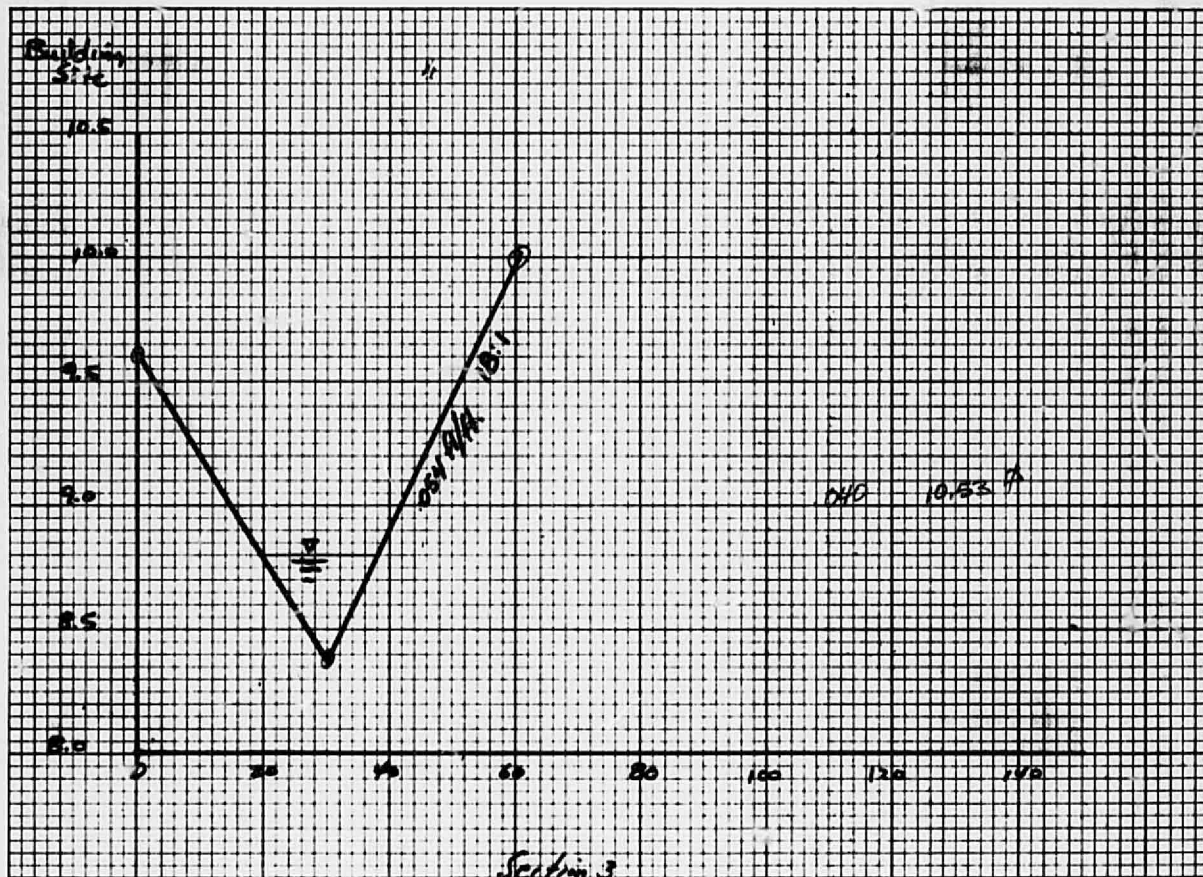
PROJECT NAME \_\_\_\_\_  
PROJECT NO. \_\_\_\_\_  
SUBJECT \_\_\_\_\_  
SHEET 2 OF 5  
BY \_\_\_\_\_ DATE \_\_\_\_\_  
CWD \_\_\_\_\_ DATE \_\_\_\_\_



Section 2

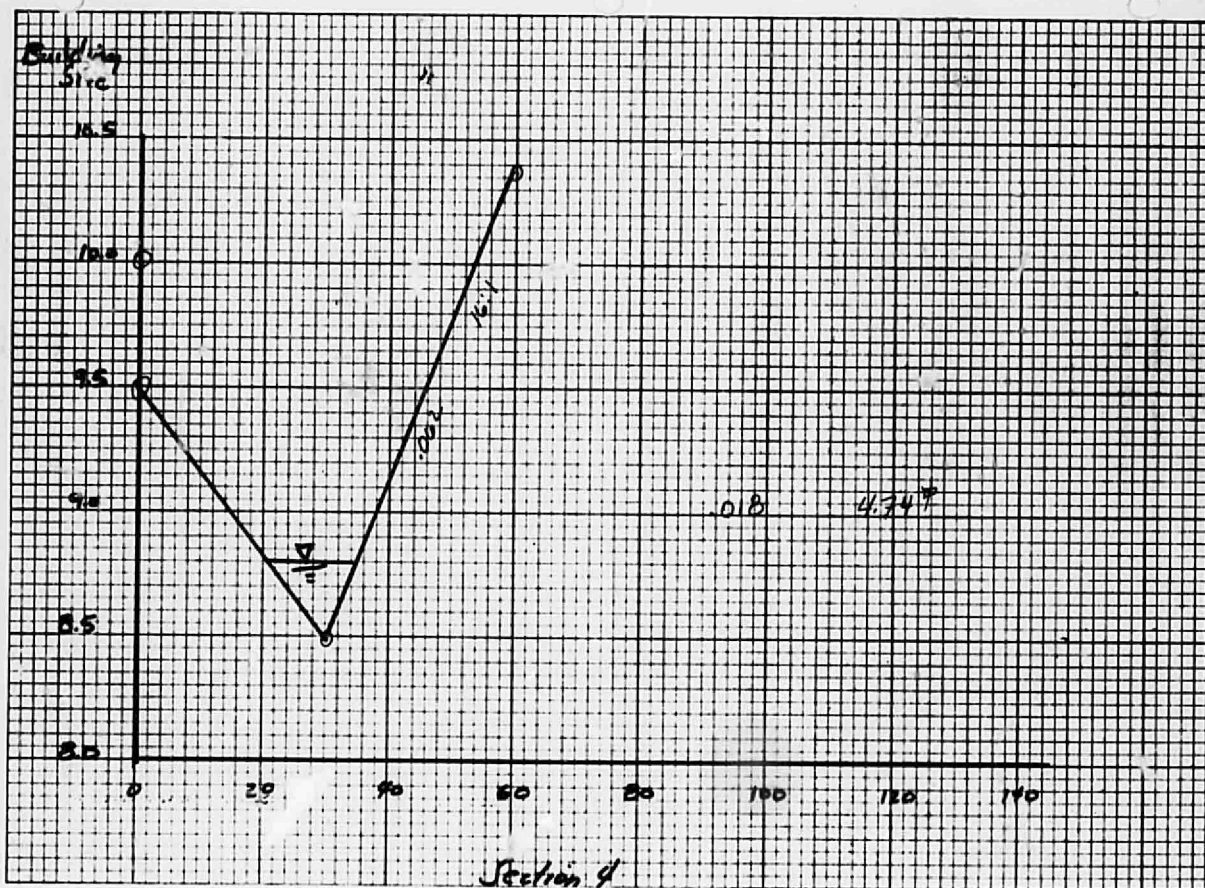


PROJECT NAME \_\_\_\_\_  
PROJECT NO. \_\_\_\_\_  
SHEET 3 OF 5  
BY \_\_\_\_\_ DATE \_\_\_\_\_  
CND \_\_\_\_\_ DATE \_\_\_\_\_



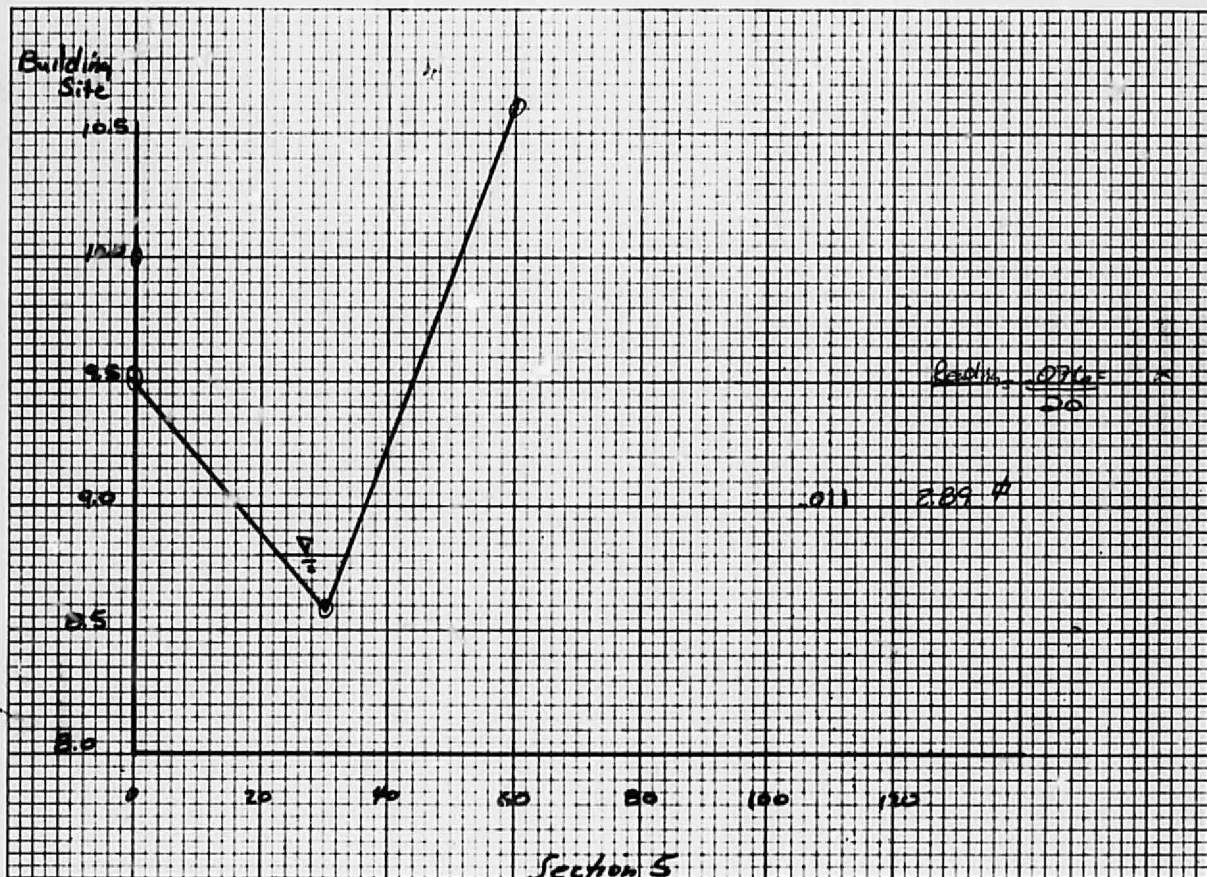


PROJECT NAME \_\_\_\_\_  
PROJECT NO. \_\_\_\_\_  
SUBJECT \_\_\_\_\_  
SHEET 4 OF 5  
BY \_\_\_\_\_ DATE \_\_\_\_\_  
CWD \_\_\_\_\_ DATE \_\_\_\_\_





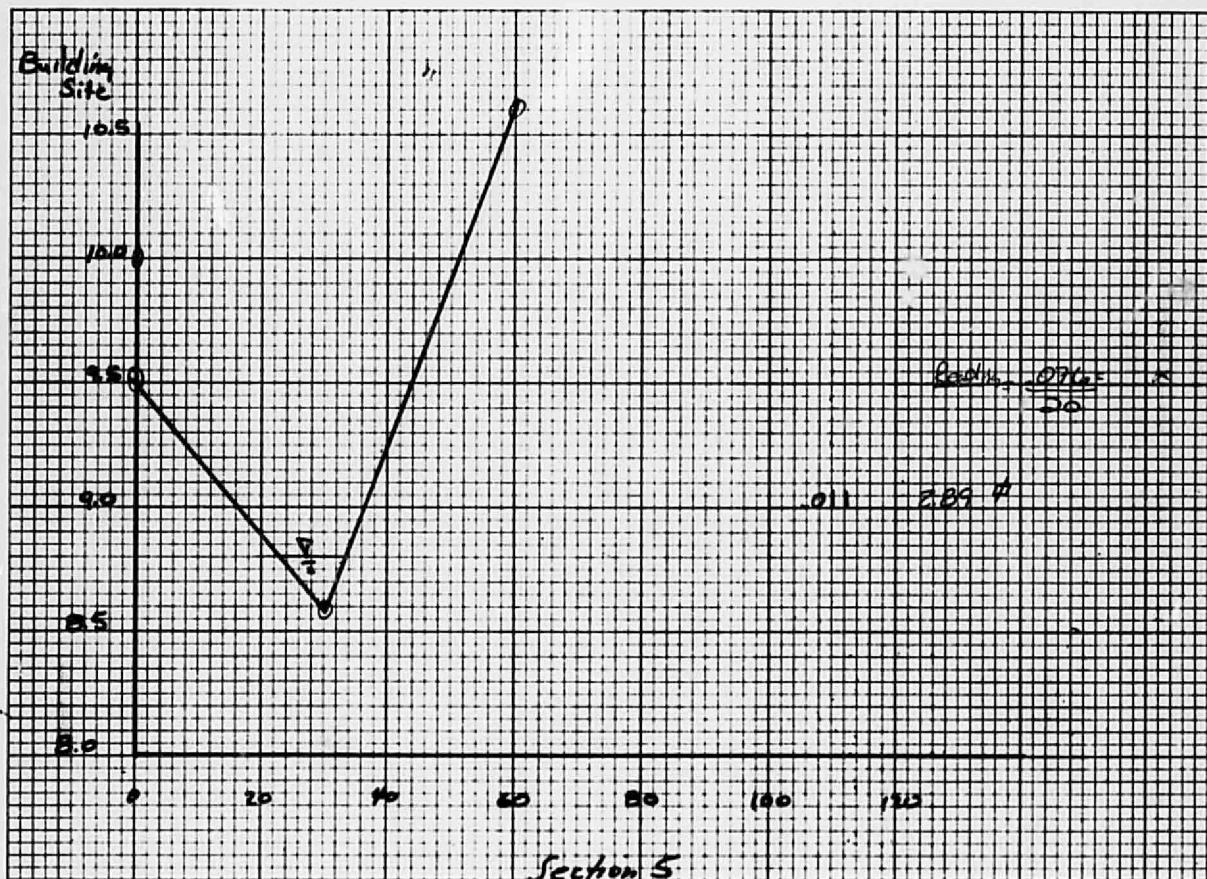
PROJECT NAME \_\_\_\_\_  
PROJECT NO. \_\_\_\_\_  
SUBJECT \_\_\_\_\_  
SHEET 5 OF 5  
BY \_\_\_\_\_ DATE \_\_\_\_\_  
CWD \_\_\_\_\_ DATE \_\_\_\_\_







PROJECT NAME \_\_\_\_\_  
PROJECT NO. \_\_\_\_\_  
SUBJECT \_\_\_\_\_  
BY \_\_\_\_\_  
DATE \_\_\_\_\_  
SHEET 5 OF 5  
DATE \_\_\_\_\_



**BOHANNAN-HUSTON**

DRAINAGE REPORT  
FOR  
OFFICE BUILDING

N.E. CORNER OF  
LOUISIANA & CANDELARIA

**HVC.**

4125 CARLISLE BOULEVARD, NORTHEAST, ALBUQUERQUE, NEW MEXICO 87107 (505) 881-2000



May 23, 1979

Mr. Dick Heiler  
City Engineer  
City of Albuquerque  
P.O. Box 1293  
Albuquerque, NM 87103

Re: Home Planning Office Drainage Report

Dear Mr. Heller:

Enclosed is a copy of the referenced drainage report for the city hydrologist's inspection and comments.

Included in the body of the report and calculations are the 10-year flows, along with the usual 100-year flow calculations. This was inserted to demonstrate the predeveloped and developed impact upon the site and surrounding area for both storm conditions.

In the past, we have presented drainage solutions of total ponding and were required to instigate a controlled discharge solution. We felt it necessary to insure that two items be satisfied for a controlled discharge solution.

1. The flooding that occurred during the 10-year storm could adequately be handled with the existing storm drainage facilities.
2. That the site, in the 100-year storm, discharge the predeveloped flow rate.

As is shown in the report, the 10-year flows can be handled by the existing storm sewer running in Candelaria. Also, the controlled discharge drainage solution does not take into account the volume released from the site, as was the case in the Faith Lutheran Drainage Report, Hope Church Drainage Report, and Christian Science Drainage Report. In all of these cases a total ponding solution was first presented, then requested to be modified to reflect a controlled discharge drainage solution. It is, therefore, our intent to comply with the city's wishes and install a controlled discharge drainage solution.

Sincerely yours,

*Michial M. Emery*  
Michial M. Emery, P.E.  
Vice President

Enclosure

cc: Mr. Jim Stephens  
Mr. Jim Stremel

RRB/js  
Job No. 79-077

DRAINAGE REPORT  
FOR  
OFFICE BUILDING  
N.E. CORNER OF LOUISIANA AND CANDELARIA

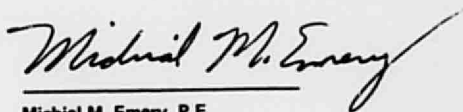
Zone Atlas Sheet No. H-19-Z

PREPARED FOR

Home Planning Development Corporation  
2900 Louisiana Boulevard, N.E.  
Albuquerque, NM 87110

PREPARED BY

Bohannon-Huston, Inc.  
4125 Carlisle Blvd., N.E.  
Albuquerque, NM 87110



Michial M. Emery, P.E.  
N.M.P.E. No. 5194



Date Submitted: \_\_\_\_\_

Date Approved: \_\_\_\_\_

By: \_\_\_\_\_

Job No. 79-077



## TABLE OF CONTENTS

|  |   |
|--|---|
| PURPOSE .....                          | 1 |
| PROJECT LOCATION AND DESCRIPTION ..... | 1 |
| EXISTING UPLAND DRAINAGE .....         | 1 |
| NEW DEVELOPED CONDITIONS .....         | 2 |
| RECOMMENDATIONS AND CONCLUSIONS .....  | 2 |

## APPENDIX

### COMPUTATIONS

## PLATES

- I. Location Map and Existing Topography
- II. Site Grading Plan and Developed Drainage Paths

**DRAINAGE REPORT  
FOR  
OFFICE BUILDING AT THE SOUTHEAST CORNER OF  
LOUISIANA AND CANDELARIA**

**PURPOSE**

The purpose of this drainage report is to adequately address the developed flows from the property during the 100-year rainfall event and to also insure that no potential flooding results from the development of the indicated parcel.

**PROJECT LOCATION AND DESCRIPTION**

The project is located on the southeast corner of Louisiana and Candelaria Boulevard and contains approximately 0.83 acres of land. The site is bordered by existing development on the east known as Village Manor Addition and on the south by an existing SU-1 office space.

The parcel is currently occupied by an abandoned gasoline station and is partially paved. The remainder of the site is pervious area. The site presently has positive drainage from the existing building and paved areas to the street.

**EXISTING UPLAND DRAINAGE**

The site sits in a basin that extends up Candelaria to the top of the basin located approximately at the intersection of the Embudo Arroyo and Candelaria. The basin slopes at a rate of 2% at the office site to approximately 4% near the top of the basin.

An existing storm sewer system is presently in operation and has the following components: A 54" storm sewer pipe lies in Candelaria starting at Pennsylvania and runs up the basin collecting all of its capacity along Candelaria. At Pennsylvania and Candelaria, the 54" storm sewer discharges into an existing 72" storm sewer pipe that runs north in Pennsylvania and discharges into the Hahn Arroyo which is concrete lined.

The capacity of the storm sewer is limited by the slope on the 72" with a capacity of approximately 217 cfs. The 10-year flow occurring at Louisiana and Candelaria

is 289 cfs of which the 217 cfs is transferred to the Hahn Arroyo leaving approximately 72 cfs in Candelaria running west.

At Pennsylvania and Candelaria a 36" storm sewer starts and runs west in Candelaria. The capacity of the storm sewer is approximately 82 cfs. The resulting flows from the 10-year storm at the intersection of Candelaria and Louisiana is carried by existing storm sewers.

It is assumed that the flows, resulting from the 100-year storm, reach Louisiana and Candelaria as follows: The storm sewers as described above, reach capacity and convey approximately 289 cfs off the streets. This leaves approximately 302 cfs from the 100-year flow of 591 cfs flowing in the street. Analyzing the flow passing alongside the subject parcel, it reaches a depth of .84 ft. and a velocity of approximately 25 feet per second.

At present, the parcel has approximately 22,000 sq. ft. of pervious surface and 14,153 sq. ft. of impervious surface. The resulting flows from the 100-year rainfall event and the 10-year rainfall event are 2.78 and 1.38 cfs respectively.

#### **PROPOSED DEVELOPED CONDITIONS**

The proposed new office site will generate an additional 1.21 cfs of flow, draining onto Louisiana Boulevard. As shown in the calculations in the appendix, the required storage volume to detain the additional 1.21 cfs is approximately 730 cu. ft. This will be accomplished in the southeast parking lot with the discharge point being a curb cut with the controlled flow rate discharging onto Louisiana as shown on the grading plan. The outlet will be 1.5' long and 6 inches high, discharging the predeveloped flow rate of 2.78 cfs.

In addition, the pad elevation of the office building should be set one foot above the water surface elevation in Candelaria, as shown on the grading plan. Incorporated into the driveway entrance onto Candelaria is a water block to prevent flow from entering the site from Candelaria Street.

To insure the integrity of the control discharge drainage solution, all roof canals should be situated to drain to the parking lots. The grading of the parking lots will route all flow to the 730 cu. ft. pond and discharge point.

## RECOMMENDATIONS AND CONCLUSIONS

It is our recommendation that the following be accomplished to further protect the site from potential drainage problems:

- 1) Establish the pad elevation for the office building at the grades specified on the grading plan.
- 2) Establish a water block at the entrance onto Candelaria.
- 3) Provide a control discharge solution as shown on the grading plan and discharge 2.78 cfs through the curb cut.
- 4) Provide a curb cut of 1.5 feet long by 6 inches high as shown on the grading plan.
- 5) Route all roof canals to drain to the parking lot to insure the integrity of the control discharge drainage solution.

**COMPUTATIONS**

### Area of Upland Basin

Top of Basin extends to the Embudo Arroyo and at the top the width extends from concrete south to just past concrete. The basin is long narrow extending from the Embudo to the discharge point of Washington Street.

Area = 1.57 planimeter reading

$$\frac{22,957 \text{ sq. ft.}}{1.074} \cdot \frac{1}{1.759} = 540.03 \text{ acres}$$

Area to Louisiana and Candelaria = 540.03 acres

Using an impervious area factor of .55 or a factor of point .55 and the 1962 Master plan for drainage intensity curves for 10 year and 100 year flows.

$$I_{100} = \frac{189}{T_c^{1.25}} = 100 \text{ year flow frequency}$$

$$I_{10} = \frac{91}{T_c^{1.25}} = 10 \text{ year flow frequency}$$

$$T_c = \frac{L}{3600V} \text{ from Peak rates of discharge for small watersheds, SCS page 3-9}$$

$$T_c = \frac{16,822'}{3600(4.0)} = 1.167 \text{ hour} = 70 \text{ min}$$

$$I_{100} = \frac{189}{70^{1.25}} = 1.989 \text{ in/hr. } I_{10} = \frac{91}{70^{1.25}} = .969 \text{ in/hr}$$

$$Q_{100} = (1.989)(540.03)(.55) = 590.7 \text{ cfs at Louisiana and Candelaria}$$

$$Q_{10} = (.969)(540.03)(.55) = 287.8 \text{ cfs}$$



PROJECT NAME  
PROJECT NO.  
SUBJECT

SHEET 1 OF 1  
BY J.L. DATE 11/29/61  
CHKD BY

(See Sheet 2A for Storm Sewer Locations)

There exist at present a 36" storm sewer s.p. in Concalona street with inlet all along Concalona assuming that the storm sewer will have the same slope as the street and considering the pipe capacity on the 36" pipe the following was determined:

$$\frac{Q}{1000} = .050 \text{ ft/ft.}$$

$$Q = \frac{0.463 \text{ d}^{8.5} \text{ s}^{\frac{1}{2}}}{n} \quad 6-36 \text{ s. } 1.64 \text{ ft/ft.}$$

$$Q = \frac{0.463}{.015} (3.0)^{8.5} (.02)^{\frac{1}{2}} = 31.73 \text{ cfs.}$$

$$V = \frac{0.590 \text{ d}^{7.48} \text{ s}^{\frac{1}{2}}}{n} \quad 6-36 \text{ s. } 1.64 \text{ ft/ft.}$$

$$V = \frac{0.590}{.015} (3.0)^{7.48} (.02)^{\frac{1}{2}} = 11.57 \text{ fps.}$$

The storm sewer system at present is a 54" storm sewer pipe above Pennsylvania extending up the main basin. This 54" pipe discharges into a 72" storm sewer pipe in Pennsylvania and discharges into the Main Arroyo.

$$Q_{54} = \frac{0.463}{.015} (4.5)^{8.5} (.02)^{\frac{1}{2}} = 240.22 \text{ cfs.}$$

$$Q_{72} = \frac{0.463}{.015} (7.0)^{8.5} (.0035)^{\frac{1}{2}} = 217.07 \text{ cfs.}$$

Controlling discharge is 72" pipe @ 217.07 cfs. Total flow in storm sewer is equal to approximately 300.0 cfs or totally handles the 10 year flood with no water in the street.



PROJECT NAME  
PROJECT NO.  
SUBJECT

SHEET 3 OF  
BY KLE DATE 7/22/72  
CHKD DATE

THIS REPRODUCTION IS THE BEST POSSIBLE  
REPRODUCTION DUE TO THE POOR QUALITY  
OF THE ORIGINAL DOCUMENT

Hahn Cirroyo



Carthage

72" Storm Sewer  
Existing

54" Storm Sewer  
Existing

Pennsylvania

Existing 50"  
Storm Sewer  
Existing

Office  
Site

Location

Carthage



PROJECT NAME  
PROJECT NO  
SUBJECT

SHEET 51 OF 51  
DATE 4/14/77  
C.D. DATE



Depth of flow during 100 year storm.

Total amount of flow not handled by storm sewer is 590.7 - 300.0 cfs = 291 cfs flowing in canal area. Depth of flow in canal area from an rip program the depth reaches .84 deep with a velocity of 25.5 fps.

Existing drainage of site.

Parcel at present condition is partially paved and all water reaches canal area by way of positive drainage away from existing building.

The area approximately 0.61 acres of paved area.

$$A = 0.83$$

$$C = 14153(1.95) + 23,000(1.4) / 36000 = .62$$

$$I_{100} = 5.40 \text{ in/hr} \quad I_{10} = 2.68 \text{ in/hr}$$

$$Q_{100} = (0.83)(0.62)(5.40) = 2.78 \text{ cfs}$$

$$Q_{10} = (0.83)(0.62)(2.68) = 1.38 \text{ cfs}$$

As is apparent the amount of flow resulting from discharge off this parcel is negligible compared to the existing flows. The 10 year flow will be accepted by the storm sewer since the storm sewer is not flowing at capacity at this point.



PROJECT NAME  
PROJECT NO.  
SUBJECT

SHEET 1 OF 1  
DATE 4/2/77  
CND

### New Developed Drs.nage

The proposed site will increase the amount  
of impervious area and contribute to the runoff.

3664 pervious area  
32,336 impervious area

Weighted C factor

$$(3664)(.40) + 32,336(.95) / 36000 = .89$$

New flows fully developed

$$Q_{100} = (0.83)(.89)(5.40) = 3.99 \text{ cfs}$$

$$Q_{10} = (0.83)(.89)(2.65) = 1.98 \text{ cfs}$$

The increase in runoff from the site to be  
handled is  $3.99 \text{ cfs} - 2.78 \text{ cfs} = 1.21 \text{ cfs}$  to be controlled  
discharged from the site. Using a stage storage graph  
to determine the required storage on site.

| $T_c$ | $V_D$ | $V_R$ | $\Delta S$ |
|-------|-------|-------|------------|
| 10    | 2394  | 1668  | 725        |
| 15    | 3141  | 2502  | 639        |
| 20    | 3723  | 3336  | 387        |

Required storage from 100 year runoff is approximately  
730 cu. ft. of control discharge solution.



PROJECT NAME  
PROJECT NO  
SUBJECT

DATE  
BY  
CHECKED  
DATE

Determining the required diameter for the  
discharge orifice plate from the weir  
equation 4-10

orifice

$$Q = C_a \sqrt{2gh}$$

$$Q = C \pi \frac{d^2}{4} \sqrt{2gh}$$

$$d^2 = \frac{4Q}{C\pi\sqrt{2gh}}$$

$$d = \left( \frac{4Q}{C\pi\sqrt{2gh}} \right)^{1/2}$$

$$d = \left( \frac{4(2.78)}{0.63\pi\sqrt{64.4(1.5)}} \right)^{1/2}$$

$$d = .98 \text{ ft} \approx 10 \text{ ft diameter}$$

Use long weir

$$Q = \frac{2}{3} L \sqrt{64.4} (.5)^{3/2}$$

$$2.78 = \frac{2}{3} L \sqrt{64.4} (.5)^{3/2}$$

$$L = 1.47 \text{ ft use } 1.5 \text{ ft long } .5 \text{ ft high}$$

Instead of using orifice plate use a 1.5 ft long  
by .5 ft high weir with steel cover plate



PROJECT NAME  
PROJECT NO  
SUBJECT

SHEET 5 OF  
BY 118 DOW 4/2/71  
CHKD DATE

**HOME PLANNING OFFICE SITE**

**Albuquerque,  
Bernalillo County, New Mexico**

**DRAINAGE REPORT  
FOR  
HOME PLANNING DEVELOPMENT CO., INC.**

**JUNE 1973**



# **HOME PLANNING OFFICE SITE**

**Albuquerque,  
Bernalillo County, New Mexico**

## **DRAINAGE REPORT FOR HOME PLANNING DEVELOPMENT CO., INC.**

**JUNE 1973**



14 June 1973

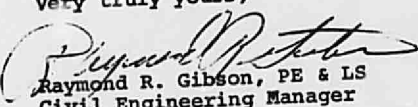
Home Planning Development Corp.  
4201 Carlisle Blvd NE  
Albuquerque, New Mexico 87107

Gentlemen:

We are submitting this Drainage Report to you on the Home Planning Office Site. The control of the runoff shall comply with the requirements of the Albuquerque Metropolitan Arroyo Flood Control Authority and with present City of Albuquerque policies.

We appreciate this opportunity to serve you. If any questions develop, we will be available to assist you in your response.

Very truly yours,

  
Raymond R. Gibson, PE & LS  
Civil Engineering Manager

RRG/teg

Enclosures

BOHANNAN WESTMAN HUSTON &amp; ASSOCIATES INC.

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


DRAINAGE REPORT  
FOR  
HOME PLANNING OFFICE SITE  
CITY OF ALBUQUERQUE  
BERNALILLO COUNTY, NEW MEXICO

JUNE 1973

PREPARED FOR:  
HOME PLANNING DEVELOPMENT Co. Inc.  
4201 CARLISLE BLVD. N.E.  
ALBUQUERQUE, NEW MEXICO 87107

BY  
BOHANNAN WESTMAN HUSTON AND ASSOCIATES, Inc.  
4125 CARLISLE BLVD. N.E.  
ALBUQUERQUE, NEW MEXICO 87107



  
Raymond R. Gibson, PE & LS  
Civil Engineering Manager

INDEX

|                             | PAGE |
|-----------------------------|------|
| I. LOCATION AND DESCRIPTION | 1    |
| II. PROPOSED DEVELOPMENT    | 1    |
| III. COMPUTATIONS           | 1    |
| IV. CONCLUSIONS             | 2    |
| V. BIBLIOGRAPHY             | 3    |

PLATE I SITE LAYOUT



## HOME PLANNING OFFICE SITE

### DRAINAGE STUDY

#### I. LOCATION AND DESCRIPTION

The property under study is a plot of land covering an area of approximately three (3) acres. It is located in the NE corner of the Albuquerque Board of Education Tract. No. 22 described in the Drainage Study submitted by Bohannon Westman Huston & Associates, Inc., in June 1973. A 100-foot Drainage Easement, for Bear Arroyo Tributary, is crossing the property from east to west. The arroyo is an improved channel with the cross-section shown in the above mentioned study.

#### II. PROPOSED DEVELOPMENT

Two (2) office buildings, one on each side of the existing Drainage Easement, are planned to be erected within the three (3) acre site. The land north of the Easement is about 4 feet below the adjacent property to the north and Wyoming Blvd. to the east. Access to this area from Wyoming Blvd. is very difficult if not impossible. It is therefore, proposed to construct a paved dip section across the arroyo and provide an access to the property from Wyoming Blvd. on the south side of the arroyo. (See Plate I). Present runoff from the property discharges into the Bear Arroyo Tributary and flows to the west. After the development, water will continue to leave the property at this point.

#### III. COMPUTATIONS

The rational formula for small drainage areas was used to compute the expected runoff from the developed site. The intensity of rain was determined

from the 100 year frequency curve in the "Master Plan of Drainage" for the City of Albuquerque. Time of concentration was so short that the intensity did not fall on the curve and the value was estimated by extrapolation of the curve. Present runoff from the property, for a 100 year, 6 hour storm is 6.77 cfs computed on the basis of an average slope of 5.0%, a poor grass surface ( $C=.5$ ) and intensity of rain ( $i=4.7$  inches/hr). The expected runoff from the developed area was computed to be 15.82 cfs. An average slope of 2.5% runoff coefficient of 1.00 for paved roads and intensity of rain  $i=7.0$  inches/hr, were used.

#### IV. CONCLUSIONS

A comparison of present runoff in the undeveloped state to the final developed runoff indicates an increase of 9 cfs. The developed runoff was determined under most unfavorable conditions i.e. all areas paved. The drainage of the developed site shall be carried and discharged into the Bear Arroyo Tributary in compliance with the provisions of Paragraph 3(B) of the Drainage Resolution 1972-2 by Albuquerque Metropolitan Arroyo Flood Control Authority. The Bear Arroyo Tributary is an improved channel as shown in Drainage Study of Albuquerque Board of Education Tract No. 22 submitted by Bohannon Westman Huston & Associates, Inc., in June 1973.

V.

BIBLIOGRAPHY

DEPARTMENT OF THE ARMY  
CORPS OF ENGINEERS

"FLOOD PLAIN INFORMATION"  
PART I 1970

WRIGHT-McLAUGHLIN  
ENGINEERS

"URBAN STORM DRAINAGE"  
CRITERIA MANUAL - VOLUME I  
1969

KING AND BRATER

"HANDBOOK OF HYDRAULICS"  
1963

ROUSE-HUNTER

"ENGINEERING HYDRAULICS"  
1950

