HYDROLOGY G22/D12 4 PLANS

G22/D12

4 Plans

Turnkey

# City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

December 19, 1978

G22-D12

Apollo Construction Inc.
237 Eubank Blvd. N.E.
Albuquerque, New Mexico 87123

Subject: Test Turnkey Project Work Authorization #T-33
Los Cuadros Subdivision

Gentlemen:

Under the provisions of the Test Turnkey Project procedures, this letter is the Work Authorization to begin field work on the project.

Sincerely,

Richard S. Heller

R. S. Heller
City Engineer

RSH/fs

cc - H. R. Orr
Co-Con, Inc.
Ray Dawson
Water Resources
Dwayne Sheppard
Bob Kielich
LaMonte Urban
Bruno Conegliano
Bill Mueller
Traffic Engineering - Jim Milton

M E M O R A N D U M

622-012

DATE: 10-19-78

SUBJ: Complaint from Mr. Mike Rouse, 11901 St. Mary, 766-7669

Adjacent to Los Cuadros subdivision apparently fill dirt was brought in to a height above the back garden wall of Mr. Rouse's home. Need to check site grading plan for Los Cuadros and go take a look at what they are doing.

/gw

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

June 28, 1978

Mr. Bruno Conegliano
Assistant City Engineer
Hydrology
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

Re: Water Surface Profile, Embudito Arroyo, Los Cuadros Subdivision

Dear Mr. Conegliano:

In accordance with your request, we are transmitting herewith three (3) blueline copies of the Water Surface Profile for the Embudito Arroyo adjacent to Los Cuadros Subdivision. The profile is based on HEC II calculations and is an attachment to the Los Cuadros Drainage Report.

If this satisfies your requirements for the Drainage Report, please sign in the space provided below and return the original copy to this office. If you have any further questions, please feel free to contact me or Ms. Jonni Powe of this office.

Sincerely yours,

Michial M. Emery

Michial M. Emery, P.E.
Vice President

ACCEPTED

By: _____
Bruno Conegliano

Date: _____

Enclosures

cc: Mr. George Thompson

JPP/js
Job No. 77-231

Cremans Inc

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

June 28, 1978

Mr. Bruno Conegliano
Assistant City Engineer
Hydrology
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

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If this satisfies your requirements for the Drainage Report, please sign in the space provided below and return the original copy to this office. If you have any further questions, please feel free to contact me or Ms. Jonni Powe of this office.

Sincerely yours,

Michael M. Emery

Michael M. Emery, P.E.
Vice President

ACCEPTED

By: _____
Bruno Conegliano

Date: _____

Enclosures

cc: Mr. George Thompson

JPP/js
Job No. 77-231

I have Reviewed the Dr Report Addendum for Las Glandes Subdivision & My Comments are as follows
I would like to have an up to date estimate of the discharge in the Colorado Arroyo with the 100 yr storm
The reports on file with the City

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

April 26, 1978

Mr. Bruno Conegliano
Assistant City Engineer
Hydrology
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

Re: Los Cuadros Drainage Report

Dear Mr. Conegliano:

Enclosed for your review and approval are two (2) copies of the Revised Drainage Report for the Los Cuadros Subdivision.

The revision is a result of an increase in the area to be developed. An additional 1.3 acres will now be included in the project, at its west end, taking the subdivision to the east right-of-way line of the Embudito Arroyo.

Drainage control is based on back yard ponding and improvements to the Embudito Arroyo.

If you have any questions, please contact Mr. Ray Macy or me at this office.

Sincerely yours,

Michial M. Emery

Michial M. Emery, P.E.
Vice President

Enclosures

cc: Mr. George G. Thompson
Mr. Jim Miller

RM/js
Job No. 77-231

Gremions Inc.

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

February 7, 1978

RECEIVED
FEB 09 1978
CITY ENGINEERS

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

Re: Los Cuadros Subdivision Drainage Report

Dear Mr. Kimmick:

The purpose of this letter is to document our conversation of February 1, 1978, concerning the above-referenced drainage report. We appreciate your concern for problems that could arise from draining water across the land to the west of the Los Cuadros Subdivision. Mr. Thompson has, for a long period of time, been trying to negotiate an easement or the purchase of the property to the west of the subdivision for drainage purposes. However, to date he has been unsuccessful. We feel we have no option but to continue these negotiations with the adjoining property owners so that the drainage question can be resolved. However, if these people cannot be successfully approached concerning this item, we will be forced to seek other solutions to the drainage problems. Our solutions will consist of ponding on lots at the westerly end of the proposed subdivision to a degree that existing conditions can be met with respect to drainage. This will result in some flows being conducted to the property to the west. We feel that Mr. Thompson has the right to discharge some flow to the west and that prohibition of any flows going in that direction is totally unfair. When the final details are resolved, we will modify our drainage report transmitted to you on January 18 and seek final approval.

Sincerely,

Michial M. Emery

Michial M. Emery, P.E.
Vice President

cc: Mr. George Thompson
Mr. Jim Miller

MME/sh
Job No. 77-231

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

January 18, 1978

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

Re: Los Cuadros Subdivision Drainage Report

Dear Mr. Kimmick:

Enclosed are two copies of the drainage report for the Los Cuadros Subdivision for your review and approval. Back yard ponding has been provided in all of the lots to reduce the developed runoff.

Efforts were made to purchase the property adjacent to Los Cuadros at the west end and/or to provide a drainage easement through the adjacent property, but this attempt was unsuccessful.

In accordance with Drainage Resolution 72-2, we are not exceeding the undeveloped runoff rate for the 100 year storm. The location of discharge from the Los Cuadros property and the adjacent property is as it existed under undeveloped conditions.

If you have any questions, please feel free to contact me or Mr. Ray Macy at this office.

Sincerely,

Michial M. Emery, P.E.
Vice President

Enclosures

cc: Mr. George Thompson
Mr. Jim Miller

RWM/sh
Job No. 77-231

ADDENDUM NO. 1

DRAINAGE REPORT

FOR THE

LOS CUADROS SUBDIVISION

FOR

GEORGE G. THOMPSON

APRIL 1978

ADDENDUM NO. 1
DRAINAGE REPORT
FOR
LOS CUADROS SUBDIVISION
ZONE ATLAS SHEET NO. G-22

APRIL 1978

PREPARED FOR

GEORGE G. THOMPSON
237 EUBANK, N.E.
ALBUQUERQUE, NEW MEXICO 87123

PREPARED BY

BOHANNAN-HUSTON, INC.
4125 CARLISLE BOULEVARD, N.E.
ALBUQUERQUE, NEW MEXICO 87107

RAYMOND W. MACY
NEW MEXICO
6414
REGISTERED PROFESSIONAL ENGINEER

Raymond W. Macy
RAYMOND W. MACY, P.E.
N.M.P.E. NO. 6414

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## APPENDIX


CALCULATIONS


## PLATE


PLATE I PROJECT LOCATION, UNDEVELOPED AND DEVELOPED RUNOFF

DRAINAGE REPORT
FOR
LOS CUADROS SUBDIVISION

## PURPOSE

The purpose of this report is to determine the storm water runoff from Los Cuadros Subdivision, resulting from a 100-year frequency storm. Recommendations for development of the parcel are made with respect to controlling runoff.

## PROJECT LOCATION AND DESCRIPTION

The study parcel consists of approximately 5.9 acres on the south side of Montgomery Boulevard approximately one-half mile east of Juan Tabo Boulevard. It is bounded on the east by La Charles Townhouses, on the south by El Dorado Heights, and on the west by the Embudito Arroyo, as shown on Plate I.

The natural ground slopes from east to west at approximately 5%. Natural soils are of decomposed granite. Vegetation is sparse amounts of native grasses.

The proposed type of development is townhouses with a density between seven and eight dwelling units per acre. Zero side lot lines and flat roofs are expected to be common features.

## HYDROLOGY

A peak runoff rate for the basin shown on Plate I was computed for a 100-year frequency storm using the rational

formula. Rainfall intensities were selected from curves presented in the Master Plan of Drainage, 1963, for the Albuquerque area. Calculations are provided in the Appendix.

DRAINAGE BEFORE DEVELOPMENT

Runoff from basins upland of the study parcel has been diverted to the south and into La Charles Drive by the drainage solution for the Villa La Charles Subdivision, which is presently under construction. None of this upland runoff will enter the study parcel. All runoff contributions are, therefore, internal. The study parcel drains south and west into the existing Embudito Arroyo. This undeveloped runoff is approximately 9.6 cfs, as shown on Plate I.

DRAINAGE AFTER DEVELOPMENT

All lots will drain half of the roof area to a rear pond. All ponds will be at least 1-foot below the house pad and begin a minimum of 5-feet from the pad. Each pond will be at least 10-feet wide and the width of the lot long. See Appendix for details.

The front half of the roof and the entire front lot area will drain down Calle Zagal to the cul-de-sac at the west end of the site. One hundred year storm runoff is expected to be increased from 9.6 cfs for undeveloped runoff to 12.7 cfs for developed runoff and enter Embudito Arroyo by a concrete rundown, terminating on concrete channel lining.

Ten feet of channel lining, in the Embudito Arroyo, will

be removed at the north lot boundary. A new five foot cutoff wall will be constructed and wire tied rip-rap will be placed two feet deep for 15-feet after the cutoff wall.

Within the Embudito Arroyo adjacent to the west lot line, drop structures similar to those immediately downstream will be placed at approximately 75-foot intervals which will complete drainage improvements in the Eubmdito Arroyo.

RECOMMENDATIONS

1. Waterblocks placed on Bermuda Drive at the north and south property lines to maintain basin boundaries.

2. Rundown and channel lining at rundown into Embudito Arroyo at west end of Calle Zagal.

3. Four drop structures at approximately 75-foot intervals in arroyo.

4. Back yard ponding at least 1 foot below pad level on all lots.

5. Ponds begin no closer than 5-feet from pad and should provide a minimum storage of 430 cubic feet.

6. Half of roof runoff will be ponded for each townhouse.

# APPENDIX

# CALCULATIONS

# DRAINAGE REPORT, LOS CUADROS SUBDIVISION - UNDEVELOPED RUNOFF ★

A = AREA = 5.9 ACRES  L = LENGTH = 1050'  S = SLOPE = 4.6%

B = GROUND FACTOR = 1.8  $t_c$ = TIME OF CONCENTRATION

$$t_c = \log^{-1}[.3641(B) + .3854(\log L) - .197(\log S) - .3613]$$

$$= \log^{-1}[.3641(1.8) + .3854(\log(1050)) - .197(\log 4.6) - .3613]$$

$$= 21.3 \text{ MIN.}$$

$$I = \text{RAINFALL INTENSITY} = \frac{189^{*}}{t_c + 25} = \frac{189}{21.3 + 25} = 4.08 \frac{IN}{HR}$$

$Q = CIA$ WHERE C = COEFFICIENT OF RUNOFF = .40 (UNIMPROVED)

$$Q = .4(4.08)(5.9)$$

$$Q = 9.6 \text{ CFS}$$

★ ASSUMING ALL PROPERTY DISCHARGES TO THE WEST WITH NO PONDING

* MASTER PLAN OF DRAINAGE, 1963

| | | | |
|---|---|---|---|
| PROJECT NAME | LOS CUADROS SUBDIVISION | SHEET 1 | OF 3 |
| PROJECT NO. | 77-231 | BY DW | DATE 3-23-78 |
| SUBJECT | DRAINAGE REPORT | CH'D | DATE |

# DEVELOPED RUNOFF

FROM 45 LOTS TOTAL

½ OF ROOF AREA (=1100 SF) & ALL BACK YARD AREA TO BE PONDED IN BACK YARD

AREA CONTRIBUTIONS: *

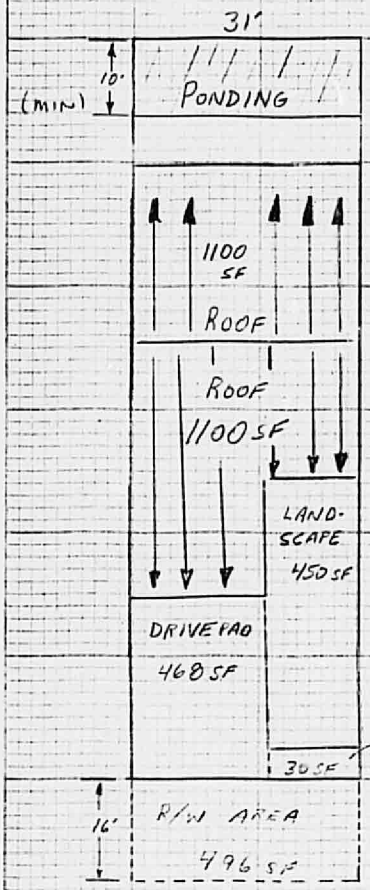
| | | |
|---|---|---|
| DRIVEWAYS | 18×26×45= | 21060 |
| SIDEWALKS | 4'+15'×45= | 2700 |
| ½ STREET | 14×33'×45= | 20,790 |
| BERMUDA DR. | 45'×300'= | 13,500 |
| ROOF AREA | 1100'²×45 = | 49,500 |
| | | 107,550 FT² = 2.47 AC |

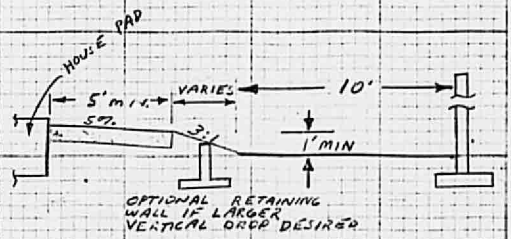
$T_c = 10$ min  $I = 5.4$  $C = .95$

$Q = CIA = .95(5.4)(2.47) = 12.7$ CFS

IN ACTUALITY, CANALES USED TO DRAIN THE FLAT ROOFS WILL REDUCE THE EFFECTIVENESS OF THE ROOF RUNOFF IN THE ABOVE COMPUTATION; THEREFORE, THE 12.7 CFS PEAK IS PROBABLY SOMEWHAT HIGH. FURTHER, IMPROVEMENTS DOWNSTREAM IN THE EMBUDITO WERE SIZED BASED ON THE 100 YEAR RUNOFF FROM URBANIZED AREAS, NOT UNDEVELOPED AREAS. FOR THESE REASONS WE FEEL THE INCREASED RUNOFF OF 3.1 CFS SHOULD BE ACCEPTABLE

TYPICAL LOT




BACK YARD POND

POND CAPACITY @ 1.2 FEET

$1.2(31)(10) + (1.2)(3 \times 1.2)(\frac{1}{2})(31) = 439$

WITH NO INFILTRATION ACCOUNTED FOR

VOLUME OF WATER DRAINED FROM HALF OF ROOF AND ENTIRE BACKYARD FROM 3 INCH RAINFALL

$\frac{3}{12}(1100 + 31(20))$

$= 430 \text{ FT}^3$

| | | | |
|---|---|---|---|
| PROJECT NAME | LOS CUADROS | SHEET 3 | OF 3 |
| PROJECT NO. | 77-231 | BY RW | DATE 3-27-78 |
| SUBJECT | LOT PONDING | CH'D | DATE |

BOHANNAN WESTMAN HUSTON & ASSOCIATES, INC.

# DRAINAGE REPORT
# FOR
# LOS CUADROS SUBDIVISION

ZONE ATLAS SHEET NO. G-22

JANUARY 1978

DRAINAGE REPORT
FOR
LOS CUADROS SUBDIVISION
ZONE ATLAS SHEET NO. G-22

JANUARY 1978

PREPARED FOR

GEORGE T. THOMPSON
237 EUBANK, N.E.
ALBUQUERQUE, NEW MEXICO 87123

PREPARED BY

BOHANNAN-HUSTON, INC.
4125 CARLISLE BOULEVARD, N.E.
ALBUQUERQUE, NEW MEXICO 87107

RAYMOND W. MACY
NEW MEXICO
6414
REGISTERED PROFESSIONAL ENGINEER

Raymond W. Macy

RAYMOND W. MACY, P.E.
N.M.P.E. NO. 6414

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| RECOMMENDATIONS | 3 |

APPENDIX

CALCULATIONS

PLATES

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| PLATE I | PROJECT LOCATION AND UNDEVELOPED RUNOFF |
| PLATE II | DEVELOPED RUNOFF |

# DRAINAGE REPORT
# FOR
# LOS CUADROS SUBDIVISION

## PURPOSE

The purpose of this report is to determine the storm water runoff from Los Cuadros Subdivision and its contributory basins resulting from a 100-year frequency storm. Recommendations for development of the parcel are made with respect to controlling runoff.

## PROJECT LOCATION AND DESCRIPTION

The study parcel consists of approximately 4.6 acres on the south side of Montgomery Boulevard approximately one-half mile east of Juan Tabo Boulevard. It is bounded on the east by La Charles Townhouses, on the south by El Dorado Heights, and on the west by unplatted land, as shown on Plate I.

The natural ground slopes from east to west at approximately 5%. Natural soils are of decomposed granite. Vegetation is sparse amounts of native grasses.

The proposed type of development is townhouses with a density between seven and eight dwelling units per acre. Zero lot lines and flat roofs are expected to be common features.

## HYDROLOGY

A peak runoff rate for the basin shown on Plate I was computed for a 100-year frequency storm using the rational

formula. Rainfall intensities were selected from curves presented in the Master Plan of Drainage, 1963, for the Albuquerque area. Calculations are provided in the Appendix.

DRAINAGE BEFORE DEVELOPMENT

Runoff from the upland basins for the study parcel has been diverted to the south and into La Charles Drive by the drainage solution for the Villa La Charles Subdivision. None of this upland runoff will enter the study parcel. All runoff contributions are, therefore, internal. The interior basin drains south and west in existing arroyos and onto the unplatted land. This runoff is approximately 8.1 cfs, as shown on Plate I.

DRAINAGE AFTER DEVELOPMENT

Due to the dense nature of the development, rear yard ponding will be required on all lots. Some lots, however, may drain half the roof area to the street in order to reduce the size of pond required without exceeding undeveloped runoff. A maximum of 21 lots may drain one-half of the roof area to the street. This would result in a developed runoff of 8.0 cfs, as shown on Plate II. The exact location of those lots with partial ponding will be determined by the placement of the townhouses. Those lots with 25 feet or less from house pad to rear lot line will have partial ponding.

All runoff that is not ponded will travel on Marjorie Avenue to the cul-de-sac at the west property line. A ten

foot wide drainage easement will convey the flow onto the adjacent unplatted land into an existing arroyo.

CONCLUSIONS

Development of Los Cuadros Subdivision as townhouses with a density of seven to eight dwelling units per acre may be accomplished without increasing the 100 year storm runoff if at least 13 of the 34 lots are ponded such that all runoff within the lot is routed to the pond, and the remaining 21 lots pond at least 50% of the runoff within the lot.

RECOMMENDATIONS

1. Waterblocks placed on Barcelona Drive at Montgomery Boulevard and the south property line to maintain basin boundaries.

2. Minimum of 13 lots pond 100% of runoff within lot from 20 foot setback line.

3. No more than 21 lots pond at least 50% of runoff within lot from 20 foot setback line, especially lots with small back yard.

4. All lots ponded.

5. Pads set 1'-0'' above rear yard elevation.

6. Ponds begin no less than ten feet from pad, 15 feet if possible.

7. Ponds not to exceed two feet in depth, with side slopes 3:1 or retaining walls.

8. Grade Marjorie Avenue to drain to west cul-de-sac.

9. At cul-de-sac provide ten foot drainage easement to property line.

# APPENDIX

# CALCULATIONS

DRAINAGE REPORT LOS CUADROS SUBDIVISION

UNDEVELOPED RUNOFF *

AREA = 4.6 ACRES  L = 720'  S = 5%

B = GROUND FACTOR = 1.8  $t_c$ = TIME OF CONCENTRATION

$t_c = \log^{-1}[.3641(B) + .3854(\log L) - .197(\log S) - .3613]$

$= \log^{-1}[.3641(1.8) + .3854(\log 720) - .197(\log 5) - .3613]$

$t_c = 18.1$ MIN

I = RAINFALL INTENSITY = $\frac{189}{t_c + 25}$ *

$I = \frac{189}{18.1 + 25}$

$I = 4.39$ IN/HR

$Q = CIA$  WHERE C = COEFFICIENT OF RUNOFF = .40

$Q = .4(4.39)(4.6)$

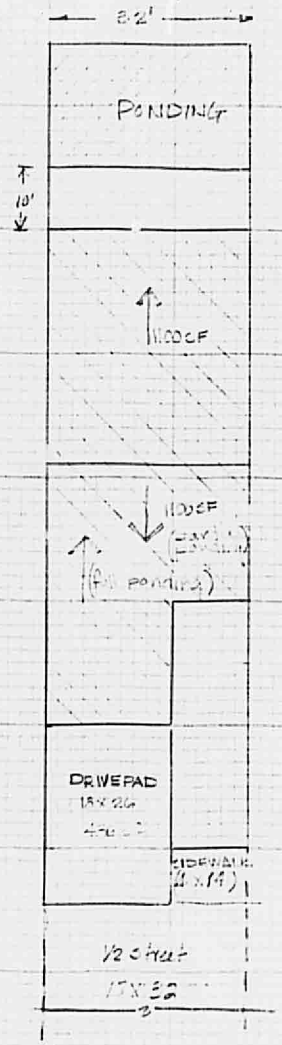
$Q = 8.1$ CFS

* ASSUMING THAT THE PROPERTY COULD ALL DISCHARGE TO WEST WITH NO PONDING.

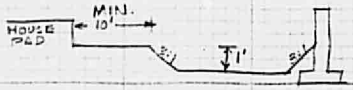
* MASTER PLAN OF DRAINAGE, 1963

| | | | |
|---|---|---|---|
| PROJECT NAME | LOS CUADROS SUBDIVISION | SHEET 1 | OF |
| PROJECT NO. | 77-195 | BY MJI | DATE 10-25-77 |
| SUBJECT | DRAINAGE REPORT | CH'D | DATE |

## TYPICAL LOT



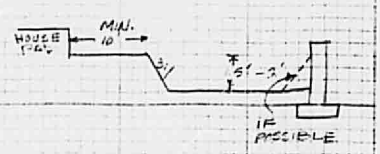

### PARTIAL PONDING




roof 1100 cf x 3"/24 hr = 275 cu.ft.
yard 2.5 x 32 x 3" = 200 cu ft
475 cu ft
storage

15 x 32 x ? = 475
1 foot deep

### FULL- PONDING




roof 2200 x 3" = 550 cu ft
yard 15 x 32 x 5" = 200
750 cu ft

(15)(32)(x) = 750
1.56' Drop.

| | | | |
|---|---|---|---|
| PROJECT NAME | Los Cimarron | SHEET 2 | OF |
| PROJECT NO. | 77-195 | BY JLF | DATE 1/4/77 |
| SUBJECT | Lot Development Runoff | CH'D | DATE |

## DEVELOPED RUNOFF

1. ALL LOTS FULLY PONDED

CONTRIBUTING FROM:

| | | |
|---|---|---|
| DRIVEPAD | 18x26x24 = | 15912 |
| SIDEWALK | 4x12x24 = | 1632 |
| 1/2 STREET | 17x32x24 = | 13496 |
| BERMUDA DR. | 275x32 = | 8800 |
| | | 44840 sq ft = 1.03 ACRES |

$T_c$ = 10 min  I = 5.4  C = 0.95

$Q = CIA = (0.95)(5.4)(1.03) = 5.23$ cfs

UNDEVELOPED − DEVELOPED

8.1 − 5.3 = 2.82 cfs

$2.82 = (5.4)(0.95)X$  where X = additional area which may be developed

$X = 0.55$ ac = 23912 ft²

TOTAL ROOF AREA WHICH MAY DRAIN TO THE STREET

2. MAXIMUM AREA DRAINED

23,912 ft²

1/2 of 1 roof = 1100 sf.

23912 ÷ 1100 = 21.74

21 roofs may be half drained.

21 roofs = 21 x 1100 = 23100 ft² = 0.53 acre

$Q = (5.4)(0.53) = 2.72$

$Q_T = 2.72 + 5.23 = 8.00$ cfs total runoff

| | | | |
|---|---|---|---|
| PROJECT NAME | Los Cuadros | SHEET 2 | OF |
| PROJECT NO. | 77-115 | BY JVP | DATE 12/77 |
| SUBJECT | INT. Developed Runoff | CH'D | DATE |

BOHANNAN WESTMAN HUSTON & ASSOCIATES, INC.