HYDROLOGY E11/D13 3 PLANS

E11/D13

3 PLANS

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

**MAYOR**
*David Rusk*

April 23, 1979

E11-D7

Mr. Fred Arfman
Chambers,Campbell,Isaacson & Chaplin
3500 Indian School Rd. N.E.
Albuquerque, N.M. 87106

Re: Saddle Ridge Equestrian Center

Dear Mr. Arfman:

The drainage report for the captioned subdivision as revised to retain onsite runoff with potential animal wasteload is approved.

Very truly yours,

Bruno Conegliano
Assistant City Engineer-Hydrology

BC/fs

cc - Dick Heller, City Engineer
Rich Leonard, AMAFCA
Drainage File

Reading

CITY OF ALBUQUERQUE, NEW MEXICO
CITY ENGINEER'S OFFICE

E11-D13

MEMORANDUM - April 2, 1979

TO: Gerald Davenport, Director of Municipal Development
FROM: Bruno Conegliano, Assistant City Engineer-Hydrology B.C
SUBJECT: Taylor Ranch

Enclosed is a copy of a letter from MSM regarding Taylor Ranch. A reply was never given because I do not really know what reply should be given. You indicated Friday that we should have a discussion session with the Council on some of these drainage issues and policies. I was wondering if you had a chance to frame up some time for this purpose. I'd like to be able to give some indications to these people.

BC/fs
Enclosure

MEURER, SERAFINI AND MEURER, INC. CONSULTING ENGINEERS • SURVEYORS • PLANNERS

2601 WYOMING BLVD., N.E., SUITE F • ALBUQUERQUE, NEW MEXICO 87110 • (505) 292-1938

March 30, 1979

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

Re: Homestead Hills North, Taylor Ranch, Tract 11, Drainage

Dear Bruno:

The purpose of this letter is to present matters for discussion and decision at the meeting scheduled with you on Tuesday, April 3, 1979, at 2:00 p.m., and to review the history of the drainage in this area.

Several reports and plans have been done on this area in the past. To begin with, William Matotan and Associates, Inc., in 1975 presented the Drainage Management Plan for the Western Albuquerque Metropolitan Area. In this plan the right-of-way and type channel for the Piedras Mercadas Arroyo were discussed. Since that time, Murray-McCormick, now MSM, submitted a drainage report for Homestead Hills East, Taylor Ranch Tract 8, in June 1977 and amended in September 1977, that defined the exact location of the Piedras Mercadas Arroyo, along the south side of Tract 11. Final plans were prepared for the arroyo and a major portion of it has now been constructed. Following that report, MSM prepared the Taylor Ranch Comprehensive Drainage Plan which was submitted to your office in January 1978 and was amended July 12, 1978. We have received no further written communication on it. On October 13, 1978, we furnished AMAFCA with a copy of this report at their request. On February 21st of this year, the City of Albuquerque and AMAFCA signed a Memorandum of Agreement which stated in Item 6 that the City pledges to eliminate the backlog of drainage reports by March 1, 1979. Since we have received no comment letter in regards to this report, we assume that it has been accepted.

We wish now to submit a drainage study on Homestead Hills North that is an amendment to this Overall Drainage Study based on the detailed calculations for this tract. We submitted a copy of the historic runoff versus the proposed runoff in plan form to your office on Thursday, March 29, 1979. As shown by that plan, no water will be drained

toward Taylor Ranch Drive except that which falls on Taylor Ranch Drive. Calculation of this flow shows that 15.6 cfs in the 100-year storm will be drained into the Piedras Mercadas Arroyo where Taylor Ranch crosses it. This flow is well below the 61 cfs shown on said Overall Drainage Study discharging into Taylor Ranch Drive out of Tract 11. As shown on the plan submitted, historically 108 cfs drains from this site in a natural condition, the majority of which flows onto the downstream property owner to the east. By our proposed plan, we show this flow to be reduced to 71 cfs where it discharges at a proposed concrete rundown at the southeast corner of subject site. The street at this location will carry up to 95 cfs with the velocity of only 6 ft./sec., at a depth of only 8" or .67 of a foot at a 1% slope. The depth times this velocity is equal to 4, which is well below the floodway criteria of 5. This calculation indicates adequate capacity within the street to handle this quantity of flow.

At our meeting at 1:30 on Wednesday, March 28, you also brought up the point that development could not occur on this tract due to the fact that there was no downstream drainage easement or drainage right-of-way for the Piedras Mercadas Arroyo. At that time you stated that this was the policy. Since we are reducing the flow that drains into this arroyo, below the historic, and flows are already concentrated at this location in the Piedras Mercadas Arroyo, we would like to know when this policy was implemented and by whose authority. According to the Memorandum of Agreement previously noted between AMAFCA and the City, in Item 9 it states "that it is not the intent of the drainage regulation to dictate a total solution at any cost; rather the intent is to require an economically reasonable degree of compliance." If the owner is required to secure drainage easements or wait until they are secured all the way to the River from this site before he can develop, he will be faced with an unreasonably economical solution.

In conclusion, the major purpose of this letter and the scheduled meeting is to clarify some of these concepts so that the owner may develop this tract in a reasonable manner. Your attention to these matters will be deeply appreciated, and if you have any questions please feel free to contact me.

Very truly yours,

MEURER, SERAFINI AND MEURER, INC.

Jeryl D. Hart, Jr., P.E.
Project Manager

JDH:dw

cc: Mr. Don Greene, Bellamah
Mr. Thomas Burlison, Bellamah
Mr. Richard Heller, City Engineer
Mr. Rich Leonard, AMAFCA

Encls.

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

MAYOR
*David Rusk*

March 26, 1979

Mr. Tom Isaacson
Chambers, Campbell, Isaacson, Chaplin, Inc.
3500 Indian School Road N.E.
Albuquerque, New Mexico 87106

E11-D7

Re: Saddle Ridge Equestrian Center Drainage Report

Dear Mr. Isaacson:

I have reviewed the Drainage Report for the captioned development and I cannot concur with the proposal submitted, primarily but not solely on public health grounds.

I recommend that a meeting be convened with representatives of your firm, the City's Department of Environmental Health, Mr. Richard Heller, City Engineer, and myself. Please advise on the time and date that would be convenient.

Very truly yours,

Bruno Conegliano
Assistant City Engineer-Hydrology

BC/ms

cc - Dick Heller
Rich Leonard
Drainage File
Reading file

MEMORANDUM

TO: Bellamah Corporation,
General Contracting Division

ATTN: Windell P. Smith

FROM: Andy R. Valdez

DATE: March 25, 1980

REF: Taylor Ranch Office Bldg. No. 2

Attached you will find a print of the Taylor Ranch Tract 27 Development Plan showing the drainage involved with Building No. 2. Also attached you will find copies of letters and calculations for the Drainage Report done by Bohaman Huston, Inc.

According to Mr. Michial Emery of Bohaman Huston, there was no Drainage Report with Bruno Conegliano's signature. The Drainage Report was given a verbal approval by Mr. Conegliano. You will note that Mr. Conegliano's signature appears on the attached Development Plan.

This is all the drainage documentation we have on the concerned project.

If there are any questions, please contact this office.

Andy R. Valdez

ARV/sbb
Attachments
cc

ENGINEERS PLANNERS PHOTOGRAMMETRISTS

BOHANNAN-HUSTON INC.

4125 CARLISLE BLVD., N.E. ALBUQUERQUE, NEW MEXICO 87107 6[illegible] 881-2000

February 19 1979

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

Re: Taylor Ranch Drainage Report, Tract 27

Dear Mr. Conegliano:

This letter is in reference to the drainage report for the above-referenced project. It was determined, in your office, that the buildings on Tract 27 would be in the throat of the outfall channel of the Boca Negra Arroyo. After a site visit to the project, a different approach to the problem presented itself.

The site visit showed that there existed two control sections on-site. The first is Taylor Ranch Road bordering the property along the entire west side. The second control section is through the existing office building at the throat of the outfall channel, see enclosed drawing.

Using the assumption, made in all the master drainage studies, i.e. Denney, Matotan, Corps, of all the flow in the Boca Negra reaching the outfall results in flow of approximately 2000 cfs coming onto the project. This would result in the worst possible case that the project would ever experience in the way of drainage. With this type of analysis the need to do a flood routing would be eliminated and upstream storage capacity could be neglected for the on-site analysis of the water surface profile.

Determining from the field and supported by the existing topography, see the enclosed drawing with the sections, Taylor Ranch Road is acting as a broad crested weir. Using an analysis of a broad crested weir and an average elevation of 5107.0, the water surface reaches 1.86 feet. Installing office building No. 2, see enclosed site plan, and decreasing the effective weir length by the length of the building, the water surface elevation reaches 5109.3 feet. With the pad elevation of the building set one foot above the water surface elevation, the pad would be at elevation 5110.3 feet.

Analyzing the water from Taylor Ranch Road to the outfall of the Boca Negra, the water becomes turbulent due to the land slope and condition of the land. The second control section, through the existing office building, approximates a natural channel, see enclosed computations. Since the flow in this area is turbulent, the water surface will lie somewhere between a weir analysis and an unequal sideslope dirt channel. Analyzing both, the depth reaches somewhere between 2.23 feet and 3.87 feet. This results in a maximum water surface elevation of 5103.7 feet in the second

control section. The velocity in the present condition is approximately 10 fps through the second control section. If the south slope were cut back, the velocity would decrease but not considerably. The situation is not favorable; but, by cutting back the slope the situation will improve.

As you can see from the calculations, the construction of the office building will not create a hazard to the building or worsen the overall drainage situation. We would like to request that you schedule a site visit, with representatives of Bellamah Corporation and me, in order to hasten the approval of the drainage report.

If you have any questions, please contact Ron R. Bohannan or me of this office.

Sincerely,

Michial M. Emery

Michial M. Emery, P.E.
Vice President

cc: Mr. Don Green

RRB/mna
Job No. 78-141

February 28, 1979

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

COPY

Re: Taylor Ranch Drainage Report

Dear Mr. Conegliano:

In accordance with your meeting of February 26, 1979, with Ron R. Bohannan, Verne Kimmick, Don Green and Dick Heller, the drainage concept was approved for the above-referenced project, using a flood elevation of 5109.3.

If you have any questions, please feel free to contact Ron R. Bohannan or me at this office.

Sincerely yours,

MNB

Michial M. Emery, P.E.
Vice President

cc: Mr. Don Green

MME/js
Job No. 79-141

COPY

February 14, 1979

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

Re. Taylor Ranch Drainage Report Tract 27

Dear Mr. Conegliano:

This letter is in reference to the drainage report for the above-referenced project. It was determined in your office that the buildings on tract 27 would be in the throat of the outfall channel of the Boca Negra Arroyo. After a site visit to the project, a different approach to the problem presented itself.

The site visit showed that there existed two control sections on-site. The first is Taylor Ranch Road bordering the property along the entire west side. The second control section is through the existing office building at the throat of the outfall channel, see attached drawing.

Using the assumption made in all the master drainage studies, i.e. Denney, Matotan, Corps, of all the flow in the Boca Negra reaching the outfall results in flow of approximately 2000 cfs coming onto the project. This would result in the worst possible case that the project would ever experience in the way of drainage. With this type of anaylsis the need to do a flood routing would be eliminated and upstream storage capacity could be neglected for the on-site anaylsis of the water surface profile.

Determining from the field and supported by the existing topography, see the attached drawing with the sections, Taylor Ranch Road is acting as a board crested weir. Using an analysis of a board crested weir and an average elevation of 5107.0 the water surface reaches 1.86 feet. Installing office building No. 2, see attached site plan, and decreasing the effective weir length by the length of the building the water surface elevation reaches 5109.3 feet. With the pad elevations of the building set one foot above the water surface elevation, the pads would be 5110.3 feet.

Analyzing the water from Taylor Ranch Road to the outfall of the Boca Negra the water becomes turbulent due to the land slope and condition of the land. The second control section through the existing office building approximates a natural channel, see attached computations. Since the flow in this area is turbulent the water surface will lie somewhere between an weir analysis and a unequal sideslope dirt channel. Analyzing both, the depth reaches somewhere between 2.23 feet and 3.87 feet. This results in a maximum water surface elevation of 5103.7 feet in the second

control section. The velocity in the present condition is approximately 10 fps through the second control section. If the south slope were cut back the velocity would decrease but not considerable. The situation is not favorable; but, by cutting back the slope the situation will improve.

As you can see from the calculations, the construction of the office building will not create a hazard to the building or worsen the overall drainage situation. I ask that a site visit with me and representives from Bellemah Corporation would greatly enhance the prospect of approving the drainage report.

If you have any questions, please contact Ron R. Bohannan or me at this office.

Sincerely,

Michial M. Emery, P.E.
Vice President

cc: Mr. Don Green

RRB/rv
Job No. 78-141

COPY

MMA

Department of Municipal Development
**City of Albuquerque**
P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

MAYOR
*David Rush*

January 9, 1979

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

Re: Taylor Ranch Tr. 27

Dear Ron:

Enclosed is a copy of the Flood Plain Management Regulations which have to be complied with by all new construction and subdivisions in the City of Albuquerque. In particular, the requirements pertaining to Albuquerque are those of Part 1910.3, Paragraph b. I want to call your attention particularly to subparagraphs 6 and 7. It is apparent that in the anticipation of an early resolution of the drainage protection works (Mariposa Diversion Channel etc.) approval was granted by the City for the development of a portion of Tract 27. Such approval was granted in controvention of the regulations quoted above, and has resulted in extensive encroachment of the broad watercourse at the outlet of the existing playa. Before further development in this area is considered, an evaluation of the effects of the existing development on the flood plain as defined in the USCE Study, Part III Flood Plain Info. Albuquerque Arroyos, must be provided. The supporting information must be included: planimetry profiles, cross sections, water surface elevations) for forwarding to the appropriate agency.

Very truly yours,

Bruno Conegliano
Assistant City Engineer-Hydrology

BC/fs
Enclosure
cc - Dick Heller
Rich Leonard
Don Greene
Drainage File

ENGINEERS PLANNERS PHOTOGRAMMETRISTS

BOHANNAN-HUSTON INC.

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

November 17, 1978

RECEIVED

NOV 20 1978

CITY ENGINEERS

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

Re: Office Building No. 2, Tract 27 – Taylor Ranch Drainage Report

Dear Mr. Conegliano:

Enclosed are three copies of the revised drainage report reference the above subject.

If you have any questions, please contact Ronald R. Bohannan of this office.

Sincerely,

C. J. Mead, P.E.
Vice President

Enclosures

cc: Mr. Don Green
Jorge De la Torre

RRB/js
Job No. 78-141

BOHANNAN-HUSTON INC.
1125 CARLISLE BLVD., N.E. ALBUQUERQUE, NEW MEXICO 87107 505 881-2000

ENGINEERS PLANNERS PHOTOGRAMMETRISTS

Returned 11/2/78

HAND DELIVERED

October 24, 1978

Mr. H. R. Orr, Jr.
Acting Director of
Public Works
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

RE: Taylor Ranch Drainage Report

Dear Mr. Orr:

Enclosed are three copies of the Taylor Ranch Tract 27 Drainage Report.

If you have any questions, please contact Ron R. Bohannan or me of this office.

Sincerely,

Michael M. Emery

Michael M. Emery, P.E.
Vice President

Enclosure

cc: Don Green

RRB/kb
Job No. 78-141

Ron Ray Bohannan
Re: Taylor Ranch Tr. 27

Enclosed is a copy of the flood plain management regulations which have to be complied with by all new construction and subdivisions in the City of Albuquerque. In particular, the requirements pertaining to Albuquerque are those of Part 1910.3, Paragraph h. I want to call your attention particularly to subparagraphs 6 and 7. It is apparent that in the anticipation of an early resolution of the drainage protection works (Mariposa Diversion Channel etc.) approval was granted by the City for the development of a portion of Tract 27. Such approval was granted in controvention of the regulations quoted above, and has resulted in extensive encroachment of the broad watercourse at the outlet of the existing playa. Before further development in this area is considered, an evaluation of the effects of the existing development on the flood plain as defined the USCE Study, Part III Flood Plain Info. Albuq. Arroyos, must be pro ied. The supporting information must be included planimetry profiles, cr ss sections, water surface elevations) for forwarding to the appropriate agency.

CITY OF ALBUQUERQUE, NEW MEXICO
CITY ENGINEER'S OFFICE

MEMORANDUM - November 21, 1977

E11-D13

TO: V.M. Kimmick
FROM: Bruno Conegliano - Asst. City Engineer - Hydrology BC.

RE: Approval of further development plan for Taylor Ranch - follow up on my letter dated 11/21/77

This brief summary of the problems (of which I am aware) that Public agencies will have to solve at public expense because improperly addressed or executed by the Bellamah Corporation.

1. Glenwood Hills South - Concrete lining and bank stablilization of drainage channel (excessive velocities, bank failures and danger prospicent properties)
2. Supperrock - R.O.W. acquisition needed. Channel constructed in part outside the property owned by Bellamah Co. (and drainage easement) without consent of adjacent owner.
3. North Hills Mobile Home Park - Channel not constructed per drainage report and the protection works which were constructed are not adequate against 100 yrs. flood.
4. Loma del Norte 7 & 8 - property transferred to other developer with issue of channel design and construction unresolved (in the words of the engineer for the developer ".....a big ugly mess.")
5. Loma del Norte 9 - property transferred to other developer before drainage solution provided.
6. Heritage Hills 5 - Since the City has accepted the decision of leaving untouched the flood plan of the Domingo Baca, a very expensive transition structure will have to be provided.

Because of the above I think we cannot continue to approve plat after plat in Taylor Ranch with only the haziest notion of what are going to be the ultimate drainage solutions. Among other things, the absence of any estimates of the cost of the improvements, does not allow the Bellamah corporation to set aside, with each new plat, a preportioned part of the cost of the necessary drainage improvements, which may eventually appear to constitute an unbearable burden.

## Taylor Ranch Drainage

Assuming that Taylor Ranch Road acts as a board crested weir 330' long with peak discharge what is the depth of water that faces bldg No. 2

$Q = CLH^{3/2}$ 5-10 King & Brater

using a coefficient of 2.63 table 5-3 King and Brater

$$H = \left(\frac{Q}{CL}\right)^{2/3} = \left(\frac{2000}{2.63(330)}\right)^{2/3}$$

$H = 1.86$ ft. $V = 3.24$ fps.

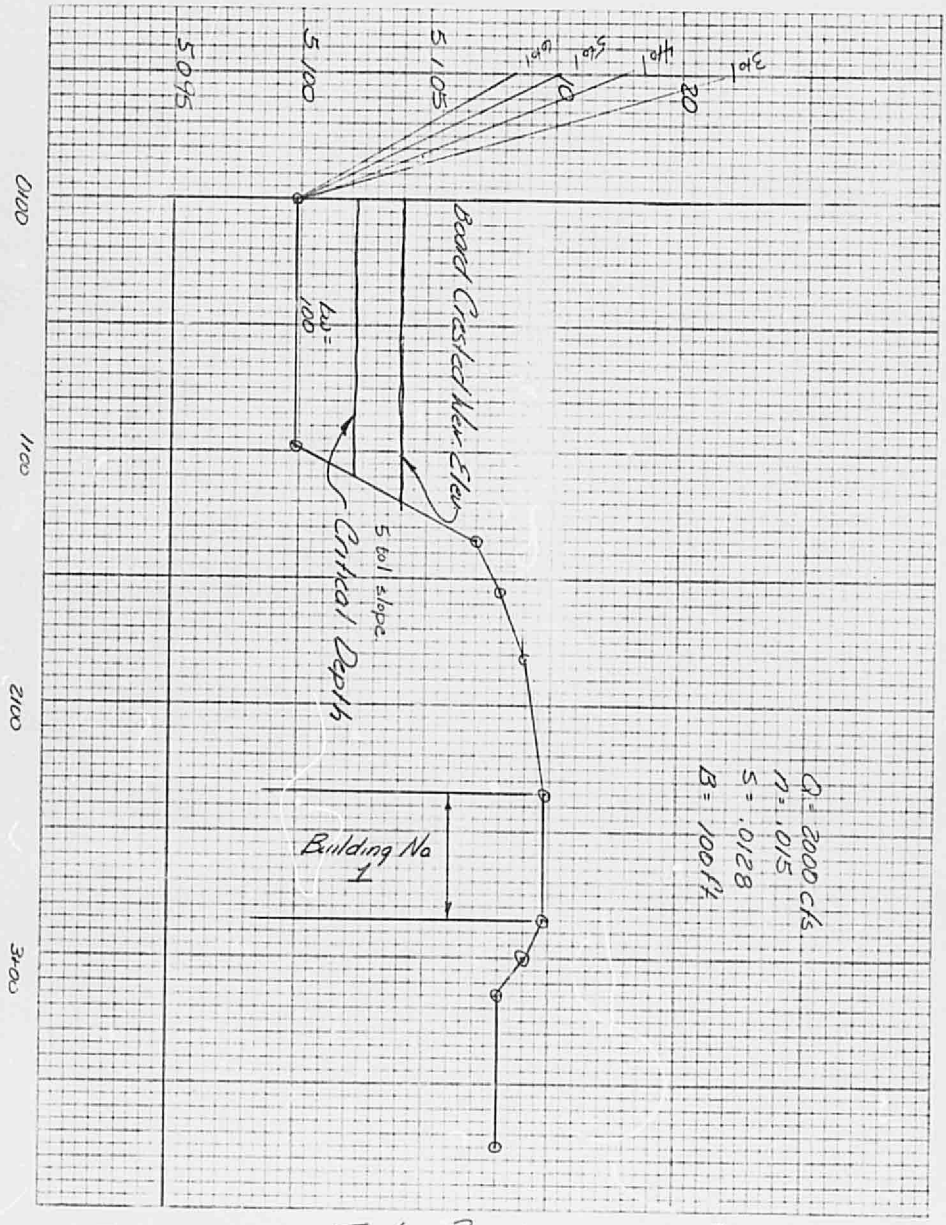
The average water surface elevation is approximately 5108.9 ft. decreasing the weir length to approximately 240' to account for building the new office.

$$H = \left(\frac{2000}{2.63(240)}\right)^{2/3}$$

$H = 2.17'$ $V = 3.84$ fps

The average water surface elevation is approximately 5109.3 ft. setting the minimum pad elevation at 5110.3 ft.

| | | | |
|---|---|---|---|
| PROJECT NAME | Taylor Ranch | SHEET 1 | OF 3 |
| PROJECT NO. | 78-141 | BY RRB | DATE 2/8/79 |
| SUBJECT | Drainage Addendum | CH'D | DATE |




| | | | | | |
|---|---|---|---|---|---|
| PROJECT NAME | Taylor Ranch | SHEET | 2 | OF | 3 |
| PROJECT NO. | 78-141 | BY | RRB | DATE | 2/8/79 |
| SUBJECT | Drainage Addendum | CH'D | | DATE | |

Assuming that the water passes the upstream weir and reaches the mouth the water depth and velocities will be reaching

Q = 2000 cfs

n = .025

S = .0128

bw = 100 ft.

North Slope 5 to 1

Proposed

| Side Slope | Normal depth depth. | Critical depth. | (Velocity) |
|---|---|---|---|
| 3 to 1 | 1.90 | 2.23' | 9.59' |
| 4 to 1 | 2.04 | 2.23 | 8.84 |
| 5 to 1 | 2.03 | 2.23' | 8.79 |
| 6 to 1 | 2.03 | 2.23' | 8.74 |

Using the control section at Montana Road at the outfall as a weir for total turbulent conditions.

$$H = \left(\frac{Q}{CL}\right)^{2/3} = \left(\frac{2000}{2.63(100)}\right)^{2/3}$$

$$H = 3.87'$$

PROJECT NAME _____ SHEET 3 OF 3

PROJECT NO. _____ BY _____ DATE _____

SUBJECT _____ CH'D _____ DATE _____

BOHANNAN-HUSTON INC.

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

DRAINAGE REPORT

FOR

OFFICE BUILDING NO. 2
TRACT 27
TAYLOR RANCH

_____

Bruno Conegliano
Assistant City Engineer – Hydrology

Date Approved: _____

# DRAINAGE REPORT

FOR

OFFICE BUILDING NO. 2
TRACT 27
TAYLOR RANCH

Zone Atlas Sheet
E-11-Z

October, 1978

PREPARED FOR

AMBELL PARTNERSHIP
6400 Uptown Boulevard, N.E.
Albuquerque, New Mexico 87110

PREPARED BY

BOHANNAN-HUSTON, INC.
4125 Carlisle Boulevard, N.E.
Albuquerque, New Mexico 87107

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

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

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METHODS ..... 1

EXISTING HYDROLOGY ..... 2

ALTERNATIVES ..... 2

CONCLUSIONS ..... 3

## APPENDIX

CALCULATIONS

# DRAINAGE REPORT

# FOR

# OFFICE BUILDING NO. 2

# TRACT 27 – TAYLOR RANCH

## INTRODUCTION

The purpose of this report is to present various alternatives for the 100-year flood protection of Tract 27 of Taylor Ranch. This construction will be phased starting with Office 1. Building Number 2 with total development at a later date.

## PROJECT LOCATION & DESCRIPTION

The Taylor Ranch office site is located in the northwestern section of Albuquerque, at the northeast corner of the intersection of Montano Road and Taylor Ranch Road. The majority of land in the vicinity of the office site remains in its natural state at present, although extensive plans for development have been made. The soil in this area consists mostly of a fine sandy loam, covered with sparse amounts of native grasses and brush. The terrain in the area has a natural slope of approximately 3%.

## METHODS

Runoff from the Taylor Ranch natural basins was computed by using a computer model of the area. This model, HYMO (HYdrologic MOdel), was developed by the Agricultural Research Service and analyzes information concerning the stage/storage and stage/discharge relationships. Topography was taken from the AMAFCA sheets of the area to determine storage capacities of the natural depressions and profiles of existing channel sections. The capacities of these channels were found by using Manning's Formula.

The inflow hydrograph for the Boca Negra channel in this area was taken from the **Preliminary Drainage Review** for Taylor Ranch prepared by Murray-McCormick, Inc., in December 1976.

**EXISTING HYDROLOGY**

The Taylor Ranch office site is contained in a natural basin, slightly below an adjacent basin (see Plate 2). The upper basin is fed by the Boca Negra channel with a peak 100-year inflow rate of 2473 cfs, as shown on the inflow hydrograph prepared by Murray-McCormick, Inc. Using the Hymo Flood Routing Model, it was found that the maximum water surface elevation in the upper basin would reach 5110.9 ft., this creates a maximum upper basin depth of 7.4 ft. The maximum discharge rate from the upper basin to the lower basin is 1827 cfs (see Plate 2). Routing the outflow hydrograph through the lower basin, the maximum rate of discharge from the lower basin over the eastern ridge is shown to be 1386 cfs. The water elevation in the lower basin will reach a maximum elevation of 5107.6 feet. This is several feet above the office site in its natural condition.

**SOLUTION**

The first solution is to raise the building above the floodwater elevations. The top of the curb, adjacent to the building site, is at an average elevation of approximately 5107.6, which is also the 100-year water surface elevation. By grading the site to a minimum pad elevation of 5108.6 the structure will remain one (1) foot above the water surface during the 100-year storm with no alteration to the natural basins.

The second solution should coincide with the raising of the building pad in the event the water surface profile is covered in the future by a major diversion channel. This would entail totac on-site retention for the office building and parking lot with a pond volume of .12 ac. ft. The pond location is shown on Plate 1.

In addition, should the water surface profile be lowered in the future or totally removed, total on-site retention will be accomplished with the grading plan on Plate 1. The calculations are shown in the appendix with pond sizing accomplished by using storage above the 5100 foot contour to the 5102 foot contour.

**CONCLUSIONS**

The Taylor Ranch office site needs would be best suited by raising the pad to an elevation at least one (1) foot above the expected flood depth of 5107.6 feet.

In addition to raising the building pad, the building of an on-site retention pond to accommodate nuisance flows of .12 ac. ft. should be built.

AMAFCA has adopted the Matotan Master Drainage Plan in this area but is making revisions at this time. An overall drainage management plan should be finalized soon in order to coincide with the rapid development taking place.

# APPENDIX

# CALCULATIONS

TOTAL IMPERMEABLE SURFACE

2.494
3.301
3.645
2.128
1.659
1.175

14.402 × 12688.09 = 182,733 FT²

.420
5329 FT²

$\frac{182,733 \text{ FT}^2}{43560 \text{ FT}^2/\text{AC}}$ = 4.195 AC.

TOTAL PARCEL AREA.

3.533
3.751
2.548
3.154
4.532
3.673
4.602
3.685

29.478 × 12688.09 = 374019. FT²

$\frac{374019}{43560}$ = 8.586 AC.

PERMEABLE SURFACE

8.586 − 4.195 = 4.391 AC

L = 560 FT.

S = 12/560 = .021  2.143%

B = [.77 (4.195) + 4.391 (1.84)] / 8.586 = 1.317

C = [ (4.195)(.95) + 4.391 (.40)] / 8.586 = .67

| | | | |
|---|---|---|---|
| PROJECT NAME | TAYLOR RANCH | SHEET 1 | OF 2 |
| PROJECT NO. | 78-151 | BY RRB | DATE 11/6/78 |
| SUBJECT | DRAINAGE REPORT | CH'D | DATE |

$T_c = \text{Log}^{-1}(.3641(B) + .3354\,\text{Log}(L) - .197\,\text{Log}(S - .3613))$

$T_c = \text{Log}^{-1}(1.053)$

$T_c = 11.30$ min

$I = \frac{189}{25 + T_c} = \frac{189}{25 + 11.30} = 5.21$ in/hr

$Q = CIA$

$(.67)(5.21)(8.586) = 29.95$ CFS

POND VOLUME $= 60\,T_c\,Q$

$= 60(11.30)(29.95) = 20{,}304.31\ ft^3$

$= .4661$ AC. FT.

CONTOUR 00 = .2447 AC.

01 = .3125 AC

02 = .4410 AC

VOLUME

1' DEPTH

$(.2447 + .3125)\frac{1}{2}(1) = .2786$ AC FT.

2' DEPTH

$(.3125 + .4410)\frac{1}{2}(1) + .2786 = .6554$ AC-FT.

NOTE PERMANENT POND ELEVATION 00, RUNOFF POND WITH FREE BOARD 02

| | | | |
|---|---|---|---|
| PROJECT NAME | TAYLOR RANCH | SHEET 2 | OF 2 |
| PROJECT NO. | 78-151 | BY RRB | DATE 11/6/78 |
| SUBJECT | DRAINAGE REPORT | CH'D | DATE |

```
START
*
*     THIS HYMO RUN CONSISTS OF A RESERVOIR ROUTING FOR THE
*  EXISTING CONDITIONS ON TAYLOR RANCH
*
*
*     THE INFLOW HYDROGRAPH WAS PROVIDED FOR FROM A PREVIOUS
*     STUDY BY MURRAY-MC CORMICK,INC.
*
STORE HYD            ID=1       HYD NO=300          DT=.08333 DA=0
                     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
                     0.0     4.1    19.2    50.4   100.8   171.8   265.3   375.3
                   481.7   574.2   649.2   713.5   771.7   881.2  1043.0  1262.8
                  1512.2  1771.9  2014.6  2215.7  2368.0  2453.1  2472.9  2434.3
                  2350.8  2239.6  2116.7  1992.8  1872.9  1759.7  1656.1  1566.0
                  1493.4  1439.8  1404.3  1383.7  1374.4  1374.1  1382.0  1398.6
                  1424.3  1458.7  1499.6  1543.2  1585.0  1620.1  1644.3  1654.1
                  1646.3  1629.7  1577.3  1517.3  1442.1  1355.4  1261.6  1165.9
                  1073.0   986.4   907.9   838.0   775.8   720.1   669.7   623.7
                   581.2   541.6   505.2   471.1   439.4   409.7   381.9   355.6
                   330.5   306.6   284.2   263.4   244.5   227.4   211.8   197.4
                   184.0   171.4   159.7   148.8   138.7   129.4
PRINT HYD            ID=1       CODE=1
```

PARTIAL HYDROGRAPH 300.0

| TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS |
|---|---|---|---|---|---|
| .000 | 0. | 2.667 | 2351. | 5.333 | 1073. |
| .083 | 0. | 2.750 | 2240. | 5.416 | 986. |
| .167 | 0. | 2.833 | 2117. | 5.500 | 908. |
| .250 | 0. | 2.917 | 1993. | 5.583 | 838. |
| .333 | 0. | 3.000 | 1873. | 5.666 | 776. |
| .417 | 0. | 3.083 | 1760. | 5.750 | 720. |
| .500 | 0. | 3.167 | 1656. | 5.833 | 670. |
| .583 | 0. | 3.250 | 1566. | 5.916 | 624. |
| .667 | 0. | 3.333 | 1493. | 6.000 | 581. |
| .750 | 4. | 3.417 | 1440. | 6.083 | 542. |
| .833 | 19. | 3.500 | 1404. | 6.166 | 505. |
| .917 | 50. | 3.583 | 1384. | 6.250 | 471. |
| 1.000 | 101. | 3.667 | 1374. | 6.333 | 439. |
| 1.083 | 172. | 3.750 | 1374. | 6.416 | 410. |
| 1.167 | 265. | 3.833 | 1382. | 6.500 | 382. |
| 1.250 | 375. | 3.917 | 1399. | 6.583 | 355. |
| 1.333 | 482. | 4.000 | 1424. | 6.666 | 331. |
| 1.417 | 574. | 4.083 | 1459. | 6.750 | 307. |
| 1.500 | 649. | 4.167 | 1500. | 6.833 | 284. |
| 1.583 | 714. | 4.250 | 1543. | 6.916 | 263. |
| 1.667 | 772. | 4.333 | 1585. | 7.000 | 245. |
| 1.750 | 881. | 4.417 | 1620. | 7.083 | 227. |
| 1.833 | 1043. | 4.500 | 1644. | 7.166 | 212. |
| 1.917 | 1263. | 4.583 | 1654. | 7.250 | 197. |
| 2.000 | 1512. | 4.666 | 1646. | 7.333 | 184. |
| 2.083 | 1772. | 4.750 | 1621. | 7.416 | 171. |
| 2.167 | 2015. | 4.833 | 1577. | 7.500 | 160. |
| 2.250 | 2219. | 4.916 | 1517. | 7.583 | 149. |
| 2.333 | 2368. | 5.000 | 1442. | 7.666 | 139. |
| 2.417 | 2453. | 5.083 | 1355. | 7.750 | 129. |
| 2.500 | 2473. | 5.166 | 1262. | | |
| 2.583 | 2434. | 5.250 | 1166. | | |

RUNOFF VOLUME = 614.921 ACRE-FT

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

PEAK DISCHARGE RATE = 2472.9 CFS
PEAK OCCURRED AT 2.50 HRS.

* ELEVATION OF POINT OF INITIAL RELEASE=5109
ROUTE RESERVOIR ID=5 HYD ID=501 INFLOW ID=1

| | | |
|---|---|---|
| 0.1 | 0 | 5103.5 |
| 0.1 | .91 | 5104 |
| 0.2 | 5.52 | 5105 |
| 0.3 | 22.73 | 5106 |
| 0.4 | 42.56 | 5107 |
| 0.5 | 68.94 | 5108 |
| 0.6 | 101.73 | 5109 |
| 313 | 140.26 | 5110 |
| 930 | 162.92 | 5110.5 |
| 2129 | 165.58 | 5111 |
| 6754 | 242.27 | 5112 |
| 14355 | 319.88 | 5113 |
| 26795 | 378.00 | 5114 |

PEAK DISCHARGE = 1827.22 CFS.
MAXIMUM WATER ELEVATION = 5110.9 FT.
MAXIMUM RESERVOIR STORAGE = 173.58 ACRE-FT.
* OUTFLOW HYD OF UPPER DEPRESSION AREA
PRINT HYD ID=5 CODE=1

OUTFLOW HYDROGRAPH RESERVOIR 501.0

| TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS |
|---|---|---|---|---|---|
| .000 | 0. | 4.167 | 1438. | 8.333 | 185. |
| .083 | 0. | 4.250 | 1464. | 8.416 | 175. |
| .167 | 0. | 4.333 | 1495. | 8.500 | 165. |
| .250 | 0. | 4.417 | 1526. | 8.583 | 156. |
| .333 | 0. | 4.500 | 1560. | 8.666 | 148. |
| .417 | 0. | 4.583 | 1588. | 8.750 | 140. |
| .500 | 0. | 4.666 | 1607. | 8.833 | 132. |
| .583 | 0. | 4.750 | 1615. | 8.916 | 125. |
| .667 | 0. | 4.833 | 1610. | 9.000 | 118. |
| .750 | 0. | 4.916 | 1591. | 9.083 | 112. |
| .833 | 0. | 5.000 | 1556. | 9.166 | 106. |
| .917 | 0. | 5.083 | 1506. | 9.250 | 100. |
| 1.000 | 0. | 5.166 | 1446. | 9.333 | 94. |
| 1.083 | 0. | 5.250 | 1375. | 9.416 | 89. |
| 1.167 | 0. | 5.333 | 1296. | 9.500 | 84. |
| 1.250 | 0. | 5.416 | 1214. | 9.583 | 80. |
| 1.333 | 0. | 5.500 | 1132. | 9.666 | 76. |
| 1.417 | 0. | 5.583 | 1052. | 9.750 | 71. |
| 1.500 | 0. | 5.666 | 976. | 9.833 | 68. |
| 1.583 | 0. | 5.750 | 917. | 9.916 | 64. |
| 1.667 | 0. | 5.833 | 879. | 10.000 | 60. |
| 1.750 | 0. | 5.916 | 839. | 10.083 | 57. |
| 1.833 | 0. | 6.000 | 798. | 10.166 | 54. |
| 1.917 | 0. | 6.083 | 758. | 10.250 | 51. |
| 2.000 | 0. | 6.166 | 718. | 10.333 | 48. |
| 2.083 | 0. | 6.250 | 678. | 10.416 | 46. |
| 2.167 | 1. | 6.333 | 640. | 10.500 | 43. |
| 2.250 | 1. | 6.416 | 603. | 10.583 | 41. |
| 2.333 | 71. | 6.500 | 568. | 10.666 | 39. |
| 2.417 | 198. | 6.583 | 533. | 10.750 | 37. |
| 2.500 | 337. | 6.666 | 501. | 10.833 | 35. |
| 2.583 | 700. | 6.750 | 470. | 10.916 | 33. |
| 2.667 | 1039. | 6.833 | 440. | 11.000 | 31. |
| 2.750 | 1426. | 6.916 | 411. | 11.083 | 29. |

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

| | | | | | |
|---|---|---|---|---|---|
| 2.833 | 1658. | 7.000 | 384. | 11.166 | 28. |
| 2.917 | 1780. | 7.083 | 359. | 11.250 | 26. |
| 3.000 | 1827. | 7.166 | 335. | 11.333 | 25. |
| 3.083 | 1824. | 7.250 | 313. | 11.416 | 23. |
| 3.167 | 1788. | 7.333 | 306. | 11.500 | 22. |
| 3.250 | 1734. | 7.416 | 299. | 11.583 | 21. |
| 3.333 | 1671. | 7.500 | 292. | 11.666 | 20. |
| 3.417 | 1606. | 7.583 | 285. | 11.750 | 19. |
| 3.500 | 1551. | 7.666 | 277. | 11.833 | 18. |
| 3.583 | 1502. | 7.750 | 269. | 11.916 | 17. |
| 3.667 | 1464. | 7.833 | 258. | 12.000 | 16. |
| 3.750 | 1437. | 7.916 | 244. | 12.083 | 15. |
| 3.833 | 1419. | 8.000 | 231. | 12.166 | 14. |
| 3.917 | 1410. | 8.083 | 216. | 12.250 | 13. |
| 4.000 | 1410. | 8.166 | 206. | 12.333 | 13. |
| 4.083 | 1420. | 8.250 | 195. | 12.416 | 12. |

RUNOFF VOLUME = 507.829 ACRE-FT
PEAK DISCHARGE RATE = 1827.2 CFS
PEAK OCCURRED AT 3.00 HRS.

* ROUTE OUTFLOW HYD OF DAM THROUGH DOWNSTREAM DEPRESSION AREA
* UNDER EXISTING CONDITIONS THE CHANNEL BOTTOM ELEVATION=5106
ROUTE RESERVOIR ID=7 HYD NO=502 INFLOW=5

| OUTFLOW | STORAGE | ELEV |
|---|---|---|
| 0.0 | 0.0 | 5101.5 |
| .1 | 1.23 | 5102 |
| .2 | 11.50 | 5103 |
| .3 | 34.03 | 5104 |
| .4 | 53.32 | 5104.5 |
| .5 | 72.60 | 5105 |
| .6 | 100.34 | 5105.5 |
| .7 | 128.08 | 5106 |
| 329 | 197.56 | 5107 |
| 2169 | 275.00 | 5108 |

PEAK DISCHARGE = 1365.98 CFS.
MAXIMUM WATER ELEVATION = 5107.6 FT.
MAXIMUM RESERVOIR STORAGE = 237.75 ACRE-FT.
* OUTFLOW HYD FLOWING IN CHANNEL BEYOND TAYLOR'S RANCH
PRINT HYD ID=7 CODE=1

OUTFLOW HYDROGRAPH RESERVOIR 502.0

| TIME HRS | FLOW CFS | TIME HRS | FLOW CFS | TIME HRS | FLOW CFS |
|---|---|---|---|---|---|
| .000 | 0. | 4.167 | 308. | 8.333 | 299. |
| .083 | 0. | 4.250 | 480. | 8.416 | 295. |
| .167 | 0. | 4.333 | 634. | 8.500 | 291. |
| .250 | 0. | 4.417 | 766. | 8.583 | 287. |
| .333 | 0. | 4.500 | 887. | 8.666 | 283. |
| .417 | 0. | 4.583 | 992. | 8.750 | 279. |
| .500 | 0. | 4.666 | 1085. | 8.833 | 275. |
| .583 | 0. | 4.750 | 1166. | 8.916 | 270. |
| .667 | 0. | 4.833 | 1234. | 9.000 | 266. |
| .750 | 0. | 4.916 | 1290. | 9.083 | 261. |
| .833 | 0. | 5.000 | 1334. | 9.166 | 257. |
| .917 | 0. | 5.083 | 1364. | 9.250 | 252. |
| 1.000 | 0. | 5.166 | 1382. | 9.333 | 248. |
| 1.083 | 0. | 5.250 | 1386. | 9.416 | 243. |
| 1.167 | 0. | 5.333 | 1378. | 9.500 | 238. |
| 1.250 | 0. | 5.416 | 1359. | 9.583 | 234. |
| 1.333 | 0. | 5.500 | 1331. | 9.666 | 229. |

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

| | | | | | |
|---|---|---|---|---|---|
| 1.417 | 0. | 5.583 | 1294. | 9.750 | 224. |
| 1.500 | 0. | 5.666 | 1251. | 9.833 | 220. |
| 1.583 | 0. | 5.750 | 1244. | 9.916 | 215. |
| 1.667 | 0. | 5.833 | 1157. | 10.000 | 210. |
| 1.750 | 0. | 5.916 | 1112. | 10.083 | 206. |
| 1.833 | 0. | 6.000 | 1067. | 10.166 | 201. |
| 1.917 | 0. | 6.083 | 1022. | 10.250 | 197. |
| 2.000 | 0. | 6.166 | 979. | 10.333 | 193. |
| 2.083 | 0. | 6.250 | 936. | 10.416 | 188. |
| 2.167 | 0. | 6.333 | 893. | 10.500 | 184. |
| 2.250 | 0. | 6.416 | 852. | 10.583 | 180. |
| 2.333 | 0. | 6.500 | 811. | 10.666 | 175. |
| 2.417 | 0. | 6.583 | 771. | 10.750 | 171. |
| 2.500 | 0. | 6.666 | 732. | 10.833 | 167. |
| 2.583 | 0. | 6.750 | 694. | 10.916 | 163. |
| 2.667 | 0. | 6.833 | 657. | 11.000 | 159. |
| 2.750 | 0. | 6.916 | 622. | 11.083 | 155. |
| 2.833 | 0. | 7.000 | 587. | 11.166 | 152. |
| 2.917 | 0. | 7.083 | 554. | 11.250 | 148. |
| 3.000 | 0. | 7.166 | 523. | 11.333 | 144. |
| 3.083 | 0. | 7.250 | 492. | 11.416 | 141. |
| 3.167 | 1. | 7.333 | 464. | 11.500 | 137. |
| 3.250 | 1. | 7.416 | 439. | 11.583 | 134. |
| 3.333 | 1. | 7.500 | 417. | 11.666 | 130. |
| 3.417 | 1. | 7.583 | 396. | 11.750 | 127. |
| 3.500 | 1. | 7.666 | 380. | 11.833 | 124. |
| 3.583 | 42. | 7.750 | 363. | 11.916 | 120. |
| 3.667 | 85. | 7.833 | 348. | 12.000 | 117. |
| 3.750 | 126. | 7.916 | 333. | 12.083 | 114. |
| 3.833 | 165. | 8.000 | 318. | 12.166 | 111. |
| 3.917 | 202. | 8.083 | 308. | 12.250 | 108. |
| 4.000 | 238. | 8.166 | 305. | 12.333 | 105. |
| 4.083 | 274. | 8.250 | 302. | 12.416 | 103. |

RUNOFF VOLUME = 356.978 ACRE-FT
PEAK DISCHARGE RATE = 1365.0 CFS
PEAK OCCURRED AT 5.25 HRS.

FINISH

0 5 7 0