# City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103


October 13, 1995

Jud Lee
Isaacson & Arfman
128 Monroe St. NE
Albuquerque, NM 87108

***RE: THE VILLAGE (F11-D7) DRAINAGE REPORT FOR SITE DEVELOPMENT PLAN FOR SUBDIVISION APPROVAL. ENGINEER'S STAMP DATED JULY 28, 1995.***

Dear Mr. Lee:

Based on the information provided on your October 11, 1995 submittal, the above referenced project is approved for Site Development Plan for Subdivision.

Prior to your next submittal, show limits of existing floodplain on your plan sheet.

If I can be of further assistance, please feel free to contact me at 768-3622.

Sincerely,

Lisa Ann Manwill
Engineering Assoc./Hyd.

c: Andrew Garcia
File

THE CITY OF ALBUQUERQUE IS AN EQUAL OPPORTUNITY/REASONABLE ACCOMMODATION EMPLOYER

## MAP LEGEND

Revised 100-Year Floodplain

REVISED AREA

ZONE AE
(EL5105)

POND NO. 16A

ZONE AE
(EL 5102)

POND NO. 16B

100-YEAR FLOOD CONTAINED
IN STORM DRAIN

ZONE X

ZONE A

100 – YEAR FLOOD
CONFINED TO
CONSTRUCTED
CHANNEL

Ladera
Golf Course

La Rinconada Diversion Channel

WESTERN TRAIL

BOULEVARD

UNSER

ATRISCO DRIVE

FRIENDLY COURT

FRIENDLY

WES

MILNE ROAD

ESTANCIA

CLEGHORN ROAD

WAYNE ROAD

65TH STREET

66TH STREET

64TH STREET

CLEGHORN

WAYNE

EVERITT

T11N

T10N

JOINS PANEL 0113

ARMAND ROAD

ARMAND COURT

MAYHILL COURT

MAXIM COURT

EVERITT COURT

67TH STREET

CISCO ROAD

71ST ST

72ND STREET

70TH STREET

68TH STREET

GEORGETOWN AVENUE

SAN BLAS PLACE

DONA LINDA

63RD STREET

3

JOSEPHS

APPROXIMATE SCALE IN FEET

500 0 500

°43'07"

NATIONAL FLOOD INSURANCE PROGRAM

# FIRM

## FLOOD INSURANCE RATE MAP

BERNALILLO COUNTY,
NEW MEXICO AND
INCORPORATED AREAS

PANEL 114 OF 825

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS

COMMUNITY NUMBER PANEL SUFFIX

BERNALILLO COUNTY
UNINCORPORATED AREAS

REVISED TO
REFLECT LOMI

DATED SEP 18 1998

MAP NUMBER
35001C0114 D

EFFECTIVE DATE:
SEPTEMBER 20, 1996

Federal Emergency Management Agency

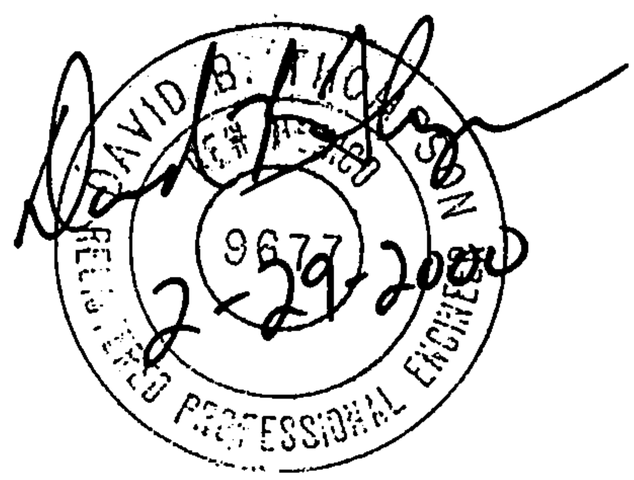
Table 3. Summary of Discharges for Shallow Flooding Areas (Cont'd)

| Flooding Source and Location | Drainage Area (square miles) | 100-Year Peak Discharges (cfs) |
|---|---|---|
| **REVISED DATA** | | |
| La Rinconada Arroyo<br>At Unser Boulevard Crossing | 1.98 | 814 |
| Sacate Blanco Arroyo[1]<br>At confluence with Amole Arroyo | 0.43 | 238[4] |
| Arroyo De San Antonio-Middle[1]<br>At Atrisco Drive<br>At Atrisco Drive Crossing<br>At Coors Boulevard | 2.61<br>4.03<br>--[3] | 1,324<br>1,970<br>2,170 |
| South Glenwood Hills Channel[2]<br>At Tramway Boulevard<br>At confluence with Piedra Lisa | 0.426<br>--[3] | 727<br>844 |

**REVISED TO REFLECT LOMR DATED** SEP 18 1998

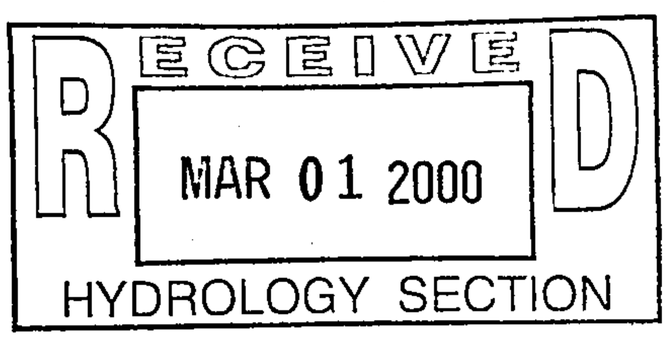
[1]Flows from Matotan, 1975
[2]Flows from Albuquerque Master Drainage Study - Volume III - Bohannan-Huston, Inc. Appendix E
[3]Drainage areas not applicable because of interbasin transfer via roads and storm sewers
[4]By Regression Analysis

# DRAINAGE MASTER PLAN
# FOR
# COORS VILLAGE
# SUBDIVISION




**Prepared by:**
**Thompson Engineering Consultants, Inc.**
**2060 Main Street N.E., Suite E**
**Los Lunas, NM 87031**

**February 2000**



# INTRODUCTION AND SITE LOCATION

The proposed Coors Village Subdivision is located on the west side of Albuquerque at the intersection of Coors Boulevard and Western Trail. The 58 acre tract is currently platted as Tract A-1-A, a portion of the University of Albuquerque Urban Center. The property will be subdivided into 4 large tracts. Tract 1 will be approximately 16.4 acres in size and will be further subdivided into single family residential lots. Tract 2, which has an area of 5 acres, will be developed as an office complex. Tract 3, which is 13.7 acres in size, will be a commercial development. Tract 4 will be for apartments. It has an area of 17 acres. This report will serve as the Drainage Master Plan for the development of these tracts. A drainage and grading plan for each tract will be required prior to development. This site was previously planned to have similar land uses.

On September 18, 1998, FEMA approved a LOMR request from the City of Albuquerque for the Unser Boulevard South, Rinconada Arroyo, and Ponds 16A and 16B, prepared by URS Greiner. This LOMR Request indicates that there is adequate volume in the Ladera Pond 16B to accept flows from the Coors Village Site.

# METHODOLOGY

The hydrologic and hydraulic criteria in Section 22 of the City of Albuquerque Development Process Manual (DPM), entitled "Drainage, Flood Control, and Erosion Control," was followed to perform the analyses given in this report. The design storm used for both the existing undeveloped and developed conditions of the Coors Village Subdivision is the 100-year, 24-hour storm event for peak flow and runoff volume computations.

A hydrologic computer model using AHYMO 97 was developed for both existing and developed conditions to determine the peak flows expected for the development. Finally, a hydraulic analysis of the storm sewer collection system was performed to assist in the sizing of the infrastructure.

# EXISTING DRAINAGE CONDITIONS

## *INTRODUCTION*

The site is located between Coors Boulevard and Atrisco Drive and is south of Western Trail. The average slope across the site is 1 to 2%. The site is sparsely vegetated.

The FEMA Flood Insurance Rate Map Number 35001C0114D, effective date September 20, 1996, and revised September 18, 1998 to reflect the LOMR previously mentioned shown in Figure 1, indicates that there is no flood hazard zone on the site.

There are two drainage systems adjacent to the site which eventually drain to the San Antonio Arroyo. The first is the Unser Boulevard/Rinconada Arroyo/Ladera Ponds 16A and 16B, mentioned previously and the Ladera Pond 15 outfall system located in Coors Boulevard. The Unser Boulevard system is maintained by the City of Albuquerque, while the Lader Pond 15 outfall system is maintained by AMAFCA.

## *UNSER BOULEVARD/RINCONADA ARROYO/PONDS 16A AND 16B LOMR REQUEST TO FEMA*

On September 18, 1998, FEMA approved a LOMR request from the City of Albuquerque for the Unser Boulevard South, Rinconada Arroyo, and Ponds 16A and 16B, prepared by URS Greiner (see Appendix C). A review of this LOMR Request indicates that there is adequate volume in the Ladera Pond 16B to accept flows from the Coors Village Site. This LOMR reduced the Base Flood Elevation for Ladera Pond 16B from 5108 to 5102 and removed the 100-year flood hazard zone from the Coors Village Site.

The majority of the watershed for the LOMR is within the Petroglyph National Monument and therefore is assumed to be undeveloped. The remainder of the watershed was analyzed as future developed conditions. A HEC-1 model was developed in 1989 for the watershed. Ladera Pond 16B was regraded in the early 1990's increasing the capacity. A survey was performed to determine the increased capacity of the facility (see Plate 3). According to calculations performed by URS Greiner, the 100-year water surface elevation using the volume detained (18 acre-feet) in the HEC-1 analysis and the survey information is 5101.50, which is lower than the water surface of 5102.63 given in the HEC-1 analysis.

## *MESA PRIETA SUBDIVISION DRAINAGE REPORT*

The Mesa Prieta Subdivision Drainage Report, prepared by Resource Technology, Inc. in September 1995, analyzed the hydraulic grade line of the Ladera Pond 15 outfall storm sewer located in Coors Village. An additional analysis of the Ladera Pond 15 outfall system was performed by Mr. Mark Burak, P.E. in May of 1995. Both of these analyses conclude that the Ladera Pond 15 Outfall storm sewer in Coors Boulevard is at capacity. The storm sewer at the intersection of Coors and Western Trail is flowing under pressure with a peak flow of 297 cfs. Since the storm sewer is flowing at capacity under pressure conditions, it cannot accept any additional flows from Coors Village.

## *CHAPPARAL WEST SUBDIVISION DRAINAGE REPORT*

The Chapparal West Subdivision Drainage Report, prepared by Jeff Mortensen & Associates, Inc. in November 1999, indicates that the runoff from the subdivision will drain into Ladera Pond 16B via a storm drain that cross Chapparal Elementary School. The 17.1 acre Chapparal West Subdivision is located within the Basin P of the Unser

Boulevard South HEC-1 hydrologic model. The HEC-1 analysis computed excess runoff in Basin P to be 1.28 inches, whereas Mortensen calculated the excess runoff to be 1.51 inches. Therefore, the additional runoff reaching Pond 16B from Chapparal West Subdivision is 0.33 acre-feet. This additional runoff raises the 100-year water surface elevation of the pond by 0.05 feet.

According to the Chapparal West Subdivision Drainage Report, Ladera Pond 16B is owned by Albuquerque Public Schools. The property has an AMAFCA blanket drainage easement with a license agreement to the City of Albuquerque. Therefore, the City and AMAFCA are responsible for maintaining the pond.

## *OFF-SITE FLOWS*

The site is bounded on three sides by existing streets, which are Coors Boulevard, Western Trail, and Atrisco Drive. There are no offsite flows from surrounding streets or from the property to the south of the site (Tracts X-1-A-1 and X-1-A-2). According to the Altura West Drainage Report, Tracts X-1-A-1 and X-1-A-2 drain to the Altura West storm drain system that is located in St. Joseph's Drive, which eventually drains to the Rio Grande. Therefore, there are no offsite flows that reach the site.

## *ON-SITE FLOWS*

For the existing conditions hydrologic analysis, land treatment type A was used to determine peak flows and runoff volumes. The developed basin boundaries were used for existing basins. The site currently drains in three directions (See Plate 1). The majority of the north portion of the site (Basins 140, 160, 200 and a portion of 100) drains to Ladera Pond 16B located west of the site. The total volume reaching Ladera Pond 16B is about 0.94 acre-feet. Portions of Basins 100 drain to Coors Boulevard. The majority of the southern portion of the site (Basins 110, 120, 130, 170, and 180) drains to a depression located at the southeast corner of the site. The total volume reaching the depression is 0.74 acre-feet. Table 1 shows the results of the existing conditions modeling.

**Table 1 Existing Drainage Conditions**

| BASINS | Area (acres) | 100yr-24hr Peak Flow (cfs) | 100yr-24hr Runoff Volume (acre-ft) | Land Treatment |
|---|---|---|---|---|
| 100 | 13.87 | 18.42 | 0.519 | 100%A |
| 110 | 6.04 | 8.03 | 0.226 | 100%A |
| 120 | 0.83 | 1.11 | 0.031 | 100%A |
| 130 | 0.72 | 0.97 | 0.027 | 100%A |
| 140 | 1.03 | 1.37 | 0.039 | 100%A |
| 150 | 1.83 | 2.44 | 0.069 | 100%A |
| 160 | 5.00 | 6.64 | 0.187 | 100%A |
| 170 | 1.57 | 2.09 | 0.059 | 100%A |
| 180 | 10.60 | 14.08 | 0.397 | 100%A |
| 200 | 16.37 | 21.74 | 0.613 | 100%A |

# DEVELOPED DRAINAGE CONDITIONS

## *DRAINAGE BASIN DELINEATION*

Plate 1 shows that the site is divided into ten drainage basins, basins 100-180 and 200. It is proposed that all of the peak flows from the site will be routed in a storm sewer to Ladera Pond 16B. The eventual outfall for the Ladera Pond 16B is the San Antonio Arroyo. The LOMR request from the City of Albuquerque for the Unser Boulevard South, Rinconada Arroyo, and Ponds 16A and 16B, prepared by URS Greiner (see Appendix C) indicates that the Ladera Pond 16B has the capacity to accept the runoff from Coors Village with minimal impact.

## *HYDROLOGIC ANALYSIS*

To determine the peak flows of each basin a hydrologic analysis was performed in accordance to section 22.2 of the Development Process Manual (DPM) using AHYMO 97. The analysis included the 100-year 24-hour storm. The 100-year 24-hour storm was the basis for determining peak flows to size the storm sewer collection system and was used to determine the required capacity of the detention ponds. The design storm values are based on Tables C-1, C-2, and C-3 of the DPM's section 22.2. The Coors Village Subdivision is contained within section F-11-Z of the City of Albuquerque Zone Atlas Map. The location of the site results in the following design storms:

100-year 1-hour event -- 1.90 inches,
100-year 6-hour event -- 2.20 inches,
100-year 24-hour event -- 2.65 inches.

Basins were assigned land treatment values in accordance with Tables A-4 and A-5 of the DPM's section 22.2. Table 1 shows the land treatments and areas for each drainage basin.

The time of concentration for all basins was calculated using the SCS Upland Method Calculated outlined in subsection B.2 of DPM section 22.2 within the AHYMO 97 model.

Because the Unser HEC-1 model was not available, an AHYMO model of the inflows to the Ladera Pond 16B and the stage-storage relationship for the pond was developed following the hydrograph parameters given in the output of the HEC-1 model for the LOMR submittal. Some trial and error was required to match the peak flow of the incoming flows and the stage-storage characteristics of Ladera Pond 16B as shown in the HEC-1 output. The AHYMO model resulted in a 100-year water surface elevation of 5102.63 with a volume of 18.42 acre-feet and a peak flow out of 32.5 cfs. This compares favorably to the values given in the HEC-1 model, which are 5102.63 water surface elevation, a volume of 18.5 acre-feet, and a peak flow of 33 cfs. Then, the revised volumes of the pond for each stage as calculated by URS Greiner was input to the AHYMO model and run to determine the 100-year water surface elevation. With the revised volumes, the 100-year water surface elevation is 5101.76 and the detained volume and peak flow out are 19.85 acre-feet and 28.8 cfs, respectively.

**Table 2 Developed Drainage Conditions**

| BASINS | Area (acres) | 100yr-24hr Peak Flow (cfs) | 100yr-24hr Runoff Volume (acre-ft) | Land Treatment |
|---|---|---|---|---|
| 100 | 13.87 | 57.13 | 2.431 | 10%B,5%C,85%D |
| 110 | 6.04 | 23.45 | 0.976 | 20%B,5%C,85%D |
| 120 | 0.83 | 3.44 | 0.146 | 10%B,5%C,85%D |
| 130 | 0.72 | 2.99 | 0.127 | 10%B,5%C,85%D |
| 140 | 1.03 | 4.26 | 0.181 | 10%B,5%C,85%D |
| 150 | 1.83 | 4.93 | 0.163 | 60%B,20%C,20%D |
| 160 | 5.00 | 19.40 | 0.807 | 20%B,5%C,75%D |
| 170 | 1.57 | 6.47 | 0.275 | 10%B,5%C,85%D |
| 180 | 10.60 | 41.12 | 1.711 | 20%B,5%C,75%D |
| 200 | 16.37 | 60.99 | 2.459 | 25%B,10%C,65%D |

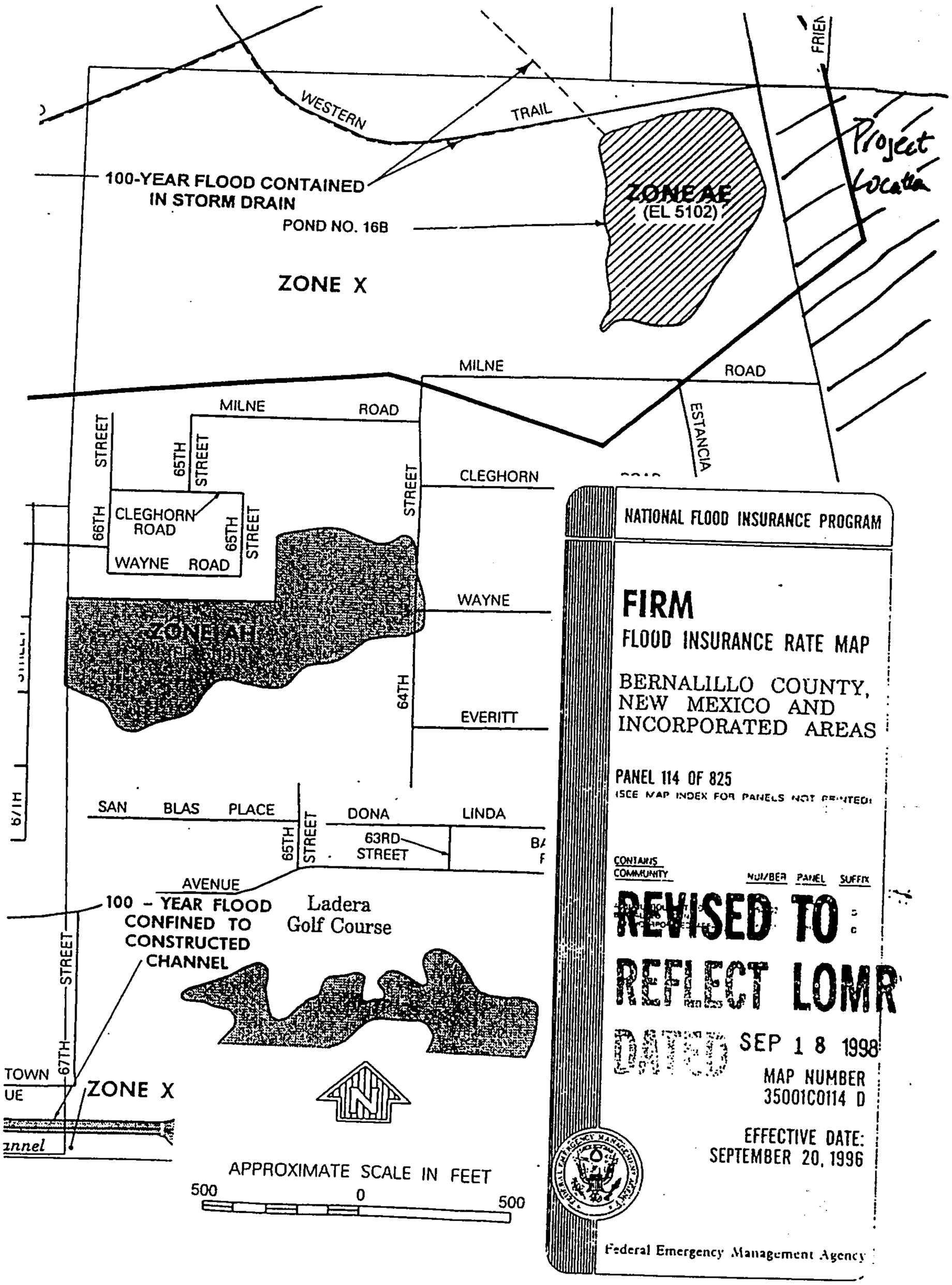



**Figure 1 FEMA Flood Insurance Rate Map**

## *DRAINAGE CONCEPT*

### Introduction

This drainage master plan addresses the drainage concept for the developed condition of the Coors Village subdivision. This drainage master plan will serve as a guide for each tract within the subdivision to follow when development occurs. A grading and drainage plan for each tract will be required prior to development. The entire subdivision is proposed to drain to Ladera Pond 16B through a storm sewer system. Based on an analysis of the Unser Boulevard South LOMR prepared by URS Greiner, it was determined that there is sufficient capacity in the Ladera Pond 16B to accept flows from the Coors Village Site. Although the majority of Coors Village lies outside of the LOMR watershed boundary, there is no additional capacity in the Ladera Pond 15 outfall storm sewer which is the existing outfall system for the site according to previous drainage analyses, including San Antonio Arroyo and the Monolithic Memories Report. According to the Monolithic Memories Drainage Report the runoff from the site would pond onsite and be released to the Ladera 15 storm sewer via a flapgate system. The flapgate system is not preferred by the City because of its unreliability and high maintenance requirements. According to the Mesa Prieta Subdivision Drainage Report and subsequent analysis by Mr. Mark Burak, P.E., the Ladera Pond 15 outfall storm sewer located in Coors Boulevard is at capacity and cannot accept any additional flows.

### Drainage Description

<u>100 Series Basins</u>

The 100 series basins will be collected in a storm sewer system and will discharge to Ladera Pond 16B near the intersection of the Tract 1 driveway and Atrisco (see Plate 1). Runoff from basins 100 through 180 will be collected in a storm sewer that will drain to Ladera Pond 16B. The street flows from basins 120, 130, 140, and 170 will be collected by Type A storm inlets and will be discharged to the storm sewer system. A 24" diameter storm sewer will be located in Street A to pick up flows from basin 120 and from basins 100 and 110 to the traffic circle at the Street A/Street B intersection. Just east of the traffic circle the storm sewer increases to a 54" diameter pipe to accept flows from basins 100 and 110. A 54" storm sewer is located in Street A from the center of the traffic circle to the manhole that accepts flows from Basin 160.

Basin 160, located west of the traffic circle, will discharge into a 24" storm drain at the driveway from Street A. Flows from Basin 160 are combined with flows from the upstream basins. At the Basin 160 driveway the storm sewer is increased to 60" diameter until the Basin 180 driveway. At manhole #3 flows from Basin 180 are introduced into the storm sewer system. A 72" storm drain from manhole #3 to manhole #13 at Basin 200 driveway conveys 158 cfs. From manhole #13, flows from Basin 200 are collected

and all of the flows from the site are discharged into the ladera Pond 16B. A riprap energy dissipator will be constructed at the outfall of the pipe into the pond. A total volume of 9.56 acre-feet is added to the pond from the storm sewer system.

Basin 200

Basin 200 discharges to manhole #13 and are combined with the Basin 100 series flows. A 42" diameter storm sewer carries the flows to manhole #13. In Atrisco Drive at manholes #1 and #13 Type A storm inlets are included to collect street flows and discharge them into the pond. Also, just north of the Basin 200 driveway at the low point in Atrisco Drive, the street grades will be raised approximately 1.5 feet from 5203.5 to 5205.0 to increase the freeboard in Ladera Pond 16B. On all storm sewers crossing Atrisco it will be important to be able to be construct the pipes under two existing gas high pressure gas lines (12" and 20") that are located in the Atrisco right-of-way east of the road.

Ladera Pond 16B

The Ladera Pond 16B, located at the northwest corner of Atrisco Drive and Milne Road, serves as the outfall for a large watershed including the escarpment to the north, the PNM Ponds detention system, and several residential areas as analyzed in the Unser Boulevard LOMR. The pond discharges to the San Antonio Arroyo through a 36" to 54" storm sewer. According to the Unser Boulevard LOMR with the revised pond volumes, the water surface elevation of 5101.5, a peak volume of 18.0 acre-feet, and a peak flow of 33 cfs (see Plate 3). The AHYMO model that was completed of the Ladera Pond 16B inflows and the pond routing with the revised pond volumes has a water surface elevation of 5101.76, a volume of 19.85 acre-feet, and a peak flow of 28.8 cfs. The difference in the Ladera Pond 16B results are because URS Greiner revised the water surface elevation by hand calculating the difference due to the revised grading, whereas the revised pond grading was added to the AHYMO model parameters for the Ladera Pond routing. The Coors Village Subdivision will discharge a total of 220 cfs at a volume of 9.56 acre-feet. The AHYMO model was revised to include discharging the runoff from the Coors Village Subdivision to the Ladera Pond 16B. The model shows that the water surface elevation will be 5102.81 with a volume of 26.75 acre-feet and a peak flow of 33.1 cfs. Since the Ladera Pond 16B peak outflow from the AHYMO model is less than the peak outflow from the HEC-1 model in the Unser Boulevard LOMR, there will be no impact to the outfall storm sewer system. Therefore there is enough capacity in the pond to accept flows from the site.

**Hydraulics Analysis**

Once the hydrologic analysis was completed, a hydraulics analysis was performed to size the proposed storm sewer pipes. The HGL analysis indicates that the 100 series storm sewer located in Street A operates under pressure. HGL elevations are shown on Plate 1

at each manhole. Also, a street capacity analysis was performed using HEC-RAS for Street A and Street B. The analysis shows that the streets flow under sub-critical conditions. The hydraulics analysis is shown in Appendix B.

**Drainage Details**

Drainage details for the project are shown on Plate 2. Details include energy dissipator details.

AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) - - VERSION: 1997.02c RUN DATE (MON/DAY/YR) =02/28/2000
INPUT FILE = D:\PROJECTS\CoorsWT\Drainage\HYD24DR5.txt USER NO.= AHYMO-I-9702a01000K21-AH



| COMMAND | HYDROGRAPH IDENTIFICATION | FROM ID NO. | TO ID NO. | AREA (SQ MI) | PEAK DISCHARGE (CFS) | RUNOFF VOLUME (AC-FT) | RUNOFF (INCHES) | TIME TO PEAK (HOURS) | CFS PER ACRE | NOTATION |
|---|---|---|---|---|---|---|---|---|---|---|
| START | | | | | | | | | | TIME= .00 |
| RAINFALL TYPE= 2 | | | | | | | | | | RAIN24= 2.650 |
| *S********** | | | | | | | | | | |
| *S BASIN 100 - COMMERCIAL | | | | | | | | | | |
| *S********** | | | | | | | | | | |
| COMPUTE NM HYD | 100.00 | - | 1 | .02167 | 56.26 | 2.510 | 2.17221 | 1.500 | 4.057 | PER IMP= 85.00 |
| *S********* | | | | | | | | | | |
| *S BASIN 110 - APARTMENTS | | | | | | | | | | |
| *S********* | | | | | | | | | | |
| COMPUTE NM HYD | 110.00 | - | 2 | .00944 | 23.11 | 1.006 | 1.99807 | 1.500 | 3.825 | PER IMP= 75.00 |
| *S COMBINE BASIN 100 & 110 | | | | | | | | | | |
| ADD HYD | 110.50 | 1& 2 | 11 | .03111 | 79.37 | 3.516 | 2.11935 | 1.500 | 3.986 | |
| *S********* | | | | | | | | | | |
| *S BASIN 120 - STREET A EAST | | | | | | | | | | |
| *S********* | | | | | | | | | | |
| COMPUTE NM HYD | 120.00 | - | 3 | .00130 | 3.39 | .151 | 2.17221 | 1.500 | 4.074 | PER IMP= 85.00 |
| *S COMBINE BASIIN 110.5 WITH 120 | | | | | | | | | | |
| ADD HYD | 120.50 | 11& 3 | 12 | .03241 | 82.76 | 3.667 | 2.12146 | 1.500 | 3.990 | |
| *S ROUTE 120.5 TO JUNCTION AT STREET A/STREET B INTERSECTION - 48" PIPE SECTION | | | | | | | | | | |
| ROUTE | 120.90 | 12 | 13 | .03241 | 82.97 | 3.667 | 2.12148 | 1.500 | 4.000 | |
| *S********** | | | | | | | | | | |
| *S BASIN 130 - FUTURE STREET B SOUTH | | | | | | | | | | |
| *S********** | | | | | | | | | | |
| COMPUTE NM HYD | 130.00 | - | 4 | .00113 | 2.95 | .131 | 2.17221 | 1.500 | 4.076 | PER IMP= 85.00 |
| *S COMBINE BASIN 120.9 WITH 130 | | | | | | | | | | |
| ADD HYD | 130.50 | 13& 4 | 14 | .03354 | 85.92 | 3.798 | 2.12316 | 1.500 | 4.003 | |
| *S********** | | | | | | | | | | |
| *S BASIN 140 - STREET B NORTH | | | | | | | | | | |
| *S********** | | | | | | | | | | |
| COMPUTE NM HYD | 140.00 | - | 5 | .00161 | 4.19 | .187 | 2.17221 | 1.500 | 4.070 | PER IMP= 85.00 |
| *S COMBINE BASIN 130.5 WITH 140 | | | | | | | | | | |
| ADD HYD | 140.50 | 14& 5 | 15 | .03515 | 90.11 | 3.984 | 2.12540 | 1.500 | 4.006 | |
| *S ROUTE 140.5 TO 60" PIPE FOR OFFICE FLOWS WITH 54" PIPE SECTION | | | | | | | | | | |
| ROUTE | 140.55 | 15 | 43 | .03515 | 89.74 | 3.984 | 2.12542 | 1.500 | 3.989 | |
| *S********** | | | | | | | | | | |
| *S BASIN 150 - PARK | | | | | | | | | | |
| *S********** | | | | | | | | | | |
| COMPUTE NM HYD | 150.00 | - | 5 | .00286 | 4.91 | .166 | 1.08557 | 1.500 | 2.682 | PER IMP= 20.00 |
| *S COMBINE BASIN 140.55 WITH 150 | | | | | | | | | | |
| ADD HYD | 150.50 | 43& 5 | 17 | .03801 | 94.65 | 4.150 | 2.04715 | 1.500 | 3.891 | |
| *S********** | | | | | | | | | | |
| *S BASIN 160 - OFFICE | | | | | | | | | | |
| *S********** | | | | | | | | | | |
| COMPUTE NM HYD | 160.00 | - | 6 | .00781 | 19.12 | .832 | 1.99807 | 1.500 | 3.826 | PER IMP= 75.00 |
| *S COMBINE BASIN 150.55 WITH 160 | | | | | | | | | | |
| ADD HYD | 160.30 | 6&17 | 20 | .04582 | 113.77 | 4.982 | 2.03878 | 1.500 | 3.880 | |
| *S ROUTE 160.3 TO JUNCTION 60" PIPE SECTION | | | | | | | | | | |
| ROUTE | 160.50 | 20 | 19 | .04582 | 113.50 | 4.982 | 2.03880 | 1.500 | 3.871 | |
| *S ROUTE 160.8 TO JUNCTION WITH BASIN 180 - 66" PIPE SECTION | | | | | | | | | | |

| COMMAND | HYDROGRAPH IDENTIFICATION | FROM ID NO. | TO ID NO. | AREA (SQ MI) | PEAK DISCHARGE (CFS) | RUNOFF VOLUME (AC-FT) | RUNOFF (INCHES) | TIME TO PEAK (HOURS) | CFS PER ACRE | NOTATION |
|---|---|---|---|---|---|---|---|---|---|---|
| ROUTE | 160.90 | 19 | 21 | .04582 | 112.01 | 4.982 | 2.03880 | 1.500 | 3.820 | |
| *S********** | | | | | | | | | | |
| *S BASIN 180 - APARTMENTS | | | | | | | | | | |
| *S********** | | | | | | | | | | |
| COMPUTE NM HYD | 180.00 | - | 7 | .01656 | 40.53 | 1.765 | 1.99807 | 1.500 | 3.824 | PER IMP= 75.00 |
| *S COMBINE BASIN 160.9 WITH 180 | | | | | | | | | | |
| ADD HYD | 180.50 | 21& 7 | 22 | .06238 | 152.54 | 6.747 | 2.02797 | 1.500 | 3.821 | |
| *S ROUTE 180.5 TO JUNCTION WITH BASIN 180 AT ATRISCO - 72" PIPE SECTION | | | | | | | | | | |
| ROUTE | 180.90 | 22 | 23 | .06238 | 151.48 | 6.747 | 2.02798 | 1.500 | 3.794 | |
| *S********** | | | | | | | | | | |
| *S BASIN 170 - STREET A WEST | | | | | | | | | | |
| *S********** | | | | | | | | | | |
| COMPUTE NM HYD | 170.00 | - | 8 | .00245 | 6.37 | .284 | 2.17221 | 1.500 | 4.065 | PER IMP= 85.00 |
| *S COMBINE BASIN 180.9 WITH 170 | | | | | | | | | | |
| ADD HYD | 170.50 | 23& 8 | 24 | .06483 | 157.86 | 7.031 | 2.03342 | 1.500 | 3.805 | |
| *S ROUTE 170.5 TO LADERA POND AT BASIN 200 - 72" PIPE SECTION | | | | | | | | | | |
| ROUTE | 170.90 | 24 | 25 | .06483 | 154.01 | 7.031 | 2.03343 | 1.550 | 3.712 | |
| *S********** | | | | | | | | | | |
| *S BASIN 200 - SINGLE FAMILY RESIDENTIAL | | | | | | | | | | |
| *S********** | | | | | | | | | | |
| COMPUTE NM HYD | 200.00 | - | 9 | .02558 | 60.23 | 2.531 | 1.85493 | 1.500 | 3.679 | PER IMP= 65.00 |
| *S COMBINE BASIN 170.9 WITH 200 | | | | | | | | | | |
| ADD HYD | 200.50 | 25& 9 | 26 | .09041 | 207.97 | 9.561 | 1.98291 | 1.500 | 3.594 | |
| ROUTE | 200.90 | 26 | 30 | .09041 | 210.69 | 9.561 | 1.98292 | 1.550 | 3.641 | |
| *S********** | | | | | | | | | | |
| *S BASIN 16B - INFLOWS FROM GREINER LOMR HEC-1 RUN INTO LADERA POND 16B | | | | | | | | | | |
| *S********** | | | | | | | | | | |
| STORE HYD | 16B | - | 11 | .53000 | 212.00 | 32.273 | 1.14172 | 1.000 | .625 | |
| *S COMBINE BASIN 200.9 WITH 16B | | | | | | | | | | |
| ADD HYD | 16B.5 | 30&11 | 27 | .62041 | 339.09 | 41.789 | 1.26293 | 1.550 | .854 | |
| *S ROUTE BASIN 16B.5 THRU LADERA POND 16B | | | | | | | | | | |
| ROUTE RESERVOIR | 16BR | 27 | 12 | .62041 | 33.06 | 40.677 | 1.22932 | 3.800 | .083 | AC-FT= 26.749 |
| FINISH | | | | | | | | | | |

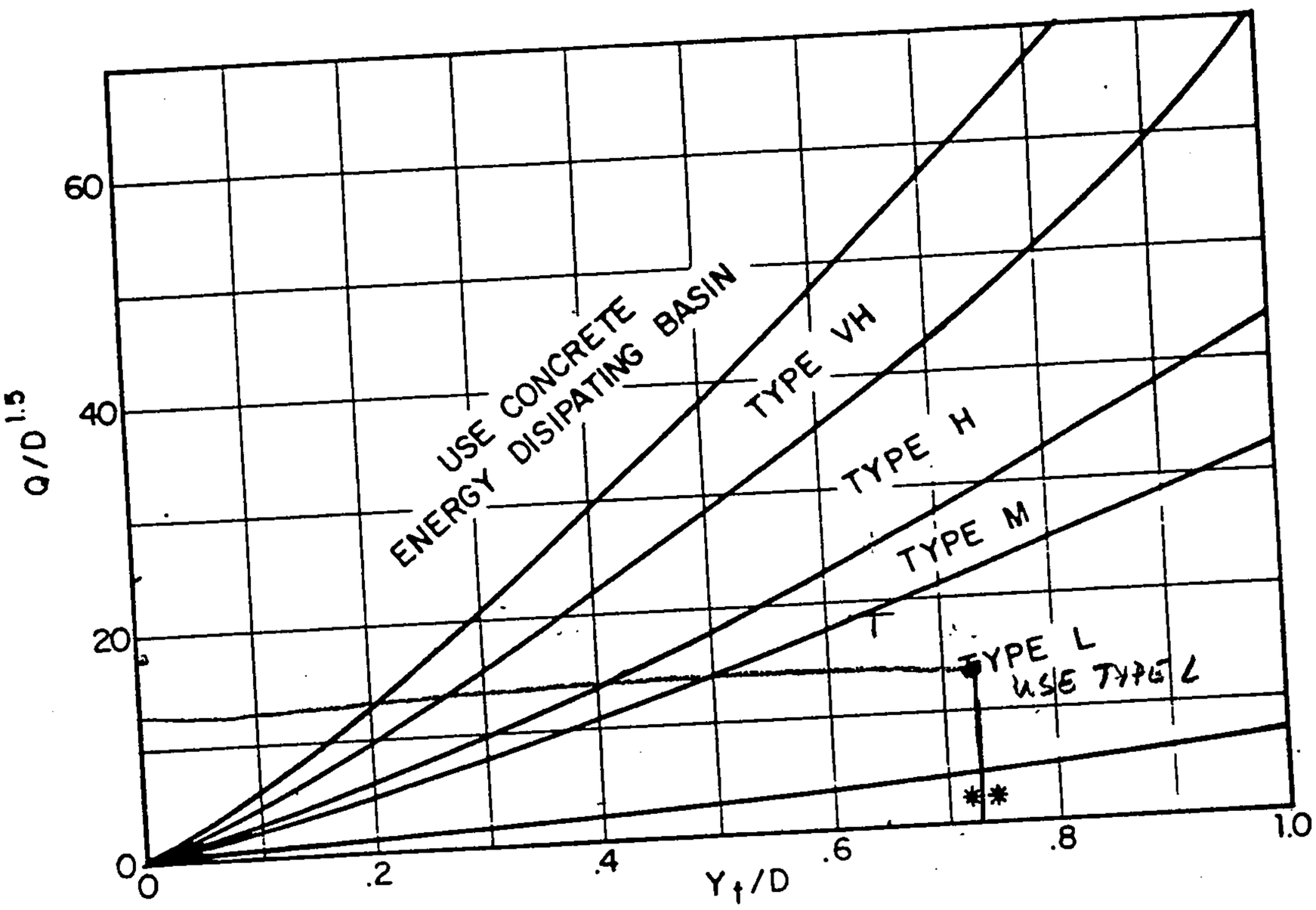
# SUMMARY OF HYDRAULIC CALCULATIONS
## CLOSED CONDUIT 2/28/2000
## ONE DISCHARGE INTO LADERA POND 16B - NO PARK POND

n = 0.013

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | JUNCTION | | LOSSES | | | | | | | | | | | |
| STATION | STRUCT | D | Q | A | V | K | Sf | L | DELTA | D | ANGLE | hf | hb | hj | hmh | ht | hmisc | SUM | E.G. | hv | H.G. | GROUND ELEV. | COMMENT |
| Street A line | | | | | | | | | | | | | | | | | | | | | 5102.81 | | |
| | | | | | | | | | | | | | | | | | | 0.00 | 5103.49 | 0.68 | 5102.81 | 5106.00 | |
| Atrisco | Pond 16B | | | | | | | | | | | 0.18 | | | | | | 0.18 | 5103.67 | 0.68 | 5102.99 | | |
| | | 78.00 | 220 | 33.18 | 6.63 | 5246.4 | 0.0018 | 100 | | | | | 0.06 | 1.41 | 0.00 | 0.00 | | 1.47 | 5105.14 | 0.45 | 5104.69 | 5108.00 | |
| Milne | MH/J | | | | | | | | 45 | 42 | 45 | | | | | | | | | | | | |
| | | 72.00 | 158 | 28.27 | 5.59 | 4237.9 | 0.0014 | 500 | | | | 0.69 | | | | | | 0.69 | 5105.84 | 0.68 | 5105.15 | | |
| Basin 180 | MH/B | | | | | | | | 90 | 24 | 90 | | 0.09 | 0.14 | 0.00 | 0.00 | | 0.23 | 5106.07 | 0.45 | 5105.62 | 5113.00 | |
| | | 72.00 | 154 | 28.27 | 5.45 | 4237.9 | 0.0013 | 90 | | | | 0.12 | | | | | | 0.12 | 5106.19 | 0.68 | 5105.51 | | |
| Basin 180 | MH/B | | | | | | | | 0 | 36 | 90 | | 0.00 | 0.05 | 0.00 | 0.00 | | 0.05 | 5106.24 | 0.45 | 5105.79 | 5110.70 | |
| | | 72.00 | 152 | 28.27 | 5.38 | 4237.9 | 0.0013 | 230 | | | | 0.30 | | | | | | 0.30 | 5106.53 | 0.45 | 5106.08 | | |
| Basin 180 | MH/B | | | | | | | | 0 | 36 | 90 | | 0.00 | 0.21 | 0.00 | 0.00 | | 0.21 | 5106.74 | 0.51 | 5106.24 | 5110.70 | |
| | | 60.00 | 112 | 19.64 | 5.70 | 2606 | 0.0018 | 430 | | | | 0.79 | | | | | | 0.79 | 5107.54 | 0.51 | 5107.03 | | |
| Basin 150 | MH/J | | | | | | | | | 24 | 45 | | 0.00 | 0.04 | 0.00 | 0.00 | | 0.04 | 5107.57 | 0.50 | 5107.08 | 5108.40 | |
| | | 60.00 | 112 | 19.64 | 5.70 | 2606 | 0.0018 | 150 | | | | 0.28 | | | | | | 0.28 | 5107.85 | 0.51 | 5107.34 | | |
| Street A/B | MH/J | | | | | | | | | 0 | 0 | | 0.00 | 0.00 | 0.02 | 0.00 | | 0.02 | 5107.87 | 0.50 | 5107.38 | 5109.50 | |
| | | 54.00 | 90 | 15.90 | 5.66 | 1967.6 | 0.0021 | 200 | | | | 0.42 | | | | | | 0.42 | 5108.29 | 0.50 | 5107.79 | | |
| Street A/B | MH/J | | | | | | | | | 0 | 0 | | 0.00 | 0.00 | 0.02 | 0.00 | | 0.02 | 5108.31 | 0.42 | 5107.89 | 5110.25 | |
| | | 54.00 | 83 | 15.90 | 5.22 | 1967.6 | 0.0018 | 70 | | | | 0.12 | | | | | | 0.12 | 5108.44 | 0.42 | 5108.01 | | |
| Basin 100 | MH/J | | | | | | | | 90 | 36 | 90 | | 0.04 | 0.46 | 0.00 | 0.00 | | 0.50 | 5108.94 | 0.19 | 5108.74 | 5109.85 | |
| | | 54.00 | 56 | 15.90 | 3.52 | 1967.6 | 0.0008 | 1000 | | | | 0.81 | | | | | | 0.81 | 5109.75 | 0.19 | 5109.55 | | |
| Basin 160 | MH | | | | | | | | | | | | 0.00 | 0.00 | 0.00 | -0.10 | | -0.10 | 5109.65 | 0.00 | 5109.65 | 5110.00 | |
| | | 24.00 | 0 | 3.14 | 0.00 | 226.29 | 0.0000 | 0 | | | | 0.00 | | | | | | 0.00 | 5109.65 | 0.00 | 5109.65 | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| Basin 200 | | | | | | | | | | | | | | | | | | | | | 5104.69 | | |
| Atrisco | MH | | | | | | | | | | | | 0.00 | 0.00 | 0.03 | 0.12 | | 0.15 | 5105.45 | 0.61 | 5104.84 | 5106.00 | |
| Inter | | 42.00 | 60.1 | 9.62 | 6.25 | 1006.6 | 0.0035 | 150 | | | | 0.53 | | | | | | 0.53 | 5105.98 | 0.61 | 5105.38 | | |
| Basins 100 | MH | | | | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 5105.98 | 0.00 | 5105.98 | 5108.00 | |
| 110 & 120 | | 42.00 | 0 | 9.62 | 0.00 | 1006.6 | 0.0000 | 0 | | | | 0.00 | | | | | | 0.00 | 5105.98 | 0.00 | 5105.98 | | |
| Basins 100 | MH | | | | | | | | | | | | 0.00 | 0.00 | 0.00 | -0.14 | | -0.14 | 5105.85 | 0.00 | 5105.85 | 5108.00 | |
| 110 & 120 | | 42.00 | 0 | 9.62 | 0.00 | 1006.6 | 0.0000 | 0 | | | | 0.00 | | | | | | 0.00 | 5105.85 | 0.00 | 5105.85 | | |

HEC-RAS Plan: Plan 01 River: Typical Street Reach: 36' F-F

| Reach | River Sta | Q Total | Min Ch El | W.S. Elev | Crit W.S. | E.G. Elev | E.G. Slope | Vel Chnl | Flow Area | Top Width | Froude # Chl |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | (cfs) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (sq ft) | (ft) | |
| 36' F-F | 5 | 2.99 | 100.00 | 100.27 | | 100.31 | 0.005550 | 1.49 | 2.00 | 19.23 | 0.82 |
| 36' F-F | 5 | 3.44 | 100.00 | 100.27 | 100.27 | 100.32 | 0.007676 | 1.75 | 1.97 | 19.05 | 0.96 |
| 36' F-F | 5 | 4.26 | 100.00 | 100.31 | | 100.34 | 0.005201 | 1.58 | 2.70 | 22.59 | 0.80 |
| 36' F-F | 5 | 6.47 | 100.00 | 100.35 | | 100.39 | 0.005150 | 1.73 | 3.74 | 26.82 | 0.81 |
| | | | | | | | | | | | |
| 36' F-F | 4 | 2.99 | 99.50 | 99.78 | | 99.81 | 0.004656 | 1.39 | 2.14 | 19.96 | 0.75 |
| 36' F-F | 4 | 3.44 | 99.50 | 99.80 | | 99.83 | 0.003839 | 1.33 | 2.58 | 22.02 | 0.69 |
| 36' F-F | 4 | 4.26 | 99.50 | 99.81 | | 99.85 | 0.004980 | 1.55 | 2.75 | 22.80 | 0.79 |
| 36' F-F | 4 | 6.47 | 99.50 | 99.85 | | 99.90 | 0.004847 | 1.69 | 3.83 | 27.15 | 0.79 |
| | | | | | | | | | | | |
| 36' F-F | 3 | 2.99 | 99.00 | 99.28 | | 99.31 | 0.005032 | 1.44 | 2.08 | 19.63 | 0.78 |
| 36' F-F | 3 | 3.44 | 99.00 | 99.28 | | 99.32 | 0.005982 | 1.59 | 2.17 | 20.08 | 0.85 |
| 36' F-F | 3 | 4.26 | 99.00 | 99.30 | | 99.34 | 0.005465 | 1.61 | 2.65 | 22.36 | 0.82 |
| 36' F-F | 3 | 6.47 | 99.00 | 99.35 | | 99.39 | 0.005287 | 1.75 | 3.71 | 26.68 | 0.83 |
| | | | | | | | | | | | |
| 36' F-F | 2 | 2.99 | 98.50 | 98.78 | | 98.81 | 0.004997 | 1.43 | 2.09 | 19.66 | 0.78 |
| 36' F-F | 2 | 3.44 | 98.50 | 98.79 | | 98.82 | 0.004916 | 1.47 | 2.34 | 20.92 | 0.77 |
| 36' F-F | 2 | 4.26 | 98.50 | 98.81 | | 98.85 | 0.004955 | 1.55 | 2.75 | 22.82 | 0.78 |
| 36' F-F | 2 | 6.47 | 98.50 | 98.85 | | 98.90 | 0.004966 | 1.70 | 3.80 | 27.02 | 0.80 |
| | | | | | | | | | | | |
| 36' F-F | 1 | 2.99 | 98.00 | 98.28 | 98.26 | 98.31 | 0.005001 | 1.43 | 2.09 | 19.66 | 0.78 |
| 36' F-F | 1 | 3.44 | 98.00 | 98.29 | 98.27 | 98.32 | 0.005008 | 1.48 | 2.32 | 20.84 | 0.78 |
| 36' F-F | 1 | 4.26 | 98.00 | 98.31 | 98.28 | 98.35 | 0.005005 | 1.55 | 2.74 | 22.77 | 0.79 |
| 36' F-F | 1 | 6.47 | 98.00 | 98.35 | 98.32 | 98.40 | 0.005004 | 1.71 | 3.79 | 26.97 | 0.80 |




Use $D_a$ instead of D whenever flow is supercritical in the barrel.
** Use Type L for a distance of 3D downstream.

$$\frac{Y_t}{D} = \frac{5102.81 - 5098}{6.5} = 0.74$$

$$Q/D^{1.5} = \frac{220}{6.5^{1.5}} = 13.28$$

FIGURE 5-7. RIPRAP EROSION PROTECTION AT CIRCULAR CONDUIT OUTLET.

# LOMR REQUEST
# FOR
# UNSER BOULEVARD SOUTH
# RINCONADA ARROYO AND PONDS 16 A and B

January 1998

**Prepared for Submittal to:**

FEDERAL EMERGENCY MANAGEMENT AGENCY

for

CITY OF ALBUQUERQUE


DANIEL L. MOREHEAD, PE/PS
Vice President

MARK S. HOLSTAD, PE
Project Manager

URS Greiner, Inc.
5971 Jefferson Blvd., NE, Suite 101
Albuquerque, NM 87109
(505) 345-3999
Fax: (505) 345-8393


URS Greiner Project No. E300137.21

# Federal Emergency Management Agency

Washington, D.C. 20472

URS GREINER

SEP 1 1998

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Jim Baca
Mayor, City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

IN REPLY REFER TO:
Case No.: 98-06-1065P

Community: City of Albuquerque, New Mexico
Community No.: 350002
Panels Affected: 35001C0113 D and 0114 D
Effective Date of This Revision: SEP 18 1998

102-D-A

Dear Mayor Baca:

This responds to a request that the Federal Emergency Management Agency (FEMA) revise the effective Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS) report for Bernalillo County, New Mexico and Incorporated Areas (the effective FIRM and FIS report for your community), in accordance with Part 65 of the National Flood Insurance Program (NFIP) regulations. In a letter dated February 24, 1998, Ms. Susan M. Calongne, P.E., City/County Floodplain Administrator, City of Albuquerque, requested that FEMA revise the FIRM and FIS report to show the effects of channelization of approximately 1,045 feet of Rinconada Arroyo just downstream of Unser Boulevard and construction of a 10-foot by 5-foot reinforced-concrete box culvert beneath Unser Boulevard, four detention ponds along Unser Boulevard, a storm drain system that extends from the four detention ponds to Pond 16B, and outlet structures for Ponds 16A and 16B. The rectangular concrete channel along Rinconada Arroyo is 8 feet wide and 5 feet deep. This request also includes a more detailed hydrologic analysis for Rinconada Arroyo and Ponds 16A and 16B.

All data required to complete our review of this request were submitted with letters from Mr. Mark S. Holstad, P.E, Project Manager, and Ms. Sheila K. Johnson, Drainage Designer, both with URS Greiner, Inc., and Ms. Calongne.

We have completed our review of the submitted data and the flood data shown on the effective FIRM and FIS report. We have revised the FIRM and FIS report to modify the elevations and floodplain boundary delineations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) along Rinconada Arroyo from approximately 1,200 feet downstream to just upstream of Unser Boulevard. The base flood for Rinconada Arroyo is contained within the channel along the reach. As a result of the modifications, the base flood elevations (BFEs) for Ponds 16A and 16B decreased and the width of the Special Flood Hazard Area (SFHA), the area that would be inundated by the base flood, decreased. SFHAs for the four detention ponds along Unser Boulevard (Ponds 3, 4, 5, and 6) were added to the FIRM. The base flood is contained within Ponds 3, 4, 5, and 6 and the storm drain system that extends from the four ponds to Pond 16B. The modifications are shown on the enclosed annotated copies of FIRM Panel(s) 35001C0113 D and 35001C0114 D and affected portions of the Summary of Discharges Table. This Letter of Map Revision (LOMR) hereby revises the above-referenced panel(s) of the effective FIRM and the affected portions of the FIS report, both dated September 20, 1996.

The modifications are effective as of the date shown above. The map panel(s) as listed above and as modified by this letter will be used for all flood insurance policies and renewals issued for your community.

The following table is a partial listing of existing and modified BFEs:

| Location | Existing BFE (feet)* | Modified BFE (feet)* |
|---|---|---|
| Pond 16A | 5,107 | 5,105 |
| Pond 16B | 5,108 | 5,102 |
| Pond 3 | None | 5,140 |
| Pond 4 | None | 5,134 |
| Pond 5 | None | 5,131 |
| Pond 6 | None | 5,127 |

*Referenced to the National Geodetic Vertical Datum, rounded to the nearest whole foot

Public notification of the modified BFEs will be given in the *Albuquerque Journal* on or about October 23 and October 30, 1998. A copy of this notification is enclosed. In addition, a notice of changes will be published in the *Federal Register*. Within 90 days of the second publication in the *Albuquerque Journal*, a citizen may request that FEMA reconsider the determination made by this LOMR. Any request for reconsideration must be based on scientific or technical data. All interested parties are on notice that, until the 90-day period elapses, the determination to modify the BFEs presented in this LOMR may itself be modified.

Because this LOMR will not be printed and distributed to primary users, such as local insurance agents and mortgage lenders, your community will serve as a repository for these new data. We encourage you to disseminate the information reflected by this LOMR throughout the community, so that interested persons, such as property owners, local insurance agents, and mortgage lenders, may benefit from the information. We also encourage you to prepare a related article for publication in your community's local newspaper. This article should describe the assistance that officials of your community will give to interested persons by providing these data and interpreting the NFIP maps.

We will not physically revise and republish the FIRM and FIS report for your community to reflect the modifications made by this LOMR at this time. When changes to the previously cited FIRM panel(s) and FIS report warrant physical revision and republication in the future, we will incorporate the modifications made by this LOMR at that time.

This LOMR is based on minimum floodplain management criteria established under the NFIP. Your community is responsible for approving all floodplain development, and for ensuring all necessary permits required by Federal or State law have been received. State, county, and community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction in the SFHA. If the State, county, or community has adopted more restrictive or comprehensive floodplain management criteria, these criteria take precedence over the minimum NFIP criteria.

The basis of this LOMR is, in whole or in part, a channel-modification/culvert project. NFIP regulations, as cited in Paragraph 60.3(b)(7), require that communities ensure that the flood-carrying capacity within the altered or relocated portion of any watercourse is maintained. This provision is incorporated into your community's existing floodplain management regulations. Consequently, the ultimate responsibility for maintenance of the modified channel and culvert rests with your community.

This determination has been made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and is in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968,

as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria are the minimum requirements and do not supersede any State or local requirements of a more stringent nature. This includes adoption of the effective FIRM and FIS report to which the regulations apply and the modifications described in this LOMR.

FEMA makes flood insurance available in participating communities; in addition, we encourage communities to develop their own loss reduction and prevention programs. Our Project Impact initiative, developed by FEMA Director James Lee Witt, seeks to focus the energy of businesses, citizens, and communities in the United States on the importance of reducing their susceptibility to the impact of all natural disasters, including floods, hurricanes, severe storms, earthquakes, and wildfires. Natural hazard mitigation is most effective when it is planned for and implemented at the local level, by the entities who are most knowledgeable of local conditions and whose economic stability and safety are at stake. For your information, we are enclosing a Project Impact Fact Sheet. For additional information on Project Impact, please visit our Web site at **www.fema.gov**.

If you have any questions regarding floodplain management regulations for your community or the NFIP in general, please contact the Consultation Coordination Officer (CCO) for your community. Information on the CCO for your community may be obtained by contacting the Director, Mitigation Division of FEMA in Denton, Texas, at (940) 898-5127. If you have any technical questions regarding this LOMR, please contact Mr. Alan Johnson of our staff in Washington, DC, either by telephone at (202) 646-3403 or by facsimile at (202) 646-4596.

Sincerely,

Alan A. Johnson, P.E., Project Engineer
Hazards Study Branch
Mitigation Directorate

For: Matthew B. Miller, P.E., Chief
Hazards Study Branch
Mitigation Directorate

Enclosure(s)

cc: Mr. Larry A. Blair, P.E.
Director
Public Works Department
City of Albuquerque

Ms. Susan M. Calongne, P.E.
City/County Floodplain Administrator
City of Albuquerque

Mr. Mark S. Holstad, P.E.
Project Manager
URS Greiner, Inc.

CHANGES ARE MADE IN DETERMINATIONS OF BASE FLOOD ELEVATIONS FOR THE CITY OF ALBUQUERQUE, BERNALILLO COUNTY, NEW MEXICO, UNDER THE NATIONAL FLOOD INSURANCE PROGRAM

On September 20, 1996, the Federal Emergency Management Agency identified Special Flood Hazard Areas (SFHAs) in the City of Albuquerque, Bernalillo County, New Mexico, through issuance of a Flood Insurance Rate Map (FIRM). The Mitigation Directorate has determined that modification of the elevations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) for certain locations in this community is appropriate. The modified base flood elevations (BFEs) revise the FIRM for the community.

The changes are being made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and are in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65.

Hydrologic and hydraulic analyses were performed to incorporate the effects of channelization of approximately 1,045 feet of Rinconada Arroyo just downstream of Unser Boulevard and construction of a 10-foot by 5-foot reinforced-concrete box culvert beneath Unser Boulevard, four detention ponds along Unser Boulevard, a storm drain system that extends from the four detention ponds to Pond 16B, and outlet structures for Ponds 16A and 16B. The modifications have resulted in an increase and decrease in SFHA width and decreased and new BFEs for Ponds 16A, 16B, 3, 4, 5, and 6. The table below indicates existing and modified BFEs for selected locations along the affected lengths of the flooding source(s) cited above.

| Location | Existing BFE (feet)* | Modified BFE (feet)* |
|---|---|---|
| Pond 16A | 5,107 | 5,105 |
| Pond 16B | 5,108 | 5,102 |
| Pond 3 | None | 5,140 |
| Pond 4 | None | 5,134 |
| Pond 5 | None | 5,131 |
| Pond 6 | None | 5,127 |

*National Geodetic Vertical Datum, rounded to nearest whole foot

Under the above-mentioned Acts of 1968 and 1973, the Mitigation Directorate must develop criteria for floodplain management. To participate in the National Flood Insurance Program (NFIP), the community must use the modified BFEs to administer the floodplain management measures of the NFIP. These modified BFEs will also be used to calculate the appropriate flood insurance premium rates for new buildings and their contents and for the second layer of insurance on existing buildings and contents.

Upon the second publication of notice of these changes in this newspaper, any person has 90 days in which he or she can request, through the Chief Executive Officer of the community, that the Mitigation Directorate reconsider the determination. Any request for reconsideration must be based on knowledge of changed conditions or new scientific or technical data. All interested parties are on notice that until the 90-day period elapses, the Mitigation Directorate's determination to modify the BFEs may itself be changed.

Any person having knowledge or wishing to comment on these changes should immediately notify:

The Honorable Jim Baca
Mayor, City of Albuquerque
P.O. Box 1293
Albuquerque, New Mexico 87103

APPROXIMATE SCALE IN FEET

0 500

NATIONAL FLOOD INSURANCE PROGRAM

# FIRM

## FLOOD INSURANCE RATE MAP

BERNALILLO COUNTY, NEW MEXICO AND INCORPORATED AREAS

PANEL 113 OF 825

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS

COMMUNITY NUMBER PANEL SUFFIX

ALBUQUERQUE 350001 0113 D

BERNALILLO COUNTY 350001 0113 D

UNINCORPORATED AREAS 350001 0113 D

**REVISED TO REFLECT LOMR DATED** SEP 18 1998

MAP NUMBER
350001C0113 D

EFFECTIVE DATE:
SEPTEMBER 20, 1996

Federal Emergency Management Agency

## MAP LEGEND

Revised 100-Year Floodplain

ZONE X

ZONE AE
(EL 5127)

POND NO. 6

POND NO. 5

T11N

T10N

ZONE AH
(EL 5131)

ZONE AH
(EL 5134)

100-YEAR FLOOD CONTAINED IN STORM DRAIN

ZONE AH
(EL 5140)

REVISED AREA

BOULEVARD

ROAD

POND NO. 4

ROAD

100-YEAR FLOOD CONTAINED IN STORM DRAIN

JOINS PANEL 0114

CLEGHORN COURT

CLEGHORN

ARMAND

UNSER

POND NO. 3

3

100 – YEAR FLOOD CONFINED TO CONSTRUCTED CHANNEL

JOSEPHS AVENUE

ST

80TH STREET

X

ZONE AO
(DEPTH 1)

ZONE X

ZONE A

*La Rinconada Diversion Channel*

35

106°43'0

*La Rinconada Arroyo*

## MAP LEGEND

Revised 100–Year Floodplain

REVISED AREA

ZONE AE
(EL5105)

POND NO. 16A

ZONE AE
(EL 5102)

POND NO. 16B

100-YEAR FLOOD CONTAINED
IN STORM DRAIN

ZONE X

ZONE AH
(EL 5105)

ATRISCO

DRIVE

FRIENDLY

FRIENDLY
COURT

WES

WESTERN

TRAIL

BOULEVARD

UNSER

MILNE ROAD

ESTANCIA

CLEGHORN

STREET

65TH STREET

66TH STREET

CLEGHORN ROAD

WAYNE ROAD

WAYNE

64TH

EVERITT

T11N

T10N

CLEGHORN ROAD

ARMAND ROAD

ARMAND COURT

MAYHILL COURT

MAXIM COURT

EVERITT COURT

67TH STREET

CISCO ROAD

71ST

3 JOSEPHS ST

68TH STREET

70TH STREET

72ND STREET

GEORGETOWN AVENUE

SAN BLAS PLACE

DONA LINDA

63RD STREET

65TH STREET

AVENUE

100 – YEAR FLOOD
CONFINED TO
CONSTRUCTED
CHANNEL

Ladera
Golf Course

JOINS PANEL 0113

*La Rinconada Diversion Channel*

°43'07"

APPROXIMATE SCALE IN FEET

500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

# FIRM

## FLOOD INSURANCE RATE MAP

BERNALILLO COUNTY,
NEW MEXICO AND
INCORPORATED AREAS

PANEL 114 OF 825

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS
COMMUNITY | NUMBER | PANEL | SUFFIX

**REVISED TO REFLECT LOMR**

DATED SEP 18 1998

MAP NUMBER
350010114 D

EFFECTIVE DATE:
SEPTEMBER 20, 1996

Federal Emergency Management Agency

Table 3. Summary of Discharges for Shallow Flooding Areas (Cont'd)

| Flooding Source and Location | Drainage Area (square miles) | 100-Year Peak Discharges (cfs) |
|---|---|---|
| **REVISED DATA** | | |
| La Rinconada Arroyo | | |
| At Unser Boulevard Crossing | 1.98 | 814 |
| Sacate Blanco Arroyo[1] | | |
| At confluence with Amole Arroyo | 0.43 | 238[4] |
| Arroyo De San Antonio-Middle[1] | | |
| At Atrisco Drive | 2.61 | 1,324 |
| At Atrisco Drive Crossing | 4.03 | 1,970 |
| At Coors Boulevard | --[3] | 2,170 |
| South Glenwood Hills Channel[2] | | |
| At Tramway Boulevard | 0.426 | 727 |
| At confluence with Piedra Lisa | --[3] | 844 |

REVISED TO REFLECT LOMR DATED SEP 1 8 1998

[1]Flows from Matotan, 1975
[2]Flows from Albuquerque Master Drainage Study - Volume III - Bohannan-Huston, Inc. Appendix E
[3]Drainage areas not applicable because of interbasin transfer via roads and storm sewers
[4]By Regression Analysis

URS Greiner

# UNSER BOULEVARD SOUTH LOMR
# RINCONADA ARROYO AND PONDS 16 A AND B
# PROJECT SUMMARY
# JANUARY 1998

We are requesting a LOMR for the project described in the attached forms, consisting of a concrete lined channel and two ponding areas. The following is an introductory statement summarizing the project and the events leading up to this submittal to FEMA.

The project, designed for the City of Albuquerque in the late 1980s, consisted of the extension of Unser Boulevard and the drainage features needed to accommodate the new road. Unser Boulevard is a four-lane, divided major thoroughfare in Albuquerque's west side.

Drainage features relating to Unser Boulevard from Ouray Road to San Antonio Arroyo were originally designed in 1985 and presented in a Final Drainage Analysis Report dated November 1988. The FEMA designated floodplains for the Rinconada Channel and Ponds 16 A and B, included in the report, were changed with this construction. At the time, submittal to FEMA for a map revision was not planned. However, pressure to develop this land has increased necessitating the removal of flood plains and this submittal. The attached forms cover these two features using two sets of forms where needed.

The LOMR revision maps are shown on Exhibits A and B and the overall project and drainage basins are shown on Exhibit C, all in Appendix 1.

HEC 1 and the Rational Equation were used to determine the hydrology and do pond routing. HEC 2 was used for the Rinconada channel routing. At the time, these were the locally accepted methods for this type of analysis.

The Rinconada channel, shown in Phase 1 Unser Boulevard on Exhibit C, was a natural arroyo but now has been contained in a concrete lined channel up to Unser Boulevard and a concrete box culvert under Unser. The existing FIRM shows the channelization to within approximately 1200 feet of Unser. Our request continues the channelization through to Unser. The revision is shown on Exhibit A in Appendix 1.

Part of the channelization was done under an earlier project called College Park West, built by the City of Albuquerque. This project constructed 1045 linear feet of concrete channel extending from the existing channel as shown on the current FIRM to the west. As builts are included in Appendix 2. Unser Boulevard South Phase I continues the concrete channel and extends a box culvert under Unser Boulevard.

Ponds 16 A and B, shown in Phase II Unser Boulevard on Exhibit C were previously undrained playas. With this project both ponds now have an outlet thereby reducing the ponding area. Pond 16 B was resurveyed due to extensive changes in the topography and road construction. The map revision is shown on Exhibit B and the detailed Pond 16 B survey is shown on Exhibit D, both in Appendix 1. The new water surface is shown on both the detail map and the FIRM map.

Unser Boulevard was constructed adjacent to Pond 16 A and acts as a dam to contain the water on the eastern side. A soil cement ponding structure and an outlet pipe were constructed. The new water surface for Pond 16 A is also shown on Exhibit B. Detail design information is shown in the plans for Unser Boulevard South Phase II, sheet F12.

The watersheds to both Rinconada Channel and Ponds 16 A & B are in a part of Albuquerque that has undergone rapid development and the areas have been studied not only with the design of the Unser Boulevard, but have been analyzed extensively as part of other projects. The actual watersheds to our project have not and will not be developed in the future because they are part of the Petroglyph National Monument, established in 1990. The intent of this request is to pull all the existing information together, and extract the information pertinent to this LOMR. All applicable reports are shown on the following reference sheet with a few notes concerning the applicability of each report to this LOMR request.

The Study of San Antonio Arroyo (Reference 3), independently reviewed and verified the drainage analysis of Unser Boulevard which ultimately drains to the San Antonio Arroyo. The analysis was found satisfactory. Copies of the review comments are attached in Appendix 3.

Most of the data used in completing the forms was extracted from the Final Drainage Report for Unser Boulevard, Report 1. However, hydrology for the Rinconada Arroyo was taken from Report 4 (flow =554cfs) since hydrology was not included in the project for the Rinconada crossing. The flow rate used in the Unser Boulevard Design (Reports 1 and 2) was 700 cfs for the 100 year condition making for a very conservative design which allows for sediment build up.

Michael Baker, Jr., Inc., was contacted to obtain the effective reports covering both Rinconada Channel and the ponds. The effective report, Drainage Management Plan Western Albuquerque Metropolitan Area, was done in 1975. No models were developed with the report. The results of our discussions and correspondence are shown in Appendix 4.

In conclusion, this area has been extensively analyzed by different local agencies using differing methods and found satisfactory. Development pressures have convinced the City of Albuquerque that it is necessary to revise the flood plains at this time. We feel that the attached information explains the analysis and the current conditions, and request that you approve this LOMR.

Sincerely,

**URS GREINER**

Mark Holstad, P.E.
Project Manager

Reviewed by:

**CITY OF ALBUQUERQUE**

Susan Calongne
Flood Plain Coordinator

| FEDERAL EMERGENCY MANAGEMENT AGENCY<br>**HYDROLOGIC ANALYSIS FORM** | *FEMA USE ONLY* | *O.M.B. No. 3067-0148*<br>*Expires July 31, 1997* |
|---|---|---|

**PUBLIC BURDEN DISCLOSURE NOTICE**

Public reporting burden for this form is estimated to average 3.67 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden, to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472.

**You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.**

**Community Name:** Albuquerque, New Mexico

**Flooding Source:** Rinconada Arroyo
*(One form for each flooding source)*

**Project Name /Identifier:** Unser Boulevard LOMR Ponds 16A & 16B

**1. HYDROLOGIC ANALYSIS IN FIS**

- [X] Approximate study stream (Zone A)
- [ ] Detailed study stream (briefly explain methodology)_____

**2. REASON FOR NEW HYDROLOGIC ANALYSIS**

- [ ] No existing analysis
- [ ] Improved data *(see data revision on page 3)*
- [X] Changed physical conditions of watershed *(explain)* SEE TEXT
- [ ] Alternative methodology *(justify why the revised model is better than model used in the effective FIS)*
- [ ] Evaluation of proposed conditions (CLOMRs only) (explain)_____
- [ ] Other_____

If a computer program/model was used in revising the hydrologic analysis, please provide a diskette with the input files for the 10-, 50-, 100 - and 500-year recurrence intervals.

Only the 100-year recurrence interval need be included for SFHAs designated as Zone A.

**3. APPROVAL OF ANALYSIS**

- [X] Approval of hydrologic analysis, including the resulting peak discharge value (s) has been provided by the appropriate local, state, or Federal Agency. (i.e., City of Albuquerque

  Attach evidence of approval. )
- [ ] Approval of the hydrologic analysis is not required by any local, State, or Federal Agency.

**PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS**

**4. REVIEW OF RESULTS**

**Stream:** Local unnamed arroyos

**Comparison of 100-year Flood Discharges**

| Location | Drainage area (Sq mi.) | FIS (cfs): | Revised (cfs): |
|---|---|---|---|
| Pond 16A in | 0.1540 | N/A | 100 |
| Pond 16A out | 0.1540 | N/A | 91 |
| Pond 16B in | 0.5259 | N/A | PNM Pond 212 |
| POnd 16B out | 0.5259 | N/A | 33 |
| | | | |

**Note:** **When revised discharges are not significantly different than FIS discharges, FEMA may require a confidence limits analysis on attachment D at a later date to complete the review.**

**As is often the case with revision requests, only a portion of a stream may actually be revised or affected by a revision. Therefore, transition to the unrevised portion is important to maintain the continuity of the study. NFIP regulations stipulate that such a transition must be assured. What is the transition from the proposed discharges to the effective discharges? Please explain how the transition was made *(attach separate sheet if necessary)***

No streams designated as Floodplain tie to Ponds 16A & 16B. The entire pond area is being reduced and there is no transition

Attach a completed "review of results" page for each flooding source.

**Is the new hydrologic analysis being developed solely to revise the flow values presented in the FIS *(i.e. no changed hydraulic conditions)*?** ☐ Yes ☒ No

**If yes, does the 100-year water surface elevation change by 1.0 foot or more?** ☐ Yes ☐ No N/A

**Note: FEMA does not normally revise NFIP maps solely due to flow changes when changes in 100-year water surface elevation are less than 1.0 foot.**

## 5. HISTORICAL FLOODING INFORMATION

Is historical data available for the flooding source? ☐ Yes ☒ No

If yes, provide the following:

Location along flooding source: _____

Maximum peak discharge: _____ cfs

Second highest peak discharge: _____ cfs

Source of information: _____

## 6. GAGE RECORD INFORMATION

Location of nearest gage to project site *(along flooding source or similar watershed; specify)*

None available in project area or similar watershed

Gaging Station: _____

Drainage area at gage: _____ $mi^2$

Number of years of data: _____

## 7. DATA REVISION

Please use the following table to list all the data and/or parameters affected by this request and identify them as new data (*New*) or as revising existing data (*Revised*). *(If necessary, attach a separate sheet.)*

| Data Parameter | New | Revised | Data Source |
|---|---|---|---|
| _____ | ☐ | ☐ | _____ |
| _____ | ☐ | ☐ | _____ |
| _____ | ☐ | ☐ | _____ |
| _____ | ☐ | ☐ | _____ |
| _____ | ☐ | ☐ | _____ |

- The data source can be a Federal, State, or local government agency, or a private source. Some State and local governments may have less strict data requirements than Federal agencies, in which case the hydrologic data may not be accepted by FEMA unless it is demonstrated that the data give a better estimate of the flood discharge.
- Attach documentation corroborating each data source *(i.e., certified statement, report, bibliographical reference to a published document)*. In the case of a published document or a government report, providing copies of the cover and pertinent pages may be helpful.

## 8. METHODOLOGY FOR NEW ANALYSIS

☐ Statistical Analysis of Gage Records (*use Attachment A*)

☐ Regional Regression Equations *(use Attachment B)*

☒ Precipitation/Runoff Model *(use Attachment C)*

☐ Other *(specify; attach backup computations and supporting data)* _____

**ATTACHMENT A: STATISTICAL ANALYSIS OF GAGE RECORDS** N/A

Gaging Station: _____

Gage Location (latitude and longitude): _____

| | FIS: | Revised: |
|---|---|---|
| 1. Number of years of data | _____ | _____ |
| Systematic | _____ | _____ |
| Historical | _____ | _____ |
| 2. Homogeneous data? | ☐ Yes ☐ No | ☐ Yes ☐ No |
| 3. Data adjustments? | ☐ Yes ☐ No | ☐ Yes ☐ No |
| 4. Number of high outliers | _____ | _____ |
| Low outliers | _____ | _____ |
| Zero events | _____ | _____ |
| 5. Generalized skew | _____ | _____ |
| 6. Station skew | _____ | _____ |
| 7. Adopted skew | _____ | _____ |
| 8. Probability distribution used (justify if log-Pearson III was not used) | _____ | _____ |
| 9. Transfer equations to ungaged sites | ☐ Yes ☐ No | |
| If yes, specify method | | |
| 10. Expected probability* | ☐ Yes ☐ No | |
| 11. Comparison of results with other analyses | ☐ Yes ☐ No | |
| If yes, describe comparison | | |

*FEMA does not accept expected probability analyses for the purpose of reflecting flood hazard information in a FIS.

If any data are not available, indicate with "N/A".

ttach analysis including plot of flood frequency curve.

## ATTACHMENT B: REGIONAL REGRESSION EQUATIONS N/A

1. Bibliographical Reference:

_____

_____

_____

*(Attach a copy of title page, table of contents, and pertinent pages including equations.)*

2. Gaged or ungaged stream: _____

3. Hydrologic region(s): _____
Attach backup map.

4. Provide parameters, values, and source of data used to define parameters.

_____

_____

_____

| | | FIS | | Revised | |
|---|---|---|---|---|---|
| 5. | Urbanized conditions calculations? ..... | ☐ Yes | ☐ No | ☐ Yes | ☐ No |
| 6. | Percent of watershed urbanization ..... | _____ | | _____ | |
| 7. | Is the watershed controlled? ..... | ☐ Yes | ☐ No | ☐ Yes | ☐ No |
| 8. | Comparison with other analyses? ..... | ☐ Yes | ☐ No | ☐ Yes | ☐ No |

If the answer to questions 5, 7, or 8 is yes, explain methodology in Comments.

If data are not available, indicate with "N/A".

9. Comments

_____

_____

_____

_____

Attach computation and supporting maps delineating the watershed boundary and drainage area divides.

**ATTACHMENT C: PRECIPITATION/RUNOFF MODEL**

| | | FIS: | Revised |
|---|---|---|---|
| 1. | Method or model used: | N/A | HEC 1 |
| | Version: | | --- |
| | Date: | | 31 Jan 1985 |
| 2. | Source of rainfall depth: | | COA DPM-SEE TEXT |
| 3. | Source of rainfall distribution: | | COA-DPM |
| 4. | Rainfall duration: | | 6 hour |
| 5. | Areal adjustment to precipitation (%): | | 100% |
| 6. | Maximum overland flow length | | 3500' |
| 7. | Hydrograph development method: | | SCS Unit Hydrograph |
| 8. | Loss rate method: | | SEE TEXT |
| | Source of soils information: | | SEE TEXT |
| | Source of land use information | | SEE TEXT |
| 9. | Channel routing method: | | SEE TEXT |
| 10. | Reservoir routing: | ☐ Yes ☐ No | ☒ Yes ☐ No |
| 11. | Baseflow considerations: | ☐ Yes ☐ No | ☐ Yes ☒ No |

If yes, explain how baseflow was determined:

12. Snowmelt considerations? ..... ☐ Yes ☐ No ☐ Yes ☒ No

13. Model calibration? ..... ☐ Yes ☐ No ☐ Yes ☒ No

If yes, explain how calibration was performed

14. Future land use conditions? ..... ☒ Yes ☐ No

If yes, explain why

Basins J1, J2, J3, M, K1, K2, K3 and K4 are analysed using existing undeveloped land use conditions. The others were analysed per city direction using proposed conditons

**NOTE: FEMA policy is to base flooding on existing conditions.**
**If data are not available, indicate with "N/A".**

**Attach precipitation/runoff model, hydrologic model schematic, curve number calculations, time of concentration calculations, and supporting maps, delineating the watershed boundary and drainage area divides.**

**ATTACHMENT D: CONFIDENCE LIMITS EVALUATION** N/A

Stream: _____

Selected location for Confidence Limits Evaluation (*describe location*): _____

_____

Discharges for selected location:

| Exceedance Probability | | FIS | Revised |
|---|---|---|---|
| 10% | (10-year) ..... | _____cfs | _____cfs |
| 2% | (50-year) ..... | _____cfs | _____cfs |
| 1% | (100-year) ..... | _____cfs | _____cfs |
| 0.2% | (500-year) ..... | _____cfs | _____cfs |

1% (100-year) Flood Confidence Intervals

90% Confidence Interval:
- 5% limit _____ cfs
- 95% limit _____ cfs

50% Confidence Interval:
- 25% limit _____ cfs
- 75% limit _____ cfs

If the value of the 100-year frequency flood in the FIS is beyond the 50% confidence interval but within the 90% confidence interval, does the 100-year water surface elevation change by 1.0 foot or more? ☐ Yes ☐ No

Note: An example of confidence limits analysis can be found in Appendix 9 of Bulletin 17B.

Attach Confidence Limits Analysis.

## FORM 3 - PONDS 16 A AND 16 B

2. Reason For New Hydrologic Analysis - Page 1 of 7.

Ponds 16 A and 16 B (not labeled on FIRM map) were undeveloped existing playas. The Unser Boulevard construction changed both ponds.

Unser Boulevard is adjacent to Pond 16 A and acts as a dam, containing the flow on the north side of the road. An outlet to Pond 16 A was also built that connects to the storm drain built in conjunction with Unser Boulevard.

Pond 16 B has changed due to regrading of the site and a pond outlet was constructed which connects to the storm drain built with Unser Boulevard. A new survey of the Pond 16 B site, labeled Exhibit D, is attached in Appendix 1.

Volume and storage calculations for both ponds are shown in Appendix 5.

Attachment C: Precipitation Runoff/Model Page 6 of 7

2. The City of Albuquerque Development Process Manual (DPM) was used which uses rainfall information from NOAA Atlas 2 Precipitation Frequency Atlas of the Western United States, Volume IV, New Mexico.

8. Soil classification was from the "Soil Survey of Bernalillo County and Parts of Sandoval and Valencia Counties, New Mexico" by the Soil Conservation Service, issued June 1977.

   Land Use is based on City planning documents and zoning for the area. The Northwest Mesa Escarpment Plan covers the area. The aerial photography from the October 14, 1983, edition of the FEMA Floodway Flood Boundary and Floodway Maps for Albuquerque, New Mexico was also used as well as site visits. The October 14, 1983, were the previous edition in which floodway limits were shown on an aerial photo with contours.

10. No Channel Routing was used - Flow was routed through ponds using HEC-1 storage routing option

| FEDERAL EMERGENCY MANAGEMENT AGENCY<br>**RIVERINE/COASTAL MAPPING FORM** | *FEMA USE ONLY* | *O.M.B. No. 3067-0148*<br>*Expires July 31, 1997* |
|---|---|---|

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**You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.**

**Community Name:** Albuquerque, New Mexico

**Flooding Source:** Unnamed arroyos

**Project Name/Identifier:** Unser Blvd LOMR Ponds 16A & 16 B

### 1. MAPPING CHANGES

**1. A topographic work map of suitable scale, contour interval, and planimetric definition must be submitted showing *(indicate N/A when not applicable)*:**

| | | | Included | | | | | |
|---|---|---|---|---|---|---|---|---|
| A. | Revised approximate 100-year floodplain boundaries (Zone A)? | Zone AE<br>Zone AH | ☒ | Yes | ☐ | No | ☐ | N/A |
| B. | Revised detailed 100- and 500-year floodplain boundaries? | See text | ☒ | Yes | ☐ | No | ☐ | N/A |
| C. | Revised 100-year floodway boundaries? | | ☐ | Yes | ☐ | No | ☒ | N/A |
| D. | Location and alignment of all cross sections used in the revised hydraulic model with stationing control indicated? | | ☐ | Yes | ☐ | No | ☒ | N/A |
| E. | Stream alignments, road and dam alignments? | | ☒ | Yes | ☐ | No | ☐ | N/A |
| F. | Current community boundaries? | | ☒ | Yes | ☐ | No | ☐ | N/A |
| G. | Effective 100- and 500-year floodplain and 100-year floodway boundaries from the FIRM/FBFM reduced or enlarged to the scale of the topographic work map? | See text | ☒ | Yes | ☐ | No | ☐ | N/A |
| H. | Tie-ins between the effective and revised 100- and 500-year floodplains and 100-year floodway boundaries? | See text | ☐ | Yes | ☐ | No | ☒ | N/A |
| I. | The requestor's property boundaries and community easements? | | ☒ | Yes | ☐ | No | ☐ | N/A |
| J. | The signed certification of a registered professional engineer? | | ☒ | Yes | ☐ | No | ☐ | N/A |
| K. | Location and description of reference marks? | | ☒ | Yes | ☐ | No | ☐ | N/A |
| L. | Vertical datum (example: NGVD, NAVD etc.)? | See text | ☒ | Yes | ☐ | No | ☐ | N/A |
| M. | Coastal zone designations tie into adjacent areas not being revised? | | ☐ | Yes | ☐ | No | ☒ | N/A |
| N. | Location and alignment of all coastal transects used to revise the coastal analyses? | | ☐ | Yes | ☐ | No | ☒ | N/A |

**If any of the items above are marked no or N/A, please explain:** See text

**2.** What is the source and date of the updated topographic information *(example: orthophoto maps, July 1985; field survey, May 1979, beach profiles, June 1987, etc.)*? Field Survey - April 1997

**3.** What is the scale and contour interval of the following workmaps?

a. Effective FIS 1" = 500' scale No contours Contour interval

b. Revision Request 1" = 50' scale One foot Contour interval

**NOTE:** Revised topographic information must be of equal or greater detail.

**4.** Attach an annotated FIRM and FBFM at the scale of the effective FIRM and FBFM showing the revised 100- and 500-year floodplain and the 100-year floodway boundaries and how they tie into those shown on the effective FIRM and FBFM downstream and upstream of the revisions or adjacent to the area of revision for coastal studies Attach additional pages if needed

PLEASE REFER TO THE INSTRUCTION FOR THE APPROPRIATE MAILING ADDRESS

**1. MAPPING CHANGES (Cont'd)**

5. **Flood Boundaries and 100-year water surface elevations:**

   a. **Has the 100-year floodplain been shifted or increased or the 100-year water surface elevation increased at any location on property other than the requestor's or community's ?** ☐ **Yes** ☒ **No**

   **If yes, please give the location of shift or increase and an explanation for the increase.**

   N/A

   b. **Have the affected property owners been notified of this shift or increase and the effect it will have on their property?** N/A ..... ☐ **Yes** ☐ **No**

   **If yes, please attach letters from these property owners stating they have no objections to the revised flood boundaries if a LOMR is being requested.**

   c. **What is the number of insurable structures that will be impacted by this shift or increase?** N/A

6. **Have the floodway boundaries shifted or increased at any location compared to those shown on the effective FBFM or FIRM?** ..... ☐ **Yes** ☐ **No**

   **If yes, explain:** Not a floodway

7. **If a V- zone has been designated, has it been delineated to extend landward to the heel of the primary frontal dune?**

   N/A ☐ **Yes** ☐ **No**

   **If no, explain:**

**Manual or digital map submission:**

☒ **Manual**

☐ **Digital**

**Digital map submissions may be used to update digital FIRMs (DFIRMs). For updating DFIRMs, these submissions must be coordinated with FEMA Headquarters as far in advance of submission as possible.**

## 2. EARTH FILL PLACEMENT

1. The fill is: ☒ Existing ☐ Proposed

2. Has fill been placed/will be placed in the regulatory floodway? ..... ☐ Yes ☐ No N/A
   If yes, please attach completed Riverine Hydraulic Analysis Form. (Form 4) Not a floodway

3. Has fill been/will be placed in floodway fringe *(area between the floodway and 100-year floodplain boundaries)*? ..... ☐ Yes ☐ No N/A

   If yes, then complete A, B, C, and D below.

   a. Are fill slopes for granular materials steeper than one vertical on one-and-one-half horizontal? ..... ☐ Yes ☐ No

      If yes, justify steeper slopes_____

   b. Is adequate erosion protection provided for fill slopes exposed to moving flood waters? *(Slopes exposed to flows with velocities of up to 5 feet per second (fps) during the 100-year flood must, at a minimum, be protected by a cover of grass, vines, weeds, or similar vegetation; slopes exposed to flows with velocities greater than 5 fps during the 100-year flood must, at a minimum, be protected by stone or rock riprap.)* ..... ☐ Yes ☐ No

      If no, describe erosion protection provided_____

   c. Has all fill placed in the revised 100-year floodplain been compacted to 95 percent of the maximum density obtainable with the Standard Proctor Test Method or acceptable equivalent method? ☐ Yes ☐ No

   d. Can structures conceivably be constructed on the fill at any time in the future? ☐ Yes ☐ No

   If yes, provide certification of fill compaction (Item c. above) by the community's NFIP permit official, a registered professional engineer, or an accredited soils engineer.

4. Has fill been placed/will be placed in a V-zone? ☐ Yes ☒ No

   If yes, is the fill protected from erosion by a flood control structure such as a revetment or seawall? N/A ☐ Yes ☐ No

   If yes, attach the coastal structures form.

## FORM 5 - PONDS 16 A AND 16 B



1. Mapping Changes

B - The 100 year floodplain is shown, the 500 year is not.
G - The 100 year floodplain is shown - Floodways are not applicable.
H - The ponds are isolated areas and there is no tie to another floodplain.
L - Vertical Datum is Mean Sea Level Datum of 1929.

Explanation of items marked N/A

C - There are no floodways in the project.
D - No cross sections were needed for a pond routing analysis.
H - see above
M - This is not a coastal project and coastal zone designations do not apply.
N - This is not a coastal project and coastal transects do not apply.

| FEDERAL EMERGENCY MANAGEMENT AGENCY<br>DAM FORM | FEMA USE ONLY | O.M.B. No. 3067-0148<br>Expires July 31, 1997 |
|---|---|---|

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**You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.**

Community Name: Albuquerque, New Mexico

Flooding Source: local unnamed arroyos

Project Name/Identifier: Unser Blvd. LOMR ponds 16A and 16B

### 1. IDENTIFIER

Name of Dam: Unser Boulevard - see text

Location of dam along flood source (in terms of stream distance or cross section identifier):

SEE TEXT

Check one of the following:

- ☐ Existing dam
- ☒ New dam Unser Blvd., which acts as a dam
- ☐ Modifications of existing dam (describe modifications)

Was the dam designed by:

_____Federal agency _____State agency

_____Local government agency __x__Private organization? URS Greiner for City of Albuquerque

### 2. BACKGROUND

Does the dam have dedicated flood control storage? ☒ Yes ☐ No

Does the project involve revised hydrology? ☒ Yes ☐ No

If yes, complete Hydrologic Analysis Form (Form 3) and include calculations of the 100-year inflow flood hydrograph routed through the dam with the beginning pool at the normal pool elevation (spillway crest elevation for ungated spillway). Include any inflow hydrograph bulking by watershed sediment yield and provide necessary debris and sediment yield analysis.

Does the revised hydrology affect the 100-year water-surface elevation behind the dam or downstream of the dam? ☒ Yes ☐ No

If yes, complete the Riverine Hydraulic Analysis Form (Form 4) and complete the table shown on the following page.

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS.

**3. RESULTS**

**Stillwater Elevation Behind the Dam**

| | FIS | Revised |
|---|---|---|
| 10-year | | |
| 50-year | | |
| 100-year | 5107 | 5103.8 |
| 500-year | | |
| Normal Pool Elevation | EMPTY | EMPTY |

**Was long term sediment accumulation taken into consideration in determining the normal pool elevation?** See text ☐ Yes ☐ No

**Was the dam designed to withstand the hydrostatic and hydrodynamic forces associated with floods greater than the 100-year flood?** ☐ Yes ☒ No

**If no, and the dam has a reasonable probability of failure during the 100-year flood, please attach dam break analysis.** The dam does not have a reasonable probability of failure during the 100-year flood.

**Provide the following data on the dam:**

**Dimensional Height:** 7.0 ft
**Crest Elevation of top of dam:** 5105.5
**100-year flood storage capacity:** 0.97 Acre - feet
**Freeboard (measured from 100-year water surface elevation):** 5103.8

**Spillway(s):**

**Type:** ☐ gated ☒ ungated

**Dimensional Width:**
**Dimensional Height:**
**Crest Elevation of top of spillway:**

**Outlet(s):**

**Type:** ☐ gated ☒ ungated

**Width:** N/A
**Height** N/A
**Diameter:** 48" RCP
**Invert Elevation:** 5098.5

**Explain flow regulation plan:**

**Are the project features, including the emergency spillway, designed to accommodate the 100-year flood discharge without overtopping the dam?** ☒ Yes ☐ No

**Was the dam designed in accordance with all currently applicable local, State, and Federal regulations?** ☒ Yes ☐ No

**If no, please provide explanation.**

**FEMA may request a list of regulations that have been complied with and supporting documentation demonstrating compliance with these regulations.**

**Attach copy of formal operation and maintenance plan**

**Answer N/A to any questions which are not applicable**

## FORM 11 - PONDS 16 A AND 16 B

Page 1 of 2

1. Identifier

Name - Unser Boulevard acts as a dam for Pond 16 A.
Location on Stream - Pond 16 A is a playa collecting local drainage. There is no defined stream draining to it.

Page 2 of 2

3. Results - was sediment accumulation taken into account?

Not in the original analysis. However in the Sediment Transport Analysis done in conjunction with Reference 3 by Dr. Richard Heggen, which includes the drainage area to Ponds 16 A and B, sediment was analyzed using USLE and the yield was determined to be 0.48 acre-feet/sq. mi./year for undeveloped conditions. The basins draining to both ponds ultimately will be developed as they are below the escarpment. (Development on or above the escarpment is not allowed by City of Albuquerque ordinance.) When development occurs, the sediment yield will drop.

In a letter to AMAFCA from Molzen-Corbin and Associates, dated October 1, 1992, written by Kurt Browning (shown in Appendix 3) Greiner's work was reviewed for AMAFCA. In the letter sediment impact data is presented. The review by Mr. Browning was based on advance information from Dr. Heggen in which he evaluated a much larger area, of which the Unser improvements are a portion. The full report is included in Supplemental Reports Volume 2.

Mr. Browning's letter states the expected sediment capture at the Unser Ponds and identified no anticipated problems with sediment or sediment transport.

33

ESCARPMENT IN STATE REGISTER OF HISTORIC PLACES

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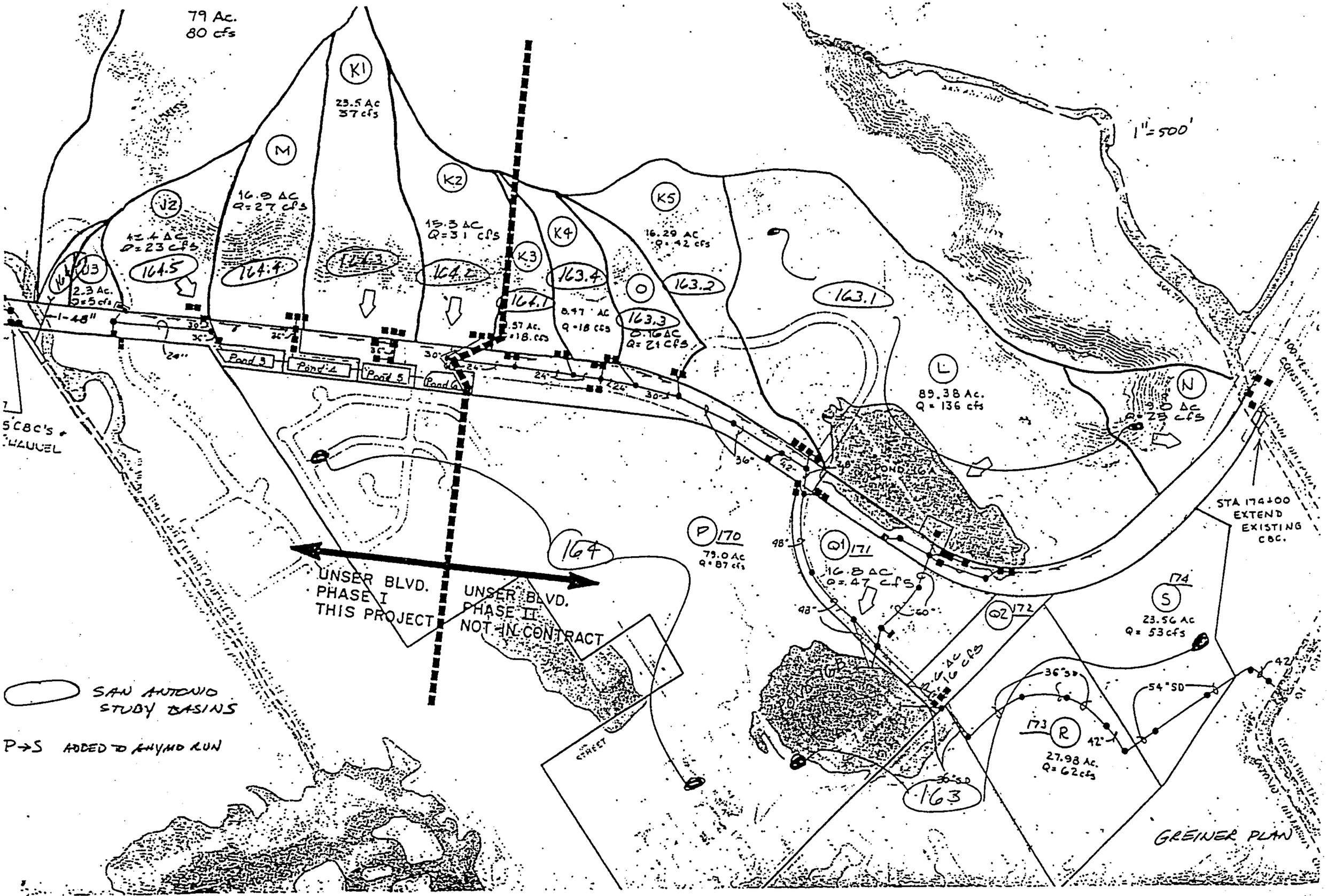
79 Ac.
80 cfs
K1
23.5 Ac
37 cfs
M
16.8 AC
Q=27 cfs
J2
42.4 AC
Q=23 cfs
J3
2.3 Ac.
Q=5 cfs
K2
15.3 AC
Q=31 cfs
K3
K4
K5
16.29 AC
Q=42 cfs
O
163.3
0.16 AC
Q=21 cfs
163.2
163.1
164.5
164.4
164.3
164.2
164.1
163.4
.57 Ac.
=1.8 cfs
8.47 AC
Q=18 cfs
I-48"
Pond 3
Pond 4
Pond 5
Pond 6
L
89.38 Ac.
Q=136 cfs
N
9.0 AC
Q=23 cfs
1"=500'
100-YEAR EQUIVALENT
POND 16A
STA 174+00
EXTEND
EXISTING
CBC.
5 CBC's
HAUGEL
UNSER BLVD.
PHASE I
THIS PROJECT
UNSER BLVD.
PHASE II
NOT IN CONTRACT
164
P 170
79.0 Ac
Q=87 cfs
Q1 171
16.8 AC
Q=47 cfs
Q2 172
S 174
23.56 Ac
Q=53 cfs
R 173
27.98 Ac.
Q=62 cfs
163
16B
POND
SAN ANTONIO
STUDY BASINS
P→S ADDED TO RHYMO RUN
GREINER PLAN

| POND 16B | | |
|---|---|---|
| Stage Elevation | Storage (AcFt) | Discharge (cfs) |
| 5097.00 | 0.00 | 0 |
| 5098.00 | 0.18 | 1 |
| 5099.00 | 1.59 | 10 |
| 5100.00 | 5.06 | 21 |
| 5101.00 | 9.73 | 25 |
| 5102.00 | 14.84 | 30 |
| 5103.00 | 20.55 | 34 |
| 5104.00 | 26.97 | 38 |
| 5108.00 | 71.02 | 46 |
| 5110.00 | 147.80 | 50 |

ENGINEER'S SEAL

MARK S. HOLLOWAY
NEW MEXICO
7201
REGISTERED PROFESSIONAL ENGINEER

| NO. | DATE | REMARKS | BY |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

REVISIONS

Greiner JN. 0690694 DESIGN

DESIGNED BY R.B. DATE 12/87

DRAWN BY J.M. DATE 12/87

CHECKED BY L.J. & T.H. DATE 4/89

GREINER ENGINEERING

CITY OF ALBUQUERQUE
PUBLIC WORKS DEPT.

# UNSER BLVD.: WESTERN TRAIL
# STORM SEWER STA. 10+00 TO 18+50

| APPROVALS | ENGINEER | DATE | APPROVALS | ENGINEER | DATE |
|---|---|---|---|---|---|
| City Engineer | B.J. Goolsby | 2-5-93 | Liquid Waste | Reginald Wilson | 12/1/92 |
| ~~A.C.E.-Design~~ | | | Traffic WATER | " | " |
| A.C.E.-Hydrology | Steve Boleng | 12-8-92 | Water-TRAFFIC | N/A RLHD | 1-13-93 |
| F.I.A.F.C.A | N/A GE | 1-4-92 | | | |

DRAWING NO. 2300 | MAP NO. | SHEET OF

# Greiner

Job UNSER LOMR Project No. E300 (37 21 Sheet ____ of ____

Description Compute Area of Regraded 16B Pond Computed By [signature] Date 25 Sept 97

Checked By ____ Date ____

VOLUME USING REVISED GRADING POND 16B

| ELEV | AREA (SF) | | VOLUME (AC FT) |
|---|---|---|---|
| 5097 | 2500 | | 0 |
| 5098 | 98,925 | | 1,164 |
| 5099 | 179,650 | (3,1776) | 4,362 |
| 5100 | 233,750 | (4,1442) | 9,107 |
| 5101 | 271,275 | (5,7993) | 14,904 |
| 5102 | 293,475 | (6,4824) | 21,386 |
| 5103 | 318,000 | (7,0136) | 28,405 |

HEC2 DONE FOR UNSER PROJECT (17 JAN 89) SHOWS A STORAGE IN POND 16B OF 18 AC FT + OUTFLOW = 33 cfs + WATER SURFACE ELEV = 5102.63

POND HAS BEEN REGRADED SOMEWHAT - TO ALLOW MORE STORAGE - OUTFLOW IS THE SAME.

WITH REVISED GRADING, WHAT IS WATER SURFACE EL @ 18 AC.FT.

.. 5101 TO 5102 → 1' ELEV CHANGE = ? ELEV CHANGE

VOLUME ... → 6,4824 3,096 (18AF - 14.904AF)

STORED AcFt)

? = .48'

5101 + .48 = 5101.5 - New Water Surface elev.

HYDROGRAPH AT STATION

| PEAK FLOW (CFS) | TIME (HR) | | MAXIMUM AVERAGE FLOW 6-HR | 24-HR | 72-HR | 24.92-HR |
|---|---|---|---|---|---|---|
| 212. | 1.00 | (CFS) | 55. | 16. | 16. | 16. |
| | | (INCHES) | 0.979 | 1.138 | 1.140 | 1.140 |
| | | (AC-FT) | 27. | 32. | 32. | 32. |

CUMULATIVE AREA = 0.53 SQ MI

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

```
179 KK      ***************
            *             *
            *     P-16B   *
            *             *
            ***************
```

ROUTE FLOW THROUGH POND '16B' (36" OUTFLOW PIPE @ S=0.2%)
MAX POND ELEV=5102 MAX OUTFLOW=35CFS

182 KO OUTPUT CONTROL VARIABLES
IPRNT 1 PRINT CONTROL
IPLOT 0 PLOT CONTROL
QSCAL 0. HYDROGRAPH PLOT SCALE

HYDROGRAPH ROUTING DATA

183 RS STORAGE ROUTING
NSTPS 1 NUMBER OF SUBREACHES
ITYP ELEV TYPE OF INITIAL CONDITION
RSVRIC 5097.00 INITIAL CONDITION
X 0.00 WORKING R AND D COEFFICIENT

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 184 SA | AREA | 0.0 | 0.5 | 2.5 | 4.5 | 4.8 | 5.4 | 6.0 | 6.9 | 15.8 | 66.9 |
| 185 SE | ELEVATION | 5097.00 | 5098.00 | 5099.00 | 5100.00 | 5101.00 | 5102.00 | 5103.00 | 5104.00 | 5108.00 | 5110.00 |
| 186 SQ | DISCHARGE | 0. | 1. | 10. | 21. | 25. | 30. | 34. | 38. | 46. | 50. |

***

COMPUTED STORAGE-ELEVATION DATA

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| STORAGE | 0.00 | 0.18 | 1.59 | 5.06 | 9.73 | 14.84 | 20.55 | 26.97 | 71.02 | 147.80 |
| ELEVATION | 5097.00 | 5098.00 | 5099.00 | 5100.00 | 5101.00 | 5102.00 | 5103.00 | 5104.00 | 5108.00 | 5110.00 |

**********

HYDROGRAPH AT STATION P-16B

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| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18 | FEB | 0445 | 58 | 31. | 16.3 | 5102.3 | * | 18 | FEB | 1305 | 158 | 16. | 3.5 | 5099.5 | * | 18 | FEB | 2125 | 258 | 1. | 0.3 | 5098.1 |
| 18 | FEB | 0450 | 59 | 31. | 16.2 | 5102.2 | * | 18 | FEB | 1310 | 159 | 16. | 3.4 | 5099.5 | * | 18 | FEB | 2130 | 259 | 1. | 0.3 | 5098.1 |
| 18 | FEB | 0455 | 60 | 31. | 16.0 | 5102.2 | * | 18 | FEB | 1315 | 160 | 15. | 3.3 | 5099.5 | * | 18 | FEB | 2135 | 260 | 1. | 0.3 | 5098.1 |
| 18 | FEB | 0500 | 61 | 31. | 15.9 | 5102.2 | * | 18 | FEB | 1320 | 161 | 15. | 3.2 | 5099.5 | * | 18 | FEB | 2140 | 261 | 1. | 0.3 | 5098.0 |
| 18 | FEB | 0505 | 62 | 31. | 15.7 | 5102.2 | * | 18 | FEB | 1325 | 162 | 15. | 3.1 | 5099.4 | * | 18 | FEB | 2145 | 262 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0510 | 63 | 31. | 15.6 | 5102.1 | * | 18 | FEB | 1330 | 163 | 15. | 3.0 | 5099.4 | * | 18 | FEB | 2150 | 263 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0515 | 64 | 30. | 15.4 | 5102.1 | * | 18 | FEB | 1335 | 164 | 14. | 2.9 | 5099.4 | * | 18 | FEB | 2155 | 264 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0520 | 65 | 30. | 15.3 | 5102.1 | * | 18 | FEB | 1340 | 165 | 14. | 2.8 | 5099.4 | * | 18 | FEB | 2200 | 265 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0525 | 66 | 30. | 15.1 | 5102.1 | * | 18 | FEB | 1345 | 166 | 14. | 2.8 | 5099.3 | * | 18 | FEB | 2205 | 266 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0530 | 67 | 30. | 15.0 | 5102.0 | * | 18 | FEB | 1350 | 167 | 13. | 2.7 | 5099.3 | * | 18 | FEB | 2210 | 267 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0535 | 68 | 30. | 14.8 | 5102.0 | * | 18 | FEB | 1355 | 168 | 13. | 2.6 | 5099.3 | * | 18 | FEB | 2215 | 268 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0540 | 69 | 30. | 14.7 | 5102.0 | * | 18 | FEB | 1400 | 169 | 13. | 2.5 | 5099.3 | * | 18 | FEB | 2220 | 269 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0545 | 70 | 30. | 14.5 | 5101.9 | * | 18 | FEB | 1405 | 170 | 13. | 2.4 | 5099.2 | * | 18 | FEB | 2225 | 270 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0550 | 71 | 30. | 14.4 | 5101.9 | * | 18 | FEB | 1410 | 171 | 12. | 2.4 | 5099.2 | * | 18 | FEB | 2230 | 271 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0555 | 72 | 29. | 14.3 | 5101.9 | * | 18 | FEB | 1415 | 172 | 12. | 2.3 | 5099.2 | * | 18 | FEB | 2235 | 272 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0600 | 73 | 29. | 14.1 | 5101.9 | * | 18 | FEB | 1420 | 173 | 12. | 2.2 | 5099.2 | * | 18 | FEB | 2240 | 273 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0605 | 74 | 29. | 14.0 | 5101.8 | * | 18 | FEB | 1425 | 174 | 12. | 2.1 | 5099.2 | * | 18 | FEB | 2245 | 274 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0610 | 75 | 29. | 13.8 | 5101.8 | * | 18 | FEB | 1430 | 175 | 12. | 2.1 | 5099.1 | * | 18 | FEB | 2250 | 275 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0615 | 76 | 29. | 13.7 | 5101.8 | * | 18 | FEB | 1435 | 176 | 11. | 2.0 | 5099.1 | * | 18 | FEB | 2255 | 276 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0620 | 77 | 29. | 13.6 | 5101.7 | * | 18 | FEB | 1440 | 177 | 11. | 1.9 | 5099.1 | * | 18 | FEB | 2300 | 277 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0625 | 78 | 29. | 13.4 | 5101.7 | * | 18 | FEB | 1445 | 178 | 11. | 1.9 | 5099.1 | * | 18 | FEB | 2305 | 278 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0630 | 79 | 28. | 13.3 | 5101.7 | * | 18 | FEB | 1450 | 179 | 11. | 1.8 | 5099.1 | * | 18 | FEB | 2310 | 279 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0635 | 80 | 28. | 13.1 | 5101.7 | * | 18 | FEB | 1455 | 180 | 10. | 1.7 | 5099.0 | * | 18 | FEB | 2315 | 280 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0640 | 81 | 28. | 13.0 | 5101.6 | * | 18 | FEB | 1500 | 181 | 10. | 1.7 | 5099.0 | * | 18 | FEB | 2320 | 281 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0645 | 82 | 28. | 12.9 | 5101.6 | * | 18 | FEB | 1505 | 182 | 10. | 1.6 | 5099.0 | * | 18 | FEB | 2325 | 282 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0650 | 83 | 28. | 12.7 | 5101.6 | * | 18 | FEB | 1510 | 183 | 10. | 1.6 | 5099.0 | * | 18 | FEB | 2330 | 283 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0655 | 84 | 28. | 12.6 | 5101.6 | * | 18 | FEB | 1515 | 184 | 9. | 1.5 | 5098.9 | * | 18 | FEB | 2335 | 284 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0700 | 85 | 28. | 12.5 | 5101.5 | * | 18 | FEB | 1520 | 185 | 9. | 1.4 | 5098.9 | * | 18 | FEB | 2340 | 285 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0705 | 86 | 28. | 12.3 | 5101.5 | * | 18 | FEB | 1525 | 186 | 9. | 1.4 | 5098.9 | * | 18 | FEB | 2345 | 286 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0710 | 87 | 27. | 12.2 | 5101.5 | * | 18 | FEB | 1530 | 187 | 8. | 1.3 | 5098.8 | * | 18 | FEB | 2350 | 287 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0715 | 88 | 27. | 12.1 | 5101.5 | * | 18 | FEB | 1535 | 188 | 8. | 1.3 | 5098.8 | * | 18 | FEB | 2355 | 288 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0720 | 89 | 27. | 11.9 | 5101.4 | * | 18 | FEB | 1540 | 189 | 8. | 1.2 | 5098.8 | * | 19 | FEB | 0000 | 289 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0725 | 90 | 27. | 11.8 | 5101.4 | * | 18 | FEB | 1545 | 190 | 8. | 1.2 | 5098.7 | * | 19 | FEB | 0005 | 290 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0730 | 91 | 27. | 11.7 | 5101.4 | * | 18 | FEB | 1550 | 191 | 7. | 1.2 | 5098.7 | * | 19 | FEB | 0010 | 291 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0735 | 92 | 27. | 11.5 | 5101.4 | * | 18 | FEB | 1555 | 192 | 7. | 1.1 | 5098.7 | * | 19 | FEB | 0015 | 292 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0740 | 93 | 27. | 11.4 | 5101.3 | * | 18 | FEB | 1600 | 193 | 7. | 1.1 | 5098.6 | * | 19 | FEB | 0020 | 293 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0745 | 94 | 27. | 11.3 | 5101.3 | * | 18 | FEB | 1605 | 194 | 7. | 1.0 | 5098.6 | * | 19 | FEB | 0025 | 294 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0750 | 95 | 26. | 11.2 | 5101.3 | * | 18 | FEB | 1610 | 195 | 6. | 1.0 | 5098.6 | * | 19 | FEB | 0030 | 295 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0755 | 96 | 26. | 11.0 | 5101.3 | * | 18 | FEB | 1615 | 196 | 6. | 1.0 | 5098.6 | * | 19 | FEB | 0035 | 296 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0800 | 97 | 26. | 10.9 | 5101.2 | * | 18 | FEB | 1620 | 197 | 6. | 0.9 | 5098.5 | * | 19 | FEB | 0040 | 297 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0805 | 98 | 26. | 10.8 | 5101.2 | * | 18 | FEB | 1625 | 198 | 6. | 0.9 | 5098.5 | * | 19 | FEB | 0045 | 298 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0810 | 99 | 26. | 10.7 | 5101.2 | * | 18 | FEB | 1630 | 199 | 5. | 0.9 | 5098.5 | * | 19 | FEB | 0050 | 299 | 1. | 0.2 | 5098.0 |
| 18 | FEB | 0815 | 100 | 26. | 10.5 | 5101.2 | * | 18 | FEB | 1635 | 200 | 5. | 0.9 | 5098.5 | * | 19 | FEB | 0055 | 300 | 1. | 0.2 | 5098.0 |
| | | | | | | | * | | | | | | | | * | | | | | | | |

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| PEAK FLOW (CFS) | TIME (HR) | | MAXIMUM AVERAGE FLOW 6-HR | 24-HR | 72-HR | 24.92-HR |
|---|---|---|---|---|---|---|
| 33. | 3.33 | (CFS) | 30. | 16. | 15. | 15. |
| | | (INCHES) | 0.536 | 1.131 | 1.134 | 1.134 |
| | | (AC-FT) | 15. | 32. | 32. | 32. |

| PEAK STORAGE (AC-FT) | TIME (HR) | MAXIMUM AVERAGE STORAGE 6-HR | 24-HR | 72-HR | 24.92-HR |
|---|---|---|---|---|---|
| 18. | 3.33 | 15. | 6. | 6. | 6. |

| PEAK STAGE (FEET) | TIME (HR) | MAXIMUM AVERAGE STAGE 6-HR | 24-HR | 72-HR | 24.92-HR |
|---|---|---|---|---|---|
| 5102.63 | 3.33 | 5102.10 | 5099.90 | 5099.82 | 5099.82 |

| DA | MON | HRMN | ORD | OUTFLOW | STORAGE | STAGE | | DA | MON | HRMN | ORD | OUTFLOW | STORAGE | STAGE | | DA | MON | HRMN | ORD | OUTFLOW | STORAGE | STAGE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18 | FEB | 0000 | 1 | 0. | 0.0 | 5097.0 | * | 18 | FEB | 0820 | 101 | 26. | 10.4 | 5101.1 | * | 18 | FEB | 1640 | 201 | 5. | 0.8 | 5098.5 |
| 18 | FEB | 0005 | 2 | 0. | 0.0 | 5097.2 | * | 18 | FEB | 0825 | 102 | 26. | 10.3 | 5101.1 | * | 18 | FEB | 1645 | 202 | 5. | 0.8 | 5098.4 |
| 18 | FEB | 0010 | 3 | 1. | 0.1 | 5097.8 | * | 18 | FEB | 0830 | 103 | 25. | 10.2 | 5101.1 | * | 18 | FEB | 1650 | 203 | 5. | 0.8 | 5098.4 |
| 18 | FEB | 0015 | 4 | 2. | 0.3 | 5098.1 | * | 18 | FEB | 0835 | 104 | 25. | 10.1 | 5101.1 | * | 18 | FEB | 1655 | 204 | 5. | 0.8 | 5098.4 |
| 18 | FEB | 0020 | 5 | 4. | 0.6 | 5098.3 | * | 18 | FEB | 0840 | 105 | 25. | 9.9 | 5101.0 | * | 18 | FEB | 1700 | 205 | 5. | 0.7 | 5098.4 |
| 18 | FEB | 0025 | 6 | 6. | 0.9 | 5098.5 | * | 18 | FEB | 0845 | 106 | 25. | 9.8 | 5101.0 | * | 18 | FEB | 1705 | 206 | 4. | 0.7 | 5098.4 |
| 18 | FEB | 0030 | 7 | 8. | 1.3 | 5098.8 | * | 18 | FEB | 0850 | 107 | 25. | 9.7 | 5101.0 | * | 18 | FEB | 1710 | 207 | 4. | 0.7 | 5098.4 |
| 18 | FEB | 0035 | 8 | 11. | 1.8 | 5099.1 | * | 18 | FEB | 0855 | 108 | 25. | 9.6 | 5101.0 | * | 18 | FEB | 1715 | 208 | 4. | 0.7 | 5098.3 |
| 18 | FEB | 0040 | 9 | 13. | 2.4 | 5099.2 | * | 18 | FEB | 0900 | 109 | 25. | 9.5 | 5100.9 | * | 18 | FEB | 1720 | 209 | 4. | 0.6 | 5098.3 |
| 18 | FEB | 0045 | 10 | 15. | 3.2 | 5099.5 | * | 18 | FEB | 0905 | 110 | 25. | 9.3 | 5100.9 | * | 18 | FEB | 1725 | 210 | 4. | 0.6 | 5098.3 |
| 18 | FEB | 0050 | 11 | 18. | 4.1 | 5099.7 | * | 18 | FEB | 0910 | 111 | 25. | 9.2 | 5100.9 | * | 18 | FEB | 1730 | 211 | 4. | 0.6 | 5098.3 |
| 18 | FEB | 0055 | 12 | 21. | 5.2 | 5100.0 | * | 18 | FEB | 0915 | 112 | 24. | 9.1 | 5100.9 | * | 18 | FEB | 1735 | 212 | 4. | 0.6 | 5098.3 |
| 18 | FEB | 0100 | 13 | 22. | 6.5 | 5100.3 | * | 18 | FEB | 0920 | 113 | 24. | 9.0 | 5100.8 | * | 18 | FEB | 1740 | 213 | 4. | 0.6 | 5098.3 |
| 18 | FEB | 0105 | 14 | 23. | 7.8 | 5100.6 | * | 18 | FEB | 0925 | 114 | 24. | 8.9 | 5100.8 | * | 18 | FEB | 1745 | 214 | 3. | 0.6 | 5098.3 |
| 18 | FEB | 0110 | 15 | 24. | 9.0 | 5100.8 | * | 18 | FEB | 0930 | 115 | 24. | 8.7 | 5100.8 | * | 18 | FEB | 1750 | 215 | 3. | 0.5 | 5098.3 |
| 18 | FEB | 0115 | 16 | 25. | 10.1 | 5101.1 | * | 18 | FEB | 0935 | 116 | 24. | 8.6 | 5100.8 | * | 18 | FEB | 1755 | 216 | 3. | 0.5 | 5098.3 |
| 18 | FEB | 0120 | 17 | 26. | 11.0 | 5101.2 | * | 18 | FEB | 0940 | 117 | 24. | 8.5 | 5100.7 | * | 18 | FEB | 1800 | 217 | 3. | 0.5 | 5098.2 |
| 18 | FEB | 0125 | 18 | 27. | 11.8 | 5101.4 | * | 18 | FEB | 0945 | 118 | 24. | 8.4 | 5100.7 | * | 18 | FEB | 1805 | 218 | 3. | 0.5 | 5098.2 |
| 18 | FEB | 0130 | 19 | 28. | 12.4 | 5101.5 | * | 18 | FEB | 0950 | 119 | 24. | 8.3 | 5100.7 | * | 18 | FEB | 1810 | 219 | 3. | 0.5 | 5098.2 |
| 18 | FEB | 0135 | 20 | 28. | 13.0 | 5101.6 | * | 18 | FEB | 0955 | 120 | 24. | 8.2 | 5100.7 | * | 18 | FEB | 1815 | 220 | 3. | 0.5 | 5098.2 |
| 18 | FEB | 0140 | 21 | 29. | 13.6 | 5101.8 | * | 18 | FEB | 1000 | 121 | 24. | 8.1 | 5100.6 | * | 18 | FEB | 1820 | 221 | 3. | 0.5 | 5098.2 |
| 18 | FEB | 0145 | 22 | 29. | 14.0 | 5101.8 | * | 18 | FEB | 1005 | 122 | 23. | 7.9 | 5100.6 | * | 18 | FEB | 1825 | 222 | 3. | 0.5 | 5098.2 |
| 18 | FEB | 0150 | 23 | 30. | 14.4 | 5101.9 | * | 18 | FEB | 1010 | 123 | 23. | 7.8 | 5100.6 | * | 18 | FEB | 1830 | 223 | 3. | 0.5 | 5098.2 |
| 18 | FEB | 0155 | 24 | 30. | 14.8 | 5102.0 | * | 18 | FEB | 1015 | 124 | 23. | 7.7 | 5100.6 | * | 18 | FEB | 1835 | 224 | 3. | 0.4 | 5098.2 |
| 18 | FEB | 0200 | 25 | 30. | 15.1 | 5102.1 | * | 18 | FEB | 1020 | 125 | 23. | 7.6 | 5100.5 | * | 18 | FEB | 1840 | 225 | 3. | 0.4 | 5098.2 |
| 18 | FEB | 0205 | 26 | 30. | 15.5 | 5102.1 | * | 18 | FEB | 1025 | 126 | 23. | 7.4 | 5100.5 | * | 18 | FEB | 1845 | 226 | 3. | 0.4 | 5098.2 |
| 18 | FEB | 0210 | 27 | 31. | 15.8 | 5102.2 | * | 18 | FEB | 1030 | 127 | 23. | 7.3 | 5100.5 | * | 18 | FEB | 1850 | 227 | 2. | 0.4 | 5098.2 |
| 18 | FEB | 0215 | 28 | 31. | 16.0 | 5102.2 | * | 18 | FEB | 1035 | 128 | 23. | 7.2 | 5100.5 | * | 18 | FEB | 1855 | 228 | 2. | 0.4 | 5098.2 |
| 18 | FEB | 0220 | 29 | 31. | 16.3 | 5102.3 | * | 18 | FEB | 1040 | 129 | 23. | 7.0 | 5100.4 | * | 18 | FEB | 1900 | 229 | 2. | 0.4 | 5098.2 |
| 18 | FEB | 0225 | 30 | 31. | 16.5 | 5102.3 | * | 18 | FEB | 1045 | 130 | 23. | 6.9 | 5100.4 | * | 18 | FEB | 1905 | 230 | 2. | 0.4 | 5098.1 |
| 18 | FEB | 0230 | 31 | 31. | 16.8 | 5102.3 | * | 18 | FEB | 1050 | 131 | 22. | 6.8 | 5100.4 | * | 18 | FEB | 1910 | 231 | 2. | 0.4 | 5098.1 |
| 18 | FEB | 0235 | 32 | 31. | 17.0 | 5102.4 | * | 18 | FEB | 1055 | 132 | 22. | 6.6 | 5100.3 | * | 18 | FEB | 1915 | 232 | 2. | 0.4 | 5098.1 |
| 18 | FEB | 0240 | 33 | 32. | 17.2 | 5102.4 | * | 18 | FEB | 1100 | 133 | 22. | 6.5 | 5100.3 | * | 18 | FEB | 1920 | 233 | 2. | 0.4 | 5098.1 |
| 18 | FEB | 0245 | 34 | 32. | 17.4 | 5102.4 | * | 18 | FEB | 1105 | 134 | 22. | 6.4 | 5100.3 | * | 18 | FEB | 1925 | 234 | 2. | 0.4 | 5098.1 |
| 18 | FEB | 0250 | 35 | 32. | 17.6 | 5102.5 | * | 18 | FEB | 1110 | 135 | 22. | 6.2 | 5100.3 | * | 18 | FEB | 1930 | 235 | 2. | 0.4 | 5098.1 |
| 18 | FEB | 0255 | 36 | 32. | 17.8 | 5102.5 | * | 18 | FEB | 1115 | 136 | 22. | 6.1 | 5100.2 | * | 18 | FEB | 1935 | 236 | 2. | 0.3 | 5098.1 |
| 18 | FEB | 0300 | 37 | 32. | 18.0 | 5102.6 | * | 18 | FEB | 1120 | 137 | 22. | 6.0 | 5100.2 | * | 18 | FEB | 1940 | 237 | 2. | 0.3 | 5098.1 |
| 18 | FEB | 0305 | 38 | 32. | 18.2 | 5102.6 | * | 18 | FEB | 1125 | 138 | 22. | 5.8 | 5100.2 | * | 18 | FEB | 1945 | 238 | 2. | 0.3 | 5098.1 |
| 18 | FEB | 0310 | 39 | 32. | 18.3 | 5102.6 | * | 18 | FEB | 1130 | 139 | 22. | 5.7 | 5100.1 | * | 18 | FEB | 1950 | 239 | 2. | 0.3 | 5098.1 |
| 18 | FEB | 0315 | 40 | 33. | 18.4 | 5102.6 | * | 18 | FEB | 1135 | 140 | 21. | 5.6 | 5100.1 | * | 18 | FEB | 1955 | 240 | 2. | 0.3 | 5098.1 |
| 18 | FEB | 0320 | 41 | 33. | 18.5 | 5102.6 | * | 18 | FEB | 1140 | 141 | 21. | 5.4 | 5100.1 | * | 18 | FEB | 2000 | 241 | 2. | 0.3 | 5098.1 |
| 18 | FEB | 0325 | 42 | 33. | 18.4 | 5102.6 | * | 18 | FEB | 1145 | 142 | 21. | 5.3 | 5100.1 | * | 18 | FEB | 2005 | 242 | 2. | 0.3 | 5098.1 |
| 18 | FEB | 0330 | 43 | 32. | 18.4 | 5102.6 | * | 18 | FEB | 1150 | 143 | 21. | 5.2 | 5100.0 | * | 18 | FEB | 2010 | 243 | 2. | 0.3 | 5098.1 |
| 18 | FEB | 0335 | 44 | 32. | 18.3 | 5102.6 | * | 18 | FEB | 1155 | 144 | 21. | 5.1 | 5100.0 | * | 18 | FEB | 2015 | 244 | 2. | 0.3 | 5098.1 |
| 18 | FEB | 0340 | 45 | 32. | 18.2 | 5102.6 | * | 18 | FEB | 1200 | 145 | 21. | 4.9 | 5100.0 | * | 18 | FEB | 2020 | 245 | 2. | 0.3 | 5098.1 |
| 18 | FEB | 0345 | 46 | 32. | 18.1 | 5102.6 | * | 18 | FEB | 1205 | 146 | 20. | 4.8 | 5099.9 | * | 18 | FEB | 2025 | 246 | 2. | 0.3 | 5098.1 |
| 18 | FEB | 0350 | 47 | 32. | 17.9 | 5102.5 | * | 18 | FEB | 1210 | 147 | 20. | 4.7 | 5099.9 | * | 18 | FEB | 2030 | 247 | 2. | 0.3 | 5098.1 |
| 18 | FEB | 0355 | 48 | 32. | 17.8 | 5102.5 | * | 18 | FEB | 1215 | 148 | 19. | 4.6 | 5099.9 | * | 18 | FEB | 2035 | 248 | 2. | 0.3 | 5098.1 |
| 18 | FEB | 0400 | 49 | 32. | 17.7 | 5102.5 | * | 18 | FEB | 1220 | 149 | 19. | 4.4 | 5099.8 | * | 18 | FEB | 2040 | 249 | 2. | 0.3 | 5098.1 |
| 18 | FEB | 0405 | 50 | 32. | 17.5 | 5102.5 | * | 18 | FEB | 1225 | 150 | 19. | 4.3 | 5099.8 | * | 18 | FEB | 2045 | 250 | 2. | 0.3 | 5098.1 |
| 18 | FEB | 0410 | 51 | 32. | 17.4 | 5102.4 | * | 18 | FEB | 1230 | 151 | 18. | 4.2 | 5099.8 | * | 18 | FEB | 2050 | 251 | 2. | 0.3 | 5098.1 |
| 18 | FEB | 0415 | 52 | 32. | 17.2 | 5102.4 | * | 18 | FEB | 1235 | 152 | 18. | 4.1 | 5099.7 | * | 18 | FEB | 2055 | 252 | 2. | 0.3 | 5098.1 |
| 18 | FEB | 0420 | 53 | 32. | 17.1 | 5102.4 | * | 18 | FEB | 1240 | 153 | 18. | 4.0 | 5099.7 | * | 18 | FEB | 2100 | 253 | 2. | 0.3 | 5098.1 |
| 18 | FEB | 0425 | 54 | 31. | 16.9 | 5102.4 | * | 18 | FEB | 1245 | 154 | 17. | 3.9 | 5099.7 | * | 18 | FEB | 2105 | 254 | 2. | 0.3 | 5098.1 |
| 18 | FEB | 0430 | 55 | 31. | 16.8 | 5102.3 | * | 18 | FEB | 1250 | 155 | 17. | 3.8 | 5099.6 | * | 18 | FEB | 2110 | 255 | 2. | 0.3 | 5098.1 |
| 18 | FEB | 0435 | 56 | 31. | 16.6 | 5102.3 | * | 18 | FEB | 1255 | 156 | 17. | 3.7 | 5099.6 | * | 18 | FEB | 2115 | 256 | 2. | 0.3 | 5098.1 |
| 18 | FEB | 0440 | 57 | 31. | 16.5 | 5102.3 | * | 18 | FEB | 1300 | 157 | 16. | 3.6 | 5099.6 | * | 18 | FEB | 2120 | 257 | 2. | 0.3 | 5098.1 |

# MESA PRIETA SUBDIVISION

## DRAINAGE REPORT

**Prepared For:**

**City of Albuquerque**

**and**

**Albuquerque Metropolitan Arroyo Flood Control Authority**

RECEIVED
SEP 18 1995

**Prepared By:**

***Resource Technology, Inc.***
***ENGINEERS AND ENVIRONMENTAL SCIENTISTS***
***2129 Osuna Rd. NE, Suite 200, Albuquerque, NM 87103***
***Telephone (505) 345-3115***
***Fax (505) 345-4132***

***September 1995***

G-10

GENEIVA MEEKER, CHAIR
DANIEL W. COOK, VICE-CHAIR
RONALD D. BROWN, SECRETARY-TREASURER
MICHAEL MURPHY, ASST. SECRETARY-TREASURER
TIM EICHENBERG, DIRECTOR

LARRY A. BLAIR
EXECUTIVE ENGINEER

**A**lbuquerque
**M**etropolitan
**A**rroyo
**F**lood
**C**ontrol
**A**uthority

2600 PROSPECT N.E. - ALBUQUERQUE, N. M. 87107
TELEPHONE (505) 884-2215

November 14, 1995

Mr. Dave Dehoff
Resource Technology, Inc.
2129 Osuna Rd. NE
Albuquerque, NM 87103

old Baca-Manogue SUB

RE: Mesa Prieta Subdivision Drainage Report, dated September 1995
~~G-10, (Ladera Dam~~ 15 outfall pipe connection)

Dear Dave:

Mr. Mark Burak has reviewed your report and we agree with the concept. It follows the concept of the previous submittals.

Please note that we only reviewed the AMAFCA issues regarding the connection. I contacted Craig Hoover at BHI to get a copy of the AHYMO output from 1993 for the Ladera Dam 15. (The HEC-1 output was from the RCE breach analysis.) At 1.5 hours, the high water elevation is 5104.3. It appears that this is still sufficient, however, the ponding depth is critical to the HGL analysis. We do not anticipate the ponding elevation changing significantly during the ongoing I-40 drainage management plan analysis.

AMAFCA will need to approve and sign all drawings associated with the connection. A storm sewer permit connection form will also need to be completed. It is our understanding, that the proposed storm sewer will be maintained by the City of Albuquerque, therefore, AMAFCA Board approval is not warranted.

Should you have any questions, please call me.

Sincerely,
AMAFCA

Kurt Browning, P.E.
Drainage Engineer

c: Fred Aguirre, COA PWD Hydrology

MARK H. BURAK Software --- DRAINPAK
1512 Sagebrush Tr SE, Alb. NM 87123

PROJECT: Ladera Basin #15, Storm Drain
JOB # : Flow from Sta 286+31 to Pond 15 Outfall location
DATE : 30 May, 1995

Tailwater elevation..... 106.20
Manning's Roughness ..... 0.013

| | STATION / DESCRIPTION | | FINISH GRADE | INV. ELEV. | PIPE DIA. (IN) | LENGTH (FT) | Q (CFS) | friction head loss | MINOR LOSSES bend Hb | manhole Hmh | transtn Ht | junction Hj | ELEV. HGL | ELEV. EGL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 26348 | | 110.00 | 94.00 | | | | | | | | | 106.20 | 106.97 |
| 1 | | | 108.11 | 94.10 | 60 | 461.00 | 138 | 1.29 | | | | | 107.49 | 108.25 |
| | 26809 | | 108.11 | 94.20 | | | | | 0.15 | 0.04 | 0.00 | 0.67 | 108.35 | 109.11 |
| 2 | | | 111.45 | 94.30 | 60 | 741.00 | 50 | 0.27 | | | | | 109.28 | 109.38 |
| | 27550 | | 111.45 | 94.40 | | | | | 0.00 | 0.01 | 0.00 | 0.08 | 109.37 | 109.47 |
| 3 | | | 107.36 | 94.50 | 60 | 303.00 | 20 | 0.02 | | | | | 109.48 | 109.49 |
| | 27853 | | 107.36 | 94.60 | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 109.48 | 109.49 |
| 4 | | | 108.00 | 94.70 | 60 | 539.00 | 20 | 0.03 | | | | | 109.51 | 109.52 |
| | 28392 | | 108.00 | 94.80 | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 109.51 | 109.53 |
| 5 | | | 108.50 | 94.90 | 60 | 239.00 | 20 | 0.01 | | | | | 109.53 | 109.54 |
| | 28631 | | 108.50 | 95.00 | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 109.53 | 109.54 |
| 6 | | | 108.50 | 95.10 | 60 | 1.00 | 20 | #DIV/0! | | | | | #DIV/0! | #DIV/0! |
| | 28632 | | 108.50 | 95.20 | | | | | 0.00 | 0.00 | #DIV/0! | 0.02 | #DIV/0! | #DIV/0! |
| 7 | | | | | | | | #DIV/0! | | | | | #DIV/0! | #DIV/0! |
| | | | | | | | | | #DIV/0! | #DIV/0! | 0.00 | #DIV/0! | #DIV/0! | #DIV/0! |
| 8 | | | | | | | | #DIV/0! | | | | | #DIV/0! | #DIV/0! |
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| 9 | | | | | | | | #DIV/0! | | | | | #DIV/0! | #DIV/0! |
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| 10 | | | | | | | | #DIV/0! | | | | | #DIV/0! | #DIV/0! |

MARK H. BURAK Software — DRAINPAK
1512 Sagebrush Tr SE, Alb. NM 87123

PROJECT: Ladera Basin #15, Storm Drain
JOB # : Flow from Sta 283+92 to Pond 15 Outfall location
DATE : 30 May, 1995

Tailwater elevation..... 106.20
Manning's Roughness ..... 0.013

| | STATION DESCRIPTION | | FINISH GRADE | INV. ELEV. | PIPE DIA. (IN) | LENGTH (FT) | Q (CFS) | friction head loss | MINOR LOSSES bend Hb | manhole Hmh | transtn Ht | junction Hj | ELEV. HGL | ELEV. EGL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 26348 | | 110.00 | 94.00 | | | | | | | | | 106.20 | 106.97 |
| 1 | | | 108.11 | 94.10 | 60 | 461.00 | 138 | 1.29 | | | | | 107.49 | 108.25 |
| | 26809 | | 108.11 | 94.20 | | | | | 0.15 | 0.04 | 0.00 | 0.67 | 108.35 | 109.11 |
| 2 | | | 111.45 | 94.30 | 60 | 741.00 | 50 | 0.27 | | | | | 109.28 | 109.38 |
| | 27550 | | 111.45 | 94.40 | | | | | 0.00 | 0.01 | 0.00 | 0.08 | 109.37 | 109.47 |
| 3 | | | 107.36 | 94.50 | 60 | 303.00 | 20 | 0.02 | | | | | 109.48 | 109.49 |
| | 27853 | | 107.36 | 94.60 | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 109.48 | 109.49 |
| 4 | | | 108.00 | 94.70 | 60 | 539.00 | 20 | 0.03 | | | | | 109.51 | 109.52 |
| | 28392 | | 108.00 | 94.80 | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 109.51 | 109.53 |
| 5 | | | 108.00 | 94.90 | 60 | 1.00 | 20 | #DIV/0! | | | | | #DIV/0! | #DIV/0! |
| | 28393 | | 108.00 | 95.00 | | | | | 0.00 | 0.00 | #DIV/0! | 0.02 | #DIV/0! | #DIV/0! |
| 6 | | | | | | | | #DIV/0! | | | | | #DIV/0! | #DIV/0! |
| 7 | | | | | | | | #DIV/0! | #DIV/0! | #DIV/0! | 0.00 | #DIV/0! | #DIV/0! | #DIV/0! |
| 8 | | | | | | | | #DIV/0! | #DIV/0! | #DIV/0! | 0.00 | #DIV/0! | #DIV/0! | #DIV/0! |
| 9 | | | | | | | | #DIV/0! | #DIV/0! | #DIV/0! | 0.00 | #DIV/0! | #DIV/0! | #DIV/0! |
| 10 | | | | | | | | #DIV/0! | #DIV/0! | #DIV/0! | 0.00 | #DIV/0! | #DIV/0! | #DIV/0! |

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MH4

MARK H. BURAK Software --- DRAINPAK
1512 Sagebrush Tr SE, Alb. NM 87123

PROJECT: Ladera Basin #15, Storm Drain
JOB # : Flow from ~~Ladera~~ to Pond 15 Outfall location
DATE : 30 May, 1995

Tailwater elevation..... 106.20
Manning's Roughness ..... 0.013

| | STATION / DESCRIPTION | FINISH GRADE | INV. ELEV. | PIPE DIA. (IN) | LENGTH (FT) | Q (CFS) | friction head loss | MINOR LOSSES bend Hb | manhole Hmh | transtn Ht | junction Hj | ELEV. HGL | ELEV. EGL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 26348 | 110.00 | 94.00 | | | | | | | | | 106.20 | 106.97 |
| 1 | | 108.11 | 94.10 | 60 | 461.00 | 138 | 1.29 | | | | | 107.49 | 108.25 |
| | 26809 | 108.11 | 94.20 | | | | | 0.15 | 0.04 | 0.00 | 0.67 | 108.35 | 109.11 |
| 2 | | 111.45 | 94.30 | 60 | 741.00 | 50 | 0.27 | | | | | 109.28 | 109.38 |
| | 27550 | 111.45 | 94.40 | | | | | 0.00 | 0.01 | 0.00 | 0.08 | 109.37 | 109.47 |
| 3 | | 107.36 | 94.50 | 60 | 303.00 | 20 | 0.02 | | | | | 109.48 | 109.49 |
| | 27853 | 107.36 | 94.60 | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 109.48 | 109.49 |
| 4 | | 107.00 | 94.70 | 60 | 1.00 | 20 | #DIV/0! | | | | | #DIV/0! | #DIV/0! |
| | 27854 | 107.00 | 94.80 | | | | | 0.00 | 0.00 | #DIV/0! | 0.02 | #DIV/0! | #DIV/0! |
| 5 | | | | | | | #DIV/0! | | | | | #DIV/0! | #DIV/0! |
| 6 | | | | | | | #DIV/0! | #DIV/0! | #DIV/0! | 0.00 | #DIV/0! | #DIV/0! | #DIV/0! |
| 7 | | | | | | | #DIV/0! | #DIV/0! | #DIV/0! | 0.00 | #DIV/0! | #DIV/0! | #DIV/0! |
| 8 | | | | | | | #DIV/0! | #DIV/0! | #DIV/0! | 0.00 | #DIV/0! | #DIV/0! | #DIV/0! |
| 9 | | | | | | | #DIV/0! | #DIV/0! | #DIV/0! | 0.00 | #DIV/0! | #DIV/0! | #DIV/0! |
| 10 | | | | | | | #DIV/0! | #DIV/0! | #DIV/0! | 0.00 | #DIV/0! | #DIV/0! | #DIV/0! |

3

MARK H. BURAK Software --- DRAINPAK
1512 Sagebrush Tr SE, Alb. NM 87123

PROJECT: Ladera Basin #15, Storm Drain
JOB # : Flow from Manhole 3 to Pond 15 Outfall location
DATE : 30 May, 1995

Tailwater elevation..... 106.20
Manning's Roughness ..... 0.013

| | STATION DESCRIPTION | | FINISH GRADE | INV. ELEV. | PIPE DIA. (IN) | LENGTH (FT) | Q (CFS) | friction head loss | MINOR LOSSES bend Hb | manhole Hmh | transtn Ht | junction Hj | ELEV. HGL | ELEV. EGL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 26348 | | 110.00 | 94.00 | | | | | | | | | 106.20 | 106.76 |
| 1 | | | 108.11 | 94.10 | 60 | 461.00 | 118 | 0.94 | | | | | 107.14 | 107.70 |
| | 26809 | | 108.11 | 94.20 | | | | | 0.11 | 0.03 | 0.00 | 0.52 | 107.81 | 108.37 |
| 2 | | | 111.45 | 94.30 | 60 | 741.00 | 30 | 0.10 | | | | | 108.43 | 108.46 |
| | 27550 | | 111.45 | 94.40 | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 108.43 | 108.47 |
| 3 | | | ~~107.30~~ | 94.50 | 60 | 1.00 | 30 | #DIV/0! | | | | | #DIV/0! | #DIV/0! |
| | 27551 | | ~~107.36~~ | 94.60 | | | | | 0.00 | 0.00 | #DIV/0! | 0.04 | #DIV/0! | #DIV/0! |
| 4 | | | | | | | | #DIV/0! | | | | | #DIV/0! | #DIV/0! |
| | | | | | | | | | #DIV/0! | #DIV/0! | 0.00 | #DIV/0! | #DIV/0! | #DIV/0! |
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| | | | | | | | | | #DIV/0! | #DIV/0! | 0.00 | #DIV/0! | #DIV/0! | #DIV/0! |
| 6 | | | | | | | | #DIV/0! | | | | | #DIV/0! | #DIV/0! |
| | | | | | | | | | #DIV/0! | #DIV/0! | 0.00 | #DIV/0! | #DIV/0! | #DIV/0! |
| 7 | | | | | | | | #DIV/0! | | | | | #DIV/0! | #DIV/0! |
| | | | | | | | | | #DIV/0! | #DIV/0! | 0.00 | #DIV/0! | #DIV/0! | #DIV/0! |
| 8 | | | | | | | | #DIV/0! | | | | | #DIV/0! | #DIV/0! |
| | | | | | | | | | #DIV/0! | #DIV/0! | 0.00 | #DIV/0! | #DIV/0! | #DIV/0! |
| 9 | | | | | | | | #DIV/0! | | | | | #DIV/0! | #DIV/0! |
| | | | | | | | | | #DIV/0! | #DIV/0! | 0.00 | #DIV/0! | #DIV/0! | #DIV/0! |
| 10 | | | | | | | | #DIV/0! | | | | | #DIV/0! | #DIV/0! |

MARK H. BURAK Software --- DRAINPAK
1512 Sagebrush Tr SE, Alb. NM 87123

PROJECT: Ladera Basin #15, Storm Drain
JOB # : Flow from MH 2 to Sta. 323+00
DATE : 30 May, 1995

Tailwater elevation..... 0.00
Manning's Roughness ..... 0.013

| | STATION | DESCRIPTION | FINISH GRADE | INV. ELEV. | PIPE DIA. (IN) | LENGTH (FT) | Q (CFS) | friction head loss | MINOR LOSSES bend Hb | manhole Hmh | transtn Ht | junction Hj | ELEV. HGL | ELEV. EGL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 32300 | | 104.50 | 94.50 | | | | | | | | | 99.50 | 101.41 |
| 1 | | | 108.00 | 94.65 | 60 | 400.00 | 218 | 2.79 | | | | | 102.29 | 104.20 |
| | 31900 | | 108.00 | 94.65 | | | | | 0.00 | 0.10 | 0.00 | 0.00 | 102.38 | 104.30 |
| 2 | | | 106.00 | 94.94 | 60 | 750.00 | 218 | 5.23 | | | | | 107.61 | 109.52 |
| | 31150 | | 106.00 | 94.94 | | | | | 0.00 | 0.10 | 0.00 | 1.20 | 108.91 | 110.82 |
| 3 | | | 109.00 | 95.17 | 60 | 625.00 | 133 | 1.62 | | | | | 111.73 | 112.44 |
| | 30525 | | 109.00 | 95.17 | | | | | 0.00 | 0.04 | 0.00 | 0.00 | 111.77 | 112.48 |
| 4 | | | 114.00 | 95.46 | 60 | 743.00 | 133 | 1.93 | | | | | 113.69 | 114.41 |
| | 29782 | | 114.00 | 95.46 | | | | | 0.14 | 0.04 | 0.00 | 0.00 | 113.87 | 114.58 |
| 5 | | | 112.00 | 95.72 | 60 | 682.00 | 133 | 1.77 | | | | | 115.64 | 116.35 |
| | 29100 | | 112.00 | 95.72 | | | | | 0.00 | 0.04 | 0.00 | 0.00 | 115.68 | 116.39 |
| 6 | | | 108.50 | 95.89 | 60 | 469.00 | 133 | 1.22 | | | | | 116.89 | 117.60 |
| | 28631 | | 108.50 | 95.89 | | | | | 0.05 | 0.04 | 0.00 | 0.00 | 116.98 | 117.69 |
| 7 | | | 108.00 | 95.99 | 60 | 239.00 | 133 | 0.62 | | | | | 117.60 | 118.31 |
| | 28392 | | 108.00 | 95.99 | | | | | 0.05 | 0.04 | 0.00 | 0.00 | 117.69 | 118.40 |
| 8 | | LADERA | 107.36 | 96.19 | 60 | 539.00 | 133 | 1.40 | | | | | 119.09 | 119.80 |
| | 27853 | MH4 | 107.36 | 96.19 | | | | | 0.00 | 0.04 | 0.00 | 0.15 | 119.27 | 119.98 |
| 9 | | | 111.45 | 96.31 | 60 | 303.00 | 118 | 0.62 | | | | | 120.04 | 120.60 |
| | 27550 | MH3 | 111.45 | 96.31 | | | | | 0.11 | 0.03 | 0.00 | 0.25 | 120.43 | 120.99 |
| 10 | | | 108.11 | 96.59 | 60 | 741.00 | 88 | 0.84 | | | | | 121.52 | 121.83 |
| | 26809 | MH2 | 108.11 | 96.59 | | | | | 0.00 | 0.02 | 0.00 | 0.00 | 121.54 | 121.85 |
| 11 | | | 108.00 | 96.60 | 60 | 1.00 | 88 | #DIV/0! | | | | | #DIV/0! | #DIV/0! |
| | | | 108.00 | 96.60 | | | | | 0.00 | 0.02 | #DIV/0! | 0.31 | #DIV/0! | #DIV/0! |
| 12 | | | | | | | | #DIV/0! | | | | | #DIV/0! | #DIV/0! |
| | | | | | | | | | #DIV/0! | #DIV/0! | 0.00 | #DIV/0! | #DIV/0! | #DIV/0! |

295

Q = 225 as best we can tell

6.

MARK H. BURAK Software --- DRAINPAK
1512 Sagebrush Tr SE, Alb. NM 87123

PROJECT: Ladera Basin #15, Storm Drain
JOB # : Flow from MH 3 to Sta. 323+00
DATE : 30 May, 1995

Tailwater elevation..... 0.00
Manning's Roughness ..... 0.013

| | STATION / DESCRIPTION | | FINISH GRADE | INV. ELEV. | PIPE DIA. (IN) | LENGTH (FT) | Q (CFS) | friction head loss | MINOR LOSSES bend Hb | manhole Hmh | transtn Ht | junction Hj | ELEV. HGL | ELEV. EGL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 32300 | | 104.50 | 94.50 | | | | | | | | | 99.50 | 100.18 |
| 1 | | | 108.00 | 94.65 | 60 | 400.00 | 130 | 0.99 | | | | | 100.49 | 101.17 |
| | 31900 | | 108.00 | 94.65 | | | | | 0.00 | 0.03 | 0.00 | 0.00 | 100.53 | 101.21 |
| 2 | | | 106.00 | 94.94 | 60 | 750.00 | 130 | 1.86 | | | | | 102.38 | 103.06 |
| | 31150 | | 106.00 | 94.94 | | | | | 0.00 | 0.03 | 0.00 | 0.60 | 103.02 | 103.70 |
| 3 | | | 109.00 | 95.17 | 60 | 625.00 | 45 | 0.19 | | | | | 103.80 | 103.88 |
| | 30525 | | 109.00 | 95.17 | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 103.81 | 103.89 |
| 4 | | | 114.00 | 95.46 | 60 | 743.00 | 45 | 0.22 | | | | | 104.03 | 104.11 |
| | 29782 | | 114.00 | 95.46 | | | | | 0.02 | 0.00 | 0.00 | 0.00 | 104.05 | 104.13 |
| 5 | | | 112.00 | 95.72 | 60 | 682.00 | 45 | 0.20 | | | | | 104.25 | 104.33 |
| | 29100 | | 112.00 | 95.72 | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 104.25 | 104.33 |
| 6 | | | 108.50 | 95.89 | 60 | 469.00 | 45 | 0.14 | | | | | 104.39 | 104.47 |
| | 28631 | | 108.50 | 95.89 | | | | | 0.01 | 0.00 | 0.00 | 0.00 | 104.40 | 104.48 |
| 7 | | | 108.00 | 95.99 | 60 | 239.00 | 45 | 0.07 | | | | | 104.47 | 104.56 |
| | 28392 | | 108.00 | 95.99 | | | | | 0.01 | 0.00 | 0.00 | 0.00 | 104.48 | 104.57 |
| 8 | | LADERA | 107.36 | 96.19 | 60 | 539.00 | 45 | 0.16 | | | | | 104.64 | 104.73 |
| | 27853 | MH4 | 107.36 | 96.19 | | | | | 0.00 | 0.00 | 0.00 | 0.05 | 104.69 | 104.77 |
| 9 | | | 111.45 | 96.31 | 60 | 303.00 | 30 | 0.04 | | | | | 104.78 | 104.81 |
| | 27550 | MH3 | 111.45 | 96.31 | | | | | 0.01 | 0.00 | 0.00 | 0.00 | 104.79 | 104.82 |
| 10 | | | 108.11 | 96.31 | 60 | 1.00 | 30 | #DIV/0! | | | | | #DIV/0! | #DIV/0! |
| | | | 108.11 | 96.31 | | | | | 0.00 | 0.00 | #DIV/0! | 0.04 | #DIV/0! | #DIV/0! |
| 11 | | | | | | | | #DIV/0! | | | | | #DIV/0! | #DIV/0! |
| | | | | | | | | | #DIV/0! | #DIV/0! | 0.00 | #DIV/0! | #DIV/0! | #DIV/0! |
| 12 | | | | | | | | #DIV/0! | | | | | #DIV/0! | #DIV/0! |
| | | | | | | | | | #DIV/0! | #DIV/0! | 0.00 | #DIV/0! | #DIV/0! | #DIV/0! |

MARK H. BURAK Software — DRAINPAK
1512 Sagebrush Tr SE, Alb. NM 87123

PROJECT: Ladera Basin #15, Storm Drain
JOB # : Flow from MH 4 to Sta. 323+00
DATE : 30 May, 1995

Tailwater elevation..... 0.00
Manning's Roughness ..... 0.013

| | STATION / DESCRIPTION | | FINISH GRADE | INV. ELEV. | PIPE DIA. (IN) | LENGTH (FT) | Q (CFS) | friction head loss | MINOR LOSSES bend Hb | manhole Hmh | transtn Ht | junction Hj | ELEV. HGL | ELEV. EGL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 32300 | | 104.50 | 94.50 | | | | | | | | | 99.50 | 99.90 |
| 1 | | | 108.00 | 94.65 | 60 | 400.00 | 100 | 0.59 | | | | | 100.09 | 100.49 |
| | 31900 | | 108.00 | 94.65 | | | | | 0.00 | 0.02 | 0.00 | 0.00 | 100.11 | 100.51 |
| 2 | | | 106.00 | 94.94 | 60 | 750.00 | 100 | 1.10 | | | | | 101.21 | 101.61 |
| | 31150 | | 106.00 | 94.94 | | | | | 0.00 | 0.02 | 0.00 | 0.39 | 101.62 | 102.02 |
| 3 | | | 109.00 | 95.17 | 60 | 625.00 | 15 | 0.02 | | | | | 102.03 | 102.04 |
| | 30525 | | 109.00 | 95.17 | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 102.04 | 102.04 |
| 4 | | | 114.00 | 95.46 | 60 | 743.00 | 15 | 0.02 | | | | | 102.06 | 102.07 |
| | 29782 | | 114.00 | 95.46 | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 102.06 | 102.07 |
| 5 | | | 112.00 | 95.72 | 60 | 682.00 | 15 | 0.02 | | | | | 102.08 | 102.09 |
| | 29100 | | 112.00 | 95.72 | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 102.08 | 102.09 |
| 6 | | | 108.50 | 95.89 | 60 | 469.00 | 15 | 0.02 | | | | | 102.10 | 102.11 |
| | 28631 | | 108.50 | 95.89 | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 102.10 | 102.11 |
| 7 | | | 108.00 | 95.99 | 60 | 239.00 | 15 | 0.01 | | | | | 102.11 | 102.12 |
| | 28392 | | 108.00 | 95.99 | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 102.11 | 102.12 |
| 8 | | LADERA | 107.36 | 96.19 | 60 | 539.00 | 15 | 0.02 | | | | | 102.13 | 102.14 |
| | 27853 | MH4 | 107.36 | 96.19 | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 102.13 | 102.14 |
| 9 | | | 107.40 | 96.20 | 60 | 1.00 | 15 | #DIV/0! | | | | | #DIV/0! | #DIV/0! |
| | | | 107.40 | 96.20 | | | | | 0.00 | 0.00 | #DIV/0! | 0.01 | #DIV/0! | #DIV/0! |
| 10 | | | | | | | | #DIV/0! | | | | | #DIV/0! | #DIV/0! |
| | | | | | | | | | #DIV/0! | #DIV/0! | 0.00 | #DIV/0! | #DIV/0! | #DIV/0! |
| 11 | | | | | | | | #DIV/0! | | | | | #DIV/0! | #DIV/0! |
| | | | | | | | | | #DIV/0! | #DIV/0! | 0.00 | #DIV/0! | #DIV/0! | #DIV/0! |
| 12 | | | | | | | | #DIV/0! | | | | | #DIV/0! | #DIV/0! |
| | | | | | | | | | #DIV/0! | #DIV/0! | 0.00 | #DIV/0! | #DIV/0! | #DIV/0! |

MARK H. BURAK Software --- DRAINPAK
1512 Sagebrush Tr SE, Alb. NM 87123

PROJECT: Ladera Basin #15, Storm Drain
JOB # : Partial flow (15 cfs) from MH 2 to Sta 323+00
DATE : 25 May, 1995

Tailwater elevation..... 0.00
Manning's Roughness ..... 0.013

| | STATION | | FINISH GRADE | INV. ELEV. | PIPE DIA. (IN) | LENGTH (FT) | Q (CFS) | friction head loss | MINOR LOSSES bend Hb | manhole Hmh | transtn Ht | junction Hj | ELEV. HGL | ELEV. EGL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 32300 | | 104.50 | 94.50 | | | | | | | | | 99.50 | 100.35 |
| 1 | | | 108.00 | 94.65 | 60 | 400.00 | 145 | 1.23 | | | | | 100.73 | 101.58 |
| | 31900 | | 108.00 | 94.65 | | | | | 0.00 | 0.04 | 0.00 | 0.00 | 100.78 | 101.62 |
| 2 | | | 106.00 | 94.94 | 60 | 750.00 | 145 | 2.31 | | | | | 103.09 | 103.93 |
| | 31150 | | 106.00 | 94.94 | | | | | 0.00 | 0.04 | 0.00 | 0.70 | 103.83 | 104.68 |
| 3 | | | 109.00 | 95.17 | 60 | 625.00 | 60 | 0.33 | | | | | 104.86 | 105.01 |
| | 30525 | | 109.00 | 95.17 | | | | | 0.00 | 0.01 | 0.00 | 0.00 | 104.87 | 105.02 |
| 4 | | | 114.00 | 95.46 | 60 | 743.00 | 60 | 0.39 | | | | | 105.26 | 105.41 |
| | 29782 | | 114.00 | 95.46 | | | | | 0.03 | 0.01 | 0.00 | 0.00 | 105.30 | 105.44 |
| 5 | | | 112.00 | 95.72 | 60 | 682.00 | 60 | 0.36 | | | | | 105.66 | 105.80 |
| | 29100 | | 112.00 | 95.72 | | | | | 0.00 | 0.01 | 0.00 | 0.00 | 105.67 | 105.81 |
| 6 | | | 108.50 | 95.89 | 60 | 469.00 | 60 | 0.25 | | | | | 105.91 | 106.06 |
| | 28631 | | 108.50 | 95.89 | | | | | 0.03 | 0.01 | 0.00 | 0.00 | 105.95 | 106.10 |
| 7 | | | 108.00 | 95.99 | 60 | 239.00 | 60 | 0.13 | | | | | 106.08 | 106.23 |
| | 28392 | | 108.00 | 95.99 | | | | | 0.03 | 0.01 | 0.00 | 0.00 | 106.12 | 106.27 |
| 8 | | LADERA | 107.36 | 96.19 | 60 | 539.00 | 60 | 0.28 | | | | | 106.41 | 106.55 |
| | 27853 | MH4 | 107.36 | 96.19 | | | | | 0.00 | 0.01 | 0.00 | 0.06 | 106.48 | 106.62 |
| 9 | | | 111.45 | 96.31 | 60 | 303.00 | 45 | 0.09 | | | | | 106.63 | 106.71 |
| | 27550 | MH3 | 111.45 | 96.31 | | | | | 0.02 | 0.00 | 0.00 | 0.07 | 106.72 | 106.80 |
| 10 | | | 108.11 | 96.59 | 60 | 741.00 | 15 | 0.02 | | | | | 106.82 | 106.83 |
| | 26809 | MH2 | 108.11 | 96.59 | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 106.82 | 106.83 |
| 11 | | | 108.11 | 96.59 | 60 | 1.00 | 15 | #DIV/0! | | | | | #DIV/0! | #DIV/0! |
| | | | 108.11 | 96.59 | | | | | 0.00 | 0.00 | #DIV/0! | 0.01 | #DIV/0! | #DIV/0! |
| 12 | | | | | | | | #DIV/0! | | | | | #DIV/0! | #DIV/0! |
| | | | | | | | | | #DIV/0! | #DIV/0! | 0.00 | #DIV/0! | #DIV/0! | #DIV/0! |

9.

MARK H. BURAK Software --- DRAINPAK
1512 Sagebrush Tr SE, Alb. NM 87123

PROJECT: Ladera Basin #15, Storm Drain
JOB # : Partial flow (73 cfs) from MH 2 to Golf Course
DATE : 25 May, 1995

Tailwater elevation..... 106.20
Manning's Roughness ..... 0.013

| | STATION DESCRIPTION | | FINISH GRADE | INV. ELEV. | PIPE DIA. (IN) | LENGTH (FT) | Q (CFS) | friction head loss | MINOR LOSSES bend Hb | manhole Hmh | transtn Ht | junction Hj | ELEV. HGL | ELEV. EGL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 26348 | | 104.00 | 94.00 | | | | | | | | | 106.20 | 106.41 |
| 1 | | | 108.11 | 94.10 | 60 | 461.00 | 73 | 0.36 | | | | | 106.56 | 106.77 |
| | 26809 | | 108.11 | 94.20 | | | | | 0.04 | 0.01 | 0.00 | 0.00 | 106.61 | 106.83 |
| 2 | | | 108.11 | 94.30 | 60 | 1.00 | 73 | #DIV/0! | | | | | #DIV/0! | #DIV/0! |
| | | | 108.11 | 94.40 | | | | | 0.00 | 0.01 | #DIV/0! | 0.21 | #DIV/0! | #DIV/0! |
| 3 | | | | | | | | #DIV/0! | | | | | #DIV/0! | #DIV/0! |
| 4 | | | | | | | | #DIV/0! | #DIV/0! | #DIV/0! | 0.00 | #DIV/0! | #DIV/0! | #DIV/0! |
| | | | | | | | | | | | | | #DIV/0! | #DIV/0! |
| 5 | | | | | | | | #DIV/0! | #DIV/0! | #DIV/0! | 0.00 | #DIV/0! | #DIV/0! | #DIV/0! |
| | | | | | | | | | | | | | #DIV/0! | #DIV/0! |
| 6 | | | | | | | | #DIV/0! | #DIV/0! | #DIV/0! | 0.00 | #DIV/0! | #DIV/0! | #DIV/0! |
| | | | | | | | | | | | | | #DIV/0! | #DIV/0! |
| 7 | | | | | | | | #DIV/0! | #DIV/0! | #DIV/0! | 0.00 | #DIV/0! | #DIV/0! | #DIV/0! |
| | | | | | | | | | | | | | #DIV/0! | #DIV/0! |
| 8 | | | | | | | | #DIV/0! | #DIV/0! | #DIV/0! | 0.00 | #DIV/0! | #DIV/0! | #DIV/0! |
| | | | | | | | | | | | | | #DIV/0! | #DIV/0! |
| 9 | | | | | | | | #DIV/0! | #DIV/0! | #DIV/0! | 0.00 | #DIV/0! | #DIV/0! | #DIV/0! |
| | | | | | | | | | | | | | #DIV/0! | #DIV/0! |
| 10 | | | | | | | | #DIV/0! | #DIV/0! | #DIV/0! | 0.00 | #DIV/0! | #DIV/0! | #DIV/0! |
| | | | | | | | | | | | | | #DIV/0! | #DIV/0! |
| 11 | | | | | | | | #DIV/0! | #DIV/0! | #DIV/0! | 0.00 | #DIV/0! | #DIV/0! | #DIV/0! |
| | | | | | | | | | | | | | #DIV/0! | #DIV/0! |
| 12 | | | | | | | | #DIV/0! | #DIV/0! | #DIV/0! | 0.00 | #DIV/0! | #DIV/0! | #DIV/0! |

10

# REVIEW MEMORANDUM

**Mark H. Burak, P.E.**
**1512 Sagebrush Trail, SE**
**Albuquerque, NM 87123**
**(505) 296-0461**

May 4, 1995

Mr. Kurt Browning, P.E.
Drainage Engineer
AMAFCA
2600 Prospect Road
Albuquerque, NM 87107

Re: Drainage Review
Baca / Manogue Subdivision Drainage Report
Submitted by Resource Technology, Inc.

This memorandum outlines the comments gathered upon review of the above report.

The project site is located in the Ladera Heights area of the Albuquerque West Mesa.

The purpose of the report was to establish a technical basis for the development of a 13.2 acre subdivision and its impact on surrounding drainage facilities. It is proposed that 110 lots will be constructed on the proposed property (8.3 units/acre) and that a significant quantity of fill material will be imported to raise the elevation above the existing flood zone.

No offsite runoff impacts the proposed project area. All runoff generated on-site will be discharged east onto 64th Street and Milne Road, or south to 65th Street and St Joseph's Avenue. The runoff generated on the subdivision will be split with 75 percent (36 cfs) directed south to St. Joseph Street and 25 percent (12 cfs) directed north to Milne Road and into Ladera Pond 16B. The runoff discharged onto St Joseph's Avenue is to be intercepted by two existing type "Double C" catch basins that are a part of an existing 60 inch diameter storm drainage system. This system is intended primarily as the outfall for the Ladera Basin 15.

The primary concerns of this review include the following:

- Street capacity under proposed conditions for 64th Street, 65th Street, Milne Road, and St. Joseph's Avenue
- Ladera Pond 16B capacity and impact under proposed conditions
- Storm drain HGL at intersection of 65th Street and St. Joseph's Avenue
- Catch basin capacities under proposed conditions.

## Street Capacities:

The rating curves for the street flows as shown in the appendix do not contain enough data points to adequately describe the street sections as they are in the field. This could have a negative affect on the calculated capacities. It is not evident in the report where the cross section information came from.

| | slope | width | 100-yr Q | TOC | ROW |
|---|---|---|---|---|---|
| 64th Street | 0.7% | 34 ft | 114 cfs | 68 cfs | 97 cfs |
| Milne Road | 0.4% | 48 ft | 114 cfs | 55 cfs | 120 cfs |
| 65th Street | 0.4%? | 34 ft | 50 cfs | 37 cfs? | 56 cfs? |
| St. Joseph's | 0.95% | 40 ft | 66 cfs | 35 cfs | 76 cfs |

## Ladera Pond 16B:

No capacity / rating curve information is given concerning the size of the pond; its inlet structures; its outlet structures; existing conditions volume calculations; proposed conditions volume calculation; or water surface elevations before and after development. It was stated in the report that draining runoff to the north is limited due to an existing problem on Milne Road near the Chaparral Elementary School, but this problem is not identified or addressed. The pond itself does not seem to pose any significant capacity limitations, but the roadway capacity may prove to be insufficient. At this point, it is not clear exactly what the limitations of the drainage are in this area. Also, it is not mentioned how deep the runoff would get in the sump where the runoff enters the pond area.

## Storm Drain HGL at 65th and St Joseph's:

The calculation sheet in the appendix states an available head of 3.8 feet based on the elevation differences between the TOC elevation (5308.80) and the spillway inlet elevation (5305.00). This available head assumes that no detrimentally high HGL exists within the system and that the worst case is that the runoff will run backwards to the golf course. This is not the worst case scenario. If the HGL at the manhole (as shown on Figure 3) is excessively high, no surface runoff will be able to enter the catch basins. Therefore the surface water will have nowhere to go but outside the given right-of-way and down St Joseph's Avenue toward Ladera. In this case, the water in the sump area will be able to pond to an unacceptable level. The HGL calculations in Figure 3 from BHI are dated 1984 and are based on many assumptions that could not have been foreseen at the time. Also, Figure 3 does not list the design flow rates associated with the storm drain system and corresponding HGL making it impossible to verify the storm drainage system with the calculated flow rates. The calculations in the appendix should not assume that the HGL will be the same as the flowline elevation.

## Catch Basin Capacities:

The calculations state that the capacity of the double C catch basins is 50 cfs. No calculations, nomographs, clogging factors, or sump conditions were included for backup to the calculations.

## Hydrologic Calculations and Assumptions:

No Tc, Tp information is included for the project area, Basins 101 and 102. Also, no figure outlining the proposed development and street layout was included in the report.

No explanation of the existing or proposed land treatment for each basin was included in the report. Table I shows different treatment percentages for most of the basins, but no figures illustrate the breakdown of the different treatment areas. In areas with unit densities over 8 units per acre, it is likely that the vast majority of treatment will be either C or D with little or no A or B. By underestimating the percentage of D treatment, the resultant peak flow rates and volumes may be significantly underestimated.

## Conclusions & Recommendations:

***Two options exist for draining the project site:***

- Ladera Pond 16
- Ladera 60" storm drain on St Joseph's Avenue

***Three restrictions appear to be evident in utilizing these options:***

- Limited street capacities
- Limited storm drain capacity
- Limited catch basin capacity

***To deal with these limitations, the following information should be requested:***

- Detailed assessment of capacity limitation of Streets (critical cross sections, profiles)
- Detailed assessment of capacity limitation of existing catch basins on St Joseph Avenue
- Detailed assessment of proposed catch basins for St Joseph Avenue (printouts, nomographs, maximum ponding depths)
- Detailed HGL model of existing storm drainage system from outfall to Ladera Basin 15
- Detailed layout showing proposed development of Basins 101 and 102
- Schematic showing a typical lot with proposed land treatments
- Schematic showing the typical existing lot with land treatments assumed
- Schematic showing flow paths and elevations for each basin for estimating Tc
- Rating curve for Ladera Pond 16 justifying volume vs. elevation impact
- Rating curve and figure for Presidio Villa Amenity Pond

MHB 5.5H 45M

# EXHIBIT A-8

Taken From "Ladera Dam #15 Dam Safety Report and Emergency Action Plan"
Bohannan-Huston Inc 1991

St. Joseph's Ave.
2 Double "C" Inlets
Inlet Elev = 8.11

St. Joseph's Ct.
Type Double "D" inlet
Constructed over existing MH
Inlet Elev = 11.45

Principle Spillway Inlet Elev = 5105.00

Existing Grade Profile does not reflect recent road construction

Ladera Rd
Inlet Elev = 7.36 controls
3 Double "C" Inlets

St. Pius X H.S. Connection

EXISTING GRADE

x85

x20

60"

MH #1

MH #2

MH #3

STA 271+53 MH #4

STA 263+46 INLET STRUCTURE

STA 268+09 90° BEND

STA 275+50

STA 283+98 117° BEND

STA 286+31 119° BEND

STA 291+00

STA 297+82 90° BEND

STA 309+25

STA 311+90

STA 319+00

STA 323+00

STA 328+00 15° BEND

STA 328+00 2 6° BEND

STA 331+50 2 6° BEND

STA 335+18 BACK
STA 335+00 FWD

STA 337+00
1° RFND

5120
5110
5100
5090
5080
5070
5060
5050
5040

263+00 268+00 273+00 278+00 283+00 288+00 293+00 298+00 303+00 308+00 313+00 318+00 323+00 328+00 333+00 33

FIGURE 2
LADERA DAM #15 PRINC

BASED ON PMP & PRO

PROPOSED STORM MANHOLE
EXISTING [redacted] MANHOLE
EXISTING WATER PRESSURE ZONE BOUNDARY

EXISTING PAVING FEATURE (INCLUDES CURB, STRIPING, SIDEWALK ETC.)

N TRAIL N.W.

60'

S 77° 36' 48" W 257.79'

518.47'

54"

54" SD (MILLINGS)

INV.98.2

233.82'

S 00° 11' 40" E

EXIST. LOW FLOW CONCRETE RUNDOWN

2 EXISTING OUTLETS TO POND ❶ 97.5±

NEW OUTLET TO POND ❶ 97.5; EXPAND LOW FLOW RUNDOWN TO MEET NEW OUTLET.

36" RCP SD

36" OUTLET TO SAN ANTONIO ARROYO

36"

EXIST. INLET STRUCTURE

48"

12" SAS

40' SAN. SEWER EASEMENT

S 12° 01' 29" E

ATRISCO DRIVE N.W.
100' R.O.W.

ACT B-1
.146 ACRES)

24" SD (PRIVATE)

S 00° 11' 40" E

EXISTING PLAY FIELD

TRACT C-1, LANDS OF A.P.S.
(11.627 ACRES)

"BASIN 16B"
(SOUTH SUMP)

AMAFCA DRAINAGE EASEMENT WITH LICENSE AGREEMENT TO THE CITY OF ALBUQUERQUE

570.26'

570.08'

S 89° 46' 40" E

12" SAS

MILNE ROAD N.W.
60' R.O.W.

845.72'

653.38'

## NOTE:

ALL PUBLIC STORM DRAIN IMPROVEMENTS PROPOSED HEREON SHALL BE CONSTRUCTED BY CITY WORK ORDER AND SHALL BE OWNED, OPERATED AND MAINTAINED BY THE CITY OF ALBUQUERQUE.

# CALCULATIONS

## I. SITE CHARACTERISTICS

A. PRECIPITATION ZONE = 1

B. $P_{6,100} = P_{360} = 2.20$ IN.

C. TOTAL AREA ($A_T$) = 743,360 SF (17.07 AC)

D. EXISTING LAND TREATMENT

| TREATMENT | AREA (SF/AC) | % |
|---|---|---|
| A | 743,360/17.07 | 100 |

E. DEVELOPED LAND TREATMENT

| TREATMENT | AREA (SF/AC) | % |
|---|---|---|
| B | 149,755/3.44 | 20 |
| C | 149,755/3.44 | 20 |
| D | 443,850/10.10 | 60 |

## II. EXISTING CONDITION

A. VOLUME

$$E_W = (E_A A_A + E_B A_B + E_C A_C + E_D A_D)/A_T$$
$$E_W = 0.44 \text{ IN.}$$
$$V_{100} = (E_W/12)A_T$$
$$V_{100} = (0.44/12)(743,360) = 27,260 \text{ CF}$$

B. PEAK DISCHARGE

$$Q_P = Q_{PA}A_A + Q_{PB}A_B + Q_{PC}A_C + Q_{PD}A_D$$
$$Q_P = Q_{100} = (1.29)(17.07) = 22.0 \text{ CFS}$$

## III. DEVELOPED CONDITION

A. VOLUME

$$E_W = (E_A A_A + E_B A_B + E_C A_C + E_D A_D)/A_T$$
$$E_W = [(0.67)(3.44)+(0.99)(3.44)+(1.97)(10.19)]/(17.07) = 1.51 \text{ IN.}$$
$$V_{100} = (E_W/12)A_T$$
$$V_{100} = (1.51/12)(743,360) = 93,540 \text{ CF}$$

B. PEAK DISCHARGE

$$Q_P = Q_{PA}A_A + Q_{PB}A_B + Q_{PC}A_C + Q_{PD}A_D$$
$$Q_P = Q_{100} = (2.03)(3.44)+(2.87)(3.44)+(4.37)(10.19) = 61.4 \text{ CFS}$$

C. SITE BASIN CALCULATIONS

$Q_{TOTAL} = 61.4$ CFS

$A_{TOTAL} = 17.1$ AC

| BASIN | AREA | % | $Q_{100}$ |
|---|---|---|---|
| A | 2.9 AC | 17 | 10.4 |
| B | 2.1 AC | 12 | 7.4 |
| C | 1.5 AC | 09 | 5.5 |
| D | 2.5 AC | 15 | 9.2 |
| E | 1.2 AC | 07 | 4.3 |
| F | 2.4 AC | 14 | 8.6 |
| G | 2.6 AC | 15 | 9.2 |
| H | 1.7 AC | 10 | 6.1 |
| I | 0.2 AC | 01 | 0.7 |
| TOTAL | 17.1 AC | 100 | 61.4 |

D. ANALYSIS POINT SUMMARY

| ANALYSIS POINT | CONTRIBUTING BASINS | CONTRIBUTING AREA | $Q_{100}$ |
|---|---|---|---|
| AP–1 | L–1 | 0.2 AC | 0.4 CFS |
| AP–2 | L–1, F | 2.6 AC | 9.0 CFS |
| AP–3 | L–1, F,G | 5.2 AC | 18.2 CFS |
| AP–4 | D | 2.5 AC | 9.2 CFS |
| AP–5 | D, E | 3.7 AC | 13.5 CFS |
| AP–6 | L–1, D,E,F,G,H | 10.6 AC | 37.8 CFS |
| AP–7 | L–2 | 1.5 AC | 3.7 CFS |
| AP–8 | L–2, B | 3.6 AC | 11.1 CFS |
| AP–9 | L–3 | 0.1 AC | 0.3 CFS |
| AP–10 | L–3, A | 3.0 AC | 10.7 CFS |
| AP–11 | L–2,L–3,A,B,C | 8.1 AC | 27.3 CFS |

TOTAL FLOW TO STORM DRAIN = AP 6 + AP 11 = 37.8 + 27.3 = 65.1 CFS

## IV. OFFSITE FLOWS

A. FUTURE DEVELOPMENT ON TRACT A–1
A = 12.76 AC
ASSUME MULTIFAMILY ATTACHED (70 % D, 15 % C, 15 % B)
$Q_{100} = (2.03)(1.91)+(2.87)(1.91)+(4.37)(8.93) = 48.4$ CFS

B. BASIN L–1

## VI. STREET CAPACITY CALCULATIONS

(USING HAESTAD FLOWMASTER 6.0, MANI

A. AP–2: $Q_{100} = 9.0$ CFS; s = 0.0(
SECTION C–C: 28' F–F W/MOUNTAI
DEPTH = 0.33 FT (CURB HEIGHT)
F = 0.80 (SUBCRITICAL: NO HYDRAI
OKAY TO USE MOUNTABLE CURB AND
USE STANDARD CURB AND GUTTER D(

B. AP–4: $Q_{100} = 9.2$ CFS; s = 0.00(
SECTION C–C: 28' F–F W/MOUNTABL
DEPTH = 0.33 FT (CURB HEIGHT)
F = 0.88 (SUBCRITICAL: NO HYDRAUL
OKAY TO USE MOUNTABLE CURB AND (
USE STANDARD CURB AND GUTTER DOV

C. AP–8: $Q_{100} = 11.1$ CFS; s = 0.010
SECTION A–A: 32' F–F W/MOUNTABLE
DEPTH = 0.32 FT (LESS THAN CURB HI
F = 1.11 (SUPERCRITICAL: SPECIFIC ENI
OKAY TO USE MOUNTABLE CURB AND GI
USE STANDARD CURB AND GUTTER DOWN

D. AP–6: $Q_{100} = 37.8$ CFS; s = 0.0050
SECTION B–B: 28' F–F W/STANDARD CUI
DEPTH = 0.62 FT (LESS THAN CURB HEI
F = 0.92 (SUBCRITICAL: NO HYDRAULIC

E. AP–11: $Q_{100} = 27.3$ CFS; s = 0.0050;
SECTION B–B: 28' F–F W/STANDARD CURI
DEPTH = 0.55 FT (LESS THAN CURB HEIC
F = 0.89 (SUBCRITICAL: NO HYDRAULIC

## VII. SUMP CONDITION

A. INLET CALCULATIONS

METHODOLOGY FROM U.S.D.O.T. FEDERAL HI
MANUAL (HEC–22)

$Q_{100} = 65.1$ CFS

MAXIMUM DEPTH = CURB HEIGHT = 0.90 F
6 INLETS TOTAL (4 SINGLE A, 2 DOUBLE C)
ASSUME GRATES 100 % CLOGGED (WORST C
ALL FLOWS WILL ENTER CURB OPENINGS

$Q_i = 0.67hL(2gd_o)^{0.5}$ (EQ. 4–35)

h = CURB OPENING HEIGHT = 0.5 FT
L = LENGTH OF OPENING = 7 FT (PER INLE
g = 32.2 FT/S$^2$
$d_o$ = EFFECTIVE DEPTH AT CENTER OF OPENI
$Q_i$ = 15.2 CFS PER INLET

15.2 CFS/INLET x 6 INLETS = 91.2 CFS > Q

B. EMERGENCY OVERFLOW CALCULATIONS

BECAUSE INLETS ARE LOCATED AT A SUMP CO
PROVIDED WITHIN 67TH STREET. OVERFLOW SI
USING HAESTAD FLOWMASTER 6.0 ASSUMING A

MAX. HEADWATER ELEVATION = 5115.35 (MAX H
CREST ELEVATION = 5114.50 (FL @ OVERFLOW
TAILWATER = 5114.82 (FL + 1.00' @ SOUTH P
CREST SURFACE: PAVED
CREST LENGTH: 30' (STREET WIDTH @ OVERFLOW
DISCHARGE = 71.3 CFS (> $Q_{100}$)

## VIII. OFFSITE DOWNSTREAM STORM DRAIN CALCULATION

A. 42" RCP @ S = 0.0037
n = 0.013

$Q_{100} = 65.1$ CFS

$Q_{CAP} = 65.8$ CFS > $Q_{100}$

B.. 54" RCP @ S = 0.0033
n = 0.013

$Q_{100} = 65.1 + 48.4 = 113.5$ CFS

$Q_{CAP} = 121.5$ CFS > $Q_{100}$