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

July 31, 2003

Scott Steffen, PE
Bohannan Huston, Inc.
7500 Jefferson NE
Albuquerque, NM 87109

Re: Cielo Oeste Subdivision Certification of the Grading Plan
Engineer's Stamp dated 8-6-02
Certification date 7-23-03 (H9/D15)

Dear Mr. Steffen,

Based upon the information provided in your submittal dated 7-23-03, the above referenced Certification is approved for Release of SIA and Financial Guarantees.

If you have any questions, you can contact me at 924-3986.

Sincerely,

Bradley L. Bingham, PE
Sr. Engineer, Planning Dept.
Development and Building Services

C: Arlene Portillo, CPN #691581
file

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

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DAVID W. COOK, DIRECTOR

JOHN P. KELLY, P.E.
EXECUTIVE ENGINEER

Albuquerque
Metropolitan
Arroyo
Flood
Control
Authority

4600 PROSPECT N.E. - ALBUQUERQUE, NM 87107
TELEPHONE (505) 884-2215 FAX (505) 884-0214

Post-it® Fax Note 7671	Date 8-8	# of pages ▶ 1
To BRAD BINGHAM	From LYNN MAZUR	
Co./Dept. HYDROLOGY	Co. AMAFCA	
Phone #	Phone #	
Fax #	Fax #	

August 8, 2002

Mr. Scott Steffen, P.E.
Bohannan Huston, Inc.
7500 Jefferson St. NE, Courtyard I
Albuquerque, New Mexico 87109

H9/D15

Re: Amended Drainage Study for Cielo Oeste Subdivision, ZAP H-9
Engineer's Stamp Dated August 6, 2002

Dear Mr. Steffen:

AMAFCA approves the amended Drainage Study and Preliminary Plat. On the work order plans, please add the AMAFCA standard notes on the Mirehaven Channel sheets, the storm drain outfall sheets, and appropriate detail sheets and submit to AMAFCA for review. As we discussed, the Turnkey Maintenance Agreement between Westland Development Corp. and AMAFCA and the Encroachment License Agreement among Westland, the City and AMAFCA must be executed before the plans are signed.

If you have any questions, please call me at 884-2215.

Sincerely,
AMAFCA

Lynn M. Mazur

Lynn M. Mazur, P.E.
Development Review Engineer

Cc: Brad Bingham, COA Hydrology

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

September 3, 2002

Scott Steffen, PE
Bohannan Huston, Inc.
7500 Jefferson NE
Albuquerque, NM 87109

Re: Cielo Oeste Subdivision Drainage Report
Engineer's Stamp dated 8-6-02 (H9/D15)

Dear Mr. Steffen,

Based upon the information provided in your submittal dated 8-6-02, the above referenced report is approved for Site Development Plan for Subdivision, Site Developments Plan for Building Permit, Preliminary Plat action by the DRB. This will be the plan that must be certified for release of Financial Guarantees. All previous approved grading and drainage plans are now void.

If you have any questions, you can contact me at 924-3986.

Sincerely,

Bradley L. Bingham, PE
Sr. Engineer, PWD
Development and Building Services

C: file

DRAINAGE AND TRANSPORTATION INFORMATION SHEET
(REV. 1/28/2003rd)

PROJECT TITLE: Cielo Oeste Subdivision ZONE MAP/DRG. FILE # H-9-Z/D15
DRB #: 1001939 EPC#: WORK ORDER#: 6915.81

LEGAL DESCRIPTION: Tracts A-1 and H-1, Tierra Oeste Unit 3
CITY ADDRESS: NW Ladera Drive and Unser Boulevard

ENGINEERING FIRM: Bohannan Huston, Inc. CONTACT: Scott Steffen
ADDRESS: 7500 Jefferson NE – Courtyard I PHONE: (505) 823-1000
CITY, STATE: Albuquerque, NM ZIP CODE: 87109

OWNER: Westland Development Co., Inc. CONTACT: Fred Ambrogi
ADDRESS: 401 Coors Boulevard NW PHONE: 831-9600
CITY, STATE: Albuquerque, NM ZIP CODE: 87121

ARCHITECT: CONTACT:
ADDRESS: PHONE:
CITY, STATE: ZIP CODE:

SURVEYOR: CONTACT:
ADDRESS: PHONE:
CITY, STATE: ZIP CODE:

CONTRACTOR: CONTACT:
ADDRESS: PHONE:
CITY, STATE: ZIP CODE:

CHECK TYPE OF SUBMITTAL:

____ DRAINAGE REPORT
____ DRAINAGE PLAN 1st SUBMITTAL, ***REQUIRES TCL or equal***
____ DRAINAGE PLAN RESUBMITTAL
____ CONCEPTUAL GRADING & DRAINAGE PLAN
____ GRADING PLAN
____ EROSION CONTROL PLAN
_X_ ENGINEER'S CERTIFICATION (HYDROLOGY)
____ CLOMR/LOMR
____ TRAFFIC CIRCULATION LAYOUT (TCL)
____ ENGINEERS CERTIFICATION (TCL)
____ ENGINEERS CERTIFICATION (DRB APPR. SITE PLAN)
____ OTHER

CHECK TYPE OF APPROVAL SOUGHT:

_X_ SIA / FINANCIAL GUARANTEE RELEASE
____ PRELIMINARY PLAT APPROVAL
____ S. DEV. PLAN FOR SUB'D. APPROVAL
____ S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
____ SECTOR PLAN APPROVAL
____ FINAL PLAT APPROVAL
____ FOUNDATION PERMIT APPROVAL
____ BUILDING PERMIT APPROVAL
____ CERTIFICATE OF OCCUPANCY (PERM.)
____ CERTIFICATE OF OCCUPANCY (TEMP.)
____ GRADING PERMIT APPROVAL
____ PAVING PERMIT APPROVAL
____ WORK ORDER APPROVAL
____ OTHER (SPECIFY)

WAS A PRE-DESIGN CONFERENCE ATTENDED:

____ YES
____ NO
____ COPY PROVIDED

RECEIVED
JUL 23 2003
HYDROLOGY SECTION

DATE SUBMITTED: 7/23/03 BY:

Requests for approvals of Site Development Plans and/or Subdivision Plats shall be accompanied by a drainage submittal. The particular nature , location and scope of the proposed development defines the degree of drainage detail. One or more of the following levels of submittal may be required based on the following:

1. Conceptual Grading and Drainage Plan: Required for approval of Site Development Plans greater than five (5) acres and Sector Plans.

2. Drainage Plans: Required for building permits, grading permits, paving permits and site plans less than five (5) acres.

3. Drainage Report: Required for subdivisions containing more than ten (10) lots or constituting five (5) acres or more.

Bohannan ▲ Huston INC.

Courtyard I
7500 Jefferson St. NE
Albuquerque, NM
87109-4335
www.bhinc.com
voice: 505.823.1000
facsimile: 505.798.7988
toll free: 800.877.5332

CLIENT/COURIER TRANSMITTAL

To: Brad Bingham
COA Hydrology Development
Plaza del Sol - 2nd Floor West

Requested by: Scott Steffen

Date: July 23, 2003

Time Due:
- ☐ **This A.M.**
- ☒ **This P.M.**
- ☐ **Rush** _____
- ☐ **By Tomorrow**

Phone: 924-3986

Job No.: 020258

Job Name: Cielo Oeste

DELIVERY VIA

- ☒ **Courier**
- ☐ **Federal Express**
- ☐ **Mail**
- ☐ **UPS**
- ☐ **Other** _____

PICK UP

Item:_____

ITEM NO.	QUANTITY	DESCRIPTION
1	1	Drainage Information Sheet
2	1	Copy of Grading and Drainage Certification

COMMENTS / INSTRUCTIONS

RECEIVED
JUL 23 2003
HYDROLOGY SECTION

REC'D BY:_____ ***DATE:***_____ ***TIME:***_____

ENGINEERING ▲
SPATIAL DATA ▲
ADVANCED TECHNOLOGIES ▲

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

June 24, 2002

Scott Steffen, PE
Bohannan Huston, Inc.
7500 Jefferson NE
Albuquerque, NM 87109

Re: Cielo Oeste Subdivision Drainage Report
Engineer's Stamp dated 6-4-02 (H9/D15)

Dear Mr. Steffen,

Based upon the information provided in your submittal dated 6-3-02, the above referenced report is approved for Site Development Plan for Subdivision, Site Developments Plan for Building Permit, Preliminary Plat action by the DRB.

If you have any questions, you can contact me at 924-3986.

Sincerely,

Bradley L. Bingham

Bradley L. Bingham, PE
Sr. Engineer, PWD
Development and Building Services

C: file

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

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TIM EICHENBERG, SECRETARY-TREASURER
LINDA STOVER, ASST SECRETARY-TREASURER
DANIEL W. COOK, DIRECTOR

JOHN P. KELLY, P.E.
EXECUTIVE ENGINEER

Albuquerque
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2600 PROSPECT N.E. - ALBUQUERQUE, NM 87107
TELEPHONE (505) 884-2215 FAX (505) 884-0214

Post-it® Fax Note 7671	Date 5-22	# of pages ▶ 1
To BRAD BINGHAM	From LYNN MAZUR	
Co./Dept. HYDROLOGY	Co. AMAFCA	
Phone #	Phone #	
Fax #	Fax #	

May 20, 2002

Mr. Scott Steffen, P.E.
Bohannan Huston, Inc.
7500 Jefferson St. NE, Courtyard I
Albuquerque, New Mexico 87109

Re: Drainage Study for Cielo Oeste Subdivision, ZAP II-9
Engineer's Stamp Dated May 9, 2002

Dear Mr. Steffen:

I have reviewed the referenced report and approve the grading plan and Preliminary Plat. There are some grading details that need to be worked out at the Mirehaven Arroyo outlet to Ladera Dam 12 (see attached copy). The maximum slope on the maintenance road is 6h:1v. Also, on the plat, it should be noted somewhere (possibly on General Note 2) that Tract A-1-A will be dedicated to AMAFCA in fee simple.

AMAFCA will sign the final plat and the work order plans. Please be aware that the Turnkey Maintenance Agreement between Westland Development Corp. and AMAFCA must be executed before the plans are signed.

I noted that the comment on the ATYMO input file says March 1992 version and the output specifies the 1994 version. When the LOMR is submitted, use the 1997 version because FEMA does not recognize the earlier versions of ATYMO. If you have any questions, please call me at 884-2215.

Sincerely,
AMAFCA

Lynn M. Mazur

Lynn M. Mazur, P.E.
Development Review Engineer

Cc: Brad Bingham, COA Hydrology

DRAINAGE INFORMATION SHEET
(REV. 11/01/2001)

H-9/D15

PROJECT TITLE: Cielo Oeste Subdivision ZONE MAP/DRG. FILE # H9Z
DRB #: EPC#: WORK ORDER#:

LEGAL DESCRIPTION: Tracts A-1 and H-1, Tierra Oeste Unit 3
CITY ADDRESS:

ENGINEERING FIRM: Bohannan Huston, Inc. CONTACT: Scott Steffen
ADDRESS: 7500 Jefferson NE – Courtyard I PHONE: (505) 823-1000
CITY, STATE: Albuquerque, NM ZIP CODE: 87109

OWNER: Westland Development Corporation, Inc. CONTACT: Fred Ambrogi
ADDRESS: 401 Coors Boulevard, NW PHONE: (505) 831-9600
CITY, STATE: Albuquerque, NM ZIP CODE: 87121

ARCHITECT: CONTACT:
ADDRESS: PHONE:
CITY, STATE: ZIP CODE:

SURVEYOR: CONTACT:
ADDRESS: PHONE:
CITY, STATE: ZIP CODE:

CONTRACTOR: CONTACT:
ADDRESS: PHONE:
CITY, STATE: ZIP CODE:

CHECK TYPE OF SUBMITTAL:
- X DRAINAGE REPORT
- ___ DRAINAGE PLAN
- X CONCEPTUAL GRADING & DRAINAGE PLAN
- X GRADING PLAN
- ___ EROSION CONTROL PLAN
- ___ ENGINEER'S CERTIFICATION (HYDROLOGY)
- ___ CLOMR/LOMR
- ___ TRAFFIC CIRCULATION LAYOUT (TCL)
- ___ ENGINEERS CERTIFICATION (TCL)
- ___ ENGINEERS CERTIFICATION (DRB APPR. SITE PLAN)
- ___ OTHER

CHECK TYPE OF APPROVAL SOUGHT:
- ___ SIA / FINANCIAL GUARANTEE RELEASE
- X PRELIMINARY PLAT APPROVAL
- X S. DEV. PLAN FOR SUB'D. APPROVAL
- X S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- ___ SECTOR PLAN APPROVAL
- ___ FINAL PLAT APPROVAL
- ___ FOUNDATION PERMIT APPROVAL
- ___ BUILDING PERMIT APPROVAL
- ___ CERTIFICATE OF OCCUPANCY (PERM.)
- ___ CERTIFICATE OF OCCUPANCY (TEMP.)
- X GRADING PERMIT APPROVAL
- ___ PAVING PERMIT APPROVAL
- ___ WORK ORDER APPROVAL
- ___ OTHER (SPECIFY)

WAS A PRE-DESIGN CONFERENCE ATTENDED:
- X YES
- ___ NO
- ___ COPY PROVIDED

RECEIVED
MAY 10 2002
HYDROLOGY SECTION

DATE SUBMITTED: 5/10/02 BY:

Requests for approvals of Site Development Plans and/or Subdivision Plats shall be accompanied by a drainage submittal. The particular nature, location and scope of the proposed development defines the degree of drainage detail. One or more of the following levels of submittal may be required based on the following:

1. **Conceptual Grading and Drainage Plan:** Required for approval of Site Development Plans greater than five (5) acres and Sector Plans.
2. **Drainage Plans:** Required for building permits, grading permits, paving permits and site plans less than five (5) acres.
3. **Drainage Report:** Required for subdivisions containing more than ten (10) lots or constituting five (5) acres or more.

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

May 29, 2002

Scott Steffen, PE
Bohannan Huston, Inc.
7500 Jefferson NE
Albuquerque, NM 87109

Re: Cielo Oeste Subdivision Drainage Report
Engineer's Stamp dated 5-9-02 (H9/D15)

Dear Mr. Steffen,

Based upon the information provided in your submittal dated 5-10-02, the above referenced report cannot be approved for Preliminary Plat until the following comments are addressed.

- Please provide spot elevations at the top and bottom of each drop structure in the Mirehaven Arroyo. Also, please provide the calculations that allowed you to design the section provided. This should include a HEC-RAS of the channel transition

- Please provide the grading plan from Tierra Oeste 3 to compare with the lot grades provided on the west side of the channel.

For your information on subsequent submittals, the depth of flow in the street cannot exceed the top of curb (0.33 feet for mountable curb) and the energy grade cannot exceed 0.2 feet above the top of curb.

If you have any questions, you can contact me at 924-3986.

Sincerely,

Bradley L. Bingham, PE
Sr. Engineer, PWD
Development and Building Services

C: file

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

DRAINAGE INFORMATION SHEET

(REV. 11/01/2001)

H-9/D15

PROJECT TITLE: Cielo Oeste Subdivision ZONE MAP/DRG. FILE # H9Z
DRB #: 1001939 EPC#: WORK ORDER#:

LEGAL DESCRIPTION: Tracts A-1 and H-1, Tierra Oeste Unit 3
CITY ADDRESS:

ENGINEERING FIRM: Bohannan Huston, Inc. CONTACT: Scott Steffen
ADDRESS: 7500 Jefferson NE – Courtyard I PHONE: (505) 823-1000
CITY, STATE: Albuquerque, NM ZIP CODE: 87109

OWNER: Westland Development Corporation, Inc. CONTACT: Fred Ambrogi
ADDRESS: 401 Coors Boulevard, NW PHONE: (505) 831-9600
CITY, STATE: Albuquerque, NM ZIP CODE: 87121

ARCHITECT: CONTACT:
ADDRESS: PHONE:
CITY, STATE: ZIP CODE:

SURVEYOR: CONTACT:
ADDRESS: PHONE:
CITY, STATE: ZIP CODE:

CONTRACTOR: CONTACT:
ADDRESS: PHONE:
CITY, STATE: ZIP CODE:

CHECK TYPE OF SUBMITTAL:

- X DRAINAGE REPORT
- ___ DRAINAGE PLAN
- X CONCEPTUAL GRADING & DRAINAGE PLAN
- X GRADING PLAN
- ___ EROSION CONTROL PLAN
- ___ ENGINEER'S CERTIFICATION (HYDROLOGY)
- ___ CLOMR/LOMR
- ___ TRAFFIC CIRCULATION LAYOUT (TCL)
- ___ ENGINEERS CERTIFICATION (TCL)
- ___ ENGINEERS CERTIFICATION (DRB APPR. SITE PLAN)
- ___ OTHER

CHECK TYPE OF APPROVAL SOUGHT:

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- X S. DEV. PLAN FOR SUB'D. APPROVAL
- X S. DEV. PLAN FOR BLDG. PERMIT APPROVAL
- ___ SECTOR PLAN APPROVAL
- ___ FINAL PLAT APPROVAL
- ___ FOUNDATION PERMIT APPROVAL
- ___ BUILDING PERMIT APPROVAL
- ___ CERTIFICATE OF OCCUPANCY (PERM.)
- ___ CERTIFICATE OF OCCUPANCY (TEMP.)
- X GRADING PERMIT APPROVAL
- ___ PAVING PERMIT APPROVAL
- ___ WORK ORDER APPROVAL
- ___ OTHER (SPECIFY)

WAS A PRE-DESIGN CONFERENCE ATTENDED:

- X YES
- ___ NO
- ___ COPY PROVIDED

RECEIVED
AUG 06 2002
PWD/DESIGN REVIEW

DATE SUBMITTED: 8/6/02 BY: Scott Steffen

Requests for approvals of Site Development Plans and/or Subdivision Plats shall be accompanied by a drainage submittal. The particular nature, location and scope of the proposed development defines the degree of drainage detail. One or more of the following levels of submittal may be required based on the following:

1. **Conceptual Grading and Drainage Plan:** Required for approval of Site Development Plans greater than five (5) acres and Sector Plans.
2. **Drainage Plans:** Required for building permits, grading permits, paving permits and site plans less than five (5) acres.
3. **Drainage Report:** Required for subdivisions containing more than ten (10) lots or constituting five (5) acres or more.

Bohannan ^ Huston INC.

Courtyard I
7500 Jefferson St. NE
Albuquerque, NM
87109-4335

www.bhinc.com

voice: 505.823.1000
facsimile: 505.798.7988
toll free: 800.877.5332

August 5, 2002

Mr. Brad Bingham, P.E.
Hydrology Development Section
City of Albuquerque
P.O. Box 1293
Albuquerque, NM 87103

Re: Cielo Oeste Subdivision - DRB Case No. 1001939

Dear Brad:

Enclosed for your review and approval are the amended drainage study and grading plan for the above referenced project. The rear lot lines for Lots 44 through 69 have been moved north by approximately 30 feet. This resulted in a slight change to the horizontal layout for Cielo Oeste Place, the elimination of Lot 1, and the removal of the rear yard ponds for Lots 46 through 51. The language and analysis pertaining to the rear ponds has been removed from the amended drainage study. In addition, a 1.5-foot garden wall has replaced the 3-foot retaining wall along the rear lot line for Lots 44 through 45.

Also shown on the amended grading plan is a retention pond to the north of Lots 6 through 9. The purpose of the pond is to retain the runoff from the area between The Crossings Subdivision to the north, Tierra Oeste Unit 3 and Cielo Oeste to the south, Gunnison Place to the west and the Mirehaven Arroyo to the east. Since there is no emergency outfall for the pond, it is sized to contain two times the 100-year storm. As you may recall, we discussed this concept at our first DRC hearing for the project on July 15, 2002. Analysis and discussion of Basin A6 and the retention pond has been added to the amended drainage study.

If you have any questions or require further information please call me at 823-1000.

Sincerely,
Bohannan Huston, Inc.

Scott J. Steffen, P.E.
Project Manager
Community Development and Planning Group

RECEIVED
AUG 06 2002
PWD/DESIGN REVIEW

Enclosures

cc: Fred Ambrogi, Westland Development Co. Inc.
Lynn Mazur, AMAFCA

P:\020258\cdp\corres\002-prel_plat_site_plan\G&D Amendment.doc

Bohannan ^ Huston INC.

Courtyard I
7500 Jefferson St. NE
Albuquerque, NM
87109-4335

www.bhinc.com

voice: 505.823.1000
facsimile: 505.798.7988
toll free: 800.877.5332

AMENDED DRAINAGE STUDY FOR CIELO OESTE SUBDIVISION

August 5, 2002

PREPARED FOR:

WESTLAND DEVELOPMENT
401 COORS BOULEVARD NW
ALBUQUERQUE, NM 87121

RECEIVED
AUG 0 6 2002
PWD/DESIGN REVIEW

PREPARED BY:

BOHANNAN HUSTON, INC.
COURTYARD I
7500 JEFFERSON STREET NE
ALBUQUERQUE, NM 87109

ENGINEERING ▲
SPATIAL DATA ▲
ADVANCED TECHNOLOGIES ▲

AMENDED DRAINAGE STUDY
FOR
CIELO OESTE SUBDIVISION

AUGUST 5, 2002

Prepared for:

WESTLAND DEVELOPMENT
401 COORS BOULEVARD NW
ALBUQUERQUE, NM 87121

Prepared by:

BOHANNAN HUSTON, INC.
COURTYARD I
7500 JEFFERSON STREET NE
ALBUQUERQUE, NM 87109

Prepared by:

Scott J. Steffen, P.E. 8/6/02
Date

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APPENDICES

APPENDIX A - AHYMO INPUT, OUTPUT FILES

APPENDIX B - STREET FLOW, INLET, AND STORM DRAIN CALCULATIONS

APPENDIX C - MIREHAVEN CHANNEL IMPROVEMENTS, HEC-RAS OUTPUT FILE

APPENDIX D - INFRASTRUCTURE LIST

PLATES

PLATE 1 - PRELIMINARY PLAT

PLATE 2 - GRADING PLAN

PLATE 3 - PROPOSED BASIN MAP

PLATE 4 - TIERRA OESTE UNIT 3 GRADING PLAN

I. INTRODUCTION

This drainage study establishes a drainage management plan for the Cielo Oeste Subdivision (Tracts A-1 and H-1 of Tierra Oeste Unit 3). The subject property is located north of Ladera Drive and west of Unser Boulevard (see vicinity map on the preliminary plat for location, **Plate 1**). Tracts A-1 and H-1 consist of approximately 63 acres of land. Cielo Oeste is planned to consist of 75 single-family, residential dwellings on approximately 10.6 acres. The Mirehaven Arroyo and electric transmission lines encumber that portion of Tract A-1 not included in the proposed development. Ladera Pond 12, the Mirehaven Diversion Channel and electric transmission lines encumber that portion of Tract H-1 not included in the proposed development.

This study provides hydrologic and hydraulic analysis and provides a drainage management plan as necessary to support the planned 75 unit development. More specifically, this report is submitted in conjunction with the preliminary plat application. Preliminary plat approval and grading plan approval is requested. Prior to final plat and building permit approvals of this project, the City of Albuquerque (COA) must approve final grading plans and work order construction plans.

II. METHODOLOGY

Existing and proposed site hydrological conditions were analyzed for the 100-year, 6-hour storm in accordance with the revised Section 22.2, Hydrology, of the Development Process Manual (DPM) for the City of Albuquerque, dated January 1993. Street capacities were analyzed using Manning's equation, consistent with the revised DPM Section 22.2. All data and calculations supporting this study are located in Appendix B. The new rational method hydrologic procedures identified within the revised DPM Section 22.2 are utilized to determine peak flow rates for design of the storm drainage improvements within the projects. The 100-year, 6-hour storm is used as the design event. The results are included in **Appendix A**.

The storm sewer system internal to the subdivision is analyzed using a hydraulic grade line analysis for pressure flow conditions. Inlet capacity computations, along with all hydraulic computations, are included in **Appendix B**.

In addition, off-site hydrologic analysis is based on two approved drainage reports: 1) the *West Interstate 40 Diversion Drainage Management Plan* dated March 2000, prepared by Bohannan Huston, Inc. and 2) the *Drainage Report Update for Las Lomitas Subdivision Unit IIB* dated February 1994, prepared by AVID Engineering, Inc.

The West I-40 DMP addresses drainage issues covering approximately 40 square miles from the Rio Puerco escarpment on the west, Double Eagle II Airport and Vulcan Volcano on the north, Coors Boulevard and the Rio Grande Bluff on the east, and Bluewater Road and I-40 on the south. The report was prepared to support future drainage plans submitted for the development of individual land parcels within the study area, and to provide design guidance for the installation of major drainage infrastructure to be constructed in advance of, or simultaneously with individual parcel development. In addition, it provides fully developed flow rates for basins within the study area.

The Las Lomitas drainage report discusses the developed flow condition in Units IIA and IIB of the Las Lomitas subdivision. Runoff from the subdivision discharges into a detention pond north of the proposed Cielo Oeste subdivision. The outfall for the pond is a 24-inch storm drain that crosses the proposed development and discharges into the Mirehaven Diversion Channel, south of the proposed development. Information from the Las Lomitas report will be used to analyze the impact of the Las Lomitas flows on the Cielo Oeste drainage management plan.

III. EXISTING CONDITIONS

A. Topography

Cielo Oeste is currently undeveloped land, generally sloping from northwest to southeast with grades ranging from approximately 1% to 15%. Soils consist of deep, well-drained loamy fine sands typical of the West Mesa. The hazards for water and wind erosion are moderate to severe, and severe, respectively. Vegetation is light consisting mostly of native grasses. A portion of the property lies within an "AO" flood hazard zone, as designated on Panel 336 of 825 of the National Flood Insurance Program, Flood Insurance Rate Maps published by FEMA for Bernalillo County, New Mexico (September 20, 1996).

The AO floodplain has an average flood depth of 1-foot. See the FEMA Floodplain exhibit provided at the end of the report text.

B. Existing Drainage Patterns

Tracts A-1 and H-1 are located within the Ladera Drainage Basin, which is included in the West Interstate 40 Drainage Management Plan. The majority of the Cielo Oeste Subdivision is located on Tract A-1, with less than one (1) acre located on Tract H-1. The western portion of Tract A-1 is drained by the Mirehaven Arroyo, which discharges into Ladera Pond 12. The eastern portion of Tract A-1 generally drains onto Tract H-1 in a northwest to southeast direction via overland flow, eventually reaching the Mirehaven Diversion Channel. The Las Lomitas Subdivision is north and east of Tract A-1. Runoff from Las Lomitas Units IIA and IIB discharges into a detention pond located on Tract A-1. The pond outlet is a 24-inch storm drain that crosses Tracts A-1 and H-1, discharging to the Mirehaven Diversion Channel. Tract H-1 is lower in elevation than Tract A-1, therefore no offsite flows from Tract H-1 will impact the proposed development.

Mirehaven Arroyo

The Mirehaven Arroyo has three principal branches that are known as Mirehaven Arroyos A, B, and C. The arroyos convey runoff from the upper Ladera basin through the Petroglyph National Monument. These three arroyos converge at the base of the escarpment within the Petroglyph National Monument. Below this point, the Mirehaven Arroyo discharges to Dam 12. The Mirehaven Arroyo is unlined except for a 1,300' long, soil cement scour wall along its northeastern bank constructed to protect the Las Lomitas Subdivision. For additional information regarding existing drainage conditions for the Mirehaven Arroyo, please refer to the *West Interstate 40 Diversion Drainage Management Plan*.

Las Lomitas Subdivision

Runoff from Las Lomitas Subdivision Units IIA and IIB, bounded by Calle de Entrada on the east, the Mirehaven Arroyo on the west, 98th Street on the north and Tract A-1 on the south, discharges to a detention pond on Tract A-1. Developed runoff, 133.6 cfs, is conveyed by the internal street system, collecting in Calle de Entrada. A storm drain system in Calle de

Entrada collects 44 cfs, which discharges to the detention pond. The remaining 90 cfs is conveyed in Calle de Entrada to the detention pond. The existing detention pond volume is approximately 4.4 acre-feet.

IV. LAND TREATMENTS

The minimum lot dimensions are 40' x 102'. The percent impervious was determined from Table A-5 of the DPM, Section 22.2. The percent of land treatment D used in the analysis of the developed condition for Cielo Oeste is 60 percent. The remaining 40 percent is divided evenly between land treatments B and C.

V. PROPOSED CONDITIONS

The Cielo Oeste Subdivision is a proposed single-family, detached-unit residential development with 75 lots on 10.6 acres, producing a density of approximately 7.1 D.U. per acre. All developed runoff generated by the Cielo Oeste Subdivision will be conveyed in the internal streets, eventually being collected by a storm drain system or discharged to Unser Boulevard. Proposed street configurations are shown on the Preliminary Plat (See **Plate 1**). An AHYMO analysis was performed to determine the flows created by the proposed development and to model the detention pond (see **Appendix A**). The storm drain system will convey flows, including flows from Las Lomitas, to the Mirehaven Diversion Channel. A rip rap energy dissipater will be installed at the end of the storm drain prior to discharging into the channel to prevent scour (see **Appendix B**).

A. Onsite Flows

The proposed development is divided into three (3) drainage basins as illustrated on the Proposed Basin Map, **Plate 3**. Basin A1 includes Casa Florida Place and lots fronting the eastern half of Casa Vistosa Place, which is being constructed as part of the Tierra Oeste Unit 3 subdivision (See **Plate 4** for the Tierra Oeste Unit 3 grading plan). The flows, 4.8 cfs, from this basin combine with the flows from Tierra Oeste Unit 3 Basin F. A storm drain inlet at the south end of the Casa Vistosa cul-de-sac collects the flows from Basin A1, and discharges into Ladera Pond 12. The Tierra Oeste Unit 3 storm drain accounts for fully

developed flows from Basin A1, which is referred to as "future on-site basin #1" in the approved Unit 3 drainage report.

Runoff from Basin A4, 25.0 cfs, is conveyed east in Cielo Oeste Place and south in Calle de Entrada to a low point in Calle de Entrada, approximately 40 feet north of the Cielo Oeste/Calle de Entrada intersection. At this point, the runoff is collected by a public storm drain and conveyed south to the Mirehaven Diversion Channel upstream of Unser Boulevard. The peak discharge to the channel is approximately 59 cfs. See **Appendix B** for the storm drain hydraulic grade line analysis. An emergency overflow is provided in Cielo Oeste Place as a backup to the storm drain system. The eastern boundary of Basin A4 is defined by a high point in Cielo Oeste Place. This high point is 0.50 feet above the low point in Calle de Entrada. The overflow allows runoff to flow east in Cielo Oeste Place, discharging through a 20-foot wide emergency access roadway to Unser Boulevard. The street hydraulics were analyzed to show that the 100-year storm passes the emergency overflow and that the water surface is lower than the proposed pad elevations adjacent to the low point. The analysis is provided in **Appendix B**.

Runoff from Basin A5, 7.3 cfs, is conveyed east in Cielo Oeste Place, discharging through a 20-foot wide emergency access roadway to Unser Boulevard. In Unser Boulevard, the runoff flows south and is collected by storm drain inlets and discharges to the Mirehaven Diversion Channel. Calculations are provided in **Appendix B**.

B. Offsite Flows

Existing offsite flows from the Mirehaven Arroyo and the Las Lomitas Subdivision impact the proposed Cielo Oeste Subdivision. In addition, the existing drainage pattern of Basins A2 and A3 (portion of Tract A-1 encumbered by the electric transmission lines) impact the proposed development. A drainage swale will be graded in Basins A2 and A3 along the northern boundary of the Cielo Oeste Subdivision. The swales will intercept the flows from Basin A2, 5.2 cfs, and Basin A3, 3.8 cfs, and convey the flows to Calle de Entrada and Unser Boulevard, respectively.

Basin A6 includes runoff from Tract E-2 of Tierra Oeste Unit 3 (bounded by The Crossings Subdivision to the north, Tierra Oeste Unit 3 to the south, and Gunnison Place NW to the west) and that portion of Tract A-1 north of the proposed subdivision and west of the Mirehaven Arroyo (portion of future Tract A-1-B). This area is encumbered by a 200-foot electric transmission line easement. Runoff from Basin A6 is 4.4 cfs, with a storm runoff volume of 0.12 acre-feet. The Basin A6 runoff will be collected in a permanent retention pond. Since there is no emergency outfall provided for the pond, the storage volume is equal to two (2) times the 100-year storm volume. An additional one foot of freeboard is provided between the top of pond elevation and the lowest building pad elevation. Calculations for Basin A6 are included in the AHYMO analysis in **Appendix A**.

Mirehaven Arroyo

As part of The Crossing Subdivision bulk plat (July 1996), Westland Development Corporation financially guaranteed improvements to the Mirehaven Arroyo from Ladera Pond 12 to the planned intersection with future 98th Street. The improvements are to be phased as development occurs along the arroyo. Section III-A describes the FEMA flood hazard zone that encumbers a portion of the site along the Mirehaven Arroyo (see FEMA Floodplain exhibit). The floodplain encumbers most of Basin A1 and the western edge of Basin A4. As part of the guaranteed improvements, the channel is being improved from Pond 12 to the Las Lomitas Subdivision. The proposed improvements include a soft bottom channel with buried riprap bank protection, concrete drop structures and an AMAFCA maintenance road. The east bank scour protection will tie to the existing soil cement scour wall adjacent to the Las Lomitas Subdivision. The channel is designed to contain the fully developed 100-year storm of 1,655 cfs, with three (3) feet of freeboard. Exhibits showing the proposed channel plan and profile, and the HEC-RAS output files are included in **Appendix C**.

Las Lomitas Subdivision

The Cielo Oeste Subdivision must accommodate the developed runoff from the Las Lomitas Subdivision. The existing detention pond on Tract A-1 will continue to be utilized as part of the drainage management plan for the Cielo Oeste Subdivision. However, the eastern portion of the pond will have to be filled in order to allow the extension of Calle de Entrada to the south into the subdivision. Currently, the 90 cfs carried by Calle de Entrada at the south

end of the Las Lomitas Subdivision free discharges into the pond at the end of the road. The extension of the road eliminates the outfall for this flow. Therefore, a cattle guard inlet will be constructed in Calle de Entrada upstream of the proposed development to intercept the flows and divert it into the detention pond. A 36-inch RCP storm drain will connect the cattle guard inlet with the pond, matching the existing invert. The pond capacity will be reduced from 4.4 acre-feet to 2.5 acre-feet due to the construction of Calle de Entrada. The new east sideslope of the pond will be protected with soil cement as is currently in place. Also, the emergency spillway of the existing pond will be eliminated with the construction of Calle de Entrada. A new spillway will be constructed on the east side of the pond, discharging into Calle de Entrada.

An AHYMO analysis is provided for Units IIA and IIB in order to analyze the impact of the reduced pond volume on the Cielo Oeste storm drain system. Las Lomitas is analyzed using a single basin of the same total area, 38 acres, land treatment percentages, and time to peak parameters as were used in the Las Lomitas report. This analysis shows a slightly lower flow rate, 128.9 cfs versus 133.6 cfs, but matched the total storm volume of 4.43 acre-feet. The reduced pond storage volume resulted in an increase in the peak discharge rate from 34.5 cfs to 43.2 cfs. The proposed storm drain facilities in Calle de Entrada are sized to accommodate these flows.

C. FEMA Floodplain

Section III-A describes the FEMA flood hazard zone that encumbers a portion of the site along the Mirehaven Arroyo (see FEMA Floodplain exhibit). The proposed channel improvements for the Mirehaven Arroyo will allow for the removal of that portion of the floodplain that encumbers the proposed Cielo Oeste Subdivision. Once the channel improvements have been as-built, a Letter of Map Revision (LOMR) request will be made to FEMA.

VI. CONCLUSION

This report provides a detailed study of the developed runoff and street capacities for the proposed Cielo Oeste Subdivision. Included is the preliminary plat, proposed conditions basin map, grading plan, infrastructure list, and all necessary hydrologic and hydraulic analyses. This drainage plan maintains the overall drainage pattern of the area as proposed in the *West Interstate 40 Diversion Drainage Management Plan*, and allows for safe management of storm runoff in the developed condition.

Appendix

APPENDICES

APPENDIX A - AHYMO INPUT, OUTPUT FILES

APPENDIX B - STREET FLOW, INLET, AND STORM DRAIN CALCULATIONS

APPENDIX C - MIREHAVEN CHANNEL IMPROVEMENTS AND HEC-RAS OUTPUT FILES

APPENDIX D - INFRASTRUCTURE LIST

APPENDIX A

AHYMO INPUT, OUTPUT FILES

```
*
*S CIELO OESTE SITE FLOW
* 7-30-02
START                RAINFALL BEGINS AT 0.00 HOURS
*                      100 YEAR RETURN PERIOD
*************************************************************************
*
*      ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
*      ::                         MISC. DATA                         ::
*      ::        RAINFALL RETURN PERIOD_______________  100-YEAR      ::
*      ::        RAINFALL DURATION___________________   6-HOUR        ::
*      ::        ZONE 1                                               ::
*      ::        RAINFALL DEPTHS: 1 HOUR (P60)___  1.88 INCHES        ::
*      ::        (UNADJUSTED)     6 HOUR (P360)__  2.21 INCHES        ::
*      ::                        24 HOUR (P1440)_  2.67 INCHES        ::
*      ::                                                             ::
*      ::        RAINFALL DATA TAKEN FROM NOAA.                       ::
*      ::                                                             ::
*      ::                HYDROGRAPH METHODOLOGY                       ::
*      ::                                                             ::
*      ::        CITY OF ALBQ. DPM VOL. 2, SECTION 22.2 July, 1997    ::
*      ::        INITIAL ABSTRACTION - INFILTRATION METHOD            ::
*      ::        Tc CALCULATIONS PER C.O.A. DPM 22.2-B.4              ::
*      ::        AMAFCA AHYMO VERSION MARCH 20,1992                   ::
*      ::                                                             ::
*      ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
*                              BEGIN  ANALYSIS
*************************************************************************
*
RAINFALL             TYPE=1 RAIN QUARTER=0.0 RAIN ONE=1.88
                     RAIN SIX=2.21 RAIN DAY=2.67 DT=0.05
**************************************
*S****LAS LOMITAS
**************************************
**** COMPUTE AND PRINT NM HYD DATA FOR BASIN 1  *********
COMPUTE NM HYD       ID=1 HYD=LOMITAS  AREA=0.0594 PER A=0.0 PER B=25
                     PER C=25 PER D=50  TP=.133  RAINFALL=-1
PRINT HYD               ID=1   CODE=1
*
*DETERMINATION OF POND:
*S******ROUTE THROUGH DETENTION POND
ROUTE RESERVOIR     ID=12 HYD=POND INFLOW ID=1 CODE=1
                    OUTFLOW (CFS) STORAGE (AC FT) ELEV (FT)
                0        0        5.4
                0.065387         0.007631398     5.5
                0.503078         0.087002071     6.0
                1.815874         0.266318405     7.0
                3.551171         0.474322644     8.0
                16.44577         0.710766854     9.0
                25.13302         0.97624332      10.0
                31.91211         1.272050247     11.0
                37.34883         1.599829041     12.0
                41.90150         1.960770011     13.0
                45.92095         2.3557788       14.0
*
PRINT HYD           ID=12      CODE=20
*
**************************************
*S****OFF-SITE FLOWS TO CALLE ENTRADA
**************************************
**** COMPUTE AND PRINT NM HYD DATA FOR BASIN A2  *********
COMPUTE NM HYD       ID=2 HYD=2  AREA=0.0059 PER A=90 PER B=10
                     PER C=0.0 PER D=0.0  TP=.133  RAINFALL=-1
PRINT HYD               ID=2   CODE=1
*
**************************************
*S****OFF-SITE FLOWS TO UNSER
**************************************
**** COMPUTE AND PRINT NM HYD DATA FOR BASIN A3  *********
COMPUTE NM HYD       ID=3 HYD=3  AREA=0.0043 PER A=90 PER B=10
                     PER C=0.0 PER D=0.0  TP=.133  RAINFALL=-1
PRINT HYD               ID=3   CODE=1
**************************************
*S****ON-SITE FLOWS
**************************************
**** COMPUTE AND PRINT NM HYD DATA FOR BASIN A4  *********
COMPUTE NM HYD       ID=4 HYD=4  AREA=0.0109 PER A=0.0 PER B=20
                     PER C=20 PER D=60  TP=.133  RAINFALL=-1
PRINT HYD               ID=4   CODE=1
```


A-1

```
*
**** COMPUTE AND PRINT NM HYD DATA FOR BASIN A5  *********
COMPUTE NM HYD       ID=5 HYD=5  AREA=0.0032 PER A=0.0 PER B=20
                     PER C=20 PER D=60  TP=.133  RAINFALL=-1
PRINT HYD               ID=5   CODE=1
*
**** COMPUTE AND PRINT NM HYD DATA FOR BASIN A1  *********
COMPUTE NM HYD       ID=6 HYD=6  AREA=0.0021 PER A=0.0 PER B=20
                     PER C=20 PER D=60  TP=.133  RAINFALL=-1
PRINT HYD               ID=6   CODE=1
*
**** COMPUTE AND PRINT NM HYD DATA FOR BASIN A6  *********
COMPUTE NM HYD       ID=7 HYD=7  AREA=0.0050 PER A=90 PER B=10
                     PER C=0.0 PER D=0.0  TP=.133  RAINFALL=-1
PRINT HYD               ID=7   CODE=1
FINISH
```

AHYMO PROGRAM SUMMARY TABLE (AHYMO_97) - - VERSION: 1997.02c RUN DATE (MON/DAY/YR) =07/30/2002
INPUT FILE = m:\ahymo\020258in.txt USER NO.= AHYMO-S-9702c1BohanHu-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
*S CIELO OESTE UNIT 4 SITE FLOW										
START										TIME= .00
RAINFALL TYPE= 1										RAIN6= 2.210
*S****LAS LOMITAS										
COMPUTE NM HYD	LOMITAS	-	1	.05940	128.88	4.437	1.40062	1.500	3.390	PER IMP= 50.00
*S******ROUTE THROUGH DETENTION POND										
ROUTE RESERVOIR	POND	1	12	.05940	43.22	4.437	1.40061	1.800	1.137	AC-FT= 2.090
*S****OFF-SITE FLOWS TO CALLE ENTRADA										
COMPUTE NM HYD	2.00	-	2	.00590	5.17	.146	.46393	1.500	1.368	PER IMP= .00
*S****OFF-SITE FLOWS TO UNSER										
COMPUTE NM HYD	3.00	-	3	.00430	3.77	.106	.46393	1.500	1.369	PER IMP= .00
*S****ON-SITE FLOWS										
COMPUTE NM HYD	4.00	-	4	.01090	24.96	.881	1.51602	1.500	3.578	PER IMP= 60.00
COMPUTE NM HYD	5.00	-	5	.00320	7.34	.259	1.51602	1.500	3.583	PER IMP= 60.00
COMPUTE NM HYD	6.00	-	6	.00210	4.82	.170	1.51602	1.500	3.587	PER IMP= 60.00
COMPUTE NM HYD	7.00	-	7	.00500	4.38	.124	.46393	1.500	1.369	PER IMP= .00
FINISH										

A-3

```
    AHYMO PROGRAM (AHYMO_97) -                          - Version:  1997.02c
         RUN DATE (MON/DAY/YR) = 07/30/2002
         START TIME (HR:MIN:SEC) = 17:33:58     USER NO.= AHYMO-S-9702c1BohanHu-AH
         INPUT FILE = m:\ahymo\020258in.txt


*
*S CIELO OESTE FLOW
* 7-30-02
START                RAINFALL BEGINS AT 0.00 HOURS
*                      100 YEAR RETURN PERIOD
*************************************************************************
*
*      ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
*      ::                         MISC. DATA                         ::
*      ::        RAINFALL RETURN PERIOD_______________  100-YEAR      ::
*      ::        RAINFALL DURATION____________________  6-HOUR           ::
*      ::            ZONE 1                                                  ::

*      ::        RAINFALL DEPTHS: 1 HOUR (P60)___  1.88 INCHES       ::
*      ::        (UNADJUSTED)     6 HOUR (P360)__  2.21 INCHES       ::
*      ::                        24 HOUR (P1440)_  2.67 INCHES       ::
*      ::                                                            ::
*      ::        RAINFALL DATA TAKEN FROM NOAA.                      ::
*      ::                                                            ::
*      ::                HYDROGRAPH METHODOLOGY                      ::
*      ::                                                            ::
*      ::        CITY OF ALBQ. DPM VOL. 2, SECTION 22.2 July, 1997   ::
*      ::        INITIAL ABSTRACTION - INFILTRATION METHOD           ::
*      ::        Tc CALCULATIONS PER C.O.A. DPM 22.2-B.4             ::
*      ::        AMAFCA AHYMO VERSION MARCH 20,1992                  ::
*      ::                                                            ::
*      ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
*                           BEGIN  ANALYSIS
*************************************************************************
*
RAINFALL             TYPE=1 RAIN QUARTER=0.0 RAIN ONE=1.88
                     RAIN SIX=2.21 RAIN DAY=2.67 DT=0.05

                 COMPUTED 6-HOUR RAINFALL DISTRIBUTION BASED ON NOAA ATLAS 2 - PEAK AT 1.40 HR.
                 DT =     .050000 HOURS        END TIME =     6.000000 HOURS
                    .0000   .0024   .0050   .0076   .0103   .0130   .0159
                    .0189   .0221   .0253   .0287   .0323   .0360   .0399
                    .0441   .0485   .0531   .0581   .0634   .0692   .0754
                    .0833   .0921   .1175   .1774   .2805   .4400   .6696
                    .9835  1.2311  1.3429  1.4364  1.5182  1.5913  1.6576
                   1.7180  1.7735  1.8245  1.8716  1.9152  1.9554  1.9644
                   1.9728  1.9805  1.9877  1.9945  2.0010  2.0071  2.0129
                   2.0185  2.0238  2.0289  2.0338  2.0386  2.0432  2.0476
                   2.0519  2.0561  2.0601  2.0641  2.0679  2.0716  2.0753
                   2.0788  2.0823  2.0857  2.0890  2.0922  2.0954  2.0985
                   2.1016  2.1046  2.1075  2.1104  2.1132  2.1160  2.1188
                   2.1215  2.1241  2.1267  2.1293  2.1318  2.1343  2.1368
                   2.1392  2.1416  2.1440  2.1463  2.1486  2.1509  2.1531
                   2.1553  2.1575  2.1596  2.1618  2.1639  2.1660  2.1680
                   2.1701  2.1721  2.1741  2.1760  2.1780  2.1799  2.1818
                   2.1837  2.1856  2.1874  2.1893  2.1911  2.1929  2.1947
                   2.1964  2.1982  2.1999  2.2016  2.2033  2.2050  2.2067
                   2.2084  2.2100

*************************************
*S****LAS LOMITAS
*************************************
**** COMPUTE AND PRINT NM HYD DATA FOR BASIN 1  *********
COMPUTE NM HYD       ID=1 HYD=LOMITAS  AREA=0.0594 PER A=0.0 PER B=25
                                  PER C=25 PER D=50  TP=.133  RAINFALL=-1

     K =    .072485HR    TP =    .133000HR    K/TP RATIO =    .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   117.52    CFS   UNIT VOLUME =     .9990        B =   526.28      P60 = 1.8800
     AREA =       .029700 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000


     K =    .118131HR    TP =    .133000HR    K/TP RATIO =    .888205     SHAPE CONSTANT, N =  3.993616
     UNIT PEAK =   79.217    CFS   UNIT VOLUME =     1.001        B =   354.74      P60 = 1.8800
     AREA =       .029700 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000
```


A-4

PRINT HYD ID=1 CODE=1

HYDROGRAPH FROM AREA LOMITAS

RUNOFF VOLUME = 1.40062 INCHES = 4.4371 ACRE-FEET
PEAK DISCHARGE RATE = 128.88 CFS AT 1.500 HOURS BASIN AREA = .0594 SQ. MI.

*
*DETERMINATION OF POND:
*S******ROUTE THROUGH DETENTION POND
ROUTE RESERVOIR ID=12 HYD=POND INFLOW ID=1 CODE=1

OUTFLOW (CFS)	STORAGE (AC FT)	ELEV (FT)
0	0	5.4
0.065387	0.007631398	5.5
0.503078	0.087002071	6.0
1.815874	0.266318405	7.0
3.551171	0.474322644	8.0
16.44577	0.710766854	9.0
25.13302	0.97624332	10.0
31.91211	1.272050247	11.0
37.34883	1.599829041	12.0
41.90150	1.960770011	13.0
45.92095	2.3557788	14.0

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

TIME (HRS)	INFLOW (CFS)	ELEV (FEET)	VOLUME (AC-FT)	OUTFLOW (CFS)
.00	.00	5.40	.000	.00
.05	.00	5.40	.000	.00
.10	.00	5.40	.000	.00
.15	.00	5.40	.000	.00
.20	.00	5.40	.000	.00
.25	.00	5.40	.000	.00
.30	.00	5.40	.000	.00
.35	.00	5.40	.000	.00
.40	.00	5.40	.000	.00
.45	.00	5.40	.000	.00
.50	.00	5.40	.000	.00
.55	.00	5.40	.000	.00
.60	.00	5.40	.000	.00
.65	.00	5.40	.000	.00
.70	.00	5.40	.000	.00
.75	.00	5.40	.000	.00
.80	.00	5.40	.000	.00
.85	.00	5.40	.000	.00
.90	.00	5.40	.000	.00
.95	.00	5.40	.000	.00
1.00	.00	5.40	.000	.00
1.05	.00	5.40	.000	.00
1.10	.00	5.40	.000	.00
1.15	.22	5.41	.000	.00
1.20	2.30	5.47	.006	.05
1.25	8.61	5.63	.028	.18
1.30	19.46	5.98	.084	.49
1.35	39.15	6.64	.202	1.34
1.40	72.66	7.75	.423	3.13
1.45	111.26	9.18	.760	18.04
1.50	128.88	10.61	1.158	29.30
1.55	114.69	11.77	1.526	36.12
1.60	90.07	12.53	1.792	39.78
1.65	70.65	12.99	1.956	41.84
1.70	57.30	13.21	2.045	42.76
1.75	47.94	13.31	2.085	43.17
1.80	41.01	13.33	2.090	43.22
1.85	35.61	13.28	2.070	43.02
1.90	31.28	13.18	2.032	42.62
1.95	27.73	13.05	1.979	42.08
2.00	24.82	12.87	1.915	41.32
2.05	22.00	12.67	1.843	40.41
2.10	17.28	12.44	1.759	39.36
2.15	12.51	12.17	1.661	38.11
2.20	9.45	11.85	1.552	36.55
2.25	7.60	11.51	1.440	34.69
2.30	6.39	11.17	1.329	32.86

2.35	5.49	10.83	1.222	30.77
2.40	4.75	10.49	1.121	28.45
2.45	4.12	10.17	1.026	26.28
2.50	3.60	9.86	.938	23.90
2.55	3.16	9.56	.859	21.30
2.60	2.78	9.29	.788	18.98
2.65	2.46	9.05	.725	16.90
2.70	2.20	8.83	.670	14.23
2.75	1.97	8.64	.625	11.77

TIME (HRS)	INFLOW (CFS)	ELEV (FEET)	VOLUME (AC-FT)	OUTFLOW (CFS)
2.80	1.77	8.48	.588	9.76
2.85	1.59	8.35	.558	8.13
2.90	1.45	8.25	.534	6.79
2.95	1.31	8.17	.514	5.69
3.00	1.20	8.10	.497	4.79
3.05	1.11	8.04	.484	4.06
3.10	1.02	7.99	.472	3.53
3.15	.95	7.94	.462	3.45
3.20	.89	7.89	.452	3.36
3.25	.84	7.84	.442	3.28
3.30	.79	7.79	.432	3.19
3.35	.75	7.75	.422	3.11
3.40	.71	7.70	.412	3.03
3.45	.68	7.65	.403	2.95
3.50	.66	7.61	.393	2.87
3.55	.64	7.57	.384	2.80
3.60	.62	7.52	.375	2.73
3.65	.59	7.48	.367	2.65
3.70	.58	7.44	.358	2.58
3.75	.56	7.40	.350	2.52
3.80	.55	7.36	.342	2.45
3.85	.55	7.33	.334	2.38
3.90	.54	7.29	.327	2.32
3.95	.52	7.26	.320	2.26
4.00	.51	7.22	.313	2.20
4.05	.51	7.19	.306	2.14
4.10	.50	7.16	.299	2.09
4.15	.50	7.13	.293	2.04
4.20	.50	7.10	.286	1.98
4.25	.49	7.07	.280	1.93
4.30	.49	7.04	.274	1.88
4.35	.49	7.01	.269	1.84
4.40	.49	6.98	.263	1.79
4.45	.49	6.95	.258	1.75
4.50	.49	6.92	.253	1.72
4.55	.49	6.90	.248	1.68
4.60	.48	6.87	.243	1.64
4.65	.49	6.84	.238	1.61
4.70	.49	6.82	.234	1.58
4.75	.49	6.79	.229	1.54
4.80	.50	6.77	.225	1.51
4.85	.50	6.75	.221	1.48
4.90	.50	6.72	.217	1.45
4.95	.51	6.70	.213	1.43
5.00	.51	6.68	.209	1.40
5.05	.51	6.66	.206	1.37
5.10	.51	6.64	.202	1.35
5.15	.52	6.62	.199	1.32
5.20	.52	6.61	.196	1.30
5.25	.53	6.59	.192	1.27
5.30	.53	6.57	.189	1.25
5.35	.54	6.55	.186	1.23
5.40	.54	6.54	.184	1.21
5.45	.55	6.52	.181	1.19
5.50	.56	6.51	.178	1.17
5.55	.56	6.50	.176	1.15

TIME (HRS)	INFLOW (CFS)	ELEV (FEET)	VOLUME (AC-FT)	OUTFLOW (CFS)
5.60	.57	6.48	.174	1.14
5.65	.57	6.47	.171	1.12
5.70	.58	6.46	.169	1.10
5.75	.59	6.45	.167	1.09
5.80	.59	6.43	.165	1.07
5.85	.60	6.42	.163	1.06

5.90	.61	6.41	.161	1.04
5.95	.62	6.40	.159	1.03
6.00	.63	6.39	.158	1.02
6.05	.60	6.38	.156	1.01
6.10	.45	6.37	.154	.99
6.15	.26	6.36	.151	.97
6.20	.16	6.34	.148	.95
6.25	.10	6.32	.145	.93
6.30	.08	6.30	.142	.90
6.35	.06	6.29	.138	.88
6.40	.05	6.27	.135	.85
6.45	.04	6.25	.131	.83
6.50	.03	6.23	.128	.81
6.55	.02	6.21	.125	.78
6.60	.02	6.20	.122	.76
6.65	.02	6.18	.119	.74
6.70	.01	6.16	.116	.72
6.75	.01	6.15	.113	.69
6.80	.01	6.13	.110	.67
6.85	.01	6.12	.108	.65
6.90	.00	6.10	.105	.63
6.95	.00	6.09	.102	.62
7.00	.00	6.07	.100	.60
7.05	.00	6.06	.098	.58
7.10	.00	6.05	.095	.56
7.15	.00	6.03	.093	.55
7.20	.00	6.02	.091	.53
7.25	.00	6.01	.089	.51
7.30	.00	6.00	.086	.50
7.35	.00	5.98	.084	.49
7.40	.00	5.97	.082	.48
7.45	.00	5.96	.080	.47
7.50	.00	5.95	.079	.46
7.55	.00	5.93	.077	.45
7.60	.00	5.92	.075	.44
7.65	.00	5.91	.073	.43
7.70	.00	5.90	.071	.42
7.75	.00	5.89	.070	.41
7.80	.00	5.88	.068	.40
7.85	.00	5.87	.066	.39
7.90	.00	5.86	.065	.38
7.95	.00	5.85	.063	.37
8.00	.00	5.84	.062	.36
8.05	.00	5.83	.060	.36
8.10	.00	5.82	.059	.35
8.15	.00	5.81	.057	.34
8.20	.00	5.80	.056	.33
8.25	.00	5.80	.055	.32
8.30	.00	5.79	.053	.32
8.35	.00	5.78	.052	.31

TIME (HRS)	INFLOW (CFS)	ELEV (FEET)	VOLUME (AC-FT)	OUTFLOW (CFS)
8.40	.00	5.77	.051	.30
8.45	.00	5.76	.049	.30
8.50	.00	5.76	.048	.29
8.55	.00	5.75	.047	.28
8.60	.00	5.74	.046	.28
8.65	.00	5.73	.045	.27
8.70	.00	5.73	.044	.26
8.75	.00	5.72	.043	.26
8.80	.00	5.71	.042	.25
8.85	.00	5.71	.040	.25
8.90	.00	5.70	.039	.24
8.95	.00	5.69	.039	.24
9.00	.00	5.69	.038	.23
9.05	.00	5.68	.037	.23
9.10	.00	5.68	.036	.22
9.15	.00	5.67	.035	.22
9.20	.00	5.67	.034	.21
9.25	.00	5.66	.033	.21
9.30	.00	5.65	.032	.20
9.35	.00	5.65	.031	.20
9.40	.00	5.64	.031	.19
9.45	.00	5.64	.030	.19
9.50	.00	5.63	.029	.18
9.55	.00	5.63	.028	.18
9.60	.00	5.63	.028	.18

9.65	.00	5.62	.027	.17
9.70	.00	5.62	.026	.17
9.75	.00	5.61	.025	.16
9.80	.00	5.61	.025	.16
9.85	.00	5.60	.024	.16
9.90	.00	5.60	.023	.15
9.95	.00	5.60	.023	.15
10.00	.00	5.59	.022	.15
10.05	.00	5.59	.022	.14
10.10	.00	5.58	.021	.14
10.15	.00	5.58	.021	.14
10.20	.00	5.58	.020	.13
10.25	.00	5.57	.019	.13
10.30	.00	5.57	.019	.13
10.35	.00	5.57	.018	.12
10.40	.00	5.56	.018	.12
10.45	.00	5.56	.017	.12
10.50	.00	5.56	.017	.12
10.55	.00	5.56	.016	.11
10.60	.00	5.55	.016	.11
10.65	.00	5.55	.015	.11
10.70	.00	5.55	.015	.11
10.75	.00	5.54	.015	.10
10.80	.00	5.54	.014	.10
10.85	.00	5.54	.014	.10
10.90	.00	5.54	.013	.10
10.95	.00	5.53	.013	.09
11.00	.00	5.53	.013	.09
11.05	.00	5.53	.012	.09
11.10	.00	5.53	.012	.09
11.15	.00	5.52	.011	.09

TIME (HRS)	INFLOW (CFS)	ELEV (FEET)	VOLUME (AC-FT)	OUTFLOW (CFS)
11.20	.00	5.52	.011	.08
11.25	.00	5.52	.011	.08
11.30	.00	5.52	.010	.08
11.35	.00	5.52	.010	.08
11.40	.00	5.51	.010	.08
11.45	.00	5.51	.009	.08
11.50	.00	5.51	.009	.07
11.55	.00	5.51	.009	.07
11.60	.00	5.51	.009	.07
11.65	.00	5.50	.008	.07
11.70	.00	5.50	.008	.07
11.75	.00	5.50	.008	.07
11.80	.00	5.50	.007	.06
11.85	.00	5.49	.007	.06
11.90	.00	5.49	.007	.06
11.95	.00	5.49	.007	.06
12.00	.00	5.48	.006	.06
12.05	.00	5.48	.006	.05
12.10	.00	5.48	.006	.05
12.15	.00	5.48	.006	.05
12.20	.00	5.47	.006	.05
12.25	.00	5.47	.005	.05
12.30	.00	5.47	.005	.04
12.35	.00	5.47	.005	.04
12.40	.00	5.46	.005	.04
12.45	.00	5.46	.005	.04
12.50	.00	5.46	.005	.04
12.55	.00	5.46	.004	.04
12.60	.00	5.46	.004	.04
12.65	.00	5.45	.004	.03
12.70	.00	5.45	.004	.03
12.75	.00	5.45	.004	.03
12.80	.00	5.45	.004	.03
12.85	.00	5.45	.004	.03
12.90	.00	5.44	.003	.03
12.95	.00	5.44	.003	.03
13.00	.00	5.44	.003	.03
13.05	.00	5.44	.003	.03
13.10	.00	5.44	.003	.03
13.15	.00	5.44	.003	.02
13.20	.00	5.44	.003	.02
13.25	.00	5.43	.003	.02
13.30	.00	5.43	.003	.02
13.35	.00	5.43	.002	.02

13.40	.00	5.43	.002	.02
13.45	.00	5.43	.002	.02
13.50	.00	5.43	.002	.02
13.55	.00	5.43	.002	.02
13.60	.00	5.43	.002	.02
13.65	.00	5.43	.002	.02
13.70	.00	5.43	.002	.02
13.75	.00	5.42	.002	.02
13.80	.00	5.42	.002	.02
13.85	.00	5.42	.002	.01
13.90	.00	5.42	.002	.01
13.95	.00	5.42	.002	.01

TIME (HRS)	INFLOW (CFS)	ELEV (FEET)	VOLUME (AC-FT)	OUTFLOW (CFS)
14.00	.00	5.42	.002	.01
14.05	.00	5.42	.002	.01
14.10	.00	5.42	.001	.01
14.15	.00	5.42	.001	.01
14.20	.00	5.42	.001	.01
14.25	.00	5.42	.001	.01
14.30	.00	5.42	.001	.01
14.35	.00	5.42	.001	.01
14.40	.00	5.42	.001	.01
14.45	.00	5.41	.001	.01
14.50	.00	5.41	.001	.01
14.55	.00	5.41	.001	.01
14.60	.00	5.41	.001	.01
14.65	.00	5.41	.001	.01
14.70	.00	5.41	.001	.01
14.75	.00	5.41	.001	.01
14.80	.00	5.41	.001	.01
14.85	.00	5.41	.001	.01
14.90	.00	5.41	.001	.01
14.95	.00	5.41	.001	.01
15.00	.00	5.41	.001	.01
15.05	.00	5.41	.001	.01
15.10	.00	5.41	.001	.01
15.15	.00	5.41	.001	.01
15.20	.00	5.41	.001	.01
15.25	.00	5.41	.001	.01
15.30	.00	5.41	.001	.01
15.35	.00	5.41	.001	.01
15.40	.00	5.41	.001	.00

PEAK DISCHARGE = 43.220 CFS - PEAK OCCURS AT HOUR 1.80
MAXIMUM WATER SURFACE ELEVATION = 13.328
MAXIMUM STORAGE = 2.0904 AC-FT INCREMENTAL TIME= .050000HRS

*
PRINT HYD ID=12 CODE=20

HYDROGRAPH FROM AREA POND

TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS	TIME HRS	FLOW CFS
.000	.0	4.000	2.2	8.000	.4	12.000	.1
1.000	.0	5.000	1.4	9.000	.2	13.000	.0
2.000	41.3	6.000	1.0	10.000	.1	14.000	.0
3.000	4.8	7.000	.6	11.000	.1	15.000	.0
16.000	.0						
17.000	.0						

RUNOFF VOLUME = 1.40061 INCHES = 4.4371 ACRE-FEET
PEAK DISCHARGE RATE = 43.22 CFS AT 1.800 HOURS BASIN AREA = .0594 SQ. MI.

*
****
*S****OFF-SITE FLOWS TO CALLE ENTRADA
****
**** COMPUTE AND PRINT NM HYD DATA FOR BASIN A2 *********
COMPUTE NM HYD ID=2 HYD=2 AREA=0.0059 PER A=90 PER B=10
PER C=0.0 PER D=0.0 TP=.133 RAINFALL=-1

K = .159810HR TP = .133000HR K/TP RATIO = 1.201576 SHAPE CONSTANT, N = 2.957646

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```
     UNIT PEAK =   12.348    CFS   UNIT VOLUME =    .9974       B =   278.35      P60 = 1.8800
     AREA =      .005900 SQ MI    IA =    .63500 INCHES    INF =   1.62800 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000

PRINT HYD                   ID=2   CODE=1

                                       OUTFLOW HYDROGRAPH REACH     2.00


    RUNOFF VOLUME =      .46393 INCHES     =        .1460 ACRE-FEET
    PEAK DISCHARGE RATE =       5.17 CFS  AT   1.500 HOURS   BASIN AREA =   .0059 SQ. MI.


*
*************************************
*S****OFF-SITE FLOWS TO UNSER
*************************************
**** COMPUTE AND PRINT NM HYD DATA FOR BASIN A3  *********
COMPUTE NM HYD       ID=3 HYD=3  AREA=0.0043 PER A=90 PER B=10
                                PER C=0.0 PER D=0.0  TP=.133  RAINFALL=-1

     K =   .159810HR    TP =   .133000HR    K/TP RATIO =  1.201576     SHAPE CONSTANT, N =  2.957646
     UNIT PEAK =   8.9993    CFS   UNIT VOLUME =    .9970       B =   278.35      P60 = 1.8800
     AREA =      .004300 SQ MI    IA =    .63500 INCHES    INF =   1.62800 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000

PRINT HYD                   ID=3   CODE=1

                                       OUTFLOW HYDROGRAPH REACH     3.00


    RUNOFF VOLUME =      .46393 INCHES     =        .1064 ACRE-FEET
    PEAK DISCHARGE RATE =       3.77 CFS  AT   1.500 HOURS   BASIN AREA =   .0043 SQ. MI.


*************************************
*S****ON-SITE FLOWS
*************************************
**** COMPUTE AND PRINT NM HYD DATA FOR BASIN A4  *********
COMPUTE NM HYD       ID=4 HYD=4  AREA=0.0109 PER A=0.0 PER B=20
                                PER C=20 PER D=60  TP=.133  RAINFALL=-1

     K =   .072485HR    TP =   .133000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   25.879    CFS   UNIT VOLUME =    .9987       B =   526.28      P60 = 1.8800
     AREA =      .006540 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000


     K =   .118131HR    TP =   .133000HR    K/TP RATIO =   .888205     SHAPE CONSTANT, N =  3.993616
     UNIT PEAK =   11.629    CFS   UNIT VOLUME =    1.000       B =   354.74      P60 = 1.8800
     AREA =      .004360 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000

PRINT HYD                   ID=4   CODE=1

                                       OUTFLOW HYDROGRAPH REACH     4.00


    RUNOFF VOLUME =     1.51602 INCHES     =        .8813 ACRE-FEET
    PEAK DISCHARGE RATE =      24.96 CFS  AT   1.500 HOURS   BASIN AREA =   .0109 SQ. MI.


*
**** COMPUTE AND PRINT NM HYD DATA FOR BASIN A5  *********
COMPUTE NM HYD       ID=5 HYD=5  AREA=0.0032 PER A=0.0 PER B=20
                                PER C=20 PER D=60  TP=.133  RAINFALL=-1

     K =   .072485HR    TP =   .133000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   7.5974    CFS   UNIT VOLUME =    .9979       B =   526.28      P60 = 1.8800
     AREA =      .001920 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000


     K =   .118131HR    TP =   .133000HR    K/TP RATIO =   .888205     SHAPE CONSTANT, N =  3.993616
     UNIT PEAK =   3.4141    CFS   UNIT VOLUME =    .9976       B =   354.74      P60 = 1.8800
     AREA =      .001280 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
```

```
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000

PRINT HYD                    ID=5   CODE=1

                                        OUTFLOW HYDROGRAPH REACH     5.00


    RUNOFF VOLUME =      1.51602 INCHES      =         .2587 ACRE-FEET
    PEAK DISCHARGE RATE =        7.34 CFS  AT   1.500 HOURS   BASIN AREA =   .0032 SQ. MI.


*
**** COMPUTE AND PRINT NM HYD DATA FOR BASIN A1  *********
COMPUTE NM HYD       ID=6 HYD=6  AREA=0.0021 PER A=0.0 PER B=20
                                 PER C=20 PER D=60  TP=.133  RAINFALL=-1

     K =   .072485HR    TP =   .133000HR    K/TP RATIO =   .545000     SHAPE CONSTANT, N =  7.106420
     UNIT PEAK =   4.9858    CFS   UNIT VOLUME =    .9971       B =   526.28      P60 = 1.8800
     AREA =      .001260 SQ MI    IA =    .10000 INCHES    INF =    .04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000

     K =   .118131HR    TP =   .133000HR    K/TP RATIO =   .888205     SHAPE CONSTANT, N =  3.993616
     UNIT PEAK =   2.2405    CFS   UNIT VOLUME =    .9956       B =   354.74      P60 = 1.8800
     AREA =      .000840 SQ MI    IA =    .42500 INCHES    INF =   1.04000 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000

PRINT HYD                    ID=6   CODE=1

                                        OUTFLOW HYDROGRAPH REACH     6.00


    RUNOFF VOLUME =      1.51602 INCHES      =         .1698 ACRE-FEET
    PEAK DISCHARGE RATE =        4.82 CFS  AT   1.500 HOURS   BASIN AREA =   .0021 SQ. MI.


*
**** COMPUTE AND PRINT NM HYD DATA FOR BASIN A6  *********
COMPUTE NM HYD       ID=7 HYD=7  AREA=0.0050 PER A=90 PER B=10
                                 PER C=0.0 PER D=0.0  TP=.133  RAINFALL=-1

     K =   .159810HR    TP =   .133000HR    K/TP RATIO =  1.201576     SHAPE CONSTANT, N =  2.957646
     UNIT PEAK =   10.464    CFS   UNIT VOLUME =    .9972       B =   278.35      P60 = 1.8800
     AREA =      .005000 SQ MI    IA =    .63500 INCHES    INF =   1.62800 INCHES PER HOUR
     RUNOFF COMPUTED BY INITIAL ABSTRACTION/INFILTRATION NUMBER METHOD - DT =   .050000

PRINT HYD                    ID=7   CODE=1

                                        OUTFLOW HYDROGRAPH REACH     7.00


    RUNOFF VOLUME =       .46393 INCHES      =         .1237 ACRE-FEET
    PEAK DISCHARGE RATE =        4.38 CFS  AT   1.500 HOURS   BASIN AREA =   .0050 SQ. MI.


FINISH

    NORMAL PROGRAM FINISH          END TIME (HR:MIN:SEC) = 17:33:58
```


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CIELO OESTE SUBDIVISION

Job # 020258
8/5/2002

SOUTH OF LAS LOMITAS

Elevation	Area ft^2	Avg Area ft^2	increment Vol ft^3	Cum Vol ft^3	Cum Vol ac-ft	H ft	Q cfs	d (ft)=	1.5
5.4	0		0	0	0	0	0		
5.5	7793.1	3896.55	389.655	389.655	0.008945	0.1	2.69		
6	8326.2	8059.65	4029.825	4419.48	0.101457	0.6	6.59		
7	9434.9	8880.55	8880.55	13300.03	0.305325	1.6	10.76		
8	10600.1	10017.5	10017.5	23317.53	0.535295	2.6	13.72		
9	11821.9	11211	11211	34528.53	0.792663	3.6	16.14		
10	13100.3	12461.1	12461.1	46989.63	1.078729	4.6	18.25		
11	14435.2	13767.75	13767.75	60757.38	1.394792	5.6	20.14		
12	15826.6	15130.9	15130.9	75888.28	1.742148	6.6	21.86		
13	17274.7	16550.65	16550.65	92438.93	2.122098	7.6	23.46		
14	18779.2	18026.95	18026.95	110465.9	2.535938	8.6	24.95		

TRACT A-1-B

Elevation	Area ft^2	Avg Area ft^2	increment Vol ft^3	Cum Vol ft^3	Cum Vol ac-ft
5215.9	0		0	0	0
5216	5323	2661.5	266.15	266.15	0.00611
5217	6301	5812	5812	6078.15	0.139535
5218	7352	6826.5	6826.5	12638.5	0.290139
5219	10600.1	8976.05	8976.05	15802.55	0.362775
5220	11821.9	11211	11211	20187.05	0.463429

APPENDIX B

STREET FLOW, INLET, AND STORM DRAIN CALCULATIONS

CIELO OESTE SUBDIVISION
Inlet & Street Capacity Calculations
June 3, 2002

1. Casa Florida Place

Basin A1 (See AHYMO summary table or Basin Map)
S = 0.70%
Q = 5.3 cfs

At 0.70%, a road with roll curb can handle 5.6 cfs. Therefore, no inlets needed. See PC stream output. Water flows into Casa Vistosa Place (Tierra Oeste Unit 3).

2. Cielo Oeste Place

Basin A4 (See AHYMO summary table or Basin Map)
S = 0.50%
Q = 26.8 cfs

At 0.50%, a road with standard curb can handle 45.1 cfs. Therefore, no inlets needed. See PC stream output. Water flows to low point in Calle de Entrada.

3. Cielo Oeste Place

Basin A5 (See AHYMO summary table or Basin Map)
S = 0.66%
Q = 8.0 cfs

At 0.66%, a road with standard curb can handle 45.8 cfs. Therefore, no inlets needed. See PC stream output. Water flows to Unser Boulevard.

4. Calle de Entrada

Flow from Las Lomitas Subdivision (See AHYMO summary table)
S =0.60%
Q = 90 cfs

At 0.60%, a road with standard curb can handle 90 cfs. This results in the water surface at the right-of-way line, as approved in the Drainage Report Update for Las Lomitas Subdivision Unit IIB. Add cattle guard inlet downstream of Las Lomitas. See PC stream output.

5. **Calle de Entrada Inlet Analysis:**

West side of street:
Use Single Grate, Single Wing Type 'A'
Assume pond depth at top of curb (0.83'):
Grate capacity is 27.8 cfs. (Does not include wing openings)

East side of street:
Use Single Grate, Single Wing Type 'A'
Assume pond depth at top of curb (0.83'):
Grate capacity is 27.8 cfs. (Does not include wing openings)

Inlet capacity at Calle de Entrada low point = 55.6 cfs > 32.0 cfs (26.8 cfs from Basin A4 and 5.2 cfs from Basin A2), therefore all runoff collected by storm drain inlets.

***** PC PROGRAM STREAM SEPTEMBER 1994 *****

CASA FLORIDA PLACE

MANNING'S N= .017 SLOPE= .007

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	0.83	5	11.00	0.13	9	35.17	0.67
2	8.38	0.67	6	22.00	0.35	10	35.63	0.67
3	8.83	0.67	7	33.00	0.13	11	44.00	0.83
4	9.00	0.00	8	35.00	0.00	12	0.00	0.00

WSEL (FT)	DEPTH INC (FT)	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID (FT)	VEL HEAD (FT)	ENERGY HEAD (FT)
0.01	0.01	0.00	0.0	0.33	0.21	0.31	0.00	0.01
0.02	0.02	0.01	0.0	0.66	0.33	0.63	0.00	0.02
0.03	0.03	0.01	0.0	0.99	0.43	0.94	0.00	0.03
0.04	0.04	0.03	0.0	1.32	0.52	1.25	0.00	0.04
0.05	0.05	0.04	0.0	1.64	0.60	1.56	0.01	0.06
0.06	0.06	0.06	0.0	1.97	0.68	1.88	0.01	0.07
0.07	0.07	0.08	0.1	2.30	0.76	2.19	0.01	0.08
0.08	0.08	0.10	0.1	2.63	0.83	2.50	0.01	0.09
0.09	0.09	0.13	0.1	2.96	0.89	2.81	0.01	0.10
0.10	0.10	0.16	0.2	3.29	0.96	3.13	0.01	0.11
0.11	0.11	0.19	0.2	3.62	1.02	3.44	0.02	0.13
0.12	0.12	0.23	0.2	3.95	1.08	3.75	0.02	0.14
0.13	0.13	0.26	0.3	4.28	1.14	4.07	0.02	0.15
0.14	0.14	0.31	0.3	5.30	1.10	5.07	0.02	0.16
0.15	0.15	0.37	0.4	6.32	1.09	6.08	0.02	0.17
0.16	0.16	0.43	0.5	7.34	1.11	7.08	0.02	0.18
0.17	0.17	0.51	0.6	8.36	1.13	8.09	0.02	0.19
0.18	0.18	0.59	0.7	9.38	1.16	9.09	0.02	0.20
0.19	0.19	0.69	0.8	10.40	1.20	10.10	0.02	0.21
0.20	0.20	0.80	1.0	11.42	1.24	11.10	0.02	0.22
0.21	0.21	0.91	1.2	12.44	1.28	12.11	0.03	0.24
0.22	0.22	1.04	1.4	13.46	1.32	13.11	0.03	0.25
0.23	0.23	1.17	1.6	14.49	1.37	14.12	0.03	0.26
0.24	0.24	1.32	1.9	15.51	1.41	15.12	0.03	0.27
0.25	0.25	1.48	2.2	16.53	1.46	16.13	0.03	0.28
0.26	0.26	1.64	2.5	17.55	1.51	17.13	0.04	0.30
0.27	0.27	1.82	2.8	18.57	1.55	18.14	0.04	0.31
0.28	0.28	2.00	3.2	19.59	1.60	19.14	0.04	0.32
0.29	0.29	2.20	3.6	20.61	1.65	20.15	0.04	0.33
0.30	0.30	2.41	4.1	21.63	1.69	21.15	0.04	0.34
0.31	0.31	2.62	4.6	22.65	1.74	22.16	0.05	0.36
0.32	0.32	2.85	5.1	23.67	1.78	23.16	0.05	0.37
0.33	0.33	3.09	5.6	24.69	1.83	24.17	0.05	0.38
0.34	0.34	3.33	6.2	25.71	1.87	25.17	0.05	0.39
0.35	0.35	3.59	6.9	26.74	1.92	26.18	0.06	0.41
0.36	0.36	3.85	7.7	26.76	2.01	26.18	0.06	0.42
0.37	0.37	4.11	8.6	26.78	2.10	26.19	0.07	0.44
0.38	0.38	4.38	9.6	26.80	2.19	26.19	0.07	0.45
0.39	0.39	4.64	10.5	26.82	2.27	26.20	0.08	0.47
0.40	0.40	4.90	11.5	26.84	2.35	26.20	0.09	0.49
0.41	0.41	5.16	12.6	26.86	2.44	26.21	0.09	0.50
0.42	0.42	5.42	13.7	26.88	2.52	26.21	0.10	0.52
0.43	0.43	5.69	14.8	26.90	2.60	26.22	0.10	0.53

ROLL CURB LIMIT

WSEL (FT)	DEPTH INC (FT)	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID (FT)	VEL HEAD (FT)	ENERGY HEAD (FT)

0.45	0.45	6.21	17.1	26.94	2.75	26.23	0.12	0.57	
0.46	0.46	6.47	18.3	26.96	2.83	26.23	0.12	0.58	
0.47	0.47	6.74	19.5	26.98	2.90	26.24	0.13	0.60	
0.48	0.48	7.00	20.8	27.00	2.97	26.24	0.14	0.62	
0.49	0.49	7.26	22.1	27.02	3.05	26.25	0.14	0.63	
0.50	0.50	7.52	23.4	27.04	3.12	26.25	0.15	0.65	
0.51	0.51	7.79	24.8	27.07	3.19	26.26	0.16	0.67	
0.52	0.52	8.05	26.2	27.09	3.26	26.26	0.16	0.68	
0.53	0.53	8.31	27.6	27.11	3.33	26.27	0.17	0.70	
0.54	0.54	8.57	29.1	27.13	3.39	26.27	0.18	0.72	
0.55	0.55	8.84	30.6	27.15	3.46	26.28	0.19	0.74	
0.56	0.56	9.10	32.1	27.17	3.53	26.28	0.19	0.75	
0.57	0.57	9.36	33.6	27.19	3.59	26.29	0.20	0.77	
0.58	0.58	9.63	35.2	27.21	3.66	26.29	0.21	0.79	
0.59	0.59	9.89	36.8	27.23	3.72	26.30	0.22	0.81	
0.60	0.60	10.15	38.4	27.25	3.79	26.30	0.22	0.82	
0.61	0.61	10.41	40.1	27.27	3.85	26.31	0.23	0.84	STD
0.62	0.62	10.68	41.8	27.29	3.91	26.31	0.24	0.86	CURB
0.63	0.63	10.94	43.5	27.31	3.97	26.32	0.25	0.88	LIMIT
0.64	0.64	11.20	45.2	27.33	4.04	26.32	0.25	0.89	
0.65	0.65	11.47	47.0	27.35	4.10	26.33	0.26	0.91	
0.66	0.66	11.73	48.8	27.37	4.16	26.33	0.27	0.93	
0.67	0.67	11.99	50.6	27.40	4.22	26.34	0.28	0.95	
0.68	0.68	12.26	51.2	28.44	4.17	28.30	0.27	0.95	
0.69	0.69	12.54	51.9	29.49	4.14	29.34	0.27	0.96	
0.70	0.70	12.86	51.8	31.45	4.03	30.39	0.25	0.95	
0.71	0.71	13.17	52.7	32.49	4.00	31.44	0.25	0.96	
0.72	0.72	13.49	53.7	33.54	3.98	32.48	0.25	0.97	
0.73	0.73	13.82	54.8	34.59	3.97	33.53	0.24	0.97	
0.74	0.74	14.16	56.0	35.63	3.95	34.58	0.24	0.98	
0.75	0.75	14.51	57.2	36.68	3.94	35.62	0.24	0.99	
0.76	0.76	14.87	58.5	37.73	3.93	36.67	0.24	1.00	
0.77	0.77	15.24	59.8	38.78	3.92	37.72	0.24	1.01	
0.78	0.78	15.62	61.2	39.82	3.92	38.77	0.24	1.02	
0.79	0.79	16.02	62.7	40.87	3.92	39.81	0.24	1.03	
0.80	0.80	16.42	64.3	41.92	3.92	40.86	0.24	1.04	
0.81	0.81	16.83	65.9	42.96	3.92	41.91	0.24	1.05	
0.82	0.82	17.26	67.6	44.01	3.92	42.95	0.24	1.06	
0.83	0.83	17.69	69.4	45.06	3.92	44.00	0.24	1.07	

CIELO VESTE PLACE
WEST OF CALLE DE ENTRADA

***** PC PROGRAM STREAM SEPTEMBER 1994 *****

MANNING'S N= .017 SLOPE= .005

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	0.83	5	11.00	0.13	9	41.17	0.67
2	8.38	0.67	6	25.00	0.41	10	41.63	0.67
3	8.83	0.67	7	39.00	0.13	11	50.00	0.83
4	9.00	0.00	8	41.00	0.00	12	0.00	0.00

WSEL (FT)	DEPTH INC (FT)	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID (FT)	VEL HEAD (FT)	ENERGY HEAD (FT)
0.01	0.01	0.00	0.0	0.33	0.17	0.31	0.00	0.01
0.02	0.02	0.01	0.0	0.66	0.28	0.63	0.00	0.02
0.03	0.03	0.01	0.0	0.99	0.36	0.94	0.00	0.03
0.04	0.04	0.03	0.0	1.32	0.44	1.25	0.00	0.04
0.05	0.05	0.04	0.0	1.64	0.51	1.56	0.00	0.05
0.06	0.06	0.06	0.0	1.97	0.58	1.88	0.01	0.07
0.07	0.07	0.08	0.0	2.30	0.64	2.19	0.01	0.08
0.08	0.08	0.10	0.1	2.63	0.70	2.50	0.01	0.09
0.09	0.09	0.13	0.1	2.96	0.76	2.81	0.01	0.10
0.10	0.10	0.16	0.1	3.29	0.81	3.13	0.01	0.11
0.11	0.11	0.19	0.2	3.62	0.86	3.44	0.01	0.12
0.12	0.12	0.23	0.2	3.95	0.92	3.75	0.01	0.13
0.13	0.13	0.26	0.3	4.28	0.97	4.07	0.01	0.14
0.14	0.14	0.31	0.3	5.30	0.93	5.07	0.01	0.15
0.15	0.15	0.37	0.3	6.32	0.92	6.08	0.01	0.16
0.16	0.16	0.43	0.4	7.34	0.93	7.08	0.01	0.17
0.17	0.17	0.51	0.5	8.36	0.95	8.09	0.01	0.18
0.18	0.18	0.59	0.6	9.38	0.98	9.09	0.01	0.19
0.19	0.19	0.69	0.7	10.40	1.01	10.10	0.02	0.21
0.20	0.20	0.80	0.8	11.42	1.05	11.10	0.02	0.22
0.21	0.21	0.91	1.0	12.44	1.08	12.11	0.02	0.23
0.22	0.22	1.04	1.2	13.46	1.12	13.11	0.02	0.24
0.23	0.23	1.17	1.4	14.49	1.16	14.12	0.02	0.25
0.24	0.24	1.32	1.6	15.51	1.20	15.12	0.02	0.26
0.25	0.25	1.48	1.8	16.53	1.23	16.13	0.02	0.27
0.26	0.26	1.64	2.1	17.55	1.27	17.13	0.03	0.29
0.27	0.27	1.82	2.4	18.57	1.31	18.14	0.03	0.30
0.28	0.28	2.00	2.7	19.59	1.35	19.14	0.03	0.31
0.29	0.29	2.20	3.1	20.61	1.39	20.15	0.03	0.32
0.30	0.30	2.41	3.4	21.63	1.43	21.15	0.03	0.33
0.31	0.31	2.62	3.9	22.65	1.47	22.16	0.03	0.34
0.32	0.32	2.85	4.3	23.67	1.51	23.16	0.04	0.36
0.33	0.33	3.09	4.8	24.69	1.55	24.17	0.04	0.37
0.34	0.34	3.33	5.3	25.71	1.58	25.17	0.04	0.38
0.35	0.35	3.59	5.8	26.74	1.62	26.18	0.04	0.39
0.36	0.36	3.86	6.4	27.76	1.66	27.18	0.04	0.40
0.37	0.37	4.13	7.0	28.78	1.70	28.19	0.04	0.41
0.38	0.38	4.42	7.7	29.80	1.73	29.19	0.05	0.43
0.39	0.39	4.72	8.3	30.82	1.77	30.20	0.05	0.44
0.40	0.40	5.03	9.1	31.84	1.81	31.20	0.05	0.45
0.41	0.41	5.34	9.8	32.86	1.84	32.21	0.05	0.46
0.42	0.42	5.66	10.8	32.88	1.91	32.21	0.06	0.48
0.43	0.43	5.99	11.9	32.90	1.98	32.22	0.06	0.49

ROLL CURB LIMIT

WSEL (FT)	DEPTH INC (FT)	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID (FT)	VEL HEAD (FT)	ENERGY HEAD (FT)
0.45	0.45	6.63	14.1	32.94	2.12	32.23	0.07	0.52

0.46	0.46	6.95	15.2	32.96	2.19	32.23	0.07	0.53	
0.47	0.47	7.28	16.4	32.98	2.26	32.24	0.08	0.55	
0.48	0.48	7.60	17.6	33.00	2.32	32.24	0.08	0.56	
0.49	0.49	7.92	18.9	33.03	2.39	32.25	0.09	0.58	
0.50	0.50	8.24	20.2	33.05	2.45	32.25	0.09	0.59	
0.51	0.51	8.57	21.5	33.07	2.51	32.26	0.10	0.61	
0.52	0.52	8.89	22.9	33.09	2.57	32.26	0.10	0.62	
0.53	0.53	9.21	24.3	33.11	2.63	32.27	0.11	0.64	
0.54	0.54	9.53	25.7	33.13	2.69	32.27	0.11	0.65	
0.55	0.55	9.86	27.1	33.15	2.75	32.28	0.12	0.67	
0.56	0.56	10.18	28.6	33.17	2.81	32.28	0.12	0.68	
0.57	0.57	10.50	30.1	33.19	2.87	32.29	0.13	0.70	
0.58	0.58	10.83	31.7	33.21	2.93	32.29	0.13	0.71	
0.59	0.59	11.15	33.3	33.23	2.98	32.30	0.14	0.73	
0.60	0.60	11.47	34.9	33.25	3.04	32.30	0.14	0.74	
0.61	0.61	11.79	36.5	33.27	3.10	32.31	0.15	0.76	
0.62	0.62	12.12	38.2	33.29	3.15	32.31	0.15	0.77	
0.63	0.63	12.44	39.9	33.31	3.21	32.32	0.16	0.79	
0.64	0.64	12.76	41.6	33.33	3.26	32.32	0.16	0.80	
0.65	0.65	13.09	43.4	33.36	3.31	32.33	0.17	0.82	
0.66	0.66	13.41	45.1	33.38	3.37	32.33	0.18	0.84	STD
0.67	0.67	13.73	46.9	33.40	3.42	32.34	0.18	0.85	CURB
0.68	0.68	14.06	47.8	34.44	3.40	34.30	0.18	0.86	
0.69	0.69	14.40	48.8	35.49	3.39	35.34	0.18	0.87	LIMIT
0.70	0.70	14.78	49.1	37.45	3.33	36.39	0.17	0.87	
0.71	0.71	15.15	50.3	38.49	3.32	37.44	0.17	0.88	
0.72	0.72	15.53	51.5	39.54	3.31	38.48	0.17	0.89	
0.73	0.73	15.92	52.7	40.59	3.31	39.53	0.17	0.90	
0.74	0.74	16.32	54.0	41.64	3.31	40.58	0.17	0.91	
0.75	0.75	16.73	55.4	42.68	3.31	41.62	0.17	0.92	
0.76	0.76	17.15	56.8	43.73	3.31	42.67	0.17	0.93	
0.77	0.77	17.58	58.3	44.78	3.31	43.72	0.17	0.94	
0.78	0.78	18.02	59.8	45.82	3.32	44.77	0.17	0.95	
0.79	0.79	18.48	61.4	46.87	3.32	45.81	0.17	0.96	
0.80	0.80	18.94	63.1	47.92	3.33	46.86	0.17	0.97	
0.81	0.81	19.41	64.8	48.97	3.34	47.91	0.17	0.98	
0.82	0.82	19.90	66.5	50.01	3.34	48.95	0.17	0.99	
0.83	0.83	20.39	68.4	51.06	3.35	50.00	0.17	1.00	

CIELO OESTE PLACE
EAST OF CALLE DE ENTRADA

***** PC PROGRAM STREAM SEPTEMBER 1994 *****

MANNING'S N= .017 SLOPE= .0066

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	0.83	5	11.00	0.13	9	41.17	0.67
2	8.38	0.67	6	25.00	0.41	10	41.63	0.67
3	8.83	0.67	7	39.00	0.13	11	50.00	0.83
4	9.00	0.00	8	41.00	0.00	12	0.00	0.00

□ WSEL (FT)	DEPTH INC (FT)	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID (FT)	VEL HEAD (FT)	ENERGY HEAD (FT)	
0.01	0.01	0.00	0.0	0.33	0.20	0.31	0.00	0.01	
0.02	0.02	0.01	0.0	0.66	0.32	0.63	0.00	0.02	
0.03	0.03	0.01	0.0	0.99	0.42	0.94	0.00	0.03	
0.04	0.04	0.03	0.0	1.32	0.51	1.25	0.00	0.04	
0.05	0.05	0.04	0.0	1.64	0.59	1.56	0.01	0.06	
0.06	0.06	0.06	0.0	1.97	0.66	1.88	0.01	0.07	
0.07	0.07	0.08	0.1	2.30	0.73	2.19	0.01	0.08	
0.08	0.08	0.10	0.1	2.63	0.80	2.50	0.01	0.09	
0.09	0.09	0.13	0.1	2.96	0.87	2.81	0.01	0.10	
0.10	0.10	0.16	0.1	3.29	0.93	3.13	0.01	0.11	
0.11	0.11	0.19	0.2	3.62	0.99	3.44	0.02	0.13	
0.12	0.12	0.23	0.2	3.95	1.05	3.75	0.02	0.14	
0.13	0.13	0.26	0.3	4.28	1.11	4.07	0.02	0.15	
0.14	0.14	0.31	0.3	5.30	1.07	5.07	0.02	0.16	
0.15	0.15	0.37	0.4	6.32	1.06	6.08	0.02	0.17	
0.16	0.16	0.43	0.5	7.34	1.07	7.08	0.02	0.18	
0.17	0.17	0.51	0.6	8.36	1.10	8.09	0.02	0.19	
0.18	0.18	0.59	0.7	9.38	1.13	9.09	0.02	0.20	
0.19	0.19	0.69	0.8	10.40	1.16	10.10	0.02	0.21	
0.20	0.20	0.80	1.0	11.42	1.20	11.10	0.02	0.22	
0.21	0.21	0.91	1.1	12.44	1.24	12.11	0.02	0.23	
0.22	0.22	1.04	1.3	13.46	1.29	13.11	0.03	0.25	
0.23	0.23	1.17	1.6	14.49	1.33	14.12	0.03	0.26	
0.24	0.24	1.32	1.8	15.51	1.37	15.12	0.03	0.27	
0.25	0.25	1.48	2.1	16.53	1.42	16.13	0.03	0.28	
0.26	0.26	1.64	2.4	17.55	1.46	17.13	0.03	0.29	
0.27	0.27	1.82	2.7	18.57	1.51	18.14	0.04	0.31	
0.28	0.28	2.00	3.1	19.59	1.55	19.14	0.04	0.32	
0.29	0.29	2.20	3.5	20.61	1.60	20.15	0.04	0.33	
0.30	0.30	2.41	4.0	21.63	1.64	21.15	0.04	0.34	
0.31	0.31	2.62	4.4	22.65	1.69	22.16	0.04	0.35	
0.32	0.32	2.85	4.9	23.67	1.73	23.16	0.05	0.37	
0.33	0.33	3.09	5.5	24.69	1.78	24.17	0.05	0.38	ROLL
0.34	0.34	3.33	6.1	25.71	1.82	25.17	0.05	0.39	CURB
0.35	0.35	3.59	6.7	26.74	1.86	26.18	0.05	0.40	LIMIT
0.36	0.36	3.86	7.4	27.76	1.91	27.18	0.06	0.42	
0.37	0.37	4.13	8.1	28.78	1.95	28.19	0.06	0.43	
0.38	0.38	4.42	8.8	29.80	1.99	29.19	0.06	0.44	
0.39	0.39	4.72	9.6	30.82	2.03	30.20	0.06	0.45	
0.40	0.40	5.03	10.4	31.84	2.07	31.20	0.07	0.47	
0.41	0.41	5.34	11.3	32.86	2.12	32.21	0.07	0.48	
0.42	0.42	5.66	12.5	32.88	2.20	32.21	0.08	0.50	
0.43	0.43	5.99	13.7	32.90	2.28	32.22	0.08	0.51	

□ WSEL (FT)	DEPTH INC (FT)	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID (FT)	VEL HEAD (FT)	ENERGY HEAD (FT)
0.45	0.45	6.63	16.2	32.94	2.44	32.23	0.09	0.54

0.46	0.46	6.95	17.5	32.96	2.52	32.23	0.10	0.56	
0.47	0.47	7.28	18.9	32.98	2.59	32.24	0.10	0.57	
0.48	0.48	7.60	20.3	33.00	2.67	32.24	0.11	0.59	
0.49	0.49	7.92	21.7	33.03	2.74	32.25	0.12	0.61	
0.50	0.50	8.24	23.2	33.05	2.81	32.25	0.12	0.62	
0.51	0.51	8.57	24.7	33.07	2.89	32.26	0.13	0.64	
0.52	0.52	8.89	26.3	33.09	2.96	32.26	0.14	0.66	
0.53	0.53	9.21	27.9	33.11	3.03	32.27	0.14	0.67	
0.54	0.54	9.53	29.5	33.13	3.10	32.27	0.15	0.69	
0.55	0.55	9.86	31.2	33.15	3.16	32.28	0.16	0.71	
0.56	0.56	10.18	32.9	33.17	3.23	32.28	0.16	0.72	
0.57	0.57	10.50	34.6	33.19	3.30	32.29	0.17	0.74	
0.58	0.58	10.83	36.4	33.21	3.36	32.29	0.18	0.76	
0.59	0.59	11.15	38.2	33.23	3.43	32.30	0.18	0.77	
0.60	0.60	11.47	40.1	33.25	3.49	32.30	0.19	0.79	
0.61	0.61	11.79	42.0	33.27	3.56	32.31	0.20	0.81	
0.62	0.62	12.12	43.9	33.29	3.62	32.31	0.20	0.82	
0.63	0.63	12.44	45.8	33.31	3.68	32.32	0.21	0.84	STD
0.64	0.64	12.76	47.8	33.33	3.74	32.32	0.22	0.86	CURB
0.65	0.65	13.09	49.8	33.36	3.81	32.33	0.22	0.87	LIMIT
0.66	0.66	13.41	51.9	33.38	3.87	32.33	0.23	0.89	
0.67	0.67	13.73	53.9	33.40	3.93	32.34	0.24	0.91	
0.68	0.68	14.06	55.0	34.44	3.91	34.30	0.24	0.92	
0.69	0.69	14.40	56.1	35.49	3.89	35.34	0.24	0.93	
0.70	0.70	14.78	56.5	37.45	3.82	36.39	0.23	0.93	
0.71	0.71	15.15	57.8	38.49	3.81	37.44	0.23	0.94	
0.72	0.72	15.53	59.1	39.54	3.81	38.48	0.23	0.95	
0.73	0.73	15.92	60.6	40.59	3.80	39.53	0.22	0.95	
0.74	0.74	16.32	62.1	41.64	3.80	40.58	0.22	0.96	
0.75	0.75	16.73	63.6	42.68	3.80	41.62	0.22	0.97	
0.76	0.76	17.15	65.3	43.73	3.80	42.67	0.22	0.98	
0.77	0.77	17.58	67.0	44.78	3.81	43.72	0.23	1.00	
0.78	0.78	18.02	68.7	45.82	3.81	44.77	0.23	1.01	
0.79	0.79	18.48	70.5	46.87	3.82	45.81	0.23	1.02	
0.80	0.80	18.94	72.4	47.92	3.82	46.86	0.23	1.03	
0.81	0.81	19.41	74.4	48.97	3.83	47.91	0.23	1.04	
0.82	0.82	19.90	76.4	50.01	3.84	48.95	0.23	1.05	
0.83	0.83	20.39	78.5	51.06	3.85	50.00	0.23	1.06	

CALLE DE ENTRADA
LAS LOMITAS SUBDIVISION

***** PC PROGRAM STREAM SEPTEMBER 1994 *****

□ MANNING'S N= .017 SLOPE= .006

□POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	0.87	5	12.00	0.13	9	50.17	0.67
2	9.38	0.67	6	30.00	0.49	10	50.63	0.67
3	9.83	0.67	7	48.00	0.13	11	60.00	0.83
4	10.00	0.00	8	50.00	0.00	12	0.00	0.00

□ WSEL (FT)	DEPTH INC (FT)	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID (FT)	VEL HEAD (FT)	ENERGY HEAD (FT)
0.01	0.01	0.00	0.0	0.33	0.19	0.31	0.00	0.01
0.02	0.02	0.01	0.0	0.66	0.30	0.63	0.00	0.02
0.03	0.03	0.01	0.0	0.99	0.40	0.94	0.00	0.03
0.04	0.04	0.03	0.0	1.32	0.48	1.25	0.00	0.04
0.05	0.05	0.04	0.0	1.64	0.56	1.56	0.00	0.05
0.06	0.06	0.06	0.0	1.97	0.63	1.88	0.01	0.07
0.07	0.07	0.08	0.1	2.30	0.70	2.19	0.01	0.08
0.08	0.08	0.10	0.1	2.63	0.77	2.50	0.01	0.09
0.09	0.09	0.13	0.1	2.96	0.83	2.81	0.01	0.10
0.10	0.10	0.16	0.1	3.29	0.89	3.13	0.01	0.11
0.11	0.11	0.19	0.2	3.62	0.95	3.44	0.01	0.12
0.12	0.12	0.23	0.2	3.95	1.00	3.75	0.02	0.14
0.13	0.13	0.26	0.3	4.28	1.06	4.07	0.02	0.15
0.14	0.14	0.31	0.3	5.30	1.02	5.07	0.02	0.16
0.15	0.15	0.37	0.4	6.32	1.01	6.08	0.02	0.17
0.16	0.16	0.43	0.4	7.34	1.02	7.08	0.02	0.18
0.17	0.17	0.51	0.5	8.36	1.05	8.09	0.02	0.19
0.18	0.18	0.59	0.6	9.38	1.07	9.09	0.02	0.20
0.19	0.19	0.69	0.8	10.40	1.11	10.10	0.02	0.21
0.20	0.20	0.80	0.9	11.42	1.15	11.10	0.02	0.22
0.21	0.21	0.91	1.1	12.44	1.19	12.11	0.02	0.23
0.22	0.22	1.04	1.3	13.46	1.23	13.11	0.02	0.24
0.23	0.23	1.17	1.5	14.49	1.27	14.12	0.02	0.25
0.24	0.24	1.32	1.7	15.51	1.31	15.12	0.03	0.27
0.25	0.25	1.48	2.0	16.53	1.35	16.13	0.03	0.28
0.26	0.26	1.64	2.3	17.55	1.40	17.13	0.03	0.29
0.27	0.27	1.82	2.6	18.57	1.44	18.14	0.03	0.30
0.28	0.28	2.00	3.0	19.59	1.48	19.14	0.03	0.31
0.29	0.29	2.20	3.4	20.61	1.52	20.15	0.04	0.33
0.30	0.30	2.41	3.8	21.63	1.57	21.15	0.04	0.34
0.31	0.31	2.62	4.2	22.65	1.61	22.16	0.04	0.35
0.32	0.32	2.85	4.7	23.67	1.65	23.16	0.04	0.36
0.33	0.33	3.09	5.2	24.69	1.69	24.17	0.04	0.37
0.34	0.34	3.33	5.8	25.71	1.73	25.17	0.05	0.39
0.35	0.35	3.59	6.4	26.74	1.78	26.18	0.05	0.40
0.36	0.36	3.86	7.0	27.76	1.82	27.18	0.05	0.41
0.37	0.37	4.13	7.7	28.78	1.86	28.19	0.05	0.42
0.38	0.38	4.42	8.4	29.80	1.90	29.19	0.06	0.44
0.39	0.39	4.72	9.1	30.82	1.94	30.20	0.06	0.45
0.40	0.40	5.03	9.9	31.84	1.98	31.20	0.06	0.46
0.41	0.41	5.34	10.8	32.86	2.02	32.21	0.06	0.47
0.42	0.42	5.67	11.7	33.88	2.06	33.21	0.07	0.49
0.43	0.43	6.01	12.6	34.90	2.09	34.22	0.07	0.50

□ WSEL (FT)	DEPTH INC (FT)	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID (FT)	VEL HEAD (FT)	ENERGY HEAD (FT)
0.45	0.45	6.71	14.6	36.94	2.17	36.23	0.07	0.52
0.46	0.46	7.08	15.6	37.96	2.21	37.23	0.08	0.54
0.47	0.47	7.46	16.8	38.99	2.25	38.24	0.08	0.55
0.48	0.48	7.84	17.9	40.01	2.29	39.24	0.08	0.56
0.49	0.49	8.24	19.1	41.03	2.32	40.25	0.08	0.57
0.50	0.50	8.64	20.7	41.05	2.40	40.25	0.09	0.59
0.51	0.51	9.05	22.3	41.07	2.47	40.26	0.09	0.60
0.52	0.52	9.45	24.0	41.09	2.54	40.26	0.10	0.62
0.53	0.53	9.85	25.7	41.11	2.61	40.27	0.11	0.64
0.54	0.54	10.25	27.5	41.13	2.68	40.27	0.11	0.65
0.55	0.55	10.66	29.3	41.15	2.75	40.28	0.12	0.67
0.56	0.56	11.06	31.2	41.17	2.82	40.28	0.12	0.68
0.57	0.57	11.46	33.1	41.19	2.89	40.29	0.13	0.70
0.58	0.58	11.87	35.0	41.21	2.95	40.29	0.14	0.72
0.59	0.59	12.27	37.0	41.23	3.02	40.30	0.14	0.73
0.60	0.60	12.67	39.1	41.25	3.08	40.30	0.15	0.75

0.61	0.61	13.07	41.1	41.27	3.15	40.31	0.15	0.76
0.62	0.62	13.48	43.3	41.29	3.21	40.31	0.16	0.78
0.63	0.63	13.88	45.4	41.32	3.27	40.32	0.17	0.80
0.64	0.64	14.28	47.6	41.34	3.33	40.32	0.17	0.81
0.65	0.65	14.69	49.9	41.36	3.40	40.33	0.18	0.83
0.66	0.66	15.09	52.2	41.38	3.46	40.33	0.19	0.85
0.67	0.67	15.49	54.5	41.40	3.52	40.34	0.19	0.86
0.68	0.68	15.90	56.0	42.45	3.52	42.30	0.19	0.87
0.69	0.69	16.32	57.5	43.51	3.52	43.36	0.19	0.88
0.70	0.70	16.78	58.4	45.47	3.48	44.41	0.19	0.89
0.71	0.71	17.23	60.2	46.53	3.49	45.47	0.19	0.90
0.72	0.72	17.69	61.9	47.58	3.50	46.52	0.19	0.91
0.73	0.73	18.16	63.7	48.64	3.51	47.58	0.19	0.92
0.74	0.74	18.64	65.6	49.69	3.52	48.63	0.19	0.93
0.75	0.75	19.13	67.6	50.75	3.53	49.69	0.19	0.94
0.76	0.76	19.63	69.6	51.80	3.55	50.74	0.20	0.96
0.77	0.77	20.15	71.7	52.86	3.56	51.80	0.20	0.97
0.78	0.78	20.67	73.9	53.91	3.57	52.85	0.20	0.98
0.79	0.79	21.20	76.1	54.97	3.59	53.91	0.20	0.99
0.80	0.80	21.75	78.4	56.02	3.60	54.96	0.20	1.00
0.81	0.81	22.30	80.7	57.08	3.62	56.01	0.20	1.01
0.82	0.82	22.87	83.1	58.13	3.64	57.07	0.21	1.03
0.83	0.83	23.44	85.6	59.19	3.65	58.12	0.21	1.04
0.84	0.84	24.03	88.7	59.65	3.69	58.59	0.21	1.05
0.85	0.85	24.62	91.9	60.12	3.73	59.06	0.22	1.07
0.86	0.86	25.21	95.1	60.59	3.77	59.53	0.22	1.08
0.87	0.87	25.81	98.4	61.06	3.81	60.00	0.23	1.10

90 CFS, WATER AT RIGHT-OF-WAY

CALLE DE ENTRADA
SOUTH OF LAS LOMITAS

40FT016.OUT

***** PC PROGRAM STREAM SEPTEMBER 1994 *****

MANNING'S N= .017 SLOPE= .016

POINT	DIST	ELEV	POINT	DIST	ELEV	POINT	DIST	ELEV
1	0.00	0.87	5	12.00	0.13	9	50.17	0.67
2	9.38	0.67	6	30.00	0.49	10	50.63	0.67
3	9.83	0.67	7	48.00	0.13	11	60.00	0.83
4	10.00	0.00	8	50.00	0.00	12	0.00	0.00

WSEL (FT)	DEPTH INC (FT)	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID (FT)	VEL HEAD (FT)	ENERGY HEAD (FT)
0.01	0.01	0.00	0.0	0.33	0.31	0.31	0.00	0.01
0.02	0.02	0.01	0.0	0.66	0.50	0.63	0.00	0.02
0.03	0.03	0.01	0.0	0.99	0.65	0.94	0.01	0.04
0.04	0.04	0.03	0.0	1.32	0.79	1.25	0.01	0.05
0.05	0.05	0.04	0.0	1.64	0.91	1.56	0.01	0.06
0.06	0.06	0.06	0.1	1.97	1.03	1.88	0.02	0.08
0.07	0.07	0.08	0.1	2.30	1.14	2.19	0.02	0.09
0.08	0.08	0.10	0.1	2.63	1.25	2.50	0.02	0.10
0.09	0.09	0.13	0.2	2.96	1.35	2.81	0.03	0.12
0.10	0.10	0.16	0.2	3.29	1.45	3.13	0.03	0.13
0.11	0.11	0.19	0.3	3.62	1.55	3.44	0.04	0.15
0.12	0.12	0.23	0.4	3.95	1.64	3.75	0.04	0.16
0.13	0.13	0.26	0.5	4.28	1.73	4.07	0.05	0.18
0.14	0.14	0.31	0.5	5.30	1.67	5.07	0.04	0.18
0.15	0.15	0.37	0.6	6.32	1.65	6.08	0.04	0.19
0.16	0.16	0.43	0.7	7.34	1.67	7.08	0.04	0.20
0.17	0.17	0.51	0.9	8.36	1.71	8.09	0.05	0.22
0.18	0.18	0.59	1.0	9.38	1.76	9.09	0.05	0.23
0.19	0.19	0.69	1.2	10.40	1.81	10.10	0.05	0.24
0.20	0.20	0.80	1.5	11.42	1.87	11.10	0.05	0.25
0.21	0.21	0.91	1.8	12.44	1.94	12.11	0.06	0.27
0.22	0.22	1.04	2.1	13.46	2.00	13.11	0.06	0.28
0.23	0.23	1.17	2.4	14.49	2.07	14.12	0.07	0.30
0.24	0.24	1.32	2.8	15.51	2.14	15.12	0.07	0.31
0.25	0.25	1.48	3.3	16.53	2.21	16.13	0.08	0.33
0.26	0.26	1.64	3.7	17.55	2.28	17.13	0.08	0.34
0.27	0.27	1.82	4.3	18.57	2.35	18.14	0.09	0.36
0.28	0.28	2.00	4.9	19.59	2.42	19.14	0.09	0.37
0.29	0.29	2.20	5.5	20.61	2.49	20.15	0.10	0.39
0.30	0.30	2.41	6.2	21.63	2.56	21.15	0.10	0.40
0.31	0.31	2.62	6.9	22.65	2.63	22.16	0.11	0.42
0.32	0.32	2.85	7.7	23.67	2.70	23.16	0.11	0.43
0.33	0.33	3.09	8.5	24.69	2.76	24.17	0.12	0.45
0.34	0.34	3.33	9.4	25.71	2.83	25.17	0.12	0.46
0.35	0.35	3.59	10.4	26.74	2.90	26.18	0.13	0.48
0.36	0.36	3.86	11.4	27.76	2.97	27.18	0.14	0.50
0.37	0.37	4.13	12.5	28.78	3.03	28.19	0.14	0.51
0.38	0.38	4.42	13.7	29.80	3.10	29.19	0.15	0.53
0.39	0.39	4.72	14.9	30.82	3.16	30.20	0.16	0.55
0.40	0.40	5.03	16.2	31.84	3.23	31.20	0.16	0.56
0.41	0.41	5.34	17.6	32.86	3.29	32.21	0.17	0.58
0.42	0.42	5.67	19.0	33.88	3.36	33.21	0.18	0.60
0.43	0.43	6.01	20.6	34.90	3.42	34.22	0.18	0.61

WSEL (FT)	DEPTH INC (FT)	FLOW AREA SQ.FT.	FLOW RATE (CFS)	WETTED PER (FT)	FLOW VEL (FPS)	TOPWID (FT)	VEL HEAD (FT)	ENERGY HEAD (FT)
0.45	0.45	6.71	23.8	36.94	3.55	36.23	0.20	0.65
0.46	0.46	7.08	25.5	37.96	3.61	37.23	0.20	0.66
0.47	0.47	7.46	27.4	38.99	3.67	38.24	0.21	0.68
0.48	0.48	7.84	29.3	40.01	3.73	39.24	0.22	0.70
0.49	0.49	8.24	31.3	41.03	3.79	40.25	0.22	0.71
0.50	0.50	8.64	33.8	41.05	3.91	40.25	0.24	0.74
0.51	0.51	9.05	36.5	41.07	4.03	40.26	0.25	0.76
0.52	0.52	9.45	39.2	41.09	4.15	40.26	0.27	0.79
0.53	0.53	9.85	42.0	41.11	4.27	40.27	0.28	0.81
0.54	0.54	10.25	44.9	41.13	4.38	40.27	0.30	0.84
0.55	0.55	10.66	47.9	41.15	4.49	40.28	0.31	0.86
0.56	0.56	11.06	50.9	41.17	4.60	40.28	0.33	0.89
0.57	0.57	11.46	54.0	41.19	4.71	40.29	0.34	0.91
0.58	0.58	11.87	57.2	41.21	4.82	40.29	0.36	0.94
0.59	0.59	12.27	60.5	41.23	4.93	40.30	0.38	0.97
0.60	0.60	12.67	63.8	41.25	5.03	40.30	0.39	0.99

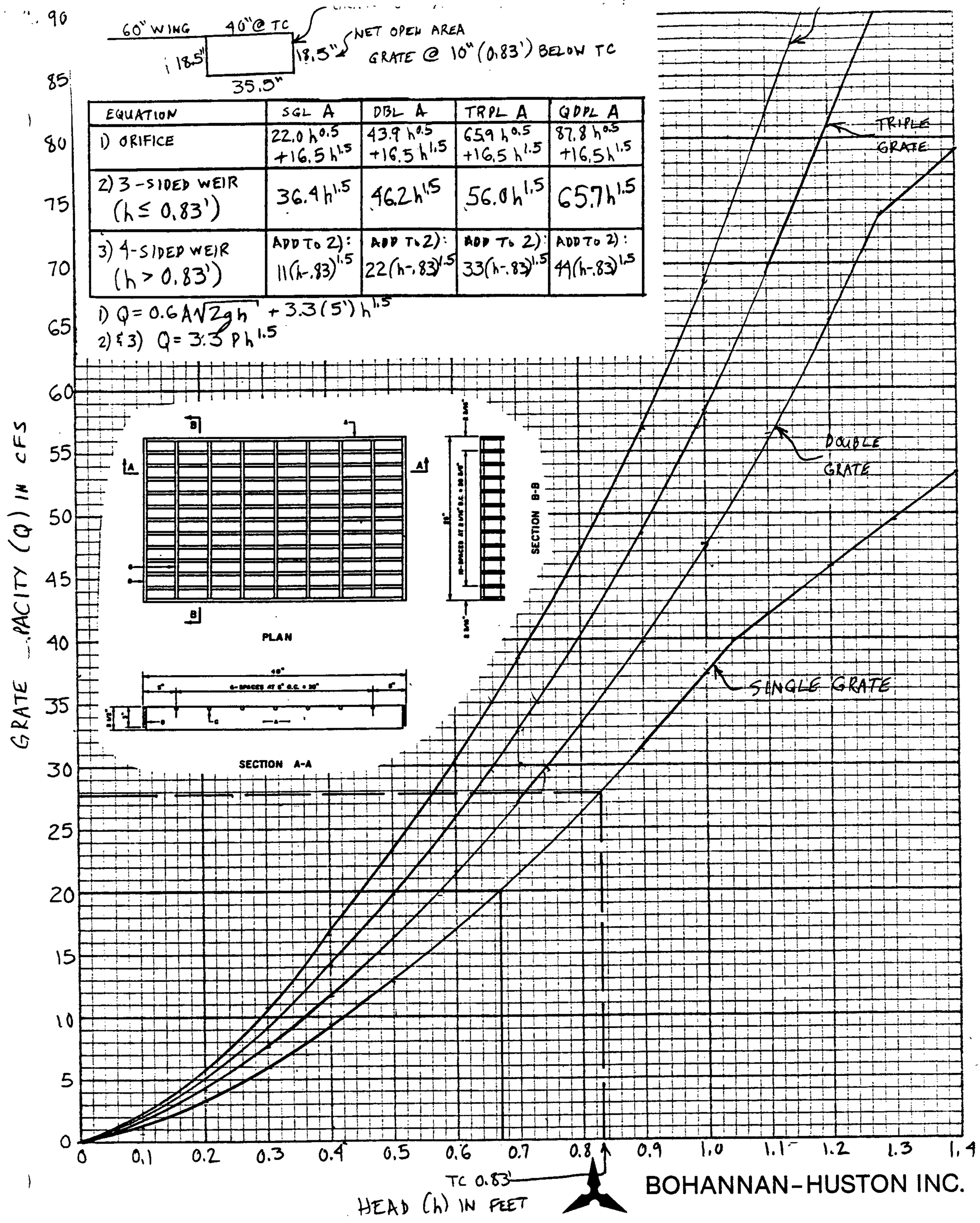
0.61	0.61	13.07	67.2	41.27	5.14	40.31	0.41	1.02
0.62	0.62	13.48	70.6	41.29	5.24	40.31	0.43	1.05
0.63	0.63	13.88	74.2	41.32	5.34	40.32	0.44	1.07
0.64	0.64	14.28	77.8	41.34	5.44	40.32	0.46	1.10
0.65	0.65	14.69	81.4	41.36	5.54	40.33	0.48	1.13
0.66	0.66	15.09	85.2	41.38	5.64	40.33	0.49	1.15
0.67	0.67	15.49	89.0	41.40	5.74	40.34	0.51	1.18
0.68	0.68	15.90	91.4	42.45	5.75	42.30	0.51	1.19
0.69	0.69	16.32	93.9	43.51	5.75	43.36	0.51	1.20
0.70	0.70	16.78	95.4	45.47	5.69	44.41	0.50	1.20
0.71	0.71	17.23	98.2	46.53	5.70	45.47	0.50	1.21
0.72	0.72	17.69	101.1	47.58	5.72	46.52	0.51	1.23
0.73	0.73	18.16	104.1	48.64	5.73	47.58	0.51	1.24
0.74	0.74	18.64	107.2	49.69	5.75	48.63	0.51	1.25
0.75	0.75	19.13	110.4	50.75	5.77	49.69	0.52	1.27
0.76	0.76	19.63	113.7	51.80	5.79	50.74	0.52	1.28
0.77	0.77	20.15	117.1	52.86	5.81	51.80	0.52	1.29
0.78	0.78	20.67	120.6	53.91	5.84	52.85	0.53	1.31
0.79	0.79	21.20	124.2	54.97	5.86	53.91	0.53	1.32
0.80	0.80	21.75	128.0	56.02	5.88	54.96	0.54	1.34
0.81	0.81	22.30	131.8	57.08	5.91	56.01	0.54	1.35
0.82	0.82	22.87	135.7	58.13	5.94	57.07	0.55	1.37
0.83	0.83	23.44	139.8	59.19	5.96	58.12	0.55	1.38
0.84	0.84	24.03	144.9	59.65	6.03	58.59	0.56	1.40
0.85	0.85	24.62	150.1	60.12	6.10	59.06	0.58	1.43
0.86	0.86	25.21	155.3	60.59	6.16	59.53	0.59	1.45
0.87	0.87	25.81	160.7	61.06	6.23	60.00	0.60	1.47

90 CFS, WATER SURFACE AT TOP OF CURB

EQUATION	SGL A	DBL A	TRPL A	QDPL A
1) ORIFICE	$22.0\,h^{0.5} + 16.5\,h^{1.5}$	$43.9\,h^{0.5} + 16.5\,h^{1.5}$	$65.9\,h^{0.5} + 16.5\,h^{1.5}$	$87.8\,h^{0.5} + 16.5\,h^{1.5}$
2) 3-SIDED WEIR ($h \le 0.83'$)	$36.4\,h^{1.5}$	$46.2\,h^{1.5}$	$56.0\,h^{1.5}$	$65.7\,h^{1.5}$
3) 4-SIDED WEIR ($h > 0.83'$)	ADD TO 2): $11(h-.83)^{1.5}$	ADD TO 2): $22(h-.83)^{1.5}$	ADD TO 2): $33(h-.83)^{1.5}$	ADD TO 2): $44(h-.83)^{1.5}$

1) $Q = 0.6A\sqrt{2gh} + 3.3(5')h^{1.5}$

2) & 3) $Q = 3.3\,P\,h^{1.5}$



BOHANNAN-HUSTON INC.

PROJECT NAME _____ SHEET _____ OF _____

PROJECT NO. _____ BY JPK DATE 4/9/92

SUBJECT RATING CURVE FOR TYPE A INLETS CH'D _____ DATE B-13

Shaded cells require user input. Non-shaded cells cannot be edited.*

CIELO OESTE SUBDIVISION - STORM DRAIN ANALYSIS

MIREHAVEN DIVERSION CHANNEL TO TRACT A-1 POND

***** HYDRAULIC GRADE LINE CALCULATIONS *****

Manning's n = 0.013
for pipe

Station	Structure	Diam. (in.)	Q (cfs)	Area	Vel.	K	Sf	Length (ft.)	MH Dia. (ft.)	JNCT Angle	Hf	Hb	Hj	Hmh	Ht	Total Losses	HGL(dn)	HGL(up)	Notes	Low Point	HV	EGL(dn)	EGL(up)
0.00	CHANNEL OUTLET								0.00	0.00		0.00	0.00	0.06	0.00	0.06		5200.30		5200.30	1.17		5201.47
		36	61.3	7.07	8.67	667	0.0084	57.40			0.48					0.48			1				
57.40	SD MH 1								6.00	45.00		0.17	0.00	0.06	0.00	0.22	5200.78	5201.01		5203.00	1.17	5201.95	5202.18
		36	61.3	7.07	8.67	667	0.0084	168.90			1.43					1.43			1				
226.30	SD MH 2								6.00	0.00		0.00	0.00	0.06	0.00	0.06	5202.44	5202.49		5206.00	1.17	5203.60	5203.66
		36	61.3	7.07	8.67	667	0.0084	250.60			2.12					2.12			1				
476.90	SD MH 3								6.00	0.00		0.00	0.50	0.06	0.00	0.56	5204.61	5205.13		5206.50	1.20	5205.78	5206.33
		30	43.2	4.91	8.80	410	0.0111	188.00			2.09					2.09			2				
664.90	SD MH 4								6.00	45.00		0.28	0.00	0.15	0.08	0.50	5207.22	5205.99		5210.50	2.94	5208.42	5208.92
		24	43.2	3.14	13.76	226	0.0365	93.00			3.39					3.39			2				
757.90	POND INLET								0.00	0.00		0.00	0.00	0.15	0.00	0.15	5209.38	5209.53		5214.00	2.94	5212.32	5212.47
		24	43.2	3.14	13.76	226	0.0365	0.00			0.00					0.00			2				
757.90									0.00	0.00		0.00	0.00	0.00	0.00	0.00	5209.53	5209.82		5214.00	2.64	5212.47	5212.47
		24	41.0	3.14	13.05	226	0.0328	0.00			0.00					0.00							

Notes:

1 Flow rate is based on 100-year flow in Basin A2 (5.2 cfs), Basin A4 (26.8 cfs) and the discharge from the detention pond at t=1.5 hours (29.3 cfs).

2 Flow rate is based on the peak discharge from the detention pond (t=1.8 hours).

CIELO OESTE SUBDIVISION
Overflow, Pond Volume and Energy Dissipater Calculations
August 5, 2002

1. Emergency Overflow in Cielo Oeste Place

Flowline elevation at low point in Calle de Entrada is 5206.34. High point in Cielo Oeste Place is 5206.84. Minimum pad elevation is 5208.07. Using the weir equation, check that depth of water over the high point is less than the minimum pad elevation for the 100-year storm.

$$Q = CLH^{1.5}$$

Where Q is the flow in cfs, C is the weir coefficient, L is the length of the weir in feet, and H is the depth of flow in feet. Using $C = 3.0$, $L = 50$ feet (right-of-way width), and a depth of 1.23 feet (5208.07-5206.84), the street capacity is 204 cfs. The 100-year flow is 161 cfs (129 cfs from Las Lomitas, 26.8 cfs from Basin A4, and 5.2 cfs from Basin A2). Solving for depth using the 100-year flow in the weir equation gives a water depth of 1.05 feet, which is less than 1.23 feet. Therefore, the emergency overflow can pass the 100-year storm without inundating the lowest pad.

2. Detention Pond Emergency Overflow Spillway

The overflow spillway for the detention pond is sized to pass the 100-year storm of 128.88 cfs. Using the weir equation and the 100-year flow, determine the spillway length for a given head on the spillway.

$$Q = CLH^{1.5}$$

Where Q is the flow in cfs, C is the weir coefficient, L is the length of the spillway crest in feet, and H is the head on the spillway in feet. Solving for L using $C = 3.3$, $H = 1.2$ feet and $Q = 128.88$ cfs in the weir equation gives a spillway crest length of 30 feet.

3. Riprap basin energy dissipater

The proposed storm drain outfall to the Mirehaven Diversion Channel is a 36-inch flared end section discharging to a riprap basin. The riprap basin is designed following the procedure presented by Stevens and Urbonas (Design of Low Tailwater Riprap Basins for

Storm Sewer Pipe Outlets). The pipe is under pressure flow, with a design discharge of 61.3 cubic feet per second (cfs) and velocity of 8.67 feet per second (fps). Knowing the velocity and depth of flow (= pipe diameter), the riprap can be designed using the following equation for the riprap sizing parameter, P_d:

$$P_d = \left(V^2 + gd\right)^{0.5}$$

With V = 8.67 fps and d = 3.0 feet, P_d equals 13.11. From Figure 4, use riprap type L. The median (D_{50}) rock size for Type L riprap is 9 inches.

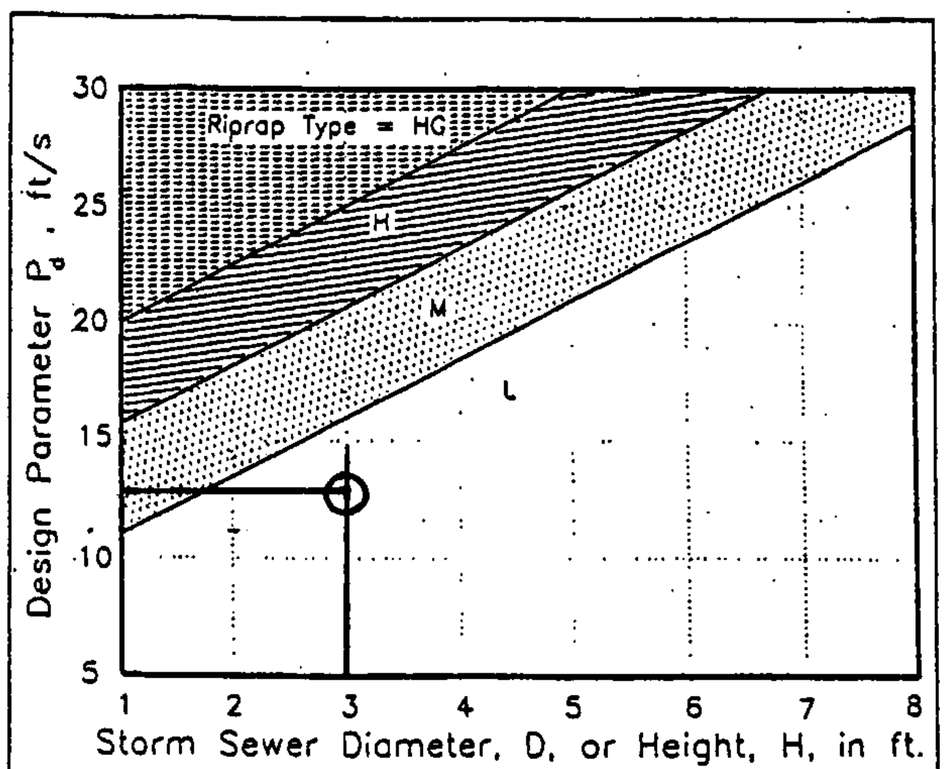


Figure 4: Riprap selection chart for low tailwater basin at pipe outlets

The thickness of the riprap layer is 15.75 inches, given from the equation T = 1.75 D_{50}. Use 16 inches.

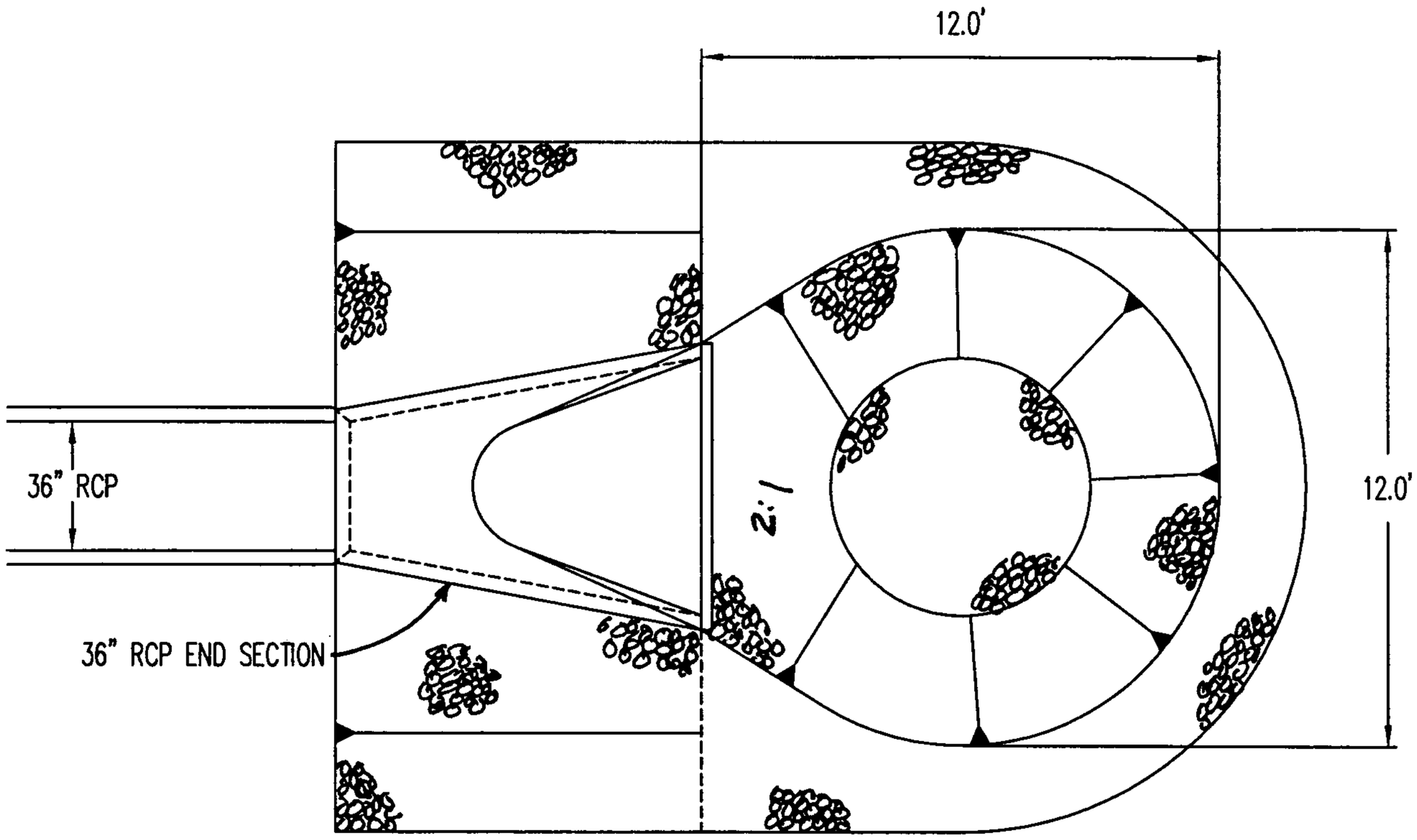
The basin length is 12 feet based on the greater length given by 4D or $D^{0.5}(V/2)$. Where D is the pipe diameter.

The basin width is equal to 4D or 12 feet.

Depth of the basin is 0.5D or 1.5 feet.

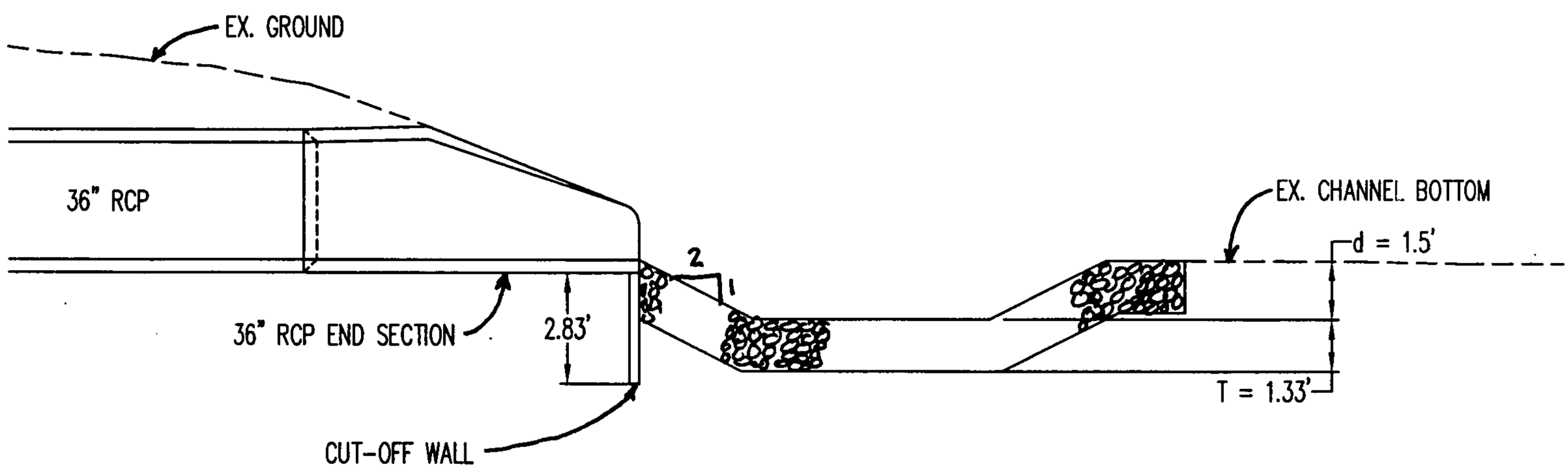
The depth of the cutoff wall at the end of the flared end section is 2.83 feet, from the equation D/2 + T.

CIELO OESTE SUBDIVISION
RIPRAP BASIN



PLAN

NTS



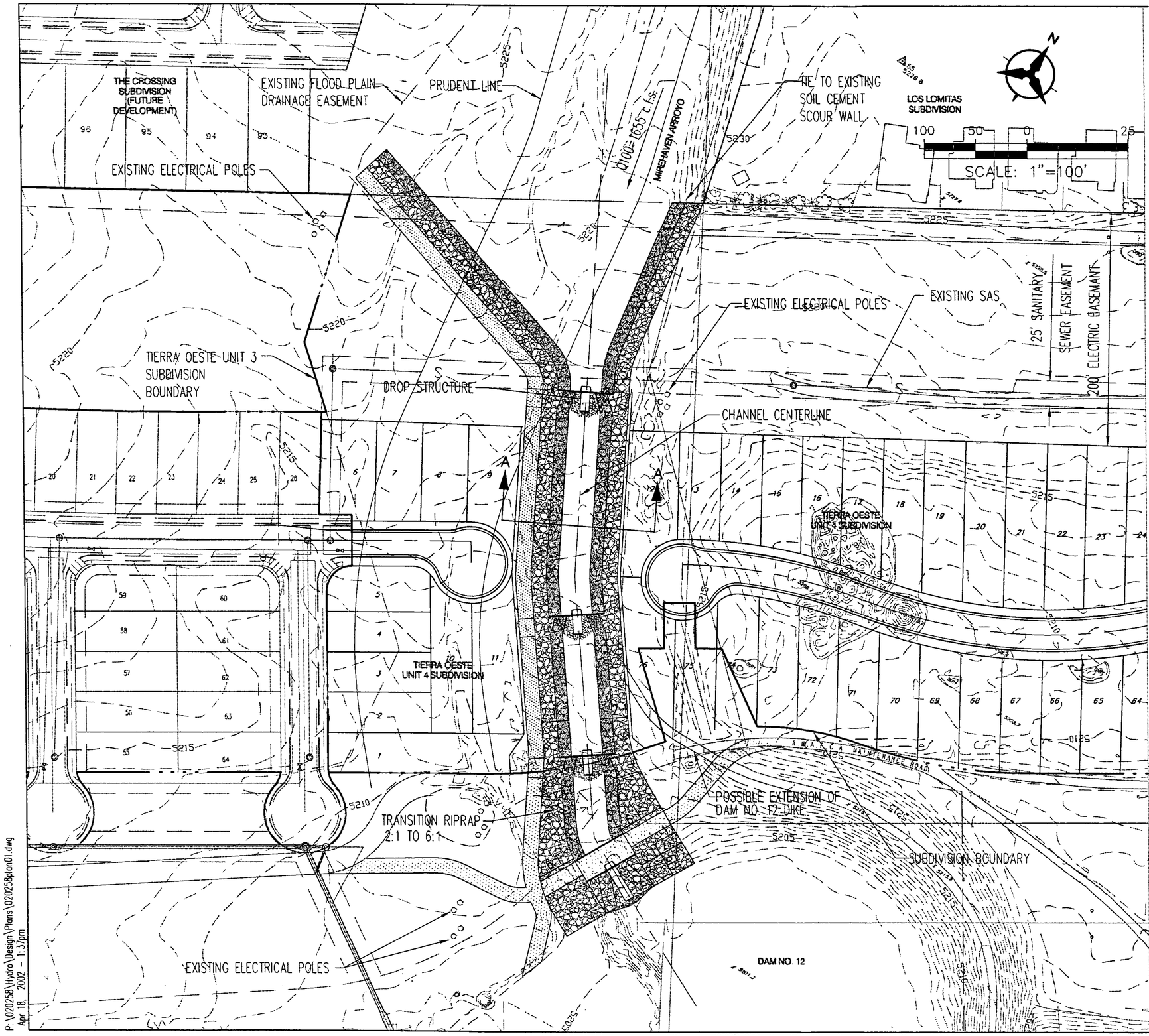
PROFILE

NTS

B-17/17

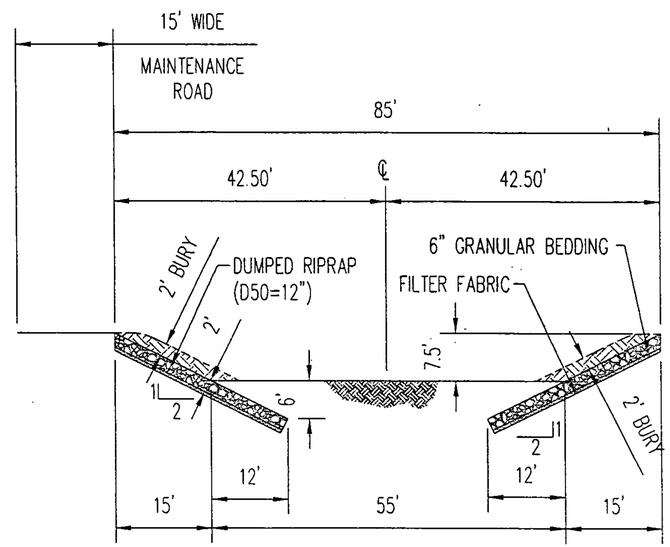
APPENDIX C

MIREHAVEN CHANNEL IMPROVEMENTS AND HEC-RAS OUTPUT FILES



LEGEND

- SOIL CEMENT
- PROPOSED AMAFCA MAINTENANCE ROAD
- DUMPED RIPRAP
- BURIED DUMPED RIPRAP



SECTION A-A TYPICAL CHANNEL SECTION
N.T.S.

Bohannan ▲ Huston
Courtyard One 7500 JEFFERSON NE Albuquerque NEW MEXICO 87109
ENGINEERS PLANNERS PHOTOGRAMMETRISTS SURVEYORS SOFTWARE DEVELOPERS

ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

PROPOSED MIREHAVEN CHANNEL

LAYOUT PLAN
FIGURE 1

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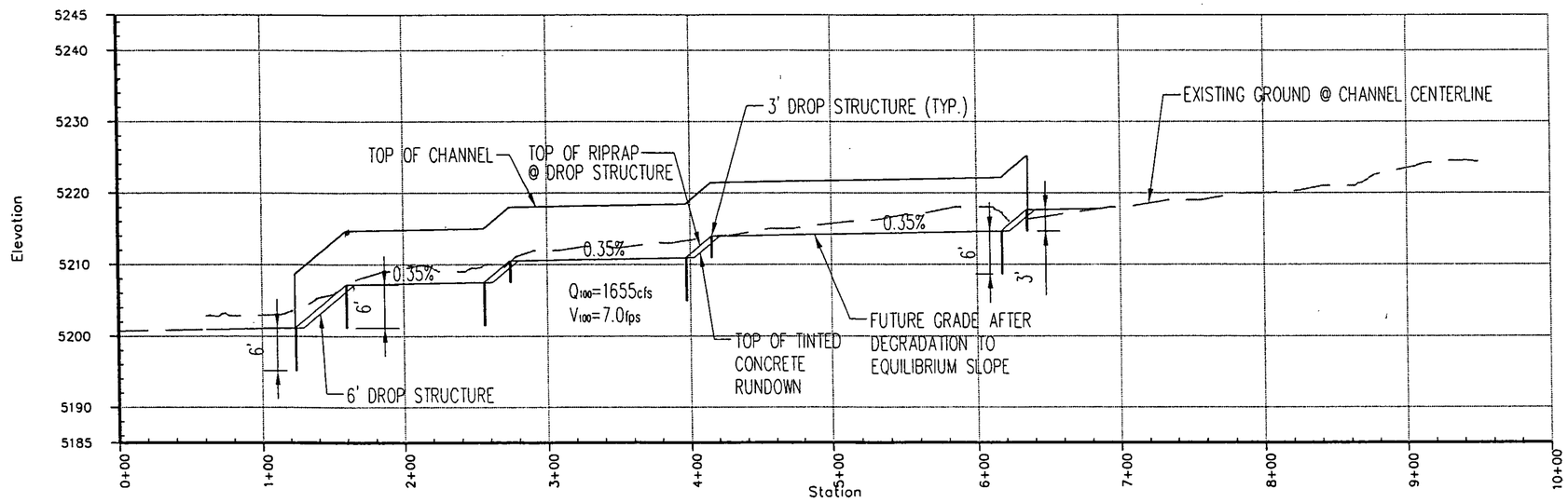
Apr 18, 2002 - 1:37pm

C-1



SCALE:
1" = 100' (HORIZ.)
1" = 20' (VERT.)

Bohannan ▲ Huston

Courtyard One 7500 JEFFERSON NE Albuquerque NEW MEXICO 87109

ENGINEERS PLANNERS PHOTOGRAMMETRISTS SURVEYORS SOFTWARE DEVELOPERS

ALBUQUERQUE METROPOLITAN
ARROYO FLOOD CONTROL AUTHORITY

PROPOSED
MIREHAVEN CHANNEL

CHANNEL PROFILE
FIGURE 2

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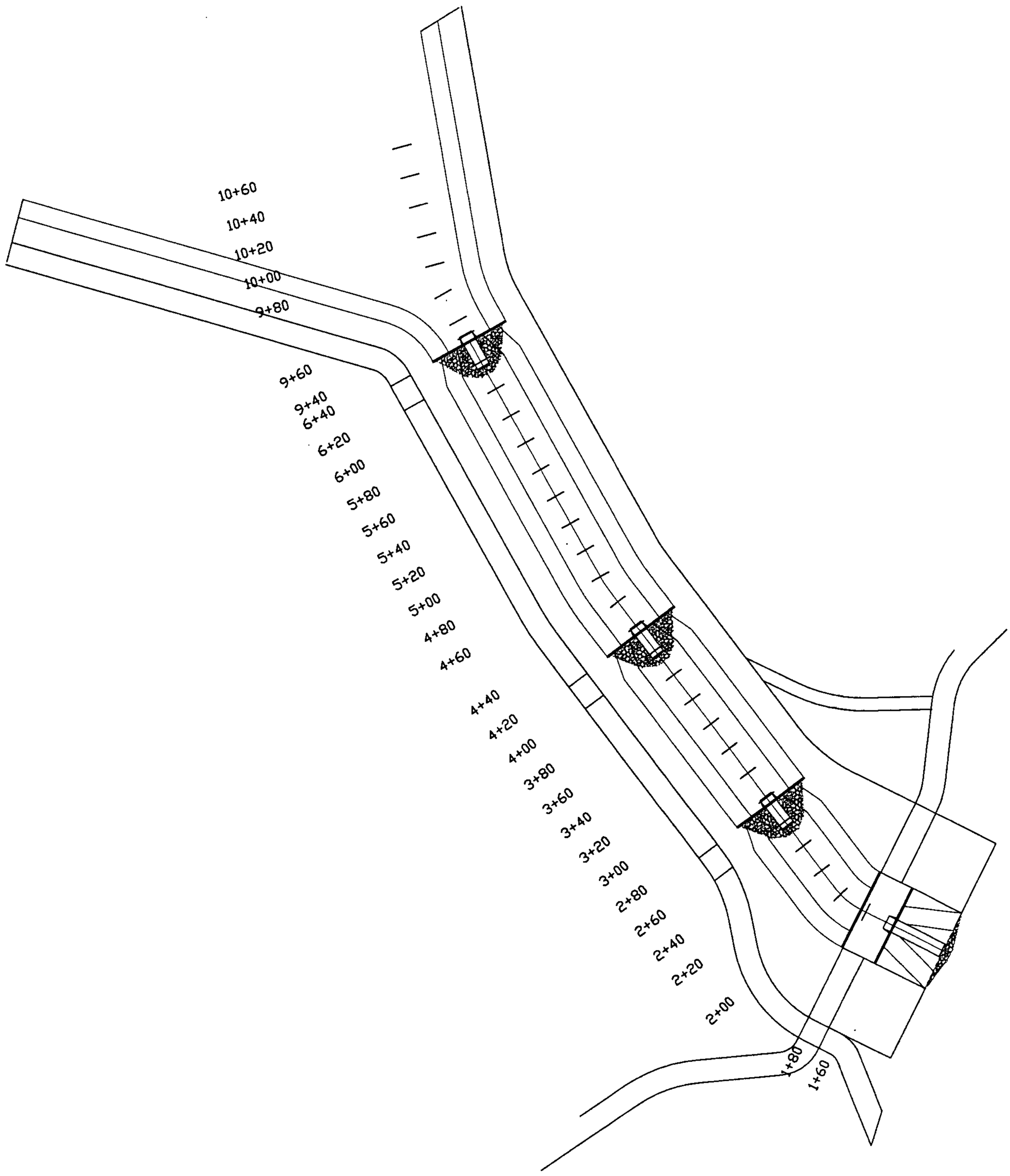
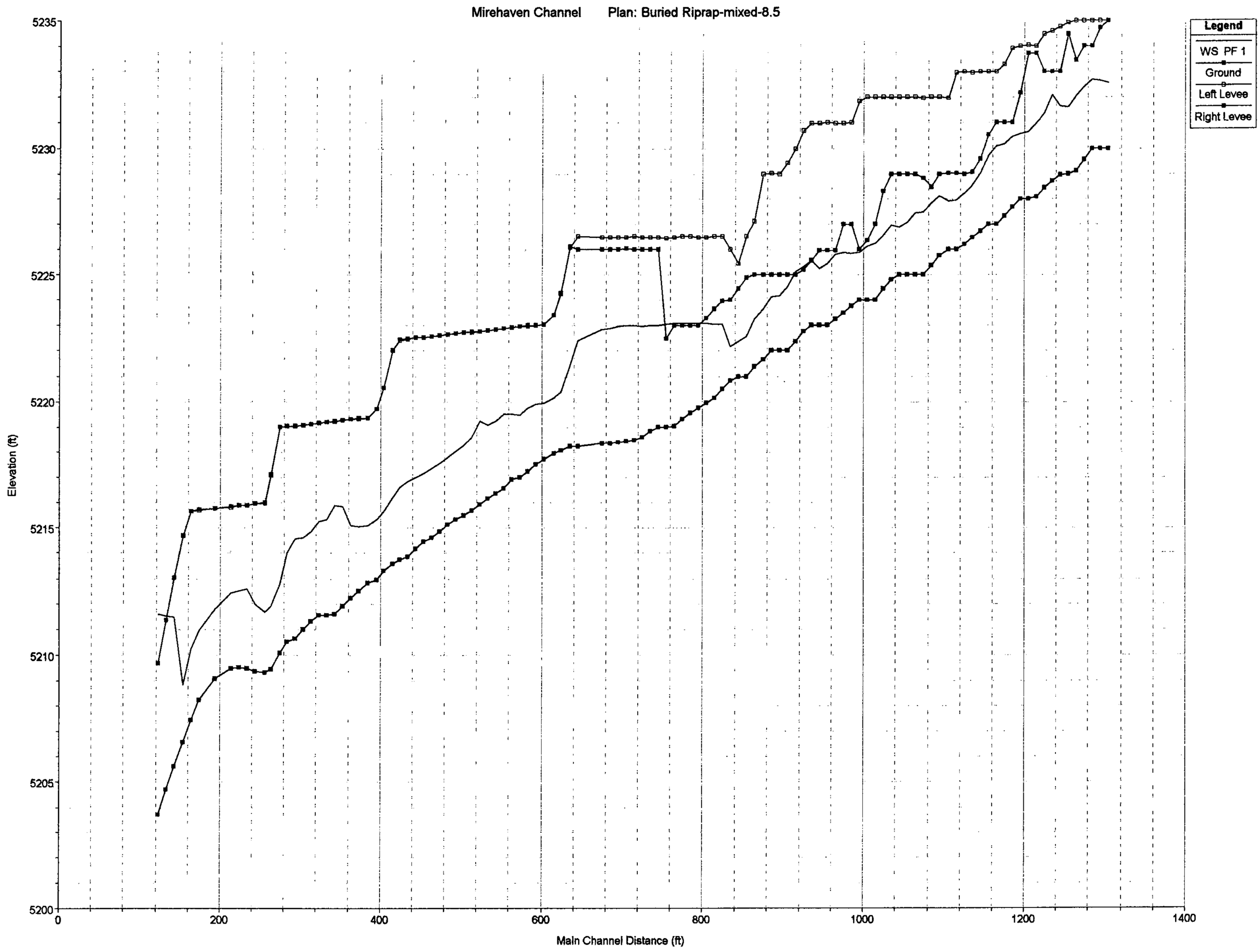
Apr 18, 2002 - 11:16am

C-2

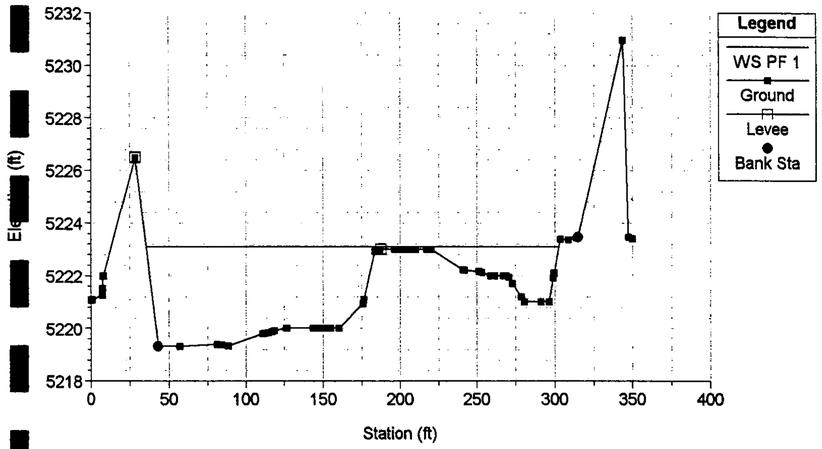

10+60
10+40
10+20
10+00
9+80
9+60
9+40
6+40
6+20
6+00
5+80
5+60
5+40
5+20
5+00
4+80
4+60
4+40
4+20
4+00
3+80
3+60
3+40
3+20
3+00
2+80
2+60
2+40
2+20
2+00
1+80
1+60

HEC-RAS Plan: BurRR-mix8.5 River: Stream Reach: Reach Profile: PF 1					
River Sta	Q Total	W.S. Elev	L. Levee Frbrd	R. Levee Frbrd	
	(cfs)	(ft)	(ft)	(ft)	
1036.00	1655	5223.03	3.43	2.96	
1026.00	1655	5223.00	3.46	3.00	
1016.00	1655	5222.97	3.52	3.02	
1006.00	1655	5223.03	3.47	2.97	
996.00	1655	5223.00	3.49	3.03	
986.00	1655	5222.96	3.53	3.04	
976.00	1655	5222.91	3.58	3.09	
966.00	1655	5222.85	3.64	3.15	
936.00	1655	5222.40	4.10	3.60	
634.73	1655	5221.42	4.68	4.70	
623.60	1655	5220.40	3.88	3.85	
615.73	1655	5220.15	3.25	3.25	
603.60	1655	5219.96	3.10	3.09	
593.60	1655	5219.90	3.13	3.12	
583.60	1655	5219.74	3.24	3.26	
573.60	1655	5219.48	3.49	3.49	
563.60	1655	5219.50	3.42	3.42	
553.60	1655	5219.52	3.37	3.37	
543.60	1655	5219.22	3.64	3.64	
533.60	1655	5219.06	3.77	3.77	
523.60	1655	5219.25	3.53	3.53	
513.60	1655	5218.60	4.16	4.14	
503.60	1655	5218.26	4.47	4.47	
493.60	1655	5218.02	4.67	4.67	
483.60	1655	5217.82	4.83	4.84	
473.60	1655	5217.58	5.03	5.02	
463.60	1655	5217.37	5.22	5.22	
453.60	1655	5217.17	5.38	5.38	
443.60	1655	5217.01	5.51	5.51	
433.60	1655	5216.85	5.62	5.65	
423.60	1655	5216.61	5.81	5.83	
415.00	1655	5216.22	5.80	5.80	
403.60	1655	5215.67	4.87	4.87	
395.86	1655	5215.32	4.39	4.39	
383.60	1655	5215.11	4.25	4.25	
373.60	1655	5215.07	4.26	4.28	
363.60	1655	5215.07	4.23	4.23	
353.60	1655	5215.84	3.43	3.43	
343.60	1655	5215.88	3.33	3.36	
333.60	1655	5215.35	3.84	3.83	
323.60	1655	5215.26	3.91	3.91	
313.60	1655	5214.84	4.28	4.28	
303.60	1655	5214.62	4.44	4.46	
293.60	1655	5214.58	4.46	4.46	
283.60	1655	5214.02	5.00	5.00	
274.89	1655	5212.76	6.24	6.22	
263.60	1655	5211.89	5.20	5.22	
255.89	1655	5211.67	4.31	4.32	
243.60	1655	5211.98	3.99	3.99	
233.60	1655	5212.57	3.30	3.33	
223.60	1655	5212.50	3.38	3.38	
213.60	1655	5212.43	3.39	3.42	
193.60	1655	5211.78	3.97	3.97	
173.60	1655	5210.93	4.76	4.78	


Mirehaven Channel Plan: Buried Riprap-mixed-8.5
Legend
WS PF 1
Ground
Left Levee
Right Levee
Elevation (ft)
5235
5230
5225
5220
5215
5210
5205
5200
0
200
400
600
800
1000
1200
1400
Main Channel Distance (ft)

C-5

Mirehaven Channel Plan: Buried Riprap-mixed-8.5
RS = 1066.000



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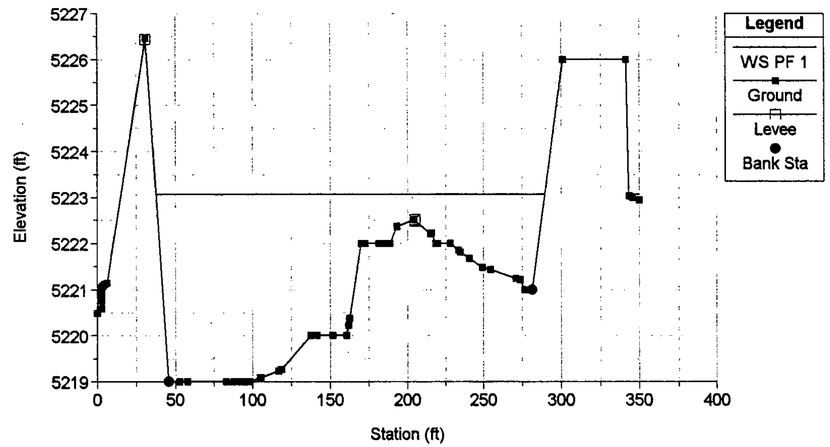

Mirehaven Channel Plan: Buried Riprap-mixed-8.5
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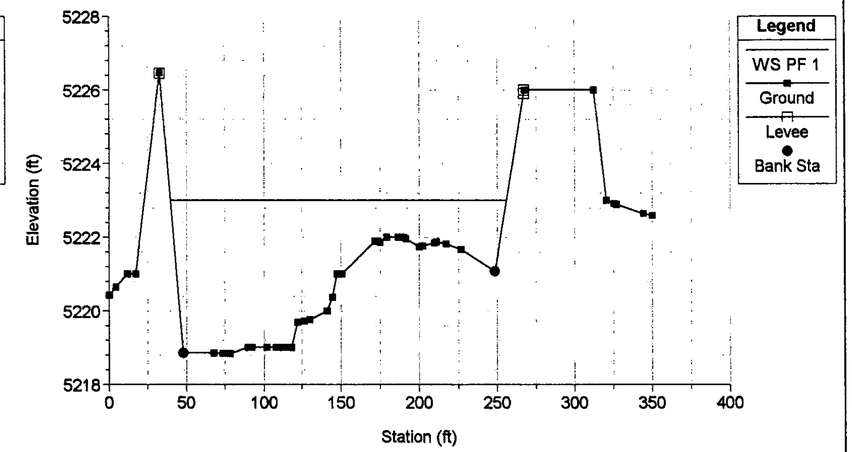

Mirehaven Channel Plan: Buried Riprap-mixed-8.5
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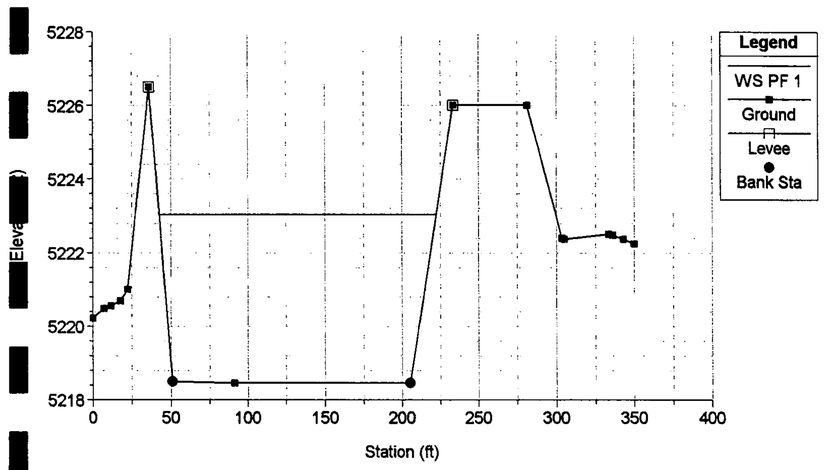

Mirehaven Channel Plan: Buried Riprap-mixed-8.5
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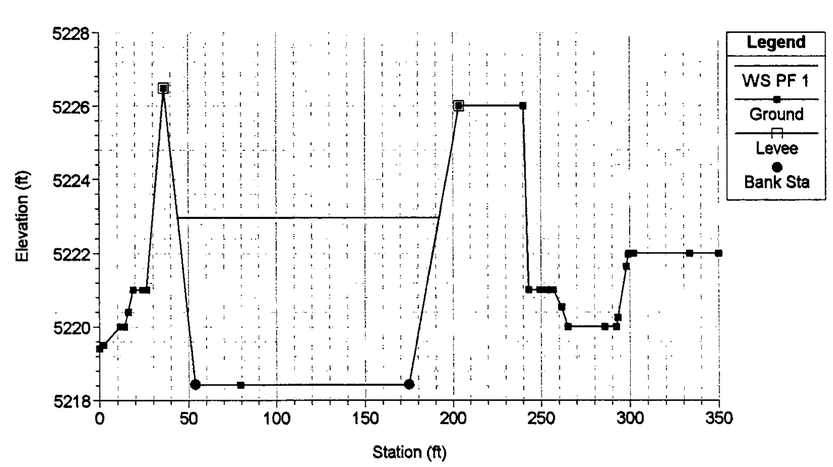
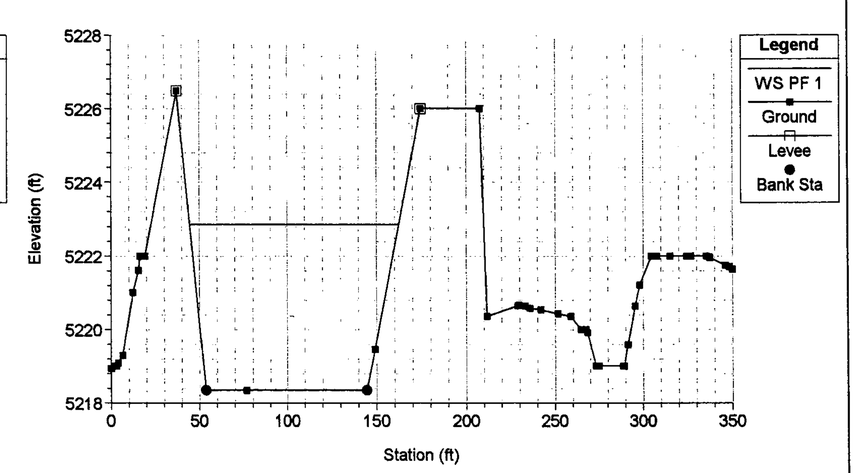
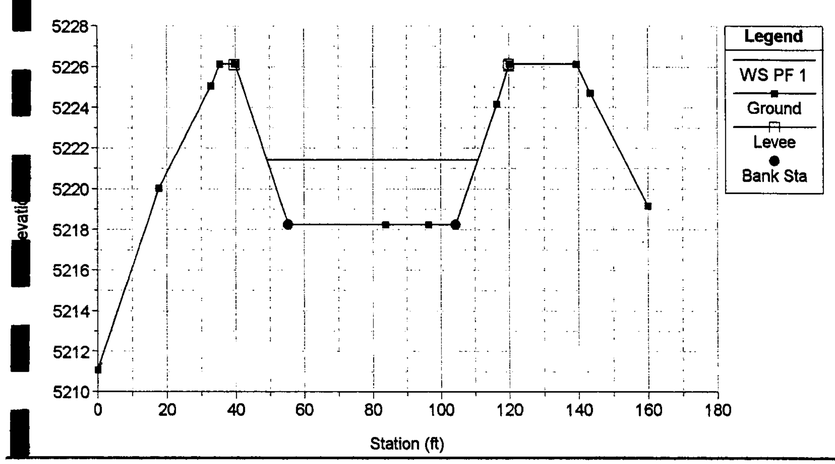


Mirehaven Channel Plan: Buried Riprap-mixed-8.5
RS = 966.0000



Mirehaven Channel Plan: Buried Riprap-mixed-8.5
RS = 634.7346



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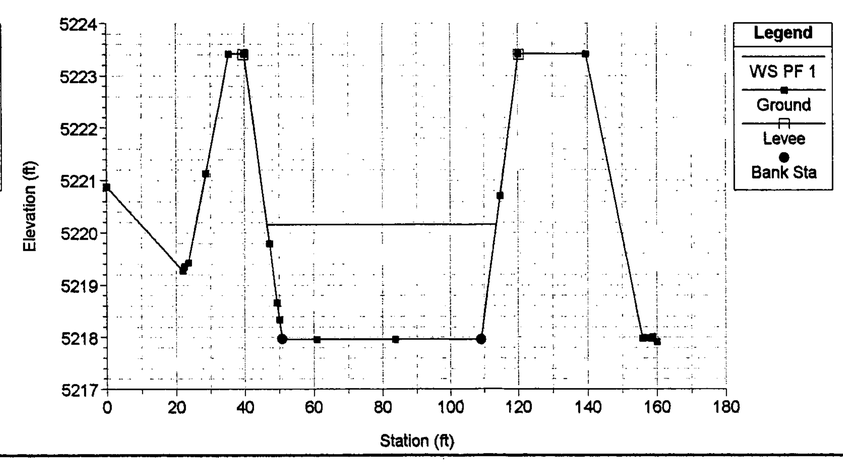
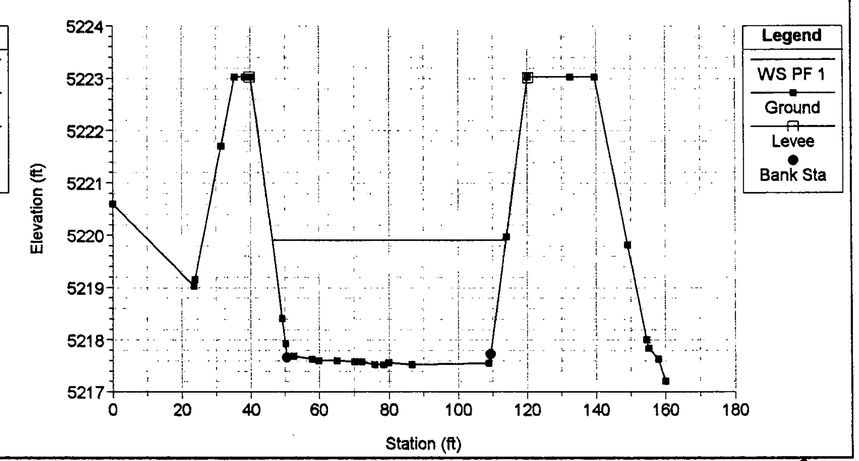


Mirehaven Channel Plan: Buried Riprap-mixed-8.5
RS = 593.6046



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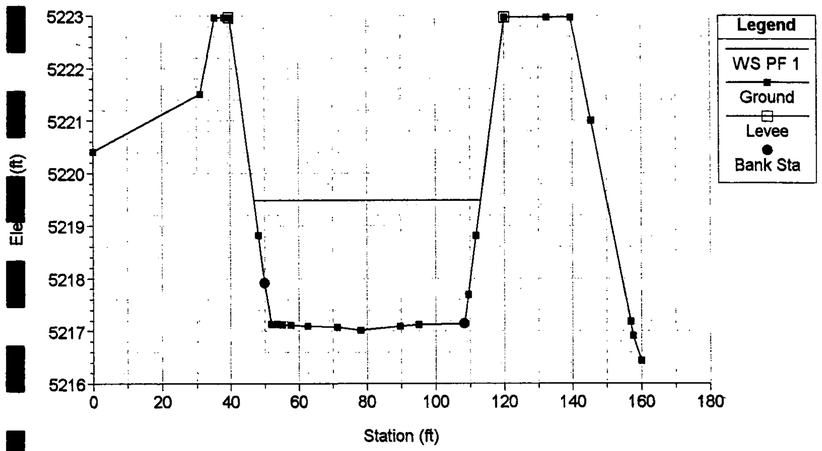

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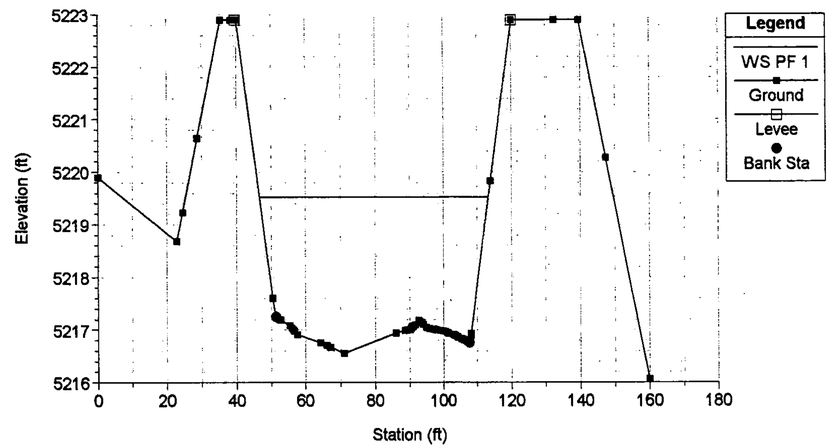
RS = 553.6046



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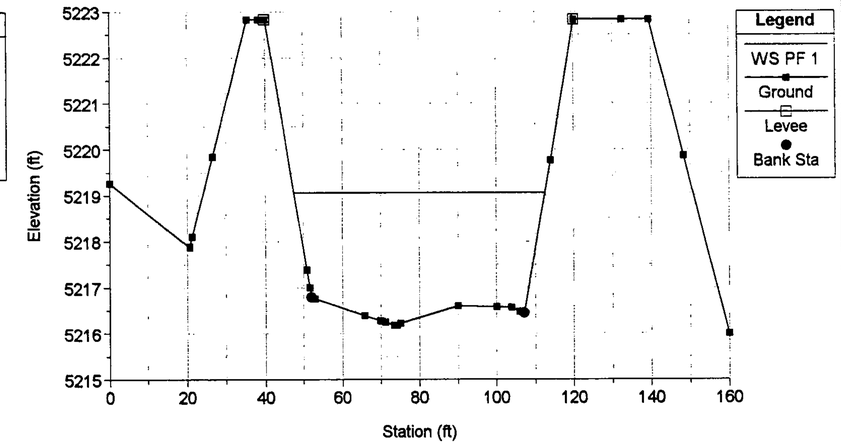

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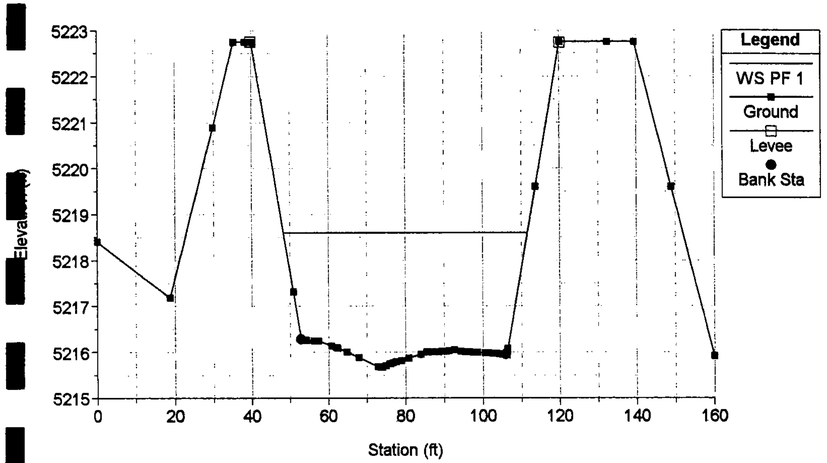

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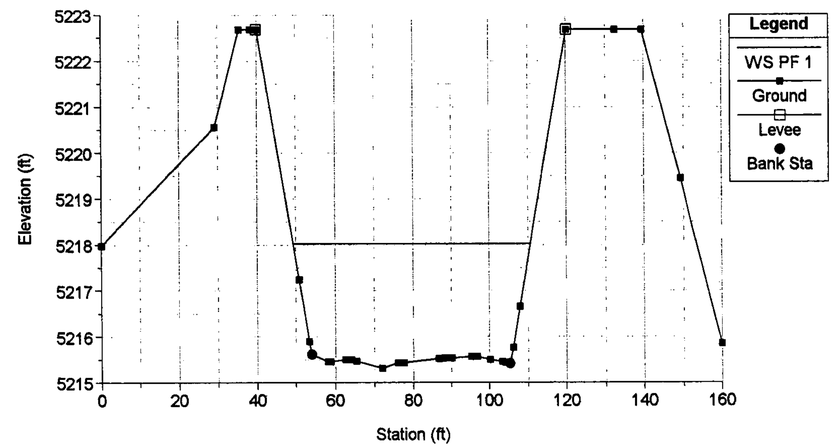

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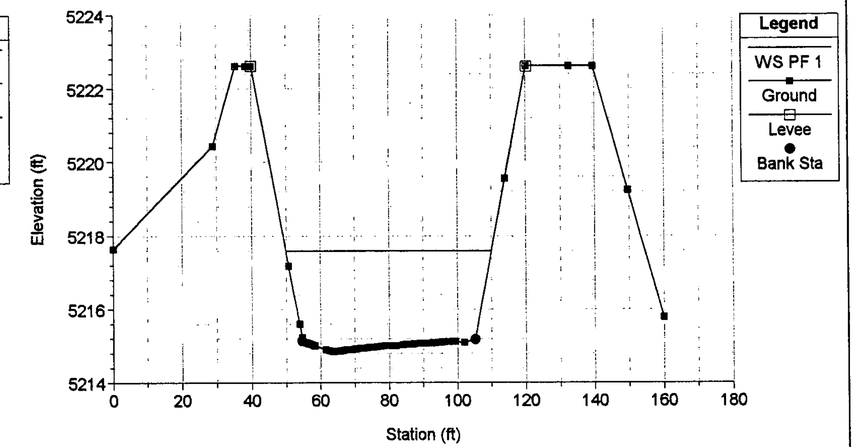
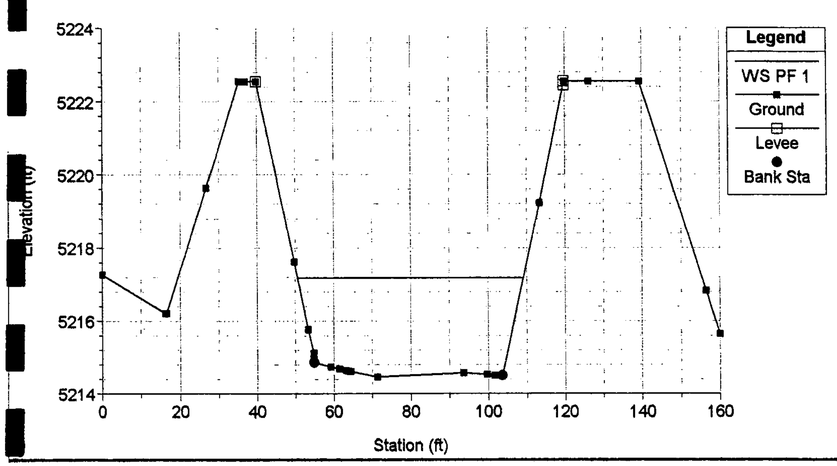


Mirehaven Channel Plan: Buried Riprap-mixed-8.5
RS = 453.6046



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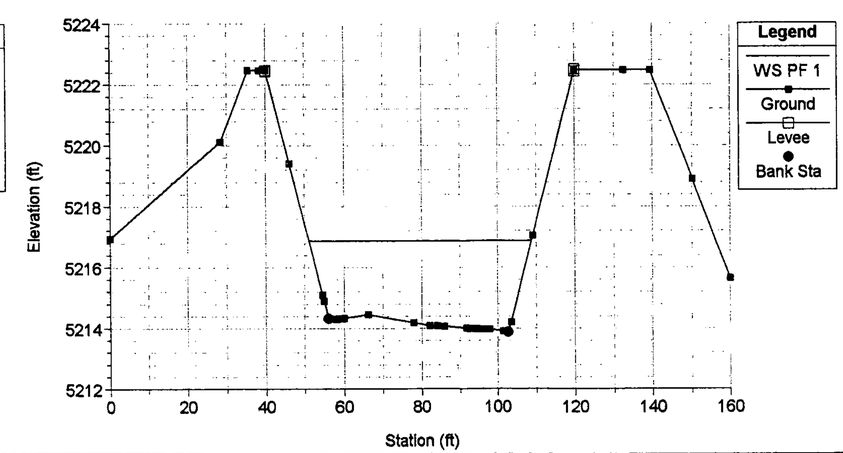
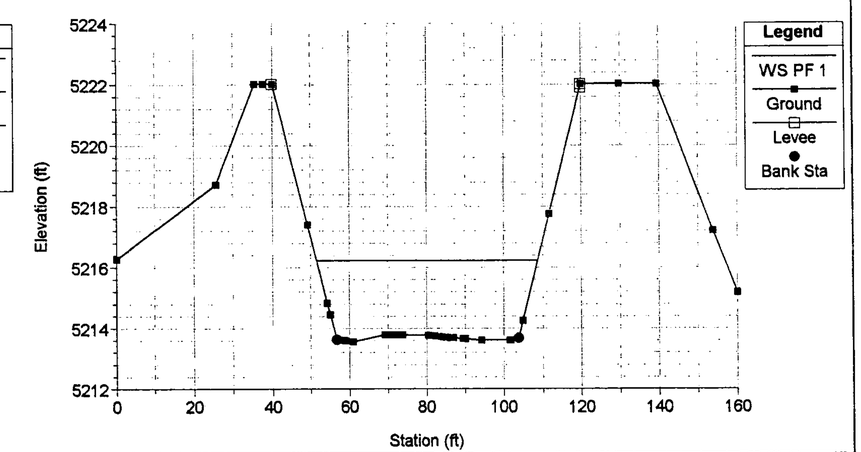


Mirehaven Channel Plan: Buried Riprap-mixed-8.5
RS = 415.0000



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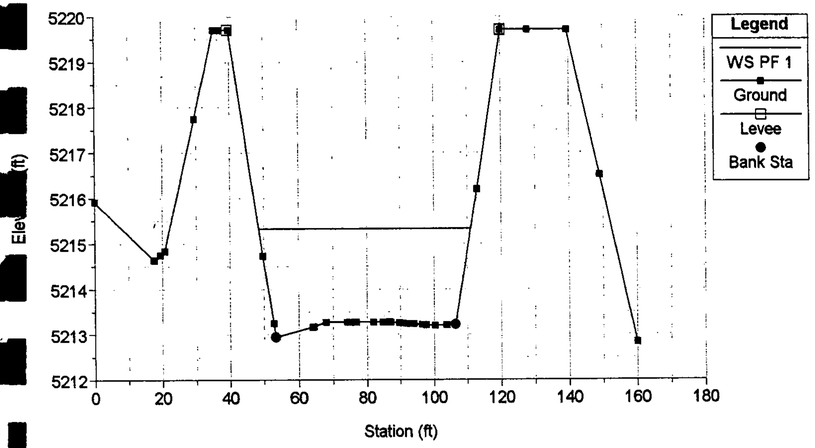
RS = 395.8620



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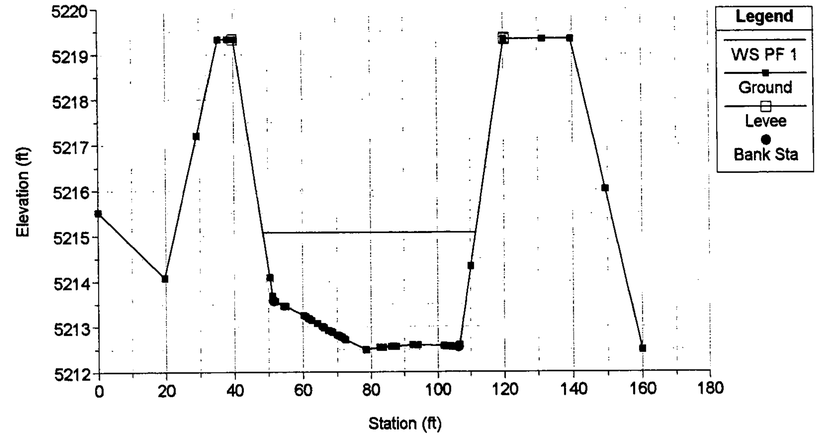
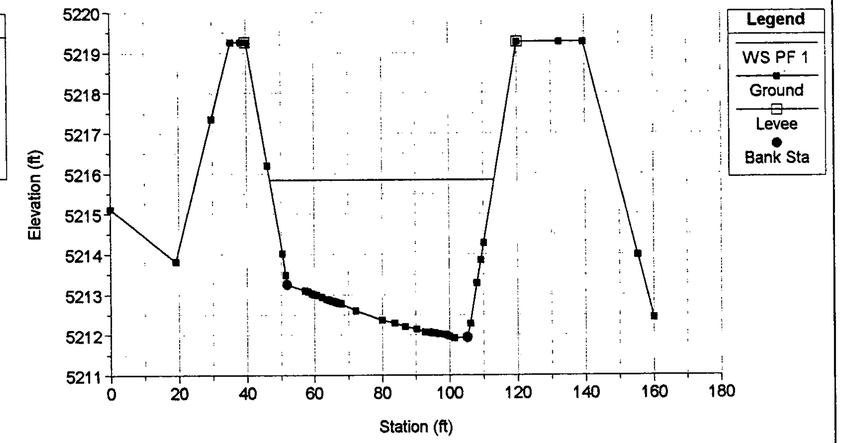
RS = 373.6046



Mirehaven Channel Plan: Buried Riprap-mixed-8.5
RS = 353.6046



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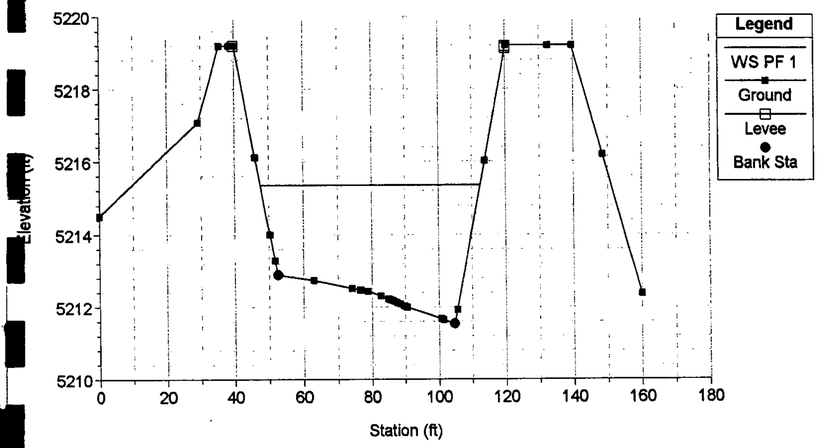

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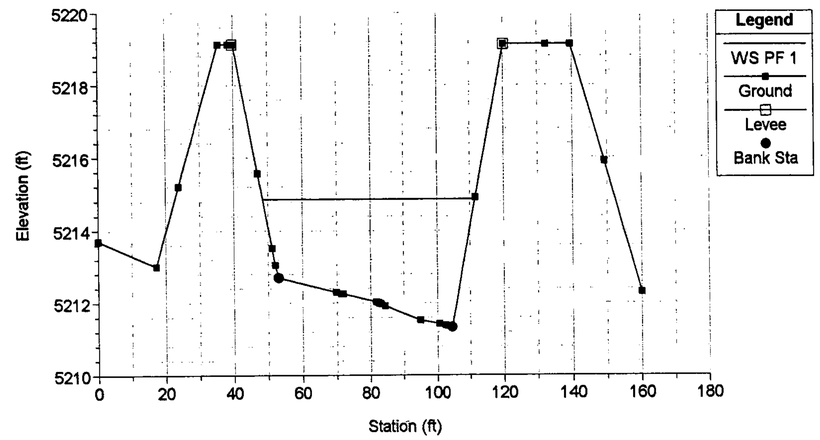

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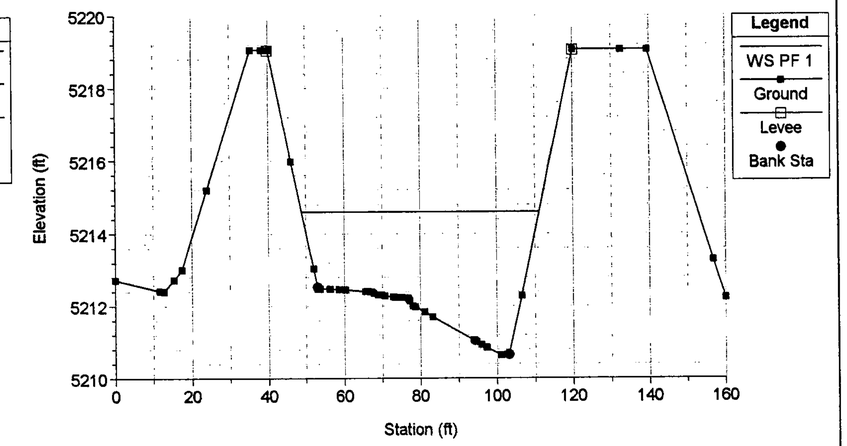
RS = 293.6046



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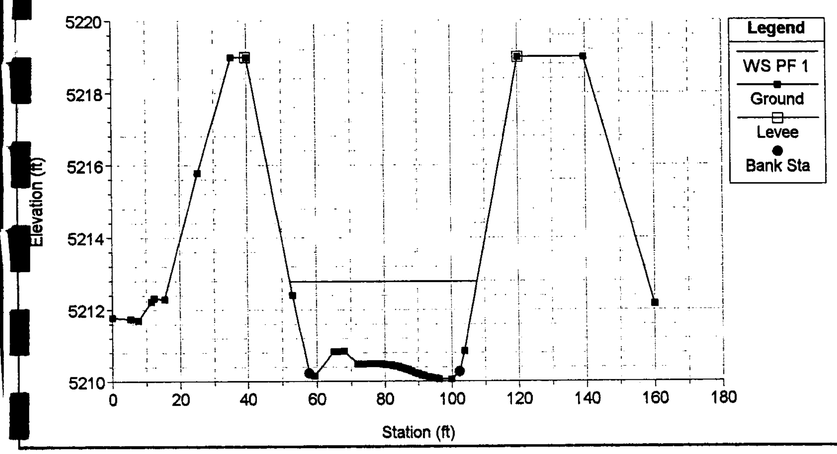

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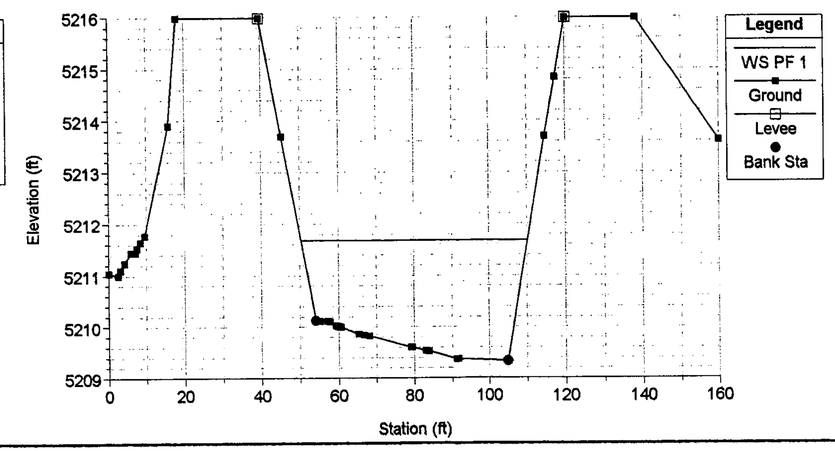

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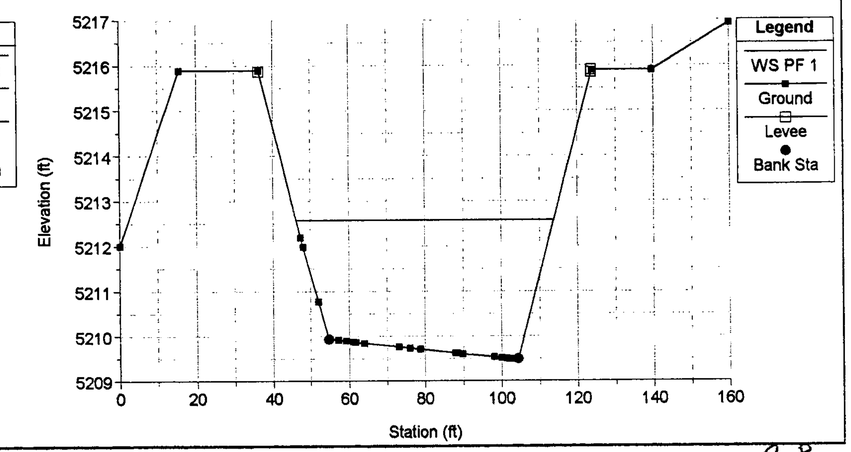
RS = 233.6046



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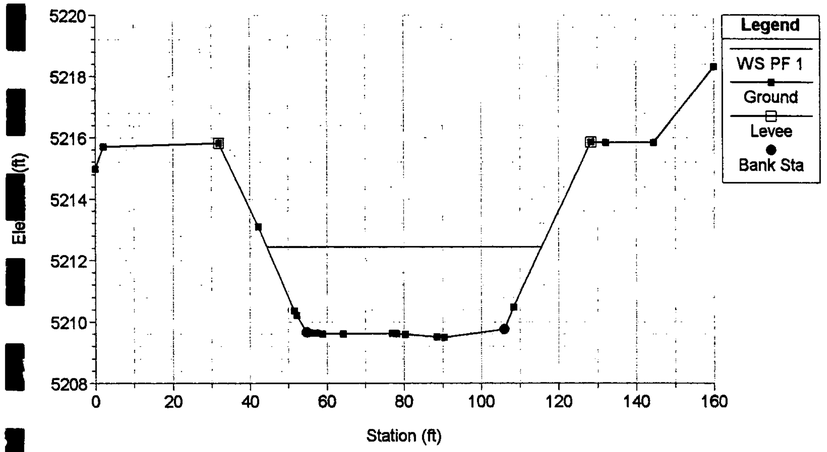

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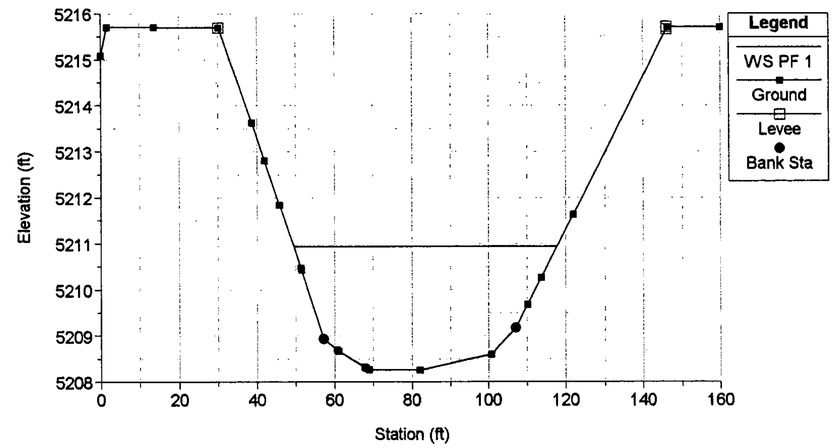

APPENDIX D

INFRASTRUCTURE LIST

Current DRC Project No. _____

ORIGINAL

Date Submitted: May 9, 2002
Date Site Plan Approved: 6/5/02
Date Preliminary Plat Approved: 6/5/02
Date Preliminary Plat Expiers: 6/5/03

Figure 12

INFRASTRUCTURE LIST

EXHIBIT "A"
TO SUBDIVISION IMPROVEMENTS AGREEMENT
DEVELOPMENT REVIEW BOARD (D.R.B.) REQUIRED INFRASTRUCTURE LIST

DRB Project No. 1001939

CIELO OESTE SUBDIVISION
TRACTS A-1 AND H-1 OF TIERRA OESTE UNIT 3
PLAT & SITE PLAN

Application No. 02DRB-00714

Following is a summary of PUBLIC/PRIVATE Infrastructure required to be constructed or financially guaranteed for the above development. This Listing is not necessarily a complete listing. During the SIA process and/or in the review of the construction drawings, if the DRC Chair determines that appurtenant items and/or unforeseen items have not been included in the infrastructure listing, the DRC Chair may include those items in the listing and related financial guarantee. Likewise, if the DRC Chair determines that appurtenant or non-essential items can be deleted from the listing, those items may be deleted as well as the related portions of the financial guarantees. All such revisions require approval by the DRC Chair, the User Department and agent/owner. If such approvals are obtained, these revisions to the listing will be incorporated administratively. In addition, any unforeseen items which arise during construction which which are necessary to complete the project and which normally are the Subdivider's responsibility will be required as a condition of project acceptance and close out by the City.

SIA Sequence #	COA DRC Project #	Size	Type of Improvement	Location	From	To	Private Inspector	City Inspector	City Cnst Engineer
			PUBLIC ROADWAY IMPROVEMENTS						
		26' F-F	RESIDENTIAL PAVING W/ PCC CURB & GUTTER & PCC 4' WIDE SIDEWALK ON BOTH SIDES*	CASA FLORIDA PLACE	CASA VISTOSA COURT	EAST CUL-DE-SAC TERMINUS	/	/	/
		32' F-F	RESIDENTIAL PAVING W/ PCC CURB & GUTTER & PCC 4' WIDE SIDEWALK ON BOTH SIDES* W/EMERGENCY ACCESS TO UNSER BOULEVARD NON-VEHICULAR PEDESTRIAN ACCESS TO UNSER BLVD	CIELO OESTE PLACE	WEST CUL-DE-SAC TERMINUS	EAST CUL-DE-SAC TERMINUS	/	/	/
		40' F-F	RESIDENTIAL PAVING W/ PCC CURB & GUTTER & PCC 4' WIDE SIDEWALK ON EAST SIDE	CALLE DE ENTRADA	NORTH BOUNDARY TRACT A-1	CIELO OESTE PLACE	/	/	/
			* SIDEWALKS TO BE DEFERRED. WAIVER OF SIDEWALK ON WEST SIDE OF CALLE DE ENTRADA				/	/	/
			NON-VEHICULAR PEDESTRIAN ACCESS TO BE PROVIDED FROM CASA FLORIDA PLACE AND CIELO OESTE PLACE TO THE MIREHAVEN CHANNEL.						
			STREET LIGHTS AS PER COA DPM						
			PUBLIC WATERLINE IMPROVEMENTS						
		8" DIA	WATERLINE W/ NEC. VALVES FH'S, MJ'S & RJ'S	CASA FLORIDA PLACE	CASA VISTOSA COURT	MIREHAVEN CHANNEL	/	/	/
		8" DIA	WATERLINE W/ NEC. VALVES FH'S, MJ'S & RJ'S	MIREHAVEN CHANNEL	CASA FLORIDA PLACE	CIELO OESTE PLACE	/	/	/
		8" DIA	WATERLINE W/ NEC. VALVES FH'S, MJ'S & RJ'S	CIELO OESTE PLACE	MIREHAVEN CHANNEL	CALLE DE ENTRADA	/	/	/
		8" DIA	WATERLINE W/ NEC. VALVES FH'S, MJ'S & RJ'S	CIELO OESTE PLACE	CALLE DE ENTRADA	EAST CUL-DE-SAC TERMINUS	/	/	/
		~~8" DIA~~	~~WATERLINE W/ NEC. VALVES FH'S, MJ'S & RJ'S~~	~~PUBLIC WATERLINE EASEMENT~~	~~CALLE DE ENTRADA~~	~~CIELO OESTE PLACE EAST CUL-DE-SAC TERMINUS~~	/	/	/
		8" DIA	WATERLINE W/ NEC. VALVES FH'S, MJ'S & RJ'S	~~CALLE DE ENTRADA~~ PUBLIC WATERLINE EASEMENT	~50' NORTH OF NORTH BOUNDARY TRACT A-1, VALVE #98 UNSER BLVD	CIELO OESTE PLACE EAST CUL-DE-SAC TERMINUS	/	/	/

D-1

ORIGINAL

Site Sequence	COA DRC Project #	Size	Type of Improvement	Location	From	To	Private Inspector	City Inspector	City Cnst Engineer
			PUBLIC SANITARY SEWER IMPROVEMENTS						
		8" DIA	SANITARY SEWER W/ NEC. MH'S & SERVICES	CASA FLORIDA PLACE	CASA VISTOSA COURT	EAST CUL-DE-SAC TERMINUS	/	/	/
		8" DIA	SANITARY SEWER W/ NEC. MH'S & SERVICES	CIELO OESTE PLACE	WEST CUL-DE-SAC TERMINUS	UNSER BOULEVARD	/	/	/
			PUBLIC STORM DRAIN IMPROVEMENTS						
		24"-36" DIA	RCP W/ NEC. MH'S, LATERALS & INLETS	CALLE DE ENTRADA	NORTH BOUNDARY TRACT A-1	MIREHAVEN DIVERSION CHANNEL	/	/	/
							/	/	/
							/	/	/

NOTE: MIREHAVEN ARROYO CHANNEL IMPROVEMENTS GUARANTEED AS PART OF THE CROSSING, COA PROJECT 545380,
MUNICIPAL LIEN FILED: JUNE 29, 2000 BK-A7, PG-2699
SIA "B" NON-WORK ORDER FILED: JUNE 29, 2000 BK-A7, PG-2698.
POND IMPROVEMENTS & 30' SPILLWAY
WATER QUALITY MANHOLE AND RIPRAP BASIN ENERGY DISAPPATOR WILL BE PROVIDED AT THE OUTLET TO THE MIREHAVEN DIVERSION CHANNEL.

A GRADING AND DRAINAGE CERTIFICAITON OF THE APPROVED GRADING PLAN IS REQUIRED PRIOR TO THE RELEASE OF FINANCIAL GUARANTEES.

LOMR FOR MIREHAVEN CHANNEL REQUIRED PRIOR TO FINAL PLAT

AGENT/OWNER

SCOTT STEFFEN
PREPARED BY: PRINT NAME

BOHANNAN HUSTON INC.
FIRM:

Scott J. Steffen 5/8/2002
SIGNATURE DATE

MAXIMUM TIME ALLOW TO CONSTRUCT IMPROVEMENTS WITHOUT A DRB EXTENSION
6-05-04

DEVELOPMENT REVIEW BOARD MEMBER APPROVALS

Janet L. Cunningham 6/5/02
DRB CHAIR DATE

6-05-02
TRANSPORTATION DEVELOPMENT DATE

Roger A Green 6/5/02
UTILITY DEVELOPMENT DATE

N/A
NEW MEXICO UTILITIES INC. DATE

Christina Sandoval 6/5/02
PARKS & RECREATION DEPARTMENT DATE

AMAFCA DATE

Bradley L. Bingham 6/5/02
CITY ENGINEER DATE

DATE

DESIGN REVIEW COMMITTEE REVISIONS

REVISION	DATE	DRC CHAIR	USER DEPARTMENT	AGENT/OWNER

0-2/2

Exhibits

PLATES

PLATE 1 - PRELIMINARY PLAT

PLATE 2 - GRADING PLAN

PLATE 3 - PROPOSED BASIN MAP

PLATE 4 - TIERRA OESTE UNIT 3 GRADING PLAN

PLATE 1

PRELIMINARY PLAT

PLATE 2

GRADING PLAN

PLATE 3

PROPOSED BASIN MAP

PLATE 4

TIERRA OESTE UNIT 3 GRADING PLAN

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Albuquerque

NEW MEXICO 87109-4335

voice 505.823.1000

fax 505.798.7988

www.bhinc.com