FLOODPLAIN DELINEATION STUDY FOR ROOSEVELT CONSERVATION DISTRIC

Property of
Flood Control District of MC Library
Please Return to
2801 W. Durango
Phoenix, AZ 85009

FLOODPLAIN DELINEATION STUDY
for
ROOSEVELT WATER CONSERVATION DISTRICT CANAL (RWCD)
McKellips Road to the Southern Canal

FCD No. 96-07

TECHNICAL DATA NOTEBOOK
December 1997

B4: WLB

Federal Emergency Management Agency

Washington, D.C. 20472

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 98-09-487P

The Honorable Wayne Brown
Mayor, City of Mesa
P.O. Box 1466
Mesa, Arizona 85211

Community: City of Mesa, Arizona
Community No.: 040048
Panel Affected: 04013C2205 E
Effective Date of This Revision: JUL 20 1998

102-I-A-C

Dear Mayor Brown:

This responds to a request that the Federal Emergency Management Agency (FEMA) revise the effective Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas (the effective FIRM for your community), in accordance with Part 65 of the National Flood Insurance Program (NFIP) regulations. In a letter dated February 24, 1998, Hasan Mushtaq, Ph.D., P.E., Engineering Division, Flood Control District of Maricopa County, requested that FEMA revise the FIRM to show the effects of more detailed topographic information and hydrologic and hydraulic analyses along the upslope side of the Roosevelt Irrigation District Canal (RIDC) from just north of McKellips Road to approximately 1,000 feet north of East Queton Drive.

All data required to complete our review of this request were submitted with letters from Dr. Mushtaq.

We have completed our review of the submitted data and the flood data shown on the effective FIRM. We have revised the FIRM to modify the elevations, floodplain boundary delineations, and zone designations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) along the upslope side of the RIDC. As a result of the modifications, base flood elevations (BFEs) were added along the upslope side of the RIDC from just north of McKellips Road to approximately 1,000 feet north of East Queton Drive, and the width of the Special Flood Hazard Area (SFHA), the area that would be inundated by the base flood, decreased. The SFHA zone designation along the upslope side of the RIDC from just north of McKellips Road to approximately 1,000 feet north of East Queton Drive has been changed from Zone A, an SFHA with no BFEs determined, to Zone AH, an SFHA with flood depths of 1 to 3 feet (usually areas of ponding) and BFEs determined. The modifications are shown on the enclosed annotated copies of FIRM Panel(s) 04013C2205 E. This Letter of Map Revision (LOMR) hereby revises the above-referenced panel(s) of the effective FIRM dated September 4, 1991.

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

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

Location	Existing BFE (feet)*	Modified BFE (feet)*
Just north of McKellips Road	None	1,351
Just north of East Queton Drive	None	1,355

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

Public notification of the proposed modified BFEs will be given in the *Arizona Republic* on or about August 20 and August 27, 1998. A copy of this notification is enclosed. In addition, a notice of changes will be published in the *Federal Register*. Within 90 days of the second publication in the *Arizona Republic*, a citizen may request that FEMA reconsider the determination made by this LOMR. Any request for reconsideration must be based on scientific or technical data. All interested parties are on notice that, until the 90-day period elapses, the determination to modify the BFEs presented in this LOMR may itself be modified.

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

We are processing a revised FIRM and Flood Insurance Study (FIS) report for Maricopa County; therefore, we will not physically revise and republish the FIRM and FIS report for your community to incorporate the modifications made by this LOMR at this time. Preliminary copies of the countywide FIRM and FIS report were submitted to your community for review on December 23, 1997. We will incorporate the modifications made by this LOMR into the countywide FIRM and FIS report before they become effective.

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

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

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

management regulations that meet or exceed minimum NFIP criteria. These criteria are the minimum and do not supersede any State or local requirements of a more stringent nature. This includes adoption of the effective FIRM to which the regulations apply and the modifications described in this LOMR. Our records show that your community has met this requirement.

A Consultation Coordination Officer (CCO) has been designated to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Ms. Dorothy M. Lacey
Director, Mitigation Division
Federal Emergency Management Agency, Region IX
The Presidio of San Francisco, Building 105
San Francisco, California 94129-1250
(415) 923-7177

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

If you have any questions regarding floodplain management regulations for your community or the NFIP in general, please contact the CCO for your community at the telephone number cited above. If you have any technical questions regarding this LOMR, please contact Mr. Mike Grimm of our staff in Washington, DC, either by telephone at (202) 646-2878 or by facsimile at (202) 646-4596.

Sincerely,

Mike Grimm, Project Engineer
Hazards Study Branch
Mitigation Directorate

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

Enclosure(s)

cc: Hasan Mushtaq, Ph.D., P.E.
Engineering Division
Flood Control District of Maricopa County

Ms. Terri Miller
State Coordinator, NFIP
Arizona Department of Water Resources

Mr. Michael J. Roberts
The WLB Group, Inc.

CHANGES ARE MADE IN DETERMINATIONS OF BASE FLOOD ELEVATIONS FOR THE CITY OF MESA, MARICOPA COUNTY, ARIZONA UNDER THE NATIONAL FLOOD INSURANCE PROGRAM

On September 4, 1991, the Federal Emergency Management Agency identified Special Flood Hazard Areas (SFHAs) in the City of Mesa, Maricopa County, Arizona, through issuance of a Flood Insurance Rate Map (FIRM). The Mitigation Directorate has determined that modification of the elevations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) for certain locations in this community is appropriate. The modified base flood elevations (BFEs) revise the FIRM for the community.

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

A hydraulic analysis was performed to incorporate more detailed topographic information and hydrologic and hydraulic analyses along the upslope side of the Roosevelt Irrigation District Canal (RIDC)from just north of McKellips Road to approximately 1,000 feet north of East Queton Drive and has resulted in a decrease in SFHA width, and the addition of BFEs along the upslope side of the RIDC. The table below indicates existing and modified BFEs for selected locations along the affected lengths of the flooding source(s) cited above.

Location	Existing BFE (feet)*	Modified BFE (feet)*
Just north of McKellips Road	None	1,351
Just north of East Queton Drive	None	1,355

*National Geodetic Vertical Datum, rounded to nearest whole foot

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

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

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

The Honorable Wayne Brown
Mayor, City of Mesa
P.O. Box 1466
Mesa, Arizona 85211

CHANGES ARE MADE IN DETERMINATIONS OF BASE FLOOD ELEVATIONS FOR THE CITY OF MESA, MARICOPA COUNTY, ARIZONA UNDER THE NATIONAL FLOOD INSURANCE PROGRAM

On September 4, 1991, the Federal Emergency Management Agency identified Special Flood Hazard Areas (SFHAs) in the City of Mesa, Maricopa County, Arizona, through issuance of a Flood Insurance Rate Map (FIRM). The Mitigation Directorate has determined that modification of the elevations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) for certain locations in this community is appropriate. The modified base flood elevations (BFEs) revise the FIRM for the community.

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

A hydraulic analysis was performed to incorporate more detailed topographic information and hydrologic and hydraulic analyses along the upslope side of the Roosevelt Irrigation District Canal (RIDC)from just north of McKellips Road to approximately 1,000 feet north of East Queton Drive and has resulted in a decrease in SFHA width, and the addition of BFEs along the upslope side of the RIDC. The table below indicates existing and modified BFEs for selected locations along the affected lengths of the flooding source(s) cited above.

Location	Existing BFE (feet)*	Modified BFE (feet)*
Just north of McKellips Road	None	1,351
Just north of East Queton Drive	None	1,355

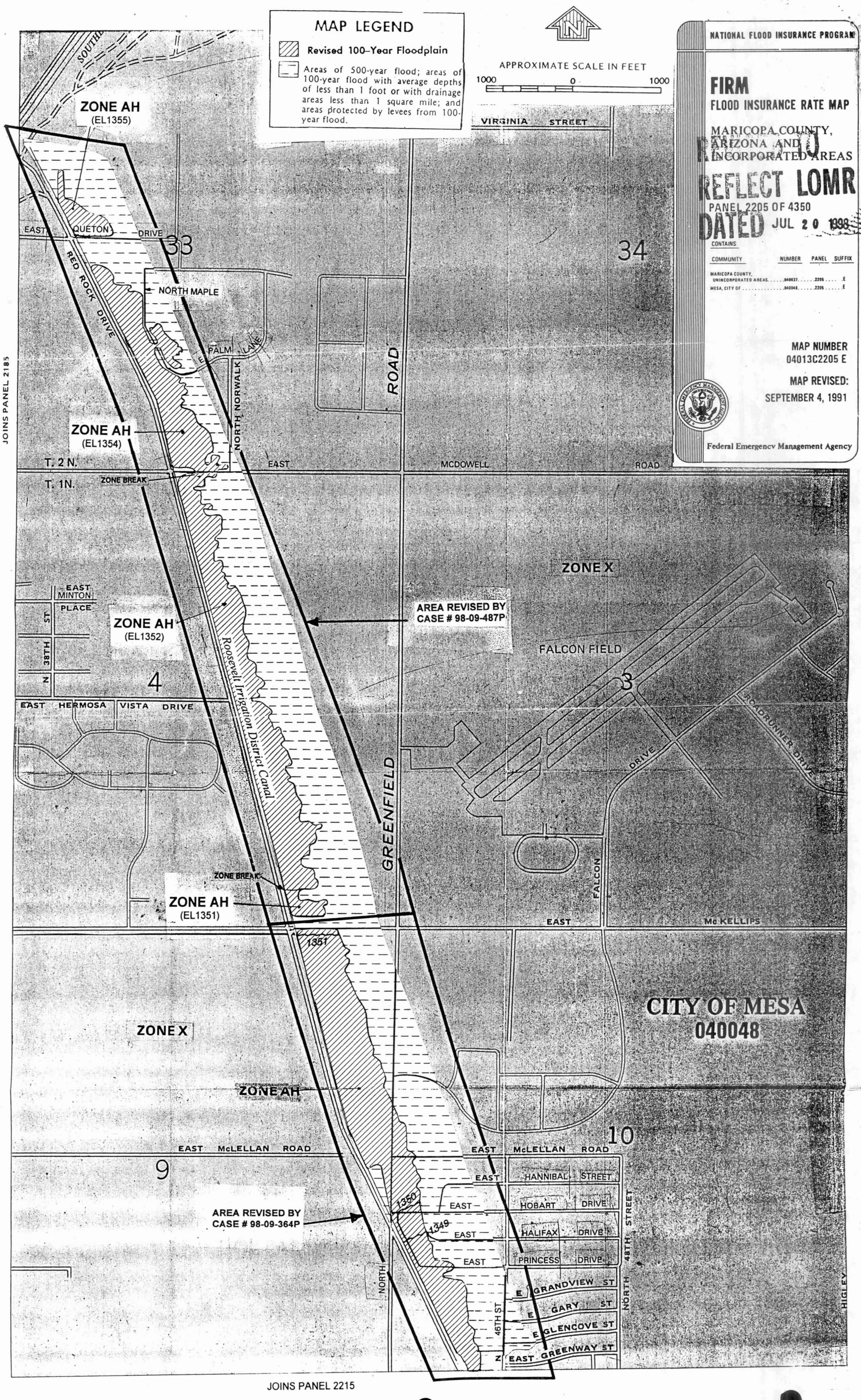
*National Geodetic Vertical Datum, rounded to nearest whole foot

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

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

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

The Honorable Wayne Brown
Mayor, City of Mesa
P.O. Box 1466
Mesa, Arizona 85211


MAP LEGEND
Revised 100-Year Floodplain
Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.
APPROXIMATE SCALE IN FEET
1000 0 1000
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS
REVISED TO REFLECT LOMR
PANEL 2205 OF 4350
DATED JUL 20 1998
CONTAINS
COMMUNITY NUMBER PANEL SUFFIX
MARICOPA COUNTY, UNINCORPORATED AREAS 040037 2205 E
MESA, CITY OF 040048 2205 E
MAP NUMBER
04013C2205 E
MAP REVISED:
SEPTEMBER 4, 1991
Federal Emergency Management Agency
JOINS PANEL 2185
ZONE AH
(EL1355)
ZONE AH
(EL1354)
ZONE AH
(EL1352)
ZONE AH
(EL1351)
ZONE AH
ZONE X
ZONE X
ZONE BREAK
ZONE BREAK
AREA REVISED BY CASE # 98-09-487P
AREA REVISED BY CASE # 98-09-364P
VIRGINIA STREET
EAST QUETON DRIVE
RED ROCK DRIVE
NORTH MAPLE
PALM LANE
NORTH NORWALK
ROAD
EAST MCDOWELL ROAD
T. 2 N.
T. 1N.
EAST MINTON PLACE
N 38TH ST
EAST HERMOSA VISTA DRIVE
Roosevelt Irrigation District Canal
GREENFIELD
FALCON FIELD
ROADRUNNER DRIVE
FALCON DRIVE
EAST McKELLIPS
CITY OF MESA
040048
EAST McLELLAN ROAD
EAST HANNIBAL STREET
EAST HOBART DRIVE
EAST HALIFAX DRIVE
EAST PRINCESS DRIVE
E GRANDVIEW ST
E GARY ST
E GLENCOVE ST
EAST GREENWAY ST
NORTH 46TH ST
NORTH 48TH STREET
HIGLEY
1351
1350
1349
3
4
9
10
33
34
JOINS PANEL 2215

FLOODPLAIN DELINEATION STUDY
for
ROOSEVELT WATER CONSERVATION DISTRICT CANAL
(RWCD)

McKellips Road to the Southern Canal

TECHNICAL DATA NOTEBOOK

DECEMBER 1997

Prepared for:

Flood Control District of Maricopa County
2801 West Durango
Phoenix, Arizona 85009
FCD No. 96-07

Prepared by:

The WLB Group, Inc.
333 E. Osborn, Suite 380
Phoenix, Arizona 85012
WLB No. 296025

TABLE OF CONTENTS

PAGE NO.

Section 1: Introduction

1.1 Purpose of Study 1
1.2 Authority 1
1.3 Study Location 1
1.4 Study Methodology 1
1.5 Acknowledgments 1
1.6 Study Results 2

Section 2: ADWR/FEMA Forms

2.1 Study Documentation Abstract for FEMA Submittals 4
2.2 FEMA Forms 5

Section 3: Survey and Mapping Information

3.1 Field Survey Information 14
3.2 Mapping 14

Section 4: Hydrology

4.1 Method Description 15
4.2 Parameter Estimation 15
4.2.1 Drainage Area Boundaries 15
4.2.2 Watershed Work Maps 15
4.2.3 Gage Data 16
4.2.4 Statistical Parameters 16
4.2.5 Precipitation 16
4.2.6 Physical Parameters 16
4.3 Problems Encountered During the Study 16
4.3.1 Special Problems and Solutions 16
4.3.2 Modeling Warning and Error Messages 16

4.4 Calibration 16
4.5 Final Results . . . . . .
4.5.1 Hydrologic Analysis Results 16
4.5.2 Verification of Results 16

PAGE NO.

Section 5: Hydraulics

5.1 Method Description 23
5.2 Work Study Maps . . . . . See Appendix
5.3-5.9 (Not Applicable)

Section 6: Erosion and Sediment Transport (Not Applicable)

Section 7: Draft FIS Report Data

7.1 Summary of Discharges
7.2 Floodway Data (Not Applicable)
7.3 Annotated Flood Insurance Rate Maps 24
7.4 Flood Profiles (Not Applicable)

Tables:

4.1 MCUNP1 Input 22
4.2 Peak Discharge 21

Figures:

2 Land Use Map 17
3 Soil Type Map 18
4 HEC-1 Schematic 19
7 Annotated Flood Plain Map 24

Appendix A: References

A.1 Data Collection Summary
A.2 Referenced Documents

Appendix B: General Documentation and Correspondence

B.1 Special Problem Reports
B.2 Contact Reports
B.3 Meeting Minutes
B.4 General Correspondence
B.5 Contract Documents

Appendix C: Survey Field Notes

C.1 Survey Notes for Aerial Mapping Control
C.2 Survey Notes for Hydrologic Modeling
C.3 Survey Notes for Hydraulic Modeling

Appendix D: Hydrologic Analysis Supporting Documentation

D.1 Precipitation Data
D.2 Physical Parameter Calculations
D.3 Hydrograph Routing Data
D.4 Reservoir Routing
D.5 Flow Splits and Diversions Data
D.6 Hydrologic Calculations (HEC-1)

Appendix E: Hydraulic Analysis and Supporting Documentation

E.1 Hydraulic Calculations for Approximate Delineation.

SECTION 1: INTRODUCTION

1.1 Purpose of Study

The purpose of this study is to define the limits of the 100-year floodplain along the Roosevelt Water Conservation District (RWCD) Canal between McKellips Road and the Southern Canal. This is a restudy. The existing floodplain along the Canal was established by assuming that floodwaters would pond to the top of the Canal bank. The restudy is a more detailed approach which includes aerial mapping, a hydrologic analysis to quantify the 100-year runoff that reaches the Canal and reservoir routing to determine the peak stages of the ponding areas along the canal.

1.2 Authority

This study was authorized by:

Flood Control District of Maricopa County
2801 West Durango
Phoenix, Arizona 85009
Contract No. 96-07
Project Manager: Pedro Calza
Telephone No. 602-506-4697

1.3 Study Location

The study reach is located within the City of Mesa, Arizona along the east side of the upper portion of the Roosevelt Water Conservation District Canal, from McKellips Road to the Southern Canal. This portion of the Canal lies in Section 4, Township 1 North, Range 6 East and Section 33, Township 2 North, Range 6 East, Gila and Salt River Base and Meridian, Maricopa County, Arizona.

1.4 Study Methodology

The floodplain limits were delineated by reservoir routing the 100-year inflow hydrographs through the ponding areas which are situated along the east (upstream) side of the RWCD Canal. The inflow flood hydrographs and the reservoir routing were computed using the US Army Corps of Engineer's HEC-1 computer program (Reference 2). The stage-storage-discharge data for the ponding areas was obtained from new aerial mapping prepared specifically for this study along with field surveyed cross sections.

1.5 Acknowledgments

A. Mr. Pedro Calza and Mr. Raju Shah, both from the Flood Control District of Maricopa County, managed the project, reviewed the work and contributed their knowledge and experience to the preparation of the study.

B. Mr. Peter Knudson, City of Mesa, reviewed the hydrologic analysis and helped in the preparation of the study.

C. Mr. Steve Moser, McDonnel Douglas, provided contour maps of their facility (contour interval of one foot) which helped tremendously in defining drainage sub-basins and retention volumes on the McDonnell Douglas land.

D. Mr. Greg Schuelke, A-N West, Inc., provided the hydrologic model used for the upper part of the watershed which was developed as part of their work on the upper east Maricopa Floodway Flood Study, for the Flood Control District of Maricopa County, FCD No. 94-26.

E. Mr. Art Witzell RLS, Collins-Pina Consulting Engineers, Inc. provided the surveying and mapping.

1.6 Study Results

The study resulted in three separate ponding areas along the RWCD Canal delineated as Zone AH with base flood elevations. In addition, a relatively short, approximate unnumbered Zone A was delineated for the floodwater discharge of 300 cfs that flows across McDowell Road and into the ponding area to the south. The following is a brief description of each area of flooding.

A. Ponding North of McDowell Road

The ponding area north of McDowell Road is delineated as a Zone AH (elev.= 1354) and covers approximately 23 acres of undeveloped lots in an existing subdivision. The maximum depth is about 3 feet. The 100-year peak discharge of 300 cfs from the ponding area flows south across McDowell Road and into the second ponding area which lies south of McDowell Road.

B. Ponding Area South of McDowell Road

The largest ponding area is situated south of McDowell Road and extends, to the south, almost to McKellips Road. It is delineated as a Zone AH (elev. = 1352) and covers an area of about 36 acres. The maximum depth is approximately 3 feet. The 100-year peak discharge from this ponding area is 86 cfs of which 76 cfs spills into the Canal at a low point in the Canal Bank about 2300 feet north of McKellips Road. The remaining 10 cfs flows southerly in a ditch along the Canal to McKellips Road where it combines with runoff flowing westerly in McKellips. The combined peak discharge at McKellips is 42 cfs of which 23 cfs is conveyed into the Canal through a 24 inch culvert. The remaining 19 cfs flows over the Canal bank and into the Canal just north of McKellips Road.

C. Small Ponding Area North of McKellips Road

A small ponding area of about 2 acres was identified just north of McKellips Road. It is delineated as Zone AH (elev. = 1351) and is confined by agricultural berms.

D. Approximate Floodplain South of McDowell Road

The peak discharge from the ponding area north of McDowell Road (300cfs) flows across McDowell Road and into the ponding area to the south. The two

ponding areas are separated by about 200 feet with a 1.5 foot drop in water surface elevation between ponds. This conveyance was delineated by approximate methods and is designated as an unnumbered Zone A.

2.1 Study Documentation Abstract for FEMA Submittals

Study Documentation Abstract for FEMA Submittals	Initial Study		Restudy		CLOMR		LOMR		Other	

Section 2.1: Study Documentation Abstract for FEMA Submittals		
2.1.1	Date Study Accepted	Pending
2.1.2	Study Contractor Contact(s) Address Phone Internal Reference Number	The WLB Group, Inc. Michael Roberts / Robert Landis 333 E. Osborn Rd. Suite 380 Phx, AZ 85012 (602) 279-1016 296025A1
2.1.3	FEMA Technical Review Contractor Contact(s) Address Phone Internal Reference Number	Pending
2.1.4	FEMA Regional Reviewer Phone	Pending
2.1.5	State Technical Reviewer Phone	
2.1.6	Local Technical Reviewer Phone	Flood Control District of Maricopa County (602) 506-1501
2.1.7	Reach Description	Roosevelt Water Conservation District Canal
2.1.8	USGS Quad Sheet(s) with original photo date & latest photo revision date	Buckhorn, Arizona 1956, photo revised 1982
2.1.9	Unique Conditions and Problems	None
2.1.10	Coordination of Q's Discharges (Agency, Date, Comments)	None

2.2 FEMA Forms

Refer to following forms

FEDERAL EMERGENCY MANAGEMENT AGENCY
REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM

O.M.B. Burden No. 3067-0148
Expires July 31, 1997

FEMA USE ONLY

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 2.13 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden, to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

1. OVERVIEW

1. The basis for this revision request is (are): *(check all that apply)*
   - ☐ Physical change
     - ☐ Existing
     - ☐ Proposed
   - ☒ Improved methodology
   - ☒ Improved data
   - ☐ Floodway revision
   - ☐ Other _____
     Explain _____
2. Flooding Source: Roosevlt Water Conservation District (RWCD) Canal
3. Project Name/Identifier: Floodplain Delineation and Topographic Mapping for Upper RWCD Canal
4. FEMA zone designations affected: _____
   (example: A, AH, AO, A1-A30, A99, AE, V, V1-30, VE, B, C, D, X)
5. The NFIP map panel(s) affected for all impacted communities is (are):

Community No.	Community Name	County	State	Map No.	Panel No.	Effective Date
040048	Mesa , City	Maricopa	AZ	04013C	2205G	9\91

6. The area of revision encompasses the following types of flooding, structures, and associated disciplines: *(check all that apply)*

Types of Flooding
- ☐ Riverine
- ☐ Coastal
- ☐ Alluvial Fan
- ☒ Shallow Flooding *(e.g. Zones AO and AH*
- ☐ Lakes

Affected by wind/wave action
- ☐ Yes
- ☐ No

- ☐ Other *(describe)* _____

Structures
- ☐ Channelization
- ☐ Levee/Floodwall
- ☐ Bridge/Culvert
- ☐ Dam
- ☐ Coastal
- ☐ Fill
- ☐ Pump Station
- ☐ None
- ☐ Channel Relocation
- ☐ Excavation
- ☐ Other *(describe)* _____

Disciplines*
- ☒ Water Resources
  - ☒ Hydrology
  - ☒ Hydraulics
  - ☐ Sediment Transport
  - ☐ Interior Drainage
- ☐ Structural
- ☐ Geotechnical
- ☒ Land Surveying
- ☐ Other *(describe)* _____

* **Attach completed "Certification by Registered Professional Engineer and/or Land Surveyor" Form for each discipline checked. (Form 2)**

2. FLOODWAY INFORMATION

7. Does the affected flooding source have a floodway designated on the effective FIRM or FBFM? ☐ Yes ☒ No
8. Does the revised floodway delineation differ from that shown on the effective FIRM or FBFM? ☐ Yes ☐ No
   If yes, give reason: N/A

5

Attach copy of either a public notice distributed by the community stating the community's intent to revise the floodway or a statement by the community that it has notified all affected property owners and affected adjacent jurisdictions.

9. Does the State have jurisdiction over the floodway or its adoption by communities participating in the NFIP? N/A ☐ Yes ☐ No

If yes, attach a copy of a letter notifying the appropriate State agency of the floodway revision and documentation of the approval of the revised floodway by the appropriate State agency.

3. PROPOSED ENCROACHMENTS

10. With floodways:

1A. Does the revision request involve fill, new construction, substantial improvement, or other development in the floodway? ☐ Yes ☐ No

1B. If yes, does the development cause the 100-year water surface elevation to increase at any location by more than 0.000 feet? ☐ Yes ☐ No

11. Without floodways:

2A. Does the revision request involve fill, new construction, substantial improvement, or other development in the 100-year floodplain? ☐ Yes ☒ No

2B. If yes, does the cumulative effect of all development that has occurred since the effective SFHA was originally identified cause the 100-year water surface elevation to increase at any location by more than one foot *(or other surcharge limit if community or state has adopted more stringent criteria)*? ☐ Yes ☐ No

If the answer to either Items 1B or 2B is yes, please provide documentation that all requirements of Section 65.12 of the NFIP regulations have been met, regarding evaluation of alternatives, notice to individual legal property owners, concurrence of CEO, and certification that no insurable structures are impacted.

4. REVISION REQUESTOR ACKNOWLEDGEMENT

12. Having read NFIP Regulations, 44 CFR Ch. I, parts 59, 60, 61, and 72, I believe that the proposed revision ☒ is ☐ is not in compliance with the requirements of the aforementioned NFIP Regulations.

5. COMMUNITY OFFICIAL ACKNOWLEDGEMENT

13. Was this revision request reviewed by the community for compliance with the community's adopted floodplain management ordinances? ☒ Yes ☐ No

Does this revision request have the endorsement of the community? ☒ Yes ☐ No

If no to either of the above questions, please explain: _____

Please note that community acknowledgement and/or notification is required for all requests as outlined in Section 65.4 (b) of the NFIP Regulations.

6. OPERATION AND MAINTENANCE

5. Does the physical change involve a flood control structure (e.g. levees, floodwalls, channelization, basins, dams)?
☐ Yes ☒ No

If yes, please provide the following information for each of the new flood control structures:

A. Inspection of the flood control project will be conducted periodically by _____ (entity) _____ with a maximum interval of _____ months between inspections.

B. Based on the results of scheduled periodic inspections, appropriate maintenance of the flood control facilities will be conducted by _____ (entity) to ensure the integrity and degree of flood protection of the structure.

C. A formal plan of operation, including documentation of the flood warning system, specific actions and assignments of responsibility by individual name or title, and provisions for testing the plan at intervals not less than one year, ☐ has ☐ has not been prepared for the flood control structure.

D. The community is willing to assume responsibility for ☐ performing ☐ overseeing compliance with the maintenance and operation plans of the _____
(Name)
flood control structure. If not performed promptly by an owner other than the community, the community will provide the necessary services without cost to the Federal government.

Attach operation and maintenance plans

7. REQUESTED RESPONSE FROM FEMA

16. After examining the pertinent NFIP regulations and reviewing the document entitled "Appeals, Revisions, and Amendments to Flood Insurance Maps: A Guide for Community Officials," dated January 1990, this request is for a:

____a. CLOMR A letter from FEMA commenting on whether a proposed project, if built as proposed, would justify a map revision *(LOMR or PMR)*, or proposed hydrology changes *(see 44 CFR Ch. I, Parts 60, 65, and 72).*

X b. LOMR A letter from FEMA officially revising the current NFIP map to show changes to floodplains, floodways, or flood elevations. LOMRs typically depict decreased flood hazards. *(See 44 CFR Ch. 1, Parts 60 and 65.)*

____c. PMR A reprinted NFIP map incorporating changes to floodplains, floodways, or flood elevations. Because of the time and cost involved to change, reprint, and redistribute an NFIP map, a PMR is usually processed when a revision reflects increased flood hazards or large-scope changes. *(See 44 CFR Ch. 1, Parts 60 and 65.)*

____d. Other: Describe _____

8. FORMS INCLUDED

17. Form 2 entitled "Certification by Registered Professional Engineer And/Or Land Surveyor" must be submitted.

following forms should be included with this request if (check the included forms):

• Hydrologic analysis for flooding source differs from that used to develop FIRM	☒ Hydrologic Analysis Form (Form 3)
• Hydraulic analysis for riverine flooding differs from that used to develop FIRM	☐ Riverine Hydraulic Analysis Form (Form 4)
• The request is based on updated topographic information or a revised floodplain or floodway delineation is requested	☐ Riverine/Coastal Mapping Form (Form 5)
• The request involves any type of channel modification	☐ Channelization Form (Form 6)
• The request involves new bridge or culvert or revised analysis of an existing bridge or culvert	☐ Bridge/Culvert Form (Form 7)
• The request involves a new revised levee/floodwall system	☐ Levee/Floodwall System Analysis Form (Form 8)
• The request involves analysis of coastal flooding	☐ Coastal Analysis Form (Form 9)
• The request involves coastal structures credited as providing protection from the 100-year flood	☐ Coastal Structures (Form 10)
• The request involves an existing, proposed, or modified dam	☐ Dam Form (Form 11)
The request involves structures credited as providing protection from the 100-year flood on an alluvial fan	☐ Alluvial Fan Flooding Form (Form 12)

9. INITIAL REVIEW FEE

18. The minimum initial review fee for the appropriate request category has been included. ☒ Yes ☐ No

Initial fee amount: $ 3,700

Check or money order only. Make check or money order payable to: **National Flood Insurance Program**. If paying by Visa or Mastercard please refer to the credit card information form which follows this form.

or

19. This request is for a project that is for public benefit and is intended to reduce the flood hazard to existing development in identified flood hazard areas as opposed to planned floodplain development. ☐ Yes ☐ No

or

20. This request is to correct an error or to include the effects of natural changes within the areas of special flood hazards. ☒ Yes ☐ No

Note: I understand that my signature indicates that all information submitted in support of this request is correct.

Signature of Revision Requestor

Printed Name and Title of Revision Requestor

Company Name

Telephone No. Date

Note: Signature indicates that the community understands, from the revision requestor, the impacts of the revision on flooding conditions in the community.

Signature of Community Official

Printed Name and Title of Community Official

Community Name

Date

Does this request impact any other communities? ☐ Yes ☒ No

If yes, attach letters from all affected jurisdictions acknowledging revision request and approving changes to floodway, if applicable.

Note: Although a photograph of physical changes is not required, it may be helpful for FEMA's review.

FEDERAL EMERGENCY MANAGEMENT AGENCY
CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR FORM

O.M.B. Burden No. 3067-0148
Expires July 31, 1997

FEMA USE ONLY

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average .23 hour per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden, to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.
2. I am licensed with an expertise in Land Surveying
   [example: water resources *(hydrology, hydraulics, sediment transport, interior drainage)**, structural, geotechnical, land surveying.]
3. I have 17 years experience in the expertise listed above.
4. I have ☒ prepared ☐ reviewed the attached supporting data and analyses related to my expertise.
5. I ☒ have ☐ have not visited and physically viewed the project.
6. In my opinion, the following analyses and/or designs, is/are being certified:
   Elevation reference marks, horizontal & vertical control for mapping.
7. Based upon the following review, the modifications in place have been constructed in general accordance with plans and specifications.

   Basis for above statement: (check all that apply)

   a. ☐ Viewed all phases of actual construction.
   b. ☐ Compared plans and specifications with as-built survey information.
   c. ☐ Examined plans and specifications and compared with completed projects.
   d. ☒ Other Not Applicable

All information submitted in support of this request is correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Name: Arthur A. Witzell
(please print or type)

Title: Survey Supervisor, Phoenix Division
(please print or type)

Registration No. #26412 Expiration Date: 9/30/98

State Arizona

Type of License Registered Land Surveyor

Signature

12/29/97
Date

REGISTERED LAND SURVEYOR
CERTIFICATE NO.
26412
ARTHUR A. WITZELL
Date Signed 12-29-97
ARIZONA, U.S.A.

Seal
(Optional)

*Specify Subdiscipline

Note: Insert not applicable (N/A) when statement does not apply.

FEDERAL EMERGENCY MANAGEMENT AGENCY

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR FORM

O.M.B. Burden No. 3067-0148
Expires July 31, 1997

FEMA USE ONLY

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average .23 hour per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden, to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

1. This certification is in accordance with 44 CFR Ch. I, Section 65.2.
2. I am licensed with an expertise in _____
   [example: water resources *(hydrology, hydraulics, sediment transport, interior drainage)**, structural, geotechnical, land surveying.]
3. I have _____ years experience in the expertise listed above.
4. I have ☐ prepared ☐ reviewed the attached supporting data and analyses related to my expertise.
5. I ☐ have ☐ have not visited and physically viewed the project.
6. In my opinion, the following analyses and/or designs, is/are being certified:
   _____
7. Based upon the following review, the modifications in place have been constructed in general accordance with plans and specifications.

   Basis for above statement: (check all that apply)

   a. ☐ Viewed all phases of actual construction.
   b. ☐ Compared plans and specifications with as-built survey information.
   c. ☐ Examined plans and specifications and compared with completed projects.
   d. ☐ Other _____

All information submitted in support of this request is correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Name: _____
(please print or type)

Title: _____
(please print or type)

Registration No. _____ Expiration Date: _____

State _____

Type of License _____

_____
Signature

_____
Date

*Specify Subdiscipline

_____
Seal
(Optional)

Note: Insert not applicable (N/A) when statement does not apply.

FEDERAL EMERGENCY MANAGEMENT AGENCY
HYDROLOGIC ANALYSIS FORM

O.M.B. Burden No. 3067-0148
Expires July 31, 1997

FEMA USE ONLY

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 3.67 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden, to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

Community Name: City of Mesa Arizona

Flooding Source: Roosevelt Water Conservation District (RWCD)Canal Bank
(One form for each flooding source)

Project Name/Identifier: Floodplain Delineation and Topographic Mapping for Upper RWCD Canal

1. HYDROLOGIC ANALYSIS IN FIS

☒ Approximate study stream (Zone A)

☒ Detailed study stream (briefly explain methodology) HEC-1: Ponding along canal

2. REASON FOR NEW HYDROLOGIC ANALYSIS

☐ No existing analysis

☒ Improved data *(see data revision on page 3)*

☐ Changed physical conditions of watershed *(explain)*

☒ Alternative methodology *(justify why the revised model is better than model used in the effective FIS)*
The effective FIS is an approximate delineation based on the top of canal bank. This revised analysis quantifies the runoff that reaches the canal and uses new topographic mapping to calculate the peak stages.

☐ Evaluation of proposed conditions (CLOMRs only) (explain)

☐ Other

If a computer program/model was used in revising the hydrologic analysis, please provide a diskette with the input files for the 10-, 50-, 100- and 500-year recurrence intervals.
Only the 100-year recurrence interval need be included for SFHAs designated as Zone A.

3. APPROVAL OF ANALYSIS

☒ Approval of the hydrologic analysis, including the resulting peak discharge value(s) has been provided by the appropriate local, state, or Federal Agency. (i.e., The Flood Control District of Maricopa County)
Attach evidence of approval.

☐ Approval of the hydrologic analysis is not required by any local, State or Federal Agency.

4. REVIEW OF RESULTS

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

If yes, provide the following:

Location along flooding source: N/A

Maximum peak discharge: _____ cfs

Second highest peak discharge: _____ cfs

Source of information: _____

6. GAGE RECORD INFORMATION

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

Gaging Station: N/A

Drainage area at gage: _____ mi^2

Number of years of data: _____

7. DATA REVISION

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

Data Parameter	New	Revised	Data Source
N/A	☐	☐	N/A
	☐	☐	
	☐	☐	
	☐	☐	
	☐	☐	

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

8. METHODOLOGY FOR NEW ANALYSIS

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

☐ Regional Regression Equations *(use Attachment B)*

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

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

ATTACHMENT A: STATISTICAL ANALYSIS OF GAGE RECORDS

Gaging Station: N/A

		FIS:	Revised:
1.	Method or model used:	N\A	HEC-1
	Version:		4.0
	Date:		September 1990
2.	Source of rainfall depth:	N\A	NOAA Atlas II
3.	Source of rainfall distribution:	N\A	SCS Type II
4.	Rainfall duration:	N\A	24 Hours
5.	Areal adjustment to precipitation (%):	N\A	0.988%
6.	Hydrograph development method:	N\A	Clark Unit Hydrograph
7.	Loss rate method:	N\A	Green - Ampt
	Source of soils information:		FCDMC
	Source of land use information:		FCDMC
8.	Channel routing method:	N\A	
9.	Reservoir routing:	☐ Yes ☒ No	☒ Yes ☐ No
10.	Baseflow considerations:	☐ Yes ☒ No	☐ Yes ☒ No

If yes, explain how baseflow was determined:

	Snowmelt considerations:	☐ Yes ☐ No	☐ Yes ☒ No
12.	Model calibration:	☐ Yes ☐ No	☐ Yes ☒ No

If yes, explain how calibration was performed

13.	Future land use condition:		☐ Yes ☒ No

If yes, explain why:

Note: FEMA policy is to base flooding on existing conditions.

If data is not available, indicate by N/A.

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

Section 3.0 Surveying and Mapping Information

3.1 Field Survey Information

Field surveying was accomplished using a series of bench loops tied into the City of Mesa Vertical Datum (NGVD29) and State Plane Coordinates 1983. Refer to Appendix C for Field Notes and Benchmarks.

Field Surveyor
Project # 3796
Collins-Piña Consulting Engineers, Inc.
40 East Virginia Ave. Suite 200
Phoenix, Arizona 85004
(602) 264-7505

Date of Survey: December 10, 1996
By:

3.2 Mapping

Mapping was accomplished utilizing aerial photography to produce a topographic map. All mapping datum was based on State Plane Coordinates 1983 for horizontal control, and NGVD29 for vertical control. Referenced vertical benchmarks came from NGS triangulation station "Flume" and tied into the City of Mesa Datum. Both were found to be on NGVD 1929 vertical datum. All field surveying and mapping were governed and are in strict conformance with FEMA Document 37 Guidelines.

Photogrammetric Mapping By:

DataBase Terrain Mapping, Inc
1075 East FT. Lowell Road, Suite A-1
Tucson Arizona, 85719
(520) 292-2020
Lee Harbors, RLS President
Project # 96019

Date of Photography December 24,1996
Time 11:00 am
Photo scale 1:3800

Flight Path(s): Southeasterly to Northwesterly, parallel to and east of the RWCD canal from McKellips Road to the Southern Canal.

Section 4.0 Hydrology

4.1 Method Description

Runoff hydrographs were generated using the Army Corps of Engineers HEC-1 program version 4.0 dated September 1990. Input File: *Rwcd24.dat* for the 100 year- 24 hour storm.

Hydrologic methods included using the Clark unit hydrograph and the Green-Ampt rainfall loss method.

4.2 Parameter Estimation

The Flood Control District of Maricopa County (FCDMC) Drainage Design Menu System (DDMS) was used to compute weighed soils, land use parameters and unit hydrographs. Refer to Table 4.2.

4.2.1 Drainage Area Boundaries

Drainage area boundaries were found through field visits and topographic mapping. Refer to Figure 4. The watershed is generally sloping to the west with the RWCD canal being the western boundary. Most subbasins were delineated using the topographic map generated from the aerial mapping effort that was also part of this study. The exceptions are the subbasins that lie within McDonnel Douglas Helicopter Facility and the contributing subbasins from the A-N West flood study. Personnel from McDonnel Douglas were able to provide a one-foot contour interval map, at a scale of 1" = 200', of their facility and surrounding area . Subbasins SB1 through SB8 were delineated with this map and verified with field visits. The contributing subbasins from the A-N West flood study were verified through field visits. The remaining subbasins (SB9-SB16) were delineated using the new topographic mapping generated as part of this study. These subbasins were also verified through field visits.

4.2.2 Watershed Work Maps

Figure 4 presents the Drainage Area Map and includes a schematic layout of the HEC-1 model. The following describes the HEC-1 nomenclature.

SB10	Subbasin ID
RS5	Routing Card
CP13	Concentration Point within Subbasin 13
DCP16	Divert to Concentration point
DRS15	Divert Return
DIS15	Divert flow to another part of the system
DOS9	Divert Flow out of system

4.2.3 Gage Data

The overall watershed does not contain significant streams or drainage structures to warrant gages therefore data are not available for comparison.

4.2.4 Statistical Parameters

Comparison were made with indirect methods using USGS Water Resources, refer to Figure 5, Investigations Report 91- 4041. All subbasins with areas of 0.1 mi^2 or greater were plotted on the log- Pearson Type III graph. All flows were within the 75% confidence limit except one SB11. SB11 plotted about 50 cfs below the 75% line. The basin is primarily a flood irrigated citrus grove with several paved streets crossing through the middle. It is reasonable to assume that this type of watershed would produce a lower than normal runoff rate.

4.2.5 Precipitation

The 100 year, 24 hour point rainfall was used in this analysis. The Soil Conservation Service (SCS) , refer to Figure 6. Type II rainfall distribution was used as the rainfall pattern. The Rainfall depth was taken directly from the National Oceanic and Atmospheric Administration Atlas 2. The 100-year, 24 hour point rainfall of 3.40 inches was reduced slightly to 3.359 inches based on the depth-area relationship in the NOAA Atlas 2.

4.2.6 Physical Parameters

Physical parameters were found using the FCDMC's guidelines, refer to Figures 2 & 3. Rainfall losses were modeled using the Green - Ampt method. The FCDMC provided a soil type map and land use map of the area. Weighted loss rate coefficients were calculated using the FCDMC's Drainage Design Menu System.

4.3 Problems Encountered During the Study

N\A

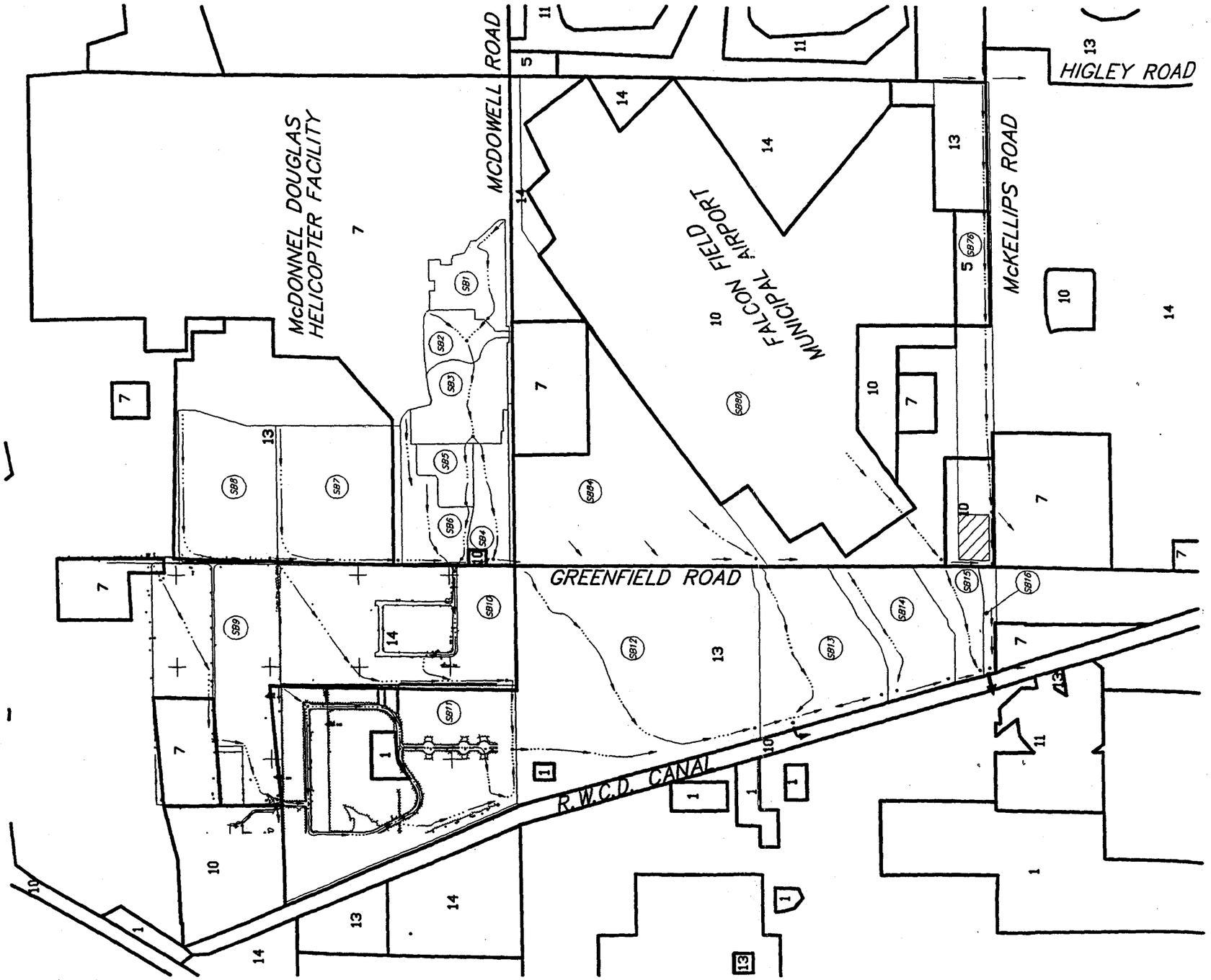
4.4 Calibration

N\A

4.5 Final Results

4.5.1 Hydrologic Analysis Results
See Table 4.1

4.5.2 Verification of Results
Refer to Section 4.2.4



NORTH

SCALE: 1"=1200'

0 300 600 1200 1800 2400

FIGURE 2

LAND USE MAP
(INDEX FROM HIS: DATA DELIVERY SPECIFICATIONS– REV. 2.0. LOOK UP TABLE: LDUSEMOD.LUT)

LEGEND:

(SB13) = SUBBASIN I.D.

10 = LANDUSE I.D.

—— = LANDUSE BOUNDARY

—— = SUBBASIN BOUNDARY

The WLB Group Inc. **WLB**

Engineering • Planning • Surveying
Landscape Architecture • Urban Design

Offices located in Tucson, Phoenix and Las Vegas, NV.
333 East Osborn Road, Suite 350
Phoenix, Arizona 85012 (602) 279-1016

Project: FLOODPLAIN DELINEATION FOR THE UPPER ROOSEVELT WATER CONSERVATION DISTRICT CANAL FCD 96-07

Sheet Title: LAND USE MAP FIGURE # 2

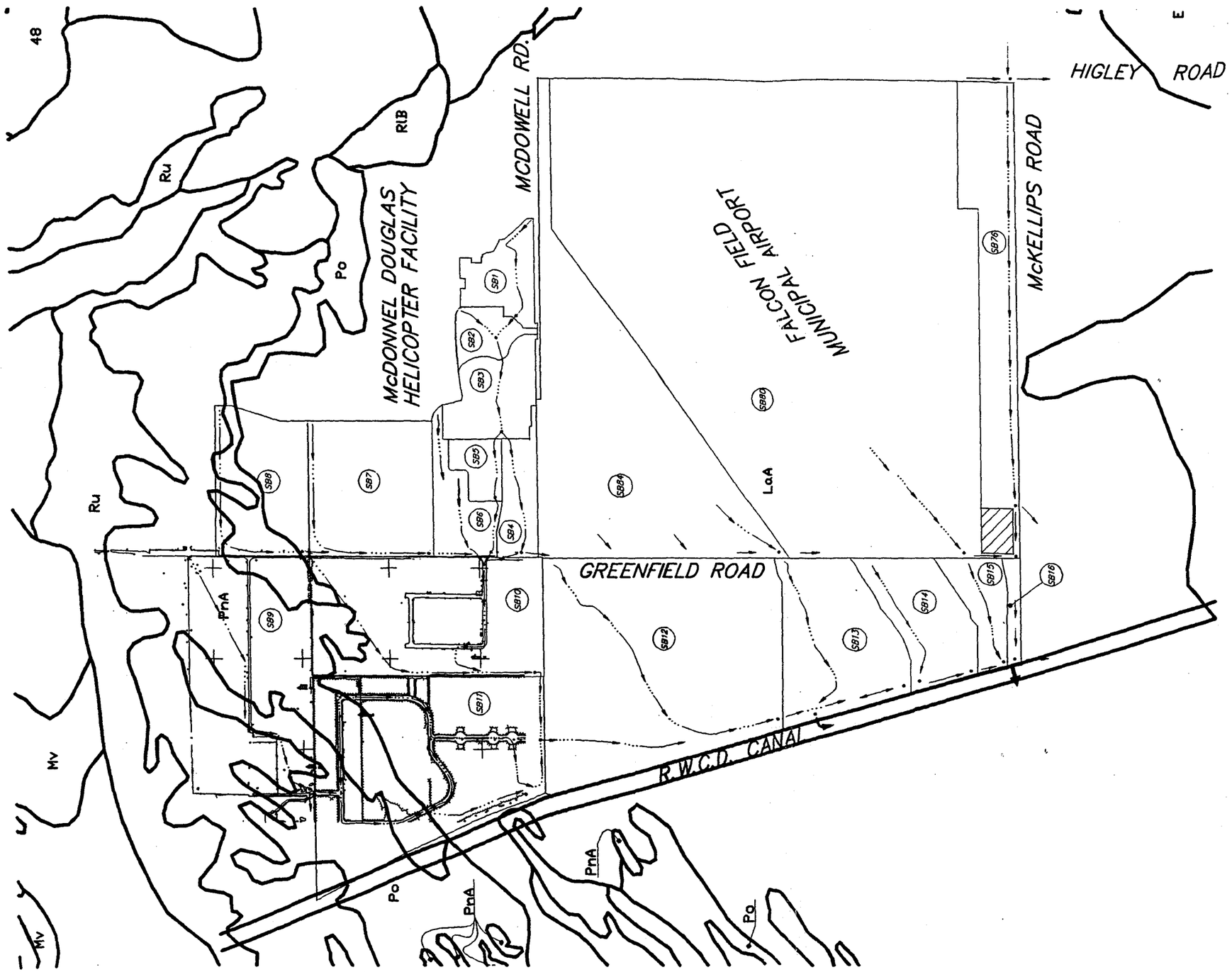
No.	Date	Item

Revisions

Scale	1" = 1200'
Job No.	296025A1
Date	5-6-97
Drawn By	DVA
Checked By	MJR

Sheet 17 of

CORBINZA.DWG



NORTH

SCALE: 1"=1200'

0 300 600 1200 1800 2400

FIGURE 3

SOIL TYPES

LEGEND:

(SB13) = SUBBASIN I.D.

— = SUBBASIN BOUNDARY

▬ = SOIL TYPE BOUNDARY

LaA = (FROM: SOIL SURVEY EASTERN MARICOPA CO., AND NORTHERN, PINAL CO., ARIZONA)

The WLB Group Inc. **WLB**

Engineering • Planning • Surveying
Landscape Architecture • Urban Design
Offices located in Tucson, Phoenix and Las Vegas, NV.
333 East Osborn Road, Suite 200
Phoenix, Arizona 85012 (602) 278-1016

Project: FLOODPLAIN DELINEATION FOR THE UPPER ROOSEVELT WATER CONSERVATION DISTRICT CANAL FCD 96-07

Sheet Title: SOIL TYPES FIGURE #

No.	Date	Item

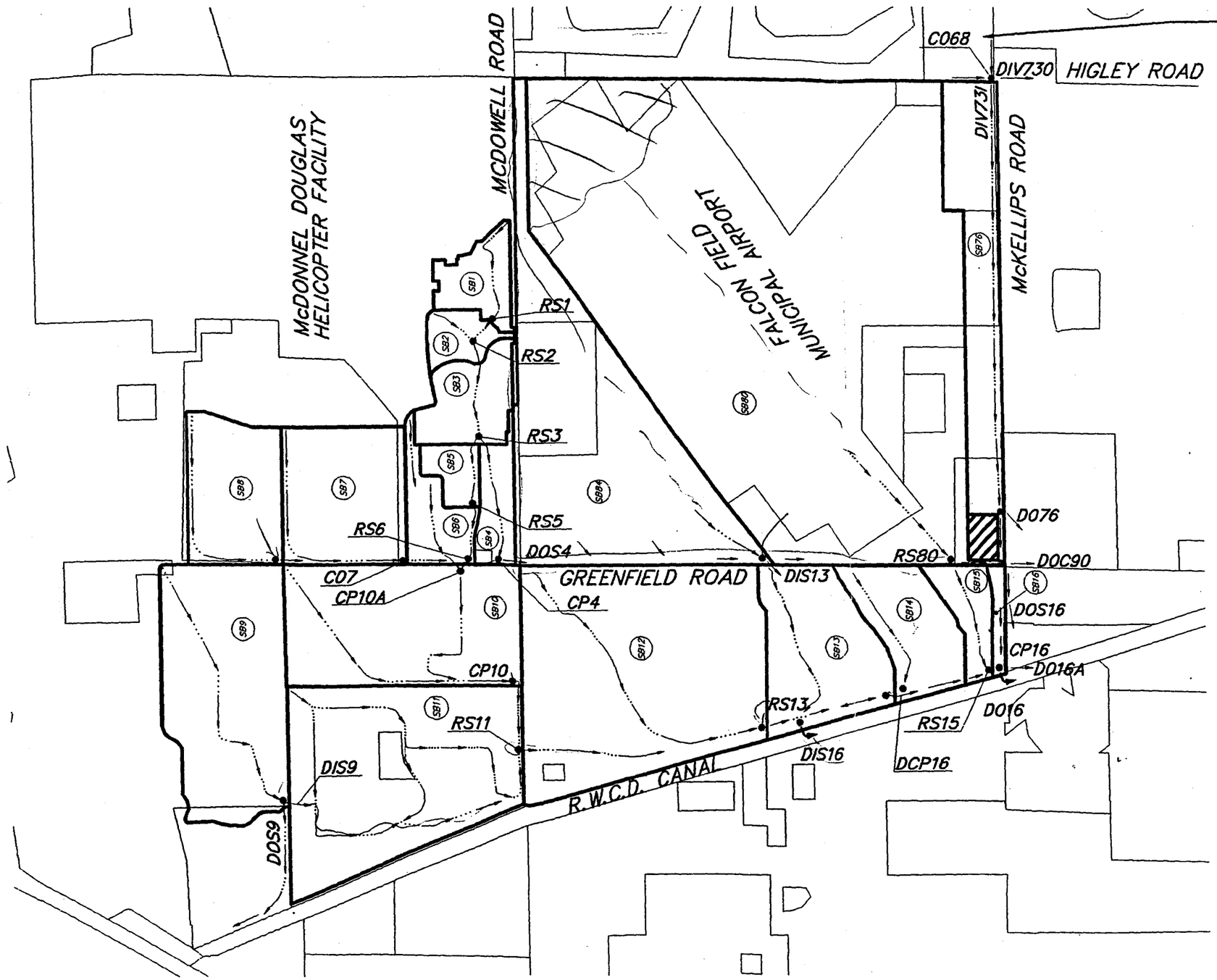
Revisions

Scale	1" = 1200'
Job No.	296025A1
Date	5-6-97
Drawn By	DVA
Checked By	MJR

Sheet 16 Of

LANDSCAPE.DWG

REFER TO "HYDROLOGY REPORT FOR UPPER EAST MARICOPA FLOODWAY FLOODPLAIN DELINEATION STUDY" FCD NO. 94-26 FOR CONTRIBUTING DRAINAGE AREAS UPSTREAM OF C068.



NORTH

SCALE: 1"=1200'

0 300 600 1200 1800 2400

FIGURE 4

HEC-1 SCHEMATIC AND DRAINAGE AREA MAP

LEGEND:

(SB13) = SUBBASIN I.D.

—— = SUBBASIN BOUNDARY

• RS15 = HEC-1 I.D. POINT

—— = LANDUSE BOUNDARY

▨ = NON CONTRIBUTING AREA

The WLB Group, Inc. **WLB**

Engineering • Planning • Surveying
Landscape Architecture • Urban Design
Offices located in Tucson, Phoenix and Las Vegas, NV.
333 East Osborn Road, Suite 350
Phoenix, Arizona 85012 (602) 279-1018

Project	FLOODPLAIN DELINEATION FOR THE UPPER ROOSEVELT WATER CONSERVATION DISTRICT CANAL FCD 96-07
Sheet Title	HEC-1 FLOW PATH SCHEMATIC FIGURE # 4

No.	Date	Item

Revisions

Scale	1" = 1200'
Job No.	296025A1
Date	5-21-97
Drawn By	DVA
Checked By	MJR

Sheet 19 Of

COMBINE4.DWG

Section 4.1

Hec-1 ID	100 year-24 hr. Peak Discharge (cfs)	Runoff Volume (ac-ft)	Time to Peak (hr)	Basin Area (mi^2)	Peak stage (ft)	Time to Peak Stage (hr)
SB1	38	3	12	0.02		
RS1	12	1	12.42	0.02	1376.12	12.42
SB2	29	2	12	0.01		
CP2	29	3	12	0.04		
RS2	14	2	12.5	0.04	1374.64	12.5
SB3	50	4	12.08	0.03		
CP3	50	6	12.08	0.07		
RS3	50	5	12.08	0.07	1373.46	12.08
DI4	25	3	12.08	0.07		
D3	25	3	12.08	0.07		
SB5	18	1	12.08	0.01		
CP5	44	4	12.08	0.08		
RS5	16	2	12.5	0.08	1370.08	12.5
R5	16	2	12.58	0.08		
SB6	27	3	12.17	0.02		
CP6	29	5	12.58	0.11		
RS6	28	5	12.58	0.11	1366.33	12.58
DR3	25	3	12.08	0		
RD3	26	3	12.25	0		
SB4	31	2	12.08	0.02		
CP4	45	5	12.25	0.02		
DOS4	6	3	12.25	0.02		
DIS4	39	2	12.25	0.02		
SB7	62	5	12.25	0.08		
SB8	39	4	12.25	0.06		
R8	38	4	12.5	0.06		
CP7	92	9	12.33	0.13		
CP10A	152	16	12.25	0.26		
R10A	151	16	12.5	0.26		
SB10	150	13	12.08	0.12		
CP10	239	29	12.17	0.38		
R10	238	29	12.25	0.38		
SB9	177	14	12.08	0.13		
DOS9	66	2	12.08	0.13		
DIS9	111	12	12.08	0.13		
R9	106	11	12.33	0.13		
SB11	103	12	12.33	0.17		
CP11	443	52	12.33	0.68		

Table 9.1 Continued

RS11	305	42	12.67	0.68	1353.75	12.67
R11	210	40	13.67	0.68		
SB12	282	14	12.08	0.21		
CP12	282	54	12.08	0.89		
SB13	103	5	12.08	0.08		
DRS84	66	3	12.42	0		
R84	38	3	13.33	0		
SB14	55	3	12.08	0.04		
CP13	440	65	12.08	1		
RS13	86	47	15.17	1	1352.17	15.17
DCP16	10		15.17	1		
DIS16	77	41	15.17	1		
SB15	21	1	12.08	0.02		
DRS15	0	0	0	0		
CP15	21	1	12.08	0.02		
RS15	0	0	0	0.02	1351.37	24.58
SB16	4	0	12.17	0		
DRCP16	10	7	15.17	0		
RDCP16	10	7	15.42	0	1353.67	15.42
DIS16A	36	8	12.17	0		
CP16	42	15	13	0.02		
DO16A	23	13	13	0.02		
DO16	19	2	13	0.02		

Note: Data was copied from HEC-1 file, Hec-1 has rounded the areas and runoff volumes.

TABLE 4.2

Summary of MCUHP1 Input Parameters

SUBBASIN	AREA	IA	DTHETA	PSIF	XKSAT	RTIMP	Tc	R
	sq.miles	ins.			adj.	%		
SB1	0.022	0.07	0.25	4.8	0.24	84	0.19	0.17
SB2	0.015	0.1	0.25	4.8	0.25	68	0.17	0.12
SB3	0.032	0.14	0.25	4.8	0.25	47	0.21	0.17
SB4	0.021	0.15	0.25	4.8	0.25	42	0.22	0.21
SB5	0.013	0.15	0.25	4.8	0.25	40	0.2	0.23
SB6	0.024	0.1	0.25	4.8	0.25	65	0.3	0.41
SB7	0.075	0.48	0.01	4.8	0.47	12	0.55	0.47
SB8	0.056	0.5	0	4.65	0.51	11	0.65	0.59
SB9	0.131	0.15	0.25	4.25	0.38	43	0.32	0.22
SB10	0.119	0.15	0.25	4.7	0.26	43	0.36	0.26
SB11	0.169	0.47	0.02	4.65	0.51	15	0.8	0.65
SB12	0.209	0.5	0	4.8	0.47	10	0.41	0.19
SB13	0.075	0.5	0	4.8	0.47	10	0.34	0.2
SB14	0.042	0.5	0	4.8	0.47	10	0.32	0.23
SB15	0.019	0.5	0	4.8	0.47	10	0.3	0.32
SB16	0.005	0.4	0.06	4.8	0.47	30	0.28	0.55

Section 5 Hydraulics

5.1 Method Description

As described in the introduction, most of the floodplain is a based on ponding elevations behind the RWCD canal. Therefore a HEC-2\ HEC-RAS model was not developed. However, the remaining Zone A floodplain was modeled using normal-depth calculations. In the analysis the peak discharge (300 cfs) over McDowell Road was used (HEC-1 ID No. RS11). Five cross section were taken between McDowell Rd. and the south ponding area. The water surface elevations obtained from the normal depth calculations were used to delineate the approximate Flood Zone A boundary. The "channel"slope was found by dividing the drop in existing ground elevation by the flow-line length. Manning's " n" estimated at 0.035.

The approximate floodplain delineation (Zone A) separates the ponding areas (Zone AH) which lie north and south of McDowell Road. The 100-year peak discharge of 300 cfs is the outflow, over McDowell Road, from the ponding area to the north. It flows into the ponding area to the south about 200 feet downstream of McDowell Road. It was delineated by approximate methods because it is relatively short in length (only about 200 feet long) and the Zone A designation will give flexibility to a developer in the future to design the site with any number of possible paths through the site to convey the 300 cfs. In the meantime, there are no structures located within the proposed Zone A for which flood insurance is required. Any future development will, by County Ordinance, be required to convey the 300 cfs from the northen ponding area to the southern ponding area without raising the upstream water surface elevation.

5.2 Work Study Maps

See pockets in back of this report.

Section 6 Erosion and Sediment Transport

Not Applicable

Section 7 Draft FIS report Data

7.1 Summary of Discharges: Not Applicable

7.2 Floodway Data: Not Applicable

7.3 Annotated Flood Insurance Rate Map: See Figure 7

7.4 Flood Profiles: Not Applicable

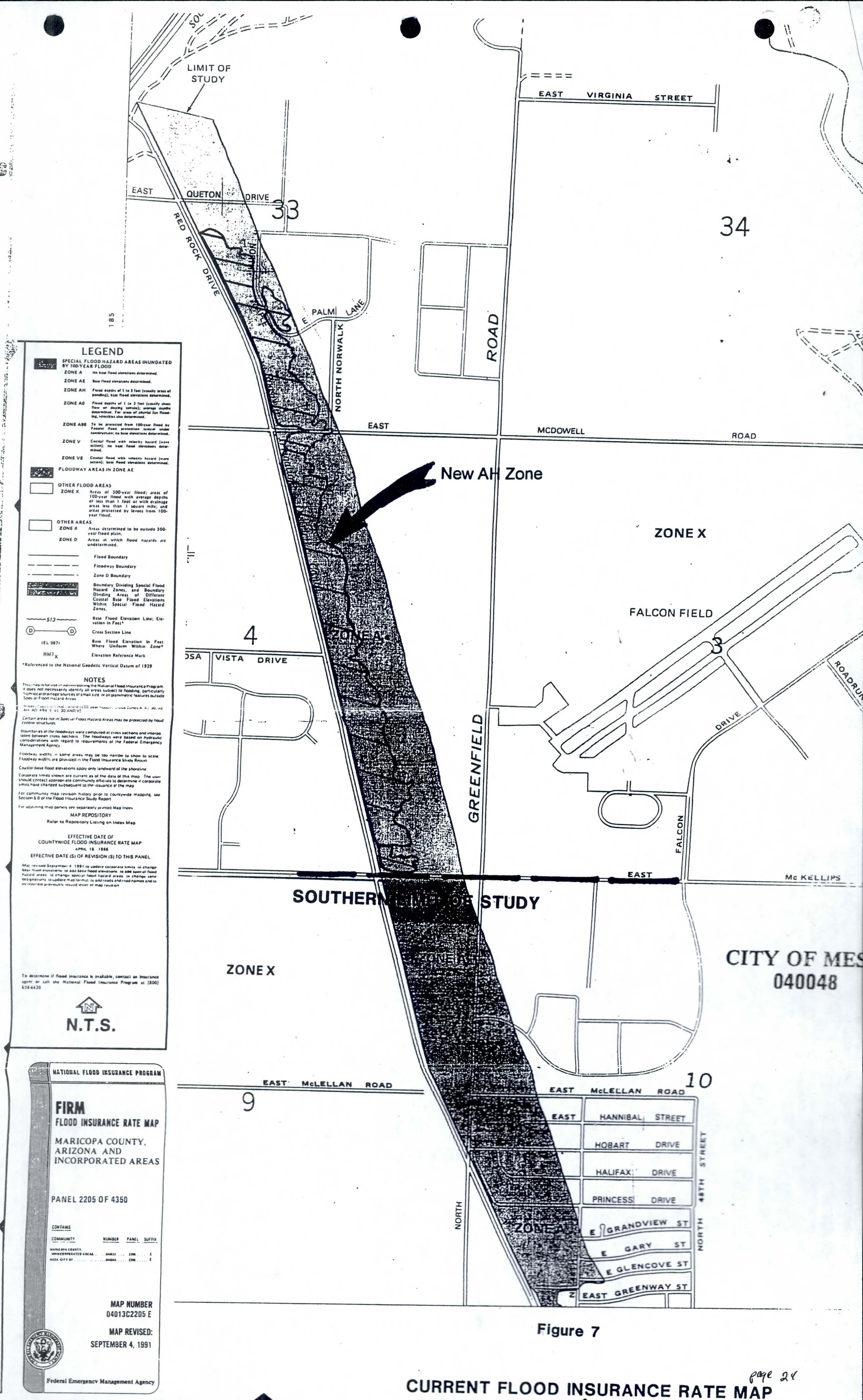


Figure 7

page 24

CURRENT FLOOD INSURANCE RATE MAP

A.1 Data Collection Summary

DATA COLLECTION REPORT

FOR
FLOODPLAIN DELINEATION FOR THE UPPER
ROOSEVELT WATER CONSERVATION DISTRICT CANAL (RWCD)

FCD NO. 96-07

MAY 1997

PREPARED FOR:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
2801 WEST DURANGO STREET
PHOENIX ARIZONA 85007

AND

CITY OF MESA
P.O. BOX 1466
55 NORTH CENTER STREET
MESA ARIZONA 85211-1466

WLB NO. 296025A1

Flood Hazard Studies

1. Hydrology Report for UPPER EAST MARICOPA FLOODWAY FLOODPLAIN DELINEATION STUDY
FCD NO. 94-26, BY A-N WEST INC. September 1995, Revised October 1995

This study was used to determine contributing runoff from: Falcon Field, drainage areas east of Higley Road and routed flows along Mckellips Road that contribute to the flooding of the orange groves north of Mckellips Rd. and east of the RWCD Canal . It is also the current study down stream of this study. Received from FCD October 1996.

Quarter Section Maps

1. Aerial Photographs, at 1" = 100', of the entire drainage area were received from the City of Mesa. They were used to determine existing land uses, vegetation cover and percent impervious. The photos were taken in September of 1993.
Map Numbers: 74; A,B,C,D
73; A,B,C,D
67; C,D
66; C,D
65; A,B,C

2. Storm Drain maps of the entire drainage area were provided by the City of Mesa. Used to determine storm drain sizes and inlet locations where applicable.
Map Numbers: 65; A,B,D
66; A,B,C,D
67; A,B,C,D
73; A,B,C,D
75; A,B,C,D
81; A,B,C,D
82; A,B,C,D
83; A,B,C,D
90; A,B,C,D
98; A,B,C

USGS Quadrangle Map

1. Buckhorn, Arizona 7 1/2' Dated 1956, photo revised 1982.

AS - Built Plans

1.AS-BUILT Plans, Greenfield Road Street Improvements; Brown Road to McDowell Road. ADOT Project M-784-(1), COM No. 87-15
By Boyle Engineering Corp. Dated 3-27-91

2. Improvement Plan for The Commons at County Greens. A planned subdivision along the RWCD Canal north of McDowell Rd. by Engineering and Surveying of Arizona, Inc. 1987

3. Topographic Mapping of McDonnel Douglas Helicopter Facility. Mapping consisted of 1 foot contours of all land owned by McDonnel Douglas north of Mcdowell Rd. and east Greenfield Rd. Total area approximately 360 ac. Map was used to determine drainage area boundaries, available retention, % impervious and flow paths for contributing area north of Mcdowell Rd., and east of Greenfield Rd. Date of mapping could not be determined.

Rainfall Data

NOAA Atlas II Precipitation-Frequency Atlas of the Western United States Volume VIII-Arizona

Land Use and Soil Type Data

Received AUTO CADD R12 files from the FCD.

1.Soil Survey for Eastern Maricopa and Northern Pinal Counties Area, Arizona by USDA Soil Conservation Service. Date: 1978.
2. Land Use From FCD Hydrologic Information System Rev 2.0 June 1995.

Existing Flood Zone 'A' Boundary

Received from FCD an AUTO CADD R-12 drawing of the existing Zone 'A' limits along the RWCD Canal, Panel No. 2205 of 4350 Revised September 4, 1991 Brown Rd to the Southern Canal. Used to compare proposed with existing flood boundary

Assessor Maps

They were used to provide the names and addresses of the land owners within the study reach that were informed, by letter, of the study. The maps were obtained from MC assessor, December 1996.
Maps; Book 141, Map 25 sheets 1,2,3,4,5,6
Map 28
Map 23 Sheet 1
Map 26 sheet 1

dc-R.wpd

A.2 Reference Documents

Appendix A.2

1. Hydrologic Design Manual for Maricopa County, Dated September 1990 with Revisions Dated January 1995.

2. HEC-1: Flood Hydrograph Package Computer Program Version 4.0 September 1990. U.S. Army Corps of Engineers Hydrologic Engineering Center, Davis California 85616-4617

3. U.S. Geological Survey 7.5 minute Quadrangle Map, "BUCKHORN, AZ. Date; 1956, with photo revisions 1982,

4. Aerial Photographs from City of Mesa Engineering (see Data Collection Report)

5. The Hydrologic Information System (HIS) Data Delivery Specifications, Rev. 2.0 Flood Control District of Maricopa County.

6. Drainage Design Menu System (DDMS) Computer Program by FCD. January, 1995.

7. Soil Survey For Aguila\Carefree Area Part of Maricopa and Pinal Counties, Arizona, by USDA Soil Conservation Service (SCS). Date: 1978.

8. Flood Insurance Rate Map, (FIRM) Panel 2205 of 4350. Map revised Sept. 1991.

9. Hydrology Report For Upper East Maricopa Floodway (UEMF) Floodplain Delineation Study FCD No. 94-26, by A-N West Inc., Dated: 10-31-95

10. Storm Drain Design Manual, Storm Drains with Paving of Major Streets, City of Phoenix, August 1975, Revised July 1987.

A.3 Contact List

Contact List

RWCD Canal

Job No. 296025

FCD Contract No. 96-07

Organization	Main Contact	Address	Phone Number
Maricopa County Flood Control District	Pedro Calza, Project Manager	2801 West Durango Phoenix, Az 85009	(602) 506-1501
CITY OF MESA	Peter Knudson, Senior Project Engineer	Engineering Dept. 55 North Center Street P.O. Box 1466 Mesa, AZ 85211-1466	(602) 644-2551
MCDONNEL DOUGLAS	Steve Moser Environmental Engineer	5000 East McDowell Road Mesa, AZ 85215-9797 MS M541-F118	(602) 891-4851
The WLB Group Inc. Study Contractor	Michael Roberts: Project Engineer Mark Gavin: Project Manager	333 East Osborn Road Phoenix, Az 850012	(602) 279 1016 Fax (602) 279-7810
Collins Pena (surveying)	Art Witzell: Head Surveyor	3800 North Central, Suite 200 Phoenix , AZ 85012	(602) 264-7505 Fax (602) 264-0568

B.1 Special Problem Reports

(Not Applicable)

B.2 Contact Reports

B.3 Meeting Minutes

B.4 General Correspondence

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

Sob file

2801 West Durango Street · Phoenix, Arizona 85009
Telephone: (602) 506-1501
Fax: (602) 506-4601
TT: (602) 506-5897

COVER SHEET

TO: Robert Landis, P.E.

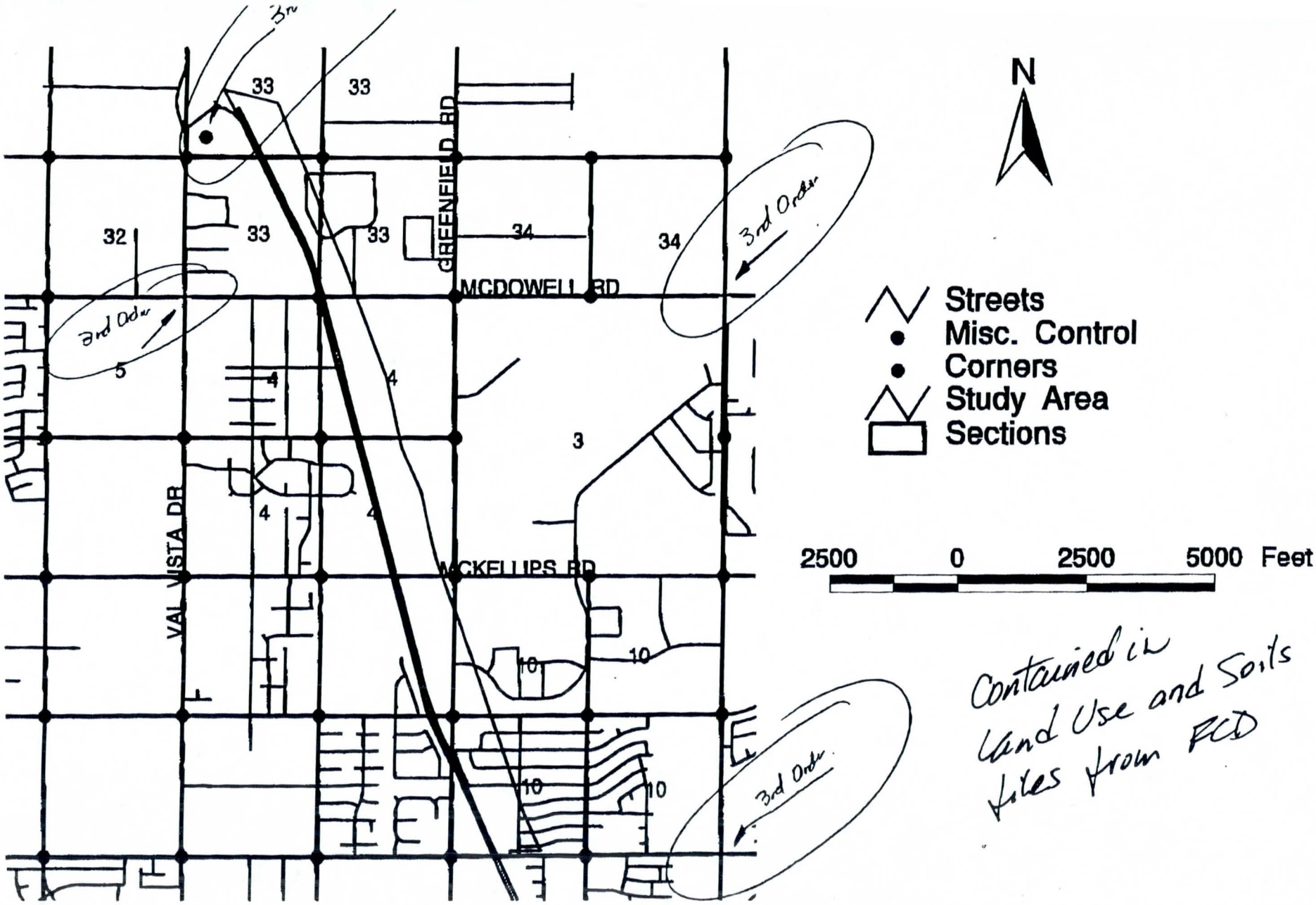
Company or Department: WLB Group **Fax #** 279-7810

FROM: Roy Shah, P.E. Tele: 506-4071

Number of pages being sent including Cover Sheet: 2

Comments: One more map showing section lines and monuments

Thanks.



[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	For further information [illegible]	Potential, Field Check, [illegible]	[illegible] accuracy of 1 part in 10,000
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	For further information [illegible]	Potential, Field Check, [illegible]	[illegible] accuracy of 1 part in 10,000
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	For further information [illegible]	Potential, Field Check, [illegible]	[illegible] accuracy of 1 part in 10,000
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	For further information [illegible]	Potential, Field Check, [illegible]	[illegible] accuracy of 1 part in 10,000
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	For further [illegible]	[illegible] Digitized from 7.5' Quadr[illegible]	[illegible] by [illegible] to [illegible]

11/20/96

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009
Telephone (602) 506-1501
Fax (602) 506-4601
TT (602) 506-5859

BOARD OF DIRECTORS
Betsey Bayless
Ed King
Tom Rawles
Don Stapley
Mary Rose Garrido Wilcox

November 18, 1996

Re: Upper RWCD Canal FIS, FCD Cont. # 96-07.

To: Mark Gavan, P.E., Project Manager

Dear Mr. Gavan;

Attached with this letter is two copies of the diskette containing .dxf files for the above referenced project reach. The .dxf files contains: 1) Land use information 2) Soils information and 3) Street names.

Call me if you need more information or have any questions.

Sincerely,

Raju C. Shah

Raju C. Shah, P.E.
Project Manager

11/20/96

LOOK UP TABLE: LDUSEMOD.LUT

NAME MEANS: Abbreviated land use definitions

LID	DEFINITION
0	Blank/unknown/uncertain
1	Low Density Residential
2	Medium Density Residential
3	High Density Residential
4	Developing Residential
5	Retail/Commercial
6	Office
7	Industrial
9	Educational
10	Public and Quasi-Public
11	Park
12	Waterway
13	Agricultural
14	Vacant
15	Non-Developable

LOOKUP TABLE: MNCPL.LUT

NAME MEANS: Municipality names.

LID	DEFINITION	CODE	FIRM NUMBER
0	Blank/unknown/uncertain		
1	AVONDALE	04 013	040038
2	BUCKEYE	04 013	040039
3	CAREFREE	04 013	040126
4	CAVE CREEK	04 013	040129
5	CHANDLER	04 013	040040
6	EL MIRAGE	04 013	040041
7	FOUNTAIN HILLS	04 013	
8	GILA BEND	04 013	040043
9	GILBERT	04 013	040044
10	GLENDALE	04 013	040045
11	GOODYEAR	04 013	040046
12	GUADALUPE	04 013	040111
13	LITCHFIELD PARK	04 013	040128
14	MARICOPA UNICORPORATED	04 013	040037
15	MESA	04 013	040048
16	PARADISE VALLEY	04 013	040049
17	PEORIA	04 013	040050
18	PHOENIX	04 013	040051
19	QUEEN CREEK	04 013	040132
20	SCOTTSDALE	04 013	045012

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

2801 West Durango Street · Phoenix, Arizona 85009
Telephone: (602) 506-1501
Fax: (602) 506-4601
TT: (602) 506-5897

COVER SHEET

TO: Mike Roberts

Company or Department: WLB Group Fax # 279-7810

FROM: Raj Shah

Number of pages being sent including Cover Sheet: 1

Comments: Mike, We have been playing a phone tag. I returned your call, but I guess you were out in the Field. However, I have looked at the "Rights of Entry" letter and the "Advertisement" for the newspaper. It looks ok, go ahead and proceed with it. Call me if you have any questions.

Thanks and Happy New Year

Raj.

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

2801 West Durango Street · Phoenix, Arizona 85009
Telephone: (602) 506-1501
Fax: (602) 506-4601
TT: (602) 506-5897

COVER SHEET

TO: Mike Roberts

Company or Department: WLB Group Fax # 279-7810

FROM: Raj Shah

Number of pages being sent including Cover Sheet: 1

Comments: Mike, We have been playing a phone tag. I returned your call, but I guess you were out in the Field. However, I have looked at the "Rights of Entry" letter and the "Advertisement" for the newspaper. It looks ok, go ahead and proceed with it. Call me if you have any questions.

Thanks and Happy New Year.

Raj.

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009
Telephone (602) 506-1501
Fax (602) 506-4601
TT (602) 506-5859

BOARD OF DIRECTORS
Betsey Bayless
Ed King
Tom Rawles
Don Stapley
Mary Rose Garrido Wilcox

November 18, 1996

Re: Upper RWCD Canal FIS, FCD Cont. # 96-07.

To: Mark Gavan, P.E., Project Manager

Dear Mr. Gavan;

Attached with this letter is two copies of the diskette containing .dxf files for the above referenced project reach. The .dxf files contains: 1) Land use information 2) Soils information and 3) Street names.

Call me if you need more information or have any questions.

Sincerely,

Raju C. Shah, P.E.
Project Manager

Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009
(602) 506-1501 fax (602) 506-4601

INTEROFFICE MEMO

To: PAC
From: BZ
Via: AMM

Subject: Review comments on **"Data Collection Report for Floodplain Delineation for the upper Roosevelt Water Conservation District Canal" by WLB, June, 1997.**

Date: July 1, 1997

The attached are our review comments. If you have any questions, please let us know. Thank you very much!

Review comments on "Data Collection Report for Floodplain Delineation for the upper Roosevelt Water Conservation District Canal" by WLB, May, 1997.

1. Some pages are missing in Appendix A-2. More specifically, lines 260-366 of schematic tree are missing.

2. As is known, the outflow peak can not be greater than the inflow peak. However, it was found that the outflow peak is greater than the inflow peak for the following routing cards: RO47P, RS3, RS6, R10. The reason may be related to the parameter selection for Muskingum-Cunge routing method which is used in this study.

The WLB Group Inc.

Engineering · Planning
Surveying · Urban Design
Landscape Architecture

FAX COVER SHEET

DATE: 1-15-96 WLB Job No.: 296025 / FCD 96-07

TO: Raju Shah

COMPANY: FLOOD CONTROL DISTRICT M.C.

FROM: Michael Roberts

We are transmitting 3 pages, including this cover sheet. If you do not receive all pages, please contact us as soon as possible at (602) 279-1016. Thank you.

COMMENTS: Raj, here is our task schedule.

We will schedule a meeting at the end of January with Peter Knudsen (C.O.M.).

We also recieved the field survey from Collins/Pina on 1/14/97.

Please call me if you have any questions

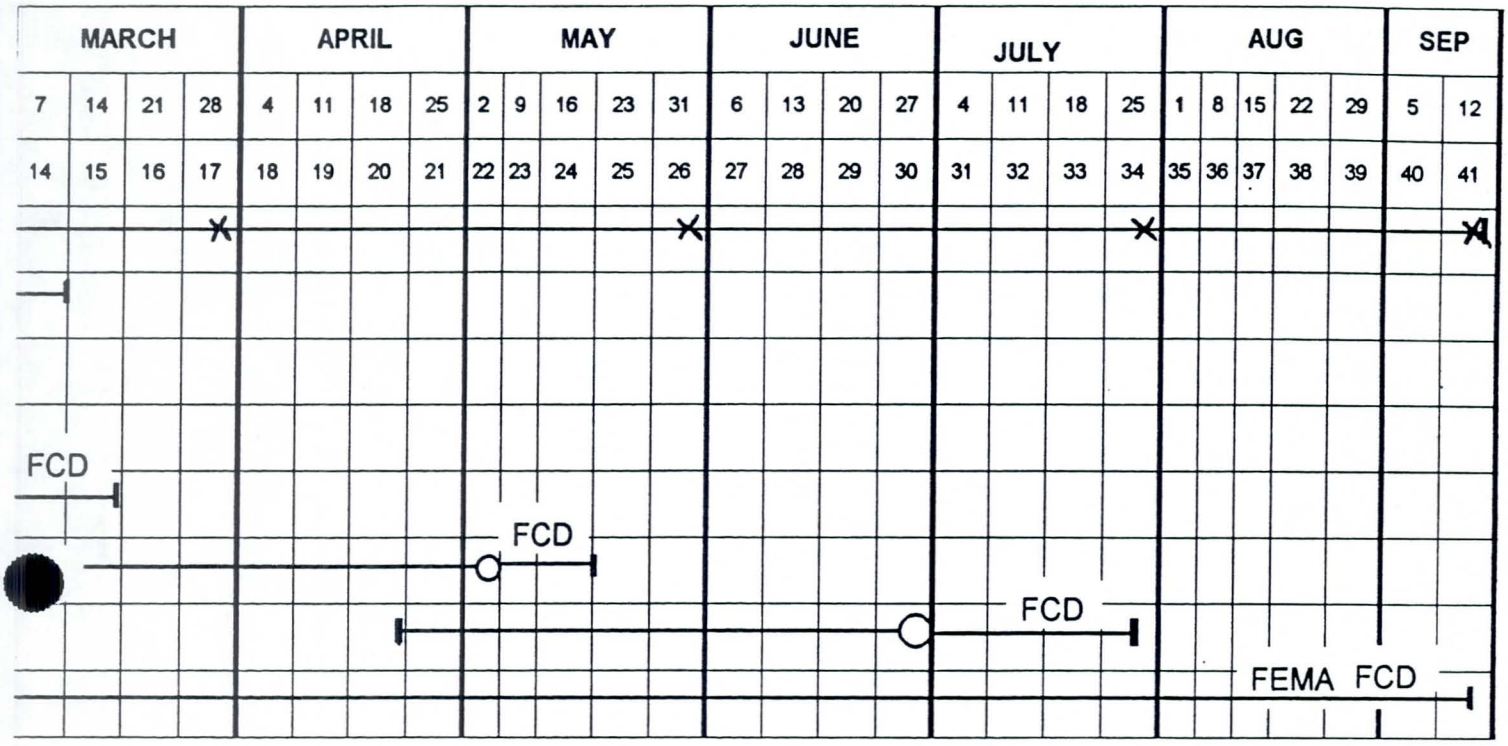
Mike

PLEASE DELIVER AS SOON AS POSSIBLE

OPERATOR: FAX NO.: (602) 279-7810

Offices located in Tucson, Phoenix, Las Vegas, and Rancho Cucamonga, California
333 East Osborn Suite 380 · Phoenix, Arizona 85012 · (602) 279-1016

)6-07



The WLB Group Inc. WLB

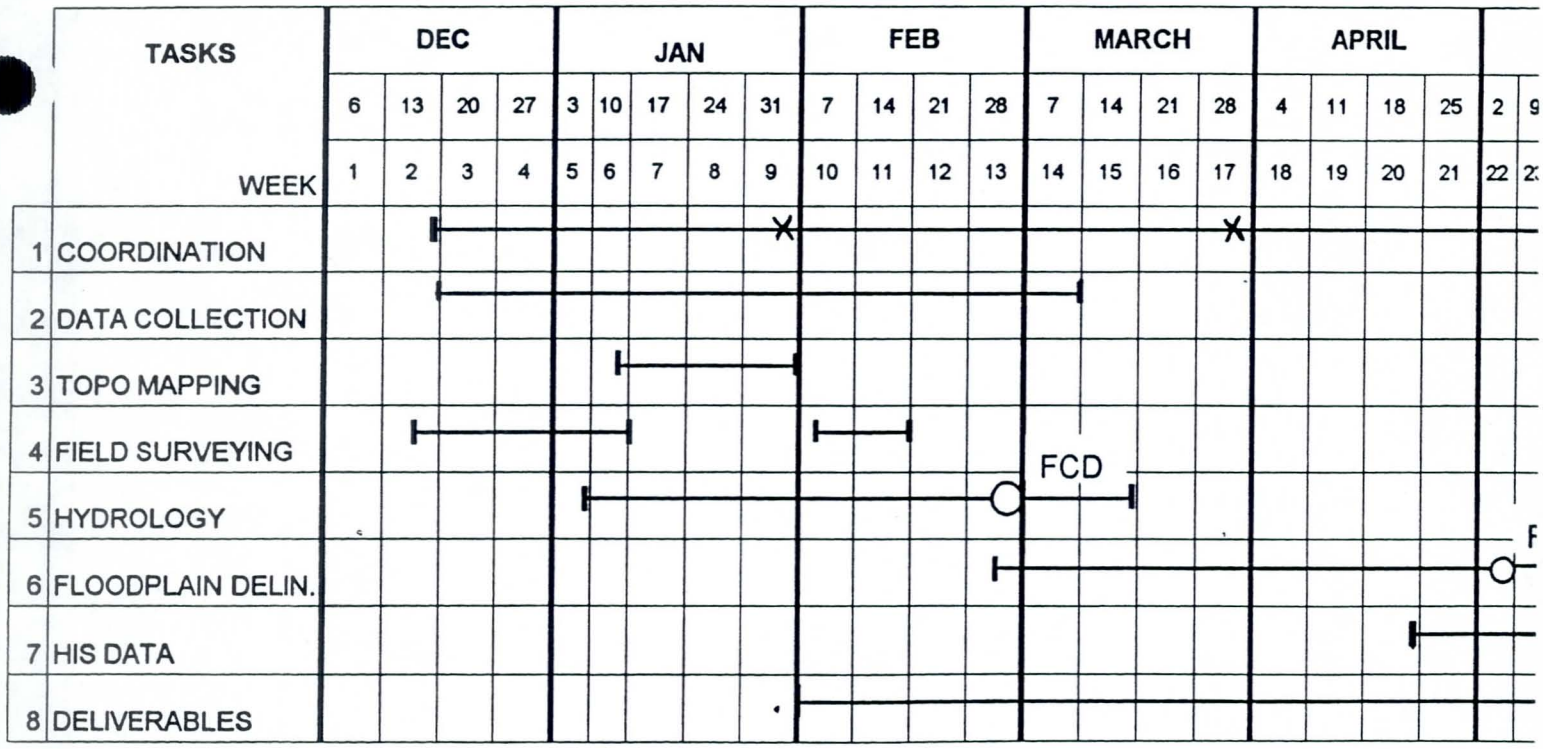
PROJECT SCHEDULE **FIS: UPPER- RWCD CANAL FCD 96-07**

NOTICE TO PROCEED: DECEMBER 13, 1996

SCHEDULED COMPLETION: SEPTEMBER 8, 1997

WLB JOB NUMBER: 296025

DATE: 1- 12- 97



O -TURN IN FOR REVIEW

X - MEETING

- START AND END TASK

The WLB Group Inc.

Engineering · Planning
Surveying · Urban Design
Landscape Architecture

FAX COVER SHEET

DATE: 5/6/97 WLB Job No.: 296025A1

TO: Raju Shaw

COMPANY: MCFCD Fax 279-7810

FROM: Mike Roberts

We are transmitting 2 pages, including this cover sheet.
If you do not receive all pages, please contact us as soon as possible at (602) 279-1016. Thank you.

COMMENTS: Raju, The Land USE ID #'s do not seem to reflect the current land uses.

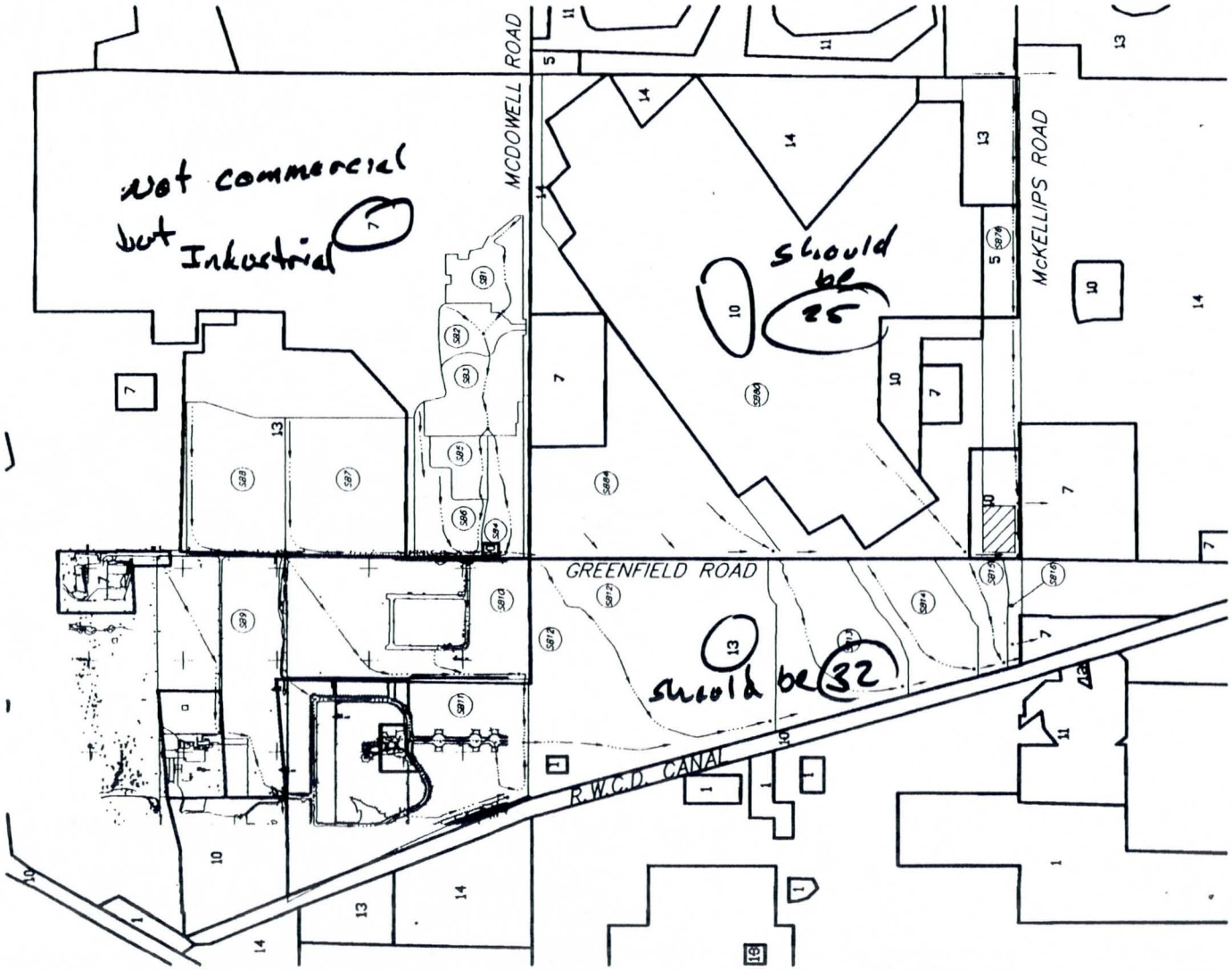
Can you make any sense out of them? If so please call.

Thanks Mike

PLEASE DELIVER AS SOON AS POSSIBLE

OPERATOR: _____ FAX NO.: (602) 279-7810

Offices located in Tucson, Phoenix, Las Vegas, and Rancho Cucamonga, California
333 East Osborn Suite 380 · Phoenix, Arizona 85012 · (602) 279-1016



NORTH

SCALE: 1"=1200'

0 300 600 1200 1800 2400

LEGEND:

(SB13) = SUBBASIN I.D.

10 = LANDUSE I.D.

—— = LANDUSE BOUNDRY

—— = SUBBASIN BOUNDRY.

The WLB Group WLB

Engineering • Planning • Surveying
Landscape Architecture • Salton Sea
Offices located in Tucson, Phoenix and Las Vegas, NV.

FLOODPLAIN DELINEATION AND TOPOGRAPHIC MAPPING FOR THE UPPER ROOSEVELT WATER CONSERVATION DISTRICT CANAL

LAND USE MAP
FIGURE #

No. Date Item

Scale 1" = 1200'
Job No. 296025A1
Date 5-6-97

Sheet

HIS Rev 2.1

The WLB Group Inc.

Engineering • Planning • Surveying • Urban Design • Landscape Architecture
Offices located in Tucson, Phoenix, Las Vegas, and Victor Valley, California
333 East Osborn, Suite 380 • Phoenix, Arizona 85012 • (602) 279-1016 • FAX (602) 279-7810

Transmittal

To: Pedro Calza
FCD of Maricopa County
2801 West Durango
Phoenix, Arizona 85009

Date: June 20, 1997
Job No.: 296025
Drawing/Spec Reference:

Re: RWCD Canal FIS Hydrology Report

We Transmit ☒ Herewith ☐ Under Separate Cover ☐ Via

Material Format

- ☐ Letter
- ☐ Memo
- ☐ Prints
- ☐ Sketch
- ☐ Reports
- ☐ Mylars
- ☐ Shop Drawing
- ☐ Clarification Drawing
- ☐ Modification Drawing
- ☐ Specifications
- ☐ Sepias
- ☐ _____

Requested Action

- ☐ For Your Approval
- ☐ For Your Signature
- ☐ Information
- ☐ Resubmit
- ☐ As Requested
- ☐ Issue Change Order
- ☐ Your Review
- ☐ Please Comment
- ☐ Make Recommendation
- ☐ Issue Construction Order
- ☐ For Your Use
- ☐ _____

Remarks:

Please find enclosed for your review and comment, the Preliminary Hydrology Report for the RWCD Canal FIS, McKellips Road to the Southern Canal. Included in the report are exhibits showing the differences in floodplain areas due to: existing Floodzone A, new Canal Bank Survey and actual ponding elevations. Also enclosed is a copy of the Data Collection Report.

Copies To: Pedro Calza at FCD

Signed: Michael Roberts
Project Engineer

Received By:

Date:

The WLB Group Inc. WLB

Engineering • Planning • Surveying • Urban Design • Landscape Architecture
Offices located in Tucson, Phoenix, Las Vegas, and Victor Valley, California
333 East Osborn, Suite 380 • Phoenix, Arizona 85012 • (602) 279-1016 • FAX (602) 279-7810

Transmittal

To: Mr. Raju Shah

Flood Control District of
Maricopa County
2801 West Durango

Phoenix, Arizona 85009

Date: March 20, 1997

Job No.: 296025

Drawing/Spec Reference:

Re: FCD No. 96-07 RWCD Canal Flood Study

We Transmit ☒ Herewith ☐ Under Separate Cover ☐ Via

Material Format

- ☐ Letter
- ☐ Memo
- ☐ Prints
- ☐ Sketch
- ☐ Reports
- ☐ Mylars
- ☐ Shop Drawing
- ☐ Clarification Drawing
- ☐ Modification Drawing
- ☐ Specifications
- ☐ Sepias
- ☐ _____

Requested Action

- ☐ For Your Approval
- ☐ For Your Signature
- ☐ Information
- ☐ Resubmit
- ☐ As Requested
- ☐ Issue Change Order
- ☐ Your Review
- ☐ Please Comment
- ☐ Make Recommendation
- ☐ Issue Construction Order
- ☐ For Your Use
- ☐ _____

Remarks:

Please find enclosed one set of blueprints showing aerial topography from Collins-Pina, for your review.

Copies To:

Signed: Michael Roberts

Michael Roberts

Received By:

Date:

The WLB Group Inc.

Engineering · Planning
Surveying · Urban Design
Landscape Architecture

FAX COVER SHEET

DATE: 12/18/96 WLB Job No.: 296025A1

TO: Raju Shah

COMPANY: MCFCD contract No. 96-07

FROM: Mike Roberts

We are transmitting 4 pages, including this cover sheet. If you do not receive all pages, please contact us as soon as possible at (602) 279-1016. Thank you.

COMMENTS: Raj, here is the Right of Entry letter we would like to send out. We will wait for your comments before sending. Also included is a list of the recipients.

Thanks

Mike

PLEASE DELIVER AS SOON AS POSSIBLE

OPERATOR: FAX NO.: (602) 279-7810

Offices located in Tucson, Phoenix, Las Vegas, and Rancho Cucamonga, California
333 East Osborn Suite 380 · Phoenix, Arizona 85012 · (602) 279-1016

December 18, 1996

Re: Request for Right of Entry
Floodplain Delineation Study along the RWCD Canal

Dear Property Owner:

The Flood Control District of Maricopa County (FCDMC), under the authority of the National Flood Insurance Act of 1968 (P.L. 93-234), is funding a detailed study of the flood hazard areas in eastern Maricopa County. The FCDMC has contracted The WLB Group, Inc. to perform a detailed study for the upstream (east) side of the Roosevelt Water Conservation District Canal (RWCD), between the Southern Canal and Mckellips Road in the City of Mesa, Arizona.

The intent of this letter is to notify you of the commencement of surveying activities to occur, between 12/26/96 and 3/30/97, in support of the above mentioned study. The surveying activities will consist of taking spot elevations along the roadways and the RWCD Canal. Also paper panels, for aerial photography, will be placed at various locations within the study area and then removed at the conclusion of the survey.

If you have any objection to our survey crews entering your property, please notify Mr. Raju Shah of the Flood Control District at 602-506-4071. Otherwise it will be assumed that you consent to our survey crews entering your property.

The study and resulting maps will be used for floodplain management purposes and submitted to the Federal Emergency Management Agency for revision of Flood Insurance Rate Maps. The study will be available to the public in approximately 12 months.

The Flood Control District and its representatives appreciate your help in assuring the accuracy of the study by allowing access to your property for our surveyors and by providing any information you may have regarding past flooding or related problems. If you have any questions regarding this right-of-entry request, please contact Mr. Raju Shah, Hydrologist, Flood Control District (Phone 506- 4071) or Mr. Michael Roberts of The WLB Group Inc. (Phone: 279-1016).

Sincerely,

THE WLB GROUP INC.

Michael J. Roberts
Project Engineer

MJR:srg

W:296025\SURVLTTR

Gardner + Assc.
4301 E. McKellips
Mesa, AZ 85205

First Interstate Bank of Az
P.O. Box 53465
Phoenix, AZ 85072

Letters to be sent to

Sandra McFadden
4042 East Palm Lane
Mesa, ~~Ariz~~ AZ 85215-110

C + C Enterprises
3302 North Greenfield Rd
Mesa, AZ 85205

NEW Mexico + Arizona Land Co.
3033 N. 44th Street
Suite 270
Phoenix, AZ 85018

Roosevelt Water Conservation District
P.O Box 100
Higley, AZ 85236

City of Mesa
P.O. Box 1466
Mesa, AZ 85211

****
*** ACTIVITY REPORT ***
****

TRANSMISSION OK

TX/RX NO.	3361
CONNECTION TEL	5064601
CONNECTION ID	MARICOPA CO. FCD
START TIME	12/18 15:08
USAGE TIME	01'04
PAGES	4
RESULT	OK

The WLB Group Inc.

Engineering • Planning
Surveying • Urban Design
Landscape Architecture

February 25, 1997

Mr. Raju Shah
Flood Control District
of Maricopa County
2801 West Durango
Phoenix, Arizona 85009

Re: Floodplain Delineation
Upper RWCD Canal
WLB No. 296025

Dear Raju:

Attached is a revised schedule for this project. As I explained on the telephone, we have extended the submittal dates for the topographic mapping, hydrology, and the floodplain delineation about 6 weeks. The total schedule time, however, has remained the same at 39 weeks. The reason for this schedule change is a misunderstanding on the part of our subconsultant on the limits of coverage for the topographic mapping. They did not cover the entire mapping area but are currently in the process of extending their mapping coverage to include the area specified in the contract. This mapping effects our hydrologic model, therefore we plan to submit the hydrology in the second week of April rather than the end of February as originally scheduled.

I will send a copy of this schedule change to Peter Knudson. As always, please call me or Mike Roberts if you have any questions.

Sincerely,

THE WLB GROUP, INC.

Mark T. Gavan

Mark T. Gavan, P.E., R.L.S.
Project Manager

MTG:srg

cc: Peter Knudson, City of Mesa

W:296025\2-25L

Offices located in Tucson, Phoenix, Las Vegas, and Victor Valley, California
333 East Osborn, Suite 380 • Phoenix, Arizona 85012 • (602) 279-1016 • FAX (602) 279-7810

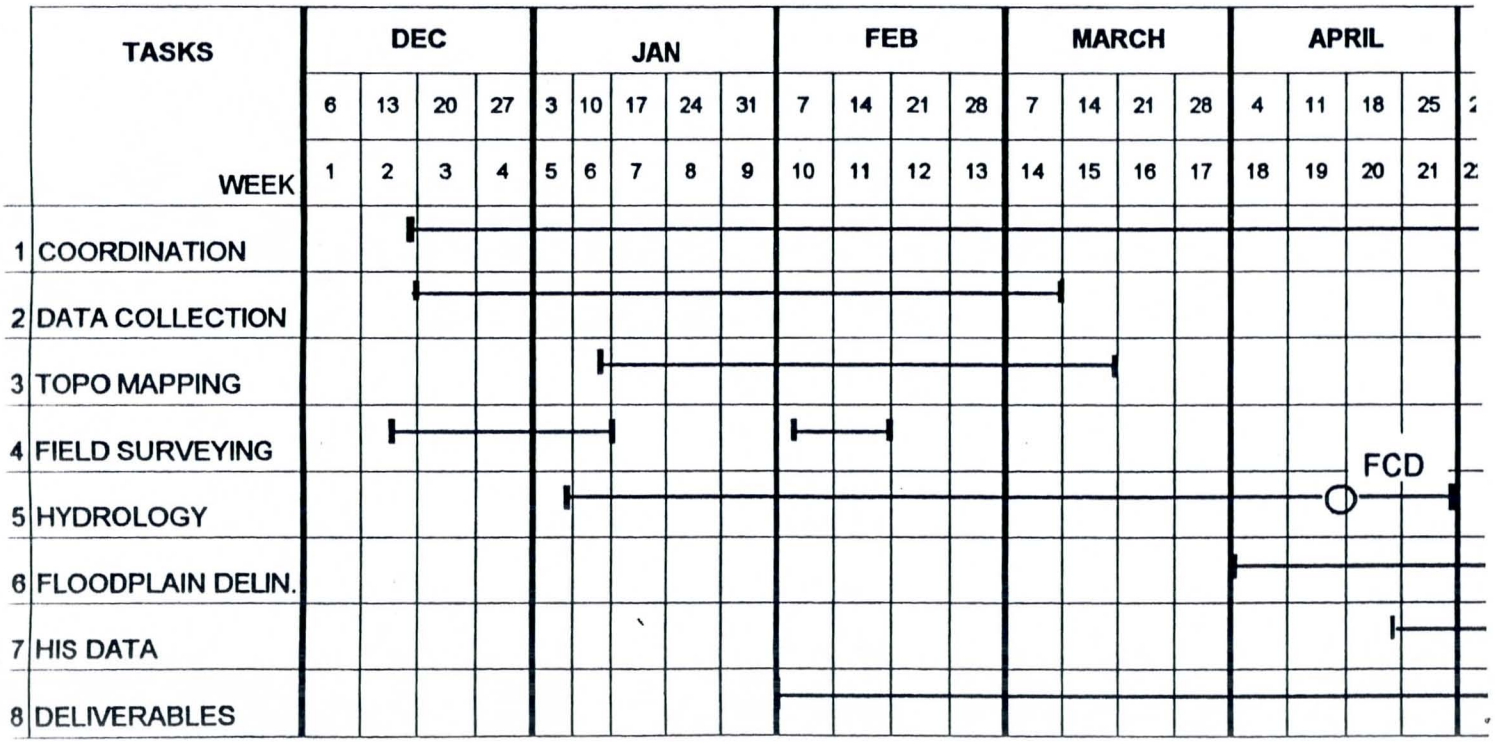
PROJECT SCHEDULE **FIS: UPPER- RWCD CANAL FCD 96-07**

NOTICE TO PROCEED: DECEMBER 13, 1996

SCHEDULED COMPLETION: SEPTEMBER 8, 1997

WLB JOB NUMBER: 296025

DATE: 1- 12- 97 (Revised 2-25-97)



O -TURN IN FOR REVIEW

< - MEETING

| - START AND END TASK

The WLB Group Inc.

Engineering • Planning
Surveying • Urban Design
Landscape Architecture

FAX COVER SHEET

DATE: 4/23/97 WLB Job No.: 296025A1

TO: Peter Knudson

COMPANY: City of Mesa

FROM: Mike Roberts For; RWCD FIS (FCD 96-07)

We are transmitting 1 pages, including this cover sheet.
If you do not receive all pages, please contact us as soon as possible at (602) 279-1016. Thank you.

COMMENTS: Peter, these are the gentlemen we talked to at McDonnel Douglas. Steve Moser was the contact.

MCDONNELL DOUGLAS

STEVEN A. MOSER
Environmental Engineer
Environmental Health & Safety

McDonnell Douglas Aerospace
McDonnell Douglas Helicopter Systems
5000 East McDowell Road (602) 891-4851
Mesa, AZ 85215-9797 Datafax (602) 891-6364
MS M541-F118

MCDONNELL DOUGLAS

WILLIAM R. POOL
Administrator, Environmental Compliance
Environmental Health & Safety

McDonnell Douglas Aerospace
McDonnell Douglas Helicopter Systems (602) 891-3220
5000 East McDowell Road Datafax (602) 891-6364
Mesa, AZ 85215-9797 wpool@msgate.mdhc.mdc.com

Mike

PLEASE DELIVER AS SOON AS POSSIBLE

OPERATOR: _____ FAX NO.: (602) 279-7810

The WLB Group Inc.

Engineering · Planning
Surveying · Urban Design
Landscape Architecture

FAX COVER SHEET

DATE: 12/17/96 WLB Job No.: 296025A1

TO: Peter Knudson

COMPANY: City of MESA Engineering (644-3392)

FROM: Mike Roberts

We are transmitting 2 pages, including this cover sheet. If you do not receive all pages, please contact us as soon as possible at (602) 279-1016. Thank you.

COMMENTS:

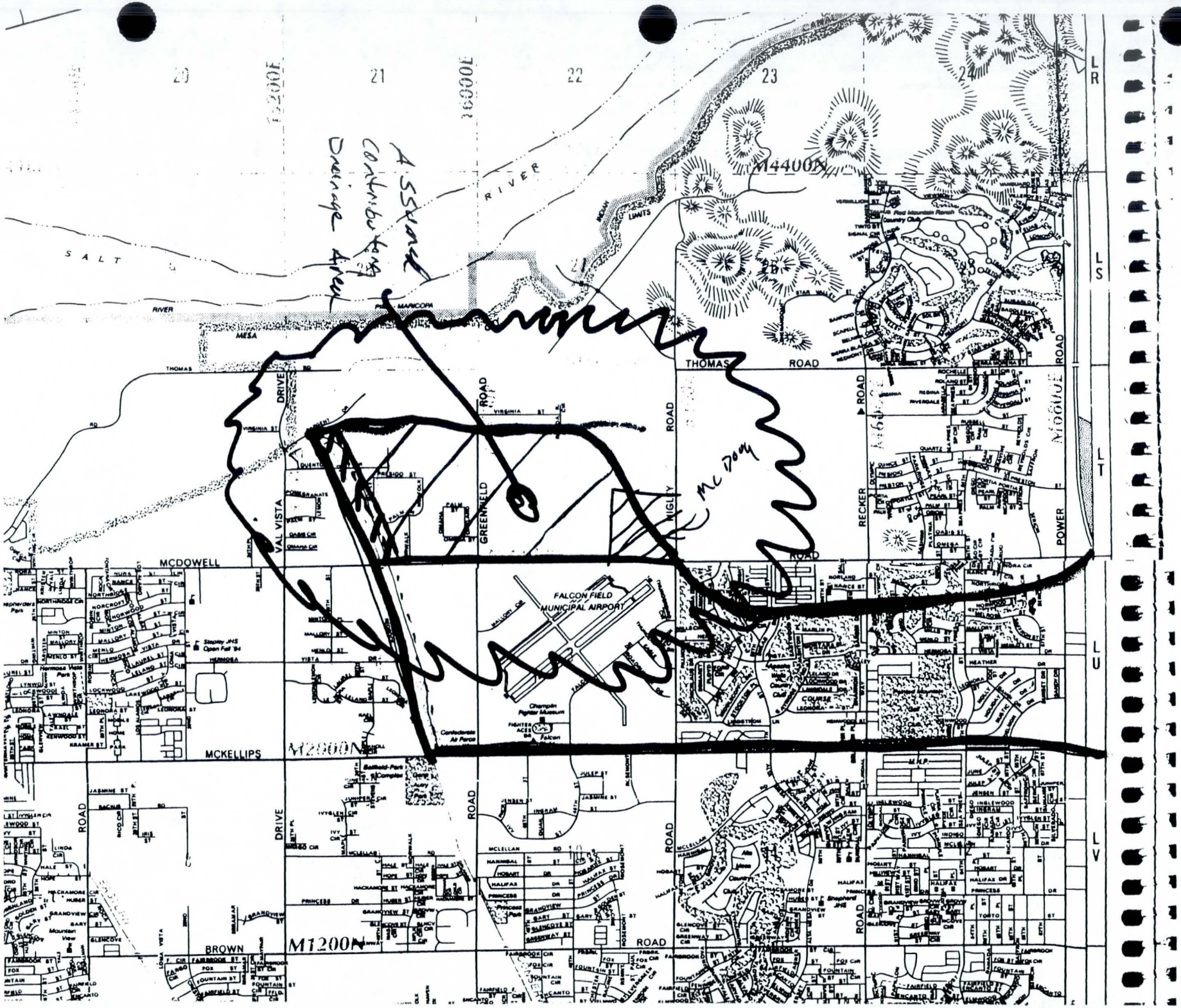
The contributing area is cross hatch
The exact extents of the contributing area
will be determined after all data is collected.

Thanks
Mike

PLEASE DELIVER AS SOON AS POSSIBLE

OPERATOR: FAX NO.: (602) 279-7810

Offices located in Tucson, Phoenix, Las Vegas, and Rancho Cucamonga, California
333 East Osborn Suite 380 · Phoenix, Arizona 85012 · (602) 279-1016


Assume Contribution Drainage Area
MC 1004
SALT RIVER
MESA
THOMAS ROAD
MCDOWELL
MCKELLIPS
BROWN
M1200N
M4400N
FALCON FIELD MUNICIPAL AIRPORT
VAL VISTA DRIVE
GREENFIELD ROAD
HIGLEY ROAD
RECKER ROAD
POWER ROAD
LR
LS
LT
LU
LV

****
*** ACTIVITY REPORT ***
****

TRANSMISSION OK

TX/RX NO.	3326
CONNECTION TEL	6443392
CONNECTION ID	CITY OF MESA ENG
START TIME	12/17 16:00
USAGE TIME	01'35
PAGES	2
RESULT	OK

The WLB Group Inc. WLB

Engineering • Planning • Surveying • Urban Design • Landscape Architecture
Offices located in Tucson, Phoenix, Las Vegas, and Victor Valley, California
333 East Osborn, Suite 380 • Phoenix, Arizona 85012 • (602) 279-1016 • FAX (602) 279-7810

Transmittal

To: Mr. Peter Knudson

City of Mesa
Engineering Department
55 North Center Street
P.O. Box 1466
Mesa, Arizona 85211-1466

Date: March 20, 1997

Job No.: 296025

Drawing/Spec Reference:

Re: FCD No. 96-07 RWCD Canal Flood Study

We Transmit ☒ Herewith ☐ Under Separate Cover ☐ Via

Material Format

- ☐ Letter
- ☐ Memo
- ☐ Prints
- ☐ Sketch
- ☐ Reports
- ☐ Mylars
- ☐ Shop Drawing
- ☐ Clarification Drawing
- ☐ Modification Drawing
- ☐ Specifications
- ☐ Sepias
- ☐ _____

Requested Action

- ☐ For Your Approval
- ☐ For Your Signature
- ☐ Information
- ☐ Resubmit
- ☐ As Requested
- ☐ Issue Change Order
- ☐ Your Review
- ☐ Please Comment
- ☐ Make Recommendation
- ☐ Issue Construction Order
- ☐ For Your Use
- ☐ _____

Remarks:

Please find enclosed one set of blueprints showing aerial topography from Collins-Pina, for your review.

Copies To:

Signed: Michael Roberts

Michael Roberts

Received By:

Date:

97017RG

ANNOUNCEMENT OF INTENT TO PERFORM FLOOD HAZARD STUDY

The Flood Control District of Maricopa County (FCDMC), under authority of the National Flood Insurance Act of 1968 (P.L. 90-448), as amended, and the Flood Disaster Protection Act of 1973 (P.L. 93-234), is funding a detailed study of the flood-hazard areas in eastern Maricopa County. FCDMC has contracted The WLB Group, Inc. to perform a study for the upstream (east) side of the Roosevelt Conservation District Canal, between the Southern Canal and McKellips Road in the City of Mesa, Arizona. Flood elevation from this study will be used to determine flood insurance rates by Federal Emergency Management Agency (FEMA).

This announcement is intended to inform all interested persons and communities of the commencement of this study so that they may have an opportunity to bring any relevant technical information to the attention of FCDMC/FEMA so that it may be considered during the course of this study.

Your comments should be addressed to Mr. Raju Shah, or Mr. Pedro Calza Hydrologists, Flood Control District of Maricopa County, 2801 West Durango Street, Phoenix, Arizona 85009. Phone: (602) 506-1501

Published: January 8, 1997

THE ARIZONA REPUBLIC
THE PHOENIX GAZETTE

STATE OF ARIZONA
COUNTY OF MARICOPA } SS.

TOM BIANCO, being first duly sworn, upon oath deposes and says: That he is the legal advertising manager of the Arizona Business Gazette, a newspaper of general circulation in the county of Maricopa, State of Arizona, published at Phoenix, Arizona, by Phoenix Newspapers Inc., which also publishes The Arizona Republic and The Phoenix Gazette, and that the copy hereto attached is a true copy of the advertisement published in the said paper on the dates as indicated.

The Arizona Republic/The Phoenix Gazette
January 8, 1997

Sworn to before me this
8th day of
January A.D. 1997

OFFICIAL SEAL
MARY LEE BOOHER
Notary Public - State of Arizona
MARICOPA COUNTY
My Comm. Expires March 17, 1999

Notary Public

THE ARIZONA REPUBLIC

97070R

ANNOUNCEMENT OF INTENT TO PERFORM FLOOD HAZARD STUDY

The Flood Control District of Maricopa County (FCDMC), under authority of the National Flood Insurance Act of 1968 (P.L. 90-448), as amended, and the Flood Disaster Protection Act of 1973 (P.L. 93-234), is funding a detailed study of the flood hazard areas in eastern Maricopa County. FCDMC has contracted The WLB Group, Inc. to perform a study for the upstream (east) leg of the Roosevelt Conservation District canal between the southwest corner of Ellsworth Road in the City of Mesa, Arizona. Flood elevation from this study will be used to determine flood insurance rates by Federal Emergency Management Agency (FEMA). This announcement is intended to inform all interested persons and communities of the commencement of this study so that they may have an opportunity to bring any reservoir technical information to the attention of FCDMC. Note that it may be contacted during the course of the study. Your comments should be addressed to Mr. Paul Brian, or Mr. Aaron Lazar, Thomas-Rasmussen Joint Venture, 201 West Dunlap Street, Phoenix, Arizona 85021.

Published February 5, 1997.

STATE OF ARIZONA
COUNTY OF MARICOPA } SS.

TOM BIANCO, being first duly sworn, upon oath deposes and says: That he is the legal advertising manager of the Arizona Business Gazette, a newspaper of general circulation in the county of Maricopa, State of Arizona, published at Phoenix, Arizona, by Phoenix Newspapers Inc., which also publishes The Arizona Republic, and that the copy hereto attached is a true copy of the advertisement published in the said paper on the dates as indicated.

The Arizona Republic

February 5, 1997

Sworn to before me this
5th day of
February A.D. 1997

OFFICIAL SEAL
MARY LEE BOOHER
Notary Public - State of Arizona
MARICOPA COUNTY
My Comm. Expires March 17, 1999

Notary Public

Tribune
NEWSPAPERS

P.O. BOX 1547 • MESA, ARIZONA 85211

P.O. Number: _____

Invoice Number: _____

JAN 1997
RE
WLB-PHX

STATE OF ARIZONA
County of Maricopa

I, _____, Legal Clerk, acknowledge that the attached hereto was published in a newspaper of general circulation at Mesa, Arizona, County of Maricopa on the following dates:

_____

M-Mesa T-Tempe C-Chandler G-Gilbert S-Scottsdale

Marie Gerg
LEGAL CLERK

Subscribed and sworn to before me this date: _____

Judy Ann Silva
NOTARY PUBLIC

OFFICIAL SEAL
JUDY ANN SILVA
NOTARY PUBLIC-ARIZONA
MARICOPA COUNTY
My Commission Expires Sept. 16, 2000

AFFIDAVIT OF PUBLICATION

ANNOUNCEMENT OF INTENT TO PERFORM FLOOD HAZARD STUDY

The Flood Control District of Maricopa County (FCDMC), under authority of the National Flood Insurance Act of 1968 (P.L. 90-448), as amended, and the Flood Disaster Protection Act of 1973 (P.L. 93-234), is funding a detailed study of the flood hazard areas in eastern Maricopa County. FCDMC has contracted The WLB Group, Inc. to perform a study for the upstream (east) side of the Roosevelt Conservation District Canal, between the Southern Canal and McKellips Road in the Gilbert Mesa, Arizona. Flood elevations from this study will be used to determine flood insurance rates by Federal Emergency Management Agency (FEMA).

This announcement is intended to inform all interested parties and [illegible] of the [illegible] study [illegible] they may have an opportunity to bring any [illegible] technical information to the attention of FCDMC/FEMA so that it may be considered during the course of this study.

Your comments should be addressed to Mr. [illegible], or Mr. Pedro Calzada Hydrologists, Flood Control District of Maricopa County, 2801 West Durango Street, Phoenix, Arizona 85009. Phone (602) 506-1501

Pub Jan 9, 1997

MG-500587

APPROVED BM DATE 1/13/97
JOB # 296025A1
OFFICE/AC# _____ 00/ _____
VENDOR # _____

MESA TRIBUNE LEGAL ADS ARE ALSO PUBLISHED IN THE GILBERT TRIBUNE

INVOICE FOR LEGAL PUBLISHING - CUSTOMER COPY

Tribune

P.O. BOX 1547 • MESA, ARIZONA 85211

P.O. Number: _____

Invoice Number: _____

AFFIDAVIT OF PUBLICATION

STATE OF ARIZONA
County of Maricopa

I, _____, Legal Clerk, acknowledge that the attached hereto was published in a newspaper of general circulation at Mesa, Arizona, County of Maricopa on the following dates:

_____ 1997

M-Mesa T-Tempe C-Chandler G-Gilbert S-Scottsdale

LEGAL CLERK

Subscribed and sworn to before me this date: _____

NOTARY PUBLIC

OFFICIAL SEAL
JUDY ANN SILVA
NOTARY PUBLIC-ARIZONA
MARICOPA COUNTY
My Commission Expires Sept. 18, 2000

ANNOUNCEMENT OF INTENT TO PROPOSE FLOOD HAZARD STUDY

The Flood Control District of Maricopa County (FCDMC), under authority of the National Flood Insurance Act of 1968 (P.L. 90-448) as amended, and the Flood Disaster Protection Act of 1973 (P.L. 93-234), is issuing a detailed study of the flood hazard areas in Western Maricopa County. FCDMC has contracted The WLB Group, Inc. to perform a study for the upstream (east) side of the Roosevelt Conservation District Canal, between the Southern Canal and Medallion Road in the City of Mesa, Arizona. Flood elevations from this study will be used to determine flood insurance rates by Federal Emergency Management Agency (FEMA).

This announcement is intended to inform all interested persons and representatives of the communities of this study so that they may have an opportunity to [illegible] relevant information [illegible] in the direction of FCDMC/FEMA as that it may be considered during the course of this study.

Your comment should be addressed to Mr. Rudy Shah or Mr. Pedro Cano, Hydrologists, Flood Control District of Maricopa County, 2801 West [illegible]

February 6, 1997 [illegible]

MB-510616

BM
396005A1 2/11/97

MESA TRIBUNE LEGAL ADS ARE ALSO PUBLISHED IN THE GILBERT TRIBUNE

INVOICE FOR LEGAL PUBLISHING - REMITTANCE

ACCOUNT NAME [illegible]			BILLING DATE 05 FEB 97	
AD AUTHORIZATION MIKE ROBERTS			P.O. NUMBER	
AD DESCRIPTION FLOOD HAZARD STUDY				
PHONE NUMBER [illegible]			INVOICE NUMBER [illegible]	
[illegible]ICATION	CLASS	TIMES 1	QUARTER INCHES 17	LAST ISSUE DATE 020697
ACCOUNT NUMBER [illegible]	AD COST 30.03		AMOUNT PAID .00	AMOUNT DUE* 30.03
*TOTAL DUE INCLUDES SPECIFIED SALES TAX WHERE APPLICABLE				

MAKE CHECKS PAYABLE TO:
TRIBUNE NEWSPAPERS
LEGAL ADVERTISING
P.O. Box 16075
Mesa, AZ 85211-6075
898-6420

MAKE ADDRESS CORRECTION ON REMITTANCE COPY

CLASS CODES AND ADDITIONAL SERVICES PROVIDED ON BACK

B.5 Contract Documents

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009
Telephone (602) 506-1501
Fax (602) 506-4601
TT (602) 506-5859

BOARD OF DIRECTORS
Betsey Bayless
Ed King
Tom Rawles
Don Stapley
Mary Rose Garrido Wilcox

December 26, 1996

WLB Group, Inc.
333 East Osborn, Suite 380
Phoenix, Arizona 85012

Subject: Contract FCD 96-07
Upper Roosevelt Water Conservation District Canal

This letter will serve as confirmation of the December 13, 1996 verbal notice to proceed with the work covered by the subject contract.

A fully executed contract is enclosed for your use.. Should you have any questions, please contact the undersigned or Donna Adams at 506-1501.

Sincerely,

Dortha Klaahsen

Dortha Klaahsen
Contracts Coordinator

C69.97.034.5

CONTRACT FOR CONSULTANT SERVICES
CONTRACT FCD 96-07
FLOODPLAIN DELINEATION AND TOPOGRAPHIC MAPPING FOR UPPER ROOSEVELT WATER CONSERVATION DISTRICT CANAL

Pursuant to the provisions of the Arizona Revised Statutes Section 48-3603, the Board of Directors of the Flood Control District has the authority to enter into contracts.

The Flood Control District of Maricopa County, Arizona, hereinafter called the "DISTRICT," is desirous of having certain professional services performed in connection with Floodplain Delineation and Topographic Mapping for Upper Roosevelt Water Conservation District (RWCD) Canal, hereinafter called the "PROJECT" and as more fully described in Exhibit "A," Scope of Work, attached; and

The WLB Group, Inc., hereinafter called "CONSULTANT" with its local offices located at 333 East Osborn, Suite 380, Phoenix, Arizona 85012 is desirous of performing said services;

THEREFORE, the parties hereto mutually agree as follows:

SECTION I - SERVICES OF THE CONSULTANT

The CONSULTANT, under the general supervision of the District Engineering Division Manager shall prepare studies, reports, surveys, plans, drawings, specifications and cost estimates as are necessary for the PROJECT and according to the directions and designated standards of the DISTRICT and in accordance with Exhibit A. It is understood and agreed that the DISTRICT's authorized representative shall be the Engineering Division Manager or his duly authorized representative, hereinafter called the "AGENT" and that he/she shall be the sole contact for administering this contract.

The CONSULTANT shall meet periodically with the AGENT so as to keep the DISTRICT informed of the progress of the work in accordance with the schedule defined in Exhibit A.

The CONSULTANT shall promptly advise the AGENT of any factors, which may develop during the PROJECT, that would likely result in construction or design costs in excess of budgetary constraints.

SECTION II - PERIOD OF SERVICE

The CONSULTANT shall complete all work in accordance with the provisions of Exhibit "A," Scope of Work within 210 calendar days after receipt of the Notice to Proceed, exclusive of DISTRICT review time. The DISTRICT is expected to require up to 60 calendar days for review time, for a total contract time period of 270 calendar days. Should extension of this contract period be necessary, and any such extension(s) continue the date of contract expiration for a time period of more than one year from the date of contract execution, adjustment(s) of the consultant's fee(s) may, upon agreement by both the DISTRICT and the CONSULTANT, be made in accordance with the Consumer Price Index for Urban Consumers, Western Division published by the U.S. Department of Labor, Bureau of Labor Statistics, using the published edition coinciding with the initial contract expiration date. Any such fee adjustment shall only apply to the extended contract time period.

SECTION III - PAYMENTS TO THE CONSULTANT

The CONSULTANT shall be paid for work under this Contract a lump sum fee of $61,330.00 plus any adjustments that have been approved in writing in accordance with the Maricopa County Procurement Code.

The DISTRICT shall pay the CONSULTANT upon completion of the work as accepted by the DISTRICT, except that progress payments may be made as billed by the CONSULTANT based on approved monthly progress reports subject to the limitations set forth in Exhibit "A," Scope of Work. Ten percent of all contract payments made on an interim basis shall be retained by the DISTRICT as insurance of proper performance of the contract or, at the option of the CONSULTANT, a substitute security may be provided by the CONSULTANT in an authorized form pursuant to procedures established by the DISTRICT. The CONSULTANT is entitled to all interest from any such substitute security.

When the contract is fifty percent (50%) completed, one-half (½) of the amount retained will be paid to the CONSULTANT provided the CONSULTANT is making satisfactory progress on the contract and there is no specific cause or claim requiring a greater amount to be retained. After the contract is fifty percent (50%) completed, no more than five percent (5%) of the amount of any subsequent progress payments shall be retained providing the CONSULTANT is making satisfactory progress on the project, except if at any time the DISTRICT determines satisfactory progress is not being made, ten percent (10%) retention shall be reinstated for all progress payments made under the contract subsequent to the determination.

If the CONSULTANT desires a partial payment in accordance with the provisions above, the CONSULTANT will complete and forward a DISTRICT provided form indicating payment distribution to MBE/WBE firms.

Any retention monies shall be paid or substitute security returned or released, as applicable, to the CONSULTANT within forty-five (45) calendar days after: (1) completion of the work in Exhibit "A" through the submittal of District accepted/approved documents to FEMA, (2) receipt of a completed "Certificate of Substantial Performance" form, (3) the CONSULTANT's statement that no project disputes exist; and (4) invoicing for any retained monies has been received by the DISTRICT. Upon acceptance and approval of the project by FEMA and the completion of all final work required by the DISTRICT, the CONSULTANT shall submit a final Certificate of Performance and invoice for any sums remaining due and payable under this Contract.

SECTION IV - THE DISTRICT'S RESPONSIBILITIES

The DISTRICT shall furnish the CONSULTANT, at no cost to the CONSULTANT, the following information or services for this PROJECT:

A. One copy of on-hand maps, records, survey ties, bench marks or other data pertinent to the PROJECT. This does not, however, relieve the CONSULTANT of the responsibility of searching records for additional information, for requesting specific information or for verification of that information provided. The DISTRICT does not warrant the accuracy or comprehensiveness of any such information.

B. All available information and data relative to policies, standards, criteria, and studies, etc. impacting the PROJECT as identified by the CONSULTANT.

C. Availability of staff for consultation with the CONSULTANT during the performance of studies and plan development in order to identify the problems, needs, and other functional aspects of the PROJECT.

D. Examination of documents submitted by the CONSULTANT and rendering of decisions pertaining thereto promptly, to avoid unreasonable delay in the progress of the work by the CONSULTANT. The DISTRICT will keep the CONSULTANT advised concerning the progress of the DISTRICT's review of work.

SECTION V - ALTERATION IN SCOPE OF WORK

Any alteration in the scope of work that will result in a substantial change in the nature of the PROJECT so as to materially increase or decrease the contract fee will require negotiation of an amendment to the contract to be executed by the DISTRICT and the CONSULTANT. No work shall commence on the change until the contract amendment has been approved by the DISTRICT and the CONSULTANT has been notified to proceed by the AGENT. It is distinctly understood and agreed that no claim for extra work done or materials furnished by the CONSULTANT will be allowed by the DISTRICT except as provided herein, nor shall the CONSULTANT do any work or furnish any materials not covered by this agreement unless such work is first authorized in writing in accordance with the Maricopa County Procurement Code. Any such work or materials furnished by the CONSULTANT without such written authorization first being given shall be at his own risk, cost, and expense, and he hereby agrees that without such written authorization he will make no claim for compensation for such work or materials furnished.

SECTION VI - RECORDS

Records of the CONSULTANT's payroll expense pertaining to this PROJECT and records of accounts between the DISTRICT and the CONSULTANT shall be kept on a generally recognized accounting basis and shall be available upon request to the DISTRICT or its authorized representative for audit during normal business hours. The records shall be subject to audit by appropriate grantor agency if the PROJECT is funded all or in part by a grant.

SECTION VII - PROJECT COMPLETION

If during the course of this contract situations arise which prevent completion within the allotted time, an extension may be granted by the AGENT.

SECTION VIII - TERMINATION

The DISTRICT may terminate this contract at any time upon reimbursement to the CONSULTANT of expenses which include reasonable charges for time and material for the percentage of work satisfactorily completed and turned over to the DISTRICT.

The DISTRICT reserves the right to postpone, terminate or abandon this PROJECT for the CONSULTANT's failure to complete the PROJECT on time, or failure to comply with the provisions of the contract. The DISTRICT also reserves the right to terminate any or all parts of this contract for its own convenience as the DISTRICT may determine at its sole discretion.

The DISTRICT hereby gives notice that pursuant to A.R.S. Section 38-511 "A" this contract may be canceled without penalty or further obligation within three years after execution if any person significantly involved in initiation, negotiation, securing, drafting, or creating a contract on behalf of the DISTRICT is, at anytime while the contract or any extension of the contract is in effect, an employee or agent of any other party to the contract in any capacity, or a consultant to any other party of the contract with respect to the subject matter of the contract. Cancellation under this section shall be effective when written notice from the DISTRICT Chief Engineer and General Manager is received by all of the parties

of the contract. In addition, the DISTRICT may recoup any fee for commission paid or due to any person significantly involved in initiation, negotiation, securing, drafting, or creating the contract on behalf of the DISTRICT from any other party to the contract arising as a result of the contract.

The CONSULTANT may terminate this contract in the event of nonpayment of fees as specified in Section III, PAYMENTS TO THE CONSULTANT.

SECTION IX - OWNERSHIP OF DOCUMENTS

All original documents including, but not limited to studies, reports, tracings, drawings, physical and computer models, estimates, field notes, investigations, design analyses, calculations, computer software, and specifications, prepared in the performance of this Contract are to be and remain the property of the DISTRICT and are to be delivered to the AGENT before final payment is made to the CONSULTANT. The DISTRICT reserves the right to reuse the documents as it sees fit. However, the DISTRICT will not reuse, alter, or modify these documents without noting such alterations, modifications, or intent of their reuse, and will hold the CONSULTANT harmless from any claims arising from the reuse, alteration, or modification of the documents. The CONSULTANT may retain reproducible copies of all such documents delivered to the DISTRICT.

SECTION X - COMPLIANCE WITH LAWS

The CONSULTANT is required to comply with all Federal, State, and local laws, local ordinances and regulations. The CONSULTANT's signature on this contract certifies compliance with the provisions of the I-9 requirements of the Immigration Reform and Control Act of 1986 for all personnel that the CONSULTANT and any subconsultants employ to complete this PROJECT. It is understood that the DISTRICT shall conduct itself in accordance with the provisions of the Maricopa County Procurement Code.

SECTION XI - GENERAL CONSIDERATIONS

A. Prior to beginning the work, the CONSULTANT shall furnish the DISTRICT for approval the names of its key employees, and of its sub-consultants and their key employees to be used on this PROJECT. Any subsequent changes are subject to the written approval of the DISTRICT.

With the exception of the DISTRICT or the Federal Emergency Management Agency, the CONSULTANT agrees not to accept any clients within the area of the 100-year floodplain for the project, during the period of the Contract, without the expressed written authority from the Chief Engineer and General Manager of the District.

The CONSULTANT, in replacing a MBE/WBE subcontractor, should attempt to contract with another MBE/WBE.

B. The failure of either party to enforce any of the provisions of this Contract or to require performance of the other party of any of the provisions hereof shall not be construed to be a waiver of such provisions, nor shall it affect the validity of this Contract or any part thereof, or the right of either party to thereafter enforce each and every provision.

C. The CONSULTANT shall be responsible for the cost of any additional design, field layout, testing, construction and supervision necessary to correct those errors or omissions attributable to the CONSULTANT and for any damage incurred by the DISTRICT as a result of additional construction costs caused by such CONSULTANT errors or omissions.

D. The fact that the DISTRICT has accepted or approved the CONSULTANT's work shall in no way relieve the CONSULTANT's responsibility.

E. It is mutually understood and agreed that this Contract shall be governed by the laws of the State of Arizona, both as to interpretation and performance. Any action at law, suit in equity, or judicial proceeding for the enforcement of this Contract, or any provision thereof, shall be instituted only in the courts of the State of Arizona.

SECTION XII - SUCCESSORS AND ASSIGNS

This Contract shall not be assigned by either party without prior written approval of the other except that the CONSULTANT may use in the performance of this Contract without prior approval of the DISTRICT, personnel or services of its related entities and affiliated companies as if they were an integral part of the CONSULTANT; and it shall extend to and be binding upon the heirs, executors, administrators, successors and assigns of the parties hereto.

SECTION XIII - NO KICK-BACK CERTIFICATION

The CONSULTANT warrants that no person has been employed or retained to solicit or secure this Contract upon any agreement or understanding for a commission, percentage, brokerage, or contingent fee; and that no member of the Board of Directors/Supervisors or any employee of the DISTRICT has any interest, financially or otherwise, in the CONSULTANT firm.

For breach or violation of this warranty, the DISTRICT shall have the right to annul this Contract without liability, or at its discretion to deduct from the Contract price or consideration, the full amount of such commission, percentage, brokerage, or contingent fee.

SECTION XIV - ANTI-DISCRIMINATION PROVISION

The Flood Control District of Maricopa County will endeavor to ensure in every way possible that minority and women-owned business enterprises shall have every opportunity to participate in providing professional services, purchased goods, and contractual services to the Flood Control District of Maricopa County without being discriminated against on the grounds of race, religion, sex, age, disability, or national origin.

The CONSULTANT agrees not to discriminate against any employee or applicant for employment because of race, religion, color, sex, age, disability, or national origin and further agrees not to engage in any unlawful employment practices. The CONSULTANT further agrees to insert the foregoing provisions in all subcontracts hereunder.

SECTION XV - AMENDMENTS

This Contract may be amended by mutual written agreement of the DISTRICT and the CONSULTANT.

SECTION XVI - INDEMNIFICATION AND INSURANCE

A. The CONSULTANT shall provide and maintain the following minimum insurance requirements:

1. Professional Liability. The CONSULTANT shall show evidence of maintaining continuous insurance for the past three (3) years with a minimum coverage limit of $1,000,000.00 each claim and/or in the aggregate.

The CONSULTANT shall provide and maintain Professional Liability Insurance with a minimum single limit of $1,000,000.00 for each claim made and an aggregate limit of $1,000,000.00 for all claims made through this contract's completion date or the policy's life, whichever is longer.

2. Commercial General Liability. Commercial general liability insurance with a minimum single limit of $1,000,000.00 for each coverage/occurrence. The policy shall include coverage for products and completed operations, bodily injury and property damage, personal injury, and general aggregate coverage.

3. Automobile Liability. Automobile liability insurance, with an individual single limit for bodily injury and property damage of no less than $1,000,000.00, each occurrence, with respect to CONSULTANT's vehicles (whether owned, hired, non-owned), assigned to or used in the performance of this contract.

4. Workers' Compensation Insurance. This insurance shall be maintained during the life of the contract.

5. Additional Insured. The policies, except professional liability and workers' compensation, required by this section shall name the DISTRICT as Additional Insured, and shall specify that insurance afforded the CONSULTANT shall be primary insurance, and that any insurance coverage carried by the DISTRICT or its employees shall be excess coverage, and not contributory coverage to that provided by the CONSULTANT. No policy issued under this contract shall lapse, be canceled, allowed to expire, or be materially changed to affect the coverage available to the DISTRICT without thirty (30) days written notice to the DISTRICT.

6. DISTRICT approved documentation outlining the coverages specified in this section shall be filed with the DISTRICT prior to issuance of the Notice to Proceed.

B. The CONSULTANT agrees to indemnify and save harmless the DISTRICT, any of its departments, agencies, officers, or employees from all suits, including attorney's fees and costs of litigation, actions, loss, damage, expense, cost or claims, of any character or any nature arising out of the CONSULTANT's wanton, willful or negligent acts, errors or omissions in the performance of work under this Contract, and any wanton, willful or negligent acts, errors or omissions by any subconsultant or other agent used by the CONSULTANT in the performance of work under this Contract.

IN WITNESS WHEREOF, the parties herein have executed this Contract.

THE WLB GROUP, INC.

Robert K. Landis

Principal (Signature)

Robert K. Landis

Printed Name

Vice President

Title

November 11, 1996

Date

86-0402012

Federal Tax Identification Number

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY:

Stanley L. Smith

Stanley L. Smith, Jr., P.E.
Interim Chief Engineer and General Manager

11-18-96

Date

ACCEPTED AND APPROVED:

Ed King

Chairman, Board of Directors

ATTEST:

Fran McCarroll

Clerk of the Board

DEC 1 1 1996

Date

LEGAL REVIEW

Approved as to form and within the powers and authority granted under the laws of the State of Arizona to the Flood Control District of Maricopa County.

Julie M. Lemmon

General Counsel, District 11/21/96

Date

EXHIBIT "A"
SCOPE OF WORK
CONTRACT FCD 96-07
FLOODPLAIN DELINEATION AND TOPOGRAPHIC MAPPING FOR UPPER ROOSEVELT WATER CONSERVATION DISTRICT CANAL

GENERAL

The project consists of approximately 1.8 miles of floodplain delineations for the Upper Roosevelt Water Conservation District (RWCD) Canal from McKellips Road to the North limit of the previous floodplain study, as shown on the attached map, Exhibit B. This will require the development of the necessary topographic data and approximately 6 square miles of watershed hydrology. The Consultant will develop the hydrology using the Corps of Engineer's HEC-1 computer model, and the floodplain and floodway delineations using primarily the HEC-2 computer model, if appropriate. The Consultant must use sound engineering judgement in the development of the hydrologic and hydraulic models. The results of the models must be analyzed carefully and refinements made to the input parameters in order to obtain the most realistic results. All work must meet Arizona Department of Water Resources (ADWR) and Federal Emergency Management Agency (FEMA) requirements for floodplain delineations. The results of this study must be reviewed and accepted by FEMA and the City of Mesa prior to the finalization of this contract. All work shall be completed within 270 calendar days from the date of Notice to Proceed, including 60 days for District review.

TASK 1 - COORDINATION

1.1 The Consultant shall submit a project schedule showing coordination meetings and completion dates for each of the tasks in the scope within 14 days of Notice To Proceed. The Consultant shall update this project schedule when appropriate.

1.2 The Consultant shall participate in regular coordination meetings (at least every 8 weeks) with the District's Project Manager and milestone coordination meetings for the development of the hydrologic and hydraulic analyses. The Consultant is responsible for the minutes of any meetings. Whenever possible, coordination and milestone meetings should be combined.

1.3 The Consultant shall submit a quarterly estimation of the projected billing within 14 days of Notice to Proceed. Thereafter, this estimation will be updated and submitted to the District's Project Manager at least 10 days prior to the end of each quarter.

1.4 The Consultant shall submit bi-monthly progress reports at least 5 days before submittal of every other month invoices. The report shall be brief and should be no longer than two typed pages. At a minimum, the monthly report shall contain the following:

a. A description of the work accomplished, by task, during the reporting month.

b. Percent (%) completed for the month and percent (%) cumulative completed for each task.

c. A brief description of the work to be accomplished during the following month.

d. A description of any problems encountered.

1.5 The Consultant is responsible for placing the legal advertising at the beginning of the study, notifying the public of the study. The advertisement will be published in a widely circulated newspaper two times, with approximately one week between runs. The advertisement must also be published two times in a local newspaper that serves the area being studied. After the advertisement is run, the Consultant will supply the District with the original affidavit of publication from each of the newspapers for each day that the advertisement was published.

1.6 The Consultant will notify all property owners and obtain any necessary Rights of Entry for the study area. The Consultant will furnish the District with a list of all the property owners notified and a sample Right of Entry letter.

1.7 The Consultant shall meet with officials from the City of Mesa. The purpose of this meeting is to identify local flooding problems and obtain information on current and planned public works projects, channel modifications, storm-drainage systems, development, and corporate limits.

1.8 This contract will not include public meetings.

1.9 Consultant/District Performance Evaluations will be performed. An informal evaluation will be performed at the completion of the hydrologic analysis. A formal evaluation will be performed at the completion of the project upon receipt of all deliverables.

TASK 2 - DATA COLLECTION

2.1 The Consultant will collect and review pertinent data from the District and other outside sources. Data to be collected will include previous flood hazard reports and hydrology for the study area; existing topographic mapping; historical flooding information; as-built plans for existing structures; FEMA Flood Hazard Boundary Maps and any Letters of Map Amendment and/or Revisions, and other pertinent information.

2.2 A written report summarizing the data collected will be submitted to the District for information purposes. A preliminary draft of this report is due within 90 days of Notice to Proceed.

TASK 3 - TOPOGRAPHIC MAPPING

3.1 An aerial survey subcontractor shall be retained by the Consultant as part of this contract. The Consultant shall coordinate all the aerial surveying work with the aerial surveying subcontractor to ensure that the specifications of the aerial surveying work are met. The Consultant is responsible for ensuring that the topographic mapping covers the area of delineation Quality control on surveys will be per FEMA Document 37, Flood Insurance Study Guidelines and Specifications for Study Contractors, January 1995.

3.1.1 The mapping effort will consist of a strip of topographic mapping along the RWCD Canal from McKellips Road to the upstream study limit at the Southern Canal. The strip will cover the RWCD Canal and the ponding areas to the east, to Greenfield Road.

3.2 Digital contour and planimetric data developed for this study shall be delivered according to the District's HIS specifications modified as follows. The area to be mapped consists of agricultural orchards having very dense tree foliage. It is the intent of the mapping effort to obtain spot elevations on a 100 feet grid for most of the mapping area except the extreme northern area which will have a 60 feet grid. Breakline spot elevations will be provided every 25 feet. The dense foliage may prevent meeting these exact specifications.

3.3 Prepare topographic mapping to a 1-foot contour interval, with a scale of 1 inch = 200 feet, with spot elevations on all section line and mid-section line roads as well as farm roads that affect the ponding elevations along the Canal.

3.4 Ground Control:

a. The Consultant shall provide all survey control using 1983 NAD.

b. The Consultant shall systematically set panel points and establish horizontal and vertical control throughout the areas to be mapped for use in compilation by the aerial survey contractor. Where readily available, surveys will tie into the State Plane Coordinate System. Field control shall be sufficient to readily allow for compilation of maps by the aerial survey contractor at the desired map scale and contour interval, and will be based on the National Geodetic Vertical Data of 1929 (NGVD). A conversion factor, including documentation of how it was derived, will be provided by the Consultant to allow comparison of NGVD 29 elevations to NAVD 88 elevations and will be included in the Technical Data Notebook. A conversion factor will be provided by the Consultant to tie the vertical datum to the City of Mesa datum.

c. The horizontal and vertical control points shall be located and marked by the Consultant. The controls for the aerial mapping shall be in sufficient numbers and shall be in locations which will be compatible with the accuracy of the mapping requirements. The controls shall be of at least third order accuracy. Section corners, quarter corners, and mid-section points shall be used for control points wherever possible.

3.5 The Consultant shall provide permanent non-erasable topographic mylars of the work study drawings. The drawings shall be 24" X 36" in size, with a scale of 1 inch = 200 feet and a contour interval of 2 feet for all mapping. A cover sheet shall be provided with the project title, date of topographic mapping, and a location map showing geographic range covered by each specific mapping sheet. Each drawing shall include the floodplain and floodway delineations and a minimum of a north arrow, scale, section corners and quarter corners, current and proposed streets and highway names, State Plane Coordinate System, major drainage features, corporate boundaries, cross section lines, channel station center line, index map, and description and elevation of elevation reference marks (ERMs). A note explaining the proper means to convert the NGVD 29 elevations to NAVD 88 elevations shall be included in "NOTES" in the map border. The mapping will have an accuracy such that ninety percent (90%) of all contours shall be within one-half contour of the true elevations and the remaining ten percent (10%) of the contours shall not be in error by more than one contour interval.

TASK 4 - FIELD SURVEY

4.1 Prepare topographic mapping to a 1-foot contour interval with a scale of 1 inch = 200 feet, with spot elevations on all section line and mid-section line roads as well as farm roads that affect the ponding elevations, for floodplain/floodway delineation areas as identified in Task 6 or FEMA criteria, whichever is more stringent.

4.2 Ground Control for Floodplain Delineations:

4.2.1 All topographic mapping and survey work shall meet or exceed Federal Emergency Management Agency (FEMA) minimum criteria as defined in FEMA Document 37, Flood Insurance Study Guidelines and Specifications for Study Contractors, January 1995. This would include, but is not

limited to: the establishment of "permanent" elevation reference marks (ERMs); field control; and verification of profiles by the ground survey profile procedure.

4.2.2 Horizontal and Vertical Control: Systematically set panel points and establish horizontal and vertical control throughout the area to be mapped for use in compilation by the aerial survey contractor. Where readily available, surveys will tie into State Plane Coordinate System 1983 NAD. Field control shall be sufficient, using at least one "permanent" point per mile, and such point(s) being used as Elevation Reference Marks (ERMs). Surveys will be based on National Geodetic Vertical Datum (NGVD) 1929, per FEMA guidelines. A conversion factor, including documentation of how it was derived, will be provided by the Consultant to allow comparison of NGVD 29 elevations to NAVD 88 elevations and will be included in the Technical Data Notebook. "Permanent" survey points shall consist of existing monumentation, such as brass caps or similar survey monuments. A conversion factor will be provided by the Consultant to tie the vertical datum to the City of Mesa datum. Where additional monumentation is needed, survey markers conforming to Maricopa Association of Governments (MAG) Uniform Standard Detail for Public Works Construction, detail 120-1, Type C, shall be placed 2" +/- above grade, and topped with a brass cap. Elevation Reference Marks will be labeled on available maps and described in a manner which allow them to be readily located in the field.

4.2.3 All aerial targets are to be removed following completion of the topographic mapping.

4.3 The Consultant shall verify the accuracy of the mapping by the procedures called for in FEMA Document 37 or other methods approved by FEMA. This shall include the verification of cross sections used in the floodplain delineation.

4.4 Field surveys of bridges, culverts, and hydraulic structures are to be obtained by the Consultant when as-built plans are not available or when changes significant to the HEC-2 modeling, such as sedimentation, have occurred since the date of as-built. This information should be reduced and compiled into an 11" x 17" (maximum size) drawing for inclusion in the final report. The information presented in the drawing should be in a format appropriate for use in the HEC-2 model. Field surveys of bridges, culverts, hydraulic structures, and routing reaches must also be obtained where necessary for proper hydrologic modeling. It may be necessary to field survey some structures since the as-built plans may not be on 1929 NGVD. A significant field survey will be required along the eastern bank of Consolidated Canal to represent the true levee condition.

TASK 5 - HYDROLOGY

5.1 The hydrologic study of the watershed will be delivered to the District under separate cover from the hydraulic analysis. The Consultant shall use the U.S. Army Corps of Engineers computer program HEC-1, 1991 Version, to develop a hydrologic model for the area. Using appropriate hydrologic judgement, sub-basins that provide reasonable depiction of the watershed condition are to be identified The sub-basins must be as homogeneous as possible, using watershed area, watershed type (mountainous and flat lands or urban and undeveloped areas), and time of concentration as criteria. Sub-basin break-downs will be done in sufficient detail to provide peak discharges at structures, major road crossings, confluences, and at boundary lines. An appropriate time step and number of ordinates is to be selected that allow for complete calculation of the flood hydrograph without sacrificing resolution of the flood peak. All calculations, or assumptions used in developing sub-basin and routing parameters shall be documented and made a part of the appendix for the hydrology report. Field surveys may need to be taken for HEC-1 modeling purposes.

5.1.1 A large portion of the watershed has been modeled in a recent flood insurance study. A-N West completed *The Upper East Maricopa Floodway Floodplain Delineation Study, FCD 94-26* in October of 1995. The appropriate sections will be incorporated into the new study. Approximately 850 acres of new watershed north of McDowell Road will be added to the existing study. The District will provide digital land use and soils files to aid in subbasin delineation.

5.2 One field trip shall be held with the Flood Control District staff at the following milestones:

a. A field trip will be scheduled to discuss the results obtained from the study.

5.3 A meeting at the Consultant's office or an approval of the District may be necessary for the following tasks at the following milestones:

a. Meeting number 1: After the preliminary HEC-1 results have been obtained and a draft report has been prepared. A copy of the draft report and the copy of the HEC-1 on a microdisk, compatible with the District's computer, must be delivered two weeks prior to the meeting.

b. Meeting number 2: To review comments by District staff.

5.4 The hydrology shall be done according to the Drainage Design Manual for Maricopa County, Arizona: Volume I - Hydrology. Peak discharges and peak volumes will be calculated for 100-yr 6-hour storm and for 100-yr 24-hour storm.

5.5 The District shall provide appropriate references to facilitate parameter estimation.

5.6 Output of the computer model should be reviewed to see if the peak flows and volumes are realistic. Make sure the results obtained from the computer model are realistic. If not, adjustment to the input may be necessary to obtain the realistic results.

5.7 Every attempt must be made to recover historic stream gage data and use it to compare with the results obtained by the hydrologic model. Major differences must be discussed in the final report.

5.8 It is required that the Consultant obtain the approval of the District at each of the following steps:

a. Soil maps, watershed boundary maps, and land use maps.

b. HEC-1 parameter estimation.

c. HEC-1 flow diagram and input parameters.

d. HEC-1 results.

5.9 The Hydrologic Report

5.9.1 The findings of the hydrologic study will be presented in Section 3 of the Technical Data Notebook and will be prepared in accordance with ADWR State Standards Attachment 1-90 (SSA 1-90). The report will be organized as specified by the District, following SSA 1-90 format.

5.9.2 Tables and Figures for the appendices:

a. Topographic base map(s)(using USGS quadrangle maps) showing sub-basins, routing reaches, Tc flow paths or lag flow paths, major man-made structures, and references (i.e., street names, Township, Range, Section, etc.) at a scale of 1 inch = 2000 feet.

b. Soils map(s) at the same scale as the base map.

c. Land use map(s) at the same scale as above.

d. Schematic map for the HEC-1 showing sub-basins (area, Tc), flow paths, routing reaches (length, slope, friction, width, velocities, transmission losses, etc.), order of combining the hydrographs, channel, pipe or culvert dimensions (where appropriate).

e. Pertinent data on all structures in the watershed (such as spillway elevation, rating curves, etc.).

f. One set of study maps (i.e., sub-basin boundary maps, flow path maps, soils maps, land use maps) to be folded and delivered in a binder.

Specific deviations from this hydrologic scope shall not be undertaken without the specific written concurrence from the Flood Control District.

TASK 6 - FLOODPLAIN DELINEATION

6.1 Floodplain delineations must be obtained using the latest available, U.S. Army Corps of Engineers HEC-2 Water Surface Profiles computer model and methodology acceptable to FEMA. This model will simulate the effects of floodplain geomorphology, flow changes, bridges, culverts, hydraulic roughness factors, effective flow limitations, split-flows, and other considerations. The consultant will prepare the study using the guidelines established in FEMA Document 37, Flood Insurance Study Guidelines and Specification for Study Contractors, January 1995, and FIA Document 12, Appeals, Revisions, and Amendments to Flood Insurance Maps, January 1990.

6.1.1 Based on a pre-proposal field visit, it has been determined that the floodplain is made up of a series of ponding areas along the canal created by raised farm roads. It is envisioned that the floodplain will be delineated using HEC-1 and the stage-storage-discharge relationship for each of the ponding areas. HEC-2 may be used to delineate the limits of flooding for the flow between ponding areas.

6.2 The delineation work shall meet requirements for floodplain and floodway delineations as prescribed by FEMA and the Arizona Department of Water Resources.

6.3 The delineation study shall be based on the final results of the hydrologic study as directed by the District.

6.4 The Consultant is to make refinements to the HEC-2 model based on review of the model results by the District, ADWR, FEMA, and the Technical Evaluation Contractor. The Consultant shall review the HEC-2 model results for reasonableness. Adjustments to the input parameters for obtaining the most realistic results is normal to the scope.

6.5 Floodways are to be determined using equal conveyance encroachment method 4 to start with, but only encroachment method 1 will be used in the final analysis. The floodway encroachment is to be as near as the one foot maximum rise in elevation as possible.

6.6 The Consultant must obtain District approval at each of the following steps:

a. Field reconnaissance report and estimation of Manning's "n" values.

b. Proposed location and alignment of the cross sections and channel centerline.

c. Floodplain (natural) delineation.

d. Floodway delineation using equal conveyance encroachment.

e. Floodway delineation using encroachment method 1.

f. Final Hydraulics Report.

6.7 Field Reconnaissance

6.7.1 The Consultant will conduct a field reconnaissance of the full study reach. This will include observation of channel and floodplain conditions for estimation of Manning's "n" values; photographic documentation of floodplain characteristics; determination of channel bank stations; observation of possible overflow areas; inspection of levees or other flood control structures; and measurement of bridge dimensions.

6.7.2 Mannings "n" values are to be determined using the methodology in the USGS report, Estimated Manning's Roughness Coefficients for Stream Channels and Flood Plains in Maricopa County, Arizona, April 1991. Copies of the report are available through the District.

6.8 Cross Sections

6.8.1 The location and alignment of cross sections and channel centerline will be submitted for the District's review and approval prior to digitizing the cross section data. Cross section stationing will be from left to right looking downstream with the thalweg as station 10,000. Cross sections will be spaced approximately every 500 feet, unless geographic or structural constraints dictate otherwise, and will extend the full width of the area inundated by 100-year flood waters. Identification of cross sections will be in river miles increasing upstream. The stationing will tie into the specified river mile of the existing FEMA studies. Cross section orientation may need to be altered after running of HEC-2 model to ensure that sections are perpendicular to flow per FEMA criteria.

6.8.2 All cross sections will be plotted using a pen, laser, or electrostatic plotter. The cross section plots will show water surface profiles, ineffective flow areas, "n" values, encroachments, channel stationing and other pertinent information. All plots are to be accompanied by a legend. These plots are to be available at all reviews.

6.8.3 Cross section plots are limited to one plot at the following three stages of work:

a. a plot of digitized "GR", STCHL, STCHR, centerline (station 10,000) to be used as a check of input data and for working sections during compilation of the floodplain model;

b. a plot of the cross section for the completed floodplain run which shows the floodplain water surface elevation, ineffective flow areas, "n" factor, and encroachments to be used as working sections for development of the floodway model;

c. a plot of the final floodway model cross sections which will show Type 1 encroachments and encroached water surface, in addition to data covered in items (a) and (b). These cross sections, generated under (c), will be submitted as part of the Final Report.

6.9 Bridges and culverts must be modeled in compliance with HEC-2 modeling requirements for the selected routine. Where multiple bridges occur, each bridge will be modeled separately. The HEC-2 modeling results for bridges, culverts, and other hydraulic structures must be checked by using an independent method approved by the District to analyze these structures.

6.10 For floodplains identified as ponding areas, methodology which will provide the District with water surface elevations must be used. If appropriate, the consultant shall identify a floodway in the ponded floodplains. The purpose of this floodway is to allow the pond to seek a constant stage throughout the areal extent of the ponds versus the creation of two independent ponds.

6.11 Flood zones must be determined according to FEMA criteria and clearly labelled on the final drawings.

6.12 The total area of the floodplain and floodway must be determined for each reach in square miles and acres.

6.13 The findings of the floodplain/floodway delineation study will be presented in Section 4 of the Technical Data Notebook and will be prepared in accordance with ADWR State Standards Attachment 1-90 (SSA 1-90). The report will be organized as specified by District standards, following SSA 1-90 format.

TASK 7 - HIS DATA

7.1 Digital data will be prepared in conformance with the District's HIS Data Delivery Specifications, Revision 2.1, for the following themes:

Name	Page No.	Description
NDXPRJ	LP-40	Shows the map sheet boundaries of the project
PRJ	LP-60	Defines the boundary of the project
CARTO	LP-110	Planimetric features captured but not used by HIS (fences, tree lines, etc.)(if any)
CORNERS	LP-210	Section corners as defined by the PLSS (Public Land Survey System)
CTRL	LP-215	Other control points that are not corners
STRCT	LP--360	Structures like building footprints, culverts, bridges (if any)

DQ	LP-410	Data quality of data: scale, date, vertical datum, projection
PRJREL	LP-430	Contractor name, project name, project ID
FPLN	LP-520	Floodway center line
FPCTLFCD	LP-523	Elevation reference marks
FPSRFFCD	LP-535	Surface water elevation
FPXFCD	LP-540	Cross sections used in HEC-2
FPZNFCD	LP-550	Floodplain zones
CNL	LP-610	Canals (if any)
FLTY	LP-620	FCD project in the area (if any)
STRTDLT	LP-660	Edge of pavement (if any)
UTILITY	LP-670	Utilities, power poles, etc. (if any) (no underground utilities)
ELV	LP-710	Contours and spot elevations
DRNBSN	LP-920	Drainage basins
DRNPTH	LP-930	Drainage path

7.1.1 The District will provide the consultant with digital land use and soils files to be used as a base for creating the HIS themes.

7.2 Separate check plots will be produced from either Arc-Info or Arc-CAD from the digital database(s) of each theme in 7.1. The check plots will be prepared with a minimum of annotation and will serve only to verify the information in the data base. If the hydrologic and delineation maps have not derived directly from the digital data delivered to the District, then the consultant will certify that the check plots have been examined and that the check plots faithfully represent the data and maps used in the report and /or work maps.

TASK 8 - DELIVERABLES

8.1 FEMA Submittal: The consultant will submit the following items to the District for review by FEMA and any other appropriate governmental agency. All of the following products are considered deliverables for the FEMA submittal:

8.1.1 Original Affidavits of Publication

8.1.2 Two (2) complete sets of blueline topographic base maps with the floodplain/floodway delineations shown. All drawings will be signed and sealed by persons of appropriate professional registration(s). Each registrant will provide a specific statement as to what service they performed.

8.1.3 Two (2) complete copies of the Technical Data Notebook, including HEC-1 and HEC-2 input/output files on diskettes. The Technical Data Notebook will be prepared in accordance with ADWR State Standards Attachment 1-90 (SSA 1-90). The notebook will be organized as specified by the District, following SSA 1-90 format.

8.1.4 Two (2) sets of completed FEMA forms will be submitted in a notebook separate from the Final Report.

8.1.5 Three (3) sets of complete survey notes will be submitted in a notebook separate from the Final Report.

8.1.6 Two (2) copies of the current FIRM panels showing the proposed delineation.

8.2 Final Submittal: The following products are considered deliverables for the final submittal to the District after FEMA approval is issued:

8.2.1 One (1) complete set of non-erasable topographic mylars of the work study drawings. Sheets shall be 24" X 36" in size and numbered correspond to the delineation maps.

8.2.2 Two (2) complete sets of mylars and five (3) complete sets of sealed blueline topographic base maps with the floodplain/floodway delineations shown. All drawings will be signed and sealed by persons of appropriate professional registration(s). Each registrant will provide a specific statement as to what service they performed.

8.2.3 One (1) complete set of transparent overlays of photo-mylars. Sheet size, numbering, and layout shall correspond to the delineation work maps.

8.2.4 One (1) complete set of 9" X 9" contact prints of the aerial stereo photographs sequentially numbered and catalogued.

8.2.5 Digitized topographic data and floodplain/floodway boundaries in conformance with the District's HIS Specifications except as modified by Task 3 - Topographic Mapping 3.2.

8.2.6 Four (4) complete copies of the Technical Data Notebook, including HEC-1 and HEC-2 input/output files on diskettes. The Technical Data Notebook will be prepared in accordance with ADWR State Standards Attachment 1-90 (SSA 1-90). The notebook will be organized as specified by the District, following SSA 1-90 format. This submittal of the Technical Data Notebook shall include any correspondence and/or meeting minutes with the reviewing agencies and shall reflect any revisions required by those reviewing agencies. Revisions may include, but are not limited to, modifications to the delineation maps, the HEC-1 model, the HEC-2 model, and/or the Final Report.

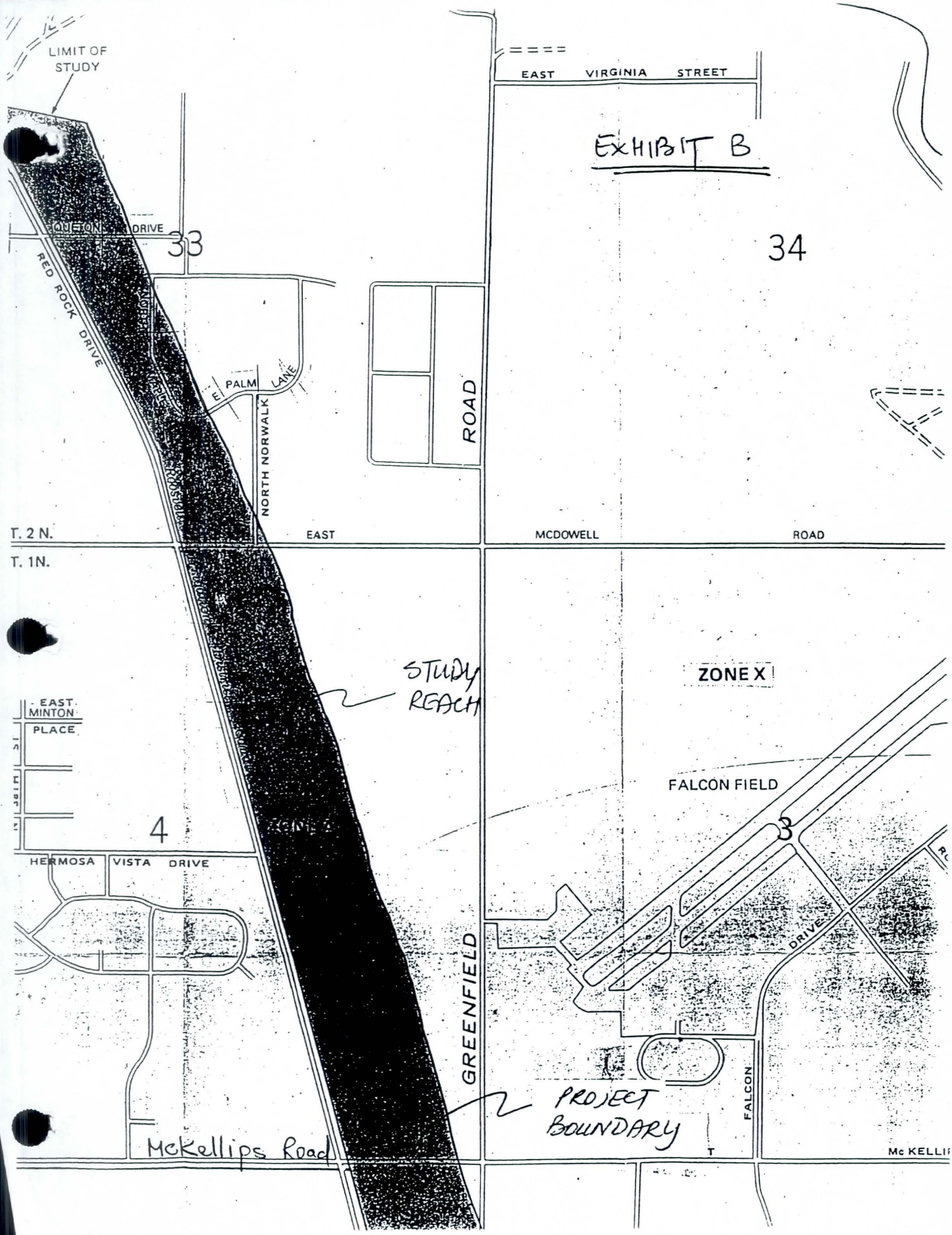


EXHIBIT B
LIMIT OF STUDY
EAST VIRGINIA STREET
QUEEN CREEK DRIVE
33
34
RED ROCK DRIVE
E PALM LANE
NORTH NORWALK
ROAD
T. 2 N.
EAST
MCDOWELL
ROAD
T. 1N.
STUDY REACH
ZONE X
EAST MINTON PLACE
FALCON FIELD
4
3
HERMOSA VISTA DRIVE
GREENFIELD
DRIVE
FALCON
PROJECT BOUNDARY
McKellips Road
Mc KELLI

C.1 Survey Notes for Aerial Mapping Vertical Control

BREIHAN
FERNANDEZ

JOB 3796
RWCD FLOOD
DELINEATION
BENCH LOOP #1

12-10-16

+	HI	-	ELEV.	DESCRIPTION
			1357.25	CHIS. BOX, T/C @ E. McDOWELL & GREENFIELD N/E COR.
4.92	1362.17	4.43	1357.74	T.P. # 1, T/C
5.67	1363.41	4.78	1358.63	T.P. # 2, T/C
5.93	1364.56	4.71	1359.85	T.P. # 3, T/C
5.99	1365.64	4.58	1361.06	T.P. # 4, T/C
5.635	1366.695	4.195	1362.50	T.P. # 5, T/C
5.79	1368.29	4.99	1363.30	T.P. # 6, T/C
5.945	1369.245	5.06	1364.185	T.P. # 7, T/C
5.655	1369.84	5.48	1364.36	T.P. # 8, BOX ON T/C @ NW COR. GREENFIELD & McDOWELL RD. (1364.35)
5.54	1369.90	5.71	1364.19	T.P. # 9, T/C
4.65	1368.84	5.535	1363.305	T.P. # 10, T/C
4.53	1367.835	5.335	1362.50	T.P. # 11, T/C
3.925	1366.425	5.365	1361.06	T.P. # 12, T/C
4.365	1365.425	5.575	1359.85	TP # 13, T/C
4.685	1364.535	5.90	1358.635	T.P. # 14, T/C
4.655	1363.29	5.545	1357.745	T.P. # 15, T/C
4.72	1362.465	5.215	1357.25	CHECK IN TO CHIS. BOX., POB. OF THIS LOOP: CHECKS FLAT

REGISTERED LAND SURVEYOR
CERTIFICATE NO.
26412
ARTHUR A.
WITZELL
Date Signed 12-12-16
ARIZONA, U.S.A.

BENCH LOOPS

+	H1	-	ELEV.	DESCRIPTION
			1316.88	T.P. #11
3.30	1320.18			
		6.54	1313.64	T.P. #12
6.57	1320.21			
		3.33	1316.88	CHECK IN
			1313.64	T.P. #12
3.43	1317.07			
		6.37	1310.70	T.P. #13
6.425	1317.125			
		3.485	1313.64	CHECK IN
			1310.70	T.P. #13
3.30	1314.00			
		5.72	1308.28	T.P. #14
5.77	1314.05			
		3.35	1310.70	CHECK IN
			1308.28	T.P. #14
3.27	1311.55			
		6.20	1305.35	T.P. #15
6.24	1311.59			
		3.31	1308.28	CHECK IN
			1305.35	T.P. #15
3.99	1309.34			
		5.91	1303.43	T.P. #16
5.96	1309.39			
		4.04	1305.35	CHECK IN
			1303.43	T.P. #16
4.57	1308.00 - 5.66 S.S.	1302.34		S.S. ON □ @ NE CORS RET. LINDSAY & MCKELLIPS (1305.14)?
		6.99	1301.01	T.P. #17

+	H1		ELEV.	DESCRIPTION	
7.06	1308.07				
		4.64	1303.43	CHECK IN	
			1301.01	T.P. #17	
3.41	1304.42				
		6.18	1298.24	T.P. #18	
6.25	1304.49				
		3.48	1301.01	CHECK IN	
			1298.24	T.P. #18	
3.80	1302.04				
		6.10	~~1295.94~~ 1295.935	T.P. #19	
6.18	1302.12				
		3.87	1298.25	CHECK IN	+0.01
			1295.935	T.P. #19	
4.195	1300.13				
		6.025	1294.105	T.P. #20	
6.055	1300.16				
		4.225	1295.935	CHECK IN	
			1294.105	T.P. #20	
5.425	1299.53				
		7.07	~~1292.46~~ 1292.455	T.P. #21	
7.015	1299.475				
		5.36	1294.115	CHECK IN	+0.01
			1292.455	T.P. #21	
2.70	1295.155				
		6.91	1288.845	T.P. #22	
6.385	1295.23				
		2.775	1292.455	CHECK IN	

REGISTERED LAND SURVEYOR
26412
ARTHUR A. WITZELL III
Date Signed 11/1/07
ARIZONA U.S.A.

+	HI	-	ELEV	DESCRIPTION
			1288.645	T.P #22
4.11	1292.955	6.15	1286.805	
6.065	1292.87			T.P #23
		4.025	1288.845	CHECK IN
			1286.805	T.P. #23
4.445	1291.25			
		6.06	1285.19	T.P. #24
6.05	1291.24			
		4.435	1286.805	CHECK IN
			1285.19	T.P. #24
4.57	1289.76			
		4.12	1285.64	RM 267 B.C. ON IRR. SW. @ McKellips & GILBERT
			*	(1285.49)
4.18	1289.82	5.29	1284.47	S.S. PT. ON S/W (1284.40')
		4.63	1285.19	CHECK IN

REGISTERED LAND SURVEYOR
CERTIFICATE NO.
26412
ARTHUR A.
WITZELL, III
Date Signed 1/4/
ARIZONA U.S.A.

BRENNAN
FERNANDEZ

JOB 3796
RWCD FLOOD
DELINEATION

12-16-16

BENCH LOOP #3 (ALONG CANAL)

+	HI	-	ELEV.	DESCRIPTION
			1352.35	T.P #2 @ CANAL ON McELLIPS (SEE BENCH LOOP 2, PAGE 29
5.04	1357.39	4.68	1352.71	T.P #1 ON F.K. @ AERIAL TARGET # 1001
4.78	1357.49	3.35	1354.14	T.P #2, 40D NAIL
5.66	1359.80	4.99	1354.81	T.P #3, 40D NAIL
5.19	1360.00	5.18	1354.82	T.P. #4, 40D NAIL
4.89	1359.69	1.40	1352.29	T.P. #5, 40D NAIL
7.12	1359.41	5.16	1354.25	T.P #6 ON ½" REBAR @ AERIAL TARGET # ~~X~~ #1003
5.76	1360.01	5.32	1354.69	T.P #7, 40D NAIL
5.26	1359.95	5.17	1354.78	T.P #8, 40D NAIL
5.03	1359.81	4.98	1354.83	T.P #9, 40D NAIL
5.03	1359.86	5.55	1354.31	T.P #10, 40D NAIL
4.56	1358.87	3.35	1355.52	T.P #11 ON F.K. NAIL @ AERIAL TARGET # ~~X~~ 1005
3.18	1358.70	4.99	1353.71	T.P #12, PAV.

+	HI	-	ELEV.	DESCRIPTION
5.76	1359.47	4.245	1355.225	T.P = 13, PAV.
5.10	1361.125	4.205	1356.92	T.P = 14 ON F.K. NAIL @ AERIAL TARGET #1006
6.30	1363.22	3.19	1360.03	T.P # 15, PAV.
7.59	1367.62	3.26	1364.36	CHECK INTO CHISELED BOX ON T/C @ N/W COR OF GREENFIELD & McDOWELL CHECKS FLAT
				(checked from benchmark elev. 1364.35) mgR
	NOTE:	SUBTRACT	0.15	FROM ALL
		TARGET	ELEVS	TO MATCH
		RM 267	(SEE	SHEET 31)

REGISTERED LAND SURVEYOR
CERTIFICATE NO.
26412
ARTHUR A.
WITZELL
Date Signed 12-21-16
ARIZONA, U.S.A.

SILVIANO FERNANDEZ

RWCD FLOOD DELINEATION

BENCH LOOP #4

ALONG CANAL NORTH OF McDOWELL

+	HI	−	ELEV.	DESCRIPTION
			1355.52	P.K. NAIL @ AERIAL TARGET #3 @ CANAL ON McDOWELL
3.40	1358.92			
		4.96	1353.96	T.P. #1, 40 D NAIL
5.085	1359.045			
		5.07	1353.975	T.P. #2, 40 D NAIL
5.13	1359.105			
		5.04	1354.065	T.P. #3, 40 D NAIL
5.515	1359.58			
		5.06	~~1354.52~~	T.P. #4 ON 1/2" REBAR
			1354.515	AERIAL TARGET #X 1015
5.10	1359.61			
		5.555	1354.065	T.P. #5, SAME AS T.P. #3
4.89	1358.955			
		4.97	1353.985	T.P. #6, SAME AS T.P. #1
5.03	1359.015			
		5.045	1353.97	T.P. #7, SAME AS T.P. #1
4.74	1358.71			
		3.18	~~1355.53~~ 1355.52	CHECK IN TO P.O.B. ±0.01 ERROR
LOOP NORTH FROM AERIAL TARGET #4				
			1354.515	AERIAL TARGET #X, 1/2" REBAR 1015
5.74	1360.255			
		4.62	1355.635	T.P. #1, 40 D NAIL
5.745	1361.38			
		5.14	1356.24	T.P. #2, 40 D NAIL
5.595	1361.835			
		5.69	1356.145	T.P. #3 ON ALUMINUM DISC ALOT. HWY DIV.
5.74	1361.885			
		5.64	1356.245	T.P. #4, SAME AS T.P. #3
5.085	1361.33			
		5.695	1355.635	T.P. #5; SAME AS T.P. #1
4.405	1360.04			
		5.53	1354.51	CHECK IN TO AERIAL TARGET #4, P.O.B. OF THIS LOOP ±0.005 ERROR
			1356.145	T.P. #3 ON ALUM. DISC (SEE ABOVE)
0.39	1356.535			
		19.29	1337.245	T.P. #1 ON NAIL
0.10	1337.345			
		15.74	1321.605	T.P. #2 ON NAIL
5.19	1326.795			
		15.74	~~1311.055~~ 1311.06	T.P. #3 ON P.K. NAIL @ AERIAL TARGET #X 1010
15.85	1326.905			
		5.31	1321.595	T.P. #4 ON NAIL
16.82	1338.415			
		1.17	1337.245	T.P. #5 ON NAIL
19.07	1356.315			
		0.18	1356.135	CHECK IN TO P.O.B. ±0.01 ERROR

* SUBTRACT 0.15 FROM ALL PANEL ELEVS (SEE SHEET 31)

REGISTERED LAND SURVEYOR CERTIFICATE NO. 26412 ARTHUR A. WITZELL Date Signed 12-2-97 ARIZONA

BRENNAN FERNANDEZ

RWCD FLOOD DELINEATION

BENCH LOOPS TO AERIAL TARGETS

+	HI	-	ELEV	DESCRIPTION
			1356.24	T.P.#2 PAGE 33
6.15	1361.39	6.25	1356.14	1/2" REBAR @ AERIAL TARGET # 1007
4.02	1360.96	5.33	1355.63	T.P.#1 PAGE 33 (1355.635) CHECKS -0.005
			1354.515	AERIAL TARGET #1015 IS SAME PT. @ AER. TARGET #4
			1354.83	T.P.#9, PAGE 32
4.99	1359.82	8.79	~~1351.03~~ 1351.035	1/2" REBAR @ AERIAL TARGET # 1014
8.33	1359.36	4.59	1354.77	T.P.# 8, PAGE 32 (1354.78) CHECKS -0.01

+	HI	-	ELEV	DESCRIPTION
			1354.82	T.P. # 4, PAGE 32
4.83	1359.65	4.905	1354.745	1/2" REBAR @ AERIAL TARGET # 1011
4.69	1359.435	4.625	1354.81	T.P. #3, PAGE 32 CHECKS FLAT

REGISTERED LAND SURVEYOR
CERTIFICATE NO.
2847
ARTEMIO A. L.
Date Signed 9/4/97
ARTEMIO A. L.

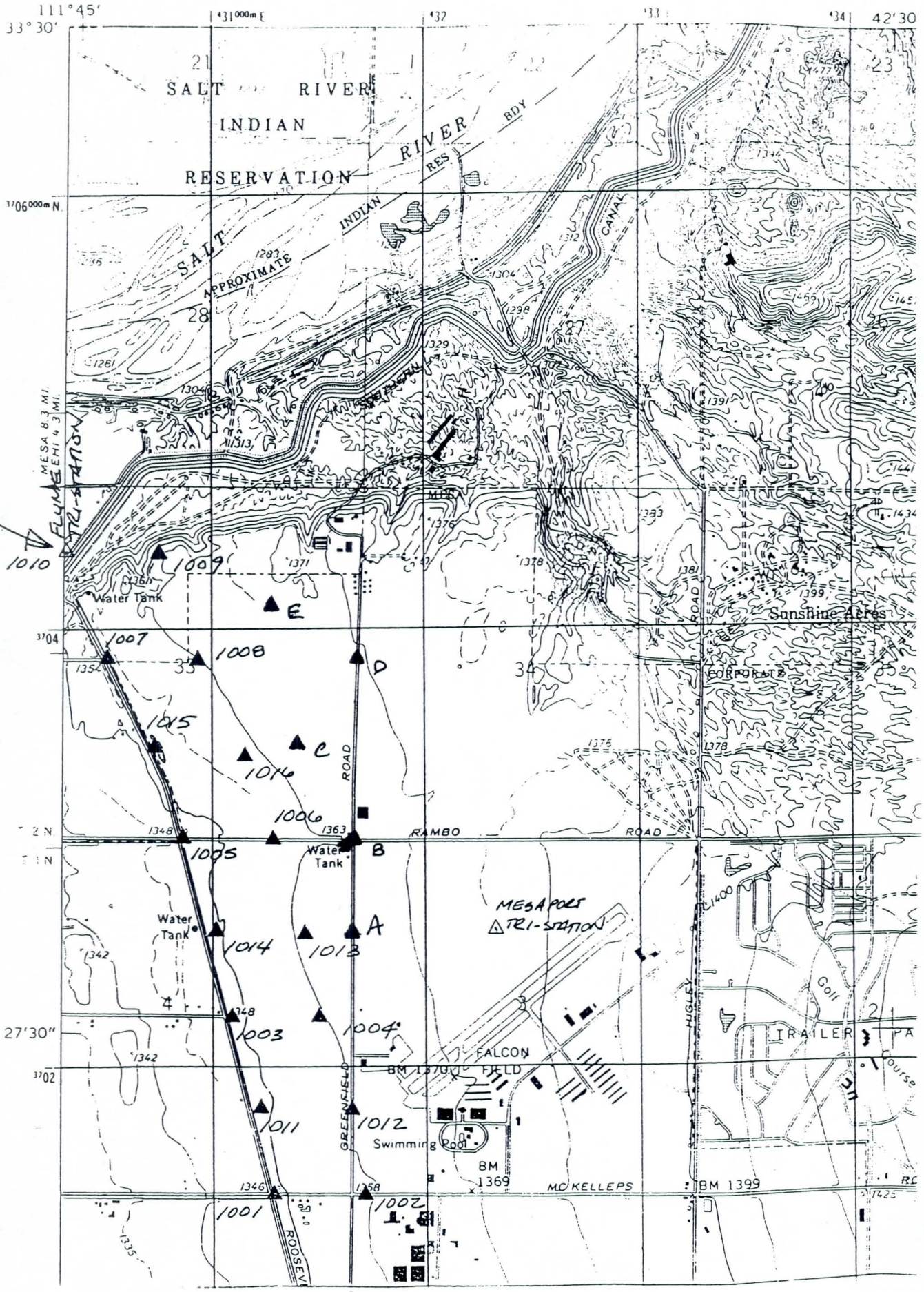
BRENNAN
FERNANDEZ

RWCD FLOOD
DELINEATION
BENCH LOOPS TO
AERIAL TARGETS

+	HI	−	ELEV.	DESCRIPTION
			1354.25	½" REBAR @ AERIAL TARGET # 1003
2.90	1357.15	3.24	1353.91	T.P. # 1, 40 D NAIL
6.54	1360.45	4.385	1356.065	T.P. # 2, 40 D NAIL
6.10	1362.165	4.275	~~1357.89~~ 1357.88	½" REBAR @ AERIAL TARGET # 1004
4.19	1362.08	4.665	1357.415	T.P. # 4, 40 D NAIL
5.56	1362.975	4.65	1358.325	T.P. # 5, 40 D NAIL
5.57	1363.895	4.68	~~1359.215~~ 1359.195	½" REBAR @ AERIAL TARGET # 1013
5.59	1364.805	4.62	1360.185	T.P. # 7, 40 D NAIL
5.10	1365.285	4.44	1360.845	T.P. # 8, 40 D NAIL
4.155	1365.00	4.935	1360.065	T.P. # 15 ON PAV. (SEE PAGE 32) (1360.113) +0.035

REGISTERED LAND SURVEYOR
CERTIFICATE NO.
26412
ARTHUR A.
WITZELL
Date Signed 11-6-97
ARIZONA U.S.A.

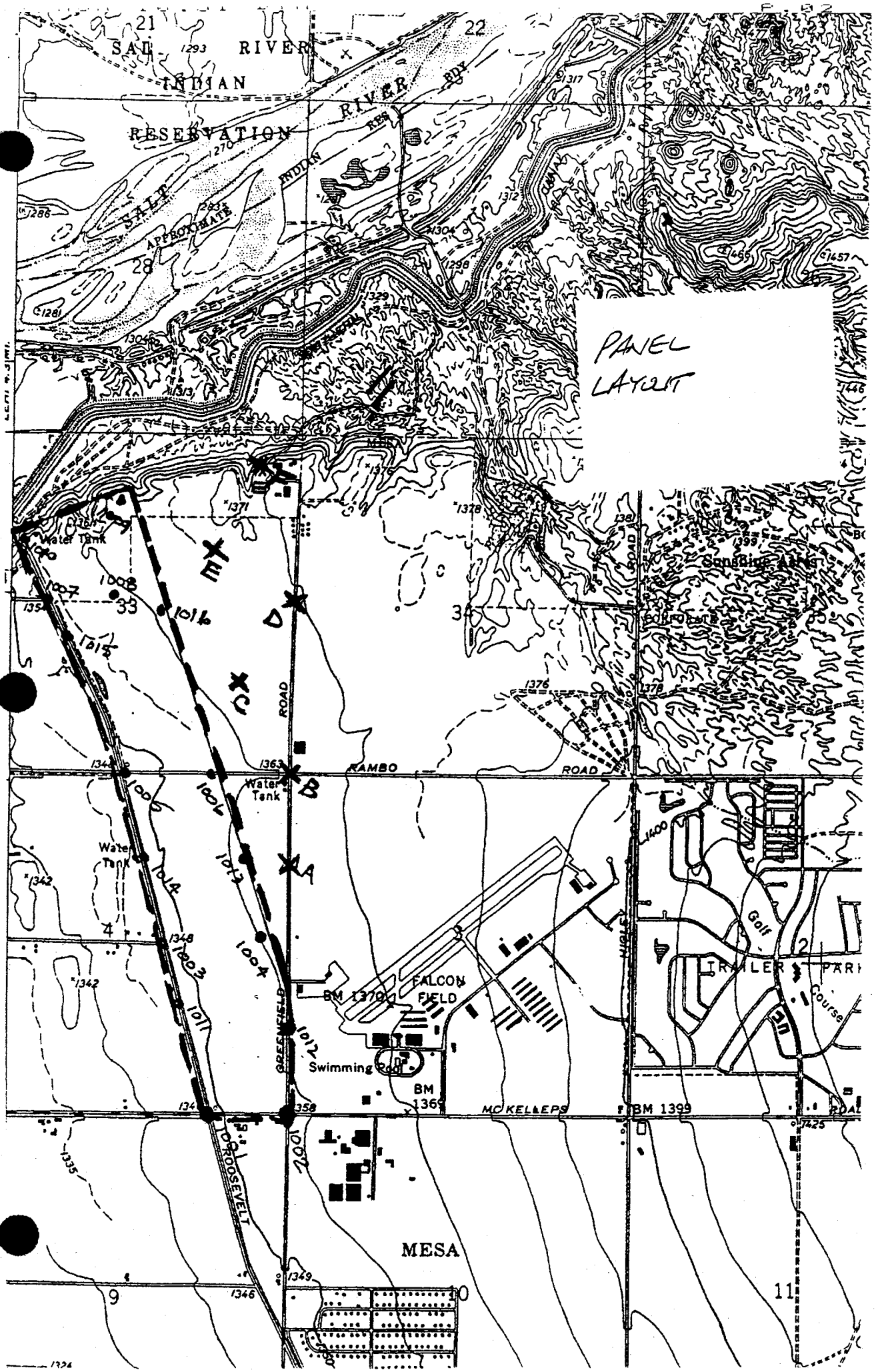
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



FLUME = # 1383

STA. PLANE 1983
INTERNATIONAL FEET

C.1 Survey Notes for Aerial Mapping Horizontal Control


PANEL LAYOUT
SALT RIVER INDIAN RESERVATION
APPROXIMATE
Water Tank
Water Tank
Water Tank
RAMBO ROAD
GREENFIELD ROAD
HIGLEY ROAD
FALCON FIELD
BM 1370
Swimming Pool
BM 1369
MC KELLEPS
BM 1399
TROOSEVELT
MESA
TRAILER PARK
Golf Course
Sandia Apts
Corporate
E
D
C
B
A

NGS DATA

```
DU2236'SIDE OF RUNWAY 04R-22L, ON NORTHEAST SIDE OF TAXIWAY C-2.
DU2236'NOTE, AN ESCORT TO STATION IS REQUIRED.
DU2236'OWNERSHIP--CITY OF MESA, MR. MARK MEYERS - ASSISTANT AIRP
DU2236'DIRECTOR, 4800 FALCON DRIVE, MESA AZ 85205, PHONE 602-832
DU2236'
DU2236'TO REACH THE STATION FROM THE JUNCTION OF STATE ROUTE 360
DU2236'(SUPERSTITION FREEWAY) AND GREENFIELD ROAD IN MESA, GO
DU2236'NORTH FOR 7.6 KM (4.7 MI) ON GREENFIELD ROAD TO MCKELLIPS
DU2236'TURN RIGHT AND
DU2236'GO EAST FOR 0.8 KM (0.5 MI) ON MCKELLIPS ROAD TO A SIDE ROAD
DU2236'TURN LEFT AND GO NORTH THEN NORTHWEST FOR 0.6 KM (0.4 MI) ON FALCON
DU2236'DRIVE TO A LEFT TURN, JUST PAST THE CONTROL TOWER.  TURN LEFT AND
DU2236'GO NORTHWEST FOR 0.2 KM (0.1 MI) THROUGH AIRCRAFT TIE DOWN AREA.
DU2236'CONTINUE AHEAD AND
DU2236'GO NORTHWEST FOR 0.3 KM (0.2 MI) ON TAXIWAY B, CROSSING TAXIWAY D
DU2236'AND RUNWAY 04R-22L.  TURN RIGHT AND
DU2236'GO NORTHEAST FOR 0.6 KM (0.4 MI) ON A DIRT MEDIAN BETWEEN RUNWAYS
DU2236'TO TAXIWAY C AND THE STATION STRAIGHT AHEAD, ON NORTHEAST SIDE OF
DU2236'TAXIWAY.
DU2236'
DU2236'THE STATION IS A STANDARD NGS DISK
DU2236'STAMPED---MESAPORT 1987---,
DU2236'SET INTO THE TOP OF A ROUND CONCRETE MONUMENT
DU2236'30 CM IN DIAMETER FLUSH WITH GROUND.  LOCATED
DU2236'38.7 METERS (127.0 FT) NORTHWEST FROM THE APPROXIMATE CENTER OF
DU2236'RUNWAY 22L-4R,
DU2236'20.1 METERS (66.0 FT) NORTHEAST FROM THE APPROXIMATE CENTER OF
DU2236'TAXIWAY C-2 AND
DU2236'7.3 METERS (24.0 FT) NORTHEAST FROM AN AIRPORT RUNWAY SIGN (22L).
DU2236'
DU2236'CALIFORNIA FAA AIRPORTS, 1987.
DU2236'
DU2236'THIS STATION SUITABLE FOR GPS SURVEYS.
DU2236'
DU2236'DESCRIBED BY S.E. RANDALL.
DU2236
DU2236                          STATION RECOVERY (1987)
DU2236
DU2236'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1987
DU2236'RECOVERED IN GOOD CONDITION.
DU2236
DU2236                          STATION RECOVERY (1992)
DU2236
DU2236'RECOVERY NOTE BY NATIONAL GEODETIC SURVEY 1992
DU2236'9.7 KM (6.00 MI) EASTERLY ALONG U.S. HIGHWAY 60 (MAIN STREET) FROM
DU2236'THE JUNCTION OF STATE HIGHWAY 87 (COUNTRY CLUB DRIVE) IN MESA, THENCE
DU2236'4.0 KM (2.50 MI) NORTHERLY ALONG NORTH GREENFIELD ROAD, THENCE 0.8 KM
DU2236'(0.50 MI) EASTERLY ALONG EAST MCKELLIPS ROAD, THENCE 0.7 KM (0.45 MI)
DU2236'NORTHERLY ALONG FALCON DRIVE, THENCE 0.5 KM (0.30 MI) NORTHWESTERLY
DU2236'ALONG TAXIWAY B, THENCE 0.6 KM (0.35 MI) NORTHEASTERLY ALONG RUNWAY
DU2236'22L, 39.0 M (128.0 FT) NORTHWEST OF THE CENTERLINE OF THE RUNWAY,
DU2236'22.2 M (72.8 FT) WEST-NORTHWEST OF A RUNWAY LIGHT, 20.0 M (65.6 FT)
DU2236'NORTHEAST OF THE CENTERLINE OF TAXIWAY C-2, 16.6 M (54.5 FT) EAST OF
DU2236'A TAXIWAY LIGHT, 6.8 M (22.3 FT) NORTHEAST OF THE NORTH END OF A
DU2236'FOOTING FOR A SIGN (RUNWAY 22L), 0.3 M (1.0 FT) BELOW THE LEVEL OF
DU2236'THE TAXIWAY, AND THE MONUMENT IS FLUSH WITH THE GROUND SURFACE.
1       National Geodetic Survey,   Retrieval Date = DECEMBER 19, 1996
DU2242 ***********************************************************************
DU2242  DESIGNATION -  FLUME
DU2242  PID         -  DU2242
DU2242  STATE/COUNTY-  AZ/MARICOPA
DU2242  USGS QUAD   -  BUCKHORN (1983)
DU2242
DU2242                          *CURRENT SURVEY CONTROL
```

```
DU2242
DU2242* NAD 83(1992)-  33 28 34.70211(N)    111 44 59.95487(W)     ADJUSTED
DU2242* NAVD 88     -       413.1     (meters)     1355.     (feet)  VERTCON
DU2242
DU2242  X           -  -1,973,528.497 (meters)                      COMP
DU2242  Y           -  -4,946,691.392 (meters)                      COMP
DU2242  Z           -   3,498,354.374 (meters)                      COMP
DU2242  LAPLACE CORR-           2.82  (seconds)                     DEFLEC96
DU2242  ELLIP HEIGHT-         383.989 (meters)                      GPS OBS
DU2242  GEOID HEIGHT-         -29.51  (meters)                      GEOID96
DU2242
DU2242  HORZ ORDER  -  FIRST
DU2242  ELLP ORDER  -  FOURTH    CLASS II
DU2242
DU2242
DU2242
DU2242.The horizontal coordinates were established by GPS observations
DU2242.and adjusted by the National Geodetic Survey in August 1993.
DU2242
DU2242.The NAVD 88 height was computed by applying the VERTCON shift value to
DU2242.the NGVD 29 height (displayed under SUPERSEDED SURVEY CONTROL.)
DU2242
DU2242.The X, Y, and Z were computed from the position and the ellipsoidal ht.
DU2242
DU2242.The Laplace correction was computed from DEFLEC96 derived deflections.
DU2242
DU2242.The ellipsoidal height was determined by GPS observations
DU2242.and is referenced to NAD 83.
DU2242
DU2242.The geoid height was determined by GEOID96.
DU2242
DU2242;                    North         East     Units   Scale      Converg.
DU2242;SPC AZ C                                          0.99990296 +0 05 31.0
DU2242;UTM  12                                           0.99965986 -0 24 49.3
DU2242
DU2242                                                   ROL
DU2242
DU2242  NAD 83(198                                       95935(W)     ADJUSTED
DU2242  NGVD 29                                               (feet)  GPS OBS
DU2242
DU2242.Superseded                                        y control.
DU2242.NGS no long                                        NGVD 29 datums.
DU2242.See file fo                                       eded data were derived.
DU2242
DU2242_MARKER: DD
DU2242_SETTING: 7                                        OUND)
DU2242_STABILITY:                                        UBJECT TO
DU2242+STABILITY:
DU2242_SATELLITE:                                        ITABLE FOR
DU2242+SATELLITE:
DU2242
DU2242  HISTORY                                           By
DU2242  HISTORY
DU2242
DU2242                        STATION DESCRIPTION
DU2242
DU2242'DESCRIBED BY ARIZONA DEPARTMENT OF TRANSPORTATION 1986 (HW)
DU2242'THE STATION IS LOCATED ABOUT 9.7 KM (6.0 MI) NORTHEAST OF THE CITY
DU2242'OF MESA, ARIZONA.
DU2242'
DU2242'TO REACH THE STATION FROM THE INTERSECTION OF MCKELLIPS ROAD AND
DU2242'VAL VISTA DRIVE, GO NORTH ON VAL VISTA DRIVE FOR 1.54 KM (0.95 MI)
DU2242'TO THE INTERSECTION OF MCDOWELL ROAD AND VAL VISTA DRIVE.  CONTINUE
DU2242'NORTH ON VAL VISTA DRIVE FOR 0.97 KM (0.6 MI) TO A BLADED ROAD ON THE
```

2242

N 900870.03148
E 750823.27141

STATE PLANE 1983
INTERNATIONAL FEET

```
DU2242'RIGHT.  TURN RIGHT ALONG THE SOUTH SIDE OF THE CANAL FOR 0.16 KM
DU2242'(0.1 MI) AND CONTINUE ON THE ROAD FOR ANOTHER 0.16 KM (0.1 MI) TO
DU2242'THE TOP OF A HILL AND THE STATION ON THE LEFT.
DU2242'
DU2242'THE STATION IS A STANDARD AGS DISK
DU2242'STAMPED---FLUME 1986---,
DU2242'SET INTO THE TOP OF A ROUND CONCRETE MONUMENT
DU2242'25 CM IN DIAMETER PROJECTING 2.5 CM ABOVE GROUND.  LOCATED
DU2242'1.46 METERS (4.8 FT) NORTHEAST FROM A WITNESS POST AND SIGN,
DU2242'2.8 METERS (9.2 FT) NORTH-NORTHWEST FROM AN UNSTAMPED B.M. WITH A
DU2242'BRASS CAP,
DU2242'9.1 METERS (30 FT) EAST FROM A FENCE CORNER,
DU2242'0.3 METERS (1.0 FT) NORTH FROM THE NORTHWEST CORNER OF A CONCRETE
DU2242'SLAB AT THE CANAL HEAD GATE.
DU2242'THE UNDERGROUND MARK IS A STANDARD AGS DISK
DU2242'STAMPED---FLUME 1986---,
DU2242'SET INTO AN IRREGULAR MASS OF CONCRETE 0.8 METERS BELOW THE SURFACE.
1        National Geodetic Survey,   Retrieval Date = DECEMBER 19, 1996
DU2252 ***********************************************************************
DU2252  DESIGNATION -  PATCH
DU2252  PID         -  DU2252
DU2252  STATE/COUNTY-  AZ/MARICOPA
DU2252  USGS QUAD   -  MESA (1983)
DU2252
DU2252                          *CURRENT SURVEY CONTROL
DU2252
DU2252* NAD 83(1992)-  33 28 02.38585(N)    111 46 43.14817(W)     ADJUSTED
DU2252* NAVD 88     -       396.6    (meters)    1301.     (feet)  VERTCON
DU2252
DU2252  X           -  -1,976,201.671 (meters)                     COMP
DU2252  Y           -  -4,946,200.535 (meters)                     COMP
DU2252  Z           -   3,497,514.661 (meters)                     COMP
DU2252  LAPLACE CORR-           2.42  (seconds)                    DEFLEC96
DU2252  ELLIP HEIGHT-         367.404 (meters)                     GPS OBS
DU2252  GEOID HEIGHT-         -29.57  (meters)                     GEOID96
DU2252
DU2252  HORZ ORDER  -  FIRST
DU2252  ELLP ORDER  -  FOURTH    CLASS II                          897591 .01294
DU2252                                                             742087. 22553
DU2252                                  3,280639895
DU2252
DU2252.The horizontal coordinates were established by GPS observations
DU2252.and adjusted by the National Geodetic Survey in August 1993.
DU2252
DU2252.The NAVD 88 height was computed by applying the VERTCON shift value to
DU2252.the NGVD 29 height (displayed under SUPERSEDED SURVEY CONTROL.)
DU2252
DU2252.The X, Y, and Z were computed from the position and the ellipsoidal ht.
DU2252
DU2252.The Laplace correction was computed from DEFLEC96 derived deflections.
DU2252
DU2252.The ellipsoidal height was determined by GPS observations
DU2252.and is referenced to NAD 83.
DU2252
DU2252.The geoid height was determined by GEOID96.
DU2252
DU2252;                     North          East     Units   Scale       Converg.
DU2252;SPC AZ C     -    273,585.741   226,188.186   MT  0.99990203 +0 04 34.0
DU2252;UTM  12      -  3,703,368.205   427,646.555   MT  0.99966454 -0 25 45.9
DU2252
DU2252                          SUPERSEDED SURVEY CONTROL
DU2252
DU2252  NAD 83(1986)-  33 28 02.37816(N)    111 46 43.15266(W)     ADJUSTED
DU2252  NGVD 29     -       396.1    (meters)    1300.     (feet)  GPS OBS
```

GPS
RAW DATA

TFR Map Raw Data Editor, File ->CANAL.RW5

```
Name CANAL,Date 03-02-1997,Time 06:35:13
Mode Setup:North Azimuth,Dist meter,Scale 1.0000000,Earth cr
Store:Pt 1,N 5000.0000,E 5000.0000,Elv 100.0000,START
Store:Pt 2000,N 897000.9250,E 752678.7220,Elv 100.0000,40d
Store:Pt 1001,N 891962.1100,E 753931.5360,Elv 1352.4960,panel
Store:Pt 1005,N 897271.0690,E 752520.7420,Elv 1355.4260,panel
Store:Pt 1006,N 897264.2190,E 753817.0000,Elv 1356.8520,panel
Store:Pt 1002,N 891961.1810,E 755081.6760,Elv 1356.7980,panel
Note: 7:51:20.00,Get Base position: LA33.275771454,LN-111.443968298,HT1268.143
Note: 7:54:1.50,Get Base position: LA33.275836398,LN-111.444052214,HT881.2664
Note:Set BASE : record intrvl: 5.0, elev cutoff: 10 deg, antenna ht: 5.660
Note:07:52:42.26,Set Base receiver position
Base Pos:Pt 2000,Lat 33.27584,Lng -111.44405,Ellips Ht 881.2664
Note:Set ROVER: record intrvl: 5.0, elev cutoff: 10 deg, antenna ht: 6.710
Note:Send Base position to Rover:LA33.275836398,LN-111.444052214,HT881.2664
Note:Set ROVER: record intrvl: 5.0, elev cutoff: 10 deg, antenna ht: 6.710
Note:Send Base position to Rover:LA33.275836398,LN-111.444052214,HT881.2664
Note:Set ROVER: record intrvl: 5.0, elev cutoff: 10 deg, antenna ht: 6.710
Note:Send Base position to Rover:LA33.275836398,LN-111.444052214,HT881.2664
????EP,TM 8: 6:40.00,LA33.275921586,LN-111.444097520,HT884.3504,RH0.0131,RV0.0
Note: 8: 6:40.00,Add cntrl pt: 1005,LA= 33.275921586,LN= -111.444097520,HT= 88
????EP,TM 8:16:46.00,LA33.275914782,LN-111.442567496,HT885.7283,RH0.0131,RV0.0
Note: 8:16:46.00,Add cntrl pt: 1006,LA= 33.275914782,LN= -111.442567496,HT= 88
Store:Pt 1012,N 893331.4260,E 755091.3820,Elv 1358.7050,panel
????EP,TM 8:28:11.00,LA33.272024298,LN-111.441063680,HT887.6640,RH0.0131,RV0.0
 : 8:28:11.00,Add cntrl pt: 1012,LA= 33.272024298,LN= -111.441063680,HT= 88
????EP,TM 8:34:35.00,LA33.270669558,LN-111.442432388,HT881.5289,RH0.0164,RV0.0
Note: 8:34:35.00,Add cntrl pt: 1001,LA= 33.270669558,LN= -111.442432388,HT= 88
Note:08:33:55.99,Solve for local Horizontal transformation
Horz Cntrl:Pt 1005,Lat 33.27592,Lng -111.44410,Ellips Ht 884.3504,H,V
Horz Cntrl:Pt 1006,Lat 33.27591,Lng -111.44257,Ellips Ht 885.7283,H,V
Horz Cntrl:Pt 1012,Lat 33.27202,Lng -111.44106,Ellips Ht 887.6640,H,V
Horz Cntrl:Pt 1001,Lat 33.27067,Lng -111.44243,Ellips Ht 881.5289,H,V
Note:08:33:58.79,Solve for local Vertical transformation
Vert Cntrl:Pt 1005,Lat 33.27592,Lng -111.44410,Ellips Ht 884.3504,H,V
Vert Cntrl:Pt 1006,Lat 33.27591,Lng -111.44257,Ellips Ht 885.7283,H,V
Vert Cntrl:Pt 1012,Lat 33.27202,Lng -111.44106,Ellips Ht 887.6640,H,V
Vert Cntrl:Pt 1001,Lat 33.27067,Lng -111.44243,Ellips Ht 881.5289,H,V
????LH,PN2000,Ha3.281041639,Hb0.000086116,Hc424446.359440180,Hd569089.42030295
????LV,PN2000,Va0.000106866,Vb0.000098393,Vc450.550968839,Ba33.275836398,Bo111
????EP,TM 8:45:0.00,LA33.274577148,LN-111.441042170,HT891.8635,RH0.0164,RV0.02
GPS:Pt 1700,N 895912.0833,E 755109.3890,Elv 1362.9850,panel a
????EP,TM 8:51:42.00,LA33.275905368,LN-111.441030932,HT893.9961,RH0.0131,RV0.0
GPS:Pt 1701,N 897254.7273,E 755118.8378,Elv 1365.1580,panel b
????EP,TM 8:56:50.00,LA33.280734550,LN-111.442330562,HT890.5840,RH0.0131,RV0.0
GPS:Pt 1702,N 898092.8735,E 754017.7444,Elv 1361.7360,panel cb
????EP,TM 9: 5:50.00,LA33.282530110,LN-111.441024638,HT897.9003,RH0.0131,RV0.0
GPS:Pt 1703,N 899907.9754,E 755124.0261,Elv 1369.1420,panel d
????EP,TM 9:14:13.00,LA33.284668900,LN-111.441579818,HT898.2283,RH0.0164,RV0.0
GPS:Pt 1704,N 902069.9746,E 754653.6183,Elv 1369.5200,panel f
```

TFR Map Coordinate Editor, File ->CANAL.CR5

,int	Northing	Easting	Elevation	- Description -
1	5000.0000	5000.0000	100.0000	START
1001	891962.1100	753931.5360	1352.4960	panel
1002	891961.1810	755081.6760	1356.7980	panel
1004	894573.2670	754433.8510	1357.8130	panel
1005	897271.0690	752520.7420	1355.4260	panel
1006	897264.2190	753817.0000	1356.8520	panel
1008	899962.2070	752802.2740	1358.2800	panel
1009	901550.9050	752031.6920	1354.3730	panel
1012	893331.4260	755091.3820	1358.7050	panel
1013	895991.7900	754456.9440	1359.0500	panel
1016	899378.8260	753379.5060	1359.3480	panel
1700	895912.0833	755109.3890	1362.9853	panel a
1701	897254.7273	755118.8378	1365.1584	panel b
1702	898092.8735	754017.7444	1361.7356	panel cb
1703	899907.9754	755124.0261	1369.1424	panel d
1704	902069.9746	754653.6183	1369.5200	panel f
1705	900044.6204	753674.2752	1362.4720	panel e
1706	894557.6093	754446.7822	1355.4100	panel 1004a
2000	897000.9250	752678.7220	100.0000	40d

JOB: CANAL TIME: 15:14 DATE: 03-04-1997

????EP,TM 9:23:58.00,LA33.282665332,LN-111.442735958,HT891.2730,RH0.0131,RV0.0
G Pt 1705,N 900044.6204,E 753674.2752,Elv 1362.4720,panel e
re:Pt 1004,N 894573.2670,E 754433.8510,Elv 1357.8130,panel
Store:Pt 1013,N 895991.7900,E 754456.9440,Elv 1359.0500,panel
Store:Pt 1016,N 899378.8260,E 753379.5060,Elv 1359.3480,panel
Store:Pt 1008,N 899962.2070,E 752802.2740,Elv 1358.2800,panel
Store:Pt 1009,N 901550.9050,E 752031.6920,Elv 1354.3730,panel
????EP,TM10: 8:52.00,LA33.273237252,LN-111.441824282,HT884.3504,RH0.0525,RV0.0
GPS:Pt 1706,N 894557.6093,E 754446.7822,Elv 1355.4100,panel 1004a

TFR Map Coordinate Editor, File ->CANAL.CR5

nt	Northing	Easting	Elevation	- Description -
1	5000.0000	5000.0000	100.0000	START
1001	891962.1100	753931.5360	1352.4960	panel
1002	891961.1810	755081.6760	1356.7980	panel
1004	894573.2670	754433.8510	1357.8130	panel
1005	897271.0690	752520.7420	1355.4260	panel
1006	897264.2190	753817.0000	1356.8520	panel
1008	899962.2070	752802.2740	1358.2800	panel
1009	901550.9050	752031.6920	1354.3730	panel
1012	893331.4260	755091.3820	1358.7050	panel
1013	895991.7900	754456.9440	1359.0500	panel
1016	899378.8260	753379.5060	1359.3480	panel
1700	895912.0833	755109.3890	1362.9853	panel a
1701	897254.7273	755118.8378	1365.1584	panel b
1702	898092.8735	754017.7444	1361.7356	panel cb
1703	899907.9754	755124.0261	1369.1424	panel d
1704	902069.9746	754653.6183	1369.5200	panel f
1705	900044.6204	753674.2752	1362.4720	panel e
1706	894557.6093	754446.7822	1355.4100	panel 1004a
2000	897000.9250	752678.7220	100.0000	40d

```
SC        V03     (C) Copyright Trimble Navigation Ltd, 1991.
            Serial no 0000        Jan-03-97 13:56
            Angle : Degrees       Dist : Feet            Press : Inch Hg
            Temp : Fahrenht       Coord : N-E-Elv        H.obs : Right

JOB         Job ID ROOSEVELT

NOTE   TS   Dec-23-96 13:07

NOTE        3796

NOTE        AERIAL CONTROL

NOTE        NAD83 INT FT NAVD29

NOTE        Dist units: International feet

NOTE   TS   Dec-23-96 13:54

NOTE   BA   Start base

EQUIP  BA   Receiver  4000SSE                  Serial    00015678
            Antenna   4000ST/SSE L1/L2 Geo     Serial
            Radius  0.76575       V.Const  0.03117    Tape adj  0.00000

GPSANT BA   Antenna height 5.270               Measuremt Uncorrected

GPSREF BA   Point ID     2000    Lat  33-27'58.52480"N Lng  111-44'39.14192"W
            Mthd Autonomous      Elv  1559.709         Code 40D

NOTE   TP   Start rover

EQUIP  TP   Receiver  4000SSE                  Serial    00004573
            Antenna   Compact L1/L2            Serial
            Radius  0.00000       V.Const  0.20505    Tape adj  0.00000

SURVEY TP   Elevation mask 12                  PDOP mask 10.000

NOTE   TP   Start rover

EQUIP  TP   Receiver  4000SSE                  Serial    00004573
            Antenna   Compact L1/L2            Serial
            Radius  0.00000       V.Const  0.20505    Tape adj  0.00000

SURVEY TP   Elevation mask 12                  PDOP mask 10.000

NOTE   TP   Start rover

EQUIP  TP   Receiver  4000SSE                  Serial    00004573
            Antenna   Compact L1/L2            Serial
            Radius  0.00000       V.Const  0.20505    Tape adj  0.00000

SURVEY TP   Elevation mask 12                  PDOP mask 10.000
```

```
                                Elv  940.376            Code TOP
            Mthd Phase differntl H.Pr 0.042             V.Pr 0.074

GPSVEC TP   Point ID      1625   Lat  33-28'35.91037"N Lng  111-44'59.70152"W
                                 Elv  939.345            Code NG
            Mthd Phase differntl H.Pr 0.033             V.Pr 0.058

GPSVEC TP   Point ID      1626   Lat  33-28'36.05840"N Lng  111-44'59.57884"W
                                 Elv  935.456            Code NG
            Mthd Phase differntl H.Pr 0.038             V.Pr 0.067

GPSVEC TP   Point ID      1627   Lat  33-28'36.66817"N Lng  111-45'00.43272"W
                                 Elv  939.398            Code TOP
            Mthd Phase differntl H.Pr 0.033             V.Pr 0.057

GPSVEC TP   Point ID      1628   Lat  33-28'36.68534"N Lng  111-45'00.39539"W
                                 Elv  939.955            Code NG
            Mthd Phase differntl H.Pr 0.037             V.Pr 0.063

GPSVEC TP   Point ID      1629   Lat  33-28'36.74881"N Lng  111-45'00.28627"W
                                 Elv  939.332            Code NG
            Mthd Phase differntl H.Pr 0.038             V.Pr 0.065

NOTE   TS   Dec-26-96 15:18

GPSVEC TP   Point ID      1630   Lat  33-28'36.80897"N Lng  111-45'00.23076"W
                                 Elv  934.837            Code NG
            Mthd Phase differntl H.Pr 0.037             V.Pr 0.064

GPSVEC TP   Point ID      1631   Lat  33-28'36.91261"N Lng  111-45'00.04943"W
                                 Elv  934.872            Code NG
            Mthd Phase differntl H.Pr 0.037             V.Pr 0.062

GPSVEC TP   Point ID      1632   Lat  33-28'36.91366"N Lng  111-45'00.68605"W
                                 Elv  939.344            Code TOP
            Mthd Phase differntl H.Pr 0.041             V.Pr 0.069

GPSVEC TP   Point ID      1633   Lat  33-28'36.79900"N Lng  111-45'01.04476"W
                                 Elv  940.434            Code BC FLUME
            Mthd Phase differntl H.Pr 0.040             V.Pr 0.068

GPSVEC TP   Point ID      1634   Lat  33-28'37.00222"N Lng  111-45'00.65858"W
                                 Elv  939.168            Code NG
            Mthd Phase differntl H.Pr 0.035             V.Pr 0.059

* END OF REPORT *
```

```
NOTE   TP   Start rover

EQUIP  TP   Receiver  4000SSE                  Serial    00004573
            Antenna   Compact L1/L2            Serial
            Radius  0.00000       V.Const  0.20505    Tape adj  0.00000

SURVEY TP   Elevation mask 12                  PDOP mask 10.000

NOTE   TS   Dec-23-96 14:06

NOTE   BA   Start base

EQUIP  BA   Receiver  4000SSE                  Serial    00015678
            Antenna   4000ST/SSE L1/L2 Geo     Serial
            Radius  0.76575       V.Const  0.03117    Tape adj  0.00000

NOTE   TP   Start rover

EQUIP  TP   Receiver  4000SSE                  Serial    00004573
            Antenna   Compact L1/L2            Serial
            Radius  0.00000       V.Const  0.20505    Tape adj  0.00000

SURVEY TP   Elevation mask 12                  PDOP mask 10.000

NOTE   TP   Start rover

EQUIP  TP   Receiver  4000SSE                  Serial    00004573
            Antenna   Compact L1/L2            Serial
            Radius  0.00000       V.Const  0.20505    Tape adj  0.00000

JRVEY  TP   Elevation mask 12                  PDOP mask 10.000

NOTE   TP   Start rover

EQUIP  TP   Receiver  4000SSE                  Serial    00004573
            Antenna   Compact L1/L2            Serial
            Radius  0.00000       V.Const  0.20505    Tape adj  0.00000

SURVEY TP   Elevation mask 12                  PDOP mask 10.000

NOTE   BA   Start base

EQUIP  BA   Receiver  4000SSE                  Serial    00015678
            Antenna   4000ST/SSE L1/L2 Geo     Serial
            Radius  0.76575       V.Const  0.03117    Tape adj  0.00000

NOTE   BA   Start base

EQUIP  BA   Receiver  4000SSE                  Serial    00015678
            Antenna   4000ST/SSE L1/L2 Geo     Serial
            Radius  0.76575       V.Const  0.03117    Tape adj  0.00000

NOTE   TP   Start rover
```

```
EQUIP   TP   Receiver  4000SSE                    Serial    00004573
             Antenna   Compact L1/L2              Serial
             Radius  0.00000       V.Const  0.20505    Tape adj  0.00000

SURVEY  TP   Elevation mask 12                    PDOP mask 10.000

NOTE    TS   Dec-23-96 14:30

NOTE    TP   Start rover

EQUIP   TP   Receiver  4000SSE                    Serial    00004573
             Antenna   Compact L1/L2              Serial
             Radius  0.00000       V.Const  0.20505    Tape adj  0.00000

SURVEY  TP   Elevation mask 12                    PDOP mask 10.000

NOTE    TP   Start rover

EQUIP   TP   Receiver  4000SSE                    Serial    00004573
             Antenna   Compact L1/L2              Serial
             Radius  0.00000       V.Const  0.20505    Tape adj  0.00000

SURVEY  TP   Elevation mask 12                    PDOP mask 10.000

NOTE    TS   Dec-23-96 14:42

NOTE    TP   Start rover

EQUIP   TP   Receiver  4000SSE                    Serial    00004573
             Antenna   Compact L1/L2              Serial
             Radius  0.00000       V.Const  0.20505    Tape adj  0.00000

SURVEY  TP   Elevation mask 12                    PDOP mask 10.000

NOTE    BA   Start base

EQUIP   BA   Receiver  4000SSE                    Serial    00015678
             Antenna   4000ST/SSE L1/L2 Geo       Serial
             Radius  0.76575       V.Const  0.03117    Tape adj  0.00000

NOTE    TP   Start rover

EQUIP   TP   Receiver  4000SSE                    Serial    00004573
             Antenna   Compact L1/L2              Serial
             Radius  0.00000       V.Const  0.20505    Tape adj  0.00000

SURVEY  TP   Elevation mask 12                    PDOP mask 10.000

NOTE    TS   Dec-23-96 15:21

NOTE    TP   Start rover

EQUIP   TP   Receiver  4000SSE                    Serial    00004573
             Antenna   Compact L1/L2              Serial
```

```
                Radius  0.00000        V.Const  0.20505    Tape adj  0.00000

SURVEY TP       Elevation mask 12                    PDOP mask 10.000

GPSANT SI       Antenna height 5.246                 Measuremt True vertical

GPSREF SI       Point ID      2000     Lat  33-27'58.52480"N Lng  111-44'39.14196"W
                Mthd Autonomous        Elv  1559.708         Code 40D

GPSANT SI       Antenna height 6.850                 Measuremt Uncorrected

GPSVEC SI       Point ID      1020     Lat  33-27'07.13365"N Lng  111-44'23.25055"W
                                       Elv  1559.994         Code <No text>
                Mthd Phase differntl H.Pr 0.029             V.Pr 0.051

NOTE   SI       Init gained: New point : 1020

NOTE   TS       Dec-23-96 15:31

GPSVEC TP       Point ID      1001     Lat  33-27'06.85814"N Lng  111-44'22.94534"W
                                       Elv  1560.316         Code PANEL
                Mthd Phase differntl H.Pr 0.030             V.Pr 0.052

GPSVEC TP       Point ID      1021     Lat  33-27'07.59737"N Lng  111-44'23.35103"W
                                       Elv  1558.700         Code PANEL
                Mthd Phase differntl H.Pr 0.048             V.Pr 0.081

GPSVEC TP       Point ID      1022     Lat  33-27'07.59751"N Lng  111-44'23.35135"W
                                       Elv  1558.699         Code PANEL
                Mthd Phase differntl H.Pr 0.038             V.Pr 0.065

GPSVEC TP       Point ID      1023     Lat  33-27'07.59722"N Lng  111-44'23.35132"W
                                       Elv  1558.690         Code TOP
                Mthd Phase differntl H.Pr 0.050             V.Pr 0.084

GPSVEC TP       Point ID      1024     Lat  33-27'07.64766"N Lng  111-44'23.09874"W
                                       Elv  1558.721         Code NG
                Mthd Phase differntl H.Pr 0.040             V.Pr 0.068

GPSVEC TP       Point ID      1025     Lat  33-27'07.70576"N Lng  111-44'22.52494"W
                                       Elv  1557.571         Code NG
                Mthd Phase differntl H.Pr 0.048             V.Pr 0.081

GPSVEC TP       Point ID      1026     Lat  33-27'08.01677"N Lng  111-44'23.48311"W
                                       Elv  1558.651         Code TOP
                Mthd Phase differntl H.Pr 0.029             V.Pr 0.048

GPSVEC TP       Point ID      1027     Lat  33-27'08.14421"N Lng  111-44'22.99913"W
                                       Elv  1558.065         Code NG
                Mthd Phase differntl H.Pr 0.038             V.Pr 0.064

GPSVEC TP       Point ID      1028     Lat  33-27'08.18604"N Lng  111-44'22.80210"W
                                       Elv  1560.386         Code NG
                Mthd Phase differntl H.Pr 0.033             V.Pr 0.055
```

```
GPSVEC TP   Point ID     1029    Lat  33-27'08.20138"N Lng  111-44'22.66022"W
                                 Elv  1560.247         Code NG
            Mthd Phase differntl H.Pr 0.049            V.Pr 0.083

GPSVEC TP   Point ID     1030    Lat  33-27'08.23946"N Lng  111-44'22.55093"W
                                 Elv  1558.498         Code NG
            Mthd Phase differntl H.Pr 0.029            V.Pr 0.049

GPSVEC TP   Point ID     1031    Lat  33-27'09.14915"N Lng  111-44'22.78579"W
                                 Elv  1557.349         Code NG
            Mthd Phase differntl H.Pr 0.027            V.Pr 0.042

GPSVEC TP   Point ID     1032    Lat  33-27'09.09947"N Lng  111-44'23.09111"W
                                 Elv  1558.412         Code NG
            Mthd Phase differntl H.Pr 0.042            V.Pr 0.068

GPSVEC TP   Point ID     1033    Lat  33-27'09.08172"N Lng  111-44'23.18370"W
                                 Elv  1560.235         Code NG
            Mthd Phase differntl H.Pr 0.045            V.Pr 0.073

GPSVEC TP   Point ID     1034    Lat  33-27'09.05666"N Lng  111-44'23.29735"W
                                 Elv  1559.914         Code NG
            Mthd Phase differntl H.Pr 0.033            V.Pr 0.053

GPSVEC TP   Point ID     1035    Lat  33-27'09.03316"N Lng  111-44'23.38739"W
                                 Elv  1557.829         Code NG
            Mthd Phase differntl H.Pr 0.043            V.Pr 0.069

GPSVEC TP   Point ID     1036    Lat  33-27'09.00187"N Lng  111-44'23.55860"W
                                 Elv  1559.176         Code TOP
            Mthd Phase differntl H.Pr 0.041            V.Pr 0.066

NOTE   TS   Dec-23-96 15:42

GPSVEC TP   Point ID     1037    Lat  33-27'08.96314"N Lng  111-44'23.75045"W
                                 Elv  1559.527         Code NG
            Mthd Phase differntl H.Pr 0.044            V.Pr 0.070

GPSVEC TP   Point ID     1038    Lat  33-27'08.95921"N Lng  111-44'23.77046"W
                                 Elv  1560.257         Code TOP
            Mthd Phase differntl H.Pr 0.048            V.Pr 0.077

GPSVEC TP   Point ID     1039    Lat  33-27'09.93078"N Lng  111-44'24.06790"W
                                 Elv  1561.531         Code TOP
            Mthd Phase differntl H.Pr 0.039            V.Pr 0.063

GPSVEC TP   Point ID     1040    Lat  33-27'09.93740"N Lng  111-44'24.04097"W
                                 Elv  1560.845         Code NG
            Mthd Phase differntl H.Pr 0.048            V.Pr 0.077

GPSVEC TP   Point ID     1041    Lat  33-27'09.98327"N Lng  111-44'23.81564"W
                                 Elv  1560.437         Code NG
            Mthd Phase differntl H.Pr 0.042            V.Pr 0.067
```

GPSVEC TP	Point ID	1042	Lat	33-27'10.02636"N	Lng	111-44'23.68579"W
			Elv	1558.102	Code	NG
	Mthd Phase	differntl	H.Pr	0.037	V.Pr	0.059
GPSVEC TP	Point ID	1043	Lat	33-27'10.04641"N	Lng	111-44'23.59392"W
			Elv	1560.389	Code	NG
	Mthd Phase	differntl	H.Pr	0.047	V.Pr	0.076
GPSVEC TP	Point ID	1044	Lat	33-27'10.06895"N	Lng	111-44'23.50129"W
			Elv	1560.442	Code	NG
	Mthd Phase	differntl	H.Pr	0.048	V.Pr	0.077
GPSVEC TP	Point ID	1045	Lat	33-27'10.08976"N	Lng	111-44'23.39556"W
			Elv	1558.060	Code	NG
	Mthd Phase	differntl	H.Pr	0.043	V.Pr	0.068
GPSVEC TP	Point ID	1046	Lat	33-27'11.06690"N	Lng	111-44'23.61257"W
			Elv	1558.585	Code	NG
	Mthd Phase	differntl	H.Pr	0.049	V.Pr	0.079
GPSVEC TP	Point ID	1047	Lat	33-27'11.03695"N	Lng	111-44'23.76463"W
			Elv	1560.340	Code	NG
	Mthd Phase	differntl	H.Pr	0.037	V.Pr	0.058
GPSVEC TP	Point ID	1048	Lat	33-27'11.00732"N	Lng	111-44'23.90089"W
			Elv	1559.636	Code	NG
	Mthd Phase	differntl	H.Pr	0.040	V.Pr	0.064
GPSVEC TP	Point ID	1049	Lat	33-27'10.99915"N	Lng	111-44'24.00529"W
			Elv	1558.089	Code	NG
	Mthd Phase	differntl	H.Pr	0.039	V.Pr	0.062
GPSVEC TP	Point ID	1050	Lat	33-27'10.97158"N	Lng	111-44'24.14893"W
			Elv	1561.163	Code	NG
	Mthd Phase	differntl	H.Pr	0.042	V.Pr	0.067
GPSVEC TP	Point ID	1051	Lat	33-27'10.92319"N	Lng	111-44'24.35834"W
			Elv	1561.547	Code	NG
	Mthd Phase	differntl	H.Pr	0.029	V.Pr	0.047
GPSVEC TP	Point ID	1052	Lat	33-27'10.91876"N	Lng	111-44'24.37714"W
			Elv	1562.160	Code	TOP
	Mthd Phase	differntl	H.Pr	0.035	V.Pr	0.056
GPSVEC TP	Point ID	1053	Lat	33-27'11.90664"N	Lng	111-44'24.69552"W
			Elv	1562.318	Code	TOP
	Mthd Phase	differntl	H.Pr	0.032	V.Pr	0.050
GPSVEC TP	Point ID	1054	Lat	33-27'11.91164"N	Lng	111-44'24.67082"W
			Elv	1561.750	Code	NG
	Mthd Phase	differntl	H.Pr	0.035	V.Pr	0.055
GPSVEC TP	Point ID	1055	Lat	33-27'11.95787"N	Lng	111-44'24.46573"W

```
                                    Elv  1561.143          Code NG
            Mthd Phase differntl H.Pr 0.031             V.Pr 0.049

GPSVEC TP   Point ID      1056      Lat  33-27'11.99675"N Lng  111-44'24.33239"W
                                    Elv  1557.384          Code NG
            Mthd Phase differntl H.Pr 0.030             V.Pr 0.048

GPSVEC TP   Point ID      1057      Lat  33-27'12.02364"N Lng  111-44'24.23443"W
                                    Elv  1559.272          Code NG
            Mthd Phase differntl H.Pr 0.034             V.Pr 0.055

GPSVEC TP   Point ID      1058      Lat  33-27'12.04538"N Lng  111-44'24.13428"W
                                    Elv  1559.296          Code NG
            Mthd Phase differntl H.Pr 0.035             V.Pr 0.055

GPSVEC TP   Point ID      1059      Lat  33-27'12.07174"N Lng  111-44'24.03445"W
                                    Elv  1557.525          Code NG
            Mthd Phase differntl H.Pr 0.038             V.Pr 0.052

GPSVEC TP   Point ID      1060      Lat  33-27'13.05184"N Lng  111-44'24.32738"W
                                    Elv  1557.825          Code NG
            Mthd Phase differntl H.Pr 0.044             V.Pr 0.066

GPSVEC TP   Point ID      1061      Lat  33-27'13.02116"N Lng  111-44'24.44953"W
                                    Elv  1559.201          Code NG
            Mthd Phase differntl H.Pr 0.024             V.Pr 0.039

GPSVEC TP   Point ID      1062      Lat  33-27'12.99715"N Lng  111-44'24.55019"W
                                    Elv  1559.045          Code NG
            Mthd Phase differntl H.Pr 0.039             V.Pr 0.061

GPSVEC TP   Point ID      1063      Lat  33-27'12.98095"N Lng  111-44'24.63749"W
                                    Elv  1557.324          Code NG
            Mthd Phase differntl H.Pr 0.031             V.Pr 0.049

GPSVEC TP   Point ID      1064      Lat  33-27'12.95572"N Lng  111-44'24.77692"W
                                    Elv  1561.359          Code NG
            Mthd Phase differntl H.Pr 0.039             V.Pr 0.062

GPSVEC TP   Point ID      1065      Lat  33-27'12.90668"N Lng  111-44'24.97564"W
                                    Elv  1562.268          Code NG
            Mthd Phase differntl H.Pr 0.036             V.Pr 0.057

GPSVEC TP   Point ID      1066      Lat  33-27'12.90017"N Lng  111-44'25.00102"W
                                    Elv  1562.716          Code TOP
            Mthd Phase differntl H.Pr 0.032             V.Pr 0.051

NOTE   TS   Dec-23-96 15:52

GPSVEC TP   Point ID      1067      Lat  33-27'13.89334"N Lng  111-44'25.32185"W
                                    Elv  1562.642          Code TOP
            Mthd Phase differntl H.Pr 0.040             V.Pr 0.063

GPSVEC TP   Point ID      1068      Lat  33-27'13.89920"N Lng  111-44'25.29989"W
```

```
                                Elv  1562.358          Code NG
          Mthd Phase differntl H.Pr 0.033             V.Pr 0.052

GPSVEC TP  Point ID     1069    Lat  33-27'13.94964"N Lng  111-44'25.08108"W
                                Elv  1561.249          Code NG
          Mthd Phase differntl H.Pr 0.038             V.Pr 0.060

GPSVEC TP  Point ID     1070    Lat  33-27'13.97426"N Lng  111-44'24.96419"W
                                Elv  1557.149          Code NG
          Mthd Phase differntl H.Pr 0.028             V.Pr 0.045

GPSVEC TP  Point ID     1071    Lat  33-27'13.99932"N Lng  111-44'24.85406"W
                                Elv  1559.233          Code NG
          Mthd Phase differntl H.Pr 0.028             V.Pr 0.044

GPSVEC TP  Point ID     1072    Lat  33-27'14.01653"N Lng  111-44'24.76648"W
                                Elv  1559.305          Code NG
          Mthd Phase differntl H.Pr 0.034             V.Pr 0.053

GPSVEC TP  Point ID     1073    Lat  33-27'14.03878"N Lng  111-44'24.68015"W
                                Elv  1557.618          Code NG
          Mthd Phase differntl H.Pr 0.044             V.Pr 0.068

NOTE   SI  High RMS

NOTE   SI  RMS OK

GPSVEC TP  Point ID     1074    Lat  33-27'15.05034"N Lng  111-44'24.96808"W
                                Elv  1557.617          Code NG
          Mthd Phase differntl H.Pr 0.025             V.Pr 0.039

GPSVEC TP  Point ID     1075    Lat  33-27'15.01571"N Lng  111-44'25.08551"W
                                Elv  1559.413          Code NG
          Mthd Phase differntl H.Pr 0.024             V.Pr 0.038

GPSVEC TP  Point ID     1076    Lat  33-27'14.99465"N Lng  111-44'25.17367"W
                                Elv  1559.228          Code NG
          Mthd Phase differntl H.Pr 0.029             V.Pr 0.045

GPSVEC TP  Point ID     1077    Lat  33-27'14.96480"N Lng  111-44'25.27418"W
                                Elv  1557.442          Code NG
          Mthd Phase differntl H.Pr 0.037             V.Pr 0.058

GPSVEC TP  Point ID     1078    Lat  33-27'14.93251"N Lng  111-44'25.39111"W
                                Elv  1561.214          Code NG
          Mthd Phase differntl H.Pr 0.038             V.Pr 0.059

GPSVEC TP  Point ID     1079    Lat  33-27'14.88359"N Lng  111-44'25.64304"W
                                Elv  1562.242          Code TOP
          Mthd Phase differntl H.Pr 0.034             V.Pr 0.053

GPSVEC TP  Point ID     1080    Lat  33-27'15.87503"N Lng  111-44'25.96193"W
                                Elv  1562.395          Code TOP
          Mthd Phase differntl H.Pr 0.033             V.Pr 0.052
```

```
GPSVEC TP   Point ID     1081    Lat  33-27'15.93310"N Lng  111-44'25.71882"W
                                 Elv  1561.461         Code NG
            Mthd Phase differntl H.Pr 0.031            V.Pr 0.049

GPSVEC TP   Point ID     1082    Lat  33-27'15.95902"N Lng  111-44'25.58623"W
                                 Elv  1557.148         Code NG
            Mthd Phase differntl H.Pr 0.032            V.Pr 0.051

GPSVEC TP   Point ID     1083    Lat  33-27'15.98108"N Lng  111-44'25.48781"W
                                 Elv  1559.255         Code NG
            Mthd Phase differntl H.Pr 0.037            V.Pr 0.059

GPSVEC TP   Point ID     1084    Lat  33-27'16.00171"N Lng  111-44'25.39993"W
                                 Elv  1559.403         Code NG
            Mthd Phase differntl H.Pr 0.037            V.Pr 0.060

GPSVEC TP   Point ID     1085    Lat  33-27'16.01366"N Lng  111-44'25.33438"W
                                 Elv  1557.938         Code NG
            Mthd Phase differntl H.Pr 0.029            V.Pr 0.046

GPSVEC TP   Point ID     1086    Lat  33-27'16.98516"N Lng  111-44'25.63728"W
                                 Elv  1557.993         Code NG
            Mthd Phase differntl H.Pr 0.039            V.Pr 0.062

GPSVEC TP   Point ID     1087    Lat  33-27'16.97353"N Lng  111-44'25.71209"W
                                 Elv  1559.403         Code NG
            Mthd Phase differntl H.Pr 0.049            V.Pr 0.078

 SVEC TP    Point ID     1088    Lat  33-27'16.96363"N Lng  111-44'25.80277"W
                                 Elv  1559.261         Code NG
            Mthd Phase differntl H.Pr 0.041            V.Pr 0.064

GPSVEC TP   Point ID     1089    Lat  33-27'16.94318"N Lng  111-44'25.91574"W
                                 Elv  1557.362         Code NG
            Mthd Phase differntl H.Pr 0.032            V.Pr 0.050

GPSVEC TP   Point ID     1090    Lat  33-27'16.91392"N Lng  111-44'26.04116"W
                                 Elv  1561.485         Code NG
            Mthd Phase differntl H.Pr 0.034            V.Pr 0.054

GPSVEC TP   Point ID     1091    Lat  33-27'16.85480"N Lng  111-44'26.27344"W
                                 Elv  1562.405         Code TOP
            Mthd Phase differntl H.Pr 0.048            V.Pr 0.075

GPSVEC TP   Point ID     1092    Lat  33-27'17.83519"N Lng  111-44'26.58005"W
                                 Elv  1562.653         Code TOP
            Mthd Phase differntl H.Pr 0.031            V.Pr 0.050

GPSVEC TP   Point ID     1093    Lat  33-27'17.84261"N Lng  111-44'26.55895"W
                                 Elv  1562.444         Code NG
            Mthd Phase differntl H.Pr 0.032            V.Pr 0.050

GPSVEC TP   Point ID     1094    Lat  33-27'17.88883"N Lng  111-44'26.34709"W
```

```
                                Elv  1561.648          Code NG
            Mthd Phase differntl H.Pr 0.038             V.Pr 0.060

GPSVEC TP   Point ID      1095   Lat  33-27'17.92310"N Lng  111-44'26.22602"W
                                Elv  1557.244          Code NG
            Mthd Phase differntl H.Pr 0.030             V.Pr 0.047

GPSVEC TP   Point ID      1096   Lat  33-27'17.94211"N Lng  111-44'26.12170"W
                                Elv  1559.275          Code NG
            Mthd Phase differntl H.Pr 0.029             V.Pr 0.046

GPSVEC TP   Point ID      1097   Lat  33-27'17.96278"N Lng  111-44'26.03562"W
                                Elv  1559.250          Code NG
            Mthd Phase differntl H.Pr 0.029             V.Pr 0.045

GPSVEC TP   Point ID      1098   Lat  33-27'17.97912"N Lng  111-44'25.96690"W
                                Elv  1557.959          Code NG
            Mthd Phase differntl H.Pr 0.035             V.Pr 0.054

NOTE    TS  Dec-23-96 16:03

GPSVEC TP   Point ID      1099   Lat  33-27'17.97912"N Lng  111-44'25.96690"W
                                Elv  1557.910          Code NG
            Mthd Phase differntl H.Pr 0.046             V.Pr 0.072

GPSVEC TP   Point ID      1100   Lat  33-27'18.97182"N Lng  111-44'26.26382"W
                                Elv  1556.879          Code NG
            Mthd Phase differntl H.Pr 0.039             V.Pr 0.059

PSVEC TP    Point ID      1101   Lat  33-27'18.95162"N Lng  111-44'26.35552"W
                                Elv  1557.901          Code NG
            Mthd Phase differntl H.Pr 0.040             V.Pr 0.063

GPSVEC TP   Point ID      1102   Lat  33-27'18.90288"N Lng  111-44'26.54776"W
                                Elv  1558.054          Code NG
            Mthd Phase differntl H.Pr 0.031             V.Pr 0.049

GPSVEC TP   Point ID      1103   Lat  33-27'18.87685"N Lng  111-44'26.65867"W
                                Elv  1561.519          Code NG
            Mthd Phase differntl H.Pr 0.039             V.Pr 0.060

GPSVEC TP   Point ID      1104   Lat  33-27'18.81720"N Lng  111-44'26.89361"W
                                Elv  1562.306          Code TOP
            Mthd Phase differntl H.Pr 0.034             V.Pr 0.052

GPSVEC TP   Point ID      1105   Lat  33-27'19.79118"N Lng  111-44'27.20580"W
                                Elv  1562.499          Code TOP
            Mthd Phase differntl H.Pr 0.030             V.Pr 0.046

GPSVEC TP   Point ID      1106   Lat  33-27'19.79708"N Lng  111-44'27.18269"W
                                Elv  1562.412          Code NG
            Mthd Phase differntl H.Pr 0.042             V.Pr 0.064

GPSVEC TP   Point ID      1107   Lat  33-27'19.80882"N Lng  111-44'27.14053"W
```

			Elv	1562.420	Code	PANEL 1011
	Mthd Phase differntl		H.Pr	0.026	V.Pr	0.039
GPSVEC TP	Point ID	1108	Lat	33-27'19.84309"N	Lng	111-44'26.95956"W
			Elv	1561.739	Code	NG
	Mthd Phase differntl		H.Pr	0.045	V.Pr	0.070
GPSVEC TP	Point ID	1109	Lat	33-27'19.86012"N	Lng	111-44'26.85228"W
			Elv	1558.331	Code	NG
	Mthd Phase differntl		H.Pr	0.022	V.Pr	0.034
GPSVEC TP	Point ID	1110	Lat	33-27'19.90296"N	Lng	111-44'26.59297"W
			Elv	1557.339	Code	NG
	Mthd Phase differntl		H.Pr	0.026	V.Pr	0.040
GPSVEC TP	Point ID	1111	Lat	33-27'20.89760"N	Lng	111-44'26.96986"W
			Elv	1557.678	Code	NG
	Mthd Phase differntl		H.Pr	0.030	V.Pr	0.046
GPSVEC TP	Point ID	1112	Lat	33-27'20.86902"N	Lng	111-44'27.16202"W
			Elv	1557.930	Code	NG
	Mthd Phase differntl		H.Pr	0.041	V.Pr	0.064
GPSVEC TP	Point ID	1113	Lat	33-27'20.84551"N	Lng	111-44'27.29288"W
			Elv	1561.822	Code	NG
	Mthd Phase differntl		H.Pr	0.026	V.Pr	0.039
GPSVEC TP	Point ID	1114	Lat	33-27'20.78986"N	Lng	111-44'27.49628"W
			Elv	1562.418	Code	NG
	Mthd Phase differntl		H.Pr	0.022	V.Pr	0.034
GPSVEC TP	Point ID	1115	Lat	33-27'20.78284"N	Lng	111-44'27.52116"W
			Elv	1562.882	Code	TOP
	Mthd Phase differntl		H.Pr	0.036	V.Pr	0.056
GPSVEC TP	Point ID	1116	Lat	33-27'21.76178"N	Lng	111-44'27.82925"W
			Elv	1562.730	Code	TOP
	Mthd Phase differntl		H.Pr	0.039	V.Pr	0.061
GPSVEC TP	Point ID	1117	Lat	33-27'21.76884"N	Lng	111-44'27.80189"W
			Elv	1562.580	Code	NG
	Mthd Phase differntl		H.Pr	0.038	V.Pr	0.059
GPSVEC TP	Point ID	1118	Lat	33-27'21.81845"N	Lng	111-44'27.59395"W
			Elv	1561.734	Code	NG
	Mthd Phase differntl		H.Pr	0.040	V.Pr	0.061
GPSVEC TP	Point ID	1119	Lat	33-27'21.84386"N	Lng	111-44'27.48422"W
			Elv	1558.063	Code	NG
	Mthd Phase differntl		H.Pr	0.049	V.Pr	0.075
GPSVEC TP	Point ID	1120	Lat	33-27'21.89225"N	Lng	111-44'27.26452"W
			Elv	1557.207	Code	NG
	Mthd Phase differntl		H.Pr	0.037	V.Pr	0.057

```
GPSVEC TP   Point ID     1121    Lat  33-27'22.84492"N Lng  111-44'27.59942"W
                                 Elv  1557.489         Code NG
            Mthd Phase differntl H.Pr 0.049            V.Pr 0.076

GPSVEC TP   Point ID     1122    Lat  33-27'22.81709"N Lng  111-44'27.78864"W
                                 Elv  1557.926         Code NG
            Mthd Phase differntl H.Pr 0.033            V.Pr 0.052

GPSVEC TP   Point ID     1123    Lat  33-27'22.79416"N Lng  111-44'27.91630"W
                                 Elv  1561.751         Code NG
            Mthd Phase differntl H.Pr 0.046            V.Pr 0.071

GPSVEC TP   Point ID     1124    Lat  33-27'22.74664"N Lng  111-44'28.11916"W
                                 Elv  1562.491         Code NG
            Mthd Phase differntl H.Pr 0.043            V.Pr 0.066

GPSVEC TP   Point ID     1125    Lat  33-27'22.74088"N Lng  111-44'28.14025"W
                                 Elv  1562.721         Code TOP
            Mthd Phase differntl H.Pr 0.045            V.Pr 0.070

NOTE   TS   Dec-23-96 16:15

GPSVEC TP   Point ID     1126    Lat  33-27'23.73340"N Lng  111-44'28.46044"W
                                 Elv  1562.920         Code TOP
            Mthd Phase differntl H.Pr 0.045            V.Pr 0.069

GPSVEC TP   Point ID     1127    Lat  33-27'23.73934"N Lng  111-44'28.43635"W
                                 Elv  1562.663         Code NG
            Mthd Phase differntl H.Pr 0.050            V.Pr 0.077

GPSVEC TP   Point ID     1128    Lat  33-27'23.78527"N Lng  111-44'28.22964"W
                                 Elv  1561.912         Code NG
            Mthd Phase differntl H.Pr 0.042            V.Pr 0.066

GPSVEC TP   Point ID     1129    Lat  33-27'23.80338"N Lng  111-44'28.11941"W
                                 Elv  1558.251         Code NG
            Mthd Phase differntl H.Pr 0.044            V.Pr 0.068

NOTE   SI   High RMS

GPSVEC TP   Point ID     1130    Lat  33-27'23.84532"N Lng  111-44'27.90424"W
                                 Elv  1558.063         Code NG
            Mthd Phase differntl H.Pr 0.054            V.Pr 0.084

NOTE   SI   RMS OK

NOTE   SI   Init lost

GPSVEC SI   Point ID     1131    Lat  33-27'24.84270"N Lng  111-44'28.23396"W
                                 Elv  1557.212         Code <No text>
            Mthd Phase differntl H.Pr 0.028            V.Pr 0.044

NOTE   SI   Init gained: New point : 1131
```

```
GPSVEC TP   Point ID     1132    Lat  33-27'24.84245"N Lng  111-44'28.23400"W
                                 Elv  1557.209         Code NG
            Mthd Phase differntl H.Pr 0.042            V.Pr 0.065

GPSVEC TP   Point ID     1133    Lat  33-27'24.80324"N Lng  111-44'28.42231"W
                                 Elv  1558.152         Code NG
            Mthd Phase differntl H.Pr 0.047            V.Pr 0.072

GPSVEC TP   Point ID     1134    Lat  33-27'24.77671"N Lng  111-44'28.54738"W
                                 Elv  1561.843         Code NG
            Mthd Phase differntl H.Pr 0.043            V.Pr 0.067

GPSVEC TP   Point ID     1135    Lat  33-27'24.72527"N Lng  111-44'28.74707"W
                                 Elv  1562.486         Code NG
            Mthd Phase differntl H.Pr 0.044            V.Pr 0.068

GPSVEC TP   Point ID     1136    Lat  33-27'24.71857"N Lng  111-44'28.76971"W
                                 Elv  1562.839         Code TOP
            Mthd Phase differntl H.Pr 0.050            V.Pr 0.077

GPSVEC TP   Point ID     1137    Lat  33-27'25.71552"N Lng  111-44'29.09598"W
                                 Elv  1562.566         Code TOP
            Mthd Phase differntl H.Pr 0.040            V.Pr 0.062

GPSVEC TP   Point ID     1138    Lat  33-27'25.72139"N Lng  111-44'29.07355"W
                                 Elv  1562.158         Code NG
            Mthd Phase differntl H.Pr 0.045            V.Pr 0.069

GPSVEC TP   Point ID     1139    Lat  33-27'25.77733"N Lng  111-44'28.83930"W
                                 Elv  1561.634         Code NG
            Mthd Phase differntl H.Pr 0.047            V.Pr 0.072

GPSVEC TP   Point ID     1140    Lat  33-27'25.79105"N Lng  111-44'28.75196"W
                                 Elv  1557.899         Code NG
            Mthd Phase differntl H.Pr 0.042            V.Pr 0.064

GPSVEC TP   Point ID     1141    Lat  33-27'25.82143"N Lng  111-44'28.60278"W
                                 Elv  1557.822         Code NG
            Mthd Phase differntl H.Pr 0.044            V.Pr 0.067

GPSVEC TP   Point ID     1142    Lat  33-27'26.84383"N Lng  111-44'28.88588"W
                                 Elv  1557.743         Code NG
            Mthd Phase differntl H.Pr 0.039            V.Pr 0.060

GPSVEC TP   Point ID     1143    Lat  33-27'26.80798"N Lng  111-44'29.05051"W
                                 Elv  1557.829         Code NG
            Mthd Phase differntl H.Pr 0.042            V.Pr 0.065

GPSVEC TP   Point ID     1144    Lat  33-27'26.77648"N Lng  111-44'29.16992"W
                                 Elv  1561.556         Code NG
            Mthd Phase differntl H.Pr 0.047            V.Pr 0.072

GPSVEC TP   Point ID     1145    Lat  33-27'26.72035"N Lng  111-44'29.39071"W
```

```
                                    Elv  1562.125          Code NG
            Mthd Phase differntl H.Pr 0.039             V.Pr 0.060

GPSVEC TP   Point ID      1146      Lat  33-27'26.71445"N Lng  111-44'29.41292"W
                                    Elv  1562.679          Code TOP
            Mthd Phase differntl H.Pr 0.039             V.Pr 0.060

GPSVEC TP   Point ID      1147      Lat  33-27'27.56617"N Lng  111-44'29.69063"W
                                    Elv  1562.084          Code TOP
            Mthd Phase differntl H.Pr 0.031             V.Pr 0.048

GPSVEC TP   Point ID      1148      Lat  33-27'27.57424"N Lng  111-44'29.66406"W
                                    Elv  1561.897          Code NG
            Mthd Phase differntl H.Pr 0.028             V.Pr 0.043

GPSVEC TP   Point ID      1149      Lat  33-27'27.62662"N Lng  111-44'29.44140"W
                                    Elv  1561.580          Code NG
            Mthd Phase differntl H.Pr 0.025             V.Pr 0.039

GPSVEC TP   Point ID      1150      Lat  33-27'27.64253"N Lng  111-44'29.33448"W
                                    Elv  1558.261          Code NG
            Mthd Phase differntl H.Pr 0.029             V.Pr 0.044

NOTE   TS   Dec-23-96 16:25

GPSVEC TP   Point ID      1151      Lat  33-27'27.69779"N Lng  111-44'29.13558"W
                                    Elv  1557.684          Code NG
            Mthd Phase differntl H.Pr 0.043             V.Pr 0.081

`SVEC TP    Point ID      1152      Lat  33-27'28.57939"N Lng  111-44'29.37469"W
                                    Elv  1557.800          Code NG
            Mthd Phase differntl H.Pr 0.047             V.Pr 0.071

GPSVEC TP   Point ID      1153      Lat  33-27'28.54472"N Lng  111-44'29.61456"W
                                    Elv  1558.111          Code NG
            Mthd Phase differntl H.Pr 0.031             V.Pr 0.047

GPSVEC TP   Point ID      1154      Lat  33-27'28.52500"N Lng  111-44'29.72652"W
                                    Elv  1560.618          Code NG
            Mthd Phase differntl H.Pr 0.021             V.Pr 0.031

GPSVEC TP   Point ID      1155      Lat  33-27'28.47499"N Lng  111-44'29.96606"W
                                    Elv  1560.917          Code NG
            Mthd Phase differntl H.Pr 0.028             V.Pr 0.042

GPSVEC TP   Point ID      1156      Lat  33-27'28.46923"N Lng  111-44'29.99090"W
                                    Elv  1561.121          Code TOP
            Mthd Phase differntl H.Pr 0.027             V.Pr 0.041

GPSVEC TP   Point ID      1157      Lat  33-27'29.08253"N Lng  111-44'30.22055"W
                                    Elv  1559.498          Code TOP
            Mthd Phase differntl H.Pr 0.026             V.Pr 0.039

GPSVEC TP   Point ID      1158      Lat  33-27'29.10798"N Lng  111-44'30.08702"W
```

```
                                Elv  1559.743          Code NG
          Mthd Phase differntl H.Pr 0.048             V.Pr 0.073

GPSVEC TP Point ID      1159    Lat  33-27'29.11424"N Lng  111-44'30.05455"W
                                Elv  1560.089         Code NG
          Mthd Phase differntl H.Pr 0.027             V.Pr 0.040

GPSVEC TP Point ID      1160    Lat  33-27'29.15953"N Lng  111-44'29.84406"W
                                Elv  1559.656         Code NG
          Mthd Phase differntl H.Pr 0.035             V.Pr 0.054

GPSVEC TP Point ID      1161    Lat  33-27'29.16925"N Lng  111-44'29.78747"W
                                Elv  1558.920         Code NG
          Mthd Phase differntl H.Pr 0.020             V.Pr 0.031

GPSVEC TP Point ID      1162    Lat  33-27'29.21008"N Lng  111-44'29.60970"W
                                Elv  1558.047         Code NG
          Mthd Phase differntl H.Pr 0.049             V.Pr 0.073

GPSVEC TP Point ID      1163    Lat  33-27'29.96500"N Lng  111-44'29.78203"W
                                Elv  1557.277         Code NG
          Mthd Phase differntl H.Pr 0.027             V.Pr 0.040

GPSVEC TP Point ID      1164    Lat  33-27'29.95103"N Lng  111-44'29.86314"W
                                Elv  1558.138         Code NG
          Mthd Phase differntl H.Pr 0.027             V.Pr 0.041

GPSVEC TP Point ID      1165    Lat  33-27'29.91467"N Lng  111-44'30.04318"W
                                Elv  1558.683         Code NG
          Mthd Phase differntl H.Pr 0.039             V.Pr 0.059

GPSVEC TP Point ID      1166    Lat  33-27'29.89696"N Lng  111-44'30.14963"W
                                Elv  1559.818         Code NG
          Mthd Phase differntl H.Pr 0.021             V.Pr 0.032

GPSVEC TP Point ID      1167    Lat  33-27'29.83896"N Lng  111-44'30.43111"W
                                Elv  1559.842         Code NG
          Mthd Phase differntl H.Pr 0.035             V.Pr 0.053

GPSVEC TP Point ID      1168    Lat  33-27'29.83453"N Lng  111-44'30.45660"W
                                Elv  1559.507         Code TOP
          Mthd Phase differntl H.Pr 0.022             V.Pr 0.033

GPSVEC TP Point ID      1169    Lat  33-27'30.33281"N Lng  111-44'30.58159"W
                                Elv  1561.466         Code TOP
          Mthd Phase differntl H.Pr 0.048             V.Pr 0.072

GPSVEC TP Point ID      1170    Lat  33-27'30.33850"N Lng  111-44'30.55636"W
                                Elv  1561.314         Code NG
          Mthd Phase differntl H.Pr 0.046             V.Pr 0.069

GPSVEC TP Point ID      1171    Lat  33-27'30.40189"N Lng  111-44'30.31922"W
                                Elv  1560.503         Code NG
          Mthd Phase differntl H.Pr 0.039             V.Pr 0.058
```

```
GPSVEC TP   Point ID     1172    Lat  33-27'30.42731"N Lng  111-44'30.21940"W
                                 Elv  1558.574         Code NG
            Mthd Phase differntl H.Pr 0.048            V.Pr 0.072

GPSVEC TP   Point ID     1173    Lat  33-27'30.47648"N Lng  111-44'30.00883"W
                                 Elv  1557.879         Code NG
            Mthd Phase differntl H.Pr 0.034            V.Pr 0.066

NOTE   SI   High RMS

NOTE   SI   RMS OK

NOTE   SI   Init lost

GPSVEC SI   Point ID     1174    Lat  33-27'31.39200"N Lng  111-44'30.32243"W
                                 Elv  1558.225         Code <No text>
            Mthd Phase differntl H.Pr 0.012            V.Pr 0.038

NOTE   SI   Init gained: New point : 1174

GPSVEC TP   Point ID     1175    Lat  33-27'31.39222"N Lng  111-44'30.32243"W
                                 Elv  1558.132         Code NG
            Mthd Phase differntl H.Pr 0.030            V.Pr 0.056

GPSVEC TP   Point ID     1176    Lat  33-27'31.35431"N Lng  111-44'30.52068"W
                                 Elv  1558.790         Code NG
            Mthd Phase differntl H.Pr 0.034            V.Pr 0.066

GPSVEC TP   Point ID     1177    Lat  33-27'31.33462"N Lng  111-44'30.63350"W
                                 Elv  1561.483         Code NG
            Mthd Phase differntl H.Pr 0.040            V.Pr 0.060

GPSVEC TP   Point ID     1178    Lat  33-27'31.28321"N Lng  111-44'30.85984"W
                                 Elv  1562.059         Code NG
            Mthd Phase differntl H.Pr 0.020            V.Pr 0.029

GPSVEC TP   Point ID     1179    Lat  33-27'31.27950"N Lng  111-44'30.87992"W
                                 Elv  1562.293         Code TOP
            Mthd Phase differntl H.Pr 0.029            V.Pr 0.043

NOTE   TS   Dec-23-96 16:36

GPSVEC TP   Point ID     1180    Lat  33-27'32.21136"N Lng  111-44'31.18387"W
                                 Elv  1561.747         Code TOP
            Mthd Phase differntl H.Pr 0.041            V.Pr 0.060

GPSVEC TP   Point ID     1181    Lat  33-27'32.21921"N Lng  111-44'31.15043"W
                                 Elv  1561.888         Code NG
            Mthd Phase differntl H.Pr 0.043            V.Pr 0.064

GPSVEC TP   Point ID     1182    Lat  33-27'32.27494"N Lng  111-44'30.92280"W
                                 Elv  1561.343         Code NG
            Mthd Phase differntl H.Pr 0.029            V.Pr 0.042
```

```
GPSVEC TP   Point ID     1183    Lat  33-27'32.30284"N Lng  111-44'30.78816"W
                                 Elv  1558.563         Code NG
            Mthd Phase differntl H.Pr 0.026            V.Pr 0.038

GPSVEC TP   Point ID     1184    Lat  33-27'32.35277"N Lng  111-44'30.54840"W
                                 Elv  1558.480         Code NG
            Mthd Phase differntl H.Pr 0.037            V.Pr 0.055

GPSVEC TP   Point ID     1185    Lat  33-27'33.04980"N Lng  111-44'30.67465"W
                                 Elv  1558.636         Code NG
            Mthd Phase differntl H.Pr 0.049            V.Pr 0.071

GPSVEC TP   Point ID     1186    Lat  33-27'33.00761"N Lng  111-44'30.94026"W
                                 Elv  1558.157         Code NG
            Mthd Phase differntl H.Pr 0.040            V.Pr 0.059

GPSVEC TP   Point ID     1187    Lat  33-27'32.95987"N Lng  111-44'31.15050"W
                                 Elv  1561.283         Code NG
            Mthd Phase differntl H.Pr 0.034            V.Pr 0.050

GPSVEC TP   Point ID     1188    Lat  33-27'32.90540"N Lng  111-44'31.39300"W
                                 Elv  1562.164         Code TOP
            Mthd Phase differntl H.Pr 0.028            V.Pr 0.041

GPSVEC TP   Point ID     1189    Lat  33-27'32.91678"N Lng  111-44'31.34432"W
                                 Elv  1561.973         Code PANEL 1003
            Mthd Phase differntl H.Pr 0.024            V.Pr 0.035

GPSVEC TP   Point ID     1190    Lat  33-27'34.02785"N Lng  111-44'31.72567"W
                                 Elv  1562.331         Code TOP
            Mthd Phase differntl H.Pr 0.036            V.Pr 0.052

GPSVEC TP   Point ID     1191    Lat  33-27'34.03192"N Lng  111-44'31.70616"W
                                 Elv  1562.089         Code NG
            Mthd Phase differntl H.Pr 0.034            V.Pr 0.048

GPSVEC TP   Point ID     1192    Lat  33-27'34.07846"N Lng  111-44'31.48498"W
                                 Elv  1561.259         Code NG
            Mthd Phase differntl H.Pr 0.045            V.Pr 0.064

GPSVEC TP   Point ID     1193    Lat  33-27'34.10316"N Lng  111-44'31.38176"W
                                 Elv  1558.856         Code NG
            Mthd Phase differntl H.Pr 0.028            V.Pr 0.039

NOTE   SI   High RMS

NOTE   SI   RMS OK

NOTE   TP   Start rover

EQUIP  TP   Receiver  4000SSE                 Serial    00004573
            Antenna   Compact L1/L2           Serial
            Radius  0.00000       V.Const  0.20505    Tape adj  0.00000
```

```
SURVEY TP   Elevation mask 12                    PDOP mask 10.000

GPSANT SI   Antenna height 6.850                 Measuremt Uncorrected

GPSVEC SI   Point ID      1194    Lat  33-27'34.15079"N Lng  111-44'31.09571"W
                                  Elv  1558.401         Code BOGUS
            Mthd Phase differntl H.Pr 0.018            V.Pr 0.063

NOTE   SI   Init gained: New point : 1194

NOTE   TS   Dec-23-96 16:46

GPSVEC TP   Point ID      1195    Lat  33-27'34.15061"N Lng  111-44'31.09610"W
                                  Elv  1558.452         Code NG
            Mthd Phase differntl H.Pr 0.043            V.Pr 0.061

GPSVEC TP   Point ID      1196    Lat  33-27'35.12286"N Lng  111-44'31.40185"W
                                  Elv  1558.445         Code NG
            Mthd Phase differntl H.Pr 0.027            V.Pr 0.051

GPSVEC TP   Point ID      1197    Lat  33-27'35.05090"N Lng  111-44'31.68395"W
                                  Elv  1558.796         Code NG
            Mthd Phase differntl H.Pr 0.024            V.Pr 0.044

GPSVEC TP   Point ID      1198    Lat  33-27'35.02282"N Lng  111-44'31.78856"W
                                  Elv  1561.751         Code NG
            Mthd Phase differntl H.Pr 0.029            V.Pr 0.054

GPSVEC TP   Point ID      1199    Lat  33-27'34.97119"N Lng  111-44'32.03059"W
                                  Elv  1562.521         Code TOP
            Mthd Phase differntl H.Pr 0.019            V.Pr 0.067

GPSVEC TP   Point ID      1200    Lat  33-27'35.88340"N Lng  111-44'32.31902"W
                                  Elv  1562.790         Code TOP
            Mthd Phase differntl H.Pr 0.023            V.Pr 0.042

GPSVEC TP   Point ID      1201    Lat  33-27'35.88901"N Lng  111-44'32.29476"W
                                  Elv  1562.514         Code NG
            Mthd Phase differntl H.Pr 0.035            V.Pr 0.065

GPSVEC TP   Point ID      1202    Lat  33-27'35.93956"N Lng  111-44'32.07480"W
                                  Elv  1561.440         Code NG
            Mthd Phase differntl H.Pr 0.035            V.Pr 0.065

GPSVEC TP   Point ID      1203    Lat  33-27'35.95518"N Lng  111-44'31.98739"W
                                  Elv  1558.994         Code NG
            Mthd Phase differntl H.Pr 0.037            V.Pr 0.068

GPSVEC TP   Point ID      1204    Lat  33-27'36.02786"N Lng  111-44'31.69993"W
                                  Elv  1558.327         Code NG
            Mthd Phase differntl H.Pr 0.042            V.Pr 0.078

NOTE   SI   High RMS
```

```
NOTE    SI    RMS OK

NOTE    SI    High RMS

NOTE    SI    RMS OK

NOTE    SI    High RMS

NOTE    SI    RMS OK

NOTE    SI    High RMS

NOTE    SI    RMS OK

GPSVEC TP     Point ID      1205     Lat  33-27'36.95209"N Lng  111-44'31.99751"W
                                     Elv  1558.706         Code NG
              Mthd Phase differntl H.Pr 0.050             V.Pr 0.091

GPSVEC TP     Point ID      1206     Lat  33-27'36.86389"N Lng  111-44'32.25581"W
                                     Elv  1558.642         Code NG
              Mthd Phase differntl H.Pr 0.025             V.Pr 0.045

GPSVEC TP     Point ID      1207     Lat  33-27'36.85374"N Lng  111-44'32.37662"W
                                     Elv  1561.465         Code NG
              Mthd Phase differntl H.Pr 0.020             V.Pr 0.037

GPSVEC TP     Point ID      1208     Lat  33-27'36.80593"N Lng  111-44'32.62016"W
                                     Elv  1562.354         Code NG
              Mthd Phase differntl H.Pr 0.019             V.Pr 0.035

GPSVEC TP     Point ID      1209     Lat  33-27'37.71418"N Lng  111-44'32.91065"W
                                     Elv  1562.389         Code TOP
              Mthd Phase differntl H.Pr 0.020             V.Pr 0.037

GPSVEC TP     Point ID      1210     Lat  33-27'37.72004"N Lng  111-44'32.88361"W
                                     Elv  1562.238         Code NG
              Mthd Phase differntl H.Pr 0.035             V.Pr 0.063

GPSVEC TP     Point ID      1211     Lat  33-27'37.77581"N Lng  111-44'32.65310"W
                                     Elv  1561.783         Code NG
              Mthd Phase differntl H.Pr 0.042             V.Pr 0.076

GPSVEC TP     Point ID      1212     Lat  33-27'37.80486"N Lng  111-44'32.53168"W
                                     Elv  1558.467         Code NG
              Mthd Phase differntl H.Pr 0.021             V.Pr 0.038

GPSVEC TP     Point ID      1213     Lat  33-27'37.86487"N Lng  111-44'32.30977"W
                                     Elv  1558.527         Code NG
              Mthd Phase differntl H.Pr 0.022             V.Pr 0.039

GPSVEC TP     Point ID      1214     Lat  33-27'38.79670"N Lng  111-44'32.58859"W
                                     Elv  1558.448         Code NG
              Mthd Phase differntl H.Pr 0.025             V.Pr 0.044
```

```
GPSVEC TP   Point ID     1215    Lat  33-27'38.73971"N Lng  111-44'32.84369"W
                                 Elv  1558.455         Code NG
            Mthd Phase differntl H.Pr 0.021            V.Pr 0.037

GPSVEC TP   Point ID     1216    Lat  33-27'38.70655"N Lng  111-44'32.96209"W
                                 Elv  1561.548         Code NG
            Mthd Phase differntl H.Pr 0.030            V.Pr 0.054

NOTE   TS   Dec-23-96 16:56

GPSVEC TP   Point ID     1217    Lat  33-27'38.64622"N Lng  111-44'33.20293"W
                                 Elv  1562.396         Code TOP
            Mthd Phase differntl H.Pr 0.021            V.Pr 0.038

GPSVEC TP   Point ID     1218    Lat  33-27'39.57653"N Lng  111-44'33.49550"W
                                 Elv  1562.639         Code TOP
            Mthd Phase differntl H.Pr 0.035            V.Pr 0.062

GPSVEC TP   Point ID     1219    Lat  33-27'39.58128"N Lng  111-44'33.47286"W
                                 Elv  1562.532         Code NG
            Mthd Phase differntl H.Pr 0.023            V.Pr 0.042

GPSVEC TP   Point ID     1220    Lat  33-27'39.63247"N Lng  111-44'33.25020"W
                                 Elv  1561.669         Code NG
            Mthd Phase differntl H.Pr 0.020            V.Pr 0.036

GPSVEC TP   Point ID     1221    Lat  33-27'39.65800"N Lng  111-44'33.13180"W
                                 Elv  1558.424         Code NG
            Mthd Phase differntl H.Pr 0.027            V.Pr 0.047

GPSVEC TP   Point ID     1222    Lat  33-27'39.73475"N Lng  111-44'32.84650"W
                                 Elv  1558.449         Code NG
            Mthd Phase differntl H.Pr 0.028            V.Pr 0.049

GPSVEC TP   Point ID     1223    Lat  33-27'40.68385"N Lng  111-44'33.15574"W
                                 Elv  1558.541         Code NG
            Mthd Phase differntl H.Pr 0.033            V.Pr 0.058

GPSVEC TP   Point ID     1224    Lat  33-27'40.64526"N Lng  111-44'33.45835"W
                                 Elv  1558.070         Code NG
            Mthd Phase differntl H.Pr 0.037            V.Pr 0.065

GPSVEC TP   Point ID     1225    Lat  33-27'40.58935"N Lng  111-44'33.54454"W
                                 Elv  1561.766         Code NG
            Mthd Phase differntl H.Pr 0.032            V.Pr 0.057

GPSVEC TP   Point ID     1226    Lat  33-27'40.54442"N Lng  111-44'33.77832"W
                                 Elv  1562.607         Code NG
            Mthd Phase differntl H.Pr 0.032            V.Pr 0.056

GPSVEC TP   Point ID     1227    Lat  33-27'40.53701"N Lng  111-44'33.80568"W
                                 Elv  1562.759         Code TOP
            Mthd Phase differntl H.Pr 0.031            V.Pr 0.055
```

```
GPSVEC TP   Point ID     1228    Lat  33-27'41.49648"N Lng  111-44'34.11071"W
                                 Elv  1562.221         Code TOP
            Mthd Phase differntl H.Pr 0.029            V.Pr 0.051

GPSVEC TP   Point ID     1229    Lat  33-27'41.56369"N Lng  111-44'33.84521"W
                                 Elv  1561.448         Code NG
            Mthd Phase differntl H.Pr 0.022            V.Pr 0.038

GPSVEC TP   Point ID     1230    Lat  33-27'41.57208"N Lng  111-44'33.76842"W
                                 Elv  1558.588         Code NG
            Mthd Phase differntl H.Pr 0.031            V.Pr 0.053

GPSVEC TP   Point ID     1231    Lat  33-27'41.66428"N Lng  111-44'33.49190"W
                                 Elv  1558.322         Code NG
            Mthd Phase differntl H.Pr 0.033            V.Pr 0.058

GPSVEC TP   Point ID     1232    Lat  33-27'42.60845"N Lng  111-44'33.77598"W
                                 Elv  1558.635         Code NG
            Mthd Phase differntl H.Pr 0.022            V.Pr 0.038

GPSVEC TP   Point ID     1233    Lat  33-27'42.53443"N Lng  111-44'34.05973"W
                                 Elv  1558.736         Code NG
            Mthd Phase differntl H.Pr 0.019            V.Pr 0.034

GPSVEC TP   Point ID     1234    Lat  33-27'42.50956"N Lng  111-44'34.15254"W
                                 Elv  1561.628         Code NG
            Mthd Phase differntl H.Pr 0.022            V.Pr 0.038

GPSVEC TP   Point ID     1235    Lat  33-27'42.45073"N Lng  111-44'34.42042"W
                                 Elv  1562.294         Code NG
            Mthd Phase differntl H.Pr 0.023            V.Pr 0.039

GPSVEC TP   Point ID     1236    Lat  33-27'42.45091"N Lng  111-44'34.42103"W
                                 Elv  1562.286         Code TOP
            Mthd Phase differntl H.Pr 0.019            V.Pr 0.032

GPSVEC TP   Point ID     1237    Lat  33-27'43.41283"N Lng  111-44'34.73016"W
                                 Elv  1562.243         Code TOP
            Mthd Phase differntl H.Pr 0.020            V.Pr 0.035

GPSVEC TP   Point ID     1238    Lat  33-27'43.47709"N Lng  111-44'34.46167"W
                                 Elv  1561.252         Code NG
            Mthd Phase differntl H.Pr 0.033            V.Pr 0.056

GPSVEC TP   Point ID     1239    Lat  33-27'43.49866"N Lng  111-44'34.38514"W
                                 Elv  1558.728         Code NG
            Mthd Phase differntl H.Pr 0.022            V.Pr 0.038

GPSVEC TP   Point ID     1240    Lat  33-27'43.56220"N Lng  111-44'34.09228"W
                                 Elv  1558.877         Code NG
            Mthd Phase differntl H.Pr 0.024            V.Pr 0.041

GPSVEC TP   Point ID     1241    Lat  33-27'44.50594"N Lng  111-44'34.38438"W
```

```
                                    Elv  1558.873          Code NG
            Mthd Phase differntl H.Pr 0.024             V.Pr 0.041

GPSVEC TP   Point ID      1242      Lat  33-27'44.43757"N Lng  111-44'34.68250"W
                                    Elv  1559.020          Code NG
            Mthd Phase differntl H.Pr 0.030             V.Pr 0.051

GPSVEC TP   Point ID      1243      Lat  33-27'44.41583"N Lng  111-44'34.76584"W
                                    Elv  1561.720          Code NG
            Mthd Phase differntl H.Pr 0.021             V.Pr 0.035

NOTE    TS  Dec-23-96 17:06

GPSVEC TP   Point ID      1244      Lat  33-27'44.36377"N Lng  111-44'35.03324"W
                                    Elv  1562.361          Code TOP
            Mthd Phase differntl H.Pr 0.026             V.Pr 0.045

GPSVEC TP   Point ID      1245      Lat  33-27'45.33347"N Lng  111-44'35.33795"W
                                    Elv  1562.206          Code TOP
            Mthd Phase differntl H.Pr 0.027             V.Pr 0.046

GPSVEC TP   Point ID      1246      Lat  33-27'45.39704"N Lng  111-44'35.07558"W
                                    Elv  1561.340          Code NG
            Mthd Phase differntl H.Pr 0.023             V.Pr 0.040

GPSVEC TP   Point ID      1247      Lat  33-27'45.41796"N Lng  111-44'34.98788"W
                                    Elv  1558.395          Code NG
            Mthd Phase differntl H.Pr 0.038             V.Pr 0.075

GPSVEC TP   Point ID      1248      Lat  33-27'45.49525"N Lng  111-44'34.71011"W
                                    Elv  1559.046          Code NG
            Mthd Phase differntl H.Pr 0.027             V.Pr 0.046

GPSVEC TP   Point ID      1014      Lat  33-27'45.98669"N Lng  111-44'35.12195"W
                                    Elv  1558.767          Code PANEL
            Mthd Phase differntl H.Pr 0.039             V.Pr 0.066

GPSVEC TP   Point ID      1249      Lat  33-27'46.42034"N Lng  111-44'35.05330"W
                                    Elv  1559.078          Code NG
            Mthd Phase differntl H.Pr 0.034             V.Pr 0.059

GPSVEC TP   Point ID      1250      Lat  33-27'46.36206"N Lng  111-44'35.29867"W
                                    Elv  1558.812          Code NG
            Mthd Phase differntl H.Pr 0.039             V.Pr 0.066

GPSVEC TP   Point ID      1251      Lat  33-27'46.34381"N Lng  111-44'35.38586"W
                                    Elv  1561.540          Code NG
            Mthd Phase differntl H.Pr 0.038             V.Pr 0.065

GPSVEC TP   Point ID      1252      Lat  33-27'46.28603"N Lng  111-44'35.64769"W
                                    Elv  1562.353          Code NG
            Mthd Phase differntl H.Pr 0.024             V.Pr 0.041

GPSVEC TP   Point ID      1253      Lat  33-27'46.28621"N Lng  111-44'35.64769"W
```

			Elv	1562.277	Code	TOP
	Mthd Phase differntl		H.Pr	0.027	V.Pr	0.045
GPSVEC TP	Point ID	1254	Lat	33-27'47.25245"N	Lng	111-44'35.94419"W
			Elv	1562.522	Code	TOP
	Mthd Phase differntl		H.Pr	0.030	V.Pr	0.060
GPSVEC TP	Point ID	1255	Lat	33-27'47.31307"N	Lng	111-44'35.68783"W
			Elv	1561.618	Code	NG
	Mthd Phase differntl		H.Pr	0.034	V.Pr	0.068
GPSVEC TP	Point ID	1256	Lat	33-27'47.33593"N	Lng	111-44'35.60179"W
			Elv	1558.599	Code	NG
	Mthd Phase differntl		H.Pr	0.039	V.Pr	0.077
GPSVEC TP	Point ID	1257	Lat	33-27'47.37618"N	Lng	111-44'35.42672"W
			Elv	1558.907	Code	NG
	Mthd Phase differntl		H.Pr	0.021	V.Pr	0.042
GPSVEC TP	Point ID	1258	Lat	33-27'48.30131"N	Lng	111-44'35.74252"W
			Elv	1558.720	Code	NG
	Mthd Phase differntl		H.Pr	0.045	V.Pr	0.091
GPSVEC TP	Point ID	1259	Lat	33-27'48.26347"N	Lng	111-44'35.91312"W
			Elv	1558.751	Code	NG
	Mthd Phase differntl		H.Pr	0.041	V.Pr	0.081
GPSVEC TP	Point ID	1260	Lat	33-27'48.24032"N	Lng	111-44'35.99891"W
			Elv	1561.684	Code	NG
	Mthd Phase differntl		H.Pr	0.037	V.Pr	0.074
GPSVEC TP	Point ID	1261	Lat	33-27'48.19277"N	Lng	111-44'36.25048"W
			Elv	1562.628	Code	NG
	Mthd Phase differntl		H.Pr	0.033	V.Pr	0.066
GPSVEC TP	Point ID	1262	Lat	33-27'49.16408"N	Lng	111-44'36.55835"W
			Elv	1562.371	Code	TOP
	Mthd Phase differntl		H.Pr	0.027	V.Pr	0.054
GPSVEC TP	Point ID	1263	Lat	33-27'49.23562"N	Lng	111-44'36.29825"W
			Elv	1561.554	Code	NG
	Mthd Phase differntl		H.Pr	0.032	V.Pr	0.063
GPSVEC TP	Point ID	1264	Lat	33-27'49.25783"N	Lng	111-44'36.22495"W
			Elv	1558.771	Code	NG
	Mthd Phase differntl		H.Pr	0.036	V.Pr	0.071
GPSVEC TP	Point ID	1265	Lat	33-27'49.29001"N	Lng	111-44'36.08430"W
			Elv	1558.714	Code	NG
	Mthd Phase differntl		H.Pr	0.031	V.Pr	0.062
GPSVEC TP	Point ID	1266	Lat	33-27'50.21276"N	Lng	111-44'36.41543"W
			Elv	1558.875	Code	NG
	Mthd Phase differntl		H.Pr	0.030	V.Pr	0.060

```
GPSVEC TP   Point ID     1267    Lat  33-27'50.18850"N Lng  111-44'36.52062"W
                                 Elv  1558.899         Code NG
            Mthd Phase differntl H.Pr 0.046            V.Pr 0.092

GPSVEC TP   Point ID     1268    Lat  33-27'50.17450"N Lng  111-44'36.59471"W
                                 Elv  1561.472         Code NG
            Mthd Phase differntl H.Pr 0.036            V.Pr 0.072

GPSVEC TP   Point ID     1269    Lat  33-27'50.11643"N Lng  111-44'36.86186"W
                                 Elv  1562.296         Code TOP
            Mthd Phase differntl H.Pr 0.032            V.Pr 0.063

NOTE   TS   Dec-23-96 17:17

GPSVEC TP   Point ID     1270    Lat  33-27'51.05977"N Lng  111-44'37.15134"W
                                 Elv  1562.612         Code TOP
            Mthd Phase differntl H.Pr 0.033            V.Pr 0.065

GPSVEC TP   Point ID     1271    Lat  33-27'51.12630"N Lng  111-44'36.91021"W
                                 Elv  1561.464         Code NG
            Mthd Phase differntl H.Pr 0.026            V.Pr 0.052

GPSVEC TP   Point ID     1272    Lat  33-27'51.15013"N Lng  111-44'36.82259"W
                                 Elv  1559.075         Code NG
            Mthd Phase differntl H.Pr 0.035            V.Pr 0.069

GPSVEC TP   Point ID     1273    Lat  33-27'51.19081"N Lng  111-44'36.67297"W
                                 Elv  1559.079         Code NG
            Mthd Phase differntl H.Pr 0.028            V.Pr 0.056

GPSVEC TP   Point ID     1274    Lat  33-27'52.10190"N Lng  111-44'36.95802"W
                                 Elv  1559.213         Code NG
            Mthd Phase differntl H.Pr 0.038            V.Pr 0.076

GPSVEC TP   Point ID     1275    Lat  33-27'52.07022"N Lng  111-44'37.11473"W
                                 Elv  1559.022         Code NG
            Mthd Phase differntl H.Pr 0.041            V.Pr 0.082

GPSVEC TP   Point ID     1276    Lat  33-27'52.05244"N Lng  111-44'37.20282"W
                                 Elv  1561.580         Code NG
            Mthd Phase differntl H.Pr 0.035            V.Pr 0.070

GPSVEC TP   Point ID     1277    Lat  33-27'51.99991"N Lng  111-44'37.46126"W
                                 Elv  1562.342         Code TOP
            Mthd Phase differntl H.Pr 0.030            V.Pr 0.060

GPSVEC TP   Point ID     1278    Lat  33-27'52.93112"N Lng  111-44'37.75459"W
                                 Elv  1562.471         Code TOP
            Mthd Phase differntl H.Pr 0.041            V.Pr 0.081

GPSVEC TP   Point ID     1279    Lat  33-27'52.99326"N Lng  111-44'37.49273"W
                                 Elv  1561.401         Code NG
            Mthd Phase differntl H.Pr 0.023            V.Pr 0.045
```

GPSVEC TP	Point ID	1280	Lat	33-27'53.01331"N	Lng	111-44'37.40456"W
			Elv	1558.865	Code	NG
	Mthd Phase differntl		H.Pr	0.035	V.Pr	0.070
GPSVEC TP	Point ID	1281	Lat	33-27'53.05190"N	Lng	111-44'37.24501"W
			Elv	1559.234	Code	NG
	Mthd Phase differntl		H.Pr	0.026	V.Pr	0.052
GPSVEC TP	Point ID	1282	Lat	33-27'53.98456"N	Lng	111-44'37.56275"W
			Elv	1559.107	Code	NG
	Mthd Phase differntl		H.Pr	0.032	V.Pr	0.062
GPSVEC TP	Point ID	1283	Lat	33-27'53.94532"N	Lng	111-44'37.71838"W
			Elv	1558.923	Code	NG
	Mthd Phase differntl		H.Pr	0.029	V.Pr	0.057
GPSVEC TP	Point ID	1284	Lat	33-27'53.92746"N	Lng	111-44'37.80017"W
			Elv	1561.406	Code	NG
	Mthd Phase differntl		H.Pr	0.023	V.Pr	0.045
GPSVEC TP	Point ID	1285	Lat	33-27'53.86406"N	Lng	111-44'38.05102"W
			Elv	1562.595	Code	TOP
	Mthd Phase differntl		H.Pr	0.023	V.Pr	0.045
GPSVEC TP	Point ID	1286	Lat	33-27'54.81209"N	Lng	111-44'38.35428"W
			Elv	1562.408	Code	TOP
	Mthd Phase differntl		H.Pr	0.040	V.Pr	0.077
GPSVEC TP	Point ID	1287	Lat	33-27'54.81680"N	Lng	111-44'38.33095"W
			Elv	1561.978	Code	NG
	Mthd Phase differntl		H.Pr	0.028	V.Pr	0.054
GPSVEC TP	Point ID	1288	Lat	33-27'54.88178"N	Lng	111-44'38.11106"W
			Elv	1561.059	Code	NG
	Mthd Phase differntl		H.Pr	0.031	V.Pr	0.060
GPSVEC TP	Point ID	1289	Lat	33-27'54.90479"N	Lng	111-44'38.03359"W
			Elv	1558.997	Code	NG
	Mthd Phase differntl		H.Pr	0.028	V.Pr	0.055
GPSVEC TP	Point ID	1290	Lat	33-27'54.94590"N	Lng	111-44'37.86832"W
			Elv	1559.211	Code	NG
	Mthd Phase differntl		H.Pr	0.028	V.Pr	0.055
GPSVEC TP	Point ID	1291	Lat	33-27'55.87499"N	Lng	111-44'38.18425"W
			Elv	1559.295	Code	NG
	Mthd Phase differntl		H.Pr	0.019	V.Pr	0.037
GPSVEC TP	Point ID	1292	Lat	33-27'55.83085"N	Lng	111-44'38.35522"W
			Elv	1559.296	Code	NG
	Mthd Phase differntl		H.Pr	0.025	V.Pr	0.049
GPSVEC TP	Point ID	1293	Lat	33-27'55.81526"N	Lng	111-44'38.41638"W

```
                                Elv  1560.876          Code NG
          Mthd Phase differntl H.Pr 0.023             V.Pr 0.045

PSVEC TP  Point ID     1294     Lat  33-27'55.76929"N Lng  111-44'38.64523"W
                                Elv  1561.934          Code NG
          Mthd Phase differntl H.Pr 0.018             V.Pr 0.034

GPSVEC TP Point ID     1295     Lat  33-27'55.76353"N Lng  111-44'38.66867"W
                                Elv  1562.251          Code TOP
          Mthd Phase differntl H.Pr 0.021             V.Pr 0.041

GPSVEC TP Point ID     1296     Lat  33-27'56.73085"N Lng  111-44'38.97719"W
                                Elv  1561.591          Code TOP
          Mthd Phase differntl H.Pr 0.028             V.Pr 0.054

GPSVEC TP Point ID     1297     Lat  33-27'56.79929"N Lng  111-44'38.72846"W
                                Elv  1560.624          Code NG
          Mthd Phase differntl H.Pr 0.024             V.Pr 0.046

GPSVEC TP Point ID     1298     Lat  33-27'56.83039"N Lng  111-44'38.62291"W
                                Elv  1559.076          Code NG
          Mthd Phase differntl H.Pr 0.050             V.Pr 0.095

GPSVEC TP Point ID     1299     Lat  33-27'56.89480"N Lng  111-44'38.53201"W
                                Elv  1559.146          Code NG
          Mthd Phase differntl H.Pr 0.046             V.Pr 0.088

NOTE   TS Dec-23-96 17:27

PSVEC TP  Point ID     1300     Lat  33-27'57.83220"N Lng  111-44'38.56852"W
                                Elv  1559.461          Code NG
          Mthd Phase differntl H.Pr 0.047             V.Pr 0.089

GPSVEC TP Point ID     1301     Lat  33-27'57.74209"N Lng  111-44'39.00840"W
                                Elv  1559.775          Code NG
          Mthd Phase differntl H.Pr 0.035             V.Pr 0.066

GPSVEC TP Point ID     1302     Lat  33-27'57.70548"N Lng  111-44'39.15276"W
                                Elv  1560.981          Code NG
          Mthd Phase differntl H.Pr 0.024             V.Pr 0.046

GPSVEC TP Point ID     1303     Lat  33-27'57.67556"N Lng  111-44'39.28067"W
                                Elv  1561.383          Code TOP
          Mthd Phase differntl H.Pr 0.050             V.Pr 0.093

GPSVEC TP Point ID     1304     Lat  33-27'58.58896"N Lng  111-44'39.56446"W
                                Elv  1562.335          Code TOP
          Mthd Phase differntl H.Pr 0.026             V.Pr 0.049

GPSVEC TP Point ID     1305     Lat  33-27'58.58903"N Lng  111-44'39.56464"W
                                Elv  1562.337          Code TOP
          Mthd Phase differntl H.Pr 0.020             V.Pr 0.038

GPSVEC TP Point ID     1306     Lat  33-27'58.69606"N Lng  111-44'39.01636"W
```

```
                                    Elv  1561.853          Code NG
            Mthd Phase differntl H.Pr 0.024              V.Pr 0.045

 PSVEC TP   Point ID     1307       Lat  33-27'58.77162"N Lng  111-44'38.53579"W
                                    Elv  1560.677          Code NG
            Mthd Phase differntl H.Pr 0.027              V.Pr 0.049

GPSVEC TP   Point ID     1005       Lat  33-27'59.37707"N Lng  111-44'39.59441"W
                                    Elv  1563.246          Code PANEL
            Mthd Phase differntl H.Pr 0.030              V.Pr 0.054

NOTE   TS   Dec-24-96 11:05

NOTE   BA   Start base

NOTE   TS   Dec-24-96 11:30

NOTE   BA   Start base

NOTE   BA   Start base

NOTE   BA   Start base

NOTE   TS   Dec-24-96 11:40

NOTE   BA   Start base

NOTE   BA   Start base

 UIP   BA   Receiver  4000SSE                   Serial    00015678
            Antenna   4000ST/SSE L1/L2 Geo      Serial
            Radius  0.76575       V.Const  0.03117    Tape adj  0.00000

GPSANT BA   Antenna height 5.130                Measuremt Uncorrected

GPSREF BA   Point ID     2001       Lat  33-27'10.19405"N Lng  111-44'24.95314"W
            Mthd Autonomous         Elv  933.959          Code 40D NAIL

NOTE   TP   Start rover

EQUIP  TP   Receiver  4000SSE                   Serial    00004573
            Antenna   Compact L1/L2             Serial
            Radius  0.00000       V.Const  0.20505    Tape adj  0.00000

SURVEY TP   Elevation mask 12                   PDOP mask 10.000

NOTE   TP   Start rover

EQUIP  TP   Receiver  4000SSE                   Serial    00004573
            Antenna   Compact L1/L2             Serial
            Radius  0.00000       V.Const  0.20505    Tape adj  0.00000

SURVEY TP   Elevation mask 12                   PDOP mask 10.000
```

```
NOTE    TP   Start rover

EQUIP   TP   Receiver  4000SSE                    Serial    00004573
             Antenna   Compact L1/L2              Serial
             Radius  0.00000       V.Const  0.20505    Tape adj  0.00000

SURVEY  TP   Elevation mask 12                    PDOP mask 10.000

NOTE    TP   Start rover

EQUIP   TP   Receiver  4000SSE                    Serial    00004573
             Antenna   Compact L1/L2              Serial
             Radius  0.00000       V.Const  0.20505    Tape adj  0.00000

SURVEY  TP   Elevation mask 12                    PDOP mask 10.000

NOTE    TS   Dec-24-96 11:50

NOTE    TP   Start rover

EQUIP   TP   Receiver  4000SSE                    Serial    00004573
             Antenna   Compact L1/L2              Serial
             Radius  0.00000       V.Const  0.20505    Tape adj  0.00000

SURVEY  TP   Elevation mask 12                    PDOP mask 10.000

GPSANT  SI   Antenna height 5.105                 Measuremt True vertical

GPSREF  SI   Point ID     2001    Lat  33-27'10.19405"N Lng  111-44'24.95314"W
             Mthd Autonomous      Elv  933.959          Code 40D NAIL

GPSANT  SI   Antenna height 6.850                 Measuremt Uncorrected

GPSVEC  SI   Point ID     1308    Lat  33-27'10.16060"N Lng  111-44'24.80266"W
                                  Elv  935.621          Code <No text>
             Mthd Phase differntl H.Pr 0.016            V.Pr 0.032

NOTE    SI   Init gained: New point : 1308

GPSVEC  TP   Point ID     1309    Lat  33-27'10.16075"N Lng  111-44'24.80240"W
                                  Elv  935.646          Code BOGUS
             Mthd Phase differntl H.Pr 0.019            V.Pr 0.038

GPSVEC  TP   Point ID     1310    Lat  33-27'08.66848"N Lng  111-44'10.78415"W
                                  Elv  941.183          Code PANEL 1002
             Mthd Phase differntl H.Pr 0.027            V.Pr 0.051

GPSVEC  TP   Point ID     1311    Lat  33-27'08.66884"N Lng  111-44'10.78415"W
                                  Elv  940.647          Code BC IN HH
             Mthd Phase differntl H.Pr 0.028            V.Pr 0.053

GPSVEC  TP   Point ID     1312    Lat  33-27'08.38512"N Lng  111-44'11.77498"W
                                  Elv  939.787          Code PAV.
             Mthd Phase differntl H.Pr 0.022            V.Pr 0.040
```

NOTE TS Dec-24-96 12:01

GPSVEC TP	Point ID	1313	Lat	33-27'08.39106"N	Lng	111-44'12.96589"W
			Elv	939.020	Code	PAV.
	Mthd Phase differntl		H.Pr	0.021	V.Pr	0.039
GPSVEC TP	Point ID	1314	Lat	33-27'08.38951"N	Lng	111-44'14.15008"W
			Elv	938.380	Code	PAV.
	Mthd Phase differntl		H.Pr	0.027	V.Pr	0.050
GPSVEC TP	Point ID	1315	Lat	33-27'08.38498"N	Lng	111-44'15.32069"W
			Elv	937.979	Code	PAV.
	Mthd Phase differntl		H.Pr	0.023	V.Pr	0.042
GPSVEC TP	Point ID	1316	Lat	33-27'08.38105"N	Lng	111-44'16.51744"W
			Elv	937.246	Code	PAV.
	Mthd Phase differntl		H.Pr	0.020	V.Pr	0.036
GPSVEC TP	Point ID	1317	Lat	33-27'08.38267"N	Lng	111-44'17.68596"W
			Elv	936.917	Code	PAV.
	Mthd Phase differntl		H.Pr	0.026	V.Pr	0.046
GPSVEC TP	Point ID	1318	Lat	33-27'08.38688"N	Lng	111-44'18.91122"W
			Elv	936.306	Code	PAV.
	Mthd Phase differntl		H.Pr	0.023	V.Pr	0.040
GPSVEC TP	Point ID	1319	Lat	33-27'08.39016"N	Lng	111-44'20.10106"W
			Elv	935.840	Code	PAV.
	Mthd Phase differntl		H.Pr	0.036	V.Pr	0.050
GPSVEC TP	Point ID	1320	Lat	33-27'08.39225"N	Lng	111-44'21.31577"W
			Elv	935.865	Code	PAV.
	Mthd Phase differntl		H.Pr	0.027	V.Pr	0.041
GPSVEC TP	Point ID	1321	Lat	33-27'08.39563"N	Lng	111-44'22.52371"W
			Elv	936.214	Code	PAV.
	Mthd Phase differntl		H.Pr	0.028	V.Pr	0.042
GPSVEC TP	Point ID	1322	Lat	33-27'08.41057"N	Lng	111-44'23.76172"W
			Elv	936.330	Code	PAV.
	Mthd Phase differntl		H.Pr	0.036	V.Pr	0.054
GPSVEC TP	Point ID	1323	Lat	33-27'08.67593"N	Lng	111-44'24.35600"W
			Elv	936.871	Code	PANEL 1001
	Mthd Phase differntl		H.Pr	0.037	V.Pr	0.055
GPSVEC TP	Point ID	1324	Lat	33-27'08.69828"N	Lng	111-44'23.76521"W
			Elv	936.924	Code	PAV.
	Mthd Phase differntl		H.Pr	0.034	V.Pr	0.050
GPSVEC TP	Point ID	1325	Lat	33-27'08.69540"N	Lng	111-44'22.58369"W
			Elv	936.669	Code	P.K.
	Mthd Phase differntl		H.Pr	0.028	V.Pr	0.041

```
GPSVEC TP   Point ID     1326    Lat  33-27'08.68954"N Lng  111-44'20.22472"W
                                 Elv  936.500          Code P.K. 108+00
            Mthd Phase differntl H.Pr 0.028            V.Pr 0.041

NOTE   TS   Dec-24-96 12:11

GPSVEC TP   Point ID     1327    Lat  33-27'08.68482"N Lng  111-44'17.86196"W
                                 Elv  937.467          Code P.K. 110+00
            Mthd Phase differntl H.Pr 0.026            V.Pr 0.038

GPSVEC TP   Point ID     1328    Lat  33-27'08.67694"N Lng  111-44'14.32180"W
                                 Elv  938.907          Code P.K. 113+00
            Mthd Phase differntl H.Pr 0.027            V.Pr 0.039

GPSVEC TP   Point ID     1329    Lat  33-27'08.67157"N Lng  111-44'11.96149"W
                                 Elv  940.329          Code P.K. 115+00
            Mthd Phase differntl H.Pr 0.030            V.Pr 0.043

GPSVEC TP   Point ID     1330    Lat  33-27'22.22356"N Lng  111-44'10.66837"W
                                 Elv  943.090          Code PANEL 1012
            Mthd Phase differntl H.Pr 0.028            V.Pr 0.038

NOTE   TS   Dec-24-96 12:23

GPSVEC TP   Point ID     1331    Lat  33-27'34.79378"N Lng  111-44'10.56210"W
                                 Elv  944.813          Code BC IN HH
            Mthd Phase differntl H.Pr 0.026            V.Pr 0.035

?SVEC TP    Point ID     1332    Lat  33-28'01.03462"N Lng  111-44'10.34146"W
                                 Elv  948.956          Code BC IN HH
            Mthd Phase differntl H.Pr 0.028            V.Pr 0.035

NOTE   TS   Dec-24-96 12:34

GPSVEC TP   Point ID     1333    Lat  33-28'01.12922"N Lng  111-44'25.70662"W
                                 Elv  941.237          Code PANEL 1006
            Mthd Phase differntl H.Pr 0.042            V.Pr 0.041

GPSVEC TP   Point ID     1334    Lat  33-28'01.13333"N Lng  111-44'26.86618"W
                                 Elv  940.753          Code PAV.
            Mthd Phase differntl H.Pr 0.045            V.Pr 0.044

GPSVEC TP   Point ID     1335    Lat  33-28'01.13300"N Lng  111-44'28.03693"W
                                 Elv  940.339          Code PAV.
            Mthd Phase differntl H.Pr 0.040            V.Pr 0.040

GPSVEC TP   Point ID     1336    Lat  33-28'01.13426"N Lng  111-44'29.22122"W
                                 Elv  939.866          Code PAV.
            Mthd Phase differntl H.Pr 0.046            V.Pr 0.045

GPSVEC TP   Point ID     1337    Lat  33-28'01.13027"N Lng  111-44'30.40746"W
                                 Elv  939.470          Code PAV.
            Mthd Phase differntl H.Pr 0.049            V.Pr 0.048
```

```
GPSVEC TP   Point ID     1338    Lat  33-28'01.13668"N Lng  111-44'31.60669"W
                                 Elv  938.973          Code PAV.
            Mthd Phase differntl H.Pr 0.048            V.Pr 0.047

GPSVEC TP   Point ID     1339    Lat  33-28'01.13502"N Lng  111-44'32.81089"W
                                 Elv  938.613          Code PAV.
            Mthd Phase differntl H.Pr 0.044            V.Pr 0.043

GPSVEC TP   Point ID     1340    Lat  33-28'01.12966"N Lng  111-44'34.00062"W
                                 Elv  938.225          Code PAV.
            Mthd Phase differntl H.Pr 0.047            V.Pr 0.046

GPSVEC TP   Point ID     1341    Lat  33-28'01.13671"N Lng  111-44'35.19787"W
                                 Elv  937.721          Code PAV.
            Mthd Phase differntl H.Pr 0.041            V.Pr 0.041

GPSVEC TP   Point ID     1342    Lat  33-28'01.13344"N Lng  111-44'36.39520"W
                                 Elv  937.519          Code PAV.
            Mthd Phase differntl H.Pr 0.042            V.Pr 0.042

GPSVEC TP   Point ID     1343    Lat  33-28'01.15576"N Lng  111-44'37.59126"W
                                 Elv  937.858          Code PAV.
            Mthd Phase differntl H.Pr 0.038            V.Pr 0.037

GPSVEC TP   Point ID     1344    Lat  33-28'01.16519"N Lng  111-44'38.79413"W
                                 Elv  938.610          Code PAV.
            Mthd Phase differntl H.Pr 0.042            V.Pr 0.041

;VEC TP     Point ID     1345    Lat  33-28'01.18254"N Lng  111-44'39.99865"W
                                 Elv  939.207          Code PAV.
            Mthd Phase differntl H.Pr 0.048            V.Pr 0.047

GPSVEC TP   Point ID     1346    Lat  33-28'01.19597"N Lng  111-44'41.00640"W
                                 Elv  939.755          Code PANEL 1005
            Mthd Phase differntl H.Pr 0.045            V.Pr 0.044

NOTE   TS   Dec-24-96 12:45

GPSVEC TP   Point ID     1347    Lat  33-28'00.34507"N Lng  111-44'40.55413"W
                                 Elv  938.174          Code C.P.2000 40D
            Mthd Phase differntl H.Pr 0.032            V.Pr 0.031

GPSVEC TP   Point ID     1348    Lat  33-28'00.97540"N Lng  111-44'38.05001"W
                                 Elv  938.225          Code PAV.
            Mthd Phase differntl H.Pr 0.045            V.Pr 0.044

GPSVEC TP   Point ID     1349    Lat  33-28'00.94249"N Lng  111-44'35.62951"W
                                 Elv  937.601          Code PAV.
            Mthd Phase differntl H.Pr 0.046            V.Pr 0.044

GPSVEC TP   Point ID     1350    Lat  33-28'00.94145"N Lng  111-44'33.25794"W
                                 Elv  938.282          Code PAV.
            Mthd Phase differntl H.Pr 0.041            V.Pr 0.039
```

```
GPSVEC TP   Point ID     1351    Lat  33-28'00.93943"N Lng  111-44'30.88741"W
                                 Elv  939.064          Code PAV.
            Mthd Phase differntl H.Pr 0.048            V.Pr 0.046

GPSVEC TP   Point ID     1352    Lat  33-28'00.93702"N Lng  111-44'28.51519"W
                                 Elv  939.984          Code PAV.
            Mthd Phase differntl H.Pr 0.034            V.Pr 0.032

GPSVEC TP   Point ID     1353    Lat  33-28'00.89512"N Lng  111-44'26.16256"W
                                 Elv  940.701          Code PAV.
            Mthd Phase differntl H.Pr 0.041            V.Pr 0.039

NOTE   SI   High RMS

NOTE   SI   RMS OK

NOTE   SI   Init lost

NOTE   TS   Dec-24-96 12:56

GPSVEC SI   Point ID     1354    Lat  33-28'22.00922"N Lng  111-44'30.87280"W
                                 Elv  943.827          Code <No text>
            Mthd Phase differntl H.Pr 0.032            V.Pr 0.032

NOTE   SI   Init gained: New point : 1354

GPSVEC TP   Point ID     1355    Lat  33-28'22.04796"N Lng  111-44'30.86988"W
                                 Elv  943.733          Code PANEL 1016
            Mthd Phase differntl H.Pr 0.039            V.Pr 0.055

GPSVEC TP   Point ID     1356    Lat  33-28'27.81908"N Lng  111-44'37.68349"W
                                 Elv  942.665          Code PANEL 1008
            Mthd Phase differntl H.Pr 0.026            V.Pr 0.038

NOTE   TS   Dec-24-96 13:13

GPSVEC TP   Point ID     1357    Lat  33-28'37.78889"N Lng  111-45'03.33238"W
                                 Elv  895.442          Code PANEL 1010
            Mthd Phase differntl H.Pr 0.024            V.Pr 0.057

NOTE   TS   Dec-24-96 13:31

NOTE   SI   Init gained:  New point

NOTE   SI   Init gained:  New point

GPSVEC SI   Point ID     1358    Lat  33-27'48.56360"N Lng  111-44'18.11735"W
                                 Elv  943.386          Code <No text>
            Mthd Phase differntl H.Pr 0.018            V.Pr 0.042

NOTE   SI   Init gained: New point : 1358

GPSVEC TP   Point ID     1359    Lat  33-27'48.54150"N Lng  111-44'18.15407"W
```

```
                                    Elv  943.435          Code PANEL 1013
            Mthd Phase differntl H.Pr 0.015             V.Pr 0.036

NOTE   TS   Dec-24-96 13:43

GPSVEC TP   Point ID     1360    Lat  33-27'34.50884"N Lng  111-44'18.42756"W
                                    Elv  942.198          Code PANEL 1004
            Mthd Phase differntl H.Pr 0.016             V.Pr 0.063

GPSVEC TP   Point ID     1361    Lat  33-27'34.68467"N Lng  111-44'18.42245"W
                                    Elv  942.229          Code NG
            Mthd Phase differntl H.Pr 0.025             V.Pr 0.044

GPSVEC TP   Point ID     1362    Lat  33-27'34.69993"N Lng  111-44'19.55666"W
                                    Elv  941.326          Code NG
            Mthd Phase differntl H.Pr 0.026             V.Pr 0.047

GPSVEC TP   Point ID     1363    Lat  33-27'34.70317"N Lng  111-44'20.73772"W
                                    Elv  940.389          Code NG
            Mthd Phase differntl H.Pr 0.028             V.Pr 0.051

GPSVEC TP   Point ID     1364    Lat  33-27'34.70504"N Lng  111-44'21.87946"W
                                    Elv  939.977          Code NG
            Mthd Phase differntl H.Pr 0.026             V.Pr 0.048

GPSVEC TP   Point ID     1365    Lat  33-27'34.71638"N Lng  111-44'23.05381"W
                                    Elv  939.359          Code NG
            Mthd Phase differntl H.Pr 0.019             V.Pr 0.035

GPSVEC TP   Point ID     1366    Lat  33-27'34.73212"N Lng  111-44'24.24602"W
                                    Elv  938.895          Code NG
            Mthd Phase differntl H.Pr 0.019             V.Pr 0.035

GPSVEC TP   Point ID     1367    Lat  33-27'34.74083"N Lng  111-44'25.11164"W
                                    Elv  938.349          Code NG
            Mthd Phase differntl H.Pr 0.021             V.Pr 0.040

GPSVEC TP   Point ID     1368    Lat  33-27'34.76635"N Lng  111-44'26.01121"W
                                    Elv  938.083          Code NG
            Mthd Phase differntl H.Pr 0.018             V.Pr 0.035

GPSVEC TP   Point ID     1369    Lat  33-27'34.76088"N Lng  111-44'27.20674"W
                                    Elv  937.166          Code NG
            Mthd Phase differntl H.Pr 0.021             V.Pr 0.041

GPSVEC TP   Point ID     1370    Lat  33-27'34.73280"N Lng  111-44'28.41122"W
                                    Elv  936.798          Code NG
            Mthd Phase differntl H.Pr 0.022             V.Pr 0.043

GPSVEC TP   Point ID     1371    Lat  33-27'34.77179"N Lng  111-44'29.62432"W
                                    Elv  936.566          Code NG
            Mthd Phase differntl H.Pr 0.021             V.Pr 0.042

GPSVEC TP   Point ID     1372    Lat  33-27'34.79256"N Lng  111-44'30.87809"W
```

```
                                Elv  935.716          Code NG
          Mthd Phase differntl H.Pr 0.023             V.Pr 0.047

NOTE   TS   Dec-26-96 07:57

NOTE   BA   Start base

EQUIP  BA   Receiver  4000SSE                  Serial    00015678
            Antenna   4000ST/SSE L1/L2 Geo     Serial
            Radius  0.76575       V.Const  0.03117    Tape adj  0.00000

GPSANT BA   Antenna height 4.960               Measuremt Uncorrected

GPSREF BA   Point ID     2001    Lat  33-27'10.19405"N Lng  111-44'24.95314"W
            Mthd Autonomous      Elv  933.785          Code 40D NAIL

NOTE   TP   Start rover

EQUIP  TP   Receiver  4000SSE                  Serial    00004573
            Antenna   Compact L1/L2            Serial
            Radius  0.00000       V.Const  0.20505    Tape adj  0.00000

SURVEY TP   Elevation mask 12                  PDOP mask 10.000

NOTE   TP   Start rover

EQUIP  TP   Receiver  4000SSE                  Serial    00004573
            Antenna   Compact L1/L2            Serial
            Radius  0.00000       V.Const  0.20505    Tape adj  0.00000

SURVEY TP   Elevation mask 12                  PDOP mask 10.000

NOTE   TP   Start rover

EQUIP  TP   Receiver  4000SSE                  Serial    00004573
            Antenna   Compact L1/L2            Serial
            Radius  0.00000       V.Const  0.20505    Tape adj  0.00000

SURVEY TP   Elevation mask 12                  PDOP mask 10.000

NOTE   SI   Failed New point : 1373

GPSANT SI   Antenna height 4.931               Measuremt True vertical

GPSREF SI   Point ID     2001    Lat  33-27'10.19405"N Lng  111-44'24.95317"W
            Mthd Autonomous      Elv  933.786          Code 40D NAIL

GPSANT SI   Antenna height 6.850               Measuremt Uncorrected

GPSVEC SI   Point ID     1373    Lat  33-27'10.24186"N Lng  111-44'24.80496"W
                                 Elv  933.933          Code BOGUS
            Mthd Phase differntl H.Pr 0.018             V.Pr 0.031

NOTE   SI   Init gained: New point : 1373
```

```
NOTE    TS    Dec-26-96 08:11

 TE     SI    Init lost

GPSVEC  SI    Point ID      1374    Lat  33-27'07.49110"N Lng  111-47'17.57249"W
                                    Elv  865.467          Code BOGUS
              Mthd Phase differntl H.Pr 0.017             V.Pr 0.031

NOTE    SI    Init gained: New point : 1374

GPSVEC  TP    Point ID      1375    Lat  33-27'07.94617"N Lng  111-47'17.24222"W
                                    Elv  869.484          Code RM 267
              Mthd Phase differntl H.Pr 0.035             V.Pr 0.064

NOTE    TS    Dec-26-96 08:22

NOTE          NO PUNCHMARK IN BC  USED CENTER OF CAP.

NOTE    TS    Dec-26-96 08:33

NOTE    SI    Init lost

GPSVEC  SI    Point ID      1376    Lat  33-25'22.59368"N Lng  111-44'13.05013"W
                                    Elv  903.609          Code BOGUS
              Mthd Phase differntl H.Pr 0.018             V.Pr 0.030

NOTE    SI    Init gained: New point : 1376

 TE     TS    Dec-26-96 08:43

GPSVEC  TP    Point ID      1377    Lat  33-25'24.08765"N Lng  111-44'12.14808"W
                                    Elv  904.901          Code RM 263
              Mthd Phase differntl H.Pr 0.023             V.Pr 0.037

NOTE    SI    Init lost

NOTE          RM 263 IS DIFF.THAN DESCRIBED.ROUND HEADBC IN HH.NOT HEXAGON

NOTE    TS    Dec-26-96 08:57

GPSVEC  SI    Point ID      1378    Lat  33-23'39.27970"N Lng  111-44'13.17095"W
                                    Elv  873.350          Code BOGUS
              Mthd Phase differntl H.Pr 0.026             V.Pr 0.037

NOTE    SI    Init gained: New point : 1378

GPSVEC  TP    Point ID      1379    Lat  33-23'39.27336"N Lng  111-44'13.40221"W
                                    Elv  875.010          Code RM 265
              Mthd Phase differntl H.Pr 0.033             V.Pr 0.066

NOTE          RM 265 CHIS. X IN   SE. COR OF IRRIG.   STRUCTURE.

NOTE    SI    Init lost
```

```
NOTE    TS    Dec-26-96 09:20

GPSVEC  SI    Point ID      1380     Lat  33-27'09.14872"N Lng  111-45'12.02807"W
                                     Elv  908.743          Code BOGUS
              Mthd Phase differntl H.Pr 0.016             V.Pr 0.031

NOTE    SI    Init gained: New point : 1380

NOTE    TS    Dec-26-96 09:22

GPSVEC  TP    Point ID      1381     Lat  33-27'08.79714"N Lng  111-45'13.11851"W
                                     Elv  910.046          Code NAIL W X-TIES
              Mthd Phase differntl H.Pr 0.021             V.Pr 0.040

NOTE          AT C-L INT. OF VAL  VISTA AND MCKELLIPS SEC. COR.

GPSVEC  TP    Point ID      1382     Lat  33-28'01.05643"N Lng  111-45'12.76416"W
                                     Elv  922.982          Code BC IN HH
              Mthd Phase differntl H.Pr 0.042             V.Pr 0.051

NOTE          P.S. AT C-L INT. OF VAL VISTA AND       MCDOWELL SEC. COR.

NOTE    TS    Dec-26-96 09:42

GPSVEC  TP    Point ID      1383     Lat  33-28'36.79914"N Lng  111-45'01.04465"W
                                     Elv  940.461          Code BC FLUME TRI STA
              Mthd Phase differntl H.Pr 0.043             V.Pr 0.051

NOTE          AT CANAL HEAD GATE. DU 2242

GPSVEC  TP    Point ID      1384     Lat  33-28'37.73500"N Lng  111-45'02.84306"W
                                     Elv  906.228          Code NG
              Mthd Phase differntl H.Pr 0.047             V.Pr 0.057

GPSVEC  TP    Point ID      1385     Lat  33-28'38.24371"N Lng  111-45'01.98324"W
                                     Elv  904.630          Code NG
              Mthd Phase differntl H.Pr 0.050             V.Pr 0.064

GPSVEC  TP    Point ID      1386     Lat  33-28'38.62844"N Lng  111-45'00.99799"W
                                     Elv  909.655          Code NG
              Mthd Phase differntl H.Pr 0.047             V.Pr 0.056

GPSVEC  TP    Point ID      1387     Lat  33-28'39.20488"N Lng  111-45'00.03355"W
                                     Elv  907.171          Code NG
              Mthd Phase differntl H.Pr 0.049             V.Pr 0.064

GPSVEC  TP    Point ID      1388     Lat  33-28'39.51491"N Lng  111-44'58.88785"W
                                     Elv  907.772          Code NG
              Mthd Phase differntl H.Pr 0.043             V.Pr 0.055

GPSVEC  TP    Point ID      1389     Lat  33-28'39.88751"N Lng  111-44'57.79568"W
                                     Elv  908.370          Code NG
              Mthd Phase differntl H.Pr 0.046             V.Pr 0.056
```

```
NOTE    SI    High RMS

NOTE    SI    RMS OK

NOTE    TS    Dec-26-96 09:53

GPSVEC  TP    Point ID      1390    Lat  33-28'42.54197"N Lng  111-44'57.17591"W
                                    Elv  894.379          Code NG
              Mthd Phase differntl H.Pr 0.058            V.Pr 0.060

NOTE    SI    Init lost

GPSVEC  SI    Point ID      1391    Lat  33-28'43.03380"N Lng  111-44'56.59336"W
                                    Elv  892.545          Code NG
              Mthd Phase differntl H.Pr 0.031            V.Pr 0.039

NOTE    SI    Init gained: New point : 1391

GPSVEC  TP    Point ID      1392    Lat  33-28'43.53283"N Lng  111-44'55.55803"W
                                    Elv  893.323          Code NG
              Mthd Phase differntl H.Pr 0.048            V.Pr 0.061

NOTE    TS    Dec-26-96 10:03

NOTE    SI    New base

NOTE    TS    Dec-26-96 10:20

 SVEC   SI    Point ID      1393    Lat  33-28'41.04746"N Lng  111-44'53.17876"W
                                    Elv  937.666          Code BOGUS
              Mthd Phase differntl H.Pr 0.018            V.Pr 0.030

NOTE    SI    Init gained: New point : 1393

NOTE    SI    New base

GPSVEC  SI    Point ID      1394    Lat  33-28'41.04768"N Lng  111-44'53.17850"W
                                    Elv  937.687          Code BOGUS
              Mthd Phase differntl H.Pr 0.021            V.Pr 0.037

NOTE    SI    Init gained: New point : 1394

NOTE    SI    New base

GPSVEC  SI    Point ID      1395    Lat  33-28'41.04764"N Lng  111-44'53.17843"W
                                    Elv  937.673          Code BOGUS
              Mthd Phase differntl H.Pr 0.018            V.Pr 0.031

NOTE    SI    Init gained: New point : 1395

NOTE    SI    New base

NOTE    SI    Init gained:  New point
```

```
GPSVEC TP   Point ID     1396    Lat  33-28'41.04768"N Lng  111-44'53.17840"W
                                 Elv  937.705          Code BOGUS
            Mthd Phase differntl H.Pr 0.032            V.Pr 0.059

NOTE   TS   Dec-26-96 10:32

GPSVEC TP   Point ID     1397    Lat  33-28'41.18513"N Lng  111-44'53.51705"W
                                 Elv  938.658          Code NG
            Mthd Phase differntl H.Pr 0.033            V.Pr 0.062

GPSVEC TP   Point ID     1398    Lat  33-28'41.68762"N Lng  111-44'52.63433"W
                                 Elv  933.952          Code NG
            Mthd Phase differntl H.Pr 0.031            V.Pr 0.059

GPSVEC TP   Point ID     1399    Lat  33-28'41.88954"N Lng  111-44'51.65282"W
                                 Elv  926.671          Code NG
            Mthd Phase differntl H.Pr 0.034            V.Pr 0.067

GPSVEC TP   Point ID     1400    Lat  33-28'42.07480"N Lng  111-44'50.73346"W
                                 Elv  915.715          Code NG
            Mthd Phase differntl H.Pr 0.028            V.Pr 0.053

GPSVEC TP   Point ID     1401    Lat  33-28'42.43656"N Lng  111-44'50.08186"W
                                 Elv  913.482          Code NG
            Mthd Phase differntl H.Pr 0.034            V.Pr 0.070

GPSVEC TP   Point ID     1402    Lat  33-28'42.75988"N Lng  111-44'49.25857"W
                                 Elv  917.829          Code NG
            Mthd Phase differntl H.Pr 0.027            V.Pr 0.055

GPSVEC TP   Point ID     1403    Lat  33-28'43.02610"N Lng  111-44'48.34021"W
                                 Elv  927.176          Code NG
            Mthd Phase differntl H.Pr 0.024            V.Pr 0.051

GPSVEC TP   Point ID     1404    Lat  33-28'43.25034"N Lng  111-44'47.51135"W
                                 Elv  934.724          Code NG
            Mthd Phase differntl H.Pr 0.025            V.Pr 0.052

GPSVEC TP   Point ID     1405    Lat  33-28'43.53510"N Lng  111-44'46.77997"W
                                 Elv  938.758          Code PANEL 1009
            Mthd Phase differntl H.Pr 0.027            V.Pr 0.057

GPSVEC TP   Point ID     1406    Lat  33-28'42.60536"N Lng  111-44'46.46148"W
                                 Elv  941.158          Code NG
            Mthd Phase differntl H.Pr 0.023            V.Pr 0.050

GPSVEC TP   Point ID     1407    Lat  33-28'41.62588"N Lng  111-44'46.33786"W
                                 Elv  941.164          Code NG
            Mthd Phase differntl H.Pr 0.026            V.Pr 0.055

GPSVEC TP   Point ID     1408    Lat  33-28'40.54667"N Lng  111-44'46.16398"W
                                 Elv  939.772          Code NG
            Mthd Phase differntl H.Pr 0.029            V.Pr 0.063
```

```
NOTE    SI    Init lost

'OTE    TS    Dec-26-96 11:29

GPSVEC  SI    Point ID      1409     Lat  33-27'10.38956"N Lng  111-44'24.88664"W
                                     Elv  934.159          Code BOGUS
              Mthd Phase differntl H.Pr 0.014             V.Pr 0.033

NOTE    SI    Init gained: New point : 1409

NOTE    SI    New base

GPSVEC  SI    Point ID      1410     Lat  33-27'10.38938"N Lng  111-44'24.88675"W
                                     Elv  934.127          Code BOGUS
              Mthd Phase differntl H.Pr 0.013             V.Pr 0.031

NOTE    SI    Init gained: New point : 1410

NOTE    SI    New base

GPSVEC  SI    Point ID      1411     Lat  33-28'00.26422"N Lng  111-44'40.80408"W
                                     Elv  936.967          Code BOGUS
              Mthd Phase differntl H.Pr 0.015             V.Pr 0.034

NOTE    SI    Init gained: New point : 1411

NOTE    SI    New base

'SVEC   SI    Point ID      1412     Lat  33-28'00.26418"N Lng  111-44'40.80408"W
                                     Elv  936.964          Code BOGUS
              Mthd Phase differntl H.Pr 0.014             V.Pr 0.032

NOTE    SI    Init gained: New point : 1412

NOTE    SI    New base

NOTE    TS    Dec-26-96 11:42

GPSVEC  SI    Point ID      1413     Lat  33-28'00.26418"N Lng  111-44'40.80397"W
                                     Elv  936.992          Code BOGUS
              Mthd Phase differntl H.Pr 0.017             V.Pr 0.036

NOTE    SI    Init gained: New point : 1413

NOTE    SI    New base

NOTE    TS    Dec-26-96 12:20

GPSVEC  SI    Point ID      1414     Lat  33-28'00.18084"N Lng  111-44'40.73348"W
                                     Elv  936.649          Code BOGUS
              Mthd Phase differntl H.Pr 0.024             V.Pr 0.030

NOTE    SI    Init gained: New point : 1414
```

```
NOTE    SI    New base

GPSVEC  SI    Point ID      1415    Lat  33-28'00.18070"N Lng  111-44'40.73356"W
                                    Elv  936.656          Code <No text>
              Mthd Phase differntl H.Pr 0.025             V.Pr 0.031

NOTE    SI    Init gained: New point : 1415

NOTE    SI    New base

GPSVEC  SI    Point ID      1416    Lat  33-28'00.18088"N Lng  111-44'40.73381"W
                                    Elv  936.712          Code BOGUS
              Mthd Phase differntl H.Pr 0.031             V.Pr 0.030

NOTE    SI    Init gained: New point : 1416

NOTE    SI    New base

GPSVEC  SI    Point ID      1417    Lat  33-28'00.18095"N Lng  111-44'40.73384"W
                                    Elv  936.697          Code BOGUS
              Mthd Phase differntl H.Pr 0.035             V.Pr 0.035

NOTE    SI    Init gained: New point : 1417

NOTE    SI    New base

NOTE    TS    Dec-26-96 12:39

GPSVEC  SI    Point ID      1418    Lat  33-27'48.60263"N Lng  111-44'18.11558"W
                                    Elv  941.743          Code BOGUS
              Mthd Phase differntl H.Pr 0.030             V.Pr 0.030

NOTE    SI    Init gained: New point : 1418

NOTE    SI    New base

GPSVEC  SI    Point ID      1419    Lat  33-27'34.65547"N Lng  111-44'18.35326"W
                                    Elv  940.664          Code BOGUS
              Mthd Phase differntl H.Pr 0.020             V.Pr 0.027

NOTE    SI    Init gained: New point : 1419

NOTE    SI    New base

GPSVEC  SI    Point ID      1420    Lat  33-27'34.65565"N Lng  111-44'18.35326"W
                                    Elv  940.655          Code BOGUS
              Mthd Phase differntl H.Pr 0.019             V.Pr 0.027

NOTE    SI    Init gained: New point : 1420

NOTE    SI    New base

NOTE    TS    Dec-26-96 12:55
```

```
GPSVEC SI   Point ID     1421    Lat  33-27'47.69550"N Lng  111-44'36.73824"W
                                 Elv  931.642          Code BOGUS
            Mthd Code differntl  H.Pr 2.065            V.Pr 3.374

NOTE   SI   Init gained: New point : 1421

NOTE   SI   New base

NOTE   TP   Start rover

EQUIP  TP   Receiver  4000SSE                 Serial    00004573
            Antenna   Compact L1/L2           Serial
            Radius  0.00000       V.Const  0.20505    Tape adj  0.00000

SURVEY TP   Elevation mask 12                 PDOP mask 10.000

GPSANT SI   Antenna height 6.850              Measuremt Uncorrected

GPSVEC SI   Point ID     1422    Lat  33-27'10.44569"N Lng  111-44'24.94054"W
                                 Elv  934.110          Code BOGUS
            Mthd Phase differntl H.Pr 0.018            V.Pr 0.030

NOTE   SI   Init gained: New point : 1422

NOTE   SI   New base

GPSVEC SI   Point ID     1423    Lat  33-27'10.44569"N Lng  111-44'24.94050"W
                                 Elv  934.124          Code BOGUS
            Mthd Phase differntl H.Pr 0.021            V.Pr 0.034

NOTE   SI   Init gained: New point : 1423

NOTE   SI   New base

NOTE   TS   Dec-26-96 13:05

NOTE   SI   Init gained:  New point

GPSVEC TP   Point ID     1424    Lat  33-27'10.44580"N Lng  111-44'24.94043"W
                                 Elv  934.122          Code BOGUS
            Mthd Phase differntl H.Pr 0.026            V.Pr 0.043

GPSVEC TP   Point ID     1425    Lat  33-28'00.34478"N Lng  111-44'40.55413"W
                                 Elv  938.212          Code CP 2000
            Mthd Phase differntl H.Pr 0.034            V.Pr 0.063

GPSVEC TP   Point ID     1426    Lat  33-28'01.82251"N Lng  111-44'41.43934"W
                                 Elv  939.081          Code TOP
            Mthd Phase differntl H.Pr 0.033            V.Pr 0.064

GPSVEC TP   Point ID     1427    Lat  33-28'01.85930"N Lng  111-44'41.26272"W
                                 Elv  938.835          Code NG
            Mthd Phase differntl H.Pr 0.030            V.Pr 0.057
```

```
GPSVEC TP   Point ID     1428    Lat  33-28'01.98725"N Lng  111-44'40.72600"W
                                 Elv  936.463          Code NG
            Mthd Phase differntl H.Pr 0.032            V.Pr 0.063

GPSVEC TP   Point ID     1429    Lat  33-28'02.68223"N Lng  111-44'40.86852"W
                                 Elv  935.787          Code NG
            Mthd Phase differntl H.Pr 0.035            V.Pr 0.067

NOTE   TS   Dec-26-96 13:15

GPSVEC TP   Point ID     1430    Lat  33-28'02.63770"N Lng  111-44'41.08070"W
                                 Elv  935.692          Code NG
            Mthd Phase differntl H.Pr 0.028            V.Pr 0.054

GPSVEC TP   Point ID     1431    Lat  33-28'02.60400"N Lng  111-44'41.17895"W
                                 Elv  934.190          Code NG
            Mthd Phase differntl H.Pr 0.033            V.Pr 0.065

GPSVEC TP   Point ID     1432    Lat  33-28'02.57048"N Lng  111-44'41.31715"W
                                 Elv  936.836          Code NG
            Mthd Phase differntl H.Pr 0.036            V.Pr 0.071

GPSVEC TP   Point ID     1433    Lat  33-28'02.51756"N Lng  111-44'41.47620"W
                                 Elv  937.852          Code NG
            Mthd Phase differntl H.Pr 0.031            V.Pr 0.062

GPSVEC TP   Point ID     1434    Lat  33-28'02.47699"N Lng  111-44'41.63381"W
                                 Elv  938.054          Code TOP
            Mthd Phase differntl H.Pr 0.031            V.Pr 0.062

GPSVEC TP   Point ID     1435    Lat  33-28'03.45446"N Lng  111-44'41.94622"W
                                 Elv  938.123          Code TOP
            Mthd Phase differntl H.Pr 0.030            V.Pr 0.060

GPSVEC TP   Point ID     1436    Lat  33-28'03.45803"N Lng  111-44'41.92775"W
                                 Elv  937.740          Code NG
            Mthd Phase differntl H.Pr 0.032            V.Pr 0.065

GPSVEC TP   Point ID     1437    Lat  33-28'03.48899"N Lng  111-44'41.81471"W
                                 Elv  937.626          Code NG
            Mthd Phase differntl H.Pr 0.043            V.Pr 0.058

GPSVEC TP   Point ID     1438    Lat  33-28'03.54810"N Lng  111-44'41.65163"W
                                 Elv  934.456          Code NG
            Mthd Phase differntl H.Pr 0.042            V.Pr 0.057

GPSVEC TP   Point ID     1439    Lat  33-28'03.58183"N Lng  111-44'41.56508"W
                                 Elv  935.590          Code NG
            Mthd Phase differntl H.Pr 0.046            V.Pr 0.062

GPSVEC TP   Point ID     1440    Lat  33-28'03.68357"N Lng  111-44'41.24562"W
                                 Elv  935.999          Code NG
            Mthd Phase differntl H.Pr 0.033            V.Pr 0.069
```

```
GPSVEC TP   Point ID     1441    Lat  33-28'04.58627"N Lng  111-44'41.70347"W
                                 Elv  935.721          Code NG
            Mthd Phase differntl H.Pr 0.045            V.Pr 0.062

GPSVEC TP   Point ID     1442    Lat  33-28'04.52986"N Lng  111-44'41.86784"W
                                 Elv  935.585          Code NG
            Mthd Phase differntl H.Pr 0.029            V.Pr 0.040

GPSVEC TP   Point ID     1443    Lat  33-28'04.50264"N Lng  111-44'41.97401"W
                                 Elv  934.518          Code NG
            Mthd Phase differntl H.Pr 0.037            V.Pr 0.051

GPSVEC TP   Point ID     1444    Lat  33-28'04.44763"N Lng  111-44'42.13774"W
                                 Elv  937.468          Code NG
            Mthd Phase differntl H.Pr 0.031            V.Pr 0.043

GPSVEC TP   Point ID     1445    Lat  33-28'04.42114"N Lng  111-44'42.26100"W
                                 Elv  937.909          Code NG
            Mthd Phase differntl H.Pr 0.041            V.Pr 0.057

GPSVEC TP   Point ID     1446    Lat  33-28'04.41599"N Lng  111-44'42.27875"W
                                 Elv  938.133          Code TOP
            Mthd Phase differntl H.Pr 0.032            V.Pr 0.045

GPSVEC TP   Point ID     1447    Lat  33-28'05.37305"N Lng  111-44'42.63115"W
                                 Elv  938.308          Code TOP
            Mthd Phase differntl H.Pr 0.043            V.Pr 0.062

'SVEC TP    Point ID     1448    Lat  33-28'05.37809"N Lng  111-44'42.61135"W
                                 Elv  938.106          Code NG
            Mthd Phase differntl H.Pr 0.037            V.Pr 0.054

GPSVEC TP   Point ID     1449    Lat  33-28'05.41160"N Lng  111-44'42.49993"W
                                 Elv  937.705          Code NG
            Mthd Phase differntl H.Pr 0.038            V.Pr 0.055

GPSVEC TP   Point ID     1450    Lat  33-28'05.45718"N Lng  111-44'42.37008"W
                                 Elv  934.890          Code NG
            Mthd Phase differntl H.Pr 0.046            V.Pr 0.067

GPSVEC TP   Point ID     1451    Lat  33-28'05.48188"N Lng  111-44'42.22867"W
                                 Elv  935.859          Code NG
            Mthd Phase differntl H.Pr 0.043            V.Pr 0.063

GPSVEC TP   Point ID     1452    Lat  33-28'05.53256"N Lng  111-44'42.04169"W
                                 Elv  936.594          Code NG
            Mthd Phase differntl H.Pr 0.048            V.Pr 0.053

NOTE   SI   High RMS

NOTE   SI   RMS OK

NOTE   SI   High RMS
```

```
NOTE    SI    RMS OK

NOTE    TS    Dec-26-96 13:26

GPSVEC TP     Point ID      1453     Lat   33-28'06.51511"N Lng   111-44'42.45403"W
                                     Elv   936.273          Code  NG
              Mthd Phase differntl   H.Pr  0.030            V.Pr  0.040

GPSVEC TP     Point ID      1454     Lat   33-28'06.46007"N Lng   111-44'42.68422"W
                                     Elv   935.580          Code  NG
              Mthd Phase differntl   H.Pr  0.028            V.Pr  0.067

GPSVEC TP     Point ID      1455     Lat   33-28'06.42457"N Lng   111-44'42.78412"W
                                     Elv   935.790          Code  NG
              Mthd Phase differntl   H.Pr  0.028            V.Pr  0.067

GPSVEC TP     Point ID      1456     Lat   33-28'06.39570"N Lng   111-44'42.87408"W
                                     Elv   938.273          Code  NG
              Mthd Phase differntl   H.Pr  0.025            V.Pr  0.061

GPSVEC TP     Point ID      1457     Lat   33-28'06.36125"N Lng   111-44'43.00433"W
                                     Elv   938.630          Code  NG
              Mthd Phase differntl   H.Pr  0.028            V.Pr  0.067

GPSVEC TP     Point ID      1458     Lat   33-28'06.35696"N Lng   111-44'43.01999"W
                                     Elv   938.853          Code  TOP
              Mthd Phase differntl   H.Pr  0.028            V.Pr  0.068

 SVEC TP      Point ID      1459     Lat   33-28'07.30744"N Lng   111-44'43.41862"W
                                     Elv   939.066          Code  TOP
              Mthd Phase differntl   H.Pr  0.028            V.Pr  0.069

GPSVEC TP     Point ID      1460     Lat   33-28'07.31471"N Lng   111-44'43.39601"W
                                     Elv   938.733          Code  NG
              Mthd Phase differntl   H.Pr  0.028            V.Pr  0.070

GPSVEC TP     Point ID      1461     Lat   33-28'07.34470"N Lng   111-44'43.28876"W
                                     Elv   938.748          Code  NG
              Mthd Phase differntl   H.Pr  0.027            V.Pr  0.068

GPSVEC TP     Point ID      1462     Lat   33-28'07.38448"N Lng   111-44'43.14934"W
                                     Elv   935.847          Code  NG
              Mthd Phase differntl   H.Pr  0.027            V.Pr  0.068

GPSVEC TP     Point ID      1463     Lat   33-28'07.45126"N Lng   111-44'42.89870"W
                                     Elv   937.041          Code  NG
              Mthd Phase differntl   H.Pr  0.027            V.Pr  0.070

NOTE    SI    High RMS

NOTE    SI    RMS OK

NOTE    SI    High RMS
```

```
NOTE    SI    RMS OK

NOTE    SI    Init gained:  New point

GPSVEC TP     Point ID      1464     Lat   33-28'08.38823"N Lng   111-44'43.30036"W
                                     Elv   936.134          Code  NG
              Mthd Phase differntl H.Pr 0.018             V.Pr 0.047

GPSVEC TP     Point ID      1465     Lat   33-28'08.32372"N Lng   111-44'43.54156"W
                                     Elv   934.790          Code  NG
              Mthd Phase differntl H.Pr 0.039             V.Pr 0.068

GPSVEC TP     Point ID      1466     Lat   33-28'08.26568"N Lng   111-44'43.70500"W
                                     Elv   937.915          Code  NG
              Mthd Phase differntl H.Pr 0.023             V.Pr 0.040

GPSVEC TP     Point ID      1467     Lat   33-28'08.22860"N Lng   111-44'43.81127"W
                                     Elv   938.247          Code  NG
              Mthd Phase differntl H.Pr 0.029             V.Pr 0.051

GPSVEC TP     Point ID      1468     Lat   33-28'08.22173"N Lng   111-44'43.82974"W
                                     Elv   938.501          Code  TOP
              Mthd Phase differntl H.Pr 0.037             V.Pr 0.066

GPSVEC TP     Point ID      1469     Lat   33-28'09.15737"N Lng   111-44'44.26768"W
                                     Elv   938.289          Code  TOP
              Mthd Phase differntl H.Pr 0.038             V.Pr 0.068

 SVEC TP      Point ID      1470     Lat   33-28'09.16291"N Lng   111-44'44.25083"W
                                     Elv   938.188          Code  NG
              Mthd Phase differntl H.Pr 0.035             V.Pr 0.063

NOTE    TS    Dec-26-96 13:36

GPSVEC TP     Point ID      1471     Lat   33-28'09.20064"N Lng   111-44'44.14866"W
                                     Elv   938.110          Code  NG
              Mthd Phase differntl H.Pr 0.034             V.Pr 0.061

GPSVEC TP     Point ID      1472     Lat   33-28'09.27023"N Lng   111-44'44.03436"W
                                     Elv   935.144          Code  NG
              Mthd Phase differntl H.Pr 0.018             V.Pr 0.051

GPSVEC TP     Point ID      1473     Lat   33-28'09.35850"N Lng   111-44'43.76267"W
                                     Elv   936.195          Code  NG
              Mthd Phase differntl H.Pr 0.022             V.Pr 0.062

GPSVEC TP     Point ID      1474     Lat   33-28'10.27538"N Lng   111-44'44.14344"W
                                     Elv   936.423          Code  NG
              Mthd Phase differntl H.Pr 0.037             V.Pr 0.068

GPSVEC TP     Point ID      1475     Lat   33-28'10.22624"N Lng   111-44'44.25626"W
                                     Elv   936.054          Code  NG
              Mthd Phase differntl H.Pr 0.037             V.Pr 0.069
```

```
GPSVEC TP   Point ID     1476    Lat  33-28'10.17696"N Lng  111-44'44.38586"W
                                 Elv  934.632          Code NG
            Mthd Phase differntl H.Pr 0.031            V.Pr 0.058

GPSVEC TP   Point ID     1477    Lat  33-28'10.11054"N Lng  111-44'44.58354"W
                                 Elv  937.868          Code NG
            Mthd Phase differntl H.Pr 0.032            V.Pr 0.060

GPSVEC TP   Point ID     1478    Lat  33-28'10.08005"N Lng  111-44'44.69878"W
                                 Elv  938.165          Code NG
            Mthd Phase differntl H.Pr 0.031            V.Pr 0.058

GPSVEC TP   Point ID     1479    Lat  33-28'10.07350"N Lng  111-44'44.71649"W
                                 Elv  938.373          Code TOP
            Mthd Phase differntl H.Pr 0.027            V.Pr 0.051

GPSVEC TP   Point ID     1480    Lat  33-28'11.00964"N Lng  111-44'45.20065"W
                                 Elv  938.470          Code TOP
            Mthd Phase differntl H.Pr 0.031            V.Pr 0.060

GPSVEC TP   Point ID     1481    Lat  33-28'11.02019"N Lng  111-44'45.17502"W
                                 Elv  938.173          Code NG
            Mthd Phase differntl H.Pr 0.028            V.Pr 0.054

GPSVEC TP   Point ID     1482    Lat  33-28'11.05943"N Lng  111-44'45.07116"W
                                 Elv  937.968          Code NG
            Mthd Phase differntl H.Pr 0.037            V.Pr 0.071

'SVEC TP    Point ID     1483    Lat  33-28'11.10799"N Lng  111-44'44.90815"W
                                 Elv  934.929          Code NG
            Mthd Phase differntl H.Pr 0.027            V.Pr 0.053

GPSVEC TP   Point ID     1484    Lat  33-28'11.15508"N Lng  111-44'44.79288"W
                                 Elv  935.763          Code NG
            Mthd Phase differntl H.Pr 0.028            V.Pr 0.056

GPSVEC TP   Point ID     1485    Lat  33-28'11.25498"N Lng  111-44'44.60327"W
                                 Elv  935.996          Code NG
            Mthd Phase differntl H.Pr 0.021            V.Pr 0.061

GPSVEC TP   Point ID     1486    Lat  33-28'12.14083"N Lng  111-44'45.12106"W
                                 Elv  936.504          Code NG
            Mthd Phase differntl H.Pr 0.035            V.Pr 0.069

GPSVEC TP   Point ID     1487    Lat  33-28'12.03085"N Lng  111-44'45.43670"W
                                 Elv  935.452          Code NG
            Mthd Phase differntl H.Pr 0.026            V.Pr 0.070

GPSVEC TP   Point ID     1488    Lat  33-28'11.98117"N Lng  111-44'45.56591"W
                                 Elv  938.159          Code NG
            Mthd Phase differntl H.Pr 0.030            V.Pr 0.063

GPSVEC TP   Point ID     1489    Lat  33-28'11.94218"N Lng  111-44'45.68129"W
```

```
                                    Elv  938.254          Code NG
          Mthd Phase differntl H.Pr 0.029            V.Pr 0.062

NOTE   SI   Init lost

NOTE   TS   Dec-26-96 13:48

NOTE   SI   Init gained:  New point

GPSVEC TP   Point ID     1490    Lat  33-28'11.93725"N Lng  111-44'45.69792"W
                                 Elv  938.494          Code TOP
          Mthd Phase differntl H.Pr 0.019            V.Pr 0.055

GPSVEC TP   Point ID     1491    Lat  33-28'12.84589"N Lng  111-44'46.21679"W
                                 Elv  938.449          Code TOP
          Mthd Phase differntl H.Pr 0.030            V.Pr 0.067

GPSVEC TP   Point ID     1492    Lat  33-28'12.85453"N Lng  111-44'46.19699"W
                                 Elv  938.300          Code NG
          Mthd Phase differntl H.Pr 0.030            V.Pr 0.067

GPSVEC TP   Point ID     1493    Lat  33-28'12.89280"N Lng  111-44'46.09331"W
                                 Elv  938.111          Code NG
          Mthd Phase differntl H.Pr 0.021            V.Pr 0.047

GPSVEC TP   Point ID     1494    Lat  33-28'12.93485"N Lng  111-44'45.98326"W
                                 Elv  934.833          Code NG
          Mthd Phase differntl H.Pr 0.029            V.Pr 0.065

GPSVEC TP   Point ID     1495    Lat  33-28'13.02218"N Lng  111-44'45.65443"W
                                 Elv  936.014          Code NG
          Mthd Phase differntl H.Pr 0.024            V.Pr 0.054

GPSVEC TP   Point ID     1496    Lat  33-28'14.04336"N Lng  111-44'46.12920"W
                                 Elv  935.954          Code NG
          Mthd Phase differntl H.Pr 0.029            V.Pr 0.067

GPSVEC TP   Point ID     1497    Lat  33-28'13.95174"N Lng  111-44'46.49647"W
                                 Elv  934.877          Code NG
          Mthd Phase differntl H.Pr 0.028            V.Pr 0.065

GPSVEC TP   Point ID     1498    Lat  33-28'13.79125"N Lng  111-44'46.62132"W
                                 Elv  938.036          Code NG
          Mthd Phase differntl H.Pr 0.024            V.Pr 0.056

GPSVEC TP   Point ID     1499    Lat  33-28'13.74665"N Lng  111-44'46.75099"W
                                 Elv  938.516          Code TOP
          Mthd Phase differntl H.Pr 0.030            V.Pr 0.059

GPSVEC TP   Point ID     1500    Lat  33-28'14.65525"N Lng  111-44'47.25982"W
                                 Elv  938.726          Code TOP
          Mthd Phase differntl H.Pr 0.032            V.Pr 0.062

GPSVEC TP   Point ID     1501    Lat  33-28'14.65507"N Lng  111-44'47.26010"W
```

```
                                Elv  938.739          Code TOP
          Mthd Phase differntl H.Pr 0.026            V.Pr 0.052

GPSVEC TP  Point ID     1502    Lat  33-28'14.70367"N Lng  111-44'47.10444"W
                                Elv  938.014          Code NG
          Mthd Phase differntl H.Pr 0.020            V.Pr 0.039

GPSVEC TP  Point ID     1503    Lat  33-28'15.04420"N Lng  111-44'47.54900"W
                                Elv  938.133          Code TOP
          Mthd Phase differntl H.Pr 0.032            V.Pr 0.064

GPSVEC TP  Point ID     1504    Lat  33-28'15.13488"N Lng  111-44'47.26180"W
                                Elv  937.704          Code NG
          Mthd Phase differntl H.Pr 0.022            V.Pr 0.053

GPSVEC TP  Point ID     1505    Lat  33-28'15.19295"N Lng  111-44'47.15999"W
                                Elv  935.539          Code NG
          Mthd Phase differntl H.Pr 0.023            V.Pr 0.048

GPSVEC TP  Point ID     1506    Lat  33-28'15.31909"N Lng  111-44'46.90432"W
                                Elv  936.143          Code NG
          Mthd Phase differntl H.Pr 0.019            V.Pr 0.038

GPSVEC TP  Point ID     1507    Lat  33-28'15.98466"N Lng  111-44'47.29949"W
                                Elv  936.282          Code NG
          Mthd Phase differntl H.Pr 0.025            V.Pr 0.051

GPSVEC TP  Point ID     1508    Lat  33-28'15.89678"N Lng  111-44'47.56297"W
                                Elv  935.971          Code NG
          Mthd Phase differntl H.Pr 0.032            V.Pr 0.067

GPSVEC TP  Point ID     1509    Lat  33-28'15.84401"N Lng  111-44'47.64912"W
                                Elv  937.991          Code NG
          Mthd Phase differntl H.Pr 0.033            V.Pr 0.068

NOTE   TS  Dec-26-96 13:58

GPSVEC TP  Point ID     1510    Lat  33-28'15.74512"N Lng  111-44'47.95782"W
                                Elv  937.865          Code TOP
          Mthd Phase differntl H.Pr 0.029            V.Pr 0.062

GPSVEC TP  Point ID     1511    Lat  33-28'16.52038"N Lng  111-44'48.38003"W
                                Elv  938.920          Code TOP
          Mthd Phase differntl H.Pr 0.033            V.Pr 0.070

GPSVEC TP  Point ID     1512    Lat  33-28'16.52657"N Lng  111-44'48.36235"W
                                Elv  938.718          Code NG
          Mthd Phase differntl H.Pr 0.032            V.Pr 0.068

GPSVEC TP  Point ID     1513    Lat  33-28'16.57574"N Lng  111-44'48.26080"W
                                Elv  938.222          Code NG
          Mthd Phase differntl H.Pr 0.030            V.Pr 0.063

GPSVEC TP  Point ID     1514    Lat  33-28'16.62928"N Lng  111-44'48.16266"W
```

			Elv	935.467	Code	NG
	Mthd Phase differntl		H.Pr	0.028	V.Pr	0.061
¬SVEC TP	Point ID	1515	Lat	33-28'16.73296"N	Lng	111-44'47.88208"W
			Elv	936.123	Code	NG
	Mthd Phase differntl		H.Pr	0.032	V.Pr	0.070
GPSVEC TP	Point ID	1516	Lat	33-28'17.74211"N	Lng	111-44'48.43756"W
			Elv	936.204	Code	NG
	Mthd Phase differntl		H.Pr	0.030	V.Pr	0.065
GPSVEC TP	Point ID	1517	Lat	33-28'17.64757"N	Lng	111-44'48.68862"W
			Elv	935.174	Code	NG
	Mthd Phase differntl		H.Pr	0.027	V.Pr	0.059
GPSVEC TP	Point ID	1518	Lat	33-28'17.56884"N	Lng	111-44'48.85375"W
			Elv	938.198	Code	NG
	Mthd Phase differntl		H.Pr	0.029	V.Pr	0.063
GPSVEC TP	Point ID	1519	Lat	33-28'17.52524"N	Lng	111-44'48.95491"W
			Elv	938.481	Code	NG
	Mthd Phase differntl		H.Pr	0.023	V.Pr	0.051
GPSVEC TP	Point ID	1520	Lat	33-28'17.51628"N	Lng	111-44'48.97788"W
			Elv	938.808	Code	TOP
	Mthd Phase differntl		H.Pr	0.027	V.Pr	0.060
GPSVEC TP	Point ID	1521	Lat	33-28'18.35249"N	Lng	111-44'49.47889"W
			Elv	938.934	Code	TOP
	Mthd Phase differntl		H.Pr	0.028	V.Pr	0.063
GPSVEC TP	Point ID	1522	Lat	33-28'18.36030"N	Lng	111-44'49.45862"W
			Elv	938.554	Code	NG
	Mthd Phase differntl		H.Pr	0.025	V.Pr	0.056
GPSVEC TP	Point ID	1523	Lat	33-28'18.40480"N	Lng	111-44'49.35502"W
			Elv	938.530	Code	NG
	Mthd Phase differntl		H.Pr	0.024	V.Pr	0.054
GPSVEC TP	Point ID	1524	Lat	33-28'19.20504"N	Lng	111-44'49.97627"W
			Elv	939.228	Code	TOP
	Mthd Phase differntl		H.Pr	0.028	V.Pr	0.063
GPSVEC TP	Point ID	1525	Lat	33-28'19.21418"N	Lng	111-44'49.95686"W
			Elv	938.978	Code	NG
	Mthd Phase differntl		H.Pr	0.030	V.Pr	0.066
GPSVEC TP	Point ID	1526	Lat	33-28'19.25314"N	Lng	111-44'49.84055"W
			Elv	938.539	Code	NG
	Mthd Phase differntl		H.Pr	0.028	V.Pr	0.062
GPSVEC TP	Point ID	1527	Lat	33-28'19.32334"N	Lng	111-44'49.70699"W
			Elv	935.583	Code	NG
	Mthd Phase differntl		H.Pr	0.030	V.Pr	0.068

```
GPSVEC TP    Point ID      1528    Lat  33-28'19.45564"N Lng  111-44'49.48382"W
                                   Elv  936.315          Code NG
             Mthd Phase differntl H.Pr 0.029            V.Pr 0.065

GPSVEC TP    Point ID      1529    Lat  33-28'20.28029"N Lng  111-44'49.92630"W
                                   Elv  936.855          Code NG
             Mthd Phase differntl H.Pr 0.029            V.Pr 0.067

GPSVEC TP    Point ID      1530    Lat  33-28'20.19954"N Lng  111-44'50.12437"W
                                   Elv  936.531          Code NG
             Mthd Phase differntl H.Pr 0.030            V.Pr 0.068

GPSVEC TP    Point ID      1531    Lat  33-28'20.17916"N Lng  111-44'50.16952"W
                                   Elv  935.586          Code NG
             Mthd Phase differntl H.Pr 0.028            V.Pr 0.064

NOTE    TS   Dec-26-96 14:08

GPSVEC TP    Point ID      1532    Lat  33-28'20.12358"N Lng  111-44'50.34890"W
                                   Elv  938.692          Code NG
             Mthd Phase differntl H.Pr 0.028            V.Pr 0.064

GPSVEC TP    Point ID      1533    Lat  33-28'20.07746"N Lng  111-44'50.46720"W
                                   Elv  938.942          Code NG
             Mthd Phase differntl H.Pr 0.029            V.Pr 0.066

GPSVEC TP    Point ID      1534    Lat  33-28'20.06638"N Lng  111-44'50.49542"W
                                   Elv  939.160          Code TOP
             Mthd Phase differntl H.Pr 0.027            V.Pr 0.062

GPSVEC TP    Point ID      1535    Lat  33-28'20.37716"N Lng  111-44'50.57624"W
                                   Elv  938.837          Code PANEL 1015
             Mthd Phase differntl H.Pr 0.026            V.Pr 0.061

GPSVEC TP    Point ID      1536    Lat  33-28'20.93542"N Lng  111-44'51.00864"W
                                   Elv  939.144          Code TOP
             Mthd Phase differntl H.Pr 0.025            V.Pr 0.058

GPSVEC TP    Point ID      1537    Lat  33-28'20.94492"N Lng  111-44'50.98538"W
                                   Elv  938.854          Code NG
             Mthd Phase differntl H.Pr 0.029            V.Pr 0.067

GPSVEC TP    Point ID      1538    Lat  33-28'20.99050"N Lng  111-44'50.87713"W
                                   Elv  938.597          Code NG
             Mthd Phase differntl H.Pr 0.028            V.Pr 0.065

GPSVEC TP    Point ID      1539    Lat  33-28'21.05735"N Lng  111-44'50.72586"W
                                   Elv  936.175          Code NG
             Mthd Phase differntl H.Pr 0.028            V.Pr 0.066

GPSVEC TP    Point ID      1540    Lat  33-28'21.16564"N Lng  111-44'50.53470"W
                                   Elv  936.931          Code NG
             Mthd Phase differntl H.Pr 0.030            V.Pr 0.069
```

```
GPSVEC TP   Point ID     1541    Lat  33-28'22.05109"N Lng  111-44'50.97656"W
                                 Elv  937.199          Code NG
            Mthd Phase differntl H.Pr 0.029            V.Pr 0.069

GPSVEC TP   Point ID     1542    Lat  33-28'21.93715"N Lng  111-44'51.24577"W
                                 Elv  936.515          Code NG
            Mthd Phase differntl H.Pr 0.027            V.Pr 0.064

GPSVEC TP   Point ID     1543    Lat  33-28'21.86908"N Lng  111-44'51.38938"W
                                 Elv  938.902          Code NG
            Mthd Phase differntl H.Pr 0.029            V.Pr 0.068

GPSVEC TP   Point ID     1544    Lat  33-28'21.82120"N Lng  111-44'51.51379"W
                                 Elv  939.161          Code NG
            Mthd Phase differntl H.Pr 0.027            V.Pr 0.065

GPSVEC TP   Point ID     1545    Lat  33-28'21.81317"N Lng  111-44'51.53298"W
                                 Elv  939.441          Code TOP
            Mthd Phase differntl H.Pr 0.028            V.Pr 0.066

GPSVEC TP   Point ID     1546    Lat  33-28'22.69013"N Lng  111-44'52.06398"W
                                 Elv  939.523          Code TOP
            Mthd Phase differntl H.Pr 0.026            V.Pr 0.062

GPSVEC TP   Point ID     1547    Lat  33-28'22.69758"N Lng  111-44'52.04749"W
                                 Elv  939.360          Code NG
            Mthd Phase differntl H.Pr 0.028            V.Pr 0.066

  SVEC TP   Point ID     1548    Lat  33-28'22.74179"N Lng  111-44'51.93190"W
                                 Elv  938.913          Code NG
            Mthd Phase differntl H.Pr 0.028            V.Pr 0.066

GPSVEC TP   Point ID     1549    Lat  33-28'22.76047"N Lng  111-44'51.80856"W
                                 Elv  936.548          Code NG
            Mthd Phase differntl H.Pr 0.029            V.Pr 0.066

GPSVEC TP   Point ID     1550    Lat  33-28'22.89558"N Lng  111-44'51.55750"W
                                 Elv  937.563          Code NG
            Mthd Phase differntl H.Pr 0.029            V.Pr 0.068

GPSVEC TP   Point ID     1551    Lat  33-28'23.77276"N Lng  111-44'52.13620"W
                                 Elv  937.705          Code NG
            Mthd Phase differntl H.Pr 0.029            V.Pr 0.068

GPSVEC TP   Point ID     1552    Lat  33-28'23.66238"N Lng  111-44'52.35698"W
                                 Elv  937.323          Code NG
            Mthd Phase differntl H.Pr 0.025            V.Pr 0.059

NOTE   TS   Dec-26-96 14:19

GPSVEC TP   Point ID     1553    Lat  33-28'23.62926"N Lng  111-44'52.45562"W
                                 Elv  939.277          Code NG
            Mthd Phase differntl H.Pr 0.027            V.Pr 0.064
```

GPSVEC TP	Point ID	1554	Lat	33-28'23.58250"N	Lng	111-44'52.57000"W
			Elv	939.567	Code	NG
	Mthd Phase differntl		H.Pr	0.027	V.Pr	0.064
GPSVEC TP	Point ID	1555	Lat	33-28'23.57450"N	Lng	111-44'52.59055"W
			Elv	939.991	Code	TOP
	Mthd Phase differntl		H.Pr	0.028	V.Pr	0.066
GPSVEC TP	Point ID	1556	Lat	33-28'24.44362"N	Lng	111-44'53.12987"W
			Elv	940.386	Code	TOP
	Mthd Phase differntl		H.Pr	0.030	V.Pr	0.069
GPSVEC TP	Point ID	1557	Lat	33-28'24.45456"N	Lng	111-44'53.10568"W
			Elv	939.746	Code	NG
	Mthd Phase differntl		H.Pr	0.028	V.Pr	0.066
GPSVEC TP	Point ID	1558	Lat	33-28'24.50276"N	Lng	111-44'52.97690"W
			Elv	939.465	Code	NG
	Mthd Phase differntl		H.Pr	0.028	V.Pr	0.066
GPSVEC TP	Point ID	1559	Lat	33-28'24.53920"N	Lng	111-44'52.88608"W
			Elv	937.389	Code	NG
	Mthd Phase differntl		H.Pr	0.026	V.Pr	0.060
GPSVEC TP	Point ID	1560	Lat	33-28'24.62376"N	Lng	111-44'52.67872"W
			Elv	937.981	Code	NG
	Mthd Phase differntl		H.Pr	0.029	V.Pr	0.067
SVEC TP	Point ID	1561	Lat	33-28'25.48859"N	Lng	111-44'53.13689"W
			Elv	938.331	Code	NG
	Mthd Phase differntl		H.Pr	0.026	V.Pr	0.060
GPSVEC TP	Point ID	1562	Lat	33-28'25.42364"N	Lng	111-44'53.34328"W
			Elv	937.372	Code	NG
	Mthd Phase differntl		H.Pr	0.036	V.Pr	0.084
GPSVEC TP	Point ID	1563	Lat	33-28'25.36316"N	Lng	111-44'53.49674"W
			Elv	939.524	Code	NG
	Mthd Phase differntl		H.Pr	0.028	V.Pr	0.065
GPSVEC TP	Point ID	1564	Lat	33-28'25.31590"N	Lng	111-44'53.61792"W
			Elv	939.739	Code	NG
	Mthd Phase differntl		H.Pr	0.034	V.Pr	0.064
GPSVEC TP	Point ID	1565	Lat	33-28'25.30751"N	Lng	111-44'53.64186"W
			Elv	939.996	Code	TOP
	Mthd Phase differntl		H.Pr	0.032	V.Pr	0.061
GPSVEC TP	Point ID	1566	Lat	33-28'26.19217"N	Lng	111-44'54.16850"W
			Elv	940.406	Code	TOP
	Mthd Phase differntl		H.Pr	0.032	V.Pr	0.061
GPSVEC TP	Point ID	1567	Lat	33-28'26.19862"N	Lng	111-44'54.15079"W

```
                                Elv  940.025          Code NG
          Mthd Phase differntl  H.Pr 0.031            V.Pr 0.059

GPSVEC TP  Point ID     1568    Lat  33-28'26.24772"N Lng  111-44'54.01140"W
                                Elv  939.560          Code NG
          Mthd Phase differntl  H.Pr 0.037            V.Pr 0.070

GPSVEC TP  Point ID     1569    Lat  33-28'26.29366"N Lng  111-44'53.92072"W
                                Elv  937.619          Code NG
          Mthd Phase differntl  H.Pr 0.034            V.Pr 0.064

GPSVEC TP  Point ID     1570    Lat  33-28'26.36116"N Lng  111-44'53.82337"W
                                Elv  937.963          Code NG
          Mthd Phase differntl  H.Pr 0.032            V.Pr 0.061

GPSVEC TP  Point ID     1571    Lat  33-28'27.16180"N Lng  111-44'54.17120"W
                                Elv  938.443          Code NG
          Mthd Phase differntl  H.Pr 0.030            V.Pr 0.070

GPSVEC TP  Point ID     1572    Lat  33-28'27.14592"N Lng  111-44'54.36773"W
                                Elv  938.891          Code NG
          Mthd Phase differntl  H.Pr 0.039            V.Pr 0.067

GPSVEC TP  Point ID     1573    Lat  33-28'27.11388"N Lng  111-44'54.54838"W
                                Elv  940.173          Code NG
          Mthd Phase differntl  H.Pr 0.030            V.Pr 0.057

GPSVEC TP  Point ID     1574    Lat  33-28'27.06319"N Lng  111-44'54.68042"W
                                Elv  940.693          Code TOP
          Mthd Phase differntl  H.Pr 0.033            V.Pr 0.064

NOTE   TS  Dec-26-96 14:29

GPSVEC TP  Point ID     1575    Lat  33-28'27.72700"N Lng  111-44'55.00777"W
                                Elv  940.460          Code PANEL 1007
          Mthd Phase differntl  H.Pr 0.021            V.Pr 0.041

GPSVEC TP  Point ID     1576    Lat  33-28'27.93886"N Lng  111-44'55.20275"W
                                Elv  940.817          Code TOP
          Mthd Phase differntl  H.Pr 0.029            V.Pr 0.055

GPSVEC TP  Point ID     1577    Lat  33-28'27.94591"N Lng  111-44'55.18414"W
                                Elv  940.489          Code NG
          Mthd Phase differntl  H.Pr 0.026            V.Pr 0.050

GPSVEC TP  Point ID     1578    Lat  33-28'28.03681"N Lng  111-44'54.97400"W
                                Elv  939.679          Code NG
          Mthd Phase differntl  H.Pr 0.028            V.Pr 0.054

GPSVEC TP  Point ID     1579    Lat  33-28'28.07393"N Lng  111-44'54.89344"W
                                Elv  938.579          Code NG
          Mthd Phase differntl  H.Pr 0.037            V.Pr 0.062

GPSVEC TP  Point ID     1580    Lat  33-28'28.93645"N Lng  111-44'55.40924"W
```

```
                                    Elv  938.462          Code NG
          Mthd Phase differntl H.Pr 0.033            V.Pr 0.062

GPSVEC TP  Point ID      1581      Lat  33-28'28.90016"N Lng  111-44'55.51534"W
                                    Elv  939.846          Code NG
          Mthd Phase differntl H.Pr 0.026            V.Pr 0.055

GPSVEC TP  Point ID      1582      Lat  33-28'28.82190"N Lng  111-44'55.71920"W
                                    Elv  940.678          Code NG
          Mthd Phase differntl H.Pr 0.032            V.Pr 0.061

GPSVEC TP  Point ID      1583      Lat  33-28'28.81808"N Lng  111-44'55.72918"W
                                    Elv  940.844          Code TOP
          Mthd Phase differntl H.Pr 0.026            V.Pr 0.049

GPSVEC TP  Point ID      1584      Lat  33-28'29.69206"N Lng  111-44'56.24693"W
                                    Elv  941.175          Code TOP
          Mthd Phase differntl H.Pr 0.019            V.Pr 0.036

GPSVEC TP  Point ID      1585      Lat  33-28'29.69922"N Lng  111-44'56.23159"W
                                    Elv  940.651          Code NG
          Mthd Phase differntl H.Pr 0.022            V.Pr 0.043

GPSVEC TP  Point ID      1586      Lat  33-28'29.79905"N Lng  111-44'55.98452"W
                                    Elv  940.009          Code NG
          Mthd Phase differntl H.Pr 0.035            V.Pr 0.067

GPSVEC TP  Point ID      1587      Lat  33-28'29.82464"N Lng  111-44'55.92970"W
                                    Elv  938.931          Code NG
          Mthd Phase differntl H.Pr 0.034            V.Pr 0.065

GPSVEC TP  Point ID      1588      Lat  33-28'30.67316"N Lng  111-44'56.44511"W
                                    Elv  939.025          Code NG
          Mthd Phase differntl H.Pr 0.033            V.Pr 0.062

GPSVEC TP  Point ID      1589      Lat  33-28'30.63785"N Lng  111-44'56.55458"W
                                    Elv  939.945          Code NG
          Mthd Phase differntl H.Pr 0.029            V.Pr 0.056

GPSVEC TP  Point ID      1590      Lat  33-28'30.55620"N Lng  111-44'56.76788"W
                                    Elv  940.360          Code TOP
          Mthd Phase differntl H.Pr 0.024            V.Pr 0.045

GPSVEC TP  Point ID      1591      Lat  33-28'31.41430"N Lng  111-44'57.27761"W
                                    Elv  940.823          Code TOP
          Mthd Phase differntl H.Pr 0.034            V.Pr 0.065

GPSVEC TP  Point ID      1592      Lat  33-28'31.42031"N Lng  111-44'57.26350"W
                                    Elv  940.403          Code NG
          Mthd Phase differntl H.Pr 0.033            V.Pr 0.063

GPSVEC TP  Point ID      1593      Lat  33-28'31.48313"N Lng  111-44'57.08854"W
                                    Elv  939.967          Code NG
          Mthd Phase differntl H.Pr 0.034            V.Pr 0.064
```

```
GPSVEC TP   Point ID     1594    Lat  33-28'31.55560"N Lng  111-44'56.96160"W
                                 Elv  938.812          Code NG
            Mthd Phase differntl H.Pr 0.034            V.Pr 0.064

NOTE   TS   Dec-26-96 14:58

NOTE   TP   Start rover

EQUIP  TP   Receiver  4000SSE                 Serial    00004573
            Antenna   Compact L1/L2           Serial
            Radius  0.00000       V.Const  0.20505    Tape adj  0.00000

SURVEY TP   Elevation mask 12                 PDOP mask 10.000

NOTE   TP   Start rover

EQUIP  TP   Receiver  4000SSE                 Serial    00004573
            Antenna   Compact L1/L2           Serial
            Radius  0.00000       V.Const  0.20505    Tape adj  0.00000

SURVEY TP   Elevation mask 12                 PDOP mask 10.000

NOTE   TP   Start rover

EQUIP  TP   Receiver  4000SSE                 Serial    00004573
            Antenna   Compact L1/L2           Serial
            Radius  0.00000       V.Const  0.20505    Tape adj  0.00000

 RVEY  TP   Elevation mask 12                 PDOP mask 10.000

NOTE   TP   Start rover

EQUIP  TP   Receiver  4000SSE                 Serial    00004573
            Antenna   Compact L1/L2           Serial
            Radius  0.00000       V.Const  0.20505    Tape adj  0.00000

SURVEY TP   Elevation mask 12                 PDOP mask 10.000

GPSANT SI   Antenna height 6.850              Measuremt Uncorrected

GPSVEC SI   Point ID     1595    Lat  33-28'31.33074"N Lng  111-44'57.09595"W
                                 Elv  940.129          Code BOGUS
            Mthd Phase differntl H.Pr 0.029            V.Pr 0.051

NOTE   SI   Init gained: New point : 1595

GPSVEC TP   Point ID     1596    Lat  33-28'32.31217"N Lng  111-44'57.81102"W
                                 Elv  940.914          Code TOP
            Mthd Phase differntl H.Pr 0.038            V.Pr 0.067

GPSVEC TP   Point ID     1597    Lat  33-28'32.31869"N Lng  111-44'57.79547"W
                                 Elv  940.524          Code NG
            Mthd Phase differntl H.Pr 0.035            V.Pr 0.062
```

```
GPSVEC TP   Point ID     1598    Lat  33-28'32.40566"N Lng  111-44'57.55528"W
                                 Elv  939.397          Code NG
            Mthd Phase differntl H.Pr 0.038            V.Pr 0.068

GPSVEC TP   Point ID     1599    Lat  33-28'32.40437"N Lng  111-44'57.54509"W
                                 Elv  939.694          Code NG
            Mthd Phase differntl H.Pr 0.030            V.Pr 0.054

GPSVEC TP   Point ID     1600    Lat  33-28'32.42568"N Lng  111-44'57.49357"W
                                 Elv  938.567          Code NG
            Mthd Phase differntl H.Pr 0.031            V.Pr 0.055

GPSVEC TP   Point ID     1601    Lat  33-28'32.44714"N Lng  111-44'57.40699"W
                                 Elv  938.493          Code NG
            Mthd Phase differntl H.Pr 0.030            V.Pr 0.053

GPSVEC TP   Point ID     1602    Lat  33-28'32.45567"N Lng  111-44'57.38500"W
                                 Elv  939.041          Code NG
            Mthd Phase differntl H.Pr 0.036            V.Pr 0.064

GPSVEC TP   Point ID     1603    Lat  33-28'32.47525"N Lng  111-44'57.32902"W
                                 Elv  937.685          Code NG
            Mthd Phase differntl H.Pr 0.036            V.Pr 0.064

GPSVEC TP   Point ID     1604    Lat  33-28'32.49638"N Lng  111-44'57.26810"W
                                 Elv  939.266          Code NG
            Mthd Phase differntl H.Pr 0.035            V.Pr 0.063

 SVEC TP    Point ID     1605    Lat  33-28'32.52691"N Lng  111-44'57.20255"W
                                 Elv  937.981          Code NG
            Mthd Phase differntl H.Pr 0.034            V.Pr 0.060

NOTE    TS  Dec-26-96 15:08

GPSVEC TP   Point ID     1606    Lat  33-28'33.46828"N Lng  111-44'57.66806"W
                                 Elv  938.120          Code NG
            Mthd Phase differntl H.Pr 0.039            V.Pr 0.068

GPSVEC TP   Point ID     1607    Lat  33-28'33.45154"N Lng  111-44'57.72876"W
                                 Elv  939.516          Code NG
            Mthd Phase differntl H.Pr 0.036            V.Pr 0.064

GPSVEC TP   Point ID     1608    Lat  33-28'33.44552"N Lng  111-44'57.77311"W
                                 Elv  938.025          Code NG
            Mthd Phase differntl H.Pr 0.039            V.Pr 0.069

GPSVEC TP   Point ID     1609    Lat  33-28'33.40150"N Lng  111-44'57.84108"W
                                 Elv  938.991          Code NG
            Mthd Phase differntl H.Pr 0.039            V.Pr 0.068

GPSVEC TP   Point ID     1610    Lat  33-28'33.33958"N Lng  111-44'57.96204"W
                                 Elv  938.156          Code NG
            Mthd Phase differntl H.Pr 0.034            V.Pr 0.060
```

GPSVEC TP	Point ID	1611	Lat	33-28'33.31178"N	Lng	111-44'58.07569"W
			Elv	940.004	Code	NG
	Mthd Phase differntl		H.Pr	0.034	V.Pr	0.060
GPSVEC TP	Point ID	1612	Lat	33-28'33.21876"N	Lng	111-44'58.31376"W
			Elv	940.705	Code	NG
	Mthd Phase differntl		H.Pr	0.032	V.Pr	0.057
GPSVEC TP	Point ID	1613	Lat	33-28'33.21116"N	Lng	111-44'58.33190"W
			Elv	940.962	Code	TOP
	Mthd Phase differntl		H.Pr	0.039	V.Pr	0.069
GPSVEC TP	Point ID	1614	Lat	33-28'34.05011"N	Lng	111-44'58.84076"W
			Elv	941.267	Code	TOP
	Mthd Phase differntl		H.Pr	0.034	V.Pr	0.059
GPSVEC TP	Point ID	1615	Lat	33-28'34.05698"N	Lng	111-44'58.82795"W
			Elv	940.900	Code	NG
	Mthd Phase differntl		H.Pr	0.038	V.Pr	0.066
GPSVEC TP	Point ID	1616	Lat	33-28'34.19159"N	Lng	111-44'58.55298"W
			Elv	940.365	Code	NG
	Mthd Phase differntl		H.Pr	0.031	V.Pr	0.055
GPSVEC TP	Point ID	1617	Lat	33-28'34.20404"N	Lng	111-44'58.51925"W
			Elv	939.589	Code	NG
	Mthd Phase differntl		H.Pr	0.030	V.Pr	0.053
SVEC TP	Point ID	1618	Lat	33-28'34.39463"N	Lng	111-44'57.99858"W
			Elv	939.297	Code	NG
	Mthd Phase differntl		H.Pr	0.039	V.Pr	0.069
GPSVEC TP	Point ID	1619	Lat	33-28'35.17741"N	Lng	111-44'58.72776"W
			Elv	936.345	Code	NG
	Mthd Phase differntl		H.Pr	0.036	V.Pr	0.064
GPSVEC TP	Point ID	1620	Lat	33-28'35.11416"N	Lng	111-44'58.88310"W
			Elv	936.225	Code	NG
	Mthd Phase differntl		H.Pr	0.036	V.Pr	0.064
GPSVEC TP	Point ID	1621	Lat	33-28'35.02470"N	Lng	111-44'59.11170"W
			Elv	940.248	Code	NG
	Mthd Phase differntl		H.Pr	0.038	V.Pr	0.066
GPSVEC TP	Point ID	1622	Lat	33-28'34.93484"N	Lng	111-44'59.34667"W
			Elv	940.800	Code	NG
	Mthd Phase differntl		H.Pr	0.035	V.Pr	0.061
GPSVEC TP	Point ID	1623	Lat	33-28'34.93020"N	Lng	111-44'59.36035"W
			Elv	941.154	Code	TOP
	Mthd Phase differntl		H.Pr	0.034	V.Pr	0.059
GPSVEC TP	Point ID	1624	Lat	33-28'35.81292"N	Lng	111-44'59.90269"W

C.2 Survey Notes for Hydrologic Modeling

1001,891962.110,753931.536,1352.496,PANEL 1001
1005,897271.069,752520.742,1355.426,PANEL 1005
1014,895917.474,752899.678,1350.947,PANEL 1014
1107,893271.242,753576.004,1354.600,PANEL 1011
1189,894596.279,753219.772,1354.153,PANEL 1003

1310,891961.181,755081.676,1356.798,PANEL 1002
1330,893331.426,755091.382,1358.705,PANEL 1012
1333,897264.219,753817.000,1356.852,PANEL 1006
1355,899378.826,753379.506,1359.348,PANEL 1016
1356,899962.207,752802.274,1358.280,PANEL 1008
1357,900970.095,750629.477,1311.057,PANEL 1010
1359,895991.790,754456.944,1359.050,PANEL 1013
1360,894573.267,754433.851,1357.813,PANEL 1004
1405,901550.905,752031.692,1354.373,PANEL 1009
1535,899209.937,751710.033,1354.452,PANEL 1015
1575,899952.926,751334.636,1356.075,PANEL 1007

1021,892036.834,753897.156,1350.880,NG
1022,892036.849,753897.129,1350.879,NG
1023,892036.820,753897.132,1350.870,TOP
1024,892041.919,753918.534,1350.901,NG
1025,892047.795,753967.157,1349.751,NG
1026,892079.230,753885.962,1350.831,TOP
1027,892092.114,753926.973,1350.245,NG
1028,892096.343,753943.669,1352.566,NG
1029,892097.894,753955.691,1352.427,NG
1030,892101.745,753964.952,1350.678,NG
1031,892193.701,753945.046,1349.529,NG
1032,892188.678,753919.175,1350.592,NG
1033,892186.883,753911.329,1352.415,NG
1034,892184.350,753901.699,1352.094,NG
1035,892181.974,753894.069,1350.008,NG
1036,892178.810,753879.561,1351.356,TOP
1037,892174.894,753863.305,1351.707,NG
1038,892174.497,753861.609,1352.437,TOP
1039,892272.709,753836.401,1353.711,TOP
1040,892273.379,753838.683,1353.024,NG
1041,892278.016,753857.776,1352.617,NG
1042,892282.373,753868.779,1350.282,NG
1043,892284.400,753876.564,1352.569,NG
1044,892286.678,753884.413,1352.622,NG
1045,892288.782,753893.372,1350.240,NG
1046,892387.558,753874.980,1350.765,NG
1047,892384.530,753862.094,1352.520,NG
1048,892381.535,753850.548,1351.816,NG
1049,892380.708,753841.702,1350.269,NG
1050,892377.920,753829.531,1353.343,NG
1051,892373.028,753811.786,1353.727,NG
1052,892372.581,753810.194,1354.340,TOP
1053,892472.441,753783.211,1354.498,TOP
1054,892472.947,753785.304,1353.930,NG
1055,892477.620,753802.682,1353.323,NG
1056,892481.551,753813.981,1349.564,NG
1057,892484.270,753822.281,1351.452,NG
1058,892486.468,753830.768,1351.476,NG
1059,892489.132,753839.227,1349.705,NG
1060,892588.206,753814.401,1350.005,NG
1061,892585.106,753804.051,1351.381,NG
1062,892582.678,753795.522,1351.225,NG
1063,892581.040,753788.124,1349.504,NG
1064,892578.489,753776.310,1353.538,NG
1065,892573.532,753759.471,1354.448,NG
1066,892572.873,753757.321,1354.896,TOP

1067,892673.268,753730.131,1354.822,TOP
1068,892673.862,753731.992,1354.538,NG
1069,892678.961,753750.532,1353.429,NG
1070,892681.450,753760.437,1349.329,NG
1071,892683.984,753769.768,1351.413,NG
1072,892685.723,753777.190,1351.485,NG
1073,892687.972,753784.505,1349.798,NG
1074,892790.228,753760.104,1349.797,NG
1075,892786.726,753750.153,1351.593,NG
1076,892784.597,753742.683,1351.408,NG
1077,892781.580,753734.166,1349.622,NG
1078,892778.315,753724.258,1353.394,NG
1079,892773.369,753702.911,1354.422,TOP
1080,892873.590,753675.886,1354.575,TOP
1081,892879.461,753696.486,1353.641,NG
1082,892882.081,753707.721,1349.328,NG
1083,892884.312,753716.060,1351.435,NG
1084,892886.398,753723.507,1351.583,NG
1085,892887.606,753729.061,1350.118,NG
1086,892985.811,753703.391,1350.172,NG
1087,892984.635,753697.052,1351.583,NG
1088,892983.634,753689.368,1351.441,NG
1089,892981.567,753679.796,1349.541,NG
1090,892978.608,753669.169,1353.665,NG
1091,892972.632,753649.487,1354.585,TOP
1092,893071.735,753623.503,1354.833,TOP
1093,893072.485,753625.291,1354.624,NG
1094,893077.158,753643.242,1353.828,NG
1095,893080.623,753653.501,1349.424,NG
1096,893082.545,753662.341,1351.455,NG
1097,893084.634,753669.635,1351.430,NG
1098,893086.286,753675.458,1350.139,NG
1099,893086.286,753675.458,1350.090,NG
1100,893186.635,753650.294,1349.059,NG
1101,893184.593,753642.525,1350.081,NG
1102,893179.665,753626.236,1350.234,NG
1103,893177.033,753616.837,1353.699,NG
1104,893171.003,753596.930,1354.486,TOP
1105,893269.459,753570.474,1354.679,TOP
1106,893270.056,753572.432,1354.592,NG
1108,893274.707,753591.339,1353.919,NG
1109,893276.429,753600.429,1350.511,NG
1110,893280.760,753622.401,1349.519,NG
1111,893381.305,753590.463,1349.858,NG
1112,893378.415,753574.180,1350.109,NG
1113,893376.038,753563.092,1354.002,NG

1114,893370.411,753545.857,1354.598,NG
1115,893369.702,753543.749,1355.062,TOP
1116,893468.660,753517.641,1354.910,TOP
1117,893469.373,753519.959,1354.760,NG
1118,893474.388,753537.578,1353.914,NG
1119,893476.958,753546.876,1350.243,NG
1120,893481.850,753565.492,1349.387,NG
1121,893578.151,753537.111,1349.669,NG
1122,893575.338,753521.078,1350.106,NG
1123,893573.019,753510.262,1353.931,NG
1124,893568.215,753493.073,1354.671,NG
1125,893567.632,753491.285,1354.901,TOP
1126,893667.963,753464.152,1355.100,TOP
1127,893668.563,753466.193,1354.843,NG
1128,893673.207,753483.708,1354.091,NG
1129,893675.038,753493.048,1350.431,NG
1130,893679.278,753511.280,1350.243,NG
1132,893780.074,753483.336,1349.389,NG
1133,893776.111,753467.379,1350.332,NG
1134,893773.428,753456.783,1354.023,NG
1135,893768.228,753439.862,1354.666,NG
1136,893767.551,753437.944,1355.018,TOP
1137,893868.329,753410.295,1354.745,TOP
1138,893868.922,753412.196,1354.338,NG
1139,893874.578,753432.044,1353.814,NG
1140,893875.964,753439.444,1350.079,NG
1141,893879.036,753452.085,1350.002,NG
1142,893982.387,753428.094,1349.923,NG
1143,893978.762,753414.145,1350.009,NG
1144,893975.577,753404.027,1353.736,NG
1145,893969.903,753385.319,1354.305,NG
1146,893969.307,753383.437,1354.859,TOP
1147,894055.404,753359.905,1354.264,TOP
1148,894056.220,753362.156,1354.077,NG
1149,894061.515,753381.022,1353.760,NG
1150,894063.124,753390.082,1350.440,NG
1151,894068.710,753406.935,1349.864,NG
1152,894157.829,753386.672,1349.980,NG
1153,894154.324,753366.348,1350.291,NG
1154,894152.329,753356.861,1352.798,NG
1155,894147.274,753336.564,1353.097,NG
1156,894146.691,753334.459,1353.301,TOP
1157,894208.687,753315.000,1351.677,TOP
1158,894211.261,753326.313,1351.922,NG
1159,894211.894,753329.065,1352.269,NG
1160,894216.472,753346.900,1351.836,NG

Check

?

1161,894217.455,753351.695,1351.100,NG
1162,894221.582,753366.758,1350.227,NG
1163,894297.894,753352.154,1349.457,NG
1164,894296.482,753345.281,1350.318,NG
1165,894292.806,753330.027,1350.863,NG
1166,894291.016,753321.007,1351.998,NG
1167,894285.152,753297.157,1352.022,NG
1168,894284.705,753294.997,1351.687,TOP
1169,894335.074,753284.405,1353.646,TOP
1170,894335.649,753286.543,1353.494,NG
1171,894342.058,753306.636,1352.683,NG
1172,894344.627,753315.094,1350.754,NG
1173,894349.599,753332.935,1350.059,NG
1175,894442.167,753306.362,1350.312,NG
1176,894438.335,753289.564,1350.970,NG
1177,894436.344,753280.004,1353.663,NG
1178,894431.147,753260.827,1354.239,NG
1179,894430.772,753259.125,1354.473,TOP
1180,894524.970,753233.369,1353.927,TOP
1181,894525.763,753236.203,1354.067,NG
1182,894531.397,753255.490,1353.523,NG
1183,894534.218,753266.898,1350.743,NG
1184,894539.266,753287.213,1350.660,NG
1185,894609.727,753276.514,1350.816,NG
1186,894605.461,753254.009,1350.337,NG
1187,894600.635,753236.195,1353.463,NG
1188,894595.129,753215.649,1354.344,TOP
1190,894708.593,753187.458,1354.511,TOP
1191,894709.004,753189.112,1354.269,NG
1192,894713.710,753207.853,1353.439,NG
1193,894716.207,753216.598,1351.036,NG
1195,894721.003,753240.802,1350.632,NG
1196,894819.285,753214.893,1350.624,NG
1197,894812.010,753190.992,1350.975,NG
1198,894809.171,753182.128,1353.931,NG
1199,894803.952,753161.621,1354.701,TOP
1200,894896.164,753137.180,1354.970,TOP
1201,894896.732,753139.236,1354.694,NG
1202,894901.841,753157.873,1353.620,NG
1203,894903.421,753165.279,1351.174,NG
1204,894910.769,753189.635,1350.507,NG
1205,895004.196,753164.420,1350.886,NG
1206,894995.280,753142.535,1350.822,NG
1207,894994.253,753132.298,1353.644,NG
1208,894989.420,753111.663,1354.534,NG
1209,895081.232,753087.049,1354.569,TOP

1311,891961.218,755081.676,1356.262,BC IN HH —— ERM-1
1312,891932.532,754997.718,1355.402,PAV.
1313,891933.125,754896.803,1354.635,PAV.
1314,891932.961,754796.459,1353.995,PAV.
1315,891932.496,754697.265,1353.594,PAV.
1316,891932.093,754595.856,1352.861,PAV.
1317,891932.251,754496.838,1352.532,PAV.
1318,891932.671,754393.013,1351.920,PAV.
1319,891932.997,754292.190,1351.455,PAV.
1320,891933.203,754189.259,1351.480,PAV.
1321,891933.541,754086.901,1351.829,PAV.
1322,891935.046,753981.996,1351.944,PAV.
1324,891964.130,753981.699,1352.539,PAV.
1325,891963.843,754081.818,1352.283,P.K.
1326,891963.260,754281.710,1352.115,P.K. 108+00
1327,891962.794,754481.922,1353.082,P.K. 110+00
1328,891962.015,754781.906,1354.522,P.K. 113+00
1329,891961.487,754981.911,1355.944,P.K. 115+00
1331,894602.115,755100.290,1360.428,BC IN HH
1332,897254.729,755118.781,1364.571,BC IN HH — ERM-2
1334,897264.631,753718.758,1356.368,PAV.
1335,897264.595,753619.569,1355.954,PAV.
1336,897264.720,753519.232,1355.481,PAV.
1337,897264.313,753418.731,1355.085,PAV.
1338,897264.959,753317.128,1354.588,PAV.
1339,897264.789,753215.105,1354.228,PAV.
1340,897264.246,753114.308,1353.840,PAV.
1341,897264.958,753012.873,1353.336,PAV.
1342,897264.626,752911.432,1353.134,PAV.
1343,897266.881,752810.098,1353.473,PAV.
1344,897267.835,752708.188,1354.225,PAV.
1345,897269.589,752606.137,1354.822,PAV.
1348,897248.649,752771.232,1353.839,PAV.
1349,897245.324,752976.304,1353.216,PAV.
1350,897245.221,753177.230,1353.897,PAV.
1351,897245.021,753378.068,1354.679,PAV.
1352,897244.782,753579.050,1355.598,PAV.
1353,897240.553,753778.372,1356.316,PAV.
1361,894591.041,754434.283,1357.844,NG
1362,894592.578,754338.181,1356.941,NG
1363,894592.901,754238.110,1356.004,NG
1364,894593.086,754141.371,1355.592,NG
1365,894594.227,754041.868,1354.974,NG
1366,894595.814,753940.851,1354.510,NG
1367,894596.691,753867.507,1353.963,NG
1368,894599.269,753791.287,1353.698,NG

1369,894598.712,753689.990,1352.781,NG
1370,894595.871,753587.934,1352.413,NG
1371,894599.809,753485.149,1352.180,NG
1372,894601.906,753378.916,1351.331,NG
1375,891890.906,739281.741,1285.099,RM 267
1377,881389.431,754966.863,1320.515,RM 263
1379,870794.136,754861.284,1290.624,RM 265
1381,891974.227,749799.648,1325.661,NAIL W X-TIES
1382,897256.969,749830.149,1338.596,BC IN HH
1383,900870.031,750823.271,1356.076,BC FLUME TRI STA
1384,900964.644,750670.928,1321.842,NG
1385,901016.064,750743.769,1320.245,NG
1386,901054.951,750827.235,1325.270,NG
1387,901113.216,750908.938,1322.786,NG
1388,901144.551,751005.995,1323.387,NG
1389,901182.212,751098.517,1323.985,NG
1390,901450.542,751151.033,1309.994,NG
1391,901500.258,751200.384,1308.160,NG
1392,901550.700,751288.090,1308.938,NG
1397,901313.369,751460.976,1354.273,NG
1398,901364.161,751535.755,1349.567,NG
1399,901384.571,751618.900,1342.286,NG
1400,901403.295,751696.782,1331.330,NG
1401,901439.863,751751.981,1329.097,NG
1402,901472.544,751821.724,1333.444,NG
1403,901499.454,751899.521,1342.791,NG
1404,901522.121,751969.735,1350.339,NG
1406,901456.920,752058.670,1356.773,NG
1407,901357.906,752069.141,1356.779,NG
1408,901248.811,752083.868,1355.387,NG
1426,897334.282,752484.079,1354.696,TOP
1427,897338.001,752499.042,1354.450,NG
1428,897350.935,752544.515,1352.078,NG
1429,897421.188,752532.440,1351.402,NG
1430,897416.687,752514.464,1351.307,NG
1431,897413.281,752506.140,1349.805,NG
1432,897409.893,752494.431,1352.451,NG
1433,897404.543,752480.956,1353.467,NG
1434,897400.442,752467.603,1353.669,TOP
1435,897499.252,752441.136,1353.738,TOP
1436,897499.612,752442.700,1353.355,NG
1437,897502.742,752452.278,1353.240,NG
1438,897508.717,752466.094,1350.071,NG
1439,897512.127,752473.426,1351.205,NG
1440,897522.411,752500.492,1351.614,NG
1441,897613.663,752461.703,1351.336,NG

1442,897607.961,752447.776,1351.200,NG
1443,897605.210,752438.782,1350.133,NG
1444,897599.649,752424.911,1353.083,NG
1445,897596.971,752414.467,1353.524,NG
1446,897596.450,752412.964,1353.748,TOP
1447,897693.197,752383.108,1353.923,TOP
1448,897693.707,752384.786,1353.721,NG
1449,897697.095,752394.226,1353.320,NG
1450,897701.702,752405.227,1350.505,NG
1451,897704.198,752417.207,1351.473,NG
1452,897709.322,752433.049,1352.209,NG
1453,897808.645,752398.115,1351.888,NG
1454,897803.081,752378.614,1351.195,NG
1455,897799.493,752370.150,1351.405,NG
1456,897796.574,752362.528,1353.888,NG
1457,897793.092,752351.493,1354.245,NG
1458,897792.659,752350.167,1354.468,TOP
1459,897888.740,752316.395,1354.680,TOP
1460,897889.475,752318.311,1354.348,NG
1461,897892.506,752327.397,1354.363,NG
1462,897896.527,752339.209,1351.462,NG
1463,897903.278,752360.443,1352.656,NG
1464,897997.994,752326.416,1351.749,NG
1465,897991.473,752305.981,1350.405,NG
1466,897985.607,752292.134,1353.530,NG
1467,897981.859,752283.130,1353.862,NG
1468,897981.164,752281.566,1354.116,TOP
1469,898075.746,752244.465,1353.904,TOP
1470,898076.306,752245.892,1353.803,NG
1471,898080.120,752254.548,1353.725,NG
1472,898087.154,752264.231,1350.759,NG
1473,898096.077,752287.249,1351.810,NG
1474,898188.763,752254.991,1352.038,NG
1475,898183.795,752245.433,1351.669,NG
1476,898178.813,752234.453,1350.247,NG
1477,898172.100,752217.706,1353.483,NG
1478,898169.017,752207.943,1353.780,NG
1479,898168.355,752206.442,1353.988,TOP
1480,898262.988,752165.425,1354.085,TOP
1481,898264.054,752167.597,1353.788,NG
1482,898268.021,752176.396,1353.582,NG
1483,898272.930,752190.206,1350.544,NG
1484,898277.690,752199.972,1351.378,NG
1485,898287.788,752216.036,1351.611,NG
1486,898377.337,752172.170,1352.119,NG
1487,898366.220,752145.428,1351.066,NG

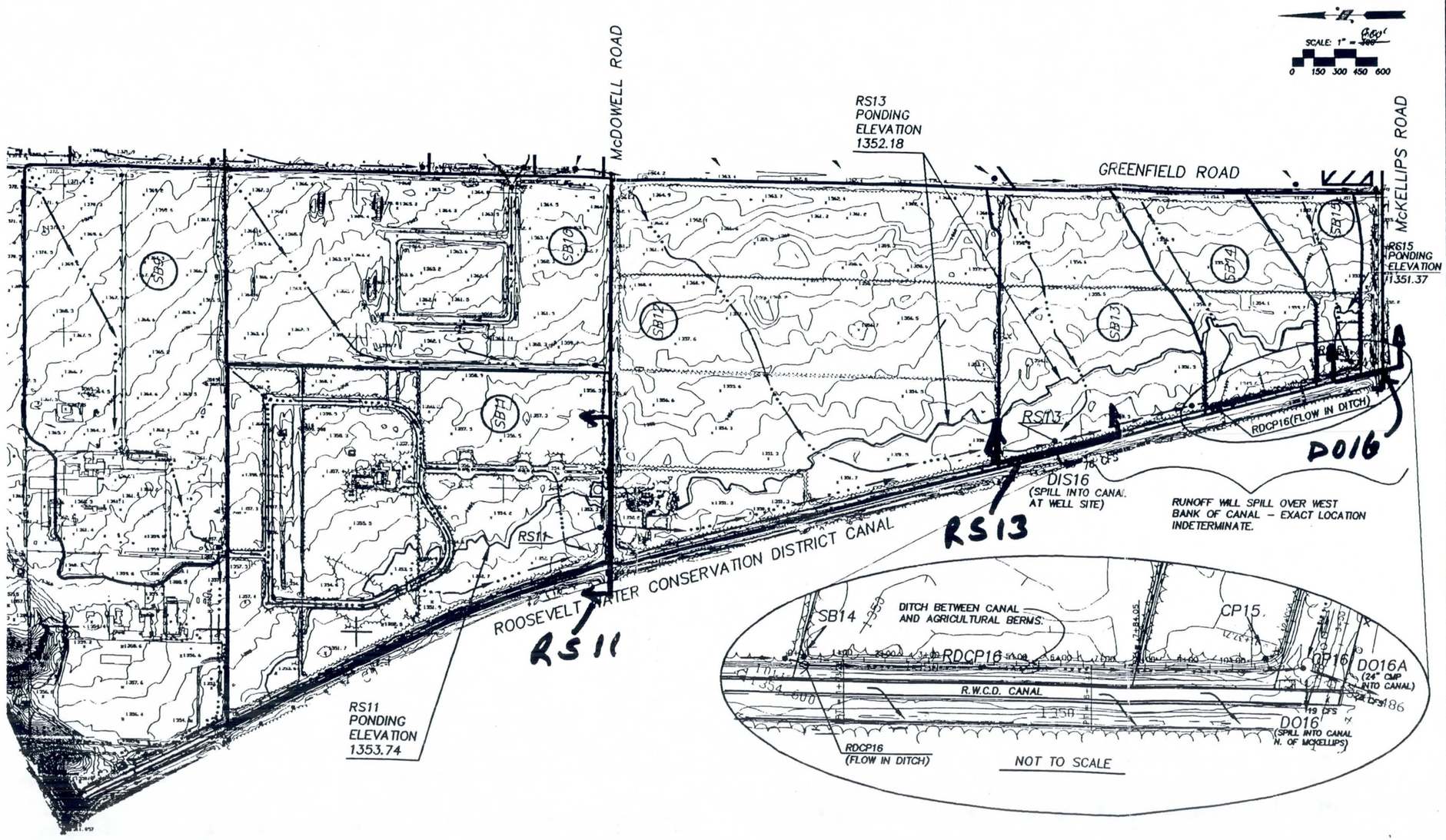
1488,898361.198,752134.482,1353.774,NG
1489,898357.257,752124.707,1353.869,NG
1490,898356.758,752123.298,1354.109,TOP
1491,898448.611,752079.341,1354.064,TOP
1492,898449.485,752081.019,1353.914,NG
1493,898453.353,752089.803,1353.726,NG
1494,898457.603,752099.126,1350.448,NG
1495,898466.431,752126.984,1351.629,NG
1496,898569.660,752086.764,1351.569,NG
1497,898560.399,752055.649,1350.492,NG
1498,898544.176,752045.071,1353.651,NG
1499,898539.667,752034.086,1354.131,TOP
1500,898631.517,751990.980,1354.341,TOP
1501,898631.498,751990.956,1354.354,TOP
1502,898636.411,752004.144,1353.629,NG
1503,898670.834,751966.481,1353.748,TOP
1504,898680.001,751990.814,1353.319,NG
1505,898685.871,751999.439,1351.153,NG
1506,898698.622,752021.099,1351.758,NG
1507,898765.903,751987.622,1351.897,NG
1508,898757.020,751965.300,1351.586,NG
1509,898751.685,751958.002,1353.606,NG
1510,898741.689,751931.849,1353.480,TOP
1511,898820.059,751896.082,1354.535,TOP
1512,898820.685,751897.579,1354.333,NG
1513,898825.656,751906.183,1353.837,NG
1514,898831.067,751914.497,1351.082,NG
1515,898841.547,751938.268,1351.737,NG
1516,898943.561,751891.211,1351.818,NG
1517,898934.005,751869.941,1350.789,NG
1518,898926.047,751855.951,1353.813,NG
1519,898921.640,751847.381,1354.096,NG
1520,898920.734,751845.435,1354.423,TOP
1521,899005.265,751802.992,1354.549,TOP
1522,899006.055,751804.709,1354.169,NG
1523,899010.552,751813.487,1354.145,NG
1524,899091.448,751760.858,1354.843,TOP
1525,899092.373,751762.502,1354.593,NG
1526,899096.310,751772.356,1354.154,NG
1527,899103.406,751783.671,1351.198,NG
1528,899116.779,751802.578,1351.930,NG
1529,899200.142,751765.094,1352.470,NG
1530,899191.980,751748.314,1352.146,NG
1531,899189.921,751744.489,1351.201,NG
1532,899184.302,751729.292,1354.307,NG
1533,899179.641,751719.270,1354.557,NG

1534,899178.520,751716.879,1354.774,TOP
1536,899266.370,751673.403,1354.759,TOP
1537,899267.331,751675.373,1354.469,NG
1538,899271.938,751684.544,1354.212,NG
1539,899278.695,751697.360,1351.790,NG
1540,899289.641,751713.555,1352.545,NG
1541,899379.151,751676.124,1352.814,NG
1542,899367.634,751653.317,1352.130,NG
1543,899360.753,751641.151,1354.517,NG
1544,899355.913,751630.611,1354.776,NG
1545,899355.101,751628.985,1355.056,TOP
1546,899443.752,751584.003,1355.138,TOP
1547,899444.506,751585.400,1354.975,NG
1548,899448.974,751595.193,1354.527,NG
1549,899450.863,751605.642,1352.163,NG
1550,899464.520,751626.912,1353.178,NG
1551,899553.193,751577.889,1353.320,NG
1552,899542.036,751559.184,1352.938,NG
1553,899538.688,751550.828,1354.892,NG
1554,899533.961,751541.138,1355.182,NG
1555,899533.153,751539.397,1355.606,TOP
1556,899621.011,751493.711,1356.000,TOP
1557,899622.117,751495.761,1355.361,NG
1558,899626.990,751506.670,1355.080,NG
1559,899630.672,751514.365,1353.004,NG
1560,899639.220,751531.932,1353.596,NG
1561,899726.645,751493.120,1353.946,NG
1562,899720.080,751475.636,1352.987,NG
1563,899713.967,751462.634,1355.139,NG
1564,899709.189,751452.369,1355.354,NG
1565,899708.341,751450.340,1355.611,TOP
1566,899797.772,751405.729,1356.021,TOP
1567,899798.423,751407.229,1355.640,NG
1568,899803.386,751419.038,1355.175,NG
1569,899808.030,751426.721,1353.234,NG
1570,899814.853,751434.968,1353.578,NG
1571,899895.788,751405.504,1354.058,NG
1572,899894.184,751388.855,1354.506,NG
1573,899890.946,751373.551,1355.788,NG
1574,899885.823,751362.364,1356.308,TOP
1576,899974.343,751318.119,1356.432,TOP
1577,899975.056,751319.696,1356.104,NG
1578,899984.244,751337.498,1355.294,NG
1579,899987.996,751344.323,1354.194,NG
1580,900075.188,751300.630,1354.077,NG
1581,900071.520,751291.642,1355.461,NG

1582,900063.610,751274.371,1356.293,NG
1583,900063.224,751273.526,1356.458,TOP
1584,900151.573,751229.669,1356.790,TOP
1585,900152.298,751230.968,1356.266,NG
1586,900162.388,751251.899,1355.624,NG
1587,900164.975,751256.544,1354.546,NG
1588,900250.752,751212.885,1354.640,NG
1589,900247.182,751203.610,1355.560,NG
1590,900238.930,751185.540,1355.975,TOP
1591,900325.674,751142.363,1356.438,TOP
1592,900326.282,751143.559,1356.018,NG
1593,900332.632,751158.381,1355.582,NG
1594,900339.957,751169.134,1354.427,NG
1596,900416.441,751097.180,1356.529,TOP
1597,900417.099,751098.497,1356.139,NG
1598,900425.890,751118.845,1355.012,NG
1599,900425.759,751119.709,1355.309,NG
1600,900427.913,751124.073,1354.182,NG
1601,900430.082,751131.407,1354.108,NG
1602,900430.944,751133.271,1354.656,NG
1603,900432.924,751138.013,1353.300,NG
1604,900435.060,751143.174,1354.881,NG
1605,900438.146,751148.727,1353.596,NG
1606,900533.308,751109.296,1353.735,NG
1607,900531.616,751104.154,1355.131,NG
1608,900531.008,751100.397,1353.640,NG
1609,900526.558,751094.639,1354.606,NG
1610,900520.299,751084.391,1353.771,NG
1611,900517.490,751074.763,1355.619,NG
1612,900508.087,751054.595,1356.320,NG
1613,900507.320,751053.058,1356.577,TOP
1614,900592.128,751009.955,1356.882,TOP
1615,900592.824,751011.041,1356.515,NG
1616,900606.429,751034.335,1355.980,NG
1617,900607.688,751037.193,1355.204,NG
1618,900626.951,751081.301,1354.912,NG
1619,900706.084,751019.534,1351.960,NG
1620,900699.691,751006.374,1351.840,NG
1621,900690.649,750987.008,1355.863,NG
1622,900681.566,750967.102,1356.415,NG
1623,900681.097,750965.943,1356.769,TOP
1624,900770.332,750920.005,1355.991,TOP
1625,900780.182,750937.047,1354.960,NG
1626,900795.145,750947.441,1351.071,NG
1627,900856.789,750875.109,1355.013,TOP
1628,900858.525,750878.272,1355.570,NG

?

1629,900864.940,750887.516,1354.947,NG
1630,900871.021,750892.219,1350.451,NG
1631,900881.497,750907.580,1350.487,NG
1632,900881.606,750853.650,1354.959,TOP
1634,900890.558,750855.977,1354.783,NG



The WLB Group INC. **WLB**

Engineering • Planning • Surveying
Landscape Architecture • Urban Design
Offices located in Tucson, Phoenix
Las Vegas, and Rancho Cucamonga, Ca.
333 East Osborn Road, Suite 200
Phoenix, Arizona 85012 (602) 279-1816

Project: FLOODPLAIN DELINEATION FOR THE UPPER ROOSEVELT WATER CONSERVATION DISTRICT CANAL FCD 96-07

Sheet Title: Cross Section Locations

No.	Date	Item

Revisions

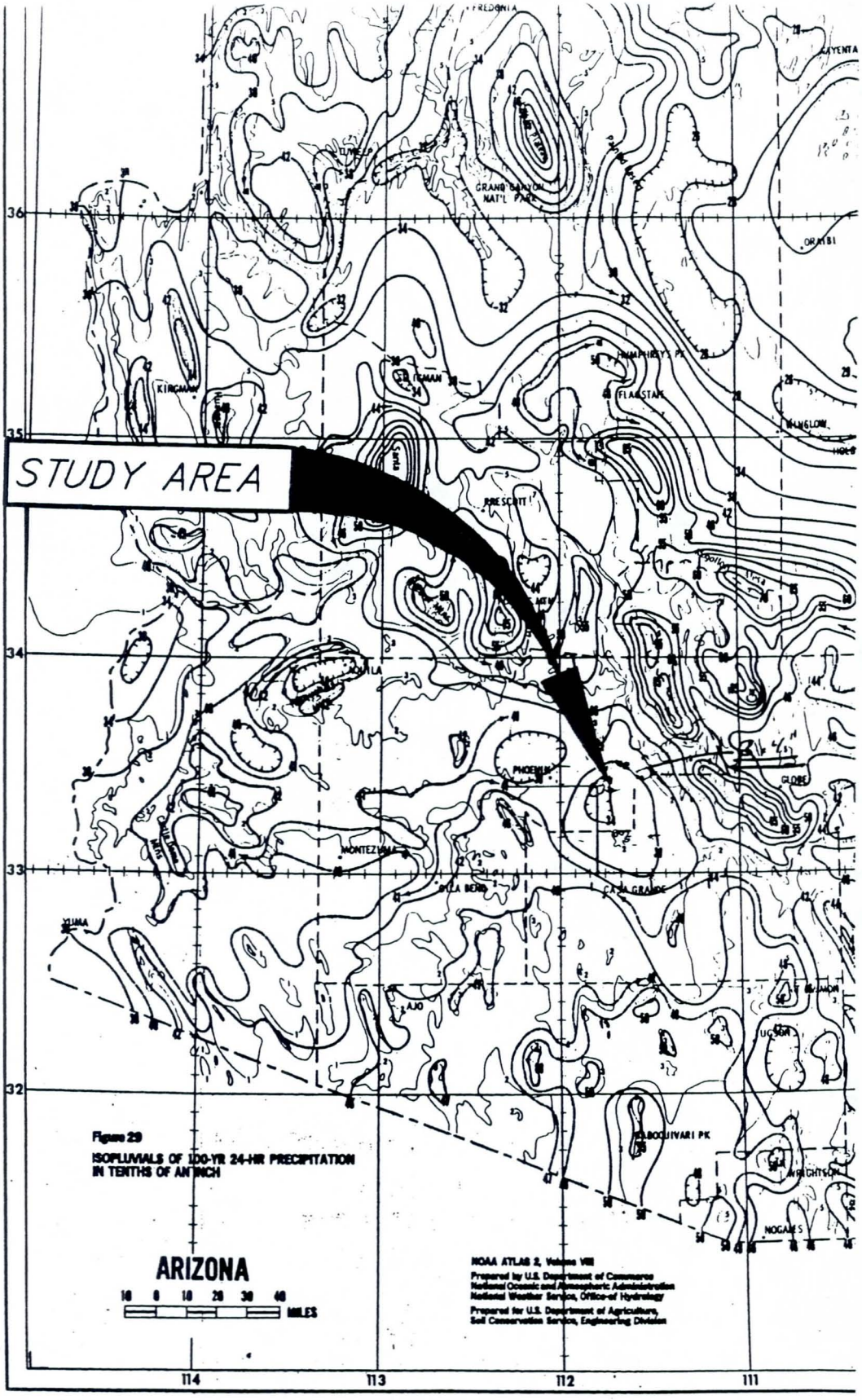
Scale	1" = 300' Fact
Job No.	296025A1
Date	6/17/97
Drawn By	DVA
Checked By	MJR

Sheet 1 Of 1

N:\296025\DTM\X_SEC Mon Dec 29 15:39:01 1997

D.1 Precipitation Data

The WLB Group Inc. **WLB**



100-YR 24-HR PRECIPITATION

Figure 6

U.S. GOVERNMENT PRINTING OFFICE: 1973 O—

100-YEAR PEAK DISCHARGE BY LP3 ANALYSIS (LP3 Q100) AND MAXIMUM RECORDED DISCHARGE (Q_M RECORD) vs. DRAINAGE AREA FOR 0.1 TO 2.0 SQUARE MILES

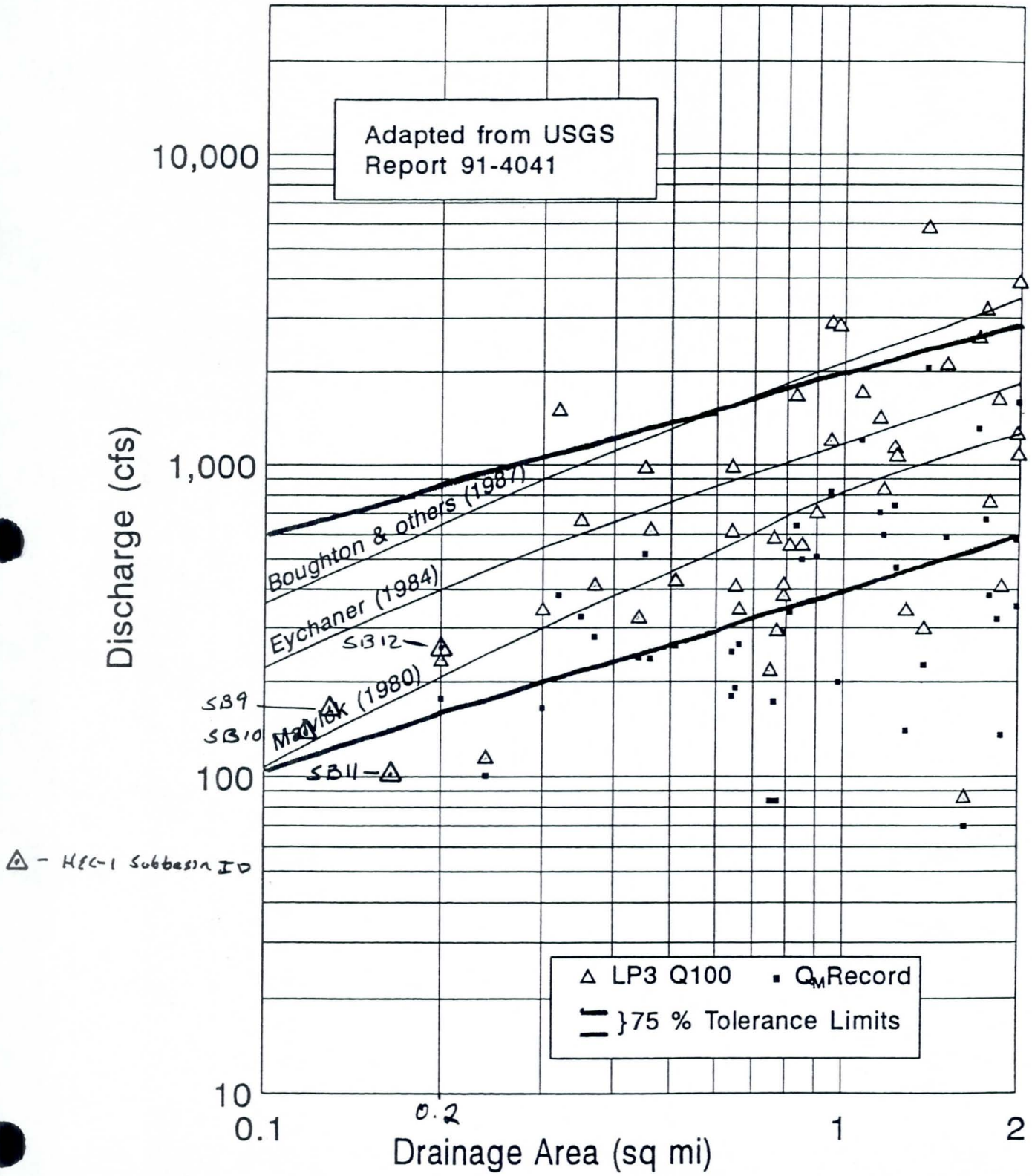


Figure 5

D.2 Physical Parameter Calculations

Table 4.2a IA, RTIMP, and Percent Vegetation Cover for Representative Land Uses in Maricopa County

Land Use Category	IA (inches)	RTIMP ** (percent)	Percent ** Veg. Cover	Gilbert Zoning Unit	Gilbert Description	Chandler Zoning Unit	Chandler Description	Mesa Zoning Unit	Mesa Description	Tempe Zoning Unit	Tempe Description	County Zoning Unit	County Description	Phoenix Zoning Unit	Phoenix Description
Agriculture	0.5*	0*	85*	AG	Agriculture	AG-1	Agriculture	AG	Agriculture	AG	Agriculture				
Very Low Density Residential	0.3*	5*	30*					R1-90	Single Residence			RURAL-190	190,000 sq. ft./dwelling unit	S-1	Ranch or Farm Residential, > 1 acre
								SR	Suburban Ranch			RURAL-70	70,000 sq. ft./dwelling unit	S-2	Ranch or Farm Commercial
				R1-43	Rural							RURAL-43	one acre/dwelling unit	RE-43	Single Family, 1 acre minimum
Low Density Residential	0.3*	15*	50*	R1-35	Rural Residential	SF-33	Single Family	R1-35	Single Residence			R1-35	Single Family Residential, 35,000 sq. ft./dwelling unit	RE-35	SF, 35,000 sq.ft min.
														RE-24	SF, 24,000 sq.ft min.
				R1-20	SF, Residential	SF-18	Single Family					R1-18	SFR, 18,000 sq. ft./unit	R1-18	SF, 18,000 sq.ft min.
				R1-15	" "			R1-15	Single Residence	R1-15	One Family Residential			R1-14	SF, 14,000 sq.ft min.
Medium Density Residential	0.25*	30*	50*	R1-10	" "	SF-10	Single Family	R1-9	Single Residence	R1-10	One Family Residential	R1-10	SFR, 10,000 sq. ft./unit	R1-10	SF, 10,000 sq.ft min.
				R1-8	" "					R1-8	One Family Residential	R1-8	SFR, 8,000 sq. ft./unit	R1-8	SF, 8,000 sq.ft min.
				R1-7	" "	SF-7	Single Family	R1-7	Single Residence	R1-7	One Family Residential				
								R1-6	Single Residence	R1-6	One Family Residential	R1-6	SFR, 6,000 sq. ft./unit	R1-6	SF, 6,000 sq.ft min.
								TCR-1	Town Center, Single Family	RO	Residence/Office			R-O	Res. Office
Multiple Family Residential	0.25*	45*	50*	R-2	Duplex	MF-1	Medium Density	R-2	Restricted Multiple Resid.	R-2	Multi-Family Residential	R-2	2 Family Residence	R-2	MF, 4,000 sq.ft./unit
				R-3	Multi-Family, Apartments	MF-2	Multi-Family	R-3	Limited Multiple Resid.	R-3R	Multi-Family Restricted	R-3	Multiple Family, Residential	R-3	MF, 3,000 sq.ft./unit
				R-4	Multi-Family, General	MF-3	High Density	R-4	General Multiple Resid.	R-3	Multi-Family Limited	R-4	Multiple Family, Residential	R-4	MF, 1,500 sq.ft./unit
				R-5	Townhouse Residential					R-4	Multi-Family General	R-5	Multiple Family, Residential	R-4A	MF, 1,000 sq.ft./unit
										R-Th	Townhouse			R-5	MF, 1,000 sq.ft./unit
				MH	Mobile Home	MH-1	Mobile Homes	TCR-2	TC, Restricted Multi-Res.	RMH	Mobile Home Residence	MHR	Manufactured Housing, Resid.	CP/BP	Business Park
				CTP	Commercial Trailer Park			TCR-3	TC, General Res.	MHS	Manufactured Housing Subd.			R-H	Resort District
										TP	Trailer Park				
Industrial	0.15*	55*	60*	I-1	Garden Type Industrial			M-1	Limited Industrial	I-1	Light Industrial			IND PARK	Industrial Park
				I-2	Light Industrial	I-1	Light Industrial			I-2	General Industrial	I-2	Light Industrial	A-1	Light Industrial
				I-3	General Industrial	I-2	General Industrial	M-2	General Industrial	I-3	Heavy Industrial	I-3	Heavy Industrial	A-2	Heavy Industrial
Commercial	0.1*	80*	75*	C-1	Light Commercial	C-1	Neighborhood Commercial	C-1	Neighborhood Comm.	CCR	Convenience Commercial	C-1	Neighborhood Commercial	C-1	Neighborhood Commercial
				C-2	General Commercial	C-2	Community Commercial	C-2	Limited Comm.	C-1	Neighborhood Commercial	C-2	Intermediate Commercial	C-2	Intermediate Commercial
				C-3	Central Commercial	C-3	Regional Commercial	C-3	General Comm.	C-2	General Commercial	C-3	General Commercial	C-3	General Commercial
				RS	Residential Services			OS	Office-Sercives	CCD	Central Comm. District	C-O	Commercial Office	C-O	Commercial Office
				RCC	Residential Conveniences			TCC	TC,High Intensity Mixed Use					HR	High Rise District
								TCB-1	TC, Limited Comm./General Manufacturing						
								TCB-2	TC, General Comm./ Light Manufacturing						
				MISCELLANEOUS CATEGORIES: These zoning units should be evaluated on a case by case basis.											
				PAD	Planned Area Development	PAD	Planned Area Development			S	Private School	PD	Planned Development Overlay	PAD	Planned Area Development
				PSC-1	Planned Neighborhood Shopping										
				PSC-2	Planned Shopping Center							CS	Planned Shopping Center	PSC	Planned Shopping Center
				IB	Industrial Buffer										
						PCO	Planned C Offices	PEP	Planned Employment Park						
								PF	Public Facilities			SU	Special Uses		
												SC	Senior Citizen Overlay	PCD	Planned Community Development
												NUP	Neighborhood Plan of Development		
												RUP	Residential Plan of Development		
												IUP	Industrial Plan of Development		
														R.O.W.	Right of Way
														P-1	Parking, Open
														P-2	Parking, Structures
														D.G	Dwelling Group

NOTES

* These values have been selected to fit many typical settings in Maricopa County. However, the engineer/hydrologist should ALWAYS evaluate the specific circumstances in any particular watershed for hydrological variations from these typical values.

** RTIMP = Percent Effective Impervious Area, Including R.O.W.

** Percent Veg. Cover = Percent vegetation cover for pervious area only

LOSS PARAMETERS FOR SUBBASIN: SB15

urvey Used Eastern County

KSAT

ap Unit	AREA Acres	% Area	XKSAT	% Rock Outcrop
AA	11.850	100.	0.25	0

TAL = 11.850 Acres XKSAT = 0.25 %Rock = 0

THETA

y = 0.35 PSIF = 4.80
rmal = 0.25
t = 0.00

AND USE

AREA Acres	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	PVMNT		NORMAL	0	95	0.05	0.01	Min	
	BAREGRD		NORMAL	10	40	0.15	0.03	Min	
11.	AGRI	100.	WET	90	10	0.50	0.20	Low	0.07
	L.D.R		NORMAL	50	25	0.30	0.01	Low	
	IND		NORMAL	60	55	0.15	0.01	Min	

1.850 = Total Area Avg. = 90 10% 0.500

ERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 0.0 %
WET = 100. %

JBBASIN DTHETA WEIGHTED BY LAND USE = 0.00

JBBASIN XKSAT ADJUSTED FOR VEG. = 0.47

MPERVIOUS AREA: URBAN @ 100 % effective = 10
ROCK OUTCROP @ 100 % effective = 0

% EFFECTIVE IMP. = 10

INPUT VALUES FOR MCUHP1 PROGRAM

JBBASIN	Area sq.mi.	Length mi.	Kb	Slope ft/mi	IA in.	DTHETA	PSIF	XKSAT adj.	RTIMP %
315	0.019	0.260	0.065	32.0	0.50	0.00	4.80	0.47	10

LOSS PARAMETERS FOR SUBBASIN: SB16

rvey Used Eastern County

:SAT

ıp Unit	AREA Acres	% Area	XKSAT	% Rock Outcrop
AA	2.900	100.	0.25	0

)TAL = 2.900 Acres XKSAT = 0.25 %Rock = 0

)THETA

-y = 0.35 PSIF = 4.80
ɔrmal = 0.25
ɜt = 0.00

ND USE

AREA Acres	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
0.670	PVMNT	23.1	NORMAL	0	95	0.05	0.01	Min	0.04
	BAREGRD		NORMAL	10	40	0.15	0.03	Min	
2	AGRI	76.9	WET	90	10	0.50	0.20	Low	0.08
	L.D.R		NORMAL	50	25	0.30	0.01	Low	
	IND		NORMAL	60	55	0.15	0.01	Min	

2.900 = Total Area Avg. = 89 30% 0.400

ERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 23.0 %
WET = 77.0 %

JBBASIN DTHETA WEIGHTED BY LAND USE = 0.06

JBBASIN XKSAT ADJUSTED FOR VEG. = 0.47

MPERVIOUS AREA: URBAN @ 100 % effective = 30
ROCK OUTCROP @ 100 % effective = 0

% EFFECTIVE IMP. = 30

INPUT VALUES FOR MCUHP1 PROGRAM

JBBASIN	Area sq.mi.	Length mi.	Kb	Slope ft/mi	IA in.	DTHETA	PSIF	XKSAT adj.	RTIMP %
316	0.005	0.220	0.065	31.0	0.40	0.06	4.80	0.47	30

LOOK UP TABLE: LDUSEMOD.LUT

NAME MEANS: Abbreviated land use definitions

LID	DEFINITION
0	Blank/unknown/uncertain
1	Low Density Residential
2	Medium Density Residential
3	High Density Residential
4	Developing Residential
5	Retail/Commercial
6	Office
7	Industrial
9	Educational
10	Public and Quasi-Public
11	Park
12	Waterway
13	Agricultural
14	Vacant
15	Non-Developable

LOOKUP TABLE: MNCPL.LUT

NAME MEANS: Municipality names.

LID	DEFINITION	CODE	FIRM NUMBER
0	Blank/unknown/uncertain		
1	AVONDALE	04 013	040038
2	BUCKEYE	04 013	040039
3	CAREFREE	04 013	040126
4	CAVE CREEK	04 013	040129
5	CHANDLER	04 013	040040
6	EL MIRAGE	04 013	040041
7	FOUNTAIN HILLS	04 013	
8	GILA BEND	04 013	040043
9	GILBERT	04 013	040044
10	GLENDALE	04 013	040045
11	GOODYEAR	04 013	040046
12	GUADALUPE	04 013	040111
13	LITCHFIELD PARK	04 013	040128
14	MARICOPA UNICORPORATED	04 013	040037
15	MESA	04 013	040048
16	PARADISE VALLEY	04 013	040049
17	PEORIA	04 013	040050
18	PHOENIX	04 013	040051
19	QUEEN CREEK	04 013	040132
20	SCOTTSDALE	04 013	045012

4.2 Surface Retention Loss

Surface retention loss, as used herein, is the summation of all rainfall losses other than infiltration. The major component of surface retention loss is depression storage; relatively minor components of surface retention loss are due to interception and evaporation, as previously discussed. Depression storage is considered to occur in two forms. First, in-place depression storage occurs at, and in the near vicinity of, the raindrop impact. The mechanism for this depression storage is the microrelief of the soil and soil cover. The second form of depression storage is the retention of surface runoff that occurs away from the point of raindrop impact in surface depressions such as puddles, roadway gutters and swales, roofs, irrigation bordered fields and lawns, and so forth.

A relatively minor contribution by interception is also considered as a part of the total surface retention loss. Estimates of surface retention loss are difficult to obtain and are a function of the physiography and land-use of the area.

The surface retention loss on impervious surfaces has been estimated to be in the range 0.0625 inch to 0.125 inch by Tholin and Keefer (1960), 0.11 inch for 1 percent slope to 0.06 inch for 2.5 percent slopes by Viessman (1967), and 0.04 inch based on rainfall-runoff data for an urban watershed in Albuquerque by Sabol (1983). Hicks (1944) provides estimates of surface retention losses during intense storms as 0.20 inch for sand, 0.15 inch for loam, and 0.10 inch for clay. Tholin and Keefer (1960) estimated the surface retention loss for turf to be between 0.25 to 0.50 inch. Based on rainfall simulator studies on undeveloped alluvial plains in the Albuquerque area, the surface retention loss was estimated as 0.1 to 0.2 inch (Sabol and others, 1982a). Rainfall simulator studies in New Mexico result in estimates of 0.39 inch for eastern plains rangelands and 0.09 inch for pinon-juniper hillslopes (Sabol and others, 1982b). Surface retention losses for various land-uses and surface cover conditions in Maricopa County have been extrapolated from these reported estimates and these are shown in Table 4.1.

Table 4.1
Surface Retention Loss for Various Land Surfaces in Maricopa County

Land-use and/or Surface Cover (1)	Surface Retention Loss IA, Inches (2)
Natural	
Desert and rangeland, flat slope	0.35
Hillslopes, Sonoran Desert	0.15
Mountain, with vegetated surface	0.25
Developed (Residential and Commercial)	
Lawn and turf	0.20
Desert landscape	0.10
Pavement	0.05
Agricultural	
Tilled fields and irrigated pasture	0.50

Table 5.1
Equation for Estimating K_b in the Tc Equation

$K_b = m \log A + b$ Where A is drainage area, in acres				
Type	**Description**	**Typical Applications**	**Equation Parameters**	
			m	**b**
A	Minimal roughness: Relatively smooth and/or well graded and uniform land surfaces. Surface runoff is sheet flow.	Commercial/ industrial areas Residential area Parks and golf courses	–0.00625	0.04
B	Moderately low roughness: Land surfaces have irregularly spaced roughness elements that protrude from the surface but the overall character of the surface is relatively uniform. Surface runoff is predominately sheet flow around the roughness elements.	Agricultural fields Pastures Desert rangelands Undeveloped urban lands	–0.01375	0.08
C	Moderately high roughness: Land surfaces that have significant large- to medium-sized roughness elements and/or poorly graded land surfaces that cause the flow to be diverted around the roughness elements. Surface runoff is sheet flow for short distances draining into meandering drainage paths.	Hillslopes Brushy alluvial fans Hilly rangeland Disturbed land, mining, etc. Forests with underbrush	–0.025	0.15
D	Maximum roughness: Rough land surfaces with torturous flow paths. Surface runoff is concentrated in numerous short flow paths that are often oblique to the main flow direction.	Mountains Some wetlands	–0.030	0.20

Soil Types within Drainage Area

Map Unit No.	Soil Name	USDA Soil Texture	Control Horizon Depth, in	Table 4.2 Textural Class	XKSAT, in/hr
Af	Agualt	Fine Sandy Loam	0-17	Loam	0.25
Ag	Agualt	Loam	0-17	Loam	0.25
Am	Alluvial Land	Sand	0-60	Loamy Sand	1.20
AnA	Antho	Sandy Loam	0-17	Sandy Loam	0.40
AnB	Antho	Sandy Loam	0-17	Sandy Loam	0.40
AoB	Antho	Gravelly Sandy Loam	0-17	Sandy Loam	0.40
Av	Avondale	Clay Loam	0-13	Clay Loam	0.04
Ca	Carrizo	Gravelly Loamy Sand	0-15	Loamy Sand	1.20
Cb	Carrizo	Fine Sandy Loam	0-15	Loam	0.25
Cc	Cashion	Clay	0-12	Clay	0.01
CeC	Cavelt	Gravelly Loam	2-8	Sandy Loam	0.40
Co	Contine	Clay Loam	0-12	Clay Loam	0.04
Es	Estrella	Loam	0-15	Loam	0.25
Gf	Gilman	Fine Sandy Loam	0-13	Loam	0.25
Gm	Gilman	Loam	0-13	Loam	0.25
Gn	Glenbar	Clay Loam	0-14	Clay Loam	0.04
Gr	Gravelly Alluvial Land	Very Gravelly Sandy Loam, Loamy Sand	0-60	Loamy Sand	1.20
LaA	Laveen	Loam	0-14	Loam	0.25
LaB	Laveen	Loam	0-14	Loam	0.25
LeA	Laveen	Clay Loam	0-14	Clay Loam	0.04
Mo	Mohall	Sandy Loam	0-16	Sandy Loam	0.40
Mv	Mohall	Loam	0-15	Loam	0.25
Pm	Pimer	Clay Loam	0-15	Clay Loam	0.04
PnA	Pinal	Gravelly Loam	0-18	Sandy Loam	0.40
PnC	Pinal	Gravelly Loam	0-18	Sandy Loam	0.40
Po	Pinal Variant	Loam	0-13	Loam	0.25
PvA	Pinamt	Very Gravelly Loam	0-3	Sandy Loam	0.40
PvC	Pinamt	Very Gravelly Loam	0-3	Sandy Loam	0.40
RlA	Rillito	Gravelly Loam	0-13	Sandy Loam	0.40
RlB	Rillito	Gravelly Loam	0-13	Sandy Loam	0.40
Ro	Rock Land	Gravelly Loam - Clay Loam	—	Loam	0.25
Ru	Rough Broken Land	Varies	—	Sandy Loam	0.40
TrB	Tremant	Gravelly Sandy Clay Loam	1-5	Silt	0.10
Tx	Trix	Clay Loam	0-14	Clay Loam	0.04
Va	Valencia	Sandy Loam	0-13	Sandy Loam	0.40
Ve	Vecont	Clay	0-14	Clay	0.01
Vf	Vint	Loamy Fine Sand	0-12	Loamy Sand	1.20

FCD FIS Along the RWCD Canal Job # 296025
Land Use Input Parameters

Land Use Type	DTHETA Condition	% Veg Cover	RTIMP %	IA in	Kn Not Required	Kb Type
Pvmnt	Normal	0.00	95.00	0.05		Min
Bareground	Normal	10.00	*40.00*	0.15		Min
Agri	Wet	90.00	*10.00*	0.5		Low
LDR	Normal	50.00	25.00	0.30		Low
IND	Normal	*60.00*	55.00	0.15		Min

LOSS PARAMETERS FOR SUBBASIN: SB1

.rvey Used Eastern County

KSAT

ap Unit	AREA Acres	% Area	XKSAT	% Rock Outcrop
LAA	13.900	100.	0.25	0

OTAL = 13.900 Acres XKSAT = 0.25 %Rock = 0

DTHETA

ry = 0.35 PSIF = 4.80
ormal = 0.25
et = 0.00

AND USE

AREA Acres	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
11.200	PVMNT	80.6	NORMAL	0	95	0.05	0.01	Min	0.03
2.700	BAREGRD	19.4	NORMAL	10	40	0.15	0.03	Min	0.04
	AGRI		WET	90	10	0.50	0.20	Low	
	L.D.R		NORMAL	50	25	0.30	0.01	Low	
	IND		NORMAL	60	55	0.15	0.01	Min	

3.900 = Total Area Avg. = 7 84% 0.070

ERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

UBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

UBBASIN XKSAT ADJUSTED FOR VEG. = 0.24

MPERVIOUS AREA: URBAN @ 100 % effective = 84
ROCK OUTCROP @ 100 % effective = 0

% EFFECTIVE IMP. = 84

INPUT VALUES FOR MCUHP1 PROGRAM

UBBASIN	Area sq.mi.	Length mi.	Kb	Slope ft/mi	IA in.	DTHETA	PSIF	XKSAT adj.	RTIMP %
SB1	0.022	0.260	0.033	38.0	0.07	0.25	4.80	0.24	84

LOSS PARAMETERS FOR SUBBASIN: SB9

Survey Used Eastern County

KSAT

ap Unit	AREA Acres	% Area	XKSAT	% Rock Outcrop
PO	25.200	30.0	0.25	0
PNA	58.660	69.9	0.40	0

TAL = 83.860 Acres XKSAT = 0.35 %Rock = 0

DTHETA

ry = 0.35 PSIF = 4.25
ormal = 0.25
et = 0.00

AND USE

AREA Acres	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	PVMNT		NORMAL	0	95	0.05	0.01	Min	
	BAREGRD	81.9	NORMAL	10	40	0.15	0.03	Min	0.03
	AGRI		WET	90	10	0.50	0.20	Low	
	L.D.R		NORMAL	50	25	0.30	0.01	Low	
15.150	IND	18.1	NORMAL	60	55	0.15	0.01	Min	0.03

3.860 = Total Area Avg. = 17 43% 0.150

ERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

JBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

JBBASIN XKSAT ADJUSTED FOR VEG. = 0.38

MPERVIOUS AREA: URBAN @ 100 % effective = 43
ROCK OUTCROP @ 100 % effective = 0

% EFFECTIVE IMP. = 43

INPUT VALUES FOR MCUHP1 PROGRAM

JBBASIN	Area sq.mi.	Length mi.	Kb	Slope ft/mi	IA in.	DTHETA	PSIF	XKSAT adj.	RTIMP %
	0.131	0.590	0.028	27.0	0.15	0.25	4.25	0.38	43

LOSS PARAMETERS FOR SUBBASIN: SB2

ɔurvey Used Eastern County

KSAT

ap Unit	AREA Acres	% Area	XKSAT	% Rock Outcrop
LAA	9.710	100.	0.25	0

OTAL = 9.710 Acres XKSAT = 0.25 %Rock = 0

DTHETA

ry = 0.35 PSIF = 4.80
ormal = 0.25
et = 0.00

AND USE

AREA Acres	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
4.960	PVMNT	51.1	NORMAL	0	95	0.05	0.01	Min	0.04
4.750	BAREGRD	48.9	NORMAL	10	40	0.15	0.03	Min	0.04
	AGRI		WET	90	10	0.50	0.20	Low	
	L.D.R		NORMAL	50	25	0.30	0.01	Low	
	IND		NORMAL	60	55	0.15	0.01	Min	

9.710 = Total Area Avg. = 9 68% 0.100

ERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

UBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

UBBASIN XKSAT ADJUSTED FOR VEG. = 0.25

MPERVIOUS AREA: URBAN @ 100 % effective = 68
ROCK OUTCROP @ 100 % effective = 0

% EFFECTIVE IMP. = 68

INPUT VALUES FOR MCUHP1 PROGRAM

UBBASIN	Area sq.mi.	Length mi.	Kb	Slope ft/mi	IA in.	DTHETA	PSIF	XKSAT adj.	RTIMP %
B2	0.015	0.140	0.034	21.0	0.10	0.25	4.80	0.25	68

LOSS PARAMETERS FOR SUBBASIN: SB3

Survey Used Eastern County

SAT

p Unit	AREA Acres	% Area	XKSAT	% Rock Outcrop
AA	20.430	100.	0.25	0

TAL = 20.430 Acres XKSAT = 0.25 %Rock = 0

THETA

y = 0.35 PSIF = 4.80
rmal = 0.25
t = 0.00

ND USE

AREA cres	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
2.700	PVMNT	13.2	NORMAL	0	95	0.05	0.01	Min	0.04
7.730	BAREGRD	86.8	NORMAL	10	40	0.15	0.03	Min	0.03
	AGRI		WET	90	10	0.50	0.20	Low	
	L.D.R		NORMAL	50	25	0.30	0.01	Low	
	IND		NORMAL	60	55	0.15	0.01	Min	
.430 = Total Area			Avg. =	10	47%	0.140			

RCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

BBASIN DTHETA WEIGHTED BY LAND USE = 0.25

BBASIN XKSAT ADJUSTED FOR VEG. = 0.25

PERVIOUS AREA: URBAN @ 100 % effective = 47
ROCK OUTCROP @ 100 % effective = 0

% EFFECTIVE IMP. = 47

INPUT VALUES FOR MCUHP1 PROGRAM

BBASIN	Area sq.mi.	Length mi.	Kb	Slope ft/mi	IA in.	DTHETA	PSIF	XKSAT adj.	RTIMP %
3	0.032	0.280	0.032	29.0	0.14	0.25	4.80	0.25	47

LOSS PARAMETERS FOR SUBBASIN: SB4

Survey Used Eastern County

SAT

Unit	AREA Acres	% Area	XKSAT	% Rock Outcrop
AA	13.580	100.	0.25	0

TAL = 13.580 Acres XKSAT = 0.25 %Rock = 0

THETA

y = 0.35 PSIF = 4.80
rmal = 0.25
t = 0.00

ND USE

AREA cres	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
0.380	PVMNT	2.8	NORMAL	0	95	0.05	0.01	Min	0.04
3.200	BAREGRD	97.2	NORMAL	10	40	0.15	0.03	Min	0.03
	AGRI		WET	90	10	0.50	0.20	Low	
	L.D.R		NORMAL	50	25	0.30	0.01	Low	
	IND		NORMAL	60	55	0.15	0.01	Min	

.580 = Total Area Avg. = 10 42% 0.150

RCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

BBASIN DTHETA WEIGHTED BY LAND USE = 0.25

BBASIN XKSAT ADJUSTED FOR VEG. = 0.25

PERVIOUS AREA: URBAN @ 100 % effective = 42
ROCK OUTCROP @ 100 % effective = 0

% EFFECTIVE IMP. = 42

INPUT VALUES FOR MCUHP1 PROGRAM

BBASIN	Area sq.mi.	Length mi.	Kb	Slope ft/mi	IA in.	DTHETA	PSIF	XKSAT adj.	RTIMP %
	0.021	0.260	0.033	27.0	0.15	0.25	4.80	0.25	42

LOSS PARAMETERS FOR SUBBASIN: SB5

.rvey Used Eastern County

KSAT

ap Unit	AREA Acres	% Area	XKSAT	% Rock Outcrop
AA	8.450	100.	0.25	0

TAL = 8.450 Acres XKSAT = 0.25 %Rock = 0

THETA

ry = 0.35 PSIF = 4.80
rmal = 0.25
et = 0.00

AND USE

AREA Acres	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	PVMNT		NORMAL	0	95	0.05	0.01	Min	
8.450	BAREGRD	100.	NORMAL	10	40	0.15	0.03	Min	0.03
	AGRI		WET	90	10	0.50	0.20	Low	
	L.D.R		NORMAL	50	25	0.30	0.01	Low	
	IND		NORMAL	60	55	0.15	0.01	Min	

8.450 = Total Area Avg. = 10 40% 0.150

ERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

UBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

UBBASIN XKSAT ADJUSTED FOR VEG. = 0.25

MPERVIOUS AREA: URBAN @ 100 % effective = 40
ROCK OUTCROP @ 100 % effective = 0

% EFFECTIVE IMP. = 40

INPUT VALUES FOR MCUHP1 PROGRAM

UBBASIN	Area sq.mi.	Length mi.	Kb	Slope ft/mi	IA in.	DTHETA	PSIF	XKSAT adj.	RTIMP %
B5	0.013	0.230	0.034	30.0	0.15	0.25	4.80	0.25	40

LOSS PARAMETERS FOR SUBBASIN: SB6

Survey Used Eastern County

KSAT

ap Unit	AREA Acres	% Area	XKSAT	% Rock Outcrop
LAA	15.360	100.	0.25	0

OTAL = 15.360 Acres XKSAT = 0.25 %Rock = 0

DTHETA

ry = 0.35 PSIF = 4.80
ormal = 0.25
et = 0.00

AND USE

AREA Acres	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
7.100	PVMNT	46.2	NORMAL	0	95	0.05	0.01	Min	0.03
8.260	BAREGRD	53.8	NORMAL	10	40	0.15	0.03	Min	0.03
	AGRI		WET	90	10	0.50	0.20	Low	
	L.D.R		NORMAL	50	25	0.30	0.01	Low	
	IND		NORMAL	60	55	0.15	0.01	Min	

5.360 = Total Area Avg. = 9 65% 0.100

ERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

UBBASIN DTHETA WEIGHTED BY LAND USE = 0.25

UBBASIN XKSAT ADJUSTED FOR VEG. = 0.25

MPERVIOUS AREA: URBAN @ 100 % effective = 65
ROCK OUTCROP @ 100 % effective = 0

% EFFECTIVE IMP. = 65

INPUT VALUES FOR MCUHP1 PROGRAM

UBBASIN	Area sq.mi.	Length mi.	Kb	Slope ft/mi	IA in.	DTHETA	PSIF	XKSAT adj.	RTIMP %
	0.024	0.420	0.033	21.0	0.10	0.25	4.80	0.25	65

LOSS PARAMETERS FOR SUBBASIN: SB7

==========

urvey Used Eastern County

KSAT

======

ap Unit	AREA Acres	% Area	XKSAT	% Rock Outcrop
LAA	48.250	100.	0.25	0

TAL = 48.250 Acres XKSAT = 0.25 %Rock = 0

DTHETA

=======

ry = 0.35 PSIF = 4.80

ormal = 0.25

et = 0.00

AND USE

=======

AREA Acres	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
0.360	PVMNT	0.7	NORMAL	0	95	0.05	0.01	Min	0.04
2.000	BAREGRD	4.1	NORMAL	10	40	0.15	0.03	Min	0.04
4[illegible]	AGRI	95.1	WET	90	10	0.50	0.20	Low	0.06
	L.D.R		NORMAL	50	25	0.30	0.01	Low	
	IND		NORMAL	60	55	0.15	0.01	Min	

3.250 = Total Area Avg. = 88 12% 0.480

ERCENT OF SUBBASIN DRY = 0.0 %

NORMAL = 5.0 %

WET = 95.0 %

UBBASIN DTHETA WEIGHTED BY LAND USE = 0.01

UBBASIN XKSAT ADJUSTED FOR VEG. = 0.47

MPERVIOUS AREA: URBAN @ 100 % effective = 12

ROCK OUTCROP @ 100 % effective = 0

% EFFECTIVE IMP. = 12

INPUT VALUES FOR MCUHP1 PROGRAM

UBBASIN	Area sq.mi.	Length mi.	Kb	Slope ft/mi	IA in.	DTHETA	PSIF	XKSAT adj.	RTIMP %
B7	0.075	0.480	0.055	15.0	0.48	0.01	4.80	0.47	12

LOSS PARAMETERS FOR SUBBASIN: SB8

urvey Used Eastern County

SAT

p Unit	AREA Acres	% Area	XKSAT	% Rock Outcrop			
O	12.200	34.1	PO	12.200	34.1	0.25	0
NA	4.480	12.5	0.40	0			
AA	19.110	53.4	0.25	0			

TAL = 35.790 Acres XKSAT = 0.27 %Rock = 0

THETA

y = 0.35 PSIF = 4.65
rmal = 0.25
t = 0.00

ND USE

AREA cres	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
0	PVMNT	0.7	NORMAL	0	95	0.05	0.01	Min	0.04
	BAREGRD		NORMAL	10	40	0.15	0.03	Min	
540	AGRI	99.3	WET	90	10	0.50	0.20	Low	0.06
	L.D.R		NORMAL	50	25	0.30	0.01	Low	
	IND		NORMAL	60	55	0.15	0.01	Min	

.790 = Total Area Avg. = 90 11% 0.500

RCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 1.0 %
WET = 99.0 %

BBASIN DTHETA WEIGHTED BY LAND USE = 0.00

BBASIN XKSAT ADJUSTED FOR VEG. = 0.51

PERVIOUS AREA: URBAN @ 100 % effective = 11
ROCK OUTCROP @ 100 % effective = 0

% EFFECTIVE IMP. = 11

INPUT VALUES FOR MCUHP1 PROGRAM

BBASIN	Area sq.mi.	Length mi.	Kb	Slope ft/mi	IA in.	DTHETA	PSIF	XKSAT adj.	RTIMP %
	0.056	0.420	0.059	10.0	0.50	0.00	4.65	0.51	11

LOSS PARAMETERS FOR SUBBASIN: SB10

Survey Used Eastern County

SAT

p Unit	AREA Acres	% Area	XKSAT	% Rock Outcrop
NA	7.600	10.0	0.40	0
AA	68.340	90.0	0.25	0

TAL = 75.940 Acres XKSAT = 0.26 %Rock = 0

THETA

y = 0.35 PSIF = 4.70
rmal = 0.25
t = 0.00

ND USE

AREA Acres	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
3.500	PVMNT	4.6	NORMAL	0	95	0.05	0.01	Min	0.04
	BAREGRD	95.4	NORMAL	10	40	0.15	0.03	Min	0.03
	AGRI		WET	90	10	0.50	0.20	Low	
	L.D.R		NORMAL	50	25	0.30	0.01	Low	
	IND		NORMAL	60	55	0.15	0.01	Min	

.940 = Total Area Avg. = 10 43% 0.150

RCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 100. %
WET = 0.0 %

BBASIN DTHETA WEIGHTED BY LAND USE = 0.25

BBASIN XKSAT ADJUSTED FOR VEG. = 0.26

PERVIOUS AREA: URBAN @ 100 % effective = 43
ROCK OUTCROP @ 100 % effective = 0

% EFFECTIVE IMP. = 43

INPUT VALUES FOR MCUHP1 PROGRAM

BBASIN	Area sq.mi.	Length mi.	Kb	Slope ft/mi	IA in.	DTHETA	PSIF	XKSAT adj.	RTIMP %
	0.119	0.590	0.028	19.0	0.15	0.25	4.70	0.26	43

LOSS PARAMETERS FOR SUBBASIN: SB11

.rvey Used Eastern County

:SAT

ıp Unit	AREA Acres	% Area	XKSAT	% Rock Outcrop
⁽NA	21.580	20.0	0.40	0
AA	86.520	80.0	0.25	0

)TAL = 108.100 Acres XKSAT = 0.27 %Rock = 0

)THETA

'y = 0.35 PSIF = 4.65
)rmal = 0.25
ıt = 0.00

ND USE

AREA Acres	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
6.300	PVMNT	5.8	NORMAL	0	95	0.05	0.01	Min	0.04
	BAREGRD		NORMAL	10	40	0.15	0.03	Min	
	AGRI	90.9	WET	90	10	0.50	0.20	Low	0.05
3.580	L.D.R	3.3	NORMAL	50	25	0.30	0.01	Low	0.07
	IND		NORMAL	60	55	0.15	0.01	Min	

)8.10 = Total Area Avg. = 89 15% 0.470

:RCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 9.0 %
WET = 91.0 %

JBBASIN DTHETA WEIGHTED BY LAND USE = 0.02

JBBASIN XKSAT ADJUSTED FOR VEG. = 0.51

IPERVIOUS AREA: URBAN @ 100 % effective = 15
ROCK OUTCROP @ 100 % effective = 0

% EFFECTIVE IMP. = 15

INPUT VALUES FOR MCUHP1 PROGRAM

JBBASIN	Area sq.mi.	Length mi.	Kb	Slope ft/mi	IA in.	DTHETA	PSIF	XKSAT adj.	RTIMP %
	0.169	0.780	0.051	14.0	0.47	0.02	4.65	0.51	15

LOSS PARAMETERS FOR SUBBASIN: SB12

urvey Used Eastern County

:SAT

ıp Unit	AREA Acres	% Area	XKSAT	% Rock Outcrop
.AA	133.900	100.	0.25	0

)TAL = 133.900 Acres XKSAT = 0.25 %Rock = 0

)THETA

:y = 0.35 PSIF = 4.80
ɔrmal = 0.25
ɔt = 0.00

ND USE

AREA Acres	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	PVMNT		NORMAL	0	95	0.05	0.01	Min	
	BAREGRD		NORMAL	10	40	0.15	0.03	Min	
33.[illegible]	AGRI	99.3	WET	90	10	0.50	0.20	Low	0.05
	L.D.R	0.7	NORMAL	50	25	0.30	0.01	Low	0.08
	IND		NORMAL	60	55	0.15	0.01	Min	

33.90 = Total Area Avg. = 90 10% 0.500

ERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 1.0 %
WET = 99.0 %

JBBASIN DTHETA WEIGHTED BY LAND USE = 0.00

JBBASIN XKSAT ADJUSTED FOR VEG. = 0.47

MPERVIOUS AREA: URBAN @ 100 % effective = 10
ROCK OUTCROP @ 100 % effective = 0

% EFFECTIVE IMP. = 10

INPUT VALUES FOR MCUHP1 PROGRAM

JBBASIN	Area sq.mi.	Length mi.	Kb	Slope ft/mi	IA in.	DTHETA	PSIF	XKSAT adj.	RTIMP %
312	0.209	0.480	0.051	28.0	0.50	0.00	4.80	0.47	10

LOSS PARAMETERS FOR SUBBASIN: SB13

Survey Used Eastern County

KSAT

ap Unit	AREA Acres	% Area	XKSAT	% Rock Outcrop
LAA	48.090	100.	0.25	0

OTAL = 48.090 Acres XKSAT = 0.25 %Rock = 0

DTHETA

ry = 0.35 PSIF = 4.80
ormal = 0.25
et = 0.00

AND USE

AREA Acres	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	PVMNT		NORMAL	0	95	0.05	0.01	Min	
	BAREGRD		NORMAL	10	40	0.15	0.03	Min	
	AGRI	100.	WET	90	10	0.50	0.20	Low	0.06
	L.D.R		NORMAL	50	25	0.30	0.01	Low	
	IND		NORMAL	60	55	0.15	0.01	Min	

8.090 = Total Area Avg. = 90 10% 0.500

ERCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 0.0 %
WET = 100. %

UBBASIN DTHETA WEIGHTED BY LAND USE = 0.00

UBBASIN XKSAT ADJUSTED FOR VEG. = 0.47

MPERVIOUS AREA: URBAN @ 100 % effective = 10
ROCK OUTCROP @ 100 % effective = 0

% EFFECTIVE IMP. = 10

INPUT VALUES FOR MCUHP1 PROGRAM

UBBASIN	Area sq.mi.	Length mi.	Kb	Slope ft/mi	IA in.	DTHETA	PSIF	XKSAT adj.	RTIMP %
SB1	0.075	0.340	0.057	31.0	0.50	0.00	4.80	0.47	10

LOSS PARAMETERS FOR SUBBASIN: SB14

.rvey Used Eastern County

:SAT

ıp Unit	AREA Acres	% Area	XKSAT	% Rock Outcrop
.AA	26.900	100.	0.25	0

)TAL = 26.900 Acres XKSAT = 0.25 %Rock = 0

)THETA

'y = 0.35 PSIF = 4.80
ɔrmal = 0.25
ıt = 0.00

ND USE

AREA ıcres	LAND USE Type	% Area	DTHETA condition	%Veg. cover	RTIMP%	IA in.	Kn	Kb Type	Kb
	PVMNT		NORMAL	0	95	0.05	0.01	Min	
	BAREGRD		NORMAL	10	40	0.15	0.03	Min	
6.	AGRI	100.	WET	90	10	0.50	0.20	Low	0.06
	L.D.R		NORMAL	50	25	0.30	0.01	Low	
	IND		NORMAL	60	55	0.15	0.01	Min	

.900 = Total Area Avg. = 90 10% 0.500

:RCENT OF SUBBASIN DRY = 0.0 %
NORMAL = 0.0 %
WET = 100. %

IBBASIN DTHETA WEIGHTED BY LAND USE = 0.00

IBBASIN XKSAT ADJUSTED FOR VEG. = 0.47

IPERVIOUS AREA: URBAN @ 100 % effective = 10
ROCK OUTCROP @ 100 % effective = 0

% EFFECTIVE IMP. = 10

INPUT VALUES FOR MCUHP1 PROGRAM

IBBASIN	Area sq.mi.	Length mi.	Kb	Slope ft/mi	IA in.	DTHETA	PSIF	XKSAT adj.	RTIMP %
314	0.042	0.290	0.060	31.0	0.50	0.00	4.80	0.47	10

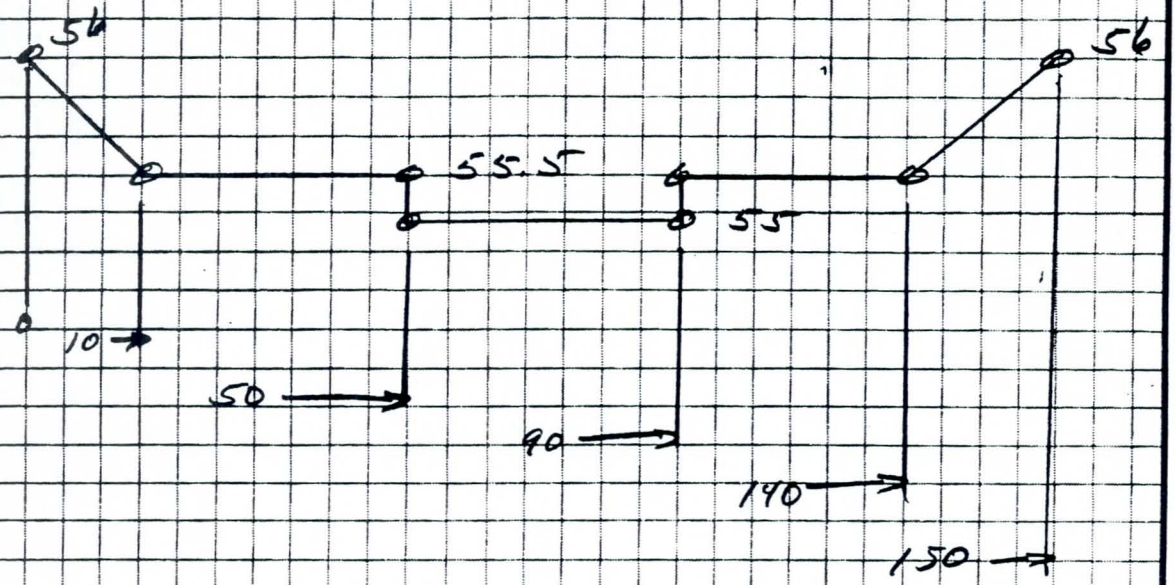
D.3 Hydrograph Routing Data

The WLB Group Inc. WLB

COMPUTATION DATA SHEET

Subject Route R9 Prepared by MJR Date

8 pt x-section



Route DIS9 through SB 11, most flow is within roadway.

Length ≅ 1,000'

slope ≅ 0.002'/'

'n' Overbank = 0.04

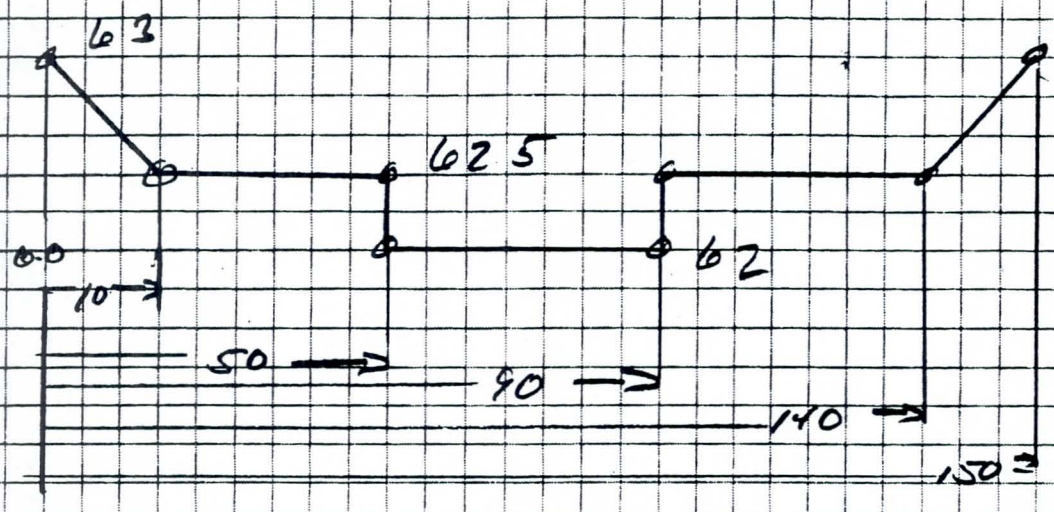
street = 0.015

The WLB Group Inc. WLB

COMPUTATION DATA SHEET

Subject Route R10 Prepared by MJK Date

Rpt x-section



Route CP10 through SB10 and combine with SB11

Length ≈ 2400 FT

Slope ≈ 0.005 ft/ft

n = 0.04 for overbank areas.
0.015 for street sections

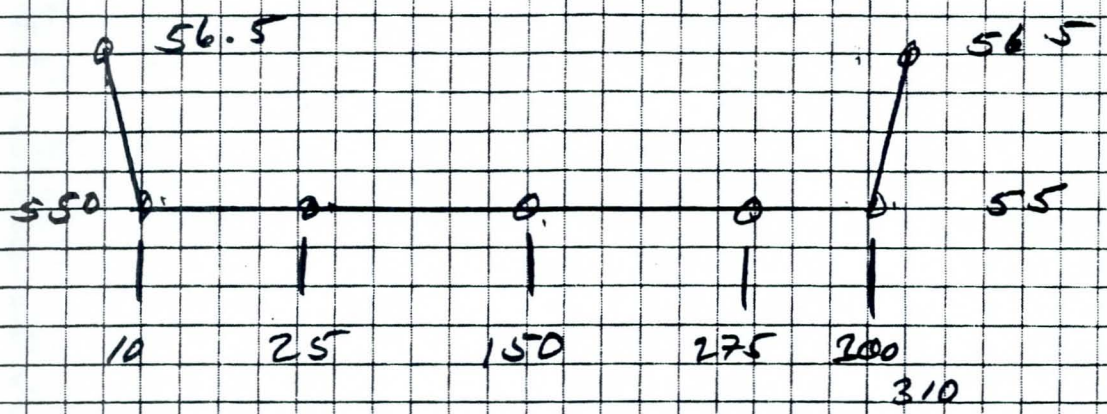
Note: same route as R84 except L = 1800', S = 0.0015 ft/ft

The WLB Group Inc. WLB

COMPUTATION DATA SHEET

Subject Route R11 Prepared by MJR Date

8 pt x-section



Route outflow from RS11 through SR12 to RS13

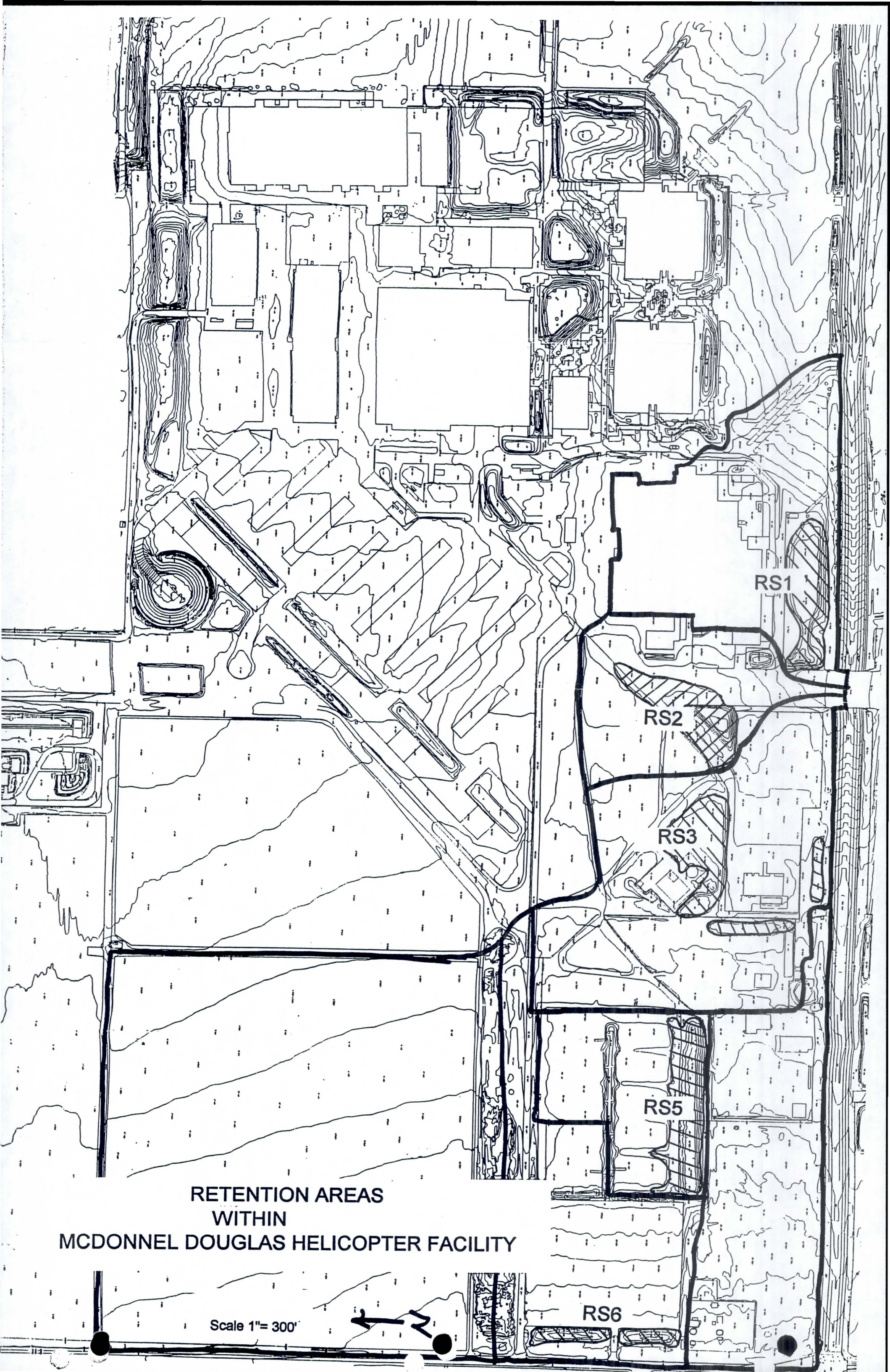
Assumed sheet flow through Orange Groves.

Length = 3000'

S = 0.001'/'

n = 0.06

D.4 Reservoir Routing



RETENTION AREAS
WITHIN
MCDONNEL DOUGLAS HELICOPTER FACILITY

The WLB Group Inc. WLB

COMPUTATION DATA SHEET

Subject Ponding Areas on McDonnel Douglas Prepared by MJK Date

RS1

Elev. FT	Area FT²	Depth FT	AVG Area ~~FT²~~ AC	Inc Volume FT³	Cum Volume FT³
1573.2	.23				
		.8	.42		
1574.0	.62				
		1.0	.76		
1575.0	.90				
		1.0	1.03		
1576.0	1.16				

The WLB Group Inc. WLB

COMPUTATION DATA SHEET

Subject Ponding on McDonnel Douglas Prepared by MJR Date

RS2

Elev. FT	Area AC	Avg Area AC	Depth FT	Inc. Volume AC-FT	Cum Volume AC-FT
1570	.05				
		.11	1.0		
1571	.17				
		.20	1.0		
1572	.22				
		.24	1.0		
1573	.26				
		.39	1.0		
1574	.53				
		.90	0.5		
1574.5	1.27				

The WLB Group Inc. WLB

COMPUTATION DATA SHEET

Subject Pending on McDonnel Douglas Prepared by MJK Date

RS 3

Elev	Area AC	AVG Area AC	Depth FT	INC. Volume AC-FT	Cum Volume AC-FT
1572.0	.11				
		.20	.5	0.10	.10
1572.5	.29				
		.26	.5	0.26	.35
1573.0	.74				

The WLB Group Inc. WLB

COMPUTATION DATA SHEET

Subject Pond on McDonnel Douglas Prepared by MJR Date

RS5

Elev FT	Area AC	AVG Area AC	Depth FT	Inc Volume AC-FT	Cum Volume AC-FT
1566.5	0.0				
		.19	.5	.10	.10
1567.0	0.38				
		.52	1.0	.52	0.61
1568.0	0.65				
		.79	1.0	.79	1.41
1569.0	0.94				
		1.31	1.0	1.31	2.72
1570.0	1.69				

The WLB Group Inc. WLB

COMPUTATION DATA SHEET

Subject Ponding on McDonnel Douglas Prepared by MJL Date

RS6

South Basin

Elev FT	Area AC	AVG Area AC	Depth FT	Volume AC-FT	Volume AC-FT
1563	0.02				
		0.05	1.0	.05	0.05
1564	0.08				
		0.12	1.0	.12	0.17
1565	0.16				
		0.19	1.0	.19	0.36
1566	0.23				

North Basin

Elev FT	Area AC	AVG Area AC	Depth FT	Volume AC-FT	Volume AC-FT
1563	0.07	0.11	1.0	0.11	0.11
1564	0.15				
		0.20	1.0	0.20	0.31
1565	0.25				

Combined Volumes

Elev FT	Cum Volume AC-FT
1563	0.0
1564	0.16
1565	0.48
1566	0.67

The WLB Group Inc. WLB

COMPUTATION DATA SHEET

RWCD Canal FIS
Job No. 296025

Subject Ponding Volumes + Areas Prepared by MJR Date

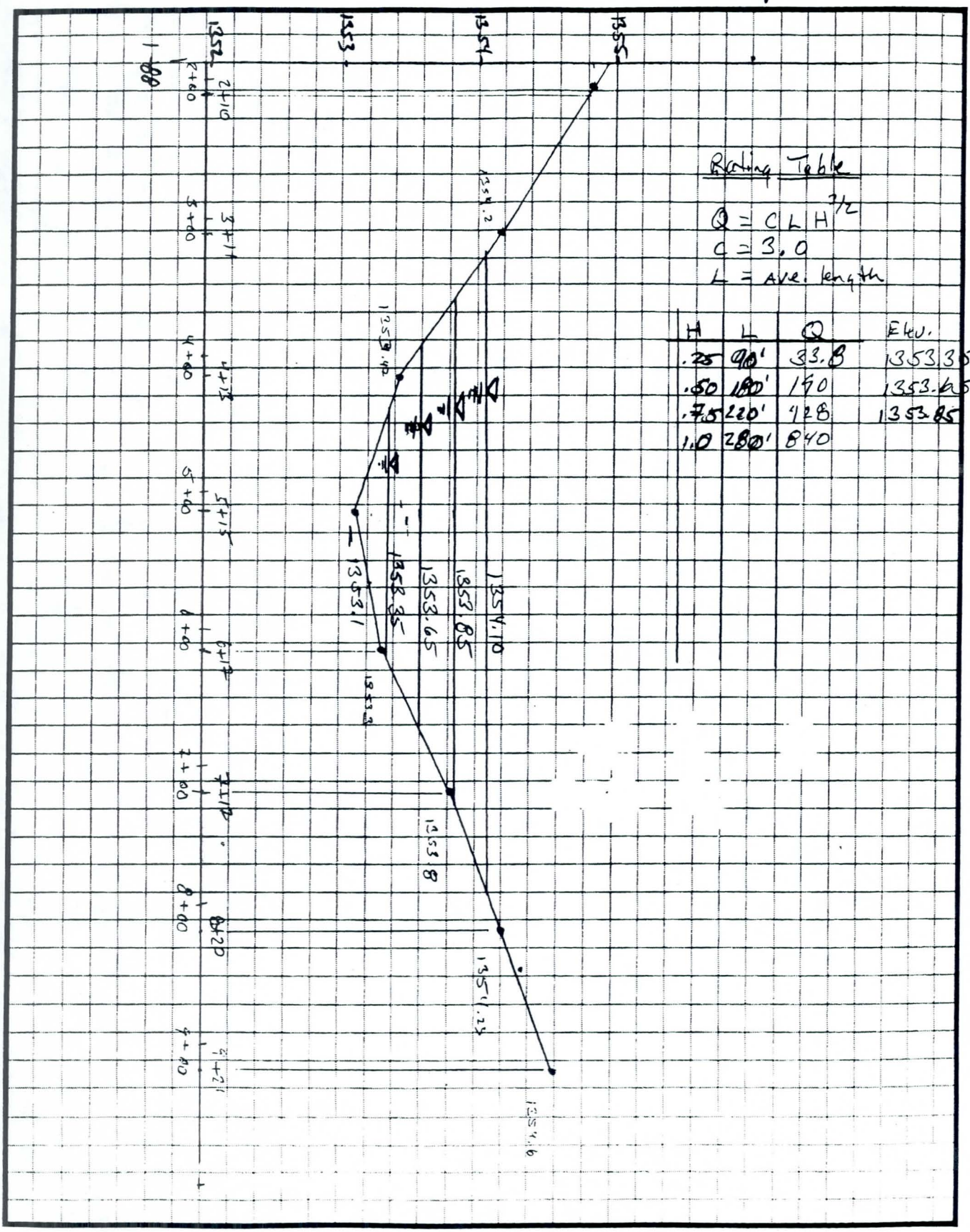
Subbasin RS11

Elev. (FT)	Area (AC)	Depth (FT)	Avg. Area (FT²/AC)	Inc Volume (FT³/AC-FT)	Cumm Volume (FT³/AC-FT)
1350	0.0				
		1.0	0.08	0.08	0.08
1351	0.158				
		1.0	1.18	1.18	1.26
1352	2.210				
		1.0	7.96	7.96	9.22
1353	13.70				
		1.0	18.75	18.75	27.97
1354	23.80				

The WLB Group Inc. WLB

COMPUTATION DATA SHEET

Subject McDowell Road Profile RS11 Prepared by MJR Date



Routing Table

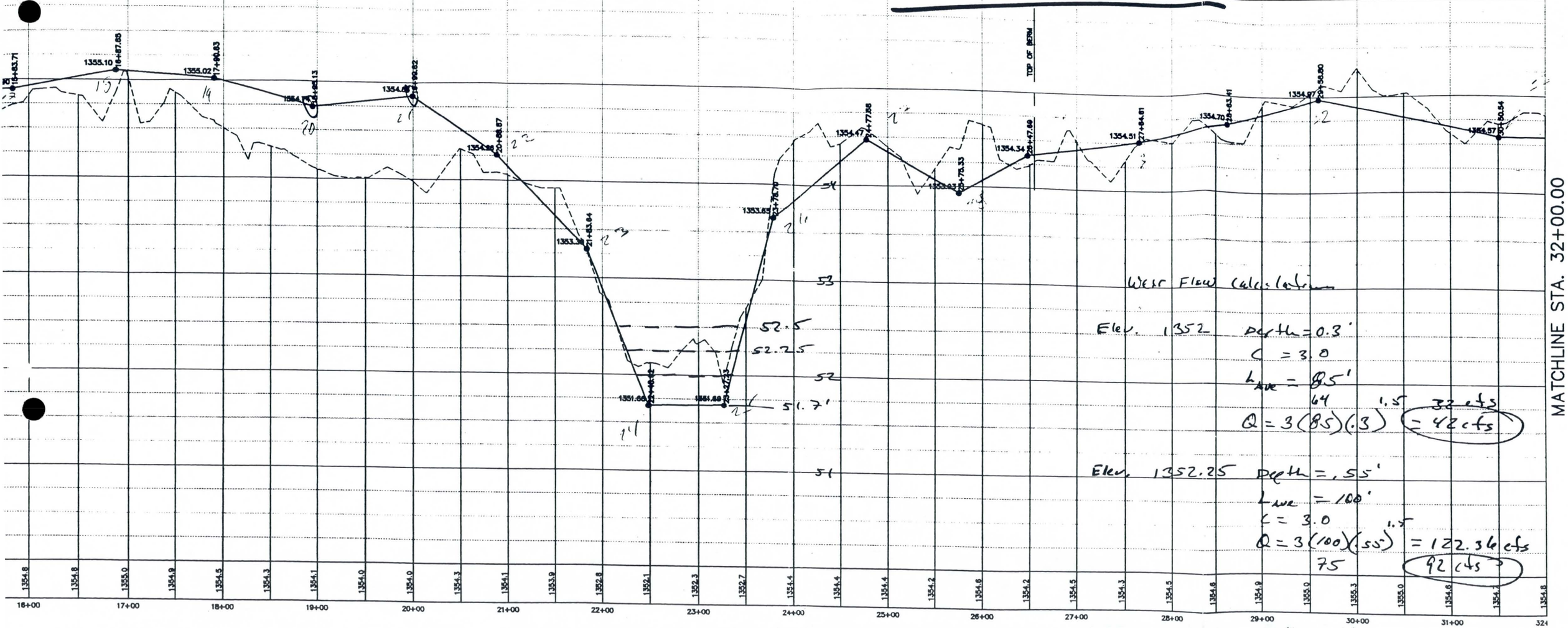
$Q = C L H^{3/2}$

$C = 3.0$

L = Ave. length

H	L	Q	Elev.
.25	90'	33.8	1353.35
.50	180'	140	1353.65
.75	220'	428	1353.85
1.0	280'	840	

Out Fall at RS13

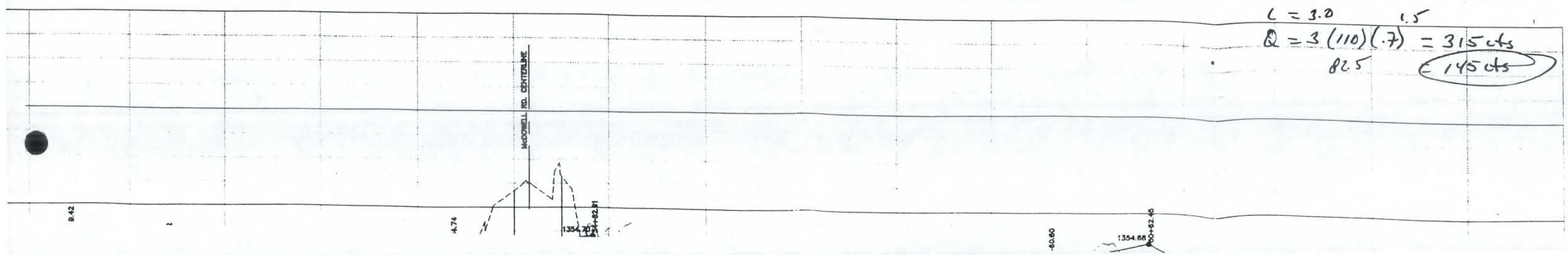


Weir Flow calculations

Elev. 1352 Depth = 0.3'
C = 3.0
L_{AVE} = 85'
64 1.5 32 cfs
$Q = 3(85)(.3)^{1.5}$ = 42 cfs

Elev. 1352.25 Depth = .55'
L_{AVE} = 100'
C = 3.0
$Q = 3(100)(.55)^{1.5}$ = 122.36 cfs
75 92 cfs

Elev. 1352.5 Depth = 0.7'
L_{AVE} = 110'
C = 3.0
$Q = 3(110)(.7)^{1.5}$ = 315 cfs
82.5 145 cfs



MATCHLINE STA. 32+00.00

The WLB Group Inc. WLB

COMPUTATION DATA SHEET

Subject Outfall at RS13 Prepared by MJK Date

Rating Curve using Weir Equation $Q = CLH^{3/2}$

$C = 3.0$

Elev. FT	Depth FT	Avg Length FT	Q cfs
1352	0.30	85	42.0
1352.25	0.55	100	92.0
1352.50	0.70	110	145.0

Discharge will spill into canal and overflow the west canal bank between elevations 1351 + 1352.

The WLB Group Inc. WLB

COMPUTATION DATA SHEET
RWCD FIS
Job No. 296025

Subject Ponding Area + Volumes Prepared by MJR Date

SB14 Available Storage

Elev (FT)	Area (FT^2)	Area (AC)	Depth (FT)	Incr Volume (AC-FT)	Cum Volume (AC-FT)
1349.6	0.0				
		.55	.4	.29	.29
1350.0	1.11				
		2.61	1.0	2.51	2.79
1351.0	4.12				
		5.57	1.0	4.83	7.62
1352.0	7.02				
		7.92	1.0	6.6	(14.23)
1353.0	8.82				

Volumes to be combined with SB12 storage and SB15 storage in RS13.

The WLB Group Inc. WLB

COMPUTATION DATA SHEET

RWCD FIS
Job No. 296025

Subject Pond Areas + Volumes Prepared by MJR Date

SB13 Available storage

Elev Ft	Area Ft^2	depth Ft	AVG Area Ft^2 AC	INC. Volume Ft^3 AC-FT	Cum Volume Ft^3 AC-FT
1349.3	0				
		.7	.86	.707	.707
1350	1.72				
		1.0	4.38	3.91	4.61
1351	7.05				
		1.0	10.0	8.16	12.77
1352	12.95				
		1.0	15.79	12.39	25.17
1353	18.62				

Note: Volume found by using cone method

$$V = \frac{H}{3}\left(\left(A_1 + A_2\right) + \sqrt{A_1 + A_2}\right)$$

Volumes to be combined with SB12 storage and SB14 storage in RS13

The WLB Group Inc. WLB

COMPUTATION DATA SHEET

RWCD Canal FIS

296025

Subject Ponding Volumes + Areas Prepared by MJL Date

Subbasin SB12 Available storage

Elev FT	Area FT²	Avg Area FT² AC	Depth FT	Inc. Volume FT³ AC-FT	Comm Volume FT³ AC-FT
1350.6	0				
		1,585	0.4	.66	.66
1351.0	3.17				
		9,945	1.0	8.11	8.77
1352.0	16.72				
		20,83	1.0	16.04	24.81
1353.0	24.94				

Note: Volumes were calculated using the conic method

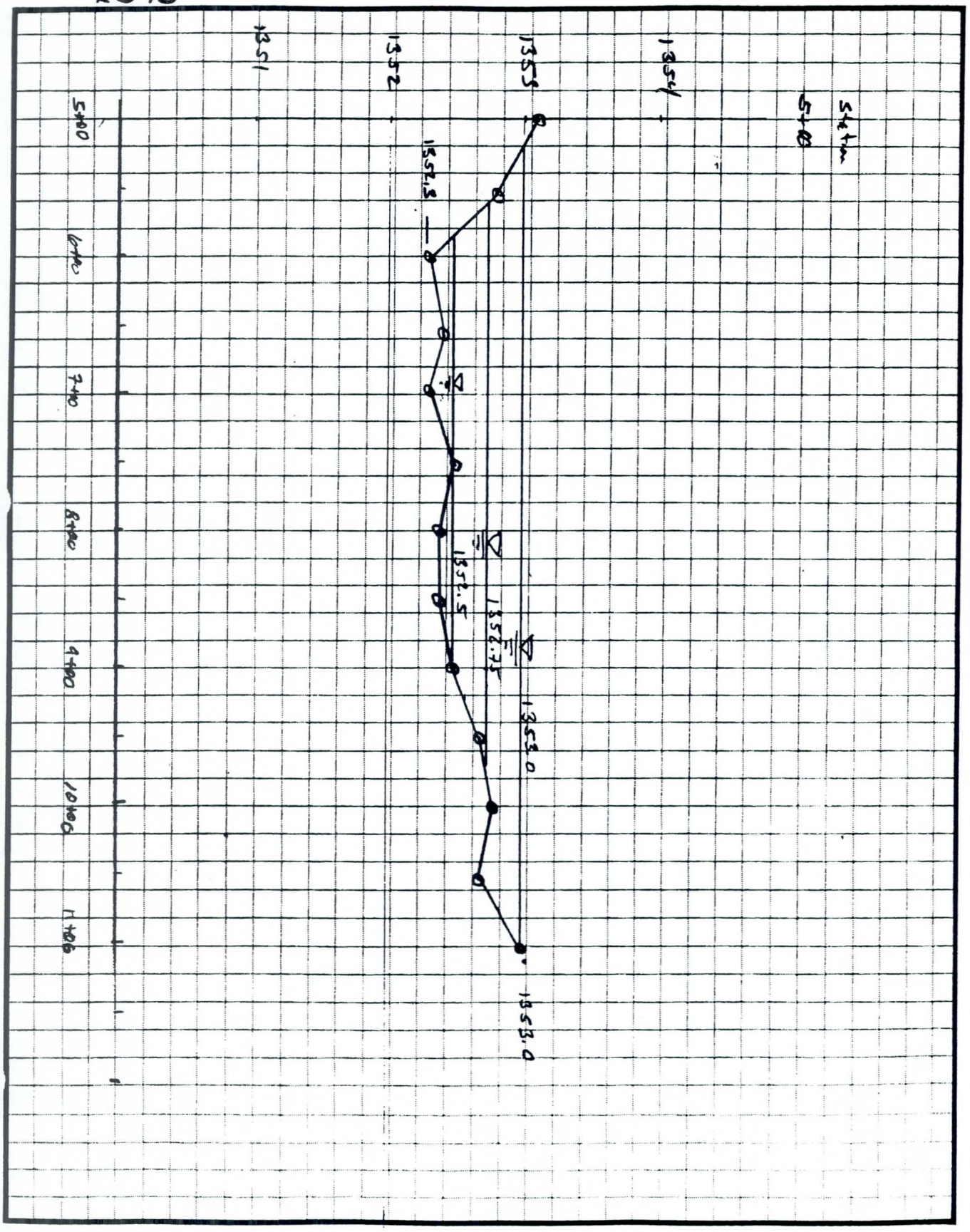
$$V = \frac{H}{3}\left((A_1 + A_2) + \sqrt{A_1 + A_2}\right)$$

Volumes to be combined with SB13 storage and SB14 storage in RS13

The WLB Group Inc. WLB

COMPUTATION DATA SHEET

Subject SB15 Outlet Rating table + Profile RS 15 Prepared by MJR Date



D.5 Flow Splits and Diversions Data

The WLB Group Inc. WLB

COMPUTATION DATA SHEET

Subject _____ Prepared by _____ Date _____

Split Flow at
Greenfield Road + McKellips
DOC90

The WLB Group Inc. WLB

COMPUTATION DATA SHEET

Subject _____ Prepared by [illegible] Date _____

Split Flow Calculation

at

Greenfield + McKellips

Greenfield Cap. - 26.5 cfs (27)

McKellips Cap - 210 cfs

210 + 27 = 237 cfs

∴ Split Flow = $\frac{210}{237}$ = 88.6% Down McKellips

+ 11.4 % Down Greenfield Rd.

Use 90/10 split

MCKELLIPS WWEST OF GREENFIELD
Worksheet for Irregular Channel

Project Description	
Project File	h:\flowmsrt\rwcdfis.fm2
Worksheet	MCKELLIPS ROAD WEST OF GREENFIELD
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data

Channel Slope	0.006000	ft/ft
Water Surface Elevation	1370.50	ft

Elevation range: 1369.50 ft to 1370.50 ft.

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	1370.50	0.00	74.00	0.020
10.00	1369.50			
38.00	1370.06			
64.00	1369.50			
74.00	1370.50			

Flow Assumed to be at Top of Banks

Results

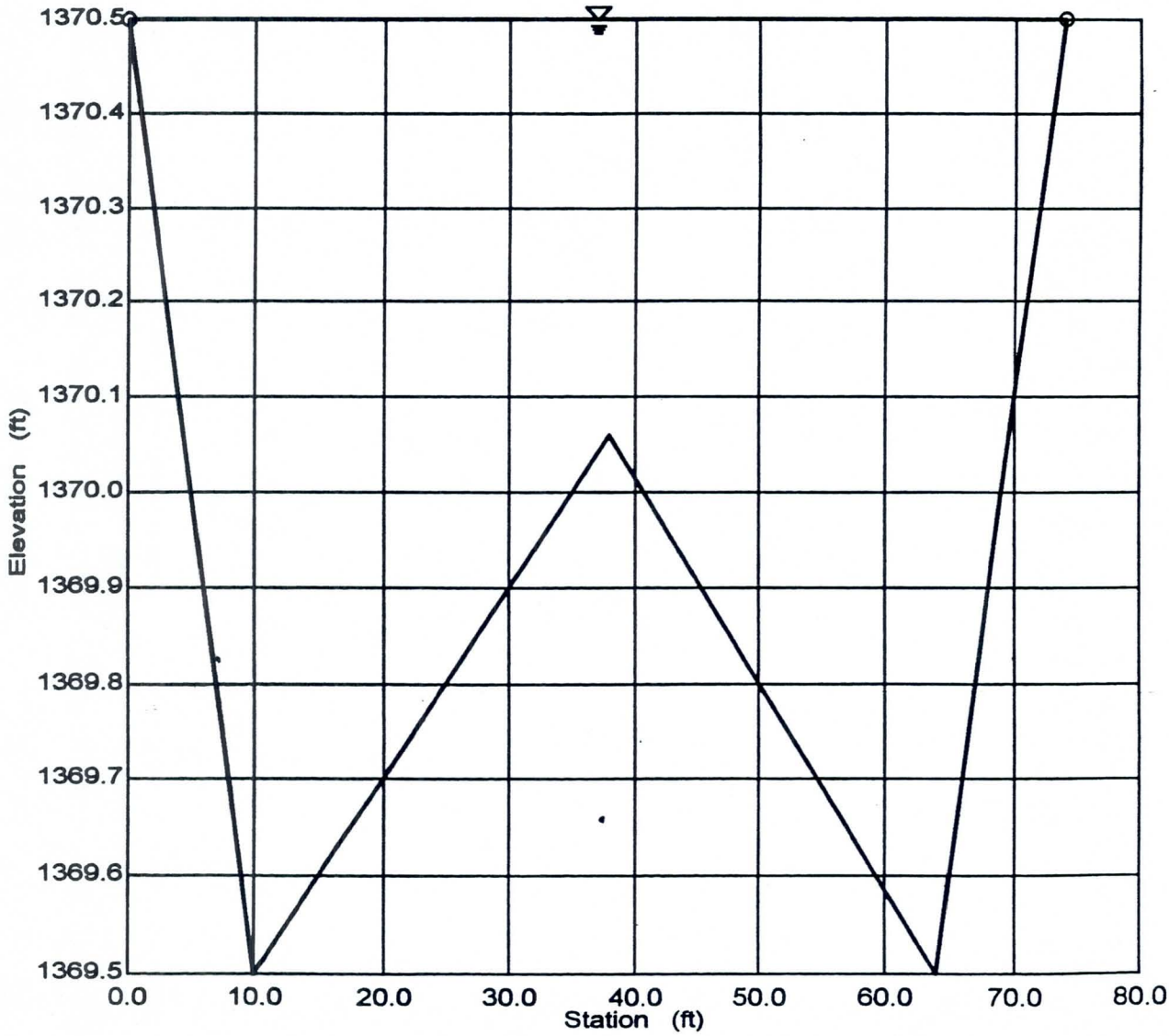
Wtd. Mannings Coefficient	0.020	
Discharge	213.14	ft^3/s
Flow Area	48.88	ft^2
Wetted Perimeter	74.11	ft
Top Width	74.00	ft
Depth	1.00	ft
Critical Water Elev.	1370.47	ft
Critical Slope	0.006779	ft/ft
Velocity	4.36	ft/s
Velocity Head	0.30	ft
Specific Energy	1370.80	ft
Froude Number	0.95	
Full Flow Capacity	213.14	ft^3/s

Flow is subcritical.

MCKELLIPS
Cross Section for Irregular Channel

Project Description	
Project File	h:\flowmsrt\rwcdfis.fm2
Worksheet	MCKELLIPS ROAD WEST OF GREENFIELD
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data		
Wtd. Mannings Coefficient	0.020	
Channel Slope	0.006000	ft/ft
Water Surface Elevation	1370.50	ft
Discharge	213.14	ft^3/s



The WLB Group Inc. WLB

COMPUTATION DATA SHEET

Subject _____ Prepared by _____ Date _____

Split Flow calculations
at SB 84 + Greenfield Rd.

The WLB Group Inc. WLB

COMPUTATION DATA SHEET

Subject Diverts at Greenfield Rd + SB 84 Prepared by MJR Date

Greenfield Rd: Capacity 26.5 cfs

Inlet capacity calculations

4 pairs (East + West side of roadway)

3' length ∴ Total Inlet length = 4 × 2 × 3' = 24'

Assume depth in street is at top of curb

∴ y = 0.5'

From City of Phoenix Storm Drain Design manual

Capture rate is 1.1 cfs/ft ∴ 24 ft × 1.1 cfs/ft = 26.4 cfs

Sequence of Diverts at Greenfield Rd + Concentration pt for SB 84

1) Runoff from SB 84 enters Greenfield Rd.
2) all flow upto 26.4 cfs is intercepted by Storm Drain Inlets
3) Flow in excess of Inlet capacity + Top of Curb street capacity will spill into SB 13.

Job # 296025

Full Flow Capacity of Greenfield Road
Worksheet for Irregular Channel

Maximum capacity for Greenfield Rd flowing at Top of Curbs. All flow above this will spill into Orange Groves to the west.

Project Description	
Project File	h:\flowmsrt\rwcdfis.fm2
Worksheet	Green Field Road
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Channel Slope	0.001900	ft/ft
Water Surface Elevation	1357.00	ft

Elevation range: 1356.50 ft to 1357.14 ft.

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	1357.00	0.00	64.00	0.012
0.00	1356.50			
32.00	1357.14			
64.00	1356.50			
64.00	1357.00			

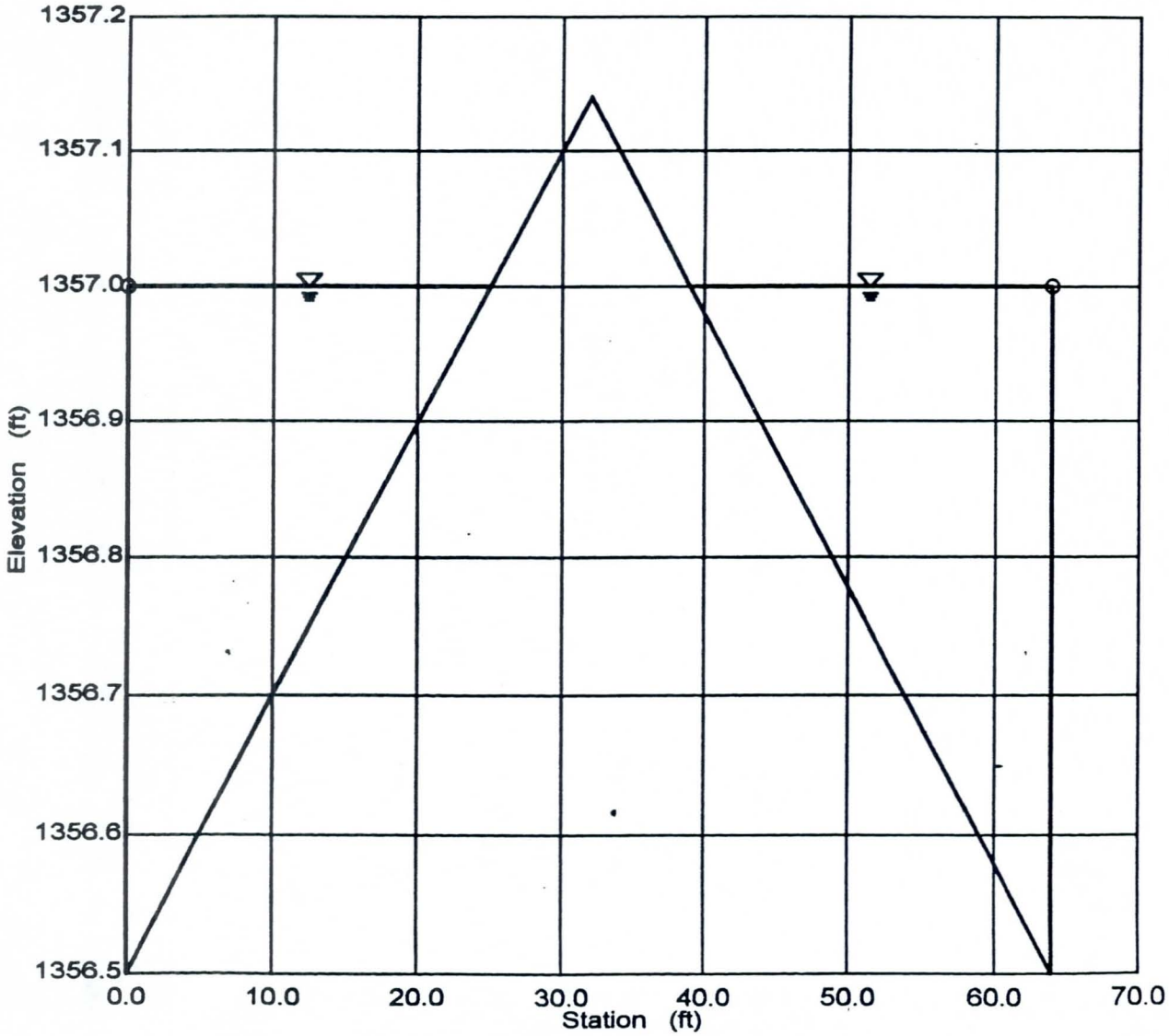
Recieved As-Builts 4/16/97
Actual Roadway width = 64' FC-FC
Slope 0.00147'/'

Results		
Wtd. Mannings Coefficient	0.012	
Discharge	26.42	ft³/s
Flow Area	12.50	ft²
Wetted Perimeter	51.01	ft
Top Width	50.00	ft
Depth	0.50	ft
Critical Water Elev.	1356.94	ft
Critical Slope	0.003558	ft/ft
Velocity	2.11	ft/s
Velocity Head	0.07	ft
Specific Energy	1357.07	ft
Froude Number	0.75	
Full Flow Capacity	26.42	ft³/s
Flow is subcritical.		
Flow is divided.		

Greenfield Road Capacity
Cross Section for Irregular Channel

Project Description	
Project File	h:\flowmsrt\rwcdfis.fm2
Worksheet	Green Field Road
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data		
Wtd. Mannings Coefficient	0.012	
Channel Slope	0.001900	ft/ft
Water Surface Elevation	1357.00	ft
Discharge	26.42	ft^3/s



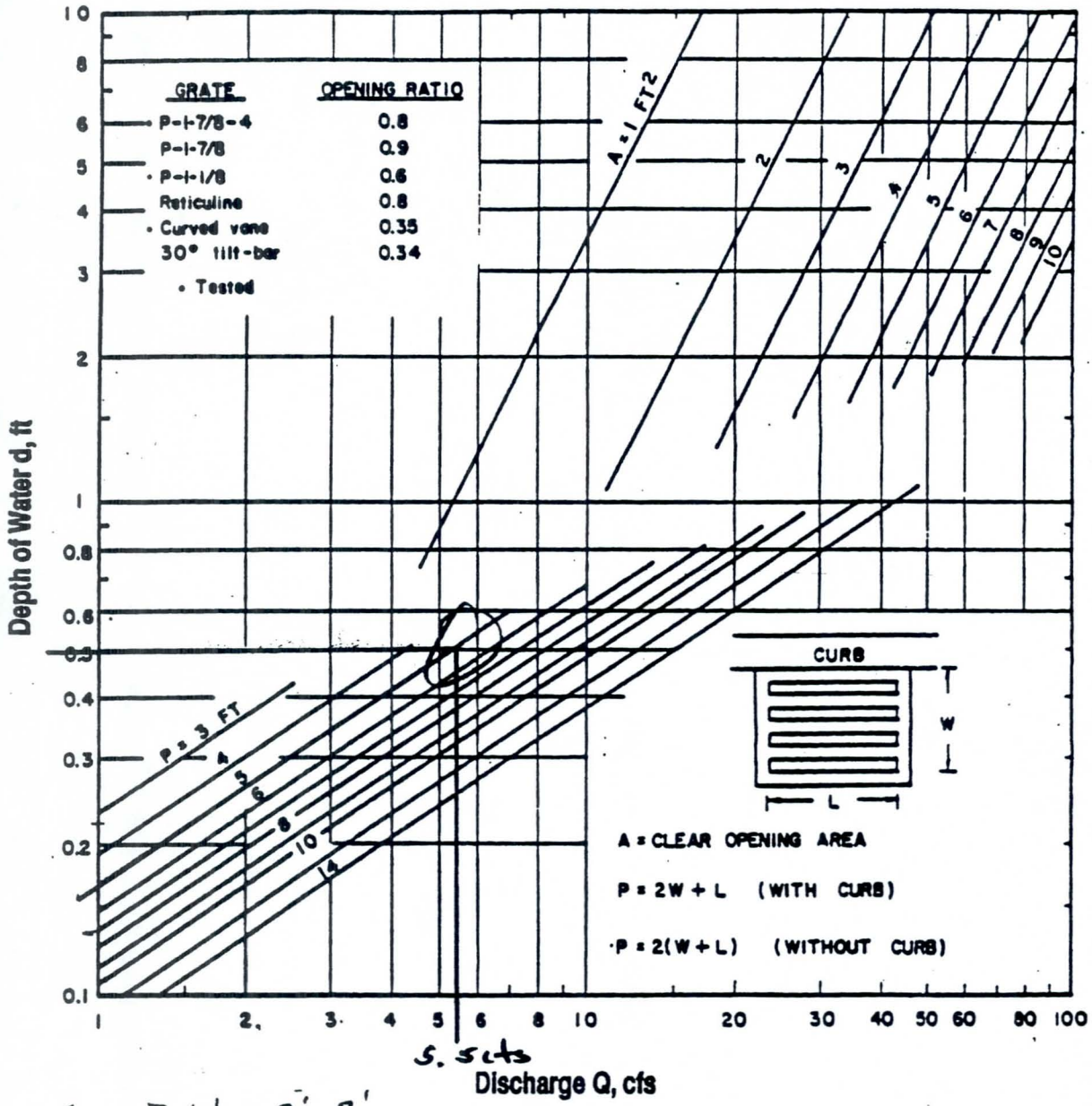
The WLB Group Inc. WLB

COMPUTATION DATA SHEET

Subject _____ Prepared by _____ Date _____

Split at CP4
Sump chart
DIS4

Sump: North of McDowell East of Greenfield
JOB# 296025



Sump Inlet - 2' x 3'
for SB 5

Assume 50% clogging factor ∴ $P = \frac{2}{2}(2+3) = 5'$

Figure 3.29
Grate Inlet Capacity in Sump Conditions
(source: FHWA, 1984, HEC-12, Chart 11)

∴ use constant loss of 5.5 cfs from SB8 (Divert out)

The WLB Group Inc. WLB

COMPUTATION DATA SHEET

Subject _____ Prepared by _____ Date _____

Split at SB 9

DIS 9

split Flow calcs

for D159

The WLB Group Inc. WLB

COMPUTATION DATA SHEET

Subject RWCD FIS Job # 246025 Prepared by MJK Date

Split Flow from SB 9 into SB 11 and out of system.

Base flow into SB 11 is full flow capacity at entrance rd. Q_p = 45.5 cfs

All flow above 45.5 cfs will be split 50/50.

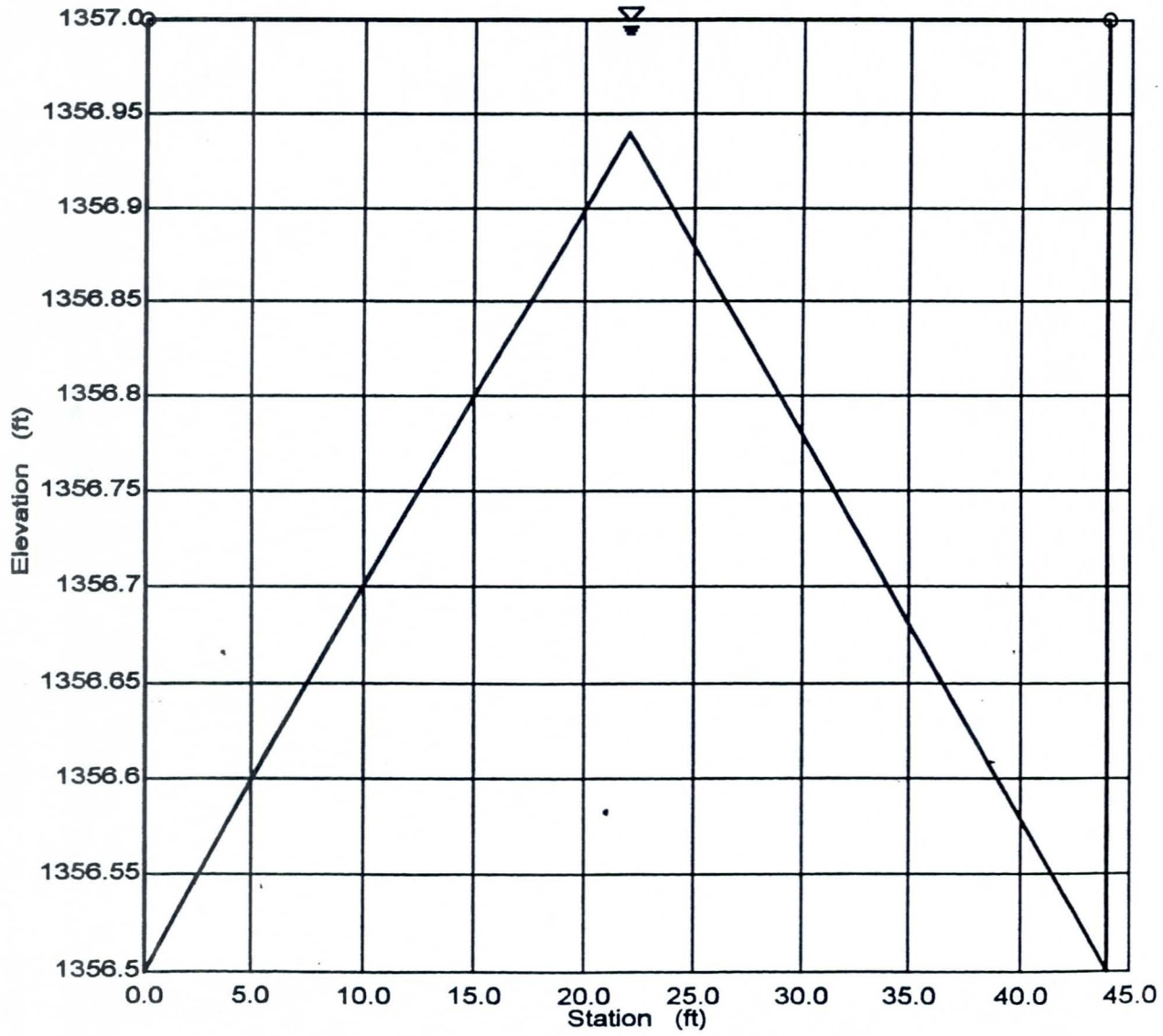
$\circ^{\circ}_{\circ}$ Divert Card

DT	D11				
DI	0.0	45.5	100.0	150.0	200.0
DQ	0.0	0.0	27.3	52.25	77.25

STREET CAP. AT SB9/SB11 SPLIT
Cross Section for Irregular Channel

Project Description	
Project File	h:\flowmsrt\rwcdfis.fm2
Worksheet	FIS
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data		
Wtd. Mannings Coefficient	0.012	
Channel Slope	0.005000	ft/ft
Water Surface Elevation	1357.00	ft
Discharge	45.48	ft^3/s



STREET CAP FOR SPLIT FLOW AT SB9/SB11
Worksheet for Irregular Channel

Maximum capacity of street section at entrance to Com. training Facility.

Project Description	
Project File	untitled
Worksheet	FIS
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data

Channel Slope 0.005000 ft/ft

Water Surface Elevation 1357.00 ft

Elevation range: 1356.50 ft to 1357.00 ft.

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	1357.00	0.00	44.00	0.012
0.00	1356.50			
22.00	1356.94			
44.00	1356.50			
44.00	1357.00			

Results		
Wtd. Mannings Coefficient	0.012	
Discharge	45.48	ft^3/s
Flow Area	12.32	ft^2
Wetted Perimeter	45.01	ft
Top Width	44.00	ft
Depth	0.50	ft
Critical Water Elev.	1357.04	ft
Critical Slope	0.003165	ft/ft
Velocity	3.69	ft/s
Velocity Head	0.21	ft
Specific Energy	1357.21	ft
Froude Number	1.23	
Full Flow Capacity	45.48	ft^3/s

Flow is supercritical.

The WLB Group Inc. WLB

COMPUTATION DATA SHEET

Subject _____ Prepared by _____ Date _____

Split out of system
at Mckellips Road, East
of Greenfield.
D076

Higley to Greenfield

MCKELLIPS ROAD
Worksheet for Irregular Channel

Project Description	
Project File	h:\flowmsrt\rwcdfis.fm2
Worksheet	MCKELLIPS ROAD CAPACITY
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Maximum capacity at Mckellips Road at Top of Curb

Input Data		
Channel Slope	0.007800	ft/ft
Water Surface Elevation	1370.00	ft

Elevation range: 1369.50 ft to 1370.14 ft.

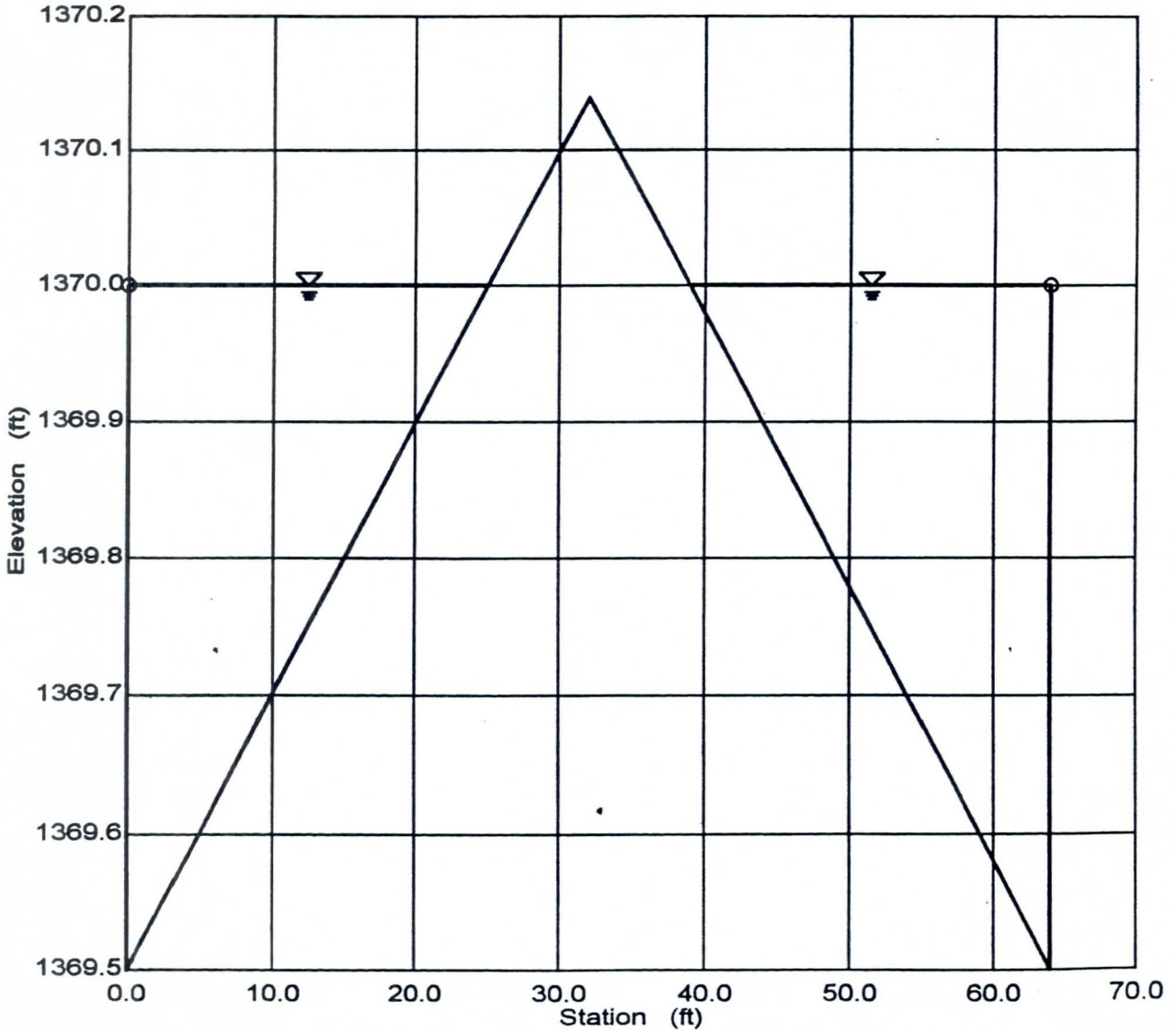
Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	1370.00	0.00	64.00	0.012
0.00	1369.50			
32.00	1370.14			
64.00	1369.50			
64.00	1370.00			

Results		
Wtd. Mannings Coefficient	0.012	
Discharge	53.53	ft^3/s
Flow Area	12.50	ft^2
Wetted Perimeter	51.01	ft
Top Width	50.00	ft
Depth	0.50	ft
Critical Water Elev.	1370.09	ft
Critical Slope	0.003238	ft/ft
Velocity	4.28	ft/s
Velocity Head	0.29	ft
Specific Energy	1370.29	ft
Froude Number	1.51	
Full Flow Capacity	53.53	ft^3/s
Flow is supercritical.		
Flow is divided.		

MCKELLIPS ROAD
Cross Section for Irregular Channel

Project Description	
Project File	h:\flowmsrt\rwcdfis.fm2
Worksheet	MCKELLIPS ROAD CAPACITY
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data		
Wtd. Mannings Coefficient	0.012	
Channel Slope	0.007800	ft/ft
Water Surface Elevation	1370.00	ft
Discharge	53.53	ft³/s



The WLB Group Inc. WLB

COMPUTATION DATA SHEET

Subject _____ Prepared by _____ Date _____

Rating Curve for Ditch

Between Agri. Berms + RWCD

Canal. Divert DCP16

Curve
Plotted Curves for Irregular Channel

Project Description	
Project File	untitled
Worksheet	RS13 LOW LEVEL OUTLET
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Constant Data	
Channel Slope	0.003000 ft/ft

Input Data			
	Minimum	Maximum	Increment
Water Surface Elevation	51.00	53.00	0.25 ft

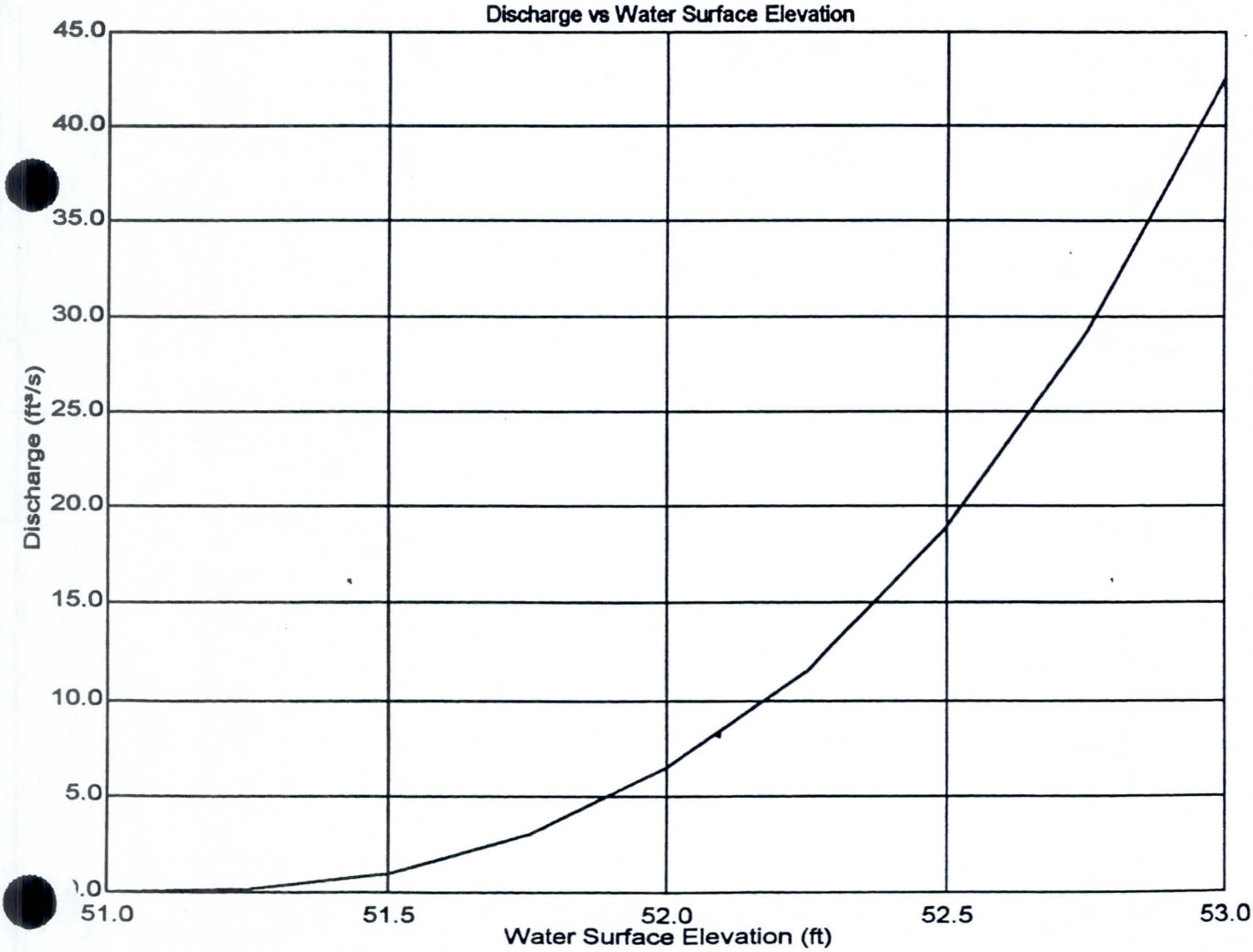


Table
Rating Table for Irregular Channel

Project Description	
Project File	untitled
Worksheet	RS13 LOW LEVEL OUTLET
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Constant Data	
Channel Slope	0.003000 ft/ft

Input Data			
	Minimum	Maximum	Increment
Water Surface Elevation	51.00	53.00	0.25 ft

Rating Table

Water Surface Elevation (ft)	Wtd. Mannings Coefficient	Discharge (ft^3/s)
51.00	0.035	0.00
51.25	0.035	0.16
51.50	0.035	1.02
51.75	0.035	3.01
52.00	0.035	6.49
52.25	0.035	11.53
52.50	0.035	18.98
52.75	0.035	29.22
53.00	0.035	42.61

approx. depth.

D.6 Hydrologic Calculations (HEC-1)

```
1*************************************
*                                   *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*          SEPTEMBER 1990           *
*           VERSION 4.0             *
*                                   *
* RUN DATE  12/18/1997  TIME  08:12:07 *
*                                   *
*************************************
```

```
*********************************
*                               *
*   U.S. ARMY CORPS OF ENGINEERS
*   HYDROLOGIC ENGINEERING CENTER
*         609 SECOND STREET
*      DAVIS, CALIFORNIA 95616
*         (916) 756-1104
*                               *
*********************************
```

```
X     X  XXXXXXX   XXXXX          X
X     X  X       X     X        XX
X     X  X       X               X
XXXXXXX  XXXX    X       XXXXX   X
X     X  X       X               X
X     X  X       X     X         X
X     X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  1           ID   DDM MCUHP1 RWCD CANAL FIS  WLB JOB# 296025
  2           ID   FEMA FIS  MCFCD FCD # 96-07
  3           ID   "FLOODPLAIN DELINEATION AND MAPPING FOR THE UPPER
  4           ID   ROOSEVELT WATER CONSERVATION DISTRICT CANAL (NORTH END OF THE UEMF)"
  5           ID   THE WLB GROUP HEC-1 INPUT FILE  :RWCD24.DAT
  6           ID                      OUTPUT FILE :RWCD24.OUT
  7           ID                      DATE: 4-29-97
  8           IT       5                    300
              *DIAGRAM
  9           IO       5
              *    A-N WEST'S  FIS  HEC-1  TITLE BLOCK
              *       SB10 TO SB84 ARE SUBBASINS FROM ANWEST'S FLOOD STUDY
              *  EXISTING CONDITION HYDROLOGY                          FILE:EMF2.DAT
              *  UPPER EAST MARICOPA FLOODWAY (UEMF) FIS FOR FCDMC (NO 94-26)
              *  100 YEAR - 24 HOUR STORM            BY A-N WEST,INC.,PHX.AZ.DATE:9/21/95
              *                REVISED:10/20/95 TO ADDRESS FCDMC AND CITY/MESA COMMENTS.

 10           KK    SB10
 11           KM   SUB-BASIN SB10
 12           KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 13           KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .982
 14           KM     L =  .39  Kb = .032  Adj. Slope =   87.0
```

```
15          BA    .031
16          IN      15
17          KM   RAINFALL DEPTH OF 3.40 WAS SPACIALLY REDUCED AS SHOWN BY THE PB RECORD
18          PB   3.359
19          KM   THE FOLLOWING PC RECORD USED A 24-HR SCS TYPE II STORM
20          PC    .000    .002    .005    .008    .011    .014    .017    .020    .023    .026
21          PC    .029    .032    .035    .038    .041    .044    .048    .052    .056    .060
22          PC    .064    .068    .072    .076    .080    .085    .090    .095    .100    .105
23          PC    .110    .115    .120    .126    .133    .140    .147    .155    .163    .172
24          PC    .181    .191    .203    .218    .236    .257    .283    .387    .663    .707
25          PC    .735    .758    .776    .791    .804    .815    .825    .834    .842    .849
26          PC    .856    .863    .869    .875    .881    .887    .893    .898    .903    .908
27          PC    .913    .918    .922    .926    .930    .934    .938    .942    .946    .950
28          PC    .953    .956    .959    .962    .965    .968    .971    .974    .977    .980
29          PC    .983    .986    .989    .992    .995    .998   1.000
30          LG    .250    .250   4.300    .490  30.000
31          UC    .188    .197
32          UA       0       5      16      30      65      77      84      90      94      97
33          UA     100

34          KK  DIV11P
35          KM   BASE FLOW OF 11 CFS (24" RCP @ 0.2 PERCENT SLOPE) DIVERTED AS DIV11P INTO
36          KM   SYSTEM REMAINING PEAK FLOW EXITS SYSTEM AS DIV11S
37          DT  DIV11S
38          DI       0      10      11      12      20      30      40      50      60
39          DQ       0       0       0       1       9      19      29      39      49

40          KK   RO11P
41          KM   ROUTING THROUGH 24" PIPE (SLOPE = 0.25%) ALONG 64TH STREET BETWEEN HERMOSA
42          KM   VISTA DRIVE AND MCDOWELL ROAD
43          RD    3060   .0020    .012            CIRC       2
```



```
LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

44          KK    SB16
45          KM   SUB-BASIN SB16
46          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
47          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .982
48          KM   L = .96  Kb = .030  ADJ. SLOPE = 76.0
49          BA    .170
50          LG    .280    .270   5.800    .230   2.000
51          UC    .304    .262
52          UA       0       5      16      30      65      77      84      90      94      97
53          UA     100

54          KK    CO20
55          KM   COMBINED HYDROGRAPHS (SB16 AND RO11P) AT THE INTERSECTION ON 64TH STREET
56          KM   BETWEEN HERMOSA VISTA DRIVE AND MCKELLIPS ROAD
57          HC       2

58          KK    RO17
59          KM   ROUTING THROUGH RETENTION BASIN NEAR 64TH STREET.  BASIN IS DRAINED BY
60          KM   12" PIPE AT 0.2% SLOPE WHICH HAS GATE VALVE.  A BASE DRAIN RATE OF 1 CFS
61          KM   WAS ASSUMED UNTIL FLOW REACHED TOP OF BASIN WHERE WEIR FLOW OVER TOP OF
62          KM   BANK OF SEVERAL HUNDRED FEET COULD OCCUR.  THE OVERFLOW WEIR FLOW WAS
63          KM   ASSUMED TO OUTLET PEAK FLOW AT NO MORE THAN 1 FOOT OVER TOP OF BANK.
64          RS       1    STOR       0
65          SV       0   0.949   1.949
```

```
 66          SQ       0       1     200
 67          SE       0       7       8

 68          KK    SB24
 69          KM   SUB-BASIN SB24
 70          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 71          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .982
 72          KM     L =  .84  Kb = .051  Adj. Slope =   74.0
 73          BA    .169
 74          LG    .250    .350   4.250    .430    .000
 75          UC    .446    .362
 76          UA       0       3       5       8      12      20      43      75      90      96
 77          UA     100

 78          KK  DIV25S
 79          KM   BASE FLOW OF 86 CFS (26" RCP @ 1.4 PERCENT SLOPE) DIVERTED AS DIV25P INTO
 80          KM   SYSTEM REMAINING PEAK FLOW AS DIV25S TO SURFACE SPLIT FLOW
 81          DT  DIV25P
 82          DI       0      28      30      40     100     200
 83          DQ       0      86      86      86      86      86

 84          KK  DIV27I
 85          KM   SPLIT SURFACE IN FLOW (DIV25S) AS FLOW INTO SYSTEM (DIV27I) ALONG MCKELLIPS
 86          KM   ROAD DITCH AND FLOW OUT OF SYSTEM (DIV270) TO RECKER ROAD
 87          DT  DIV270
 88          DI       0      25      50      75     100     125     150
 89          DQ       0    3.71   22.26   41.80   62.25   82.91  103.40
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 90          KK   RO27I
 91          KM   ROUTING SURFACE FLOW ALONG MCKELLIPS ROAD BETWEEN BUSH
 92          KM   HIGHWAY AND 64TH STREET
 93          RS       1    FLOW      -1
 94          RC    .035    .015    .035    1920   .0141
 95          RX       0       5       5      39      73      84      93      94
 96          RY  100.84  100.76  100.26  101.16  100.68   98.82  100.10  100.24

 97          KK    SB18
 98          KM   SUB-BASIN SB18
 99          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
100          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .982
101          KM     L =  .45  Kb = .037  Adj. Slope =   47.0
102          BA    .005
103          LG    .300    .210   6.400    .190   1.000
104          UC    .258    .891
105          UA       0       5      16      30      65      77      84      90      94      97
106          UA     100

107          KK    SB30
108          KM   SUB-BASIN SB30
109          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
110          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .982
111          KM     L =  .52  Kb = .040  Adj. Slope =   33.0
112          BA    .035
113          LG    .280    .280   4.900    .340  10.000
114          UC    .358    .474
115          UA       0       5      16      30      65      77      84      90      94      97
```

```
116          UA     100

117          KK  DIV25P
118          KM   RETRIEVE DIV25P 36" PIPE FLOW
119          DR  DIV25P

120          KK   RO25P
121          KM   ROUTE FLOW THROUGH 36" PIPE ALONG MCKELLIPS ROAD BETWEEN 64TH & 66TH STREETS
122          RD    1920   .0141    .012            CIRC       3

123          KK    CO32
124          KM   COMBINED HYDROGRAPHS (SB18, RO17, RO25P, SB30, AND RO27I) AT INTERSECTION OF
125          KM   64TH STREET AND MCKELLIPS ROAD
126          HC       5

127          KK  DIV35S
128          KM   SPLIT FLOW OF 86 CFS (36" RCP CAP @ 1.4 PERCENT SLOPE) DIVERTED AS DIV35P
129          KM   INTO SYSTEM.  REMAINING FLOW AS DIV35S TO SURFACE SPLIT FLOW ALONG
130          KM   MCKELLIPS ROAD
131          DT  DIV35P
132          DI       0      28      30      40     100     200     350
133          DQ       0      86      86      86      86      86      86
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

134          KK  DIV39I
135          KM   SPLIT SURFACE FLOW AS DIV39I INTO SYSTEM ALONG MCKELLIPS RD AND DIVERT FLOW
136          KM   AS DIV390 OUT OF SYSTEM INTO CONCRETE CHANNEL IN PALMAS DEL SOL M.H. PARK
137          DT  DIV390
138          DI       0      25      50      75     100     125     150     175     200     225
139          DI     250
140          DQ       0       0    7.58   26.66   44.89   63.70   83.77  102.04  110.24  116.87
141          DQ  124.11

142          KK   RO39I
143          KM   ROUTING SURFACE FLOW ALONG MCKELLIPS ROAD BETWEEN 64TH
144          KM   STREET AND RECKER ROAD
145          RS       2    FLOW      -1
146          RC    .035    .015    .035    1920   .0182
147          RX       0       9      19      19      43      67      86      99
148          RY   98.51   97.34   97.98   97.48   98.44   98.54   97.80   99.55

149          KK    SB42
150          KM   SUB-BASIN SB42
151          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
152          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .982
153          KM     L =  .81  Kb = .046  Adj. Slope =   44.0
154          BA    .182
155          LG    .240    .260   4.300    .570  10.000
156          UC    .508    .390
157          UA       0       3       5       8      12      20      43      75      90      96
158          UA     100

159          KK  DIV35P
160          KM   RETRIEVE DIV35P
161          DR  DIV35P

162          KK   RO35P
```

```
163          KM   ROUTING THROUGH 36" PIPE (SLOPE = 1.41%) ALONG MCKELLIPS ROAD BETWEEN 64TH
164          KM   STREET AND RECKER ROAD
165          RD    1920   .0141    .012            CIRC       3

166          KK    C044
167          KM   COMBINED HYDROGRAPHS (R035P, R039I, AND SB42) AT INTERSECTION OF RECKER
168          KM   ROAD AND MCKELLIPS ROAD
169          HC       3

170          KK  DIV47S
171          KM   BASE FLOW OF 112 CFS (42" RCP CAP @1.02 PERCENT) DIVERTED AS DIV47P.
172          KM   REMAINING PEAK FLOW AS DIV47S TO SURFACE SPLIT FLOW
173          DT  DIV47P
174          DI       0     112     120     200     300    1000
175          DQ       0     112     112     112     112     112
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


176          KK  DIV49I
177          KM   SPLIT SURFACE FLOW OF FLOW INTO SYSTEM ALONG MCKELLIPS STREET AS DIV49I AND
178          KM   FLOW OUT OF SYSTEM AS DIV49O DOWN RECKER ROAD
179          DT  DIV49O
180          DI       0      25      50      55      75     100     125     150     175     200
181          DI     225     250     275     300     325     350     388
182          DQ       0       0       0       0    7.69   11.54   15.38   19.23   23.08   26.92
183          DQ   34.62   42.31   48.08   57.69   65.38   73.08   82.69

184          KK   R049I
185          KM   ROUTE SURFACE FLOW FROM DIV49I ALONG MCKELLIPS ROAD FROM RECKER ROAD TO
186          KM   56TH STREET
187          RS       1    FLOW      -1
188          RC    .035    .015    .035    2640    .010
189          RX       0      23      23      55      87      87     110     110
190          RY     1.5      .5       0     .64       0      .5     .96     1.5

191          KK    SB52
192          KM   SUB-BASIN SB52
193          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
194          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .982
195          KM     L =  .39  Kb = .055  Adj. Slope =   56.0
196          BA    .061
197          LG    .250    .340   4.000   0.490   4.000
198          UC    .313    .236
199          UA       0       3       5       8      12      20      43      75      90      96
200          UA     100

201          KK    SB54
202          KM   SUB-BASIN SB54
203          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
204          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .982
205          KM     L =  .25  Kb = .032  Adj. Slope =   52.0
206          BA    .033
207          LG    .190    .250   4.200   0.530  34.000
208          UC    .175    .123
209          UA       0       5      16      30      65      77      84      90      94      97
210          UA     100

211          KK    R051
```

```
212          KM   ROUTING THROUGH COMBINED AVERAGE OF 10 RETENTION BASINS NEAR MCKELLIPS ROAD
213          KM   BETWEEN HIGLEY AND RECKER ROADS.  LOW FLOW OUTLET BY DRY WELLS, 1 CFS LOW
214          KM   FLOW ASSUMED.  OVERFLOW OCCURS OVER BERMS AND TOP OF BANKS.  OVERFLOW
215          KM   DISCHARGE ASSUMED HIGH ENOUGH TO PASS PEAK OUTFLOW WITH NO MORE THAN 1 FOOT
216          KM   OF HEAD OVER TOP OF BANKS.
217          RS       1    STOR       0
218          SV       0    2.12    3.12
219          SQ       0       1     100
220          SE       0    3.55    4.55
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

221          KK    C056
222          KM   COMBINED HYDROGRAPHS (SB52, R049I, AND R051) AT 56TH STREET AND
223          KM   MCKELLIPS ROAD
224          HC       3

225          KK    R057S
226          KM   ROUTING SURFACE FLOW ALONG MCKELLIPS ROAD BETWEEN 56TH STREET
227          KM   AND HIGLEY ROAD
228          RS       1    FLOW      -1
229          RC    .035    .015    .035    2640    .010
230          RX       0      23      23      55      87      87     110     110
231          RY     1.5      .5       0     .64       0      .5     .96     1.5

232          KK    SB60
233          KM   SUB-BASIN SB60
234          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
235          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .982
236          KM     L =  .57  Kb = .031  Adj. Slope =   44.0
237          BA    .153
238          LG    .180    .250   4.800    .380  44.000
239          UC    .271    .161

240          KK    SB62
241          KM   SUB-BASIN SB62
242          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
243          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .982
244          KM     L =  .52  Kb = .030  Adj. Slope =   48.0
245          BA    .072
246          LG    .150    .250   4.500    .430  60.000
247          UC    .242    .203
248          UA       0       5      16      30      65      77      84      90      94      97
249          UA     100

250          KK    R064
251          KM   ROUTING THROUGH COMBINED AVERAGE OF 2 RETENTION BASINS NEAR MCKELLIPS AND
252          KM   HIGLEY ROAD INTERSECTION.  THE LOW FLOW OUTLET INVOLVES DRYWELLS AND A 1 CFS
253          KM   DRAIN RATE WAS ASSUMED FOR THIS. THE OVERFLOW OCCURS OVER A LONG TOP OF
254          KM   BANK AND THE OVERFLOW DISCHARGE WAS ASSUMED TO PASS THE PEAK OUTFLOW WITH
255          KM   NO MORE THAN 1 FOOT OF HEAD ABOVE TOP OF BANK.
256          RS       1    STOR       0
257          SV       0  1.7115  2.7115
258          SQ       0       1     100
259          SE       0    2.86    3.86

260          KK  DIV47P
261          KM   RETRIEVE DIV47P (SPLIT FLOW TO 42 INCH PIPE AT MCKELLIPS AND RECKER RD.)
```

```
262          DR  DIV47P

263          KK   RO47P
264          KM   ROUTING THROUGH 42" PIPE (SLOPE = 1%) ALONG MCKELLIPS ROAD BETWEEN RECKER
265          KM   AND HIGLEY ROADS
266          RD    3280    .010    .012            CIRC     3.5
1                                          HEC-1 INPUT                                                    PAGE  7

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


267          KK    CO68
268          KM   COMBINED HYDROGRAPHS (SB60, RO64, RO47P, AND RO57S) AT INTERSECTION OF HIGLEY
269          KM   ROAD AND MCKELLIPS ROAD
270          HC       4

271          KK  DIV71S
272          KM   BASE FLOW OF 140 CFS (48" RCP CAP @ 0.81 PERCENT SLOPE) DIVERTED AS DIV71P
273          KM   REMAINING PEAK FLOW AS DIV71S TO SURFACE SPLIT FLOW ALONG MCKELLIPS ROAD
274          DT  DIV71P
275          DI       0     140     150     200     300     500
276          DQ       0     140     140     140     140     140

277          KK  DIV73I
278          KM   SPLIT SURFACE FLOW OF FLOW INTO SYSTEM ALONG MCKELLIPS ROAD AS DIV73I AND
279          KM   SURFACE FLOW OUT OF SYSTEM AS DIV730 DOWN HIGLEY ROAD
280          DT  DIV730
281          DI       0      25      50      75     100     125     150     175     200     225
282          DI     250     275     300     350     400     450     500     515
283          DQ       0    3.85   21.15   32.69   44.23   53.85   61.54   69.23   78.85   88.46
284          DQ  100.00  107.69  119.23  140.38  165.38  188.46  215.38  219.23

285          KK   RO73I
286          KM   ROUTING SURFACE FLOW FROM DIV73I ALONG MCKELLIPS ROAD FROM HIGLEY ROAD TO
287          KM   GREENFIELD ROAD
288          RS       4    FLOW      -1
289          RC    .035    .015    .035    5280   .0078
290          RX       0      23      23      55      87      87     110     110
291          RY     1.5      .5       0     .64       0      .5     .96     1.5

292          KK    SB76
293          KM   SUB-BASIN SB76
294          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
295          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .982
296          KM     L = 0.99  Kb = .045  Adj. Slope =   43.0
297          BA    .098
298          LG    .280    .200   4.800    .360  19.000
299          UC    .517    .663

300          KK    CP76
301          KM        COMBINE ROUTED FLOW ALONG MCKELLIPS AND RUNOFF FROM SB76
302          HC       2

303          KK    DI76
304          KM        DIVERT OVERFLOW OF MCKELLIPS OUT OF SYSTEM
305          DT    DO76
306          DI    53.5   100.0   200.0   300.0
307          DQ     0.0    46.5   146.5   246.5

308          KK    SB84
```

```
309          KM   SUB-BASIN SB84
310          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
311          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .982   THE DEFAULT T/A CURVE
312          KM   WAS USED.
313          KM     L = 1.11  Kb = .046  Adj. Slope =   34.0
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

314          BA    .197
315          LG    .230    .350   4.800    .240  12.000
316          UC    .642    .620

317          KK  DI180A
318          KM        DIVERT FLOW TO STORM DRAIN.  INLET CAPCITY APROX. 27cfs
319          KM       (This flow goes out of the system.)
320          DT   Dos84
321          DI     0.0   100.0   200.0
322          DQ    27.0    27.0    27.0

323          KK  DI80A1
324          KM        DIVERT FLOW IN EXCESS OF STREET AND STORM DRAIN CAPACITY
325          KM        TO SB13 STREET CAPACITY 26.5 CFS   THE REMAINING FLOWS COMBINES AT
326          KM        MCKELLIPS AND GREENFIELD
327          DT   DIS13
328          DI     0.0    26.5    50.0   100.0
329          DQ     0.0     0.0    23.5    73.5

330          KK    CP80
331          KM   SUB-BASIN SB80
332          KM      ******  % IMPERVIOUS CHANGED BY WLB (24% TO 40% BASED ON AERIAL PHOTOS)
333          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
334          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .982
335          KM     L = 1.09  Kb = .043  Adj. Slope =   27.0
336          BA    .636
337          LG    .170    .340   4.800    .220    40.0
338          UC    .642    .314
339          UA       0       3       5       8      12      20      43      75      90      96
340          UA     100

341          KK   DIS80
342          KM    ****DIVERT STORM DRAIN INFLOW       ADDED BY WLB
343          KM        THE STORM DRAIN WILL DRAIN BASIN ON A CONTINOUS BASIS
344          DT   DOS80
345          DI     2.5     5.0     6.4     7.7     100   200.0    1000
346          DQ     2.5     5.0     6.4     7.7     7.7     7.7     7.7

347          KK    RS80
348          KM   ROUTING FROM SB80 INTO FALCON FIELD RETENTION BASIN.  THE LOW FLOW OUTLET
349          KM   IS A 12" RCP INTO THE GREENFIELD ROAD STORM DRAIN.  AN INLET CONTROL
350          KM   DISCHARGE CAPACITY WAS USED TO ESTIMATE THE 12" PIPE CAPACITY.  THE
351          KM   EMERGENCY OVERFLOW WAS A SLOPED CONCRETE BROAD CRESTED WEIR OF 30 FEET
352          KM   WIDTH AT I.E. OF 1361.59'
353          RS      -1    STOR       0
354          SV       0    5.75   19.60   36.76  46.395    46.5   56.03   57.03
355          SQ     0.0     0.0     0.0     0.0     0.0     0.1   91.60    91.6
356          SE    1358    1359    1360    1361 1361.59 1361.60  1362.0  1363.0

357          KK   CP80A
358          KM        COMBINE STREET FLOW FROM SB84 AND OVER FLOW FROM SB80
```

```
359          HC      2
1                                        HEC-1 INPUT                                                    PAGE  9

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


360          KK   DOS15
361          KM     DIVERT EXCESS FLOW FROM STREET TO SUBBASIN #15
362          KM     GREENFIELD ROAD CAPACITY  26.5 CFS
363          DT   DIS15
364          DI     0.0    26.5    50.0   100.0
365          DQ     0.0     0.0    23.5    73.5

366          KK   CP76A
367          KM   COMBINED HYDROGRAPHS (DOS15, DI76) AT GREENFIELD ROAD
368          KM   AND MCKELLIPS ROAD INTERSECTION
369          HC      2

370          KK   DIC90
371          KM        SPLIT FLOW AT INTERSECTION OF MCKELLIPS AND GREENFIELD ROADS
372          KM        FLOW SPLIT IS 90±10 MCKELLIPS HAS MUCH GREATER CAPACITY THAN GREENFIELD
373          DT   DOC90
374          DI     0.0    10.0    20.0    30.0    40.0    50.0   100.0
375          DQ     0.0     1.0     2.0     3.0     4.0     5.0    10.0

376          KK   DIS16
377          KM        50±50 SPLIT FOR REMAINING FLOW
378          KM        NORTH HALF GOES INTO SYSTEM WHILE THE SOUTH HALF GOES OUT OF SYSTEM INTO
379          KM        SUBBASIN SB92: DIS16 WILL BE COMBINED AT CP16
380          DT   DOS16
381          DI     1.0    10.0    20.0    50.0   100.0   200.0
382          DQ      .5     5.0    10.0    25.0    50.0   100.0
             *
             *      END OF A-N WEST SUBBASINS
             *   ************************************
             *      START OF WLB SUBBASINS
             *

383          KK     SB1
384          KM   SUB-BASIN SB1
385          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
386          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .988
387          KM     L =  .26  Kb = .033  Adj. Slope =   38.0
388          BA    .022
389          LG    .070    .250   4.800    .240  84.000
390          UC    .188    .173
391          UA       0       5      16      30      65      77      84      90      94      97
392          UA     100

393          KK   RS1
394          KM        STORAGE BASIN IN SB1
395          RS       1    STOR       0
396          SA     .23     .62     .90    1.16     1.3
397          SE  1373.2  1374.0  1375.0  1376.0  1376.5
398          SQ       0       0       0       0    50.0
                                         HEC-1 INPUT                                                    PAGE 10

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

```
KK     SB2
KM   SUB-BASIN SB2
KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .988
KM     L =  .14  Kb = .034  Adj. Slope =   21.0
BA    .015
LG    .100    .250   4.800    .250  68.000
UC    .171    .118
UA       0       5      16      30      65      77      84      90      94      97
UA     100

KK     CP2
KM        COMBINE SUBBASINS 1 AND 2 THEN ROUTE THROUGH RETENTION
KM        BASIN 2
HC       2

KK   RS2
KM        STORAGE BASIN IN   SB2
RS       1    STOR       0
SA     .05     .17     .23     .26     .53    1.27     1.5
SE  1370.0  1371.0  1372.0  1373.0  1374.0  1374.5  1375.0
SQ     0.0     0.0     0.0     0.0     0.0     0.0    50.0

KK     SB3
KM   SUB-BASIN SB3
KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .988
KM     L =  .28  Kb = .032  Adj. Slope =   29.0
BA    .032
LG    .140    .250   4.800    .250  47.000
UC    .213    .170
UA       0       5      16      30      65      77      84      90      94      97
UA     100

KK     CP3
KM        COMBINE SUBASINS 1 2 3 AND ROUTE THROUGH RETETION
KM        BASIN RS3
HC       2

KK   RS3
KM        STORAGE BASIN IN   SB3
RS       1    STOR       0
SV     0.0     .23     .41     0.5     0.5
SE  1372.0  1372.5  1373.0 1373.25  1373.5
SS  1373.0   50.00     3.0     1.5

KK      D3
KM        DIVERT SPLIT FLOW 50±50 HALF GOING TO RETENTION BASIN
KM        RS5 AND HALF GOING TO THROUGH SUBASIN 4
DT     DI4
DI     0.0    10.0    20.0    30.0    40.0    50.0   100.0
DQ     0.0     5.0     10.    15.0    20.0    25.0    50.0
```



```
LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

KK     SB5
KM   SUB-BASIN SB5
KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
```

```
448          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .988
449          KM     L =  .23  Kb = .034  Adj. Slope =   30.0
450          BA    .013
451          LG    .150    .250   4.800    .250  40.000
452          UC    .200    .227
453          UA       0       5      16      30      65      77      84      90      94      97
454          UA     100

455          KK     CP5
456          KM        COMBINE REMAINING FLOW
457          HC       2

458          KK     RS5
459          KM        STORAGE BASIN IN  SB5
460          RS       1    STOR       0
461          SA     0.0    0.10    0.52    0.79    1.31     1.5
462          SE  1366.5  1367.0  1368.0  1369.0  1370.0  1370.5
463          SQ     0.0     0.0     0.0     0.0     0.0   100.0

464          KK      R5
465          KM        ROUTE OVER FLOW THROUGH SB6
466          RD     600    .005    .035            TRAP      10       6

467          KK     SB6
468          KM   SUB-BASIN SB6
469          KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
470          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .988
471          KM     L =  .42  Kb = .033  Adj. Slope =   21.0
472          BA    .024
473          LG    .100    .250   4.800    .250  65.000
474          UC    .304    .413
475          UA       0       5      16      30      65      77      84      90      94      97
476          UA     100

477          KK     CP6
478          KM        COMBINE RS6 AND  RS5
479          HC       2

480          KK     RS6
481          KM        STORAGE BASIN IN SB6
482          RS       1    STOR       0
483          SV     0.0    0.16    0.48    0.67    0.95
484          SE  1363.0  1364.0  1365.5  1366.0  1366.5
485          SS  1366.0    50.0     3.0     1.5

486          KK   DR3
487          KM        RETREIVE DIVERTED SPLIT FLOW FROM RS3
488          DR     DI4
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

489          KK     RD3
490          KM        ROUTE DIVERTED FLOW THROUGH SB4
491          KM
492          RD    1350    .005    .035            TRAP     100      10

493          KK     SB4
494          KM   SUB-BASIN SB4
```

```
495        KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
496        KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .988
497        KM     L =  .26  Kb = .033  Adj. Slope =   27.0
498        BA    .021
499        LG    .150    .250   4.800    .250  42.000
500        UC    .217    .209
501        UA       0       5      16      30      65      77      84      90      94      97
502        UA     100

503        KK     CP4
504        KM        COMBINE SUBASIN 4 AND ROUTED FLOW DIVERT FROM SB3
505        HC       2

506        KK    DIS4
507        KM        DIVERT FLOW INTO 2X3 SUMP
508        KM        A 50% CLOGGING FACTOR WAS USED FOR SUMP
509        DT    DOS4
510        DI     0.0     5.0    10.0    20.0    50.0   100.0
511        DQ     5.5     5.5     5.5     5.5     5.5     5.5

512        KK     SB7
513        KM   SUB-BASIN SB7
514        KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
515        KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .988
516        KM     L =  .48  Kb = .055  Adj. Slope =   15.0
517        BA    .075
518        LG     0.5    .010   4.800    .470  12.000
519        UC    .554    .468
520        UA       0       5      16      30      65      77      84      90      94      97
521        UA     100

522        KK     SB8
523        KM   SUB-BASIN SB8
524        KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
525        KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .988
526        KM     L =  .42  Kb = .059  Adj. Slope =   10.0
527        BA    .056
528        LG     0.5    .000   4.650    .510  11.000
529        UC    .646    .588
530        UA       0       5      16      30      65      77      84      90      94      97
531        UA     100
```



```
LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

532        KK     R8
533        KM     ROUTE SUBBASIN 8 TO CONCENTRATION POINT AT SUBBASIN 7
534        KM
535        RD    1400    .002    .03            TRAP      20       5

536        KK     CP7
537        KM        COMBINE SUBBASIN SB7 AND R8
538        HC       2

539        KK   CP10A
540        KM        COMBINE ALL REMAINING FLOWS AND ROUTE THROUGH SUBBASIN # 10
541        HC       3

542        KK    R10A
```

```
543        KM        ROUTE DOWN PAVED ROAD THROUGH VACANT LAND
544        RD
545        RC   0.04    .015     .04  2400.0    .005
546        RX    0.0    10.0    50.0    50.0    90.0    90.0   140.0    150.
547        RY   64.0    62.5    62.5    62.0    62.0    62.5    62.5    64.0

548        KK   SB10
549        KM   SUB-BASIN SB10
550        KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
551        KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .988
552        KM    L =  .59  Kb = .028  Adj. Slope =   19.0
553        BA   .119
554        LG   .150    .250   4.700    .260  43.000
555        UC   .358    .261
556        UA      0       5      16      30      65      77      84      90      94      97
557        UA    100

558        KK   CP10
559        KM        COMBINE FLOWS FROM THE EAST
560        HC      2

561        KK    R10
562        KM        ROUTE FLOWS DOWN MCDOWELL ROAD AND COMBINE INTO SB11
563        RD
564        RC   0.04    .015     .04    1000    .007
565        RX    0.0    10.0    50.0    50.0    90.0    90.0   140.0    150.
566        RY   63.0    62.5    62.5    62.0    62.0    62.5    62.5    63.0

567        KK    SB9
568        KM   SUB-BASIN SB9
569        KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
570        KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .988
571        KM    L =  .59  Kb = .028  Adj. Slope =   27.0
572        BA   .131
573        LG   .150    .250   4.250    .380  43.000
574        UC   .317    .216
575        UA      0       5      16      30      65      77      84      90      94      97
576        UA    100
```



```
LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


577        KK   DIS9
578        KM    DIVERT 50% OF FLOW GREATER THAN STREET CAPACITY  OUT OF SYSTEM (IT IS COM P
579        DT   DOS9
580        DI    0.0    45.5   100.0   150.0   200.0
581        DQ    0.0     0.0    27.3   52.25   77.25

582        KK     R9
583        KM        ROUTE FLOWS FROM SB9 INTO SB11 DOWN PAVED ROAD TO PONDING AREA
584        RD
585        RC    .04    .015     .04  1600.0    .002
586        RX    0.0    10.0    50.0    50.0    90.0    90.0   140.0   150.0
587        RY   56.0    55.5    55.5    55.0    55.0    55.5    55.5    56.0

588        KK   SB11
589        KM   SUB-BASIN SB11
590        KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
591        KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .988
```

```
592        KM    L =  .78  Kb = .051  Adj. Slope =   14.0
593        BA   .169
594        LG    0.5    0.02    4.65     .51    15.0
595        UC   .796    .648
596        UA      0       5      16      30      65      77      84      90      94      97
597        UA    100

598        KK   CP11
599        KM       COMBINE SB11 AND NON DIVERTED FLOW  FROM SB9
600        KM
601        HC      3

602        KK   RS11
603        KM   SPILLWAY IS OVER MCDOWELL ROAD
604        KM   STAGE - DISCHARGE: RATING CURVE WAS DEVELOPED FROM MCDOWELL ROAD PROFILE
605        KM   USING THE WEIR EQUATION
606        KM       STORAGE BASIN IN    SB11
607        RS      1    STOR       0
608        SA    0.0    .158    2.21    13.7   14.89    17.8    21.4   23.73    25.1
609        SE   1350    1351    1352    1353  1353.1 1353.35 1353.65 1353.85  1354.1
610        SQ    0.0     0.0     0.0     0.0     0.0    43.2   190.0   430.0     840

611        KK    R11
612        KM       ROUTE OVER FLOW FROM MCDOWELL ROAD INTO RS13
613        KM       ASSUME SHEET FLOW THROUGH ORANGE GROVE AND RESIDENCE
614        RD
615        RC    .06     .06     .06  3000.0    .001
616        RX    0.0    10.0    25.0   150.0     275   300.0   310.0   310.0
617        RY   56.5    55.0    55.0    55.0    55.0    55.0    55.0    56.5

618        KK   SB12
619        KM   SUB-BASIN SB12
620        KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
621        KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .988
622        KM    L =  .48  Kb = .051  Adj. Slope =   28.0
623        BA   .209
624        LG    0.5    .000   4.800    .470  10.000
```



```
LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

625        UC   .408    .186
626        UA      0       5      16      30      65      77      84      90      94      97
627        UA    100

628        KK   CP12
629        KM       COMBINE RS11 AND SB12
630        HC      2

631        KK   SB13
632        KM   SUB-BASIN SB13
633        KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
634        KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .988
635        KM    L =  .34  Kb = .057  Adj. Slope =   31.0
636        BA   .075
637        LG    0.5    .000   4.800    .470  10.000
638        UC   .338    .205
639        UA      0       5      16      30      65      77      84      90      94      97
640        UA    100
```

```
641        KK   DRS84
642        KM       RETURN SPLIT FLOW FROM SB84 AT GREENFIELD ROAD
643        DR   DIS13

644        KK    R84
645        KM       ROUTE SPLIT THROUGH SB13 TO PONDIING AREA
646        KM       THERE IS NOT A DEFINED CHANNEL THERFORE SHEET FLOW THROUGH THE ORANGE GR
647        KM       IS USED FOR THE ROUTE
648        RD
649        RC   0.06     .06    0.06  1800.0   .0015
650        RX    0.0    10.0    50.0   100.0   200.0   250.0   300.0   310.0
651        RY   56.0    55.0    55.0    55.0    55.0    55.0    55.0    56.0

652        KK   SB14
653        KM   SUB-BASIN SB14
654        KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
655        KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .988
656        KM    L =  .29  Kb = .060  Adj. Slope =   31.0
657        BA   .042
658        LG    0.5    .000   4.800    .470  10.000
659        UC   .317    .234
660        UA      0       5      16      30      65      77      84      90      94      97
661        UA    100

662        KK   CP13
663        KM       COMBINE SB14 SB13 R84
664        HC      4

665        KK   RS13
666        KM       STORAGE BASIN IN  SB13
667        KM    BASIN SPILLS INTO AND ACROSS THE RWCD CANAL AT LOCATIONS SHOWN ON EXHIBIT
668        KM    THE AVAILABLE STORAGE IN SB14 IS NOT CONSIDERED UNTIL WSEL IS ABOVE THE
669        KM    BERM MINIMUM ELEVATION OF 1352'
670        RS      1    STOR       0
671        SV    0.0     .71    5.27    9.32   13.37   17.42   21.47    29.9   38.48   47.05
672        SV  55.63    64.2
```



```
LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

673        SE  1349.3    1350    1351 1351.25  1351.5 1351.75  1352.0 1352.01 1352.25  1352.5
674        SE  1352.7  1353.0
675        SQ    0.0     0.0     0.0     .16    1.02    3.01    48.5    48.5     104   164.0
676        SQ    400     500

677        KK   DIS16
678        KM       DIVERTED FLOW IS FLOW THROUGH DITCH BETWEEN CANAL BANK AND BERMS
679        DT   DCP16
680        DI    0.0    0.16    1.02    3.01    48.0   104.0   164.0
681        DQ    0.0    0.16    1.02    3.01     6.5    11.5    19.0

682        KK    SB15
683        KM   SUB-BASIN SB15
684        KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
685        KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .988
686        KM    L =  .26  Kb = .065  Adj. Slope =   32.0
687        BA   .019
688        LG    0.5    .000   4.800    .470  10.000
689        UC   .304    .322
690        UA      0       5      16      30      65      77      84      90      94      97
```

```
691        UA     100

692        KK   DRS15
693        KM     RETURN SPLIT FLOW FROM GREENFIELD ROAD
694        DR   DIS15

695        KK    CP15
696        KM
697        HC       2

698        KK    RS15
699        KM    STORAGE BASIN IN SB15
700        KM
701        RS       1    STOR       0
702        SA   0.084    1.27    2.91    3.23    3.24    3.45    3.70    3.96
703        SE    1350    1351    1352  1352.3 1352.31  1352.5 1352.75  1353.0
704        SQ     0.0     0.0     0.0     0.0     1.0    38.2   265.6   818.0

705        KK    SB16
706        KM   SUB-BASIN SB16
707        KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
708        KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .988
709        KM     L =  .22  Kb = .065  Adj. Slope =   31.0
710        BA    .005
711        LG     0.5    .060   4.800    .470  30.000
712        UC    .279    .548
713        UA       0       5      16      30      65      77      84      90      94      97
714        UA     100

715        KK  DRCP16
716        KM        RETURN DITCH FLOW
717        DR   DCP16
```



```
LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


718        KK  RDCP16
719        KM        ROUTE DITCH FLOW TO CONCENTRATION POINT
720        RS
721        RC     .04     .04     .04    1200   .0015
722        RX     0.0    20.0    27.0    30.0    33.0    40.0    45.0    50.0
723        RY    1355    1354    1354    1351    1354    1354    1355    1355

724        KK  DIS16A
725        KM        REMAINING FLOW FROM THE INTERSECTION OF MCKELLIPS AND GREENFIELD
726        DR   DOS16

727        KK    CP16
728        KM       COMBINE DRCP16, SB16, DCP16, RS15
729        KM       CONCENTRATION  POINT ON THE NORTH SIDE OF MCKELLIPS ROAD AT THE RWCD CANA
730        HC       4

731        KK    DO16
732        KM        FINAL DIVERT OUT OF SYSTEM
733        KM        A SERIES OF TWO CULVERTS THAT DRAIN TO THE RWCD CANAL
734        KM        PEAK DISCHARGE THROUGH THE CULVERTS IS 24.5 CFS.
735        KM
736        KM        THE REMAINING FLOW WILL COMBINE WITH THE DITCH FLOW FROM RS13
737        KM        AT C16
```

```
738          DT   DO16A
739          DI     0.0    10.0    20.0    30.0    50.0   100.0   200.0
740          DQ    23.2    23.2    23.2    23.2    23.2    23.2    23.2
741          ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

 NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

  10       SB10
              .
              .
  37          .-------> DIV11S
  34      DIV11P
              V
              V
  40       RO11P
              .
              .
  44          .       SB16
              .          .
              .          .
  54       CO20............
              V
              V
  58       RO17
              .
              .
  68          .       SB24
              .          .
              .          .
  81          .          .-------> DIV25P
  78          .     DIV25S
              .          .
              .          .
  87          .          .-------> DIV270
  84          .     DIV27I
              .          V
              .          V
  90          .      RO27I
              .          .
              .          .
  97          .          .       SB18
              .          .          .
              .          .          .
 107          .          .          .       SB30
              .          .          .         .
              .          .          .         .
 119          .          .          .         .        ..<-------  DIV25P
 117          .          .          .         .     DIV25P
              .          .          .         .          V
              .          .          .         .          V
 120          .          .          .         .      RO25P
              .          .          .         .          .
              .          .          .         .          .
 123       CO32.............................................
              .
              .
```

```
131          .-------> DIV35P
127     DIV35S
             .
             .
137          .-------> DIV390
134     DIV39I
             V
             V
142      RO39I
             .
             .
149          .        SB42
             .          .
             .          .
161          .          .          .<-------  DIV35P
159          .          .     DIV35P
             .          .          V
             .          .          V
162          .          .     RO35P
             .          .          .
             .          .          .
166       CO44.......................
             .
             .
173          .-------> DIV47P
170     DIV47S
             .
             .
179          .-------> DIV490
176     DIV49I
             V
             V
184      RO49I
             .
             .
191          .        SB52
             .          .
             .          .
201          .          .       SB54
             .          .          V
             .          .          V
211          .          .       RO51
             .          .          .
             .          .          .
221       CO56.......................
             V
             V
225       RO57
             .
             .
232          .        SB60
             .          .
             .          .
240          .          .       SB62
             .          .          V
             .          .          V
250          .          .       RO64
             .          .          .
             .          .          .
262          .          .          .          .<-------  DIV47P
```

```
260          .          .          .      DIV47P
             .          .          .          V
             .          .          .          V
263          .          .          .      RO47P
             .          .          .          .
             .          .          .          .
267       CO68.................................
             .
             .
274          .-------> DIV71P
271      DIV71S
             .
             .
280          .-------> DIV730
277      DIV73I
             V
             V
285       RO73I
             .
             .
292          .       SB76
             .          .
             .          .
300       CP76............
             .
             .
305          .------->   DO76
303       DI76
             .
             .
308          .       SB84
             .          .
             .          .
320          .          .------->   Dos84
317          .     DI180A
             .          .
             .          .
327          .          .------->   DIS13
323          .     DI80A1
             .          .
             .          .
330          .          .       CP80
             .          .          .
             .          .          .
344          .          .          .------->   DOS80
341          .          .      DIS80
             .          .          V
             .          .          V
347          .          .       RS80
             .          .          .
             .          .          .
357          .      CP80A............
             .          .
             .          .
363          .          .------->   DIS15
360          .      DOS15
             .          .
             .          .
366      CP76A............
             .
```

```
          .
373       .-------> DOC90
370   DIC90
          .
          .
380       .-------> DOS16
376   DIS16
          .
          .
383       .       SB1
          .         V
          .         V
393       .     RS1
          .         .
          .         .
399       .         .       SB2
          .         .         .
          .         .         .
409       .       CP2............
          .         V
          .         V
413       .     RS2
          .         .
          .         .
419       .         .       SB3
          .         .         .
          .         .         .
429       .       CP3............
          .         V
          .         V
433       .     RS3
          .         .
          .         .
442       .         .-------> DI4
439       .       D3
          .         .
          .         .
445       .         .       SB5
          .         .         .
          .         .         .
455       .       CP5............
          .         V
          .         V
458       .       RS5
          .         V
          .         V
464       .       R5
          .         .
          .         .
467       .         .       SB6
          .         .         .
          .         .         .
477       .       CP6............
          .         V
          .         V
480       .       RS6
          .         .
          .         .
488       .         .         .<-------   DI4
486       .         .     DR3
```

```
          .         .         V
          .         .         V
489       .         .       RD3
          .         .         .
          .         .         .
493       .         .         .        SB4
          .         .         .         .
          .         .         .         .
503       .         .       CP4............
          .         .         .
          .         .         .
509       .         .         .-------->   DOS4
506       .         .      DIS4
          .         .         .
          .         .         .
512       .         .         .        SB7
          .         .         .         .
          .         .         .         .
522       .         .         .         .        SB8
          .         .         .         .         V
          .         .         .         .         V
532       .         .         .         .        R8
          .         .         .         .         .
          .         .         .         .         .
536       .         .         .        CP7............
          .         .         .         .
          .         .         .         .
539       .      CP10A......................
          .         V
          .         V
542       .       R10A
          .         .
          .         .
548       .         .      SB10
          .         .         .
          .         .         .
558       .       CP10............
          .         V
          .         V
561       .        R10
          .         .
          .         .
567       .         .       SB9
          .         .         .
          .         .         .
579       .         .         .-------->   DOS9
577       .         .      DIS9
          .         .         V
          .         .         V
582       .         .        R9
          .         .         .
          .         .         .
588       .         .         .       SB11
          .         .         .         .
          .         .         .         .
598       .      CP11......................
          .         V
          .         V
602       .      RS11
          .         V
```

```
          .          V
611       .         R11
          .          .
          .          .
618       .          .        SB12
          .          .          .
          .          .          .
628       .       CP12............
          .          .
          .          .
631       .          .        SB13
          .          .          .
          .          .          .
643       .          .          .          .<-------   DIS13
641       .          .          .       DRS84
          .          .          .          V
          .          .          .          V
644       .          .          .         R84
          .          .          .          .
          .          .          .          .
652       .          .          .          .        SB14
          .          .          .          .          .
          .          .          .          .          .
662       .       CP13.................................
          .          V
          .          V
665       .       RS13
          .          .
          .          .
679       .          .------->   DCP16
677       .      DIS16
          .          .
          .          .
682       .          .        SB15
          .          .          .
          .          .          .
694       .          .          .          .<-------   DIS15
692       .          .          .       DRS15
          .          .          .          .
          .          .          .          .
695       .          .        CP15............
          .          .          V
          .          .          V
698       .          .        RS15
          .          .          .
          .          .          .
705       .          .          .       SB16
          .          .          .          .
          .          .          .          .
717       .          .          .          .          .<-------   DCP16
715       .          .          .          .     DRCP16
          .          .          .          .          V
          .          .          .          .          V
718       .          .          .          .     RDCP16
          .          .          .          .          .
          .          .          .          .          .
726       .          .          .          .          .          .<-------   DOS16
724       .          .          .          .          .     DIS16A
          .          .          .          .          .          .
          .          .          .          .          .          .
```

```
727          .          .        CP16.................................
             .          .          .
             .          .          .
738          .          .          .-------->   DO16A
731          .          .        DO16

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************                                    ***********************************
*                                      *                                    *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                    *   U.S. ARMY CORPS OF ENGINEERS
*            SEPTEMBER 1990            *                                    *   HYDROLOGIC ENGINEERING CENTER
*             VERSION 4.0              *                                    *         609 SECOND STREET
*                                      *                                    *      DAVIS, CALIFORNIA 95616
* RUN DATE  12/18/1997  TIME  08:12:07 *                                    *         (916) 756-1104
*                                      *                                    *
****************************************                                    ***********************************


                    DDM MCUHP1 RWCD CANAL FIS  WLB JOB# 296025
                    FEMA FIS  MCFCD FCD # 96-07
                    "FLOODPLAIN DELINEATION AND MAPPING FOR THE UPPER
                    ROOSEVELT WATER CONSERVATION DISTRICT CANAL (NORTH END OF THE UEMF)"
                    THE WLB GROUP HEC-1 INPUT FILE  :RWCD24.DAT
                                        OUTPUT FILE :RWCD24.OUT
                                        DATE: 4-29-97

 9 IO        OUTPUT CONTROL VARIABLES
                  IPRNT          5  PRINT CONTROL
                  IPLOT          0  PLOT CONTROL
                  QSCAL         0.  HYDROGRAPH PLOT SCALE

  IT         HYDROGRAPH TIME DATA
                   NMIN          5  MINUTES IN COMPUTATION INTERVAL
                  IDATE     1    0  STARTING DATE
                  ITIME       0000  STARTING TIME
                     NQ        300  NUMBER OF HYDROGRAPH ORDINATES
                 NDDATE     2    0  ENDING DATE
                 NDTIME       0055  ENDING TIME
                 ICENT          19  CENTURY MARK

            COMPUTATION INTERVAL     .08 HOURS
                 TOTAL TIME BASE   24.92 HOURS

      ENGLISH UNITS
           DRAINAGE AREA          SQUARE MILES
           PRECIPITATION DEPTH    INCHES
           LENGTH, ELEVATION      FEET
           FLOW                   CUBIC FEET PER SECOND
           STORAGE VOLUME         ACRE-FEET
           SURFACE AREA           ACRES
           TEMPERATURE            DEGREES FAHRENHEIT
1
                                          RUNOFF SUMMARY
                                     FLOW IN CUBIC FEET PER SECOND
                                   TIME IN HOURS,  AREA IN SQUARE MILES

                          PEAK   TIME OF     AVERAGE FLOW FOR MAXIMUM PERIOD      BASIN     MAXIMUM     TIME OF
```

	OPERATION	STATION	FLOW	PEAK	6-HOUR	24-HOUR	72-HOUR	AREA	STAGE	MAX STAGE
+										
	HYDROGRAPH AT									
		SB10	40.	12.08	4.	1.	1.	.03		
	DIVERSION TO									
+		DIV11S	29.	11.83	2.	0.	0.	.03		
	HYDROGRAPH AT									
+		DIV11P	11.	11.83	3.	1.	1.	.03		
	ROUTED TO									
+		RO11P	11.	12.08	3.	1.	1.	.03		
	HYDROGRAPH AT									
+		SB16	192.	12.08	18.	5.	4.	.17		
	2 COMBINED AT									
+		CO20	203.	12.08	20.	5.	5.	.20		
	ROUTED TO									
+		RO17	193.	12.17	19.	5.	5.	.20		
+									7.97	12.17
	HYDROGRAPH AT									
+		SB24	124.	12.33	13.	3.	3.	.17		
	DIVERSION TO									
+		DIV25P	86.	12.33	12.	3.	3.	.17		
	HYDROGRAPH AT									
+		DIV25S	38.	12.33	1.	0.	0.	.17		
	DIVERSION TO									
+		DIV27O	13.	12.33	0.	0.	0.	.17		
	HYDROGRAPH AT									
+		DIV27I	25.	12.33	1.	0.	0.	.17		
	ROUTED TO									
+		RO27I	19.	12.42	1.	0.	0.	.17		
+									99.64	12.42
	HYDROGRAPH AT									
+		SB18	3.	12.17	1.	0.	0.	.00		
	HYDROGRAPH AT									
+		SB30	26.	12.17	4.	1.	1.	.04		
	HYDROGRAPH AT									
+		DIV25P	86.	12.17	12.	3.	3.	.00		
	ROUTED TO									
+		RO25P	86.	12.25	12.	3.	3.	.00		
	5 COMBINED AT									
+		CO32	300.	12.25	36.	9.	9.	.41		
	DIVERSION TO									

+		DIV35P	86.	12.25	19.	5.	5.	.41		
	HYDROGRAPH AT								
+		DIV35S	214.	12.25	17.	4.	4.	.41		
	DIVERSION TO								
+		DIV390	114.	12.25	9.	2.	2.	.41		
	HYDROGRAPH AT								
+		DIV39I	100.	12.25	9.	2.	2.	.41		
	ROUTED TO								
+		RO39I	95.	12.33	9.	2.	2.	.41		
+									98.26	12.33
	HYDROGRAPH AT								
+		SB42	131.	12.33	16.	5.	4.	.18		
	HYDROGRAPH AT								
+		DIV35P	86.	12.00	19.	5.	5.	.00		
	ROUTED TO								
+		RO35P	86.	12.00	19.	5.	5.	.00		
	3 COMBINED AT								
+		CO44	312.	12.33	44.	12.	11.	.59		
	DIVERSION TO								
+		DIV47P	112.	12.33	28.	8.	8.	.59		
	HYDROGRAPH AT								
		DIV47S	200.	12.33	16.	4.	4.	.59		
	DIVERSION TO								
+		DIV490	27.	12.33	2.	0.	0.	.59		
	HYDROGRAPH AT								
+		DIV49I	173.	12.33	14.	4.	3.	.59		
	ROUTED TO								
+		RO49I	146.	12.42	14.	4.	3.	.59		
+									.73	12.42
	HYDROGRAPH AT								
+		SB52	60.	12.17	5.	1.	1.	.06		
	HYDROGRAPH AT								
+		SB54	52.	12.00	5.	1.	1.	.03		
	ROUTED TO								
+		RO51	4.	12.58	1.	1.	1.	.03		
+									3.58	12.58
	3 COMBINED AT								
+		CO56	176.	12.42	21.	6.	5.	.69		
	ROUTED TO								
+		RO57	161.	12.50	21.	5.	5.	.69		
+									.76	12.50

	HYDROGRAPH AT								
+		SB60	227.	12.08	25.	8.	8.	.15	
	HYDROGRAPH AT								
+		SB62	107.	12.08	14.	5.	4.	.07	
	ROUTED TO								
+		RO64	91.	12.17	13.	4.	4.	.07	
+									3.77 12.17
	HYDROGRAPH AT								
+		DIV47P	112.	12.00	28.	8.	8.	.00	
	ROUTED TO								
+		RO47P	112.	12.42	28.	8.	8.	.00	
	4 COMBINED AT								
+		CO68	455.	12.17	85.	25.	24.	.91	
	DIVERSION TO								
+		DIV71P	140.	12.17	48.	16.	15.	.91	
	HYDROGRAPH AT								
+		DIV71S	315.	12.17	37.	9.	9.	.91	
	DIVERSION TO								
+		DIV730	126.	12.17	15.	4.	4.	.91	
	HYDROGRAPH AT								
+		DIV73I	190.	12.17	22.	5.	5.	.91	
	ROUTED TO								
+		RO73I	165.	12.42	22.	5.	5.	.91	
+									.80 12.42
	HYDROGRAPH AT								
+		SB76	60.	12.33	12.	4.	3.	.10	
	2 COMBINED AT								
+		CP76	224.	12.42	34.	9.	9.	1.01	
	DIVERSION TO								
+		DO76	171.	12.17	18.	4.	4.	1.01	
	HYDROGRAPH AT								
+		DI76	54.	12.17	16.	5.	4.	1.01	
	HYDROGRAPH AT								
+		SB84	119.	12.42	23.	6.	6.	.20	
	DIVERSION TO								
+		Dos84	27.	12.42	12.	4.	3.	.20	
	HYDROGRAPH AT								
+		DI180A	92.	12.42	12.	3.	3.	.20	
	DIVERSION TO								
+		DIS13	66.	12.08	6.	2.	1.	.20	
	HYDROGRAPH AT								

+		DI80A1	27.	12.08	6.	1.	1.	.20		
	HYDROGRAPH AT								
+		CP80	695.	12.42	105.	33.	32.	.64		
	DIVERSION TO								
+		DOS80	8.	12.42	8.	7.	7.	.64		
	HYDROGRAPH AT								
+		DIS80	688.	12.42	97.	26.	25.	.64		
	ROUTED TO								
+		RS80	14.	14.67	8.	2.	2.	.64		
+									1361.66	14.67
	2 COMBINED AT								
+		CP80A	27.	12.08	13.	4.	3.	.83		
	DIVERSION TO								
+		DIS15	0.	12.08	0.	0.	0.	.83		
	HYDROGRAPH AT								
+		DOS15	27.	12.08	13.	4.	3.	.83		
	2 COMBINED AT								
+		CP76A	80.	12.17	29.	8.	8.	1.84		
	DIVERSION TO								
+		DOC90	8.	12.17	3.	1.	1.	1.84		
	HYDROGRAPH AT								
+		DIC90	72.	12.17	26.	7.	7.	1.84		
	DIVERSION TO								
+		DOS16	36.	12.17	13.	4.	4.	1.84		
	HYDROGRAPH AT								
+		DIS16	36.	12.17	13.	4.	3.	1.84		
	HYDROGRAPH AT								
+		SB1	38.	12.00	5.	2.	2.	.02		
	ROUTED TO								
+		RS1	12.	12.42	2.	1.	1.	.02		
+									1376.12	12.42
	HYDROGRAPH AT								
+		SB2	29.	12.00	3.	1.	1.	.01		
	2 COMBINED AT								
+		CP2	29.	12.00	5.	2.	2.	.04		
	ROUTED TO								
+		RS2	14.	12.50	3.	1.	1.	.04		
+									1374.64	12.50
	HYDROGRAPH AT								
+		SB3	50.	12.08	6.	2.	2.	.03		
	2 COMBINED AT								

+	CP3	50.	12.08	9.	3.	3.	.07		
ROUTED TO									
+	RS3	50.	12.08	9.	3.	3.	.07		
+								1373.46	12.08
DIVERSION TO									
+	DI4	25.	12.08	4.	1.	1.	.07		
HYDROGRAPH AT									
+	D3	25.	12.08	4.	1.	1.	.07		
HYDROGRAPH AT									
+	SB5	18.	12.08	2.	1.	1.	.01		
2 COMBINED AT									
+	CP5	44.	12.08	6.	2.	2.	.08		
ROUTED TO									
+	RS5	16.	12.50	3.	1.	1.	.08		
+								1370.08	12.50
ROUTED TO									
+	R5	16.	12.58	3.	1.	1.	.08		
HYDROGRAPH AT									
+	SB6	27.	12.17	5.	2.	2.	.02		
2 COMBINED AT									
+	CP6	29.	12.58	8.	3.	3.	.11		
ROUTED TO									
+	RS6	28.	12.58	8.	2.	2.	.11		
+								1366.33	12.58
HYDROGRAPH AT									
+	DR3	25.	12.08	4.	1.	1.	.00		
ROUTED TO									
+	RD3	26.	12.25	4.	1.	1.	.00		
HYDROGRAPH AT									
+	SB4	31.	12.08	4.	1.	1.	.02		
2 COMBINED AT									
+	CP4	45.	12.25	8.	2.	2.	.02		
DIVERSION TO									
+	DOS4	6.	12.25	3.	1.	1.	.02		
HYDROGRAPH AT									
+	DIS4	39.	12.25	4.	1.	1.	.02		
HYDROGRAPH AT									
+	SB7	62.	12.25	10.	3.	3.	.08		
HYDROGRAPH AT									
+	SB8	39.	12.25	7.	2.	2.	.06		
ROUTED TO									

+		R8	38.	12.50	7.	2.	2.	.06	
	2 COMBINED AT								
+		CP7	92.	12.33	17.	5.	4.	.13	
	3 COMBINED AT								
+		CP10A	152.	12.25	29.	8.	8.	.26	
	ROUTED TO								
+		R10A	151.	12.50	29.	8.	8.	.26	
	HYDROGRAPH AT								
+		SB10	150.	12.08	20.	6.	6.	.12	
	2 COMBINED AT								
+		CP10	239.	12.17	48.	14.	14.	.38	
	ROUTED TO								
+		R10	238.	12.25	48.	14.	14.	.38	
	HYDROGRAPH AT								
+		SB9	177.	12.08	21.	7.	7.	.13	
	DIVERSION TO								
+		DOS9	66.	12.08	4.	1.	1.	.13	
	HYDROGRAPH AT								
+		DIS9	111.	12.08	17.	6.	6.	.13	
	ROUTED TO								
		R9	106.	12.33	17.	6.	6.	.13	
	HYDROGRAPH AT								
+		SB11	103.	12.33	22.	6.	6.	.17	
	3 COMBINED AT								
+		CP11	443.	12.33	87.	26.	25.	.68	
	ROUTED TO								
+		RS11	305.	12.67	77.	21.	20.	.68	
+									1353.75 12.67
	ROUTED TO								
+		R11	210.	13.67	70.	20.	19.	.68	
	HYDROGRAPH AT								
+		SB12	282.	12.08	27.	7.	7.	.21	
	2 COMBINED AT								
+		CP12	282.	12.08	91.	27.	26.	.89	
	HYDROGRAPH AT								
+		SB13	103.	12.08	10.	3.	3.	.08	
	HYDROGRAPH AT								
		DRS84	66.	12.42	6.	2.	1.	.00	
	ROUTED TO								
+		R84	38.	13.33	6.	2.	2.	.00	

	HYDROGRAPH AT								
+		SB14	55.	12.08	5.	1.	1.	.04	
	4 COMBINED AT								
+		CP13	440.	12.08	112.	33.	32.	1.00	
	ROUTED TO								
+		RS13	86.	15.17	64.	24.	23.	1.00	
+								1352.17	15.17
	DIVERSION TO								
+		DCP16	10.	15.17	8.	3.	3.	1.00	
	HYDROGRAPH AT								
+		DIS16	77.	15.17	56.	20.	20.	1.00	
	HYDROGRAPH AT								
+		SB15	21.	12.08	2.	1.	1.	.02	
	HYDROGRAPH AT								
+		DRS15	0.	.08	0.	0.	0.	.00	
	2 COMBINED AT								
+		CP15	21.	12.08	2.	1.	1.	.02	
	ROUTED TO								
+		RS15	0.	.08	0.	0.	0.	.02	
+								1351.37	24.58
	HYDROGRAPH AT								
		SB16	4.	12.17	1.	0.	0.	.00	
	HYDROGRAPH AT								
+		DRCP16	10.	15.17	8.	3.	3.	.00	
	ROUTED TO								
+		RDCP16	10.	15.42	8.	3.	3.	.00	
+								1353.67	15.42
	HYDROGRAPH AT								
+		DIS16A	36.	12.17	13.	4.	4.	.00	
	4 COMBINED AT								
+		CP16	42.	13.00	20.	7.	7.	.02	
	DIVERSION TO								
+		DO16A	23.	13.00	17.	6.	6.	.02	
	HYDROGRAPH AT								
+		DO16	19.	13.00	4.	1.	1.	.02	

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)

R011P	MANE	5.00	11.07	725.00	1.06	5.00	11.07	725.00	1.06

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1751E+01 EXCESS= .0000E+00 OUTFLOW= .1745E+01 BASIN STORAGE= .1201E-02 PERCENT ERROR=

R025P	MANE	1.98	87.40	733.81	-1.00	5.00	86.07	735.00	-1.00
R035P	MANE	1.98	86.63	723.89	-1.00	5.00	86.16	720.00	-1.00
R047P	MANE	3.61	113.80	726.06	-1.00	5.00	112.02	745.00	-1.00
R5	MANE	.50	15.71	754.50	.46	5.00	15.70	755.00	.46

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1995E+01 EXCESS= .0000E+00 OUTFLOW= .1990E+01 BASIN STORAGE= .3246E-02 PERCENT ERROR=

RD3	MANE	5.00	25.99	735.00	-1.00	5.00	25.99	735.00	-1.00
R8	MANE	5.00	37.53	750.00	1.29	5.00	37.53	750.00	1.29

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3852E+01 EXCESS= .0000E+00 OUTFLOW= .3839E+01 BASIN STORAGE= .9137E-02 PERCENT ERROR=

R10A	MANE	5.00	150.87	750.00	1.15	5.00	150.87	750.00	1.15

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1578E+02 EXCESS= .0000E+00 OUTFLOW= .1579E+02 BASIN STORAGE= .2589E-01 PERCENT ERROR=

R10	MANE	4.27	238.41	734.85	1.42	5.00	238.31	735.00	1.42

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2852E+02 EXCESS= .0000E+00 OUTFLOW= .2851E+02 BASIN STORAGE= .2473E-01 PERCENT ERROR=

R9	MANE	5.00	105.74	740.00	1.64	5.00	105.74	740.00	1.64

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1151E+02 EXCESS= .0000E+00 OUTFLOW= .1146E+02 BASIN STORAGE= .7030E-02 PERCENT ERROR=

R11	MANE	2.00	210.24	820.00	1.10	5.00	210.24	820.00	1.10

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4204E+02 EXCESS= .0000E+00 OUTFLOW= .3962E+02 BASIN STORAGE= .2068E+01 PERCENT ERROR=

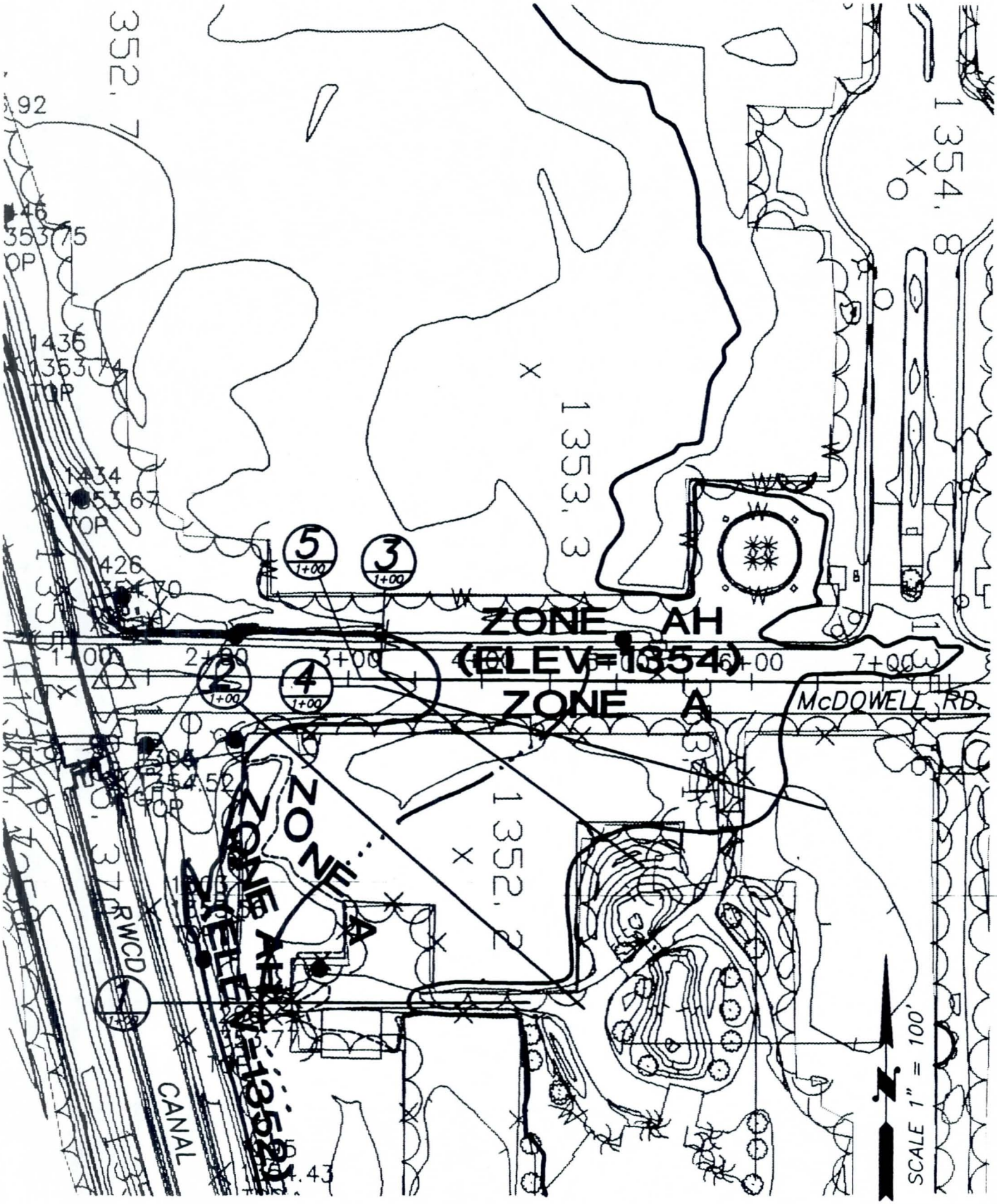
R84	MANE	1.25	38.28	801.25	-1.00	5.00	38.06	800.00	-1.00

*** NORMAL END OF HEC-1 ***

E.1 Hydraulic Calculations for Approximate Delineations

ZONE A

CROSS SECTION LOCATION FOR CONVEYANCE CALCULATIONS



Cross Section # 1
Worksheet for Irregular Channel

Project Description	
Project File	h:\flowmart\rwcd.fm2
Worksheet	Normal Depth Calc. for Cross Section #1
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data

Channel Slope 0.005700 ft/ft

Elevation range: 1351.20 ft to 1353.50 ft.

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
130.00	1353.50	130.00	340.00	0.035
140.00	1352.70			
152.00	1351.20			
160.00	1351.30			
170.00	1351.60			
180.00	1351.70			
190.00	1351.70			
198.00	1352.10			
210.00	1352.10			
220.00	1352.10			
250.00	1352.60			
280.00	1352.70			
300.00	1352.90			
340.00	1353.20			

Discharge 300.00 ft^3/s

Results

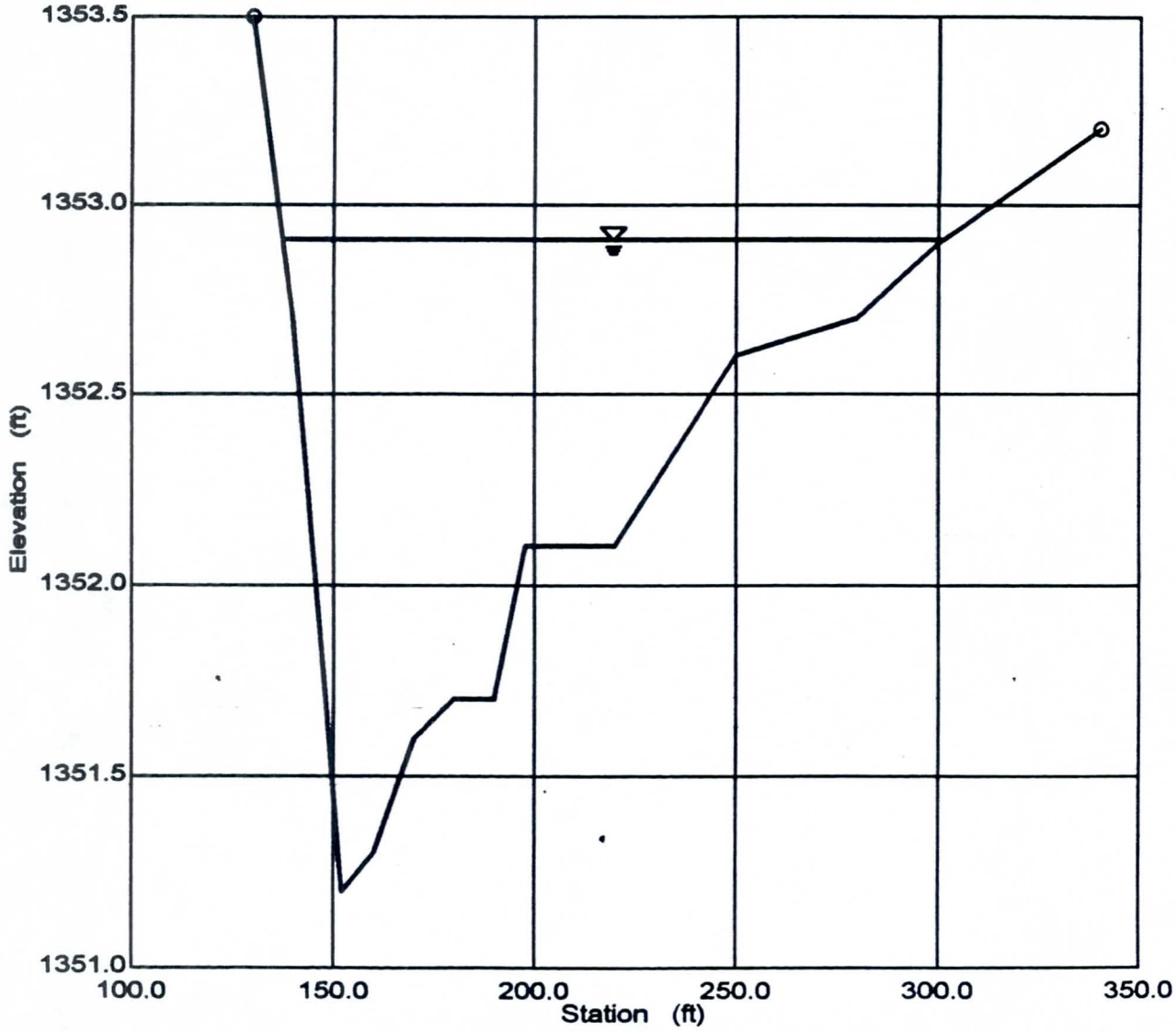
Wtd. Mannings Coefficient	0.035	
Water Surface Elevation	1352.91	ft
Flow Area	117.19	ft^2
Wetted Perimeter	164.17	ft
Top Width	164.05	ft
Depth	1.71	ft
Critical Water Elev.	1352.54	ft
Critical Slope	0.020828	ft/ft
Velocity	2.56	ft/s
Velocity Head	0.10	ft
Specific Energy	1353.01	ft
Froude Number	0.53	
Full Flow Capacity	800.42	ft^3/s

Flow is subcritical.

Cross Section # 1
Cross Section for Irregular Channel

Project Description	
Project File	h:\flowmsrt\rwcd.fm2
Worksheet	Normal Depth Calc. for Cross Section #1
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data		
Wtd. Mannings Coefficient	0.035	
Channel Slope	0.005700	ft/ft
Water Surface Elevation	1352.91	ft
Discharge	300.00	ft³/s



Cross Section #2
Worksheet for Irregular Channel

Project Description	
Project File	h:\flowmsrt\rwcd.fm2
Worksheet	Normal Depth Calc. for Cross section #2
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data

Channel Slope 0.005700 ft/ft

Elevation range: 1352.30 ft to 1354.60 ft.

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
110.00	1354.60	110.00	440.00	0.035
130.00	1353.20			
160.00	1352.30			
196.00	1353.00			
250.00	1353.00			
300.00	1352.60			
320.00	1352.80			
350.00	1352.40			
390.00	1352.50			
420.00	1353.20			
440.00	1353.50			

Discharge 300.00 ft^3/s

Results

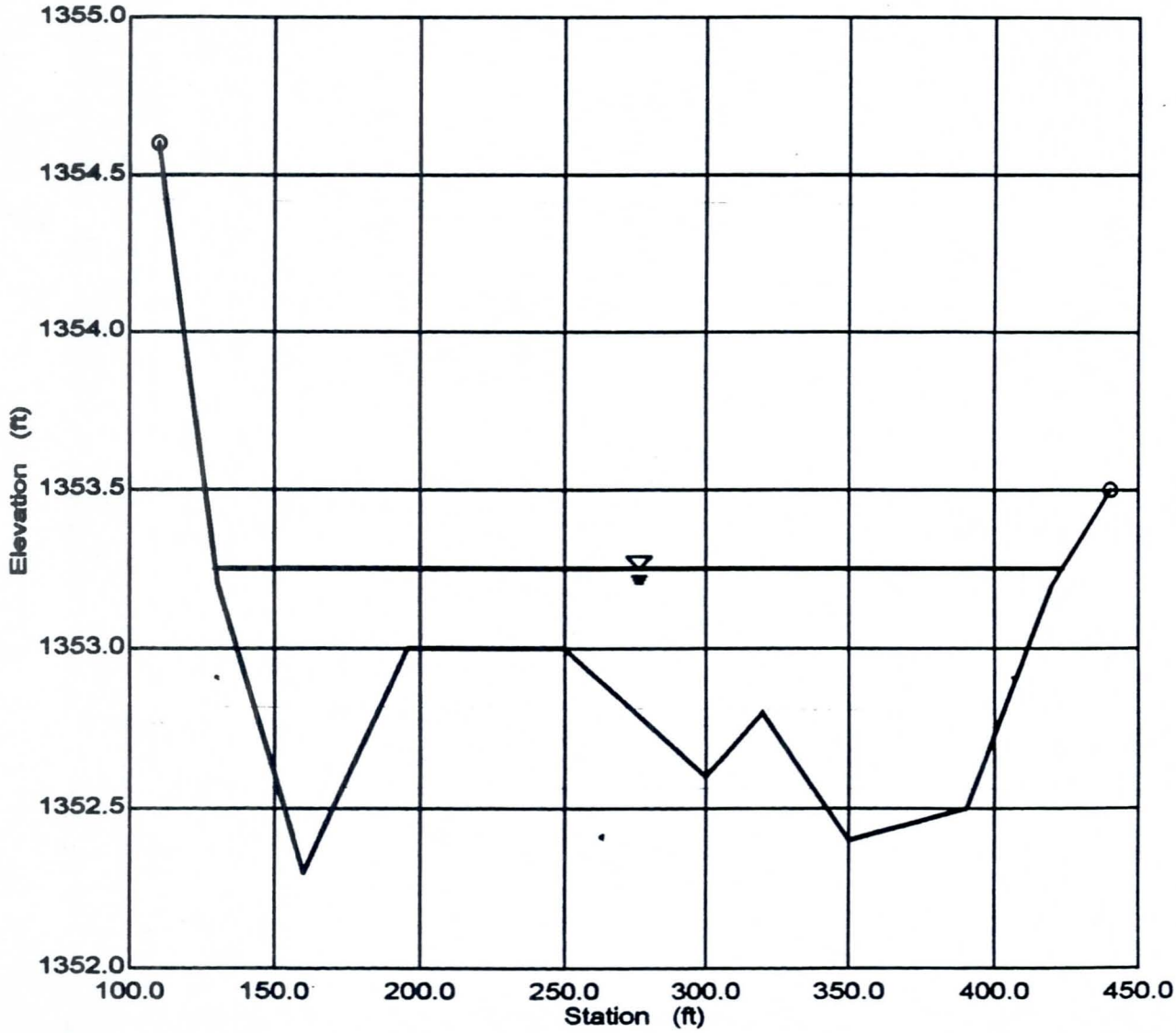
Wtd. Mannings Coefficient	0.035	
Water Surface Elevation	1353.25	ft
Flow Area	148.00	ft^2
Wetted Perimeter	294.30	ft
Top Width	294.27	ft
Depth	0.95	ft
Critical Water Elev.	1353.06	ft
Critical Slope	0.025838	ft/ft
Velocity	2.03	ft/s
Velocity Head	0.06	ft
Specific Energy	1353.32	ft
Froude Number	0.50	
Full Flow Capacity	2682.44	ft^3/s

Flow is subcritical.

Cross Section #2
Cross Section for Irregular Channel

Project Description	
Project File	h:\flowmsrt\wcd.fm2
Worksheet	Normal Depth Calc. for Cross section #2
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data		
Wtd. Mannings Coefficient	0.035	
Channel Slope	0.005700	ft/ft
Water Surface Elevation	1353.25	ft
Discharge	300.00	ft^3/s



Cross section #3
Worksheet for Irregular Channel

Project Description	
Project File	h:\flowmsrt\rwcd.fm2
Worksheet	Normal Depth Calc. for Cross Section # 3
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data

Channel Slope 0.005700 ft/ft

Elevation range: 1352.50 ft to 1354.50 ft.

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
130.00	1354.00	130.00	320.00	0.035
160.00	1353.20			
170.00	1352.90			
200.00	1353.20			
240.00	1352.50			
280.00	1352.50			
300.00	1352.50			
320.00	1354.50			

Discharge 300.00 ft^3/s

Results

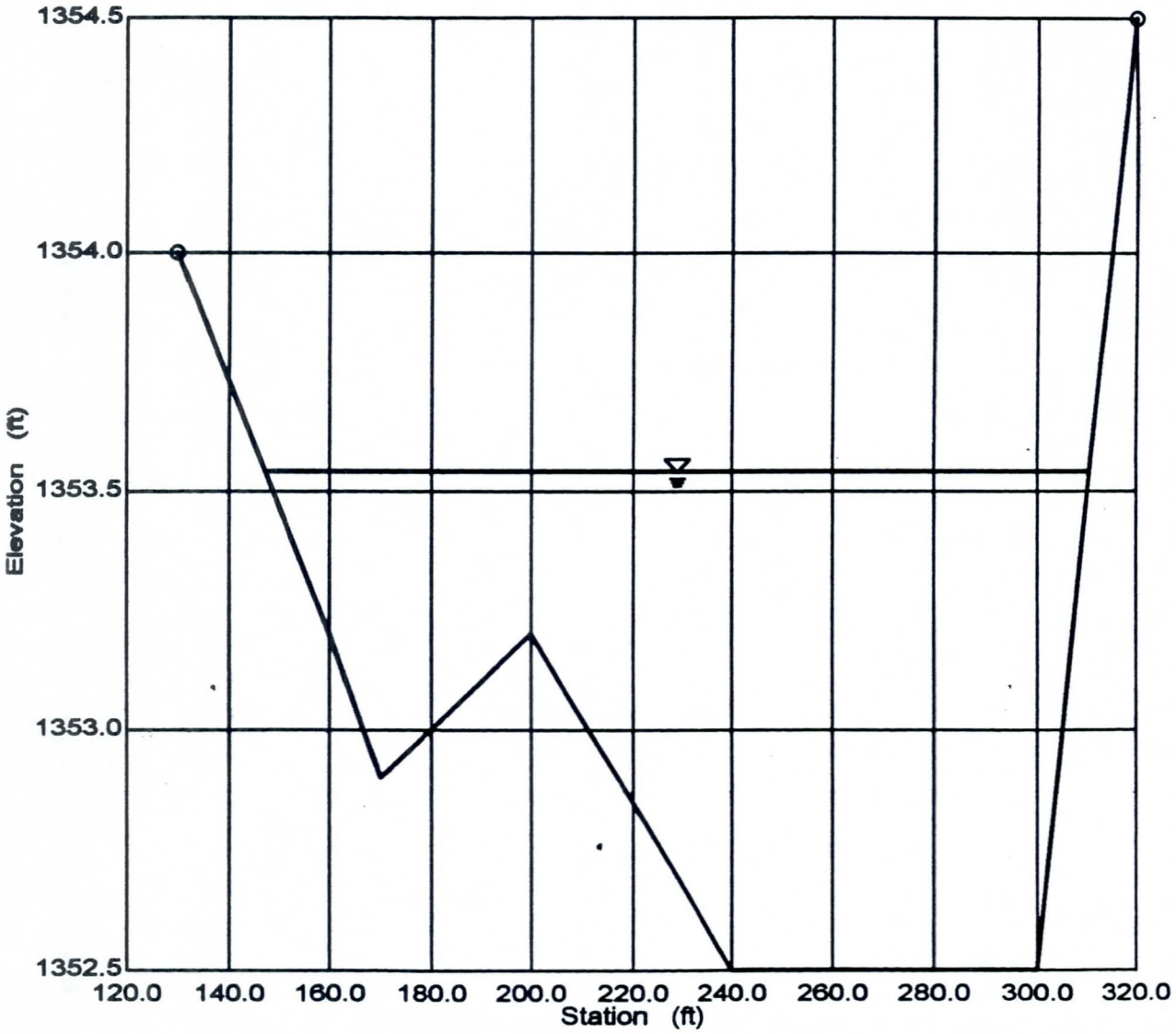
Wtd. Mannings Coefficient	0.035	
Water Surface Elevation	1353.54	ft
Flow Area	116.89	ft^2
Wetted Perimeter	163.13	ft
Top Width	163.07	ft
Depth	1.04	ft
Critical Water Elev.	1353.27	ft
Critical Slope	0.022526	ft/ft
Velocity	2.57	ft/s
Velocity Head	0.10	ft
Specific Energy	1353.64	ft
Froude Number	0.53	
Full Flow Capacity	1236.62	ft^3/s

Flow is subcritical.

Cross Section #3
Cross Section for Irregular Channel

Project Description	
Project File	h:\flowmsrt\rwcd.fm2
Worksheet	Normal Depth Calc. for Cross Section # 3
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data		
Wtd. Mannings Coefficient	0.035	
Channel Slope	0.005700	ft/ft
Water Surface Elevation	1353.54	ft
Discharge	300.00	ft^3/s



Normal Depth Calc's for X-sec. #4
Worksheet for Irregular Channel

Project Description	
Project File	h:\flowmsrt\rwcd.fm2
Worksheet	Normal Depth Calc. for Cross Section # 4
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data

Channel Slope 0.005700 ft/ft

Elevation range: 1353.00 ft to 1354.40 ft.

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
100.00	1354.40	100.00	382.00	0.035
120.00	1354.00			
160.00	1353.60			
200.00	1353.00			
260.00	1353.00			
330.00	1353.40			
360.00	1353.00			
370.00	1353.70			
382.00	1353.90			

Discharge 300.00 ft^3/s

Results

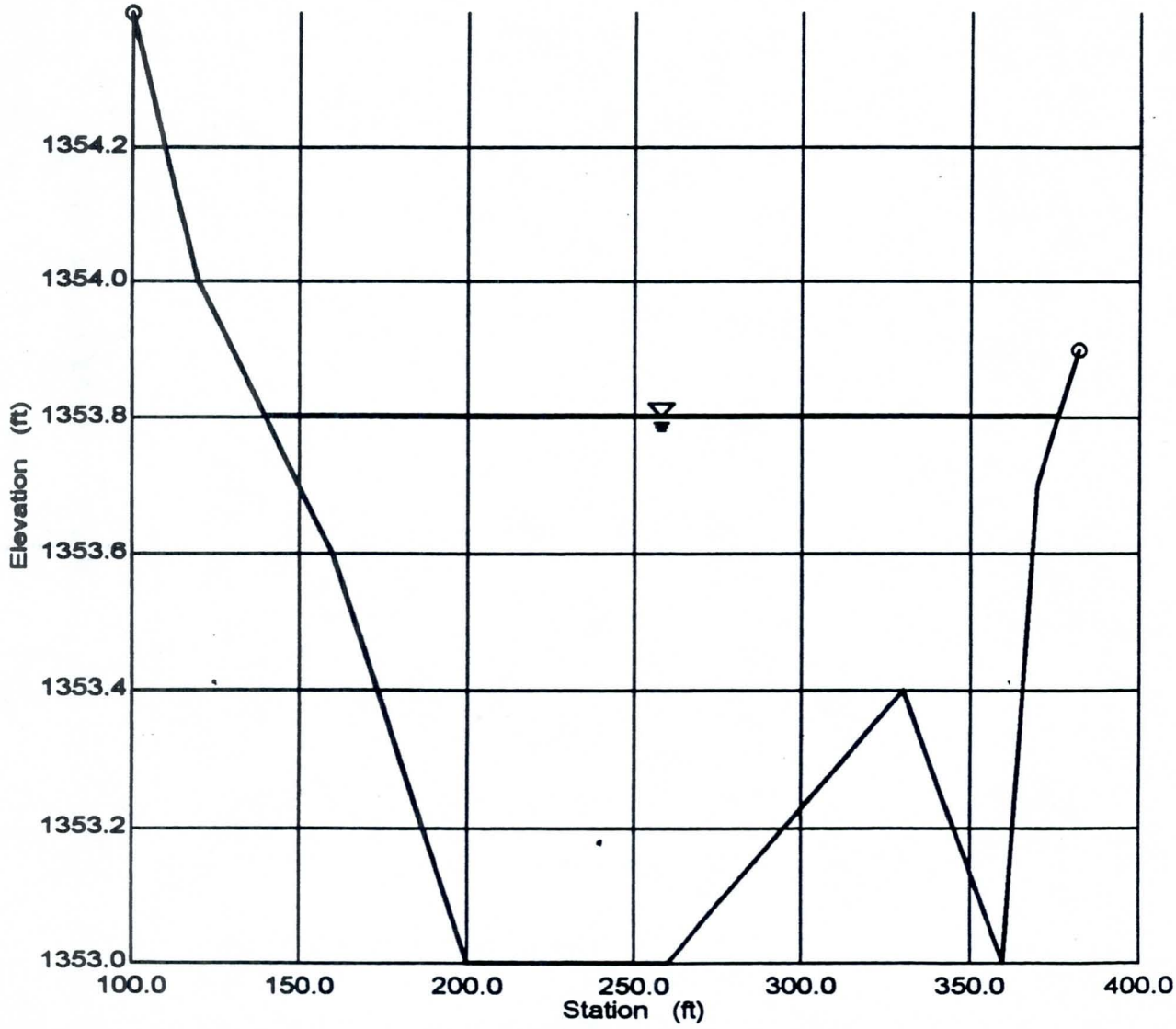
Wtd. Mannings Coefficient	0.035	
Water Surface Elevation	1353.80	ft
Flow Area	135.63	ft^2
Wetted Perimeter	236.60	ft
Top Width	236.56	ft
Depth	0.80	ft
Critical Water Elev.	1353.56	ft
Critical Slope	0.024144	ft/ft
Velocity	2.21	ft/s
Velocity Head	0.08	ft
Specific Energy	1353.88	ft
Froude Number	0.51	
Full Flow Capacity	966.02	ft^3/s

Flow is subcritical.

Cross Section # 4
Cross Section for Irregular Channel

Project Description	
Project File	h:\flowmsrt\rwcd.fm2
Worksheet	Normal Depth Calc. for Cross Section # 4
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data		
Wtd. Mannings Coefficient	0.035	
Channel Slope	0.005700	ft/ft
Water Surface Elevation	1353.80	ft
Discharge	300.00	ft^3/s



Cross Section # 5
Worksheet for Irregular Channel

Project Description	
Project File	h:\flowmart\rwcd.fm2
Worksheet	Normal Depth Calc for Cross Section # 5
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data

Channel Slope 0.005700 ft/ft

Elevation range: 1353.20 ft to 1354.00 ft.

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
130.00	1354.00	130.00	450.00	0.015
150.00	1353.90			
200.00	1353.60			
250.00	1353.30			
270.00	1353.20			
290.00	1353.20			
310.00	1353.20			
350.00	1353.30			
400.00	1353.50			
433.00	1353.80			
450.00	1353.80			

Discharge 300.00 ft^3/s

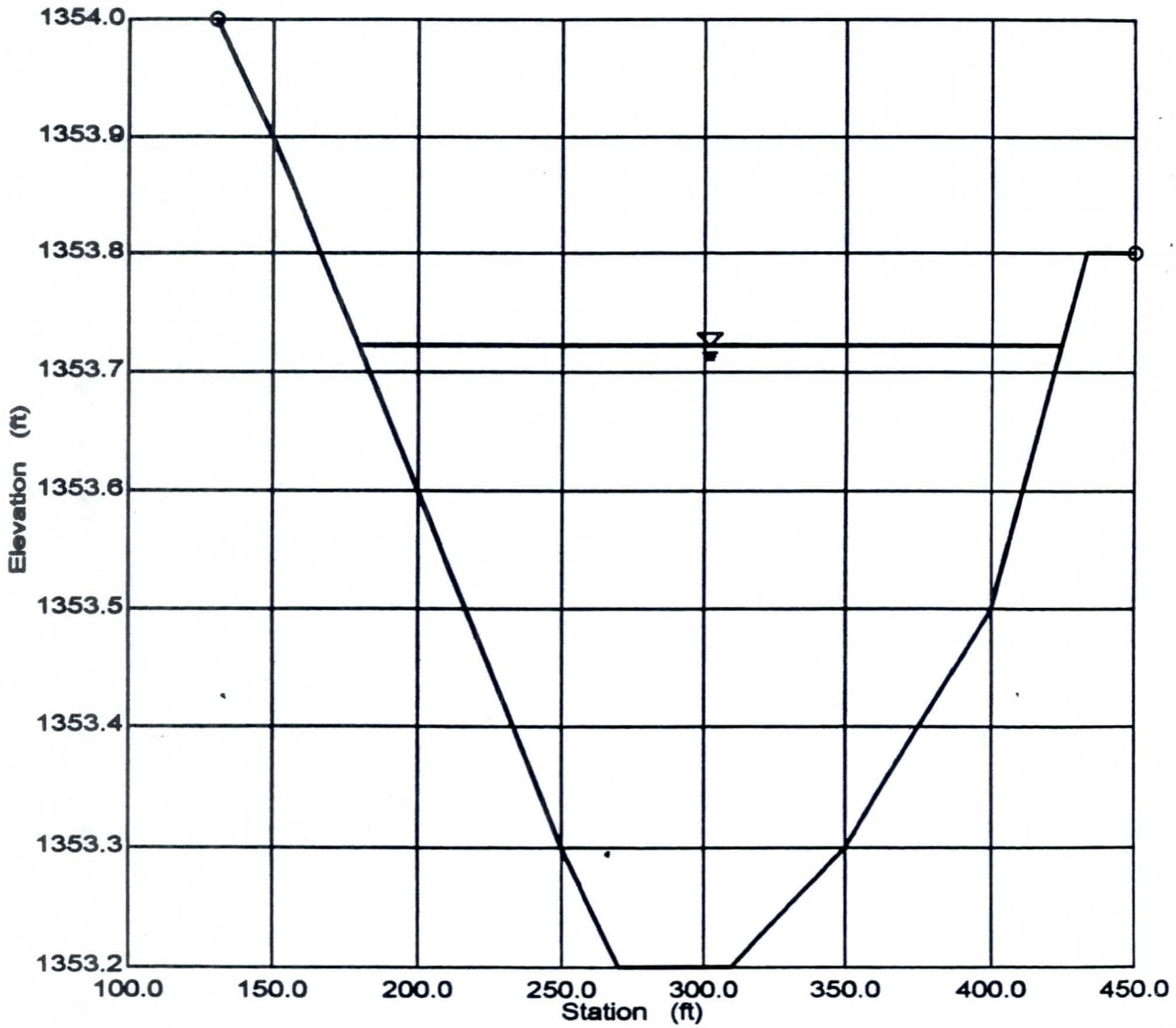
Results		
Wtd. Mannings Coefficient	0.015	
Water Surface Elevation	1353.72	ft
Flow Area	82.66	ft^2
Wetted Perimeter	244.54	ft
Top Width	244.54	ft
Depth	0.52	ft
Critical Water Elev.	1353.75	ft
Critical Slope	0.004637	ft/ft
Velocity	3.63	ft/s
Velocity Head	0.20	ft
Specific Energy	1353.93	ft
Froude Number	1.10	
Full Flow Capacity	776.81	ft^3/s

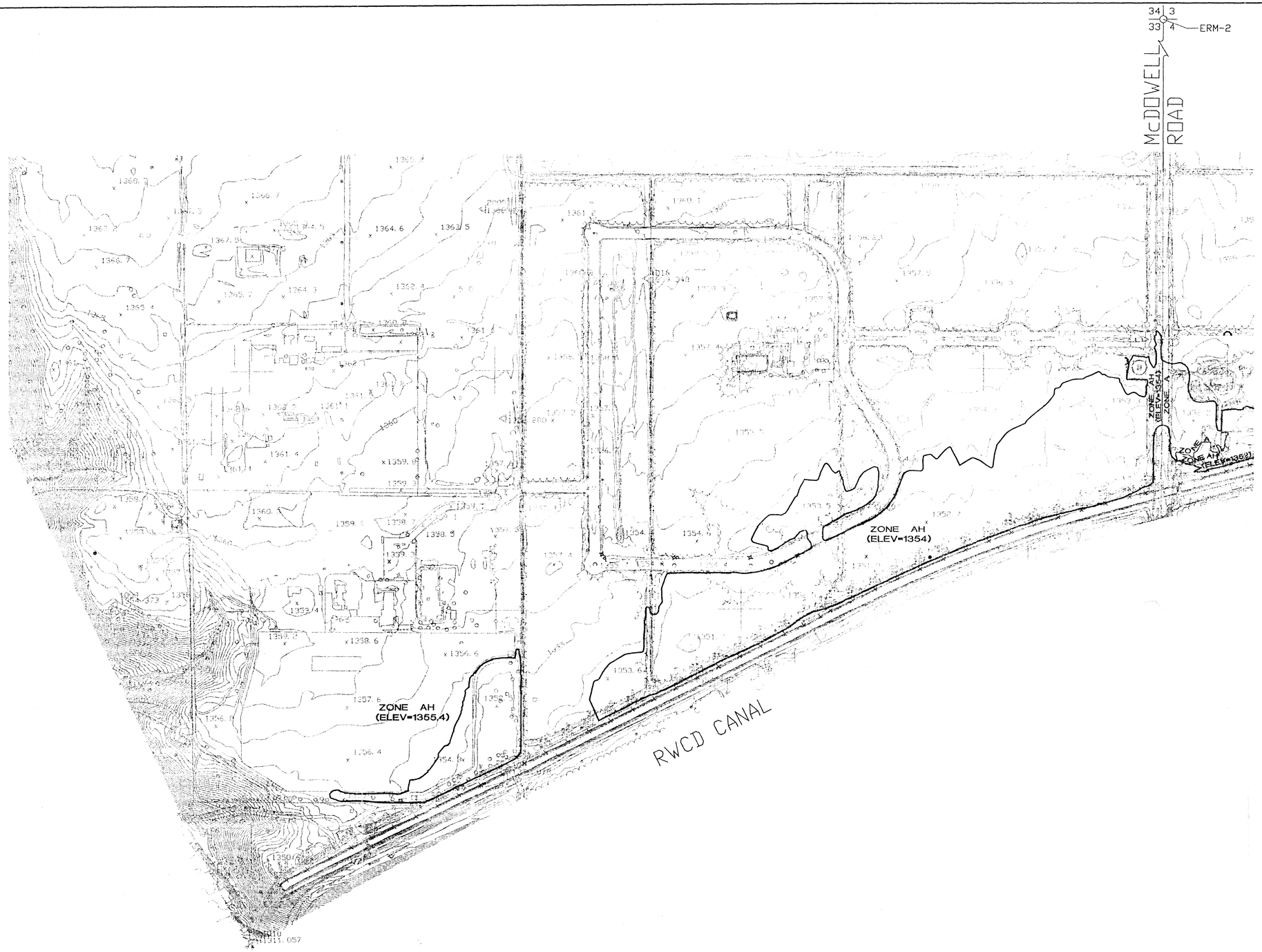
Flow is supercritical.

Cross Section # 5
Cross Section for Irregular Channel

Project Description	
Project File	h:\flowmsrt\rwcd.fm2
Worksheet	Normal Depth Calc for Cross Section # 5
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Section Data		
Wtd. Mannings Coefficient	0.015	
Channel Slope	0.005700	ft/ft
Water Surface Elevation	1353.72	ft
Discharge	300.00	ft³/s





FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOOD INSURANCE STUDY WORK MAP

ROOSEVELT WATER CONSERVATION DISTRICT CANAL

F.C.D. CONTRACT NO. 96-07

LEGEND

ERM3 X	ELEVATION REFERENCE MARK
	100-YR FLOODPLAIN BOUNDARY
ZONE AH (ELEV 1352)	ZONE DESIGNATION WITH BASE FLOOD ELEVATION
4 3 / 9 10	SECTION CORNER

ELEVATION REFERENCE MARKS

ID. NUMBER	ELEVATION	DESCRIPTION/LOCATION
ERM-1	1356.26	B/C IN H.H. AT INTERSECTION OF GREENFIELD AND McKELLIPS RD.
ERM-2	1364.57	B/C IN H.H. AT INTERSECTION OF GREENFIELD AND McDOWELL RD.

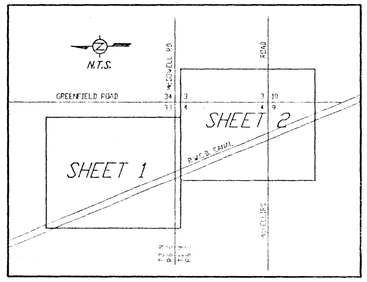
NOTES

1.0 CONVERSION FROM NGVD29 TO NAVD88 PER U.S. ARMY TOPOGRAPHIC ENGINEERING CENTER PROGRAM CORPSCON V-4.11

	NGVD29 ELV. (++)	NAVD88 ELV. (++)
ERM-1	1356.262	1358.07
ERM-2	1364.571	1366.40

200 0' 200 400

SCALE: 1" = 200 FEET
CONTOUR INTERVAL = 1ft.



INDEX MAP

STUDY CONTRACTOR:

The WLB Group INC.

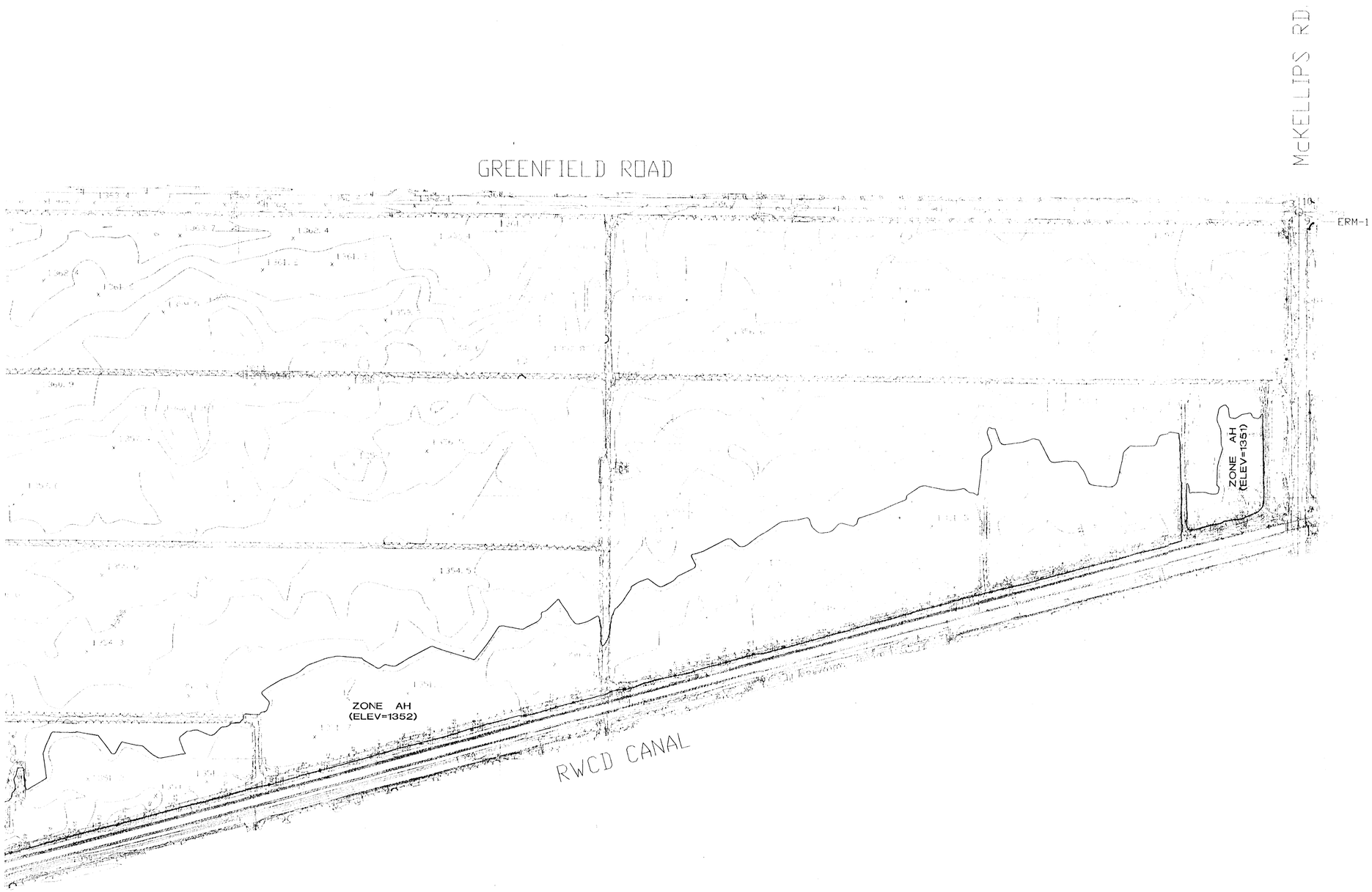
SURVEYING AND AERIAL MAPPING CONSULTANT

COLLINS - PINA CONSULTING ENGINEERS, INC.

DATE FLOWN FOR AERIAL MAPPING:
DECEMBER 24, 1996

FLOODPLAIN DELINEATION DATE:
DECEMBER 1997

SHEET 1 OF 2



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FLOOD INSURANCE STUDY WORK MAP

ROOSEVELT WATER CONSERVATION DISTRICT CANAL

F.C.D. CONTRACT NO. 96-07

LEGEND

ERM3 •	ELEVATION REFERENCE MARK
———	100-YR FLOODPLAIN BOUNDARY
ZONE AH (ELEV 1352)	ZONE DESIGNATION WITH BASE FLOOD ELEVATION
4 | 3 / 9 | 10	SECTION CORNER

ELEVATION REFERENCE MARKS

ID NUMBER	ELEVATION	DESCRIPTION/LOCATION
ERM-1	1356.26	B.C. IN RR AT INTERSECTION OF GREENFIELD AND McKELLIPS RD.
ERM-2	1364.57	B.C. IN RR AT INTERSECTION OF GREENFIELD AND McDOWELL RD.

NOTES

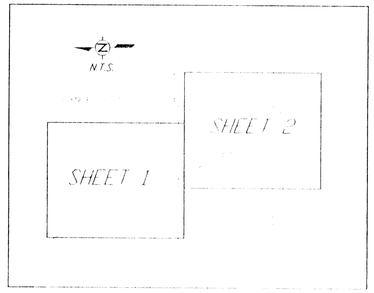
1) CONVERSION FROM NGVD29 TO NAVD88 PER U.S. ARMY TOPOGRAPHIC ENGINEERING CENTER PROGRAM CORPSCON V-4.11

	NGVD29 ELEV (m)	NAVD88 ELEV (m)
ERM-1	1356.26	1358.[illegible]
ERM-2	[illegible]	[illegible]

200 0 200 400

SCALE: 1" = 200 FEET

CONTOUR INTERVAL = 1FT



INDEX MAP

The WLB Group

COLLINS - PINA CONSULTING ENGINEERS, INC.

DECEMBER 24, 1996

SHEET 2 OF 2

DECEMBER 1997