MEMORANDUM

REGIONAL FLOOD CONTROL DISTRICT
FLOODPLAIN MANAGEMENT DIVISION

DATE: February 27, 2006

TO: Floodplain Management Division Staff

FROM: Eric Shepp, P.E., Division Manager
Floodplain Management Division

SUBJECT: Use of Special Study 16 – Upper Canada Del Oro Wash

Questions have arisen regarding the use of this special study. The study currently includes two separate documents:

1) *Flood Control Study for Canada Del Oro Wash, Catalina Arizona, dated November 1991.* This study was prepared in order to determine the number of properties affected by the CDO floodplain, floodway, and erosion hazard setback, and was intended to prioritize acquisition through the FLAP program. There is no new analysis in this study, just a cataloging of floodplain/erosion hazard information onto a single map. Because of the age of this study, much of this information is now obsolete. As such, this study will be removed from the shelf.

2) *Upper Canada Del Oro Wash Letter of Map Revision Study, dated July 1994.* This study was prepared in order to submit to FEMA for potential revision to the floodplain and floodway boundaries, but was never submitted. However, it is still a regulatory tool that we should use to assist in establishing Base Flood Elevations. FPUPs shall incorporate the more restrictive Base Flood Elevation from this study and the FIS study.

   Part of the reason that this was not submitted to FEMA was that some of the floodplain boundaries were not accurately mapped on the associated topographic maps. As such, care should be taken when determining BFEs. Individual cross-section locations and water surface elevations are considered to be accurate.

This study will be included in the Special Studies GIS layer as reminder to use this information when necessary.

Please let me know if you have any questions.

cc: Chris Cawein, Deputy Director, Regional Flood Control District
Jerry Curless, Manager, Planning and Development Division
Mare Hodshon-Yates, Infrastructure Division

Cover Letter

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Page 106
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Page 109
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Page 183
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188

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MAP 2 of 4 UPPER CANADA DEL ORO WASH

Call to pick up
Dave Dalton
520 909-9134

1-MAP 3.00

~~7.50~~ X.25 = ~~8.75~~

11.75
total

Verified Statement of Non-Commercial Purpose
Public Data Request

Pima County Government
130 West Congress
Tucson, Arizona 85701

Caution: Arizona Revised Statutes § 39-121.03 (C) provides:

> "A person who obtains public records for a commercial purpose without indicating the commercial purpose or who obtains a public record for a noncommercial purpose and uses or knowingly allows the use of such public record for a commercial purpose or who obtains a public record for a commercial purpose and uses or knowingly allows the use of such public record for a different commercial purpose or who obtains a public record from anyone other than the custodian of such records and uses then for a commercial purpose shall in addition to other penalties be liable to the state or the political subdivision from which the public record was obtained for damages in the amount of three times the amount which would have been charged for the public record had the commercial purpose been stated plus costs and reasonable attorney's fees or shall be liable to the state or the political subdivision for the amount of three times the actual damages if it can be shown that the public record would not have been provided had the commercial purpose of actual use been stated at the time of obtaining the records."

Verified Statement

I hereby agree that the public records I have requested are not for a "commercial purpose" as defined by A.R.S. §39-121.03. I also hereby agree that the public records will not be transmitted or sold to any other person for a commercial purpose.

David B. Dalton
Name

Signature

6330 N Campbell Ave #120
Tucson, AZ 85718
Address (please print)

5/31/07
Date

Bonnette P Licata
Notary Public

November 14, 2010
Date Commission Expires

Draft
NOT Accepted
for research only

LETTER OF MAP REVISION STUDY
FOR
UPPER CANADA DEL ORO WASH
PIMA COUNTY, ARIZONA

Prepared By:

David Evans and Associates, Inc.
3845 No. Business Center Drive
Tucson, AZ 85705
(602) 292-2160

Prepared For:

Pima County Department of Transportation
201 N. Stone Avenue
Tucson, AZ 85701

Note these errors
Match sheet 3 & 4 do not correlate'

July, 1994
Revised October, 1994

'E' series profiles do not correlate with Map/Hec-2
x sec 5 will be adjusted

Please e-mail comments to BS at Planning

Registered Professional Engineer (Civil)
CERTIFICATE NO.
19681
MATTHEW W.
FLICK
DATE SIGNED
ARIZONA U. S. A.

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LETTER OF MAP REVISION STUDY
UPPER CANADA DEL ORO WASH
PIMA COUNTY, ARIZONA

1.0 INTRODUCTION

1.1 Purpose of Study

The purpose of this Letter Of Map Revision (LOMR) study report is to revise and update the existing Flood Insurance Study (FIS) and Flood Insurance Rate Maps (FIRMs) for a portion of the Canada Del Oro Wash within the unincorporated area of Pima County, Arizona. This information will be used by Pima County to update existing flood plain information as part of the regular phase of the National Flood Insurance Program (NFIP).

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases the more restrictive criteria take precedence and the State (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgements

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydraulic analyses for this study were performed by David Evans and Associates for Pima County under Contract No. 07-04-J-117167-1292. This work was completed in July, 1994.

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2.0 AREA STUDIED

2.1 Scope of Study

This LOMR study covers the unincorporated area of Pima County along the Canada Del Oro Wash from approximately the boundary of Catalina State Park to the Pinal County line. The area of study is shown on the vicinity map (Figure 1).

Riverine flooding along the Canada Del Oro Wash was studied by detailed method.

2.2 Community Description

This portion of the unincorporated area of Pima County is located near the Pima-Pinal County boundary north of Catalina State Park. The study reach generally lies within the unincorporated town of Catalina. The town of Oro Valley is approximately five miles south of the study reach.

Existing development along the study reach is generally rural, low-density residential. Golder Ranch Road bridge was constructed in 1987 to provide access to residential development on the hillsides east of the wash.

Although the Canada Del Oro Wash carries intermittent snow melt runoff during the winter and spring, the stream is generally ephemeral and carries significant flow only in response to direct precipitation.

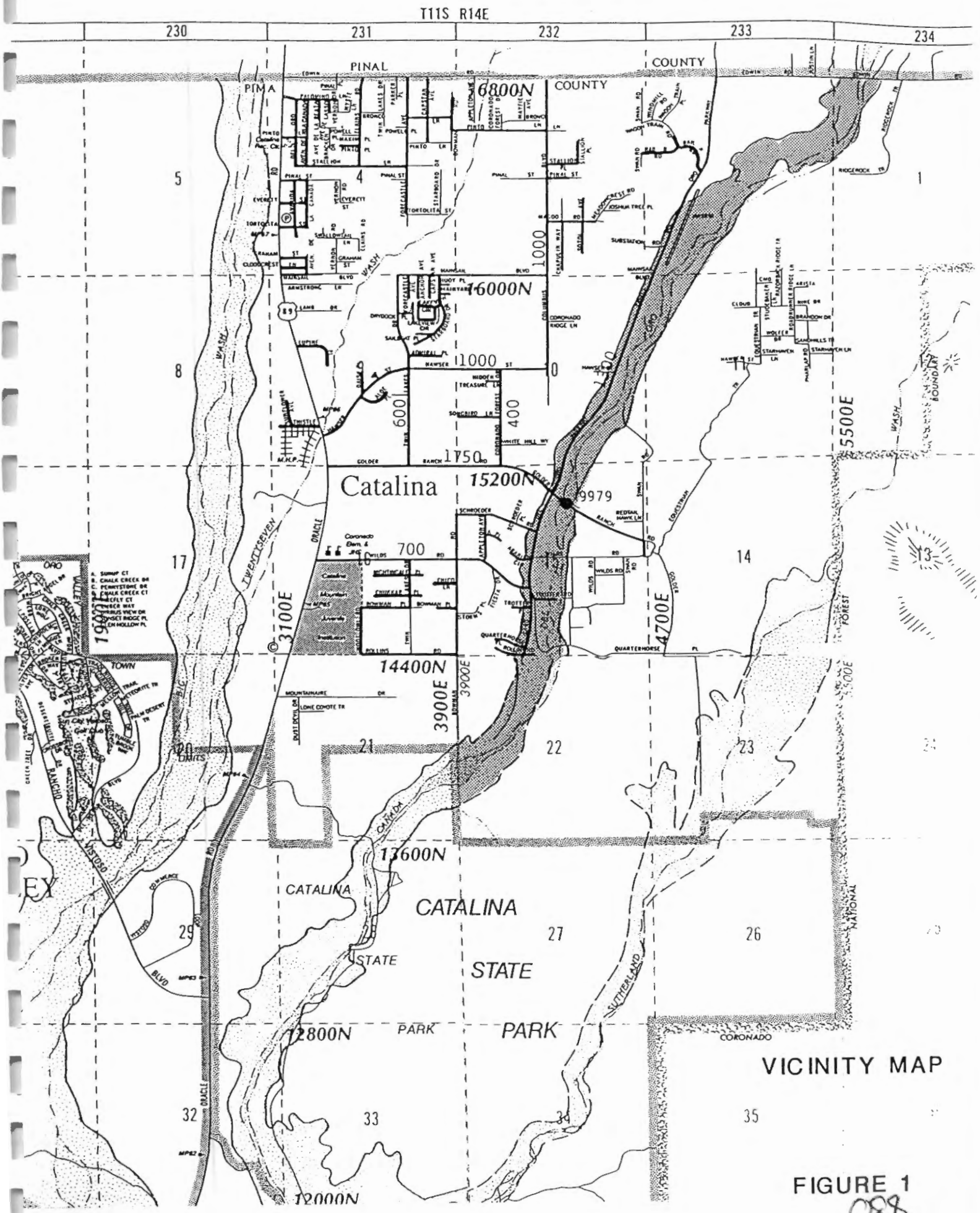

T11S R14E
230
231
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233
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PINAL COUNTY
PIMA COUNTY
6800N
16000N
15200N
14400N
13600N
12800N
12000N
11000
1000
600
400
1750
700
5500E
4700E
3900E
3100E
Catalina
9979
TOWN
CATALINA STATE PARK
CATALINA STATE PARK
CORONADO
VICINITY MAP

FIGURE 1

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2.3 Principal Flood Problems

Low-lying areas adjacent to the channel are subject to periodic flooding from floods of lesser magnitude than the 100-year event. The area inundated by the 10-year event is not significantly different than the 100-year flood plain. Similarly, the area inundated by the 500-year event is not significantly different than the 100-year flood plain. Prior to construction of the bridge at Golder Ranch Road, access across the channel was severely limited during and after periods of flooding; the remaining wash crossings are unimproved, at-grade (dip) crossings.

Another significant flooding problem results from erosion. This was demonstrated during the flooding of January 1993. Several cross-sections used in the hydraulic modeling for this study had to be re-surveyed due to channel changes which resulted from that flooding. There are locations along the study reach where the present location of the primary channel does not fall within the 100-year flood-prone area as depicted on the effective FIRMs.

2.4 Flood Protection Measures

No major structural flood protection measures exist or are planned by Pima County. A gun range has constructed earthen embankments north of Catalina State Park, but these do not provide significant flood protection.

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Pima County constructed the Golder Ranch Road bridge in 1987 (Reference 1) but significant flood protection measures were not constructed at that time.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for flood plain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Just as in the case of this LOMR study, maps and flood elevations will be amended periodically to reflect future changes.

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3.1 Hydrologic Analyses

No new hydrologic analyses were performed for this study; the hydrologic data contained herein is identical to that presented in the effective FIS (Reference 2).

Table 1. Summary of Discharges

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
Canada del Oro Wash					
Above Confluence with Sutherland Wash	72.9	5,200	12,800	17,500	29,000

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the riverine source studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Cross-section data for the backwater analyses were obtained from topographic maps compiled from aerial photographs (Reference 3) and supplemented by field survey. The elevation data and structural geometry for the Golder Ranch Road bridge was verified with the bridge construction plans.

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Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross-section locations are also shown on the LOMR Work Map (Exhibit 2).

Water-surface elevations of floods of the selected recurrence intervals were computed using the COE HEC-2 step-backwater computer program (Reference 4). Starting water-surface elevations were determined using the slope-area method.

Channel and overbank roughness factors (Manning's "n") used in the hydraulic computations were chosen by engineering judgement and were based on field observations of the stream and flood plain areas. The channel "n" values ranged from 0.030 to 0.036 and the overbank "n" values ranged from 0.032 to 0.1.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

Many computed flood flow velocities were high because of fairly steep channel slopes and the low roughness coefficients. In some reaches, the velocities were high and the computed depths were low. This flow

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condition is hydraulically classified as supercritical. Supercritical flows have inherently unstable flow elevations. Small changes in channel geometry or other hydraulic conditions may cause the flow to abruptly change (through a hydraulic jump) to subcritical flow, with lower velocities and greater depths (equal energy). Flood elevations at cross sections where supercritical flow was indicated were adjusted to the corresponding elevations for critical flow.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD).

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study produces maps designed to assist communities in developing flood plain management measures.

4.1 Flood Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for flood plain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. The 100- and 500-year flood plain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at scale of 1:2400 with contour intervals of 2 feet (Reference 3).

4.2 Floodways

Encroachment on flood plains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood plain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent flood plain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodway in this study is presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodway presented in this study was computed for certain stream segments on the basis of equal conveyance reduction from each side of the flood plain. HEC-2 encroachment method 4 was used to set the initial floodway; method 1 was then used to set the stations for the floodway boundary. Floodway widths were computed at cross sections.

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Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections (Table 2). In cases where the floodway and 100-year flood plain boundaries are either close together or collinear, only the floodway boundary is shown.

The area between the floodway and 100-year flood plain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 3.

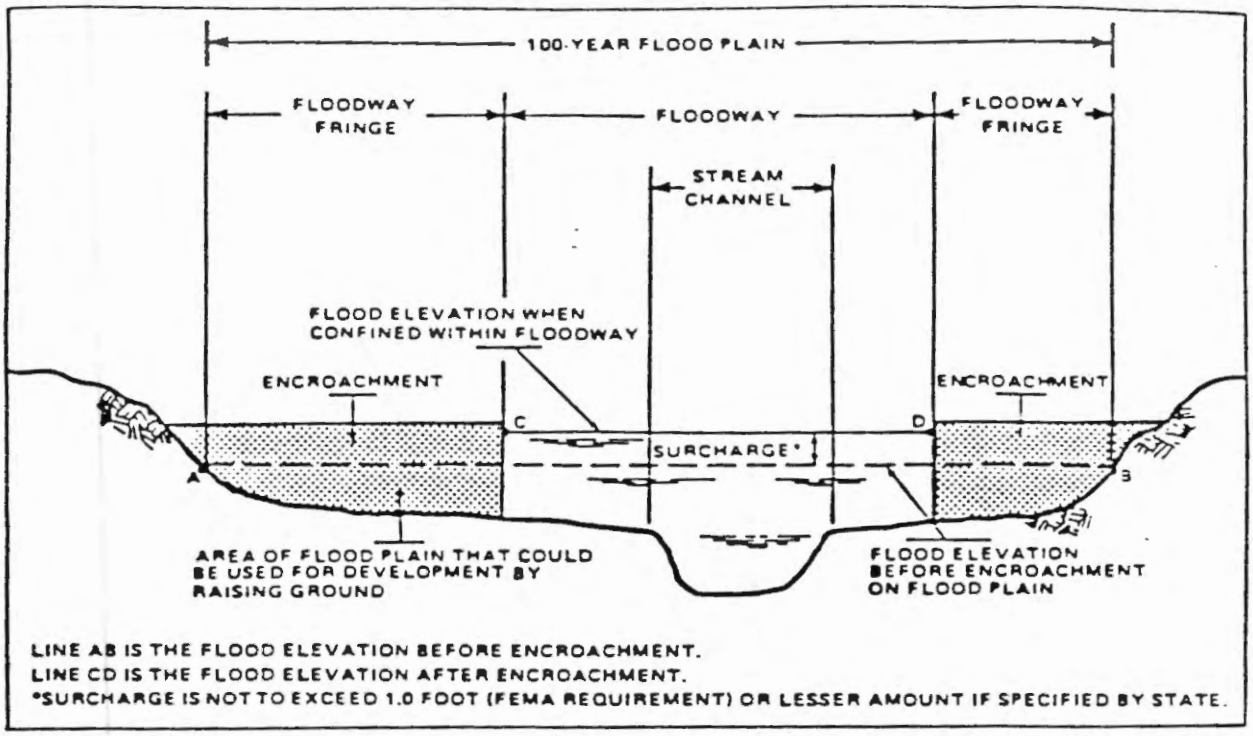


Figure 2. Floodway Schematic

CAG

FLOODWAY DATA, CANADA DEL ORO

CROSS-SECTION	FLOODWAY WIDTH (FT)	FLOODWAY SECTION AREA (SQ. FT.)	FLOODWAY MEAN VELOCITY (FPS)	WATER SURFACE ELEVATION WITH FLOODWAY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	DIFFERENCE (FT)
DJ	693.	2466.	7.1	2884.5	2883.5	1.0
DK	691.	2228.	7.9	2890.7	2889.7	1.0
DL	560.	2069.	8.5	2898.6	2897.6	1.0
DM	398.	1804.	9.7	2907.1	2906.2	.9
DN	490.	1906.	9.2	2910.3	2909.7	.6
DO	591.	2749.	6.4	2913.8	2912.9	0.9
DP	458.	1770.	9.9	2920.0	2919.5	.5
DQ	528.	2255.	7.8	2927.2	2926.2	1.0
DR	439.	1701.	10.3	2932.3	2932.1	.2
DS	498.	1728.	10.1	2937.7	2937.2	.5
DT	584.	2148.	8.1	2944.2	2943.2	1.0
DU	577.	1975.	8.9	2948.3	2947.8	.5
DV	590.	2196.	8.0	2954.9	2953.9	1.0
DW	538.	1939.	9.0	2960.4	2960.3	.3
DX	485.	1975.	8.9	2965.2	2965.2	.0
14.300	463.	2113.	8.3	2966.3	2966.3	.0
DY	464.	2401.	7.3	2966.9	2966.9	.0
DZ	403.	1779.	9.8	2967.8	2967.2	.6
EA	558.	2012.	8.7	2972.8	2972.1	.7
EB	518.	1937.	9.0	2975.7	2974.8	.9
EC	625.	2169.	8.1	2981.9	2980.9	1.0
ED	525.	1932.	9.1	2986.6	2985.7	.9
EE	528.	1921.	9.1	2993.0	2992.0	1.0
EF	372.	1730.	10.1	3001.8	3001.2	.6
EG	421.	2113.	8.3	3008.5	3007.6	1.0
EH	512.	2000.	8.7	3011.4	3010.5	.9
EI	424.	1786.	9.8	3015.0	3014.1	.9
EJ	506.	2120.	8.3	3023.8	3022.8	1.0
EK	538.	2178.	8.0	3028.0	3027.1	.9
EL	611.	2264.	7.7	3031.8	3030.8	1.0
EM	660.	2337.	7.5	3034.7	3033.8	.9
EN	758.	2796.	6.3	3037.9	3036.9	1.0
EO	615.	1933.	9.1	3041.9	3040.9	1.0
EP	415.	1659.	10.5	3046.4	3045.6	.8
EQ	445.	2069.	8.5	3052.5	3051.5	1.0
ER	437.	1881.	9.3	3058.0	3057.0	1.0
ES	448.	2064.	8.5	3063.7	3062.7	1.0
ET	587.	2193.	8.0	3070.1	3069.3	.8
EU	632.	2348.	7.5	3078.4	3077.6	.8
EV	625.	2896.	6.0	3085.2	3084.2	1.0
EW	498.	2030.	8.6	3089.9	3089.1	.8
EX	430.	2070.	8.5	3095.1	3094.2	.9
EY	368.	1779.	9.8	3100.8	3099.8	1.0

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5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. The zones shown on the work maps are as follows:

Zone AE:

Zone AE is the flood insurance rate zone that corresponds to the 100-year flood plains that are determined by detailed methods. In most instances, whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year flood plain, areas within the 500-year flood plain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

6.0 LETTER OF MAP REVISION WORK MAP

Letter of Map Revision Work Map is designed for flood insurance map preparation and flood plain management applications.

For flood insurance map preparation, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year flood plains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths.

For flood plain management applications, the map shows by tints, screens, and symbols, the 100-and 500-year flood plains, the floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

7.0 OTHER STUDIES

The flood plain and floodway boundaries at the limits of study do not match those shown on the effective FIRMs because:

A. Flows occurring since the preparation of the effective FIS have changed the shape and location of the primary channel and the geologic floodplain

and

B. The resolution of the mapping prepared for this study (1:2400) is greater than that (1:4800) used for preparation of the effective FIRMs.

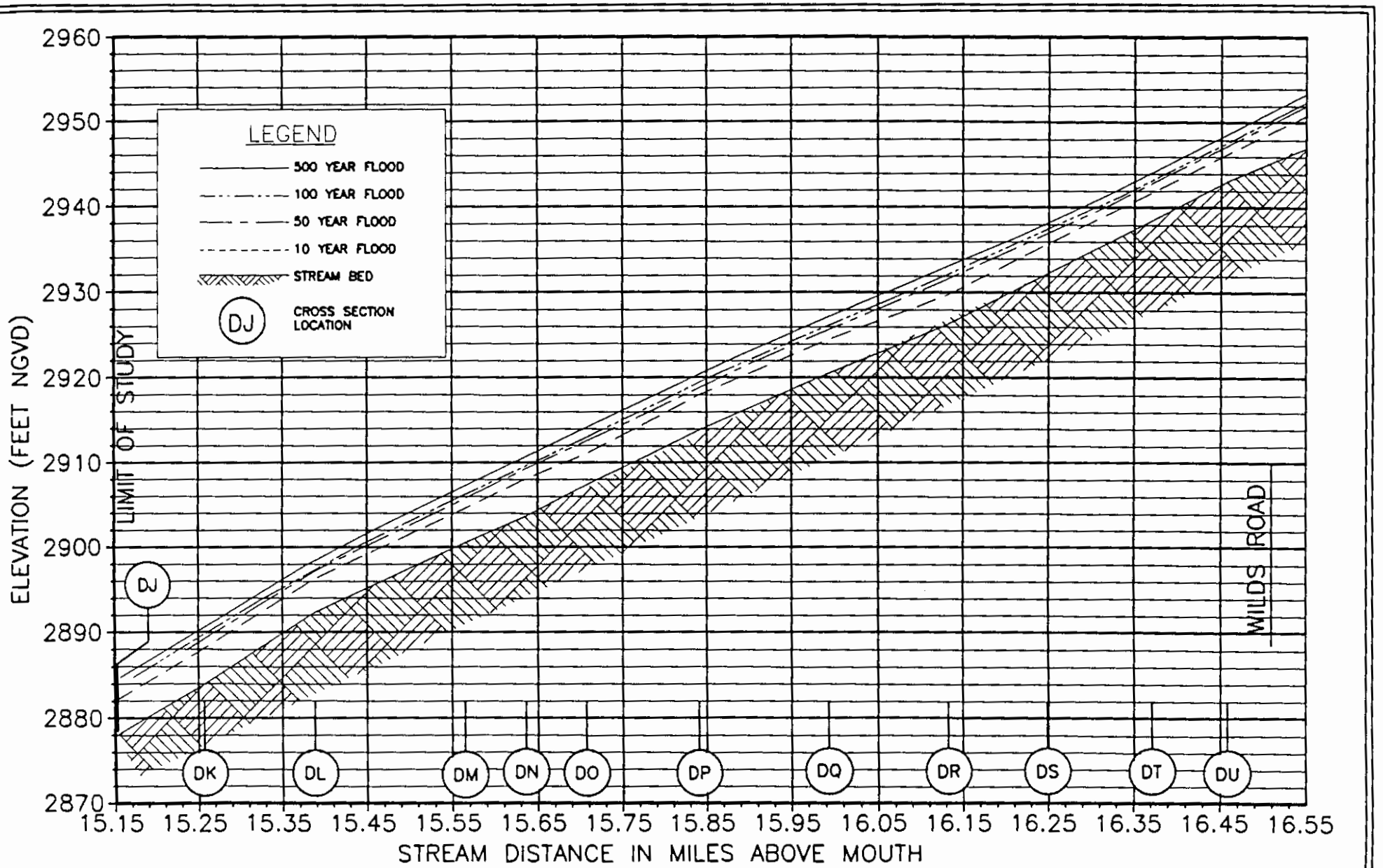
8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Flood Control Planning Section, Pima County Department of Transportation and Flood Control District, 201 North Stone Avenue, Tucson, AZ 85701.

9.0 BIBLIOGRAPHY AND REFERENCES

1. Pima County Department of Transportation and Flood Control District, Construction Plans for "Golder Ranch Road Bridge, Project No. 4BACS3", September 1986.
2. Federal Emergency Mangement Agency, Flood Insurance Study, Pima County, Arizona (Unincorporated Areas), September 30, 1992.
3. Cooper Aerial Survey Company, Topographic Maps, Scale 1:2400, Contour Interval 2 feet, May 1992.
4. U.S. Department of the Army, Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water-Surface Profiles, Generalized Computer Program, Davis, California, May 1992.

APPENDIX



FLOOD PROFILES FOR

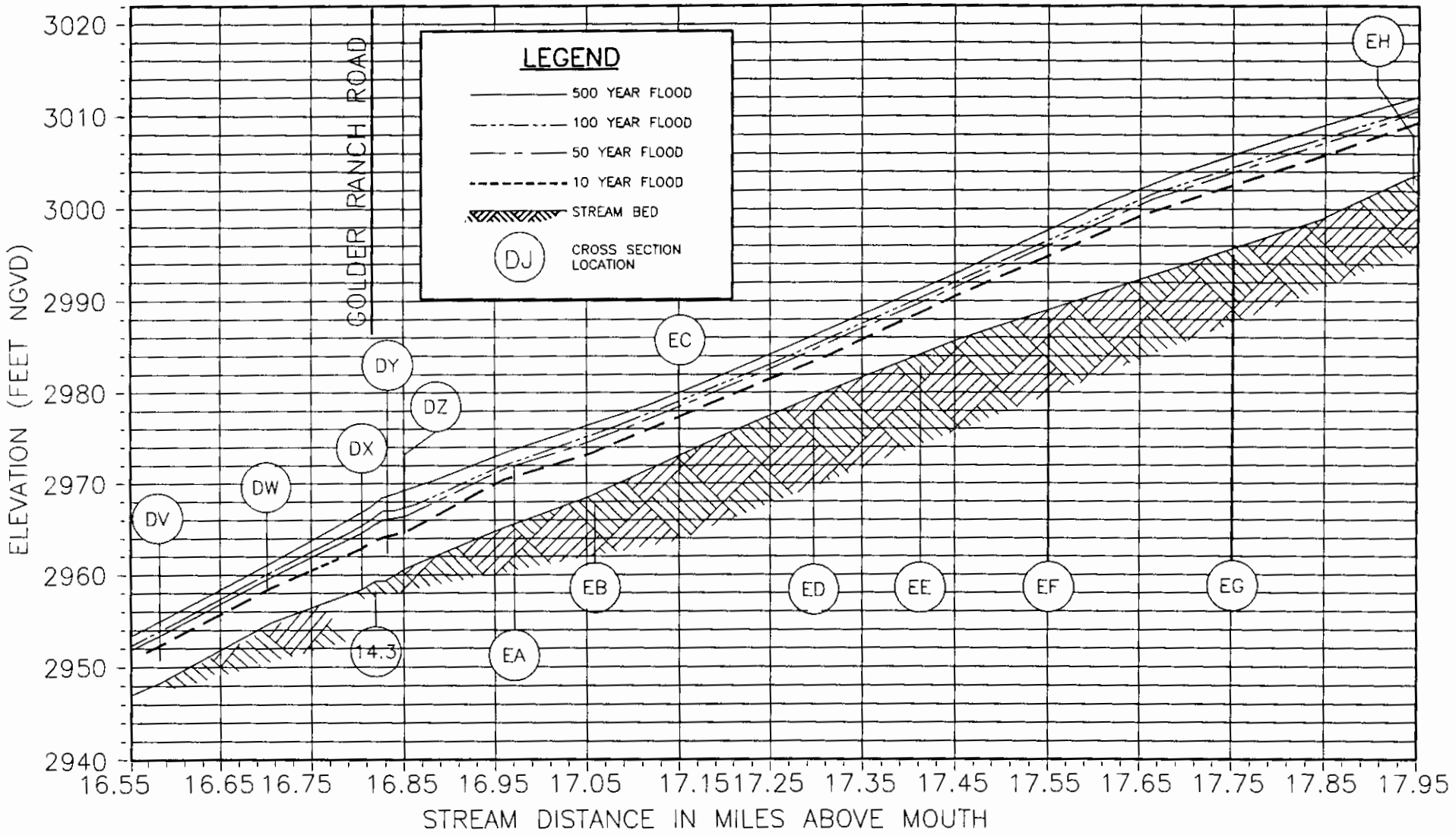
CANADA DEL ORO WASH

PIMA COUNTY AZ

(UNINCORPORATED AREAS)

DEA JOB # PCDT0010

DAVID EVANS AND ASSOCIATES, INC.
ENGINEERS, SURVEYORS, PLANNERS, LANDSCAPE ARCHITECTS
3643 N. BUSINESS CENTER DR., TUCSON, ARIZONA 85705-2879



FLOOD PROFILES FOR

CANADA DEL ORO WASH

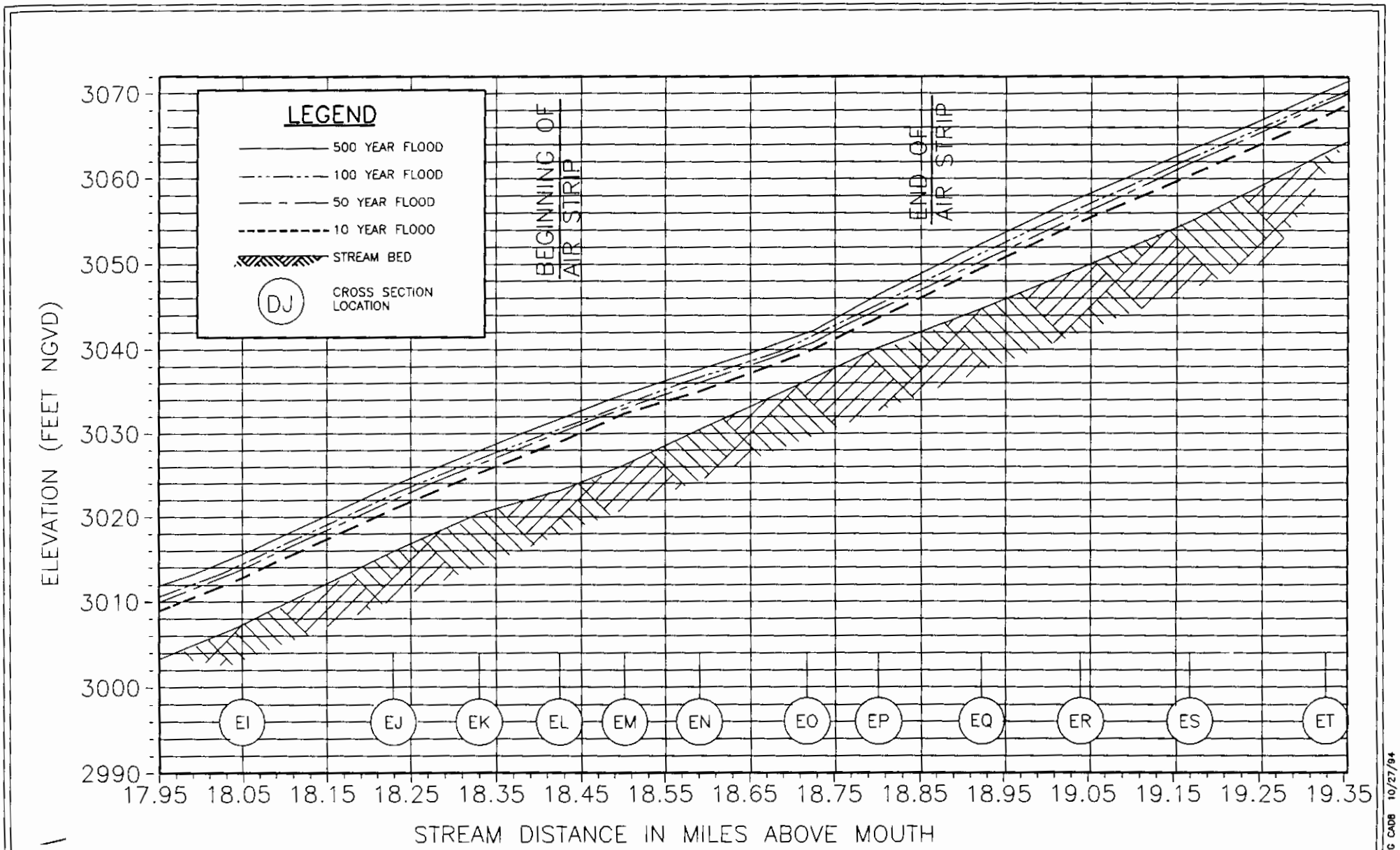
PIMA COUNTY AZ

(UNINCORPORATED AREAS)

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DAVID EVANS AND ASSOCIATES, INC.
ENGINEERS, SURVEYORS, PLANNERS, LANDSCAPE ARCHITECTS
3845 N. BUSINESS CENTER DR., TUCSON, ARIZONA 85705-2879

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FLOOD PROFILES FOR

CANADA DEL ORO WASH

PIMA COUNTY AZ

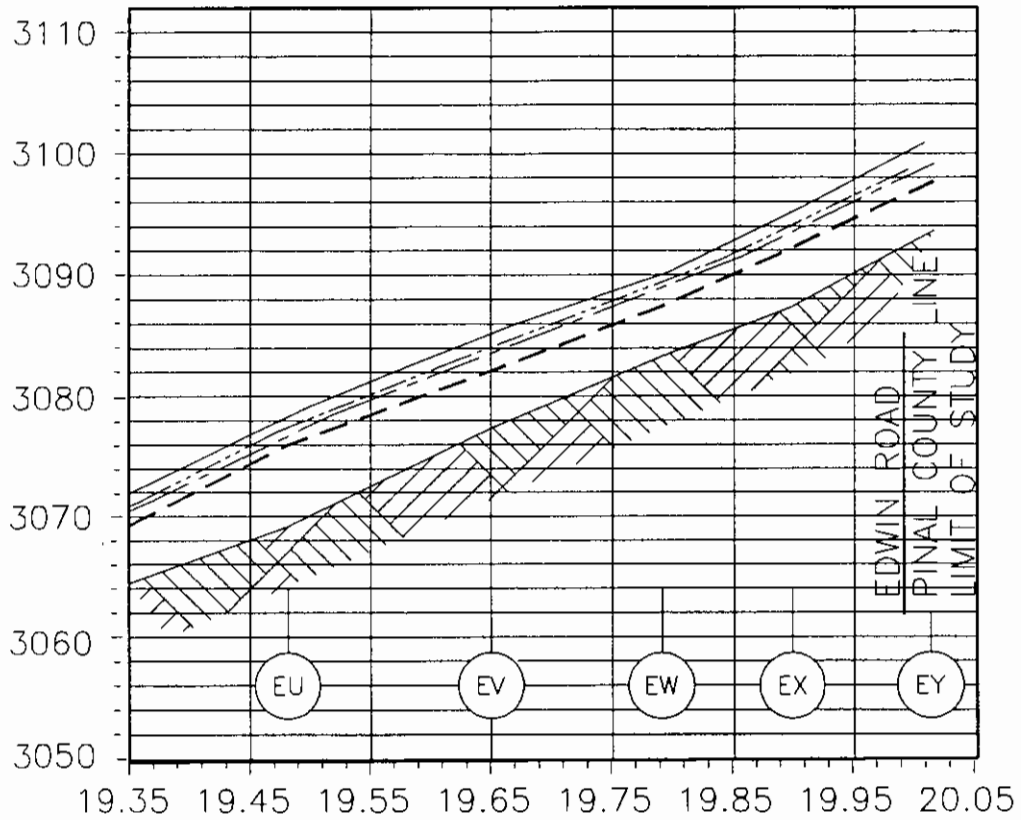
(UNINCORPORATED AREAS)

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ENGINEERS, SURVEYORS, PLANNERS, LANDSCAPE ARCHITECTS
3845 N. BUSINESS CENTER DR., TUCSON, ARIZONA 85705-2979

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LEGEND

- 500 YEAR FLOOD
- 100 YEAR FLOOD
- 50 YEAR FLOOD
- 10 YEAR FLOOD
- STREAM BED
- (DJ) CROSS SECTION LOCATION

10 of 17

FLOOD PROFILES FOR
CANADA DEL ORO WASH
PIMA COUNTY AZ
(UNINCORPORATED AREAS)

DEA JOB # PCDT0010

DAVID EVANS AND ASSOCIATES, INC.
ENGINEERS, SURVEYORS, PLANNERS, LANDSCAPE ARCHITECTS
3645 N. BUSINESS CENTER DR., TUCSON, ARIZONA 85705-2870

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HEC2 S/N: 1353000090 HMVersion: 6.60 Data File: MULTPROF.HC2

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*  Version   4.6.2;  May 1991                *
*                                            *
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*  U.S. ARMY CORPS OF ENGINEERS      *
*  HYDROLOGIC ENGINEERING CENTER     *
*  609 SECOND STREET, SUITE D        *
*  DAVIS, CALIFORNIA 95616-4687      *
*         (916) 756-1104             *
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H A E S T A D  M E T H O D S
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37 Brookside Road * Waterbury, Connecticut 06708 * (203) 755-1666

10-, 50-, 100-, 500-YEAR ANALYSES

THIS RUN EXECUTED 27OCT94 16:37:23

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**************************************
 HEC-2 WATER SURFACE PROFILES

 Version  4.6.2;  May 1991
**************************************

T1      UPPER CANADA DEL ORO FLOOD INSURANCE STUDY
T2      CATALINA STATE PARK BOUNDARY TO PINAL COUNTY LINE
T3      CANADA OEL ORO
T4      CONSULTANT:  DAVID EVANS & ASSOCIATES, INC     DEA JOB NO. PCDT0010
T5                   3845 N. BUSINESS CENTER DRIVE     PHONE: (602) 292-2160
T6                   TUCSON, AZ 85705                  FAX: (602) 292-9131
T6      DAVID EVANS & ASSOCIATES PROJECT MANAGER:  MATT FLICK
T7      CLIENT: PIMA COUNTY DEPT. OF TRANS. & FLOOD CONTROL DISTRICT
T8              201 N. STONE AVENUE                    ACTIVITY # 4FUCDO
T9              TUCSON, AZ 85701                       PHONE: (602) 740-6350
T9      PIMA COUNTY FLOOD CONTROL DISTRICT PROJECT MANAGER:  STEVE CASILLAS
T9*************************************************************************
T9***** 10-YEAR ANALYSIS  - Q100= 5200 CFS  - STARTING WSE = 2882          **
T9*************************************************************************

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

      0         2         0         0     0.006         0         0         0    2882.0         0

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

      1         0        -1         0         0         0        -1         0         0         0


J3  VARIABLE CODES FOR SUMMARY PRINTOUT

    150       201

NC    0.045     0.045     0.032       0.1         0.3
QT         4      5200     12800     17500       29000
  *****  DOWNSTREAM OF GUN RANGE EMBANKMENTS  *****
  *****  BOWMAN ROAD  *****
  *****  CATALINA STATE PARK  *****
  ***** DJ *****
NH         4      .050    1008.4      .040    1171.7      .032    1314.5      .070    1464.8
X1         1        70    1171.7    1314.5         0         0         0
GR    2889.9       0.0    2887.1      13.4    2880.4      29.4    2880.3      44.4    2881.4      58.0
GR    2881.8      81.1    2882.2     117.9    2883.0     153.5    2883.3     189.8    2882.9     219.3
GR    2880.0     229.8    2880.1     239.6    2881.2     246.9    2881.8     262.9    2881.8     281.6
GR    2881.0     295.7    2881.0     316.2    2883.0     337.3    2882.7     360.4    2882.1     391.4
GR    2882.2     406.8    2881.4     442.8    2881.1     471.8    2881.2     497.7    2878.6     509.9
GR    2878.9     538.5    2880.9     545.7    2881.5     579.9    2881.4     591.3    2879.5     598.6
GR    2879.3     609.5    2880.6     617.4    2879.5     625.8    2880.9     633.4    2882.0     647.2
GR    2881.3     659.7    2877.9     665.8    2877.9     672.3    2881.6     684.9    2881.5     716.1
GR    2882.4     724.1    2882.6     743.5    2881.6     755.1    2881.6     762.5    2881.7     797.8
GR    2882.4     825.6    2880.4     832.1    2882.0     842.4    2881.6     856.3    2882.4     870.2
GR    2881.2     896.4    2881.7     906.4    2880.6     918.2    2881.5     926.6    2881.5    1008.4
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GR  2880.4   1015.9   2880.4   1029.0   2880.1   1082.3   2880.5   1113.0   2880.7   1140.0
GR  2880.8   1171.7   2880.2   1223.4   2879.3   1228.0   2879.5   1252.4   2880.0   1293.6
GR  2881.1   1314.5   2881.3   1341.7   2884.9   1380.9   2886.9   1413.3   2895.5   1464.8
  ***** DOWNSTREAM OF GUN RANGE EMBANKMENTS *****
  ***** DK *****

NC     .05      .070      .03       .1        .3
X1       2        57     887.2   1001.4       600       580       570
GR  2893.2       0.0   2886.4     21.0   2886.0      24.4   2886.0      31.0   2884.0      46.7
GR  2884.7      56.8   2886.1     71.7   2886.3      81.3   2887.3      89.2   2887.2     103.6
GR  2886.8     120.0   2886.1    132.4   2886.1     151.3   2886.9     172.5   2887.6     180.9
GR  2887.1     232.3   2887.6    286.0   2887.3     362.8   2887.7     417.8   2887.1     424.9
GR  2887.8     439.0   2887.9    468.4   2887.6     508.5   2887.9     529.9   2887.7     567.4
GR  2884.8     574.4   2884.8    587.3   2885.7     590.7   2884.9     596.8   2886.3     608.8
GR  2888.0     628.6   2888.4    645.0   2888.9     663.5   2887.2     672.4   2887.2     693.9
GR  2888.8     710.5   2889.1    780.5   2887.9     792.3   2887.1     816.9   2888.8     835.0
GR  2888.7     862.3   2887.9    887.2   2887.3     900.0   2885.3     905.4   2885.4     917.0
GR  2886.9     923.5   2886.9    933.8   2885.4     939.8   2885.0     989.0   2887.4    1001.4
GR  2887.3    1016.8   2887.1   1044.2   2887.3    1079.5   2888.3    1095.9   2889.8    1117.5
GR  2890.6    1131.3   2894.1   1153.2
  ***** UPSTREAM OF GUN RANGE EMBANKMENTS *****
  ***** DL *****

NC    .050      .044      .032
X1       3        41     697.6     769.6       650       700       685
GR  2908.8       0.0   2903.8     16.0   2905.1      32.5   2894.6      64.9   2894.9     102.1
GR  2894.9     144.9   2894.8    211.5   2894.1     230.0   2895.1     265.3   2894.7     288.8
GR  2895.4     310.6   2895.4    359.2   2894.4     387.8   2895.3     407.2   2895.5     434.3
GR  2895.6     464.7   2895.6    496.5   2895.3     565.8   2895.1     622.6   2895.1     681.6
GR  2895.3     697.6   2892.3    702.7   2892.3     751.0   2896.7     769.6   2894.6     781.3
GR  2894.5     808.1   2894.4    845.8   2895.0     861.6   2894.3     883.6   2895.0     897.0
GR  2894.2     919.0   2895.3    944.1   2895.3     959.9   2894.9     964.8   2896.1     972.1
GR  2901.1    1066.2   2902.6   1095.5   2912.2    1145.1   2910.9    1149.6   2911.7    1158.3
GR  2916.4    1168.6
  ***** CROSS-SECTION GROUND POINTS INCORPORATE SURVEY DATA THAT REFLECT
  ***** CHANGES WHICH OCCURRED IN THE FLOODING OF JANUARY 1993 (NEW INPUT DATA
  ***** USES WHOLE NUMBER STATIONING)
  ***** DM *****

NC    .050      .044      .032
X1       4        45       443       557       975       685       935
GR  2918.5       0.0   2915.3     24.3   2913.6      46.5   2910.8      75.5   2908.6      97.9
GR  2907.6     127.7   2906.1    150.7   2904.6     158.2   2904.2     172.2   2905.2     201.1
GR  2905.4     225.5   2905.0    266.1   2904.9     314.0   2905.0     360.6   2905.0     389.6
GR  2904.2       393   2903.9      443   2903.8       461   2900.7       497   2900.5       533
GR  2904.0       549   2901.7      553   2902.3       557   2902.6       599   2902.9     627.1
GR  2902.8     677.7   2902.7    731.3   2903.1     787.5   2903.6     844.5   2903.6     894.9
GR  2903.8     951.7   2904.6    971.1   2905.1    1006.8   2904.2    1010.5   2904.9    1022.1
GR  2905.0    1029.3   2905.6   1048.6   2906.3    1071.4   2907.5    1096.6   2908.9    1122.1
GR  2908.9    1144.6   2915.4   1179.6   2928.7    1247.1   2926.5    1262.9   2927.9    1268.3
  ***** CROSS-SECTION GROUND POINTS INCORPORATE SURVEY DATA THAT REFLECT
  ***** CHANGES WHICH OCCURRED IN THE FLOODING OF JANUARY 1993 (NEW INPUT DATA
  ***** USES WHOLE NUMBER STATIONING)
  CROSS-SECTION 4.5 ADDED FOR COMPUTATIONAL STABILITY BETWEEN SECNOs 4 & 5
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***** DN *****

NC     0.05      0.046      0.032
X1      4.5         23        179        287        350        325        375          0       2900          0
GR       14          0        6.1         20        6.3         29          8         38        8.5         47
GR        8        105          5        110        5.2        156        7.6        179        6.7        201
GR      5.2        214          4        216        3.6        245        3.6        274        5.2        287
GR      6.4        292        6.5        445          8        645        7.9        850          9        895
GR        9        945        9.4        995       15.5       1045
  ***** CROSS-SECTION GROUND POINTS INCORPORATE SURVEY DATA THAT REFLECT
  ***** CHANGES WHICH OCCURRED IN THE FLOODING OF JANUARY 1993 (NEW INPUT DATA
  ***** USES WHOLE NUMBER STATIONING)
  ***** DO *****

NH         5       .070         99       .032        179       .040      460.8         .1      637.2       .044
NH    1130.6
X1         5         29         99        179        350        325        375
GR    2920.4        0.0     2917.2         49     2912.9         99     2907.8        119     2907.8        141
GR    2907.3        163     2910.5        179     2910.0        229     2910.0      247.8     2909.7      297.5
GR    2909.3      344.9     2908.7      413.5     2909.3      460.8     2909.1      496.3     2908.7      521.9
GR    2908.8      562.2     2909.1      637.2     2909.5      686.9     2909.9      781.0     2910.9      833.5
GR    2912.1      869.4     2912.0      892.1     2910.9      926.3     2910.9      953.6     2912.0      984.2
GR    2911.7     1025.4     2911.3     1076.4     2915.3     1103.4     2923.8     1130.6
  ***** DP *****

NH         4       .070         28       .032         77       .046      282.7       .042     1119.8
X1         6         37         28         77        730        710        710
GR    2933.8        0.0     2927.2       15.3     2916.       28     2914.1       32.4     2914.1       66.7
GR    2916.5       77.0     2916.7       90.4     2916.6      125.5     2916.1      162.3     2915.9      179.9
GR    2914.9      194.7     2916.7      213.7     2916.8      232.5     2916.3      246.1     2915.7      257.2
GR    2913.8      265.4     2916.1      273.2     2916.3      282.7     2916.4      369.2     2916.8      462.3
GR    2917.0      608.3     2917.8      684.6     2918.8      746.0     2918.6      815.5     2918.6      892.9
GR    2918.5      924.2     2917.0      930.9     2917.0      939.6     2918.6      947.4     2918.6      958.3
GR    2918.3     1007.2     2916.9     1029.1     2919.7     1048.8     2919.7     1067.4     2922.0     1099.4
GR    2924.3     1116.4     2926.6     1119.8
  *****  ROLLINS ROAD  *****
  ***** DQ *****

NH         4        .07       22.2       .032       91.4       .047      399.3       .040     1099.7
X1         7         46       22.2       91.4        810        700        800
GR    2930.1        0.0     2929.7        6.8     2925.9       22.2     2920.6       34.9     2920.6       63.4
GR    2921.0       78.4     2923.6       91.4     2924.3      112.5     2924.1      130.0     2923.5      152.8
GR    2922.4      172.6     2922.4      186.0     2923.4      202.1     2923.8      215.4     2922.4      228.3
GR    2923.3      237.0     2923.5      252.5     2922.9      265.7     2922.7      281.1     2923.3      296.9
GR    2922.8      311.2     2920.5      319.3     2922.5      329.8     2923.1      343.8     2923.5      359.0
GR    2923.0      399.3     2923.0      479.8     2923.0      561.2     2922.6      584.7     2923.0      606.6
GR    2923.2      649.1     2923.7      719.4     2924.8      785.5     2925.0      847.4     2926.2      928.1
GR    2924.7      937.0     2924.6      954.9     2926.0      961.5     2926.7      977.8     2927.1     1015.2
GR    2927.3     1022.8     2929.2     1039.0     2930.3     1057.9     2930.9     1062.1     2932.4     1099.6
GR    2932.4     1099.7
  ***** CROSS-SECTION GROUND POINTS INCORPORATE SURVEY DATA THAT REFLECT
  ***** CHANGES WHICH OCCURRED IN THE FLOODING OF JANUARY 1993 (NEW INPUT DATA
  ***** USES WHOLE NUMBER STATIONING)
  ***** DR *****
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NC     .048       .041       .032
X1        8         50          5        243        750        730        740
GR   2939.8        0.0     2936.6          5     2926.3         20     2926.4         70     2927.3         74
GR   2927.1        120       2927        127     2926.5        178     2926.6        220     2928.6        225
GR   2930.2        243     2929.8      265.7     2930.2      282.3     2930.6      311.3     2928.6      329.4
GR   2928.7      341.9     2929.7      350.8     2927.6      363.4     2927.4      368.7     2930.9      378.0
GR   2931.2      394.4     2931.2      416.8     2930.6      447.3     2930.4      482.1     2930.1      520.3
GR   2930.3      557.6     2930.3      588.7     2930.7      624.5     2930.6      670.9     2930.7      713.6
GR   2930.6      772.1     2930.3      799.3     2930.0      817.8     2930.4      824.7     2930.2      848.1
GR   2929.4      853.0     2930.6      863.3     2930.7      883.5     2931.3      897.7     2931.2      916.8
GR   2929.9      935.4     2930.2      946.8     2930.0      969.0     2930.7      975.2     2931.6      996.4
GR   2931.7     1019.5     2931.7     1036.0     2933.8     1059.7     2937.9     1105.6     2940.7     1123.0
  ***** CROSS-SECTION GROUND POINTS INCORPORATE SURVEY DATA THAT REFLECT
  ***** CHANGES WHICH OCCURRED IN THE FLOODING OF JANUARY 1993 (NEW INPUT DATA
  ***** USES WHOLE NUMBER STATIONING)
  ***** TROTTER PLACE / TROTTER ROAD  *****
  ***** DS *****

X1        9         62         88        380        640        575        610
GR   2950.0        0.0     2936.4         59     2934.9         88     2933.3         90     2933.3         99
GR   2935.4        111     2932.4        159     2932.3        180     2934.5        186     2934.1        259
GR   2934.0        305     2933.1        309     2932.7        359     2935.5        366     2936.1        380
GR   2932.8      398.7     2935.0      404.3     2935.0      427.2     2933.9      443.0     2935.8      461.6
GR   2936.1      477.2     2935.1      496.5     2932.2      503.8     2932.3      508.9     2934.5      517.8
GR   2934.1      531.1     2935.8      544.1     2935.9      557.7     2935.5      582.6     2935.7      637.3
GR   2936.5      687.3     2935.9      731.6     2935.1      772.5     2934.6      825.7     2935.3      834.0
GR   2934.7      843.6     2934.4      859.7     2934.4      873.2     2936.0      882.2     2935.2      894.5
GR   2935.3      933.3     2935.8      952.3     2934.7      966.7     2934.8      991.6     2936.2     1008.3
GR   2936.1     1022.2     2935.4     1046.9     2935.7     1077.0     2936.5     1125.1     2936.5     1201.3
GR   2937.6     1229.8     2946.7     1261.0     2949.4     1282.7     2949.1     1303.1     2947.2     1335.8
GR   2948.4     1358.5     2947.2     1362.8     2948.4     1367.4     2948.8     1387.6     2949.0     1404.2
GR   2950.1     1423.3     2951.5     1431.8
  ***** CROSS-SECTION GROUND POINTS INCORPORATE SURVEY DATA THAT REFLECT
  ***** CHANGES WHICH OCCURRED IN THE FLOODING OF JANUARY 1993 (NEW INPUT DATA
  ***** USES WHOLE NUMBER STATIONING)
  *****  WILDS ROAD (WEST OF CDO)  *****
  ***** DT *****

NH        4       .052         29       .032        213       .044      369.1       .042     1270.8
X1       10         32         29        213        620        630        660
GR   2949.6        0.0     2947.8       14.7     2947.5         29     2939.2         61     2939.9        119.0
GR   2940.5        177     2941.5        188     2942.1        213     2941.8      220.9     2941.4        264.4
GR   2941.2      297.6     2941.0      324.7     2940.5      366.4     2938.6      369.1     2940.0        379.3
GR   2940.1      417.4     2940.5      441.2     2940.5      471.3     2940.1      544.8     2940.1        593.0
GR   2940.3      646.4     2940.5      724.7     2941.0      792.1     2940.4      831.5     2940.7        846.9
GR   2940.7      860.4     2940.9      924.0     2941.3      966.8     2942.2     1023.0     2943.8     1101.0
GR   2945.8     1175.9     2951.3     1270.8
  ***** CROSS-SECTION GROUND POINTS INCORPORATE SURVEY DATA THAT REFLECT
  ***** CHANGES WHICH OCCURRED IN THE FLOODING OF JANUARY 1993 (NEW INPUT DATA
  ***** USES WHOLE NUMBER STATIONING)
  *****  ARABIAN CIRCLE  *****
  ***** DU *****
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NH       5       .05        45       .032       135       .042       527.7       .052       767.5       .042
NH  1106.1
X1      11        43        45        135       450        500        450
GR  2955.0       0.0    2952.9         20    2949.3         45    2948.3         53    2943.2         55
GR  2943.1        90    2943.2        125    2945.4        135    2945.9        155    2946.0      224.5
GR  2946.0     247.7    2945.6      280.9    2945.1      320.3    2945.8      337.9    2944.5      364.2
GR  2945.4     379.3    2944.9      403.9    2944.8      425.3    2944.0      438.2    2945.5      452.5
GR  2945.1     482.2    2943.7      501.4    2944.1      527.7    2945.0      549.0    2944.5      576.6
GR  2944.4     613.4    2945.1      641.2    2945.1      670.7    2944.7      702.7    2945.1      744.5
GR  2945.5     787.5    2946.0      833.9    2945.3      872.5    2945.7      893.2    2945.2      915.6
GR  2947.1     945.8    2946.0      961.4    2945.9      989.8    2946.6     1017.7    2947.4     1048.7
GR  2948.7    1077.0    2950.8     1105.5    2951.4     1106.1
  ***** DV *****

NC                                    0.3        0.5
NH       6       .060        56.5       .032       160.1       .058       237.1       .032       293.7       .052
NH   402.7       .042     1106.6
X1      12        46       237.1       293.7       650        650        655
GR  2960.0       0.0    2959.0         17.9    2954.8         56.5    2950.8        102.2    2950.8        113.1
GR  2951.5     134.4    2951.4      160.1      2951.4      196.0      2951.9      219.4      2952.0      237.1
GR  2948.3     253.4    2948.7      277.6      2951.5      293.7      2951.9      318.2      2951.9      340.3
GR  2951.1     363.1    2951.9      377.2      2951.7      402.7      2952.0      420.4      2951.1      442.3
GR  2951.1     470.6    2951.3      495.7      2951.1      549.3      2950.5      572.4      2950.9      589.9
GR  2951.1     616.2    2951.2      658.2      2951.3      697.3      2951.1      746.8      2951.2      794.2
GR  2950.5     808.4    2951.0      831.0      2951.1      880.5      2951.1      935.1      2951.8      953.6
GR  2950.5     965.9    2951.3      976.5      2951.4      996.8      2950.0     1010.3      2951.5     1020.3
GR  2951.9    1049.3    2955.2     1069.9      2955.4     1082.0      2954.8     1091.0      2958.6     1105.6
GR  2960.6    1106.6
  *****  ET CARD (RIGHT ENCROACHMENT) DEFINES INEFFECTIVE FLOW AREA
  *****  DUE TO GOLDER RANCH ROAD BRIDGE
  ***** DW *****

ET                  9.1        9.1        9.1        9.1                                              50         760
NC      .040        .042       .032
X1        13          53      222.2      286.9        630        630        650
X3        10
GR      2972          50       2970         63       2966         70       2966         81       2964         90
GR  2960.3       100.0    2958.2      116.9      2957.4      131.5      2957.4      183.4      2959.9      198.9
GR  2960.3       222.2    2954.8      237.8      2954.8      280.0      2956.2      286.9      2956.2      304.6
GR  2956.0       330.1    2956.7      366.8      2956.8      414.7      2957.2      474.2      2956.9      514.6
GR  2957.8       546.3    2957.4      574.9      2955.3      585.8      2957.9      604.7      2957.5      649.9
GR  2956.3       665.8    2955.8      675.0      2957.9      690.4      2956.2      701.3      2957.9      725.5
GR  2957.5       753.9    2957.2      774.1      2958.7      793.8      2958.7      821.3      2958.7      865.9
GR  2958.6       905.7    2959.0      941.2      2959.0      970.8      2958.7     1009.5      2959.1     1013.2
GR  2957.9      1019.9    2957.4     1026.6      2956.3     1037.8      2958.1     1056.6      2956.5     1068.3
GR  2956.9      1077.3    2957.8     1090.4      2957.3     1099.8      2957.8     1119.6      2958.5     1145.6
GR  2958.4      1169.9    2960.4     1192.1      2962.7     1217.1
  *****  ET CARD (RIGHT ENCROACHMENT) DEFINES INEFFECTIVE FLOW AREA
  *****  DUE TO GOLDER RANCH ROAD BRIDGE
  ***** DX *****
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ET                9.1       9.1       9.1       9.1                                                  585
NC      .055      .045      .032
X1        14        57     168.2       277       500       540       520
GR      2972        45      2970        60      2968        71      2966        80      2964        92
GR    2963.3     100.0    2961.2     119.1    2959.8     143.6    2959.5     166.2    2958.6     171.2
GR    2958.6     179.7    2958.9     196.8    2958.8     214.8    2959.1     236.1    2958.4     248.7
GR    2958.4     263.8    2960.0     277.0    2961.8     294.0    2962.2     313.8    2962.3     333.5
GR    2961.4     358.0    2961.8     382.1    2962.0     421.8    2962.3     464.5    2962.4     480.7
GR    2962.8     496.3    2961.9     515.3    2961.9     542.0    2963.0     562.4    2963.1     573.1
GR    2962.0     579.4    2962.3     598.7    2963.4     613.9    2963.4     641.4    2962.8     668.9
GR    2962.8     688.6    2961.9     712.1    2962.0     723.4    2961.3     733.9    2963.1     752.7
GR    2963.0     777.1    2965.4     815.4    2963.3     836.3    2962.7     853.3    2962.9     878.6
GR    2963.8     912.7    2970.3     941.0    2970.9     951.7    2971.0     973.4    2970.5     983.6
GR    2966.8     998.9    2967.4    1022.7    2968.6    1057.3    2968.9    1087.6    2969.9    1103.0
GR    2970.0    1115.5    2970.0    1115.6
  ***** DOWNSTREAM SIDE OF GOLDER RANCH BRIDGE *****
  ***** GR STATION 110 = GOLDER BRIDGE (P.C. W.O. 4BAC83) STATION 36+00

ET                9.11      9.11      9.11      9.11                                      110       590
X1      14.3        10       128       345        70        90        60
BT        10       110   2986.82   2981.82       120   2986.60   2981.60       126   2986.43   2981.43
BT       210    2984.6    2979.6       270   2983.33   2978.33       320   2982.24   2977.24       345
BT    2981.5    2976.5       585    2976.5   2971.46       590   2976.36   2971.36       660   2974.83
BT    2974.8
GR    2981.8       110      2970       120      2962       128      2960       210      2959.3     270
GR      2960       320      2962       345      2964       585      2970       590      2974.83    660
  ***** DY *****

ET                9.11      9.11      9.11      9.11                                      110       590
X1      14.6                                      53        53        53
BT        10       110   2986.82   2981.82       120   2986.60   2981.60       128   2986.43   2981.43
BT       210    2984.6    2979.6       270   2983.33   2978.33       320   2982.24   2977.24       345
BT    2981.5    2976.5       585    2976.5   2971.46       590   2976.36   2971.36       660   2974.83
BT    2974.8
  ***** ET CARD (RIGHT ENCROACHMENT) DEFINES INEFFECTIVE FLOW AREA
  ***** DUE TO GOLDER RANCH ROAD BRIDGE
  ***** DZ *****

ET                9.1       9.1       9.1       9.1                                        0       692
NC      .055      .045      .032
X1        15        33     251.1     340.6       121       121       121
GR    2985.0       0.0    2981.6      27.2    2974.2      76.6    2967.9     119.8    2966.4     150.1
GR    2964.0     172.5    2962.1     210.4    2961.4     229.1    2961.6     251.1    2960.7     266.3
GR    2960.9     319.6    2961.9     340.6    2962.6     376.7    2963.1     417.2    2963.6     447.2
GR    2964.0     494.5    2964.8     518.1    2964.8     540.6    2964.9     607.3    2965.0     654.1
GR    2965.3     698.4    2965.1     734.4    2965.3     787.3    2965.5     825.7    2965.9     874.2
GR    2967.5     915.3    2970.3     932.6    2971.2     965.2    2971.0     985.7    2973.2    1011.9
GR    2975.3    1044.5    2976.8    1061.7    2976.4    1102.9
  ***** EA *****
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112

NC	.042	.048	.032							
X1	16	46	352.1	420.5	550	490	560			
GR	2976.0	0.0	2972.5	31.3	2969.6	46.2	2969.6	58.7	2966.3	70.6
GR	2966.3	77.8	2969.6	88.8	2969.9	125.0	2967.5	133.1	2969.2	141.9
GR	2969.4	169.4	2969.3	213.3	2969.0	277.3	2969.5	290.2	2969.4	320.7
GR	2969.8	352.1	2965.1	358.3	2965.8	409.0	2967.7	420.5	2967.9	440.6
GR	2969.5	495.5	2968.2	508.0	2969.6	520.4	2969.1	541.0	2970.2	570.1
GR	2971.2	586.6	2970.4	596.7	2969.2	608.7	2970.0	624.1	2969.4	642.5
GR	2969.2	669.8	2970.1	701.2	2971.7	721.6	2972.7	740.3	2973.0	755.0
GR	2973.7	759.9	2970.6	768.5	2970.6	788.7	2969.9	814.9	2968.3	843.2
GR	2969.2	860.0	2969.6	883.1	2969.4	911.0	2970.2	936.7	2970.5	963.0
GR	2976.6	1004.3								

***** EB *****

NC	.042	.044	.032	0.1	0.3					
X1	17	39	744.4	845.6	334	369	490			
GR	2982.0	0.0	2978.2	28.2	2974.0	62.4	2972.9	93.2	2972.5	123.8
GR	2971.3	134.1	2971.2	142.7	2969.7	149.6	2971.8	159.4	2971.9	170.6
GR	2971.4	193.6	2971.5	208.8	2972.2	224.6	2972.2	243.6	2970.5	256.8
GR	2971.1	275.5	2971.6	313.3	2971.6	342.6	2972.0	421.3	2972.3	512.4
GR	2972.7	613.6	2972.7	660.2	2973.2	708.8	2973.5	744.4	2968.5	761.6
GR	2969.8	830.6	2973.8	845.8	2973.2	872.1	2975.3	899.7	2975.1	933.3
GR	2977.1	967.5	2980.1	1007.8	2981.2	1025.5	2981.9	1036.2	2982.8	1061.6
GR	2984.3	1073.2	2985.0	1092.7	2985.6	1109.6	2983.2	1154.5		

***** EC *****

NH	4	.038	864.9	.056	923.6	.038	975.5	.044	1147.2	
X1	18	42	923.6	975.5	680	770	770			
GR	2992	38	2990	61	2986	69	2986	77	2984	85
GR	2981.9	100.0	2977.6	142.7	2977.6	155.6	2975.6	158.6	2975.6	167.1
GR	2977.2	182.6	2976.3	207.0	2978.4	221.2	2977.2	225.0	2977.2	257.7
GR	2978.4	264.4	2978.1	273.6	2978.2	294.0	2978.5	305.9	2977.0	313.0
GR	2977.0	346.3	2977.9	350.9	2977.9	396.0	2977.9	458.7	2978.7	529.9
GR	2978.7	608.2	2978.8	672.1	2976.7	762.1	2978.7	836.2	2978.7	864.9
GR	2979.8	871.4	2979.9	892.8	2980.1	912.4	2979.2	923.6	2975.2	938.7
GR	2975.3	957.3	2978.6	975.5	2980.1	997.4	2981.1	1017.1	2985.5	1076.5
GR	2992.8	1130.7	2993.1	1147.2						

***** ED *****

NC	.038	.038	.032							
X1	19	39	713.9	789	620	660	810			
GR	2988.0	0.0	2985.0	26.0	2983.8	34.7	2983.5	49.0	2982.5	57.5
GR	2981.7	77.8	2982.1	95.4	2981.8	122.6	2981.7	141.2	2983.0	174.9
GR	2982.3	200.7	2981.9	225.2	2981.5	258.9	2981.9	283.6	2983.4	293.4
GR	2983.1	316.7	2982.9	356.9	2983.1	381.0	2983.1	410.5	2983.0	448.7
GR	2983.2	486.3	2983.3	521.6	2983.4	561.4	2983.6	591.4	2984.4	617.6
GR	2984.6	644.9	2984.4	660.1	2982.6	672.7	2982.0	693.0	2982.7	713.9
GR	2980.7	728.4	2980.7	743.0	2980.3	754.2	2980.2	776.3	2983.4	789.0
GR	2984.9	821.0	2988.1	866.8	2992.1	931.2	2995.5	964.1		

***** EE *****

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NH       5       .06      122.3       .040      481.9       .032      522.2       .040      765.2       .044
NH   915.3
X1      20        45      481.9      522.2        720        745        730
GR  2997.7       0.0     2996.0       12.2     2994.3       26.3     2991.1       56.2     2990.1       78.3
GR  2988.7     109.0     2988.6      122.3     2988.9      141.4     2986.9      177.2     2989.3      220.2
GR  2989.6     238.9     2989.5      252.7     2990.2      266.9     2989.3      292.3     2990.0      310.2
GR  2990.0     330.8     2990.2      354.9     2990.1      379.5     2990.2      398.4     2989.5      411.4
GR  2989.9     431.0     2990.6      448.6     2990.3      481.9     2985.7      490.3     2986.1      512.7
GR  2988.8     522.2     2989.3      550.9     2988.2      566.2     2989.0      578.1     2988.5      593.4
GR  2988.4     605.7     2988.9      623.9     2988.9      644.1     2989.1      675.9     2989.9      697.3
GR  2989.9     711.6     2989.0      740.6     2988.4      765.2     2988.6      790.6     2988.9      827.3
GR  2989.8     848.4     2993.3      874.5     2998.8      900.8     2999.7      915.2     2999.8      915.3
  ***** CROSS-SECTION 21 HAS BEEN MODIFIED TO REFLECT THE REALIGNMENT OF THE
  ***** CROSS-SECTION TO BETTER REFLECT FLOW PATTERNS
  ***** HAWSER STREET *****
  ***** EF *****

NH       4       .060        67       .040       372       .032       423       .040      1020
X1      21         26       372        423      1060      1000      1060                   2900
GR     110          0       108         25       106        47       104         67       102         88
GR     100        110        98        178        97       245        97        340        96        372
GR      94        378      92.4        380      92.4       400        94        403        96        410
GR      98        423        98        430        98       442      98.6        620      99.3        700
GR     100        745       102        822       104       875       106        925       106        978
GR     110       1020
  ***** CROSS-SECTION GROUND POINTS INCORPORATE SURVEY DATA THAT REFLECT
  ***** CHANGES WHICH OCCURRED IN THE FLOODING OF JANUARY 1993 (NEW INPUT DATA
  ***** USES WHOLE NUMBER STATIONING)
  ***** EG *****

NC    .045       .041       .032
X1      22         47        180        241       1020       1000       1020
GR  3014.5       0.0     3009.6       46.3     3006.8       68.5     3006.3       93.1     3005.8      116.9
GR  3006.1     123.8     3005.1      132.6     3005.7      141.5     3004.3        155     3004.6        180
GR  2999.5       186     2999.4        210     2998.9        234     3000.8        241     3004.3        265
GR  3002.8       280     3002.2        286     3005.1        292     3004.6      349.1     3004.5      400.7
GR  3004.2     475.8     3004.8      492.5     3004.2      514.7     3004.3      545.0     3004.1      563.1
GR  3003.3     570.9     3004.3      591.8     3004.6      602.1     3004.6      639.5     3005.1      653.8
GR  3003.9     671.6     3004.0      691.0     3005.0      702.2     3004.0      718.1     3004.1      734.6
GR  3005.7     757.1     3006.0      779.3     3006.6      792.1     3006.1      810.2     3006.7      819.6
GR  3006.8     842.2     3006.1      845.8     3007.0      855.5     3007.1      875.0     3007.1      889.9
GR  3007.4     909.7     3016.4      926.5
  ***** CROSS-SECTION GROUND POINTS INCORPORATE SURVEY DATA THAT REFLECT
  ***** CHANGES WHICH OCCURRED IN THE FLOODING OF JANUARY 1993 (NEW INPUT DATA
  ***** USES WHOLE NUMBER STATIONING)
  ***** CROSS-SECTION 22.5 ADDED FOR COMPUTATIONAL STABILITY BETWEEN SECNOS
  ***** 22 AND 23.  GROUND DATA REFLECTS NEW SURVEY DATA OBTAINED
  ***** AFTER THE JANUARY, 1993 FLOODING.
  ***** EH *****
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X1     22.5        25          0         61        490        423        490          0       3000          0
GR       24         0        3.8         29        3.3         40        3.5         50        3.8         61
GR      5.9        71        6.9         81          7        115        5.6        118        7.1        138
GR      5.9       152        7.8        161        8.1        170          8        270        8.8        370
GR      7.6       470        7.2        570          8        670        7.9        830       9.18        855
GR     9.34       870       6.97        881        6.5        920        9.1        985       26.1       1040
  ***** CROSS-SECTION GROUND POINTS INCORPORATE SURVEY DATA THAT REFLECT
  ***** CHANGES WHICH OCCURRED IN THE FLOODING OF JANUARY 1993 (NEW INPUT DATA
  ***** USES WHOLE NUMBER STATIONING)
  ***** EI *****

NC      .065       .043       .032
X1        23         50        167      276.3        490        423        490
GR    3025.0        0.0     3020.4       29.8     3016.3       63.3     3012.2       86.5     3010.9      105.3
GR    3011.1      125.0     3011.0      143.9     3010.0      160.6     3011.4        167     3007.6        192
GR    3007.3        210     3007.0        213     3007.0        226     3010.8        253     3010.2        275
GR    3012.3      276.3     3012.3      312.2     3012.2      333.4     3011.8      363.4     3011.5      387.8
GR    3011.2      417.1     3010.1      442.3     3011.4      464.2     3011.4      484.9     3011.9      503.4
GR    3012.4      525.1     3010.9      530.9     3012.1      537.1     3010.7      544.6     3010.6      564.1
GR    3010.4      594.9     3012.2      617.2     3011.4      631.2     3010.4      646.1     3011.9      661.5
GR    3011.9      681.3     3012.0      708.4     3012.0      730.7     3011.9      774.1     3011.0      782.3
GR    3010.8      804.9     3011.5      811.0     3011.6      830.8     3012.4      846.2     3012.4      861.4
GR    3012.1      877.3     3012.7      889.2     3013.3      906.9     3013.7      920.8     3026.8      956.2
  *****  SOUTH END OF AIRSTRIP  *****
  ***** EJ *****

NH        6       .050      206.9       .032      291.5       .053      416.8       .035      455.1       .035
NH    576.3       .042      981.6
X1       24         45      416.8      455.1        975        980        980
GR    3030.0        0.0     3022.5       67.7     3019.9      109.5     3020.6      126.0     3020.4      148.0
GR    3020.9      179.4     3020.9      206.9     3019.4      232.6     3017.1      240.0     3018.0      252.2
GR    3018.0      276.7     3020.4      291.5     3020.6      309.0     3021.1      346.8     3020.7      369.8
GR    3021.0      386.0     3020.3      416.8     3016.0      425.7     3015.9      442.4     3019.7      455.1
GR    3020.1      463.3     3020.2      492.0     3019.6      509.8     3020.3      517.2     3019.3      533.8
GR    3018.8      550.2     3019.7      562.4     3019.1      576.3     3018.9      632.5     3020.3      641.9
GR    3020.1      659.4     3019.8      696.0     3019.7      736.2     3019.6      764.7     3019.3      798.3
GR    3019.0      828.5     3019.0      840.9     3016.5      848.2     3023.3      866.0     3024.1      877.1
GR    3024.3      899.1     3023.2      919.4     3023.6      937.6     3023.4      954.6     3035.4      981.6
  *****  CROSS-SECTION 24.1 ADDED FOR COMPUTATIONAL STABILITY
  ***** EK *****

NC      .050       .040       .035
X1      24.1         24        312        350        550        540        540
GR      3056        0.0       3050         35       3040         50       3032        140       3026        175
GR      3025        245       3024        290     3022.8        312     3020.5        320     3020.8        336
GR    3023.8        350       3024        380     3023.5        410       3024        450     3023.5        490
GR      3024        508       3025        620       3024        710       3024        840     3023.5        980
GR    3024.5       1040       3026       1090       3025       1115       3034       1140
  ***** EL *****
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NC     .050       .042       .035
X1       25         51        274      303.4        510        500        510
GR   3043.3        0.0     3038.3       42.8     3030.6      107.9     3028.5      137.8     3028.2      148.5
GR   3029.3      169.7     3028.6      179.5     3028.3      202.4     3027.5      212.2     3028.6      222.3
GR   3028.9      231.9     3028.5      245.9     3028.6      260.9     3028.2      274.0     3024.9      279.5
GR   3023.8      283.3     3023.3      294.7     3027.8      303.4     3028.1      321.3     3028.1      332.4
GR   3029.2      346.3     3028.7      365.2     3028.3      398.1     3028.0      436.9     3028.5      458.0
GR   3028.3      480.3     3027.7      505.2     3027.5      519.6     3028.8      561.8     3028.8      599.3
GR   3026.7      649.7     3028.0      662.2     3027.5      677.3     3027.9      701.4     3028.3      722.6
GR   3029.4      732.4     3027.9      748.3     3027.8      763.0     3028.3      775.2     3028.0      814.1
GR   3029.0      829.0     3028.5      846.2     3028.2      880.2     3027.9      918.1     3027.5      942.9
GR   3027.1      972.2     3026.9      992.9     3026.5     1039.4     3026.2     1052.0     3026.2     1057.6
GR   3042.6     1095.3
  ***** CROSS-SECTION 25.1 ADDED FOR COMPUTATIONAL STABILITY
  ***** EM *****

NH       5       .050        315       .035        365       .042        650       .038       1220       .052
NH    1350
X1     25.1         23        315        365        380        430        400
GR     3050        0.0       3040         40       3034         65       3032        130       3032        220
GR     3031        290       3030        315     3026.3        335     3026.3        355       3029        365
GR   3031.8        440       3031        462       3032        505     3031.5        570       3032        650
GR   3031.5        760       3032        840       3031        950     3031.1       1100       3032       1220
GR     3034       1290       3044       1320       3054       1350
  ***** EN *****

NH       5       .065      122.9       .032      157.2       .042      785.6       .036     1272.5       .052
NH  1419.7
X1       26         68      122.9      157.2        470        480        470
GR     3046         40       3044         65       3042         78       3040         89       3038         96
GR   3037.1      100.0     3033.5      109.1     3033.4      122.9     3030.7      134.3     3030.6      146.5
GR   3035.1      157.2     3034.9      176.4     3035.5      197.2     3035.3      220.7     3035.5      245.7
GR   3035.2      261.9     3034.6      283.7     3034.2      304.7     3033.4      314.9     3033.8      328.7
GR   3033.6      343.3     3034.2      370.1     3034.2      389.9     3033.3      404.1     3033.3      416.7
GR   3034.1      434.2     3033.5      449.4     3033.4      465.0     3034.0      475.9     3033.7      499.5
GR   3033.8      513.6     3033.7      538.6     3034.4      559.1     3034.8      579.0     3034.3      602.4
GR   3033.1      623.2     3033.6      640.2     3033.2      652.0     3034.2      663.1     3033.3      679.1
GR   3031.2      695.5     3031.6      701.9     3034.5      718.0     3034.6      741.2     3035.5      765.8
GR   3035.3      785.6     3035.6      802.3     3035.0      818.9     3034.9      834.3     3034.7      879.7
GR   3034.7      911.7     3034.6      951.5     3034.5      983.0     3034.4     1016.4     3034.4     1032.2
GR   3033.3     1046.9     3033.3     1098.3     3034.6     1122.1     3033.9     1131.9     3033.8     1164.6
GR   3033.7     1205.9     3033.8     1251.5     3034.3     1272.5     3035.3     1300.9     3036.4     1334.5
GR   3038.0     1379.1     3039.6     1415.0     3040.5     1419.7
  *****  DIKE (WEST OF CHANNEL, CROSS-SECTIONS 27-29)
  *****  NOT CONSIDERED AS REGULATORY LEVEE
  *****  EFFECTIVE FLOW AREA NOT REDUCED
  ***** EO *****
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NC      .052        .044        .032
X1        27          54       309.9         410         675         590         670
GR    3054.0         0.0      3050.0        43.3      3047.7        76.7      3044.4       119.6      3040.7       135.7
GR    3040.7       212.5      3040.0       240.7      3039.1       250.0      3039.3       258.7      3039.5       273.2
GR    3037.6       284.1      3037.2       290.8      3040.8       309.9      3040.1       319.8      3039.0       332.4
GR    3039.1       337.6      3037.4       345.7      3037.0       357.5      3038.3       362.5      3038.5       368.0
GR    3036.4       392.8      3037.0       402.9      3041.1       410.0      3039.3       421.1      3039.9       447.2
GR    3039.6       478.5      3038.3       487.7      3039.1       504.0      3039.8       516.5      3039.2       535.6
GR    3039.4       556.8      3039.3       585.0      3039.0       630.5      3038.9       666.2      3038.9       704.9
GR    3038.8       789.1      3038.2       829.3      3038.4       887.4      3039.0       942.1      3039.2       989.9
GR    3038.8      1053.8      3038.9      1094.2      3038.8      1120.3      3038.2      1165.9      3038.9      1181.6
GR    3038.2      1210.6      3038.1      1237.2      3038.2      1266.3      3038.2      1304.4      3038.4      1329.9
GR    3038.7      1362.1      3039.7      1372.5      3041.0      1384.5      3049.4      1403.7
  ***** DIKE (WEST OF CHANNEL, CROSS-SECTIONS 27-29)
  ***** NOT CONSIDERED AS REGULATORY LEVEE
  ***** EFFECTIVE FLOW AREA NOT REDUCED
  ***** DIKE (WEST OF CHANNEL, CROSS-SECTIONS 27-29)
  ***** NOT CONSIDERED AS REGULATORY LEVEE
  ***** EFFECTIVE FLOW AREA NOT REDUCED
  ***** EP *****

NH        5         .05       207.8        .042       415.6        .032       588.7        .040       769.0        .044
NH   1274.9
X1       28          53       415.6       588.7         390         450         450
GR    3054.0         0.0      3052.6        35.5      3050.9        74.7      3046.1       103.6      3046.2       140.7
GR    3044.4       179.1      3043.7       192.6      3040.4       205.6      3040.7       207.8      3043.3       216.1
GR    3043.9       231.5      3043.5       250.3      3043.6       277.4      3043.5       311.6      3043.6       354.7
GR    3043.6       391.7      3043.4       415.6      3040.7       437.4      3040.7       450.4      3040.7       476.9
GR    3041.4       485.9      3041.2       506.1      3040.9       524.4      3041.3       535.0      3041.0       559.3
GR    3040.6       579.9      3044.1       588.7      3046.3       613.5      3046.6       621.6      3043.1       638.8
GR    3043.1       661.8      3042.8       695.1      3042.2       729.2      3042.5       769.0      3042.6       802.0
GR    3042.8       836.4      3043.0       885.5      3043.3       920.6      3043.8       937.0      3045.0       953.6
GR    3044.3       972.7      3044.2       996.2      3044.7      1016.6      3045.1      1050.0      3046.2      1090.9
GR    3047.2      1123.0      3048.0      1148.4      3048.9      1167.4      3050.7      1196.6      3052.0      1210.5
GR    3051.0      1224.2      3053.6      1243.8      3061.4      1274.9
  ***** DIKE (WEST OF CHANNEL, CROSS-SECTIONS 27-29)
  ***** NOT CONSIDERED AS REGULATORY LEVEE
  ***** EFFECTIVE FLOW AREA NOT REDUCED
  ***** EQ *****

NC      .050        .054        .035
X1        29          59       645.7       696.8         540         600         640
GR    3062.0         0.0      3060.2        33.2      3055.2        64.0      3051.8       134.5      3049.8       208.1
GR    3050.0       224.5      3050.0       245.1      3048.5       262.7      3048.8       267.4      3049.7       274.8
GR    3048.8       320.6      3049.4       330.6      3049.4       375.8      3048.4       386.3      3048.8       395.4
GR    3049.0       407.6      3049.1       429.2      3049.1       441.5      3047.7       451.7      3048.8       462.2
GR    3048.7       482.9      3048.8       525.2      3048.8       547.5      3046.1       572.7      3046.8       579.5
GR    3046.7       593.8      3047.6       599.7      3046.9       645.7      3045.0       655.0      3045.1       664.3
GR    3045.9       674.3      3045.9       690.8      3046.8       698.6      3047.3       711.2      3047.3       753.2
GR    3047.4       778.1      3047.8       801.5      3048.4       829.0      3048.9       852.5      3048.8       870.8
GR    3049.3       893.1      3049.8       912.2      3050.6       933.2      3053.1       967.7      3055.6       995.1
GR    3057.2      1037.1      3055.4      1044.9      3055.7      1076.3      3055.3      1092.4      3056.8      1107.4
GR    3057.4      1158.2      3056.5      1200.4      3061.8      1220.8      3062.7      1253.4      3063.8      1276.8
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GR   3065.6     1464.4     3066.3     1503.6     3068.4     1556.9     3069.8     1605.4
  *****  DIKE (WEST OF CHANNEL)
  *****  NOT CONSIDERED AS REGULATORY LEVEE
  *****  EFFECTIVE FLOW AREA NOT REDUCED
  ***** ER *****

NH        4       .050      675.2       .032      725.2       .041      998.9       .054     1720.9
X1       30         73      675.2      725.2        560        675        620
GR   3071.1        0.0     3069.1       28.1     3063.8       82.0     3059.2       118.4     3057.1       160.4
GR   3054.7      199.3     3054.7      218.7     3052.9      242.1     3053.9       252.1     3054.4       266.8
GR   3054.6      284.0     3054.8      312.9     3052.5      334.5     3054.6       349.6     3054.7       374.5
GR   3053.6      402.2     3054.2      438.8     3054.5      471.0     3053.7       486.2     3054.1       503.0
GR   3054.3      548.5     3054.8      585.0     3055.4      616.2     3054.4       643.0     3054.4       653.0
GR   3052.0      664.3     3051.8      675.2     3049.8      683.4     3050.1       693.3     3051.3       707.2
GR   3051.4      718.8     3052.2      725.2     3050.7      742.8     3054.6       764.9     3055.2       782.6
GR   3054.1      804.7     3053.1      844.3     3054.4      866.0     3054.9       883.9     3055.6       891.7
GR   3054.0      906.0     3053.7      921.7     3054.6      932.3     3055.8       945.8     3054.4       973.5
GR   3054.1      998.9     3052.9     1018.9     3055.6     1031.1     3063.3      1057.1     3056.5      1085.7
GR   3055.8     1107.0     3054.9     1125.3     3055.0     1154.4     3055.5      1184.9     3055.6      1217.7
GR   3055.9     1251.3     3056.2     1281.5     3055.1     1289.9     3056.1      1297.9     3055.9      1319.4
GR   3056.2     1361.7     3057.1     1391.7     3057.1     1430.2     3058.0      1454.8     3059.1      1488.4
GR   3059.8     1526.4     3060.3     1565.7     3061.1     1606.7     3061.8      1636.2     3060.7      1655.4
  ***** ES *****

NH        7       .056      401.0       .036      457.9       .050      641.9       .052      702.9       .051
NH    767.6       .037      820.7       .048     2082.5
X1       31         73      641.9      702.9        681        680        680
GR   3080.0        0.0     3078.3       22.0     3075.2       39.6     3072.1        95.1     3069.9       121.0
GR   3066.7      175.6     3066.1      212.1     3063.9      264.2     3062.1       307.7     3061.2       346.8
GR   3060.3      385.8     3060.9      401.0     3059.6      420.4     3059.7       439.3     3061.0       457.9
GR   3061.0      480.9     3061.0      541.9     3061.2      563.0     3058.9       573.5     3058.4       588.9
GR   3059.6      599.7     3059.6      615.7     3060.7      628.5     3060.1       641.9     3055.4       664.6
GR   3055.3      682.0     3058.7      702.9     3060.1      713.9     3059.8       751.3     3056.2       767.6
GR   3056.2      779.5     3059.7      799.5     3060.1      810.9     3059.4       820.7     3060.4       835.2
GR   3060.5      859.7     3062.0      914.1     3057.6      941.8     3057.8       967.9     3058.4      1002.3
GR   3060.0     1020.8     3060.1     1045.7     3060.4     1084.2     3060.9      1140.6     3059.2      1152.6
GR   3062.1     1166.5     3062.0     1190.4     3061.5     1216.7     3061.5      1236.6     3062.9      1261.6
GR   3063.4     1290.7     3061.7     1415.1     3061.5     1471.2     3062.6      1522.6     3063.8      1556.9
GR   3065.3     1607.9     3066.7     1657.3     3068.8     1717.2     3069.9      1775.7     3070.4      1796.1
GR   3071.6     1844.9     3072.2     1862.4     3072.9     1884.0     3074.1      1915.5     3074.3      1952.4
GR   3072.5     1963.8     3072.5     1986.6     3075.2     1980.4     3075.7      2002.2     3075.0      2019.5
GR   3077.4     2037.3     3081.6     2074.3     3082.6     2082.5
  ***** ET *****

NC     .060       .057       .036
X1       32         66      517.4      614.8        835        721        805
GR   3080.0        0.0     3080.0       26.9     3080.1       43.2     3079.5        75.9     3078.1       102.7
GR   3078.9      124.4     3079.6      145.9     3079.2      164.7     3078.9       178.5     3077.4       209.6
GR   3075.8      243.2     3074.3      290.1     3073.6      321.7     3072.8       352.4     3071.2       382.0
GR   3068.9      425.5     3067.2      471.8     3065.8      498.1     3065.9       495.7     3066.3       548.7
GR   3067.0      517.4     3065.4      536.5     3065.3      558.6     3065.4       587.7     3064.6       607.0
GR   3066.7      614.8     3067.6      626.4     3067.4      636.9     3066.1       678.1     3065.7       716.4
GR   3066.4      747.7     3066.5      776.1     3066.8      824.0     3067.1       852.3     3067.3       877.5
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GR   3066.4      911.6     3066.7      927.4     3066.8      956.8     3066.8      975.7     3067.0     1013.2
GR   3066.8     1058.6     3066.7     1121.2     3067.2     1151.9     3067.2     1188.8     3066.6     1221.2
GR   3066.2     1254.2     3066.4     1306.9     3066.7     1339.3     3066.4     1380.2     3064.6     1369.2
GR   3065.9     1397.1     3066.1     1431.8     3072.4     1474.3     3072.7     1519.5     3071.3     1534.1
GR   3072.5     1549.4     3073.1     1567.3     3073.4     1586.6     3072.2     1616.3     3070.4     1623.3
GR   3073.0     1633.3     3075.5     1671.5     3076.2     1736.4     3076.1     1786.1     3079.1     1810.4
GR   3080.1     1817.7
  *****  CROSS-SECTION 33 HAS BEEN MODIFIED TO REFLECT THE REALIGNMENT OF THE
  *****  CROSS-SECTION TO BETTER MODEL FLOW PATTERNS
  ***** EU *****

NC     .065       .057       .036
X1       33         40      445.3      466.6        850        730        850
GR   3090.2        0.0     3087.1       49.4     3083.5      115.0     3082.4      159.2     3081.1      198.2
GR   3077.3      233.8     3076.6      258.7     3075.9      279.9     3075.4      298.9     3072.4      309.7
GR   3071.6      321.4     3073.1      334.4     3072.8      340.0     3074.6      349.0     3075.2      371.2
GR   3074.7      392.4     3073.9      404.3     3073.9      418.0     3071.5      445.3     3069.2      453.5
GR   3070.5      467.5     3073.9      488.6     3074.0        520     3075.0        675     3076        820
GR   3076.5        875       3076        920       3074        970       3075       1060       3076       1220
GR     3076       1320       3078       1335       3080       1365     3080.5       1390       3080       1425
GR     3080       1470       3082       1525       3084       1610       3090       1655       3093       1690
  *****  CROSS-SECTION 34 HAS BEEN MODIFIED TO REFLECT THE REALIGNMENT OF THE
  *****  CROSS-SECTION TO BETTER MODEL FLOW PATTERNS
  ***** EV *****

NH         5       .070      139.3       .037      190.6       .058      249.4       .036      291.5       .056
NH      1585
X1        34         45      249.4      291.5        890        700        890
GR   3093.4        0.0     3090.3       25.0     3086.6       64.7     3087.2       76.2     3085.4      102.8
GR   3081.3      139.3     3078.8      143.5     3079.2      160.9     3079.2      172.8     3081.2      190.6
GR   3082.4      199.1     3080.9      214.2     3079.9      235.1     3079.3      249.4     3077.5      262.2
GR   3077.4      274.4     3082.3      291.5     3081.2      312.4     3081.8      326.7     3081.5      362.7
GR   3081.2      393.3     3081.1      408.4     3079.8      420.8     3081.9      433.4     3080.9      456.2
GR   3080.9      484.3     3080.6      509.4     3080.1      530.7     3080.8      555.2     3079.7        593
GR     3080        600     3080.5        650       3080        780       3082        940       3083       1035
GR   3082.6       1085       3083       1180       3082       1245     3081.7       1252       3082       1262
GR     3084       1320       3082       1415       3084       1440       3086       1510     3084.3       1585
  *****  CROSS-SECTION 35 HAS BEEN MODIFIED TO REFLECT THE REALIGNMENT OF THE
  *****  CROSS-SECTION TO BETTER MODEL FLOW PATTERNS
  ***** EW *****

NC     .052       .057       .032
X1       35         50      706.1      751.2        750        380        750
GR   3096.0        0.0     3093.0        3.6     3086.5       69.5     3086.2      110.4     3085.7      138.7
GR   3085.6      195.7     3085.7      218.6     3085.6      265.4     3085.8      310.0     3085.8      359.1
GR   3084.8      364.0     3086.5      375.3     3086.3      387.4     3086.3      405.0     3085.4      418.9
GR   3085.6      431.5     3086.5      449.5     3086.4      466.9     3085.7      480.6     3084.1      497.2
GR   3085.2      525.4     3085.2      540.4     3085.3      556.9     3085.6      570.7     3084.1      582.2
GR   3086.1      593.8     3086.5      623.6     3087.1      638.7     3087.2      668.4     3087.4      684.1
GR   3084.4      720.1     3084.5      756.7     3083.4      781.8     3083.4      797.2     3086.0      821.2
GR     3088        860     3087.5        880       3091        920     3088.5       1025       3089       1160
GR   3089.5       1195       3089.2       1240     3089.3       1320     3089.6       1390       3090       1425
GR     3090       1570     3088.8       1582       3090       1593     3090.4       1625       3090       1640
  *****  CROSS-SECTION 36 HAS BEEN MODIFIED TO REFLECT THE REALIGNMENT OF THE
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*****  CROSS-SECTION TO BETTER MODEL FLOW PATTERNS
*****  ET CARD (RIGHT ENCROACHMENT) DEFINES INEFFECTIVE FLOW AREA
*****  DUE TO RIDGE LOCATED BETWEEN CROSS-SECTIONS 36 & 37
***** EX *****

ET                9.1       9.1       9.1       9.1                                          0       1391
NH        5      .054     949.6      .032    1014.7      .054      1480      .037      1675      .058
NH     1840
X1        36        45     949.6    1014.7       550       600       570
GR    3116.2       0.0    3101.7      35.7    3093.7      47.2    3094.1      55.7    3093.8      66.5
GR    3093.0      70.6    3092.5     139.2    3092.2     229.6    3092.3     325.8    3092.1     390.9
GR    3091.8     447.9    3091.0     536.4    3090.4     587.0    3090.1     654.7    3089.7     715.3
GR    3090.6     773.4    3090.0     796.7    3091.0     834.4    3091.6     879.2    3092.5     911.8
GR    3091.5     931.6    3091.2     949.6    3087.8     957.2    3087.8     963.8    3088.8     986.7
GR    3087.5     995.0    3087.5    1005.7    3090.6    1014.7    3092.3    1024.2    3092.6    1052.0
GR    3095.9    1073.9    3096.9    1106.7    3097.4    1143.0    3098.0    1184.5    3098.6    1205
GR    3098.5    1380      3098      1455      3097.2    1480      3098      1505      3099      1530
GR      3098    1600      3098      1675      3096.5    1690      3098      1745      3099.3    1840
  *****  EDWIN ROAD  *****
  *****  PINAL COUNTY LINE  *****
  ***** EY *****

NH        4      .060     760.6      .046    1082.9      .035    1130.6      .059    1296.8
X1       37        48    1082.9    1130.6       620       620       620
GR    3112.4       0.0    3105.4      64.5    3103.1      73.5    3103.1      85.2    3104.0      90.9
GR    3099.6     120.6    3099.4     123.0    3098.9     134.1    3099.1     171.1    3099.3     220.6
GR    3099.2     258.8    3099.0     316.0    3096.4     360.4    3097.5     413.6    3097.4     450.8
GR    3097.0     489.5    3097.1     534.1    3096.9     589.1    3097.1     602.2    3096.8     624.3
GR    3096.9     641.6    3097.8     661.2    3097.9     694.4    3097.7     731.2    3095.2     760.6
GR    3094.9     796.0    3095.1     848.6    3097.7     874.2    3096.9     890.4    3095.3     901.3
GR    3095.3     924.6    3096.4     936.4    3096.3     968.7    3095.6    1002.2    3095.9    1014.3
GR    3097.1    1026.3    3095.9    1039.8    3096.3    1056.2    3098.8    1065.7    3097.1    1082.9
GR    3093.8    1090.6    3094.1    1115.4    3100.6    1130.6    3108.0    1212.7    3107.8    1220.0
GR    3108.4    1250.4    3113.5    1297.8    3113.7    1298.8
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SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*PROF 1

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

CCHV= .100 CEHV= .300
1490 NH CARD USED
*SECNO 1.000

3265 DIVIDED FLOW

1.000	4.10	2882.00	2881.79	2882.00	2882.37	.37	.00	.00	2880.80
5200.0	3394.0	1767.7	38.3	694.8	274.3	24.4	.0	.0	2881.10
.00	3.79	6.44	1.57	.047	.032	.070	.000	2877.30	25.58
.008070	0.	0.	0.	0	5	0	.00	1049.86	1349.32

CCHV= .100 CEHV= .300
*SECNO 2.000

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

2.000	4.17	2888.17	2888.17	.00	2888.62	.65	5.42	.09	2887.90
5200.0	2775.2	2263.6	161.2	690.9	258.5	79.3	15.1	13.4	2887.40
.03	4.02	8.76	2.03	.050	.030	.070	.000	2884.00	15.55
.010627	600.	570.	580.	0	8	0	.00	908.15	1093.70

*SECNO 3.000

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3.000	3.96	2896.26	2896.26	.00	2896.78	.82	6.59	.01	2895.30
5200.0	2057.5	2005.1	137.4	757.4	236.8	304.0	32.7	27.2	2896.70
.06	2.79	8.47	2.74	.050	.032	.044	.000	2892.33	39.35
.006721	650.	685.	700.	0	10	0	.00	910.96	975.07

*SECNO 4.000

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	FR	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

4.000	4.03	2904.53	2904.53	.00	2905.22	.69	6.28	.05	2903.90
5200.0	317.8	3017.6	1864.7	130.2	385.8	532.7	57.4	44.7	2903.30
.10	2.44	8.25	3.50	.050	.032	.044	.000	2900.50	160.55
.006791	975.	935.	885.	0	5	0	.00	717.64	1024.50

*SECNO 4.500

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

4.500	4.43	2908.03	2908.03	.00	2908.76	.74	2.30	.01	2907.60
5200.0	939.1	2946.8	1314.1	206.6	545.3	422.2	68.4	50.5	2905.20
.12	4.50	8.50	3.11	.050	.032	.046	.000	2903.60	15.13
.007216	350.	375.	325.	0	8	0	.00	776.45	883.14

1490 NH CARD USED
*SECNO 5.000

3265 DIVIDED FLOW

5.000	3.70	2911.00	2910.61	.00	2911.45	.45	2.66	.03	2912.90
5200.0	.0	1628.2	3571.8	.5	206.3	1019.8	74.0	56.3	2910.50
.14	.00	8.14	3.50	.000	.032	.054	.000	2907.30	106.45
.008062	350.	375.	325.	2	10	0	.00	763.22	956.38

1490 NH CARD USED
*SECNO 6.000

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

6.000	4.17	2917.97	2917.97	.00	2918.64	.68	5.42	.07	2916.00
5200.0	3.6	1719.6	3476.4	2.3	176.2	843.0	92.2	66.2	2910.50
.17	1.61	9.92	4.12	.070	.032	.044	.000	2913.80	25.76
.008633	730.	710.	710.	8	11	0	.00	667.64	944.38

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IOC	ICONT	CORAR	TOPWID	ENDST

1490 NH CARD USED
*SECNO 7.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

7.000	3.96	2924.46	2924.46	.00	2928.05	.56	6.02	.01	2925.40
5200.0	.0	1863.7	3336.3	.0	211.0	861.1	109.4	77.3	2923.60
.21	.00	8.83	3.87	.000	.032	.043	.000	2920.50	25.64
.007801	810.	800.	700.	0	10	0	.00	736.60	765.24

*SECNO 8.000

3265 DIVIDED FLOW

8.000	3.45	2929.75	2929.45	.00	2930.89	.94	3.54	.11	2926.60
5200.0	.0	4997.1	202.9	.0	633.4	56.9	124.3	88.4	2930.20
.24	.00	7.89	3.44	.000	.032	.041	.000	2926.30	14.97
.007245	750.	740.	730.	3	15	0	.00	283.86	855.62

*SECNO 9.000

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

9.000	3.48	2935.68	2935.68	.00	2936.33	.65	5.10	.03	2934.90
5200.0	9.7	3686.3	1301.4	5.9	544.5	339.5	135.2	95.6	2936.10
.26	1.65	7.14	3.63	.046	.032	.041	.000	2932.20	72.91
.009938	640.	610.	575.	0	3	0	.00	778.49	1075.07

1490 NH CARD USED
*SECNO 10.000

3265 DIVIDED FLOW

10.000	3.25	2941.65	2941.60	.05	2942.17	.53	5.81	.03	2947.50
5200.0	.0	1501.5	3698.5	.0	538.6	439.4	130.6	100.1	2942.10
.30	.00	5.92	3.54	.000	.032	.042	.000	2936.60	50.80
.008192	620.	660.	630.	4	7	0	.00	733.47	1001.62

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

1490 NH CARD USED
*SECNO 11.000

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

11.000	3.21	2946.31	2946.31	.00	2946.89	.57	3.96	.07	2949.30
5200.0	.0	2092.0	3108.0	.0	243.5	893.6	163.7	118.7	2945.40
.33	.00	8.59	3.48	.000	.032	.046	.000	2943.10	53.76
.008224	450.	450.	500.	0	5	0	.00	928.68	1006.30

CCHV= .300 CEHV= .500
1490 NH CARD USED
*SECNO 12.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

12.000	4.01	2952.31	2952.31	.00	2952.88	.57	5.93	.00	2952.00
5200.0	493.1	1532.1	3174.8	131.5	163.2	616.3	160.5	132.8	2951.50
.36	3.75	5.37	3.88	.036	.032	.042	.000	2948.30	84.90
.010104	650.	665.	650.	0	14	0	.00	966.99	1051.85

*SECNO 13.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS= 50.0 760.0 TYPE= 1 TARGET= 710.000

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 2960.30 ELREA= 2956.20

13.000	3.78	2958.58	2956.58	.00	2959.26	.69	5.75	.06	2960.30
5200.0	.0	1873.4	3326.6	.0	141.2	727.5	149.3	143.7	2956.20
.39	.00	9.31	4.57	.000	.032	.042	.000	2954.60	227.07
.008122	630.	650.	650.	1	10	0	.00	932.93	760.00

*SECNO 14.000

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

3720 CRITICAL DEPTH ASSUMED

14.000	4.45	2962.85	2962.85	.00	2963.88	1.03	3.64	.17	2958.40
5200.0	593.0	3996.8	610.2	146.9	439.7	242.3	206.0	149.8	2960.00
.41	3.98	9.09	2.52	.055	.032	.045	.000	2956.40	104.06
.005971	500.	520.	540.	0	8	0	.00	460.50	579.40

*SECNO 14.300
BTCARD, BRIDGE STENCL= 110.00 STENCR= 590.00
3840 SECTION NOT HIGH ENOUGH241459.000 3031.600 2959.300100000.000 2941.845 2

3370 NORMAL BRIDGE, NRD= 10 MIN ELTRD= 2974.63 MAX ELLC= 2961.43

3470 ENCROACHMENT STATIONS= 110.0 590.0 TYPE= 1 TARGET= 480.000

14.300	4.47	2963.77	2963.01	.00	2964.36	.61	.37	.12	2962.00
5200.0	1.9	4850.6	347.5	1.6	748.7	187.1	207.7	150.7	2962.00
.41	1.21	6.48	1.86	.055	.032	.045	.000	2959.30	126.13
.003736	70.	80.	90.	4	22	0	.00	459.87	556.50

*SECNO 14.600
BTCARD, BRIDGE STENCL= 110.00 STENCR= 590.00
3840 SECTION NOT HIGH ENOUGH160967.500 3031.600 2959.300100000.000 2963.750 2

3370 NORMAL BRIDGE, NRD= 10 MIN ELTRD= 2974.63 MAX ELLC= 2961.43

3470 ENCROACHMENT STATIONS= 110.0 590.0 TYPE= 1 TARGET= 480.000

14.600	4.82	2964.12	2963.01	.00	2964.58	.46	.16	.04	2962.00
5200.0	2.5	4712.9	484.6	2.3	826.2	269.5	206.9	151.2	2962.00
.41	1.12	5.70	1.68	.055	.032	.045	.000	2959.30	125.88
.002540	53.	53.	53.	2	22	0	.00	459.23	585.10

*SECNO 15.000

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

15.000	3.99	2964.69	2964.69	.00	2965.77	1.08	.81	.61	2960.80
5200.0	641.6	3277.7	1060.7	186.7	525.4	251.9	214.8	151.4	2962.00
.42	4.46	9.97	4.69	.055	.032	.045	.000	2960.42	161.47
.008147	121.	131.	141.	0	12	1	.00	358.37	514.84

SECNO	DEPTH	CWSEL	CRIWS	WSLEL	LB	BV	L	ELOSS	L BANK ELEV
Q	QLOB	QCH	QROB	SLOB	RCH	AROB	VOL	TWA	R BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WIN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 16.000

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

16.000	5.30	2970.40	2970.40	.00	2971.13	.72	3.48	.11	2964.60
5200.0	1229.2	2774.2	1196.7	377.7	311.6	450.1	225.2	139.2	2967.70
.44	3.25	8.91	2.66	.042	.033	.043	.000	2965.10	43.62
.005039	550.	560.	490.	0	12	0	.00	796.89	654.57

CCHV= .100 CEHV= .300
*SECNO 17.000

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

17.000	4.71	2973.21	2973.21	.00	2973.66	.04	2.49	.01	2968.50
5200.0	2660.8	2539.2	.0	709.4	303.1	.0	232.7	165.5	2973.60
.46	3.75	8.38	.03	.042	.032	.044	.000	2968.50	64.54
.007191	334.	490.	369.	0	9	0	.00	723.49	673.72

1490 NH CARD USED
*SECNO 18.000

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

18.000	4.12	2979.32	2979.32	.00	2979.66	.00	3.71	.01	2974.20
5200.0	3860.1	1339.9	0.0	825.4	139.6	3.7	248.7	177.1	2978.00
.49	4.66	6.00	1.61	.038	.032	.044	.000	2978.20	151.66
.008965	680.	770.	770.	0	9	0	.00	808.88	784.98

*SECNO 19.000

3265 DIVIDED FLOW

19.000	3.61	2984.01	2983.61	.00	2984.06	.01	3.64	.01	2982.40
5200.0	3365.3	1813.8	5.0	744.3	211.7	9.1	260.0	186.4	2988.40
.53	4.18	7.86	1.42	.035	.031	.038	.000	2980.20	98.50
.006400	620.	810.	800.	0	10	0	.00	710.81	682.11

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

1490 NH CARD USED
*SECNO 20.000

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

20.000	4.84	2990.54	2990.54	.00	2991.20	.66	5.25	.04	2990.30
5200.0	1297.6	1552.5	2349.9	370.8	154.8	515.3	280.5	200.8	2988.60
.56	3.50	10.03	4.55	.043	.032	.041	.000	2955.70	88.50
.008160	720.	730.	745.	0	14	0	.00	777.73	813.94

1490 NH CARD USED
*SECNO 21.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

21.000	6.91	2999.31	2999.31	.00	3000.21	.89	7.03	.07	2996.00
5200.0	2132.2	2534.0	333.8	400.9	251.1	205.0	304.1	216.9	2998.00
.60	4.63	9.94	2.55	.040	.032	.040	.000	2992.40	133.30
.005594	1080.	1060.	1000.	0	14	0	.00	867.64	700.94

*SECNO 22.000

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

22.000	6.77	3005.67	3005.67	.00	3006.41	.74	4.25	.02	3004.60
5200.0	82.2	3156.2	1959.8	43.5	366.4	709.2	327.8	230.7	3000.80
.65	1.89	8.57	2.76	.045	.032	.041	.000	2998.90	127.56
.003244	1020.	1020.	1000.	0	0	0	.00	628.50	756.72

*SECNO 22.500

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

22.500	5.66	3006.96	3006.96	.00	3007.61	.66	1.91	.01	3004.00
5200.0	.0	2342.7	2857.3	.0	251.1	891.9	339.4	236.2	3000.90
.67	.00	9.04	3.22	.000	.032	.041	.000	3000.80	21.60
.005552	490.	490.	425.	0	14	0	.00	891.66	849.56

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	KW	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	ANL	ANCH	ANR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IBC	ICONT	CORAR	TOPWID	ENDST

*SECNO 23.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

23.000	5.56	3012.56	3012.56	.00	3013.20	.64	2.44	.00	3011.40
5200.0	280.1	3198.5	1721.4	125.2	407.[illegible]	598.5	351.1	246.7	3012.30
.69	2.24	7.86	2.68	.065	.032	.043	.000	3007.00	64.44
.005068	490.	490.	423.	0	0	0	.00	602.06	886.30

1490 NH CARD USED
*SECNO 24.000

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

24.000	5.08	3020.98	3020.98	.00	3021.60	.63	6.21	.00	3020.30
5200.0	1535.2	1383.2	2281.8	234.4	149.4	572.9	374.7	264.1	3015.70
.74	6.03	9.26	3.98	.033	.035	.045	.000	3015.90	52.20
.008159	975.	980.	980.	0	9	0	.00	747.30	658.41

*SECNO 24.100

24.100	4.84	3025.34	3025.31	.00	3025.86	.52	4.24	.01	3022.60
5200.0	273.1	1391.3	3540.6	68.9	151.2	904.3	387.9	274.0	3023.80
.76	3.25	9.14	3.92	.030	.035	.040	.000	3020.50	237.09
.007513	550.	540.	540.	2	10	0	.00	830.87	1067.96

*SECNO 25.000

3265 DIVIDED FLOW

25.000	5.89	3029.19	3029.16	.00	3029.71	.52	3.85	.00	3028.20
5200.0	208.2	1230.9	3760.9	95.3	128.6	983.5	401.1	284.1	3027.30
.79	2.19	9.57	4.08	.030	.035	.042	.000	3025.30	126.03
.007805	510.	510.	505.	2	12	0	.00	927.38	1064.46

1490 NH CARD USED
*SECNO 25.100
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST
25.100	6.23	3032.53	3032.53	.00	3033.05	.31	2.37	.00	3030.00
5200.0	365.7	2168.9	2665.4	173.6	261.0	948.2	413.4	294.0	3029.00
.81	2.10	8.31	2.61	.050	.035	.040	.000	3026.30	116.07
.004308	380.	400.	430.	0	7	0	.00	1120.49	1238.56

1490 NH CARD USED
*SECNO 26.000

3265 DIVIDED FLOW

26.000	4.57	3035.17	3035.04	.00	3035.53	.36	2.47	.02	3033.40
5200.0	67.7	940.7	4191.6	27.3	113.8	1119.6	427.3	305.9	3035.10
.64	2.48	8.14	3.74	.065	.032	.040	.000	3030.60	104.88
.006372	470.	470.	480.	2	14	0	.00	1057.66	1297.24

*SECNO 27.000

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

27.000	3.40	3039.80	3039.80	.00	3040.28	.43	4.68	.03	3040.80
5200.0	203.0	1651.2	3345.8	61.1	208.2	940.7	445.0	320.6	3041.10
.88	3.33	8.05	3.56	.052	.031	.044	.000	3036.40	242.79
.009349	675.	670.	590.	0	13	0	.00	1086.43	1373.40

1490 NH CARD USED
*SECNO 28.000

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

28.000	3.53	3043.93	3043.93	.00	3044.46	.72	3.69	.06	3043.40
5200.0	335.9	3710.3	1156.7	122.9	470.1	338.3	455.3	329.7	3044.10
.90	2.73	7.79	3.43	.045	.032	.042	.000	3040.40	168.16
.007331	390.	450.	450.	0	8	0	.00	702.66	938.76

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 29.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

29.000	4.75	3049.75	3049.75	.00	3050.48	.73	4.99	.00	3046.90
5200.0	1698.6	2073.5	1427.9	462.4	211.6	354.5	470.2	339.5	3046.80
.92	3.67	9.80	4.03	.050	.035	.054	.000	3045.00	246.45
.008445	590.	640.	660.	0	11	0	.00	863.92	910.36

1490 NH CARD USED
*SECNO 30.000

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

30.000	5.49	3055.29	3055.29	.00	3055.96	.67	4.34	.00	3051.80
5200.0	1400.7	2124.4	1674.9	509.6	221.4	426.0	485.6	350.2	3052.20
.95	2.75	9.60	3.93	.050	.032	.042	.000	3049.80	189.78
.005926	560.	620.	675.	0	11	0	.00	879.21	1291.40

1490 NH CARD USED
*SECNO 31.000

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

31.000	5.41	3060.71	3060.71	.00	3061.38	.67	4.85	.05	3060.10
5200.0	384.1	2354.1	2461.8	123.4	236.0	509.5	501.5	361.8	3058.70
.98	3.06	9.69	4.33	.047	.032	.044	.000	3055.30	368.00
.007504	681.	680.	690.	0	5	0	.00	894.29	1159.84

*SECNO 32.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

32.000	4.38	3067.78	3067.78	.00	3068.34	.56	5.73	.03	3067.00
5200.0	192.1	2701.0	2306.3	71.3	191.1	436.6	526.7	375.4	3066.10
1.02	2.70	7.97	2.52	.060	.036	.057	.000	3063.30	436.00
.007151	835.	835.	721.	0	14	0	.00	907.07	1448.13

SECNO	DEPTH	CWSEL	CRIWS	WTSLK	EG	FV	AL	QLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	ANL	ANCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 33.000

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

33.000	6.86	3076.06	3076.06	.00	3076.76	.72	5.67	.05	3071.50
5200.0	1321.8	2140.9	1737.3	357.9	215.3	680.7	543.7	392.2	3073.90
1.06	3.69	9.94	2.55	.065	.036	.057	.000	3069.20	274.97
.006971	850.	850.	730.	0	14	0	.00	956.05	1320.47

1490 NH CARD USED
*SECNO 34.000

3265 DIVIDED FLOW

34.000	4.79	3082.19	3081.91	.00	3082.60	.41	5.79	.03	3077.30
5200.0	1200.9	1180.8	2818.3	224.5	146.1	925.1	566.2	407.6	3082.30
1.11	5.35	8.05	3.05	.042	.036	.056	.000	3077.40	131.44
.007392	890.	890.	700.	3	17	0	.00	864.66	1417.28

*SECNO 35.000

3265 DIVIDED FLOW

35.000	4.16	3087.56	3087.38	.00	3088.03	.47	5.41	.02	3087.40
5200.0	3546.9	1653.1	.0	967.9	204.0	.1	565.7	419.7	3088.00
1.15	3.66	8.10	.15	.032	.032	.057	.000	3083.40	84.08
.007994	750.	750.	580.	3	10	0	.00	702.37	884.53

1490 NH CARD USED
*SECNO 36.000

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

36.000	4.87	3092.37	3092.37	.00	3093.10	.74	4.05	.08	3091.20
5200.0	2714.1	2467.6	18.2	844.2	262.0	8.6	600.2	429.5	3090.60
1.17	3.22	9.42	2.36	.034	.032	.034	.000	3087.50	179.36
.006608	550.	570.	600.	3	11	.	.00	841.06	1027.91

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTR	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

1490 NH CARD USED
*SECNO 37.000

3265 DIVIDED FLOW

37.000	4.05	3097.85	3097.84	.00	3098.50	.65	5.59	.01	3097.10
5200.0	3908.7	1291.3	.0	797.9	131.5	.0	814.8	440.4	3100.60
1.20	4.90	9.82	.00	.046	.035	.000	.000	3093.80	3095.38
.011931	620.	620.	620.	2	12	0	.00	681.36	1124.16

```
T1      UPPER CANADA DEL ORO FLOOD INSURANCE STUDY
T2      CATALINA STATE PARK BOUNDARY TO PINAL COUNTY LINE
T3      CANADA DEL ORO
T4      CONSULTANT:  DAVID EVANS & ASSOCIATES, INC      DEA JOB NO. PCDT0010
T5                   3845 N. BUSINESS CENTER DRIVE      PHONE: (602) 292-2160
T6                   TUCSON, AZ 85705                   FAX: (602) 292-9131
T6      DAVID EVANS & ASSOCIATES PROJECT MANAGER:  MATT FLICK
T7      CLIENT: PIMA COUNTY DEPT. OF TRANS. & FLOOD CONTROL DISTRICT
T8              201 N. STONE AVENUE                    ACTIVITY # 4FUCDO
T9              TUCSON, AZ 85701                       PHONE: (602) 740-6350
T9      PIMA COUNTY FLOOD CONTROL DISTRICT PROJECT MANAGER:  STEVE CASILLAS
T9*************************************************************************
T9*****  50-YEAR ANALYSIS  - Q50=12800 CFS  - STARTING WSE = 2683          **
T9*************************************************************************
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J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
	0	3	0	0	0.008	0	0	0	2683.0	0

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	2	0	-1	0	0	0	-1	0	0	0

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	QLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IOC	ICONT	CORAR	TOPWID	ENDST

*PROF 2

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

CCHV= .100 CEHV= .300
1490 NH CARD USED
*SECNO 1.000

3265 DIVIDED FLOW

1.000	5.12	2883.32	2882.74	2563.00	2866.57	.57	.00	.00	2860.80
12800.0	9031.7	3599.6	168.7	1915.0	420.1	68.6	.0	.0	2881.10
.00	4.72	6.57	2.57	.047	.032	.070	.000	2877.90	23.14
.008087	0.	0.	0.	0	10	3	.00	1282.87	1360.43

CCHV= .100 CEHV= .300
*SECNO 2.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

2.000	5.21	2883.21	2883.21	.00	2870.17	.54	5.56	.12	2867.50
12800.0	7635.7	4347.5	816.9	1503.6	377.3	180.3	20.4	16.3	2887.40
.02	5.21	11.52	3.37	.050	.030	.070	.000	2884.00	12.33
.011121	600.	570.	560.	0	6	3	.00	1096.61	1108.94

*SECNO 3.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3.000	4.86	2897.18	2897.18	.00	2890.06	.86	6.86	.01	2893.30
12800.0	6315.4	3523.9	2956.7	1324.9	392.6	506.3	62.4	31.7	2898.70
.05	4.77	11.65	5.91	.050	.032	.044	.000	2892.30	56.95
.009512	850.	685.	700.	0	10	0	.00	735.42	992.37

*SECNO 4.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

4.000	5.17	2903.67	2903.67	.00	2896.72	1.05	8.19	.05	2898.50
12800.0	1528.2	5466.1	5765.7	5476.9	495.3	1663.1	106.1	51.4	2903.00
.06	3.63	11.08	5.44	.050	.032	.044	.000	2900.50	102.86
.008173	975.	935.	885.	0	8	0	.00	897.96	1053.61

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WIN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 4.500
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

4.500	5.63	2909.23	2909.23	.00	2913.28	1.01	2.80	.00	2907.60
12800.0	2158.5	5290.8	5350.7	393.2	475.7	1152.6	121.7	56.6	2903.20
.10	5.49	11.12	4.64	.050	.032	.046	.000	2903.60	12.07
.007998	350.	375.	325.	0	8	0	.00	962.02	974.09

1490 NH CARD USED
*SECNO 5.000

5.000	5.01	2912.31	2911.83	.00	2912.91	.60	2.62	.04	2912.30
12800.0	.0	2884.2	9915.8	.0	298.2	2065.4	136.6	66.0	2910.50
.11	.00	9.67	4.80	.000	.032	.052	.000	2907.30	101.32
.007324	350.	375.	325.	1	15	0	.00	981.86	1083.20

1490 NH CARD USED
*SECNO 6.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

6.000	5.28	2919.08	2919.08	.00	2920.03	.95	5.92	.10	2916.00
12800.0	12.3	2850.9	9936.8	5.4	227.0	1714.0	178.8	82.2	2918.30
.14	2.29	12.53	5.60	.070	.032	.044	.000	2913.60	24.51
.009577	730.	710.	710.	0	5	5	.00	1005.02	1033.83

1490 NH CARD USED
*SECNO 7.000

7.000	5.11	2923.61	2923.52	.00	2926.40	.79	6.36	.02	2923.30
12800.0	.0	3096.6	9703.4	.0	288.0	1784.6	226.5	98.0	2923.00
.17	.00	10.75	5.50	.000	.032	.043	.000	2920.80	22.89
.006092	810.	800.	790.	3	10	3	.00	1036.77	1059.66

*SECNO 8.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

8.000	5.30	2931.30	2931.30	.00	2933.68	1.06	7.07	.08	2930.00
12800.0	.0	3278.4	9521.6	.0	308.0	1902.4	249.2	114.1	2930.20
.19	.00	9.27	5.01	.000	.032	.042	.000	2926.80	22.26
.005313	750.	740.	730.	1	5	5	.00	981.24	1012.32

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	XL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XML	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 9.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

9.000	4.61	2936.61	2936.61	.00	2937.63	.82	3.90	.02	2934.90
12800.0	104.0	7548.9	5147.1	34.0	672.1	1117.2	257.3	128.4	2936.10
.22	3.06	8.66	4.61	.048	.032	.041	.000	2932.20	57.22
.008147	640.	610.	575.	0	10	0	.00	1152.10	1209.33

1490 NH CARD USED
*SECNO 10.000

10.000	4.13	2942.73	2942.44	.00	2944.36	.65	3.74	.02	2947.50
12800.0	.0	3250.6	9549.4	.0	395.8	1650.1	297.2	144.1	2942.10
.25	.00	8.21	5.79	.000	.032	.042	.000	2936.00	47.43
.009823	620.	660.	630.	3	12	0	.00	1000.92	1046.35

1490 NH CARD USED
*SECNO 11.000

11.000	4.20	2947.20	2947.24	.00	2948.10	.84	4.16	.03	2949.30
12800.0	.0	3574.1	9226.9	.0	320.4	1738.6	320.5	158.4	2945.40
.27	.00	11.15	5.25	.000	.032	.044	.000	2940.10	53.39
.009477	450.	450.	500.	2	5	0	.00	991.27	1044.66

CCHV= .300 CEHV= .500
1490 NH CARD USED
*SECNO 12.000

12.000	5.07	2953.37	2953.13	.00	2954.07	.70	5.76	.04	2952.00
12800.0	1562.9	2391.9	8625.1	294.4	223.3	1626.7	352.1	170.2	2951.50
.29	5.29	10.71	5.43	.040	.032	.043	.000	2948.30	72.76
.008668	650.	655.	650.	3	11	0	.00	985.74	1058.51

*SECNO 13.000

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS= 50.0 760.0 THICK= 1 TAPOUT= 910.000

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	FR	HL	QLOSS	CRIWSM ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	AMCHAN ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

3495 OVERBANK AREA ASSUMED NON-EFFECTIVE, ELLEA= 2960.00 ELREA= 2956.20

13.000	4.95	2959.75	2959.75	2958.58	2961.03	1.26	0.12	.29	2960.30
12600.0	.0	3460.5	9339.5	.0	272.9	1279.6	379.0	161.2	2956.20
.31	.00	12.66	7.30	.000	.032	.042	.000	2954.80	220.76
.010807	630.	650.	630.	0	10	0	.00	536.24	750.00

*SECNO 14.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

14.000	6.11	2964.51	2964.51	2962.85	2966.05	1.55	4.50	.14	2959.50
12800.0	1499.0	7582.9	3718.1	268.3	619.5	739.5	398.3	187.5	2960.00
.33	5.59	12.24	5.03	.055	.032	.045	.000	2958.40	88.97
.006856	500.	520.	540.	0	11	0	.00	490.43	579.40

*SECNO 14.300
BTCARD, BRIDGE STENCL= 110.00 STENCR= 590.00
3840 SECTION NOT HIGH ENOUGH241460.700 3031.800 2959.300100000.000 2953.389 1

3370 NORMAL BRIDGE, NRD= 10 MIN ELTRD= 2974.83 MAX ELLC= 2981.43

3470 ENCROACHMENT STATIONS= 110.0 590.0 TYPE= 1 TARGET= 480.000

14.300	6.24	2965.54	2964.93	2963.77	2966.63	1.09	.44	.14	2962.00
12800.0	12.8	10338.2	2448.9	6.3	1134.4	611.4	401.6	186.4	2962.00
.33	2.05	9.11	4.01	.055	.032	.045	.000	2959.30	124.46
.004248	70.	80.	90.	5	15	0	.00	461.83	550.29

*SECNO 14.600
BTCARD, BRIDGE STENCL= 110.00 STENCR= 590.00
3840 SECTION NOT HIGH ENOUGH160969.200 3031.800 2959.300100000.000 2963.484 1

3370 NORMAL BRIDGE, NRD= 10 MIN ELTRD= 2974.83 MAX ELLC= 2981.43

3470 ENCROACHMENT STATIONS= 110.0 590.0 TYPE= 1 TARGET= 480.000

14.600	6.76	2966.06	2964.56	2964.12	2966.09	1.01	.43	.06	2962.00
12800.0	15.3	10017.6	2767.1	6.3	1241.3	736.2	406.6	169.0	2962.00
.34	1.85	8.32	3.75	.055	.032	.045	.000	2959.30	123.96
.002899	53.	63.	84.	2	15	0	.00	462.77	548.72

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	ZNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IBC	ICONT	CORAR	TOPWID	ENDST

*SECNO 15.000

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

15.000	5.72	2966.42	2966.42	2964.69	2967.92	1.50	.55	.03	2961.60
12800.0	2155.6	6177.1	4467.0	366.1	463.7	783.2	406.9	176.3	2961.50
.34	5.89	12.77	5.81	.055	.032	.045	.000	2960.70	137.72
.007962	121.	121.	121.	0	15	0	.00	516.38	654.10

*SECNO 16.000

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

16.000	6.46	2971.56	2971.56	2970.41	2972.57	.81	3.01	.15	2965.10
12800.0	3892.5	4594.8	4012.6	744.8	842.6	1013.6	438.8	196.7	2965.10
.36	5.23	11.72	4.25	.042	.032	.048	.000	2965.10	36.66
.006425	550.	560.	490.	3	6	0	.00	667.46	770.32

CCHV= .100 CEHV= .300
*SECNO 17.000

17.000	5.93	2974.43	2974.30	2973.21	2975.27	.64	2.69	.01	2970.50
12800.0	6257.9	4349.0	193.1	1528.0	425.8	66.0	449.4	205.9	2973.80
.38	5.40	10.21	2.81	.042	.032	.044	.000	2968.30	58.93
.007220	334.	490.	369.	2	10	0	.00	661.77	920.71

1490 NH CARD USED
*SECNO 18.000

18.000	5.10	2980.30	2980.20	2979.32	2981.20	.90	5.92	.02	2979.20
12800.0	10449.5	2282.4	68.1	1568.2	201.9	21.3	460.1	219.8	2978.60
.40	6.58	11.31	3.20	.038	.032	.044	.000	2975.20	115.66
.009896	680.	770.	770.	2	9	0	.00	685.53	1001.03

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HF	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 19.000

19.000	5.06	2985.26	2984.91	2984.01	2986.01	.76	4.80	.01	2982.70
12800.0	9510.8	3170.9	118.2	1631.1	326.0	38.4	307.1	27.6	2988.40
.43	5.83	9.73	3.25	.030	.032	.038	.000	2980.20	25.59
.006253	620.	610.	600.	3	13	0	.00	600.53	626.13

1490 NH CARD USED
*SECNO 20.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

20.000	5.81	2991.51	2991.51	2990.84	2992.36	1.05	5.81	.03	2986.00
12800.0	4409.0	2562.3	5834.7	778.5	193.6	639.3	536.9	240.2	2988.00
.45	5.66	13.23	6.95	.042	.032	.041	.000	2980.70	52.39
.010534	720.	730.	745.	0	11	0	.00	650.74	681.14

1490 NH CARD USED
*SECNO 21.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

21.000	8.27	3000.67	3000.67	2999.31	3001.90	1.24	8.77	.05	2996.00
12800.0	5498.5	4169.5	3135.0	609.4	324.0	637.5	561.8	262.8	2998.00
.49	6.79	12.87	4.32	.040	.032	.040	.000	2992.40	102.67
.006823	1080.	1060.	1000.	0	14	0	.00	667.97	770.64

*SECNO 22.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

22.000	8.15	3007.05	3007.05	3005.67	3008.09	1.04	8.53	.02	3004.50
12800.0	539.1	5221.8	7039.1	164.3	452.5	1470.1	626.7	287.6	3000.50
.53	3.28	11.54	4.72	.045	.032	.041	.000	2998.90	56.50
.004468	1020.	1020.	1000.	0	6	0	.00	799.08	865.56

*SECNO 22.500
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

22.500	6.68	3009.98	3009.70	3008.36	3010.83	.87	6.47	.02	3004.00
12800.0	.0	3683.9	9116.1	.0	800.	1684.1	648.0	288.0	3008.50
.54	.00	11.49	5.32	.000	.032	.041	.000	3000.00	20.13
.006986	490.	490.	485.	0	14	0	.00	0.0	0.0

SECNO	DEPTH	CWSEL	CRIWS	WSELK			HL	SLOPC	E.GRNN ELEV
Q	QLOB	QCh	QROB	ALOB	ACH	ARCE		IWR	R.GRNN ELEV
TIME	VLOB	VCH	VROB	XNL		XNH	WTH	ELMIN	SGTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 23.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

23.000	6.58	3013.58	3013.58	3012.5o	3014.70	1.12	3.30	.07	3011.40
12800.0	790.6	5880.2	6129.2	212.0	518.0	1232.4	668.6	297.5	3012.30
.56	3.73	11.35	4.97	.065	.032	.043	.000	3007.00	78.69
.007666	490.	490.	423.	0	5	0	.00	837.91	916.61

1490 NH CARD USED
*SECNO 24.000

24.000	6.22	3022.12	3022.03	3020.96	3023.02	.89	6.30	.02	3020.30
12800.0	4188.0	2265.2	6326.8	836.7	19.4	1054.0	711.7	316.8	3015.70
.60	6.58	11.81	6.09	.038	.035	.043	.000	3015.90	[illegible]
.009419	975.	960.	960.	2	10	0	.00	739.42	881.13

*SECNO 24.100

24.100	6.08	3026.58	3026.22	3025.34	[illegible]	[illegible]	4.17	.03	[illegible]
12800.0	800.5	2005.8	9993.7	194.7	193.4	16[illegible]	73[illegible]	[illegible]	3025.20
.62	4.11	10.11	5.50	.030	.033	.040	.000	3026.69	206.10
.006406	550.	540.	540.	3	10	0	.00	88.71	1094.84

*SECNO 25.000

25.000	6.91	3030.21	3030.02	3029.19	3030.93	.72	3.70	.03	3026.20
12800.0	972.5	1831.3	9996.2	252.3	196.1	1717.8	764.1	336.6	3027.60
.64	3.85	11.52	5.82	.030	.035	.042	.000	3029.10	113.43
.003541	510.	510.	500.	0	6	0	.00	958.39	1050.82

1490 NH CARD USED
*SECNO 25.100
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

25.100	7.09	3033.39	3033.39	3032.53	3034.15	.76	3.08	.01	3030.00
12800.0	1236.6	3402.0	8161.4	351.0	306.1	1710.8	763.7	347.1	3027.00
.66	3.52	11.19	4.77	.050	.035	.039	.000	3026.30	98.76
.006382	380.	400.	430.	0	5	0	.00	1169.83	1266.59

1490 NH CARD USED

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	AV	AL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IBC	ICONT	CORAR	TOPWID	ENDST

*SECNO 26.000

26.000	5.78	3036.38	3036.84	3035.17	3036.76	.40	[illegible]	.04	3033.40
12800.0	149.3	1343.6	11307.2	50.9	156.3	2467.5	611.3	380.3	3036.10
.69	2.94	8.56	4.55	.065	.032	.039	.000	3026.00	101.83
.004688	470.	470.	480.	2	13	0	.00	1231.96	1335.81

*SECNO 27.000

3265 DIVIDED FLOW

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .00

27.000	4.14	3040.54	3040.51	3039.80	3041.31	.76	4.42	.11	3040.80
12800.0	533.0	2655.6	9411.4	115.3	271.7	1695.1	844.2	376.6	3041.10
.71	4.60	10.50	5.69	.055	.032	.044	.000	3030.40	216.66
.012886	675.	670.	590.	2	13	0	.00	1151.76	1380.27

1490 NH CARD USED
*SECNO 28.000

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

28.000	4.75	3045.15	3045.15	3043.93	3046.16	1.03	4.32	.08	3043.40
12800.0	1846.8	6936.7	4016.5	414.0	666.9	776.5	864.1	326.8	3044.10
.73	4.45	10.10	5.17	.048	.032	.042	.000	3040.40	163.16
.007562	390.	450.	450.	0	8	0	.00	256.62	1031.74

*SECNO 29.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

29.000	5.94	3050.94	3050.94	3049.79	3052.08	1.42	5.06	.12	3046.90
12800.0	5532.1	3604.3	3663.6	999.3	271.2	1025.4	857.3	336.3	3049.60
.75	5.53	13.14	5.90	.050	.035	.054	.000	3035.00	184.16
.010755	590.	640.	660.	2	11	0	.00	771.08	935.22

SECNO	DEPTH	CWSEL	CRIWS	WSLLR	EG	WV	HL	OLOSS	L BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VCH	TWA	R BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ZLMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

1490 NH CARD USED
*SECNO 30.000

3265 DIVIDED FLOW

30.000	6.64	3056.44	3056.40	3055.29	3057.28	.83	5.20	.03	3051.80
12800.0	4631.7	3359.2	4809.1	1061.6	277.3	975.6	921.0	411.9	3052.20
.78	4.28	12.03	4.93	.050	.032	.043	.000	3049.80	171.02
.006833	560.	620.	675.	3	8	0	.00	1144.80	1369.86

1490 NH CARD USED
*SECNO 31.000

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

31.000	6.82	3062.12	3062.12	3060.71	3063.14	1.02	4.54	.06	3060.19
12800.0	2186.9	3968.8	6644.3	519.7	324.0	1292.3	936.4	469.3	3060.72
.80	4.21	12.25	5.57	.047	.032	.045	.000	3058.20	307.23
.007633	681.	680.	690.	0	2	0	.00	1066.20	1300.15

*SECNO 32.000

32.000	5.41	3066.61	3066.77	3067.78	.069.83	.04	3.43	.02	3067.00
12800.0	576.1	4740.4	7483.5	146.4	439.1	1769.2	993.6	447.2	3066.70
.84	3.88	10.80	4.23	.060	.036	.057	.000	3063.40	426.08
.009305	835.	835.	721.	2	14	0	.00	1021.97	1456.03

*SECNO 33.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

33.000	7.39	3077.19	3077.19	3078.08	3076.11	.91	4.16	.02	3071.53
12800.0	2832.1	3424.1	6543.8	570.3	284.2	1054.5	1035.7	481.5	3078.30
.87	4.97	12.96	4.98	.065	.038	.057	.000	3069.40	222.36
.009020	850.	850.	730.	6	16	0	.00	1091.25	1328.93

1490 NH CARD USED
*SECNO 34.000

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	AV	AL	CLOSS	L-BANK ELEV
Q	GLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	ANL	ANCH	ANR	WTP	ELMIN	SETA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

3265 DIVIDED FLOW

34.000	6.15	3083.56	3083.07	3082.19	3084.01	.46	5.86	.06	3079.30
12800.0	2413.0	1692.8	8494.2	394.3	205.5	2212.0	1081.0	485.5	3082.36
.91	6.14	5.30	3.64	.044	.030	.056	.000	3077.40	1.30
.006375	890.	890.	700.	4	14	0	.00	1280.37	1434.34

*SECNO 35.000

35.000	5.26	3088.66	3088.43	3087.56	3089.01	.63	7.15	.11	3087.40
12800.0	9281.4	3206.0	312.6	1674.5	286.2	1361.1	1116.6	502.3	3088.00
.94	5.54	11.12	1.98	.052	.032	.057	.000	3083.40	71.91
.009747	750.	750.	560.	3	15	1	.00	987.60	1054.81

1490 NH CARD USED
*SECNO 36.000

36.000	6.04	3093.54	3093.32	3092.37	3094.36	1.11	7.99	.06	3091.20
12800.0	8413.0	4235.2	151.8	1648.7	338.3	4613.4	1448.6	518.0	3090.00
.96	4.55	12.51	3.07	.054	.032	.064	.000	3087.50	69.82
.008284	550.	570.	600.	2	11	0	.00	988.42	1057.24

1490 NH CARD USED
*SECNO 37.000

37.000	5.54	3099.34	3098.95	3097.85	3100.06	.69	5.44	.03	3097.10
12800.0	10709.3	2090.7	.0	1920.3	179.8	.0	1177.6	529.2	3100.00
.99	5.56	10.68	.00	.030	.030	.000	.000	3093.80	129.59
.009298	620.	620.	620.	2	12	0	.00	998.07	1127.66

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T1      UPPER CANADA DEL ORO FLOOD INSURANCE STUDY
T2      CATALINA STATE PARK BOUNDARY TO FINAL COUNTY LINE
T3      CANADA DEL ORO
T4      CONSULTANT:  DAVID EVANS & ASSOCIATES, INC      DEA JOB NO. PCDT0010
T5                   3845 N. BUSINESS CENTER DRIVE      PHONE: (602) 292-2160
T6                   TUCSON, AZ 85705                   FAX: (602) 292-2131
T6      DAVID EVANS & ASSOCIATES PROJECT MANAGER:  MATT FLICK
T7      CLIENT: PIMA COUNTY DEPT. OF TRANS. & FLOOD CONTROL DISTRICT
T8              201 N. STONE AVENUE                    ACTIVITY # 4FUCD0
T9              TUCSON, AZ 85701                       PHONE: (602) 740-6350
T9      PIMA COUNTY FLOOD CONTROL DISTRICT PROJECT MANAGER:  STEVE CASILLAS
T9*************************************************************************
T9***** 100-YEAR ANALYSIS  - Q100=17500 CFS  - STARTING WSE = 2883.5        **
T9*************************************************************************

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

       0        4         0         0     0.008         0         0         0    2883.5         0

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

       3        0        -1         0         0         0        -1         0         0         0
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SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	[illegible]	[illegible]	QLOB	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	HCH	AFLC	VCL	Tw	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTH	ELMIN	S.TE
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*PROF 3

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

CCHV= .100 CEHV= .300
1490 NH CARD USED
*SECNO 1.000

1.000	5.60	2883.50	2883.12	2883.50	2884.16	.38	.00	.00	2880.60
17500.0	12667.2	4574.3	258.4	2456.4	486.3	66.3	.6	.6	2881.10
.00	5.15	9.36	2.81	.049	.033	.071	.000	2877.90	14.00
.007895	0.	0.	0.	0	11	0	.00	1045.00	1060.00

CCHV= .100 CEHV= .300
*SECNO 2.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

2.000	5.70	2889.70	2889.76	.06	2890.00	1.01	5.44	.13	2887.50
17500.0	11160.9	5427.0	912.1	1937.3	43.3	236.4	58.6	1.1	2887.40
.02	5.76	12.51	8.03	.050	.030	.072	.000	2884.00	14.00
.010873	600.	570.	580.	0	0	0	.00	1250.20	1110.00

*SECNO 3.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3.000	5.34	2897.64	2897.64	.00	2898.70	1.06	7.01	.00	2895.30
17500.0	9068.4	4330.8	4100.8	1618.7	333.6	604.3	77.6	32.3	2896.70
.05	5.62	12.91	6.79	.050	.032	.044	.000	2892.30	15.83
.010166	650.	665.	700.	0	10	0	.00	945.44	1090.99

*SECNO 4.000

4.000	5.68	2906.16	2906.17	.00	2907.41	1.25	6.66	.05	2903.90
17500.0	2482.9	6756.6	8258.5	548.8	553.7	1320.5	131.1	62.5	2903.30
.06	4.53	12.21	6.25	.050	.032	.044	.000	2900.50	141.46
.006554	975.	980.	985.	5	8	2	.00	918.11	1090.91

*SECNO 4.500
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

4.500	6.12	2909.72	2909.72	.00	2910.96	1.24	7.01	.06	2906.20
17500.0	2910.4	6830.3	8059.3	611.1	621.1	1429.1	131.0	69.0	2906.20
.09	4.74	12.37	6.40	.050	.032	.044	.000	2903.60	141.46
.008613	1000.	975.	985.	5	9	2	.00	918.11	1090.91

SECNO	DEPTH	CWSEL	CRIWS	ASUM	EG	HV	HL	ALOSS	L CHAN ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	SUMQ	VOL	TWA	R CHAN ELEV
TIME	VLOB	VCH	VROB	ANL	ACUM	AXR	WTN	ELMIN	DSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	ISS	ICONT	CONAR	TOPWID	EINCT

1490 NH CARD USED
*SECNO 5.000

3301 HV CHANGED MORE THAN HTOL

5.000	5.62	2912.92	2912.92	.00	2913.00	.00	2.64	.03	2912.80
17500.0	.0	3341.7	13980.3	.0	34[illegible]	2[illegible]	171.3	[illegible]	2920.30
.10	.02	10.22	5.33	.000	.002	.001	.000	2907.00	98.75
.006978	350.	375.	325.	2	12	0	.00	982.55	1081.00

1490 NH CARD USED
*SECNO 6.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

6.000	5.72	2919.52	2919.52	.00	2920.04	[illegible]	3.54	.10	2916.60
17500.0	18.2	3427.0	14054.8	7.0	249.2	1140.[illegible]	218.2	19.[illegible]	2916.50
.13	2.53	13.75	5.57	.070	.036	[illegible]	.000	2918.59	[illegible]
.010210	730.	710.	710.	0	0	[illegible]	.00	1[illegible]	1044.45

1490 NH CARD USED
*SECNO 7.000

7.000	5.66	2926.16	2926.95	.00	2927.03	[illegible]	[illegible]	[illegible]	2[illegible]
17500.0	.1	3716.6	13783.[illegible]	.1	216.9	1[illegible]	185.[illegible]	[illegible]	2[illegible]
.16	.48	11.58	6.12	.070	.032	.04[illegible]	.000	2926.[illegible]	[illegible]
.007778	810.	800.	700.	0	10	[illegible]	.00	944.[illegible]	[illegible]

*SECNO 6.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

6.000	5.23	2932.16	2932.[illegible]	.07	2[illegible]	[illegible]	7.[illegible]	[illegible]	[illegible]
17500.0	.0	12060.7	5[illegible]	[illegible]	1[illegible]	1[illegible]	2[illegible]	[illegible]	[illegible]
.19	.00	10.[illegible]	[illegible]	.00[illegible]	.00[illegible]	.04[illegible]	.00[illegible]	2[illegible]	[illegible]
.005621	750.	740.	[illegible]	0	0	0	.00	1[illegible]	[illegible]

*SECNO 9.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

9.000	[illegible]	2937.24	2937.[illegible]	.0[illegible]	2[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
17500.[illegible]	.[illegible]	9[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.006361	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	QLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

1490 NH CARD USED
*SECNO 10.000

10.000	4.58	2943.18	2942.60	.00	2943.99	.81	5.77	.02	2947.50
17500.0	.0	4305.7	13194.3	.0	471.3	2035.1	369.5	146.8	2942.10
.23	.00	9.13	6.48	.000	.082	.042	.000	2938.60	45.66
.009757	620.	660.	630.	3	15	0	.00	1024.85	1070.52

1490 NH CARD USED
*SECNO 11.000

11.000	4.68	2947.78	2947.64	.00	2948.74	.96	4.70	.05	2949.30
17500.0	.0	4323.0	13177.0	.0	362.6	2200.5	346.1	156.3	2945.43
.25	.00	11.91	5.99	.000	.083	.046	.000	2940.10	63.20
.009529	450.	450.	500.	2	5	0	.00	1003.72	1066.93

CCHV= .300 CEHV= .500
1490 NH CARD USED
*SECNO 12.000

12.000	5.56	2953.06	2953.59	.00	2954.69	.83	.91	.04	2952.00
17500.0	2288.7	2697.4	12313.9	374.7	220.1	1998.8	406.3	170.1	2951.50
.27	6.03	11.56	6.17	.049	.082	.041	.000	2946.30	87.27
.008663	650.	655.	600.	3	6	0	.00	994.85	1082.12

*SECNO 13.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS= 50.0 760.0 TYPE= 1 TARGET= 10.000

13.000	5.53	2960.33	2960.33	2956.58	2961.07	1.20	5.75	.21	2960.50
17500.0	1579.4	3939.7	11960.9	256.1	309.7	1852.0	471.1	165.2	2956.20
.29	6.63	12.72	7.72	.054	.083	.042	.000	2954.80	99.53
.009505	630.	650.	630.	0	7	0	.00	660.07	760.00

*SECNO 14.000

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

14.000	6.83	2963.23	2963.23	2962.07	2967.39	1.61	5.86	.36	2959.50
17500.0	2069.2	9557.2	5873.6	227.4	691.0	939.2	496.0	172.1	2960.00
.31	6.32	13.68	6.12	.053	.091	.048	.000	2956.40	84.61
.007298	500.	520.	540.	0	11	0	.00	494.77	579.38

SECNO	DEPTH	CWSEL	CRIWS	WSELR	EG	HV	HL	QLOB	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTH	ELMIN	SSTM
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IBC	ICONT	CORAR	TOPWID	ENDST

*SECNO 14.300
BTCARD, BRIDGE STENCL= 110.00 STENCR= 590.00
3840 SECTION NOT HIGH ENOUGH241461.400 3031.800 2959.300[illegible]0000.000 2966.374 1

3370 NORMAL BRIDGE, NRD= 10 MIN ELTRD= 2974.83 MAX ELLC= 2981.43

3470 ENCROACHMENT STATIONS= 110.0 590.0 TYPE= 1 TARGET= 480.000

14.300	7.03	2966.33	2965.66	2963.27	2961.06	1.38	.47	.15	2962.50
17500.0	22.7	13507.4	3969.5	9.4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.31	2.42	10.35	4.76	.055	[illegible]	.045	.000	2959.00	[illegible]
.004548	70.	80.	90.	6	18	0	.00	463.27	580.94

*SECNO 14.600
BTCARD, BRIDGE STENCL= 110.00 STENCR= 590.00
3840 SECTION NOT HIGH ENOUGH160970.000 3031.800 2959.300[illegible]0000.000 2966.374 2

3370 NORMAL BRIDGE, NRD= 10 MIN ELTRD= 2974.83 MAX ELLC= 2981.43

3470 ENCROACHMENT STATIONS= 110.0 590.0 TYPE= 1 TARGET= 480.000

14.600	7.64	2966.94	2965.66	2964.12	2962.[illegible]	1.38	.52	.18	2962.50
17500.0	26.7	13122.3	4350.9	12.2	[illegible]	[illegible]	502.6	[illegible]	2962.00
.31	2.18	9.13	4.88	.055	.032	.045	.000	2959.00	123.06
.003104	53.	53.	53.	3	18	0	.00	464.39	587.45

*SECNO 15.000

3301 HV CHANGED MORE THAN HVINS

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, XRATIO = .62

15.000	6.47	2967.17	2967.13	2964.[illegible]	2968.[illegible]	1.7[illegible]	.[illegible]	.34	2981.50
17500.0	2960.1	7731.7	[illegible]800.2	[illegible]56.0	[illegible]	1606.7	[illegible]	[illegible]	2961.10
.31	0.51	14.02	6.74	.[illegible]	.[illegible]	.045	.000	[illegible]	128.34
.008075	121.	121.	121.	2	18	0	.00	628.56	834.10

*SECNO 16.000

SECNO	DEPTH	WSEL	CRIWS	WTELEV	VO	AV	AL	CWSEL	CHANL ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XBL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IOC	ICONT	CORAR	TOPWID	ENDST

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

16.000	6.90	2972.00	2972.00	2978.40	2978.25	1.25	4.16	.18	2969.80
17500.0	5524.4	5655.6	6322.0	876.1	420.7	1227.9	536.0	203.6	2967.70
.33	6.29	10.44	5.15	.042	.032	.048	.000	2965.10	34.21
.007681	550.	560.	490.	0	8	0	.00	901.58	978.16

CCHV= .100 CEHV= .300
*SECNO 17.000

17.000	6.61	2975.11	2974.81	2979.21	2976.00	.63	2.71	.64	2971.50
17500.0	11818.7	5240.7	440.6	1496.8	494.6	2110.6	387.9	210.9	2973.60
.35	5.92	10.59	3.56	.042	.032	.044	.000	2966.30	38.40
.006358	334.	490.	369.	2	10	1	.00	879.99	931.39

1490 NH CARD USED
*SECNO 18.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

18.000	5.55	2980.75	2980.55	2983.35	2981.00	1.11	3.66	.06	2979.20
17500.0	14369.3	2752.6	130.1	1350.3	228.1	3411.7	566.3	226.1	2978.60
.37	7.47	12.41	3.37	.036	.032	.044	.000	2975.20	111.42
.010306	660.	770.	770.	0	10	0	.00	845.79	1010.21

*SECNO 19.000

19.000	5.64	2985.64	2985.48	2984.61	2986.74	.90	4.06	.02	2982.70
17500.0	13360.6	3892.1	247.3	1.1.1.1	384.6	80.3	422.1	207.3	2983.40
.39	6.56	10.53	4.10	.036	.032	.038	.000	2980.20	20.13
.006204	620.	610.	600.	4	12	0	.00	814.24	854.42

1490 NH CARD USED
*SECNO 20.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

20.000	6.34	2992.04	2992.04	2990.34	2994.64	1.48	5.73	.09	2990.30
17500.0	6553.0	3021.5	924.6	1087.6	215.0	1530.1	444.9	230.9	2986.60
.42	6.30	14.06	7.77	.042	.032	.044	.000	2985.70	47.43
.010338	720.	730.	745.	2	6	0	.00	821.84	885.09

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	hV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VCL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

1490 NH CARD USED
*SECNO 21.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

21.000	8.83	3001.23	3001.23	2999.31	3000.69	1.46	.12	.06	2996.00
17500.0	7508.4	5019.0	4972.6	962.5	992.1	838.7	721.6	169.0	2998.00
.45	7.80	14.23	5.93	.040	.032	.040	.000	1982.40	36.49
.007454	1080.	1060.	1000.	3	14	0	.00	695.76	752.27

*SECNO 22.000

22.000	8.72	3007.62	3007.61	3005.69	3006.83	1.51	0.11	.01	3004.00
17500.0	923.3	6243.9	10330.8	196.1	409.2	1166.2	776.4	210.6	3000.00
.48	4.01	12.62	5.54	.048	.032	.041	.000	1936.80	62.00
.004998	1020.	1020.	1006.	2	6	0	.00	840.16	913.16

*SECNO 22.500

22.500	7.21	3010.51	3010.41	3008.58	3011.45	.94	2.69	.03	3024.00
17500.0	.0	4267.5	13232.5	.0	583.5	289.2	802.6	295.6	3006.90
.50	.00	12.07	5.78	.000	.032	.041	.000	3030.00	19.35
.006916	490.	490.	423.	1	14	0	.00	967.02	988.37

*SECNO 23.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

23.000	7.06	3014.06	3014.06	3012.56	3016.40	1.34	3.41	.12	3011.40
17500.0	1109.9	7251.5	9136.6	238.5	570.9	1640.7	827.7	304.6	3012.30
.51	4.35	12.70	5.92	.048	.032	.043	.000	3007.00	75.96
.008436	490.	490.	423.	0	5	0	.00	845.82	921.78

1490 NH CARD USED
*SECNO 24.000

24.000	6.89	3022.79	3022.52	3020.68	3023.36	.96	8.31	.04	3020.30
17500.0	6021.4	2677.3	8801.3	666.9	1.00	1184.1	881.4	328.8	3015.70
.55	6.83	12.23	6.21	.039	.032	.038	.000	3021.80	69.07
.008551	975.	980	969.	3	20	3	.00	690.81	838.10

*SECNO 24.100

24.100	6.58	3027.06	3026.87	3024.93	3027.73	.87	9.63	.03	3024.60
17500.0	1156.3	2096.8	13946.9	131.2	1.00	1.00	910.0	0.00	3015.60
.57	4.60	11.00	5.34	.039	.032	.038	.000	3026.00	58.04
.006693	990.	940.	941.	1	11	1	.00	682.93	809.11

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	AL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST
*SECNO 25.000									
25.000	7.46	3030.76	3030.38	3031.19	3031.57	.61	3.70	.01	3028.20
17500.0	1534.6	2101.4	13863.8	340.1	175.1	2137.7	943.7	344.7	3027.80
.59	4.47	12.00	6.49	.050	.035	.042	.000	3023.30	106.54
.008144	510.	510.	500.	2	8	0	.00	961.55	1068.09
1490 NH CARD USED									
*SECNO 25.100									
25.100	7.53	3033.83	3033.65	3032.53	3034.68	.65	3.10	.01	3030.00
17500.0	1840.3	3928.6	11731.1	446.9	326.0	2113.9	970.4	355.1	3029.00
.61	4.10	12.05	5.85	.050	.035	.039	.000	3026.30	68.61
.006734	360.	400.	430.	2	5	0	.00	1195.27	1264.08
1490 NH CARD USED									
*SECNO 26.000									
26.000	6.28	3036.68	3036.14	3035.17	3037.36	.46	2.64	.04	3033.40
17500.0	198.4	1590.4	15711.3	61.3	174.3	3091.7	1004.6	366.5	3035.10
.63	3.20	9.12	5.08	.045	.032	.036	.000	3030.60	100.54
.004616	470.	470.	460.	2	13	0	.00	1247.36	1346.10
*SECNO 27.000									
3265 DIVIDED FLOW									
3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .60									
27.000	4.55	3040.95	3040.90	3039.83	3041.63	.89	4.55	.12	3040.60
17500.0	782.9	3475.1	13242.0	180.6	312.4	2054.4	1044.9	385.3	3041.10
.66	4.88	11.12	6.45	.052	.032	.044	.000	3036.40	168.62
.012763	675.	670.	590.	1	14	0	.00	1134.29	1384.07
1490 NH CARD USED									
*SECNO 28.000									
3265 DIVIDED FLOW									
7185 MINIMUM SPECIFIC ENERGY									
3720 CRITICAL DEPTH ASSUMED									

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	AV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCF	XNA	WTN	ELMIN	ISTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST
28.000	5.23	3045.63	3045.63	3043.93	3046.08	1.25	4.46	.11	3040.40
17500.0	2869.8	8730.2	5900.0	838.8	770.3	991.4	1069.3	395.8	3044.10
.67	5.32	11.33	5.95	.043	.032	.042	.000	3040.40	152.63
.008176	390.	450.	450.	0	11	0	.00	892.00	1084.75

*SECNO 29.000

29.000	6.53	3051.53	3051.46	3049.75	3052.78	1.23	3.20	.00	3046.00
17500.0	8130.6	4336.1	5033.1	1196.9	815.7	784.9	1102.3	497.9	3046.80
.69	6.28	14.16	8.58	.054	.035	.034	.000	3045.60	148.64
.010818	590.	640.	660.	2	11	0	.00	800.64	944.20

1490 NH CARD USED
*SECNO 30.000

3265 DIVIDED FLOW

30.000	7.24	3057.04	3056.78	3055.29	3057.88	.81	3.06	.04	3051.80
17500.0	6637.0	3876.2	4992.8	1308.0	908.3	1032.3	1140.6	421.9	3052.20
.72	4.80	12.53	7.73	.086	.052	.044	.000	3045.60	161.44
.006487	560.	620.	670.	3	1	0	.00	1280.04	1331.55

1490 NH CARD USED
*SECNO 31.000

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

31.000	7.40	3062.70	3062.70	3060.71	3063.78	1.05	4.18	.06	3056.10
17500.0	3469.1	4082.4	9948.5	718.2	352.4	1036.4	1188.0	440.2	3058.70
.74	4.83	13.03	5.65	.047	.032	.040	.000	3055.30	293.20
.007520	661.	680.	730.	0	5	0	.00	1148.36	1525.45

*SECNO 32.000

32.000	5.92	3066.32	3066.18	3064.49	3070.26	.78	5.51	.01	3057.00
17500.0	867.0	5773.0	10860.0	131.0	451.4	2252.6	1204.0	456.1	3066.70
.77	4.39	11.60	4.93	.000	.036	.054	.000	3060.40	427.51
.009609	835.	835.	925.	1	14	0	.00	1230.03	1450.54

SECNO	DEPTH	CWSEL	CRIWS	wSELK	EG	.X	AL	QLOSS	L-BANK ELEV
Q	QLOB	QCh	QROB	ALOB	AC..	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNC	XNR	WTA	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IBC	ICONT	CORAR	TOPWID	ENDST

*SECNO 33.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

33.000	8.41	3077.61	3077.61	3076.06	3078.71	1.10	5.24	.04	3071.20
17500.0	3736.6	4134.1	9.24.1	659.2	202.3	1957.9	1234.7	477.6	3073.41
.60	5.67	14.64	4.52	.065	.036	.067	.000	3069.20	22.66
.010539	850.	850.	720.	0	14	0	.00	1102.21	1352.07

1490 NH CARD USED
*SECNO 34.000

3301 HV CHANGED MORE THAN HVINS

34.000	6.79	3084.19	3083.36	3082.17	3084.67	.48	5.90	.06	3079.30
17500.0	3046.2	2227.5	12224.3	479.4	232..	2948..	1341.0	498.2	3082.30
.84	6.36	9.65	4.15	.044	.03.	.056	.000	3077.40	113.54
.005807	890.	890.	700.	1	11	0	.00	1103.21	1446.79

*SECNO 35.000

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

35.000	5.73	3089.13	3088.96	3087.36	3090.17	1.05	6.36	.17	3087.40
17500.0	12610.3	4068.7	822.0	199.4	321.8	302.8	1386.4	516.9	3088.86
.87	6.44	12.85	2.72	.052	.03.	.067	.000	3083.40	67.11
.010897	750.	750.	563.	1	13	0	.00	1064.63	1385.63

1490 NH CARD USED
*SECNO 36.000

36.000	6.70	3094.20	3094.01	3092.87	3095.11	1.00	6.05	.00	3091.20
17500.0	12208.5	4971.7	1.0.5	1435.1	301..	70.9	1423.3	824.2	30 9.80
.89	5.03	11.94	3.61	.104	.062	.014	.000	3087.80	18.46
.007674	550.	670.	510.	1	11	0	.00	1118.41	1511.61

1490 NH CARD USED

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	SLOPI	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTH	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IBC	ICONT	CORAR	TOPWID	ENDST

*SECNO 37.000

37.000	6.05	3099.65	3099.45	3097.65	3100.07	.62	5.43	.02	3097.10
17500.0	14926.6	2571.4	.0	2497.9	216.4	.0	1462.6	544.0	3100.60
.91	6.20	11.75	.00	.051	.035	.000	.000	3093.60	116.91
.010071	620.	620.	620.	2	1	0	.00	100-.34	1120.85

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T1      UPPER CANADA DEL ORO FLOOD INSURANCE STUDY
T2      CATALINA STATE PARK BOUNDARY TO PINAL COUNTY LINE
T3      CANADA DEL ORO
T4      CONSULTANT:  DAVID EVANS & ASSOCIATES, INC      DEA JOB NO. PC0T0C.0
T5                   3845 N. BUSINESS CENTER DRIVE      PHONE: (602) 293-2150
T6                   TUCSON, AZ 85705                   FAX: (602) 293-2199
T6      DAVID EVANS & ASSOCIATES PROJECT MANAGER:  MATT FLICK
T7      CLIENT: PIMA COUNTY DEPT. OF TRANS. & FLOOD CONTROL DISTRICT
T8              201 N. STONE AVENUE                    ACTIVITY # 4P0000
T9              TUCSON, AZ 85701                       PHONE: (602) 740-6330
T9      PIMA COUNTY FLOOD CONTROL DISTRICT PROJECT MANAGER:  STEVE CASILLAS
T9*************************************************************************
T9***** 500-YEAR ANALYSIS  - Q500=25000 CFS  - STARTING W.S = 2804.4        **
T9*************************************************************************

J1  ICHECK    INQ       NINC      IDIR      STRT      METRIC    HVINC     Q         WSEL      FQ
       0         5         0         0     0.008         0         0         0    2804.4         0

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLOC     ICW       CHNIM     ITRACE
      15         0        -1         0         0         0        -1         0         0         0
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SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	AV	KL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*PROF 4

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS

CCHV= .100 CEHV= .300
1490 NM CARD USED
*SECNO 1.000

1.000	6.50	2884.40	2883.98	2884.40	2885.3	.99	.00	.00	2880.60
29000.0	21679.4	6828.8	493.8	3494.0	617.6	189.4	.2	.6	2861.10
.00	6.20	11.06	3.54	.048	.032	.070	.000	2877.90	2.88
.008073	0.	0.	0.	0	5	0	.00	1360.61	1373.44

CCHV= .100 CEHV= .300
*SECNO 2.000

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

2.000	6.59	2891.59	2891.59	.00	2892.06	1.49	1.07	.02	2885.70
29000.0	19374.0	7761.7	1864.3	3721.0	5008.8	347.4	80.8	18.5	2881.40
.02	7.12	14.66	4.19	.056	.031	.070	.000	2884.01	6.05
.011584	600.	370.	600.	0	5	0	.00	1122.13	1122.17

*SECNO 3.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3.000	6.19	2898.49	2898.49	.00	2900.03	1.54	1.62	.01	2896.30
29000.0	15866.8	6199.1	6934.0	2167.7	3911.2	806.8	106.7	32.8	2896.70
.04	7.32	15.61	8.58	.050	.031	.044	.000	2892.30	62.35
.011893	650.	685.	700.	0	12	0	.00	964.15	1017.06

*SECNO 4.000

4.000	6.90	2907.40	2907.17	.00	2908.61	1.41	0.77	.01	2903.10
29000.0	5199.0	9801.0	9449.0	4211.1	4794.0	1996.0	18.1	33.8	2905.30
.07	5.64	10.42	7.37	.050	.030	.044	.000	2900.60	130.71
.007646	975.	985.	985.	0	8	0	.00	964.15	1094.71

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	IW	ML	QLOSS	LEFTBANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 4.500
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

4.500	7.05	2910.65	2910.65	.00	2910.65	1.00	2.38	.00	2903.60
29000.0	4719.4	9654.6	15045.1	632.6	668.7	2161.5	186.5	.1.1	2913.10
.08	7.46	14.72	9.31	.050	.032	.050	.000	2907.00	8.41
.009648	350.	375.	325.	0	0	0	.00	911.0	1000.20

1490 NH CARD USED
*SECNO 5.000

3301 HV CHANGED MORE THAN HVINS

5.000	6.81	2914.11	2913.17	.00	2914.02	.91	2.70	.07	2912.90
29000.0	10.6	5186.4	23801.1	8.5	441.8	3707.0	287.6	.1.7	2916.80
.09	1.24	11.74	8.42	.070	.032	.050	.000	2907.30	14.41
.006655	350.	375.	325.	2	15	3	.00	1010.47	1041.16

1490 NH CARD USED
*SECNO 6.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

6.000	6.71	2920.61	2920.61	.00	2921.48	.81	3.02	.14	2911.00
29000.0	34.7	4549.4	24415.9	11.6	297.5	6123.1	291.4	66.6	2916.50
.11	3.01	15.26	7.62	.070	.032	.043	.000	2910.60	22.68
.009939	730.	710.	710.	0	0	0	.00	1055.85	1076.73

1490 NH CARD USED
*SECNO 7.000

7.000	6.65	2926.15	2926.77	.00	2926.36	1.23	3.43	.01	2919.30
29000.0	4.4	5291.5	23744.1	8.2	394.6	9127.6	300.1	102.2	2923.60
.13	1.38	17.11	.33	.070	.032	.043	.000	2920.30	17.38
.008269	810.	800.	700.	4	11	2	.00	1000.01	1017.14

*SECNO 8.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

8.000	6.81	2933.11	2933.11	.00	2934.06	1.	3.29	.10	2926.60
29000.0	.0	17006.4	11993.6	.0	24.7.7	.....	.....	.....	.....
.16	.00	15.17	5.66	.00	.....	.041	.000	2930.00	15.09
.006349	750.	940.	930.	0	0	0	.00	.....	.....

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	ALPHA	CHANL ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VEL	TWA	AVERAGE ELEV
TIME	VLOB	VCH	VROB	ANL	ANCH	ANR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 9.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

9.000	5.78	2937.98	2937.36	.00	2939.40	1.41	4.89	.01	2934.50
29000.0	375.0	14240.0	14385.0	79.2	1215.2	2106.3	462.0	134.0	2936.12
.17	5.13	11.72	6.82	.048	.032	.041	.000	2932.20	32.12
.009593	640.	610.	550.	0	15	0	.00	1179.00	1201.12

1490 NH CARD USED
*SECNO 10.000

10.000	5.61	2944.21	2943.71	.00	2945.26	1.07	5.63	.03	2937.58
29000.0	.0	6771.5	22228.5	.0	640.8	2946.6	313.1	150.7	2942.10
.20	.00	10.47	7.54	.000	.032	.042	.000	2938.00	41.69
.008701	620.	660.	630.	2	15	0	.00	1074.52	1116.21

1490 NH CARD USED
*SECNO 11.000

11.000	5.56	2946.66	2946.38	.00	2947.46	1.01	4.66	.02	2949.00
29000.0	.0	5878.0	23021.0	.0	437.1	2807.3	504.2	122.6	2940.74
.21	.00	10.66	7.36	.000	.032	.045	.000	2940.13	49.09
.010356	450.	480.	360.	1	8	0	.00	1022.67	1071.76

CCHV= .300 CEHV= .500
1490 NH CARD USED
*SECNO 12.000

3265 DIVIDED FLOW

12.000	6.61	2954.91	2954.41	.00	2956.04	1.03	5.36	.03	2950.13
29000.0	4119.2	4009.0	20871.9	315.0	310.2	2807.9	606.0	127.0	2951.38
.23	7.29	12.93	7.43	.040	.032	.043	.000	2946.00	50.45
.006143	650.	650.	650.	2	8	0	.00	1014.00	1091.42

*SECNO 13.000

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	AL	SLOBS	L BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SOTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

3470 ENCROACHMENT STATIONS= 50.0 760.0 TYPE= 1 TARGET= .10.000

13.000	8.49	2961.29	2961.29	2956.58	2963.28	1.97	0.00	.47	2950.00
29000.0	3101.6	5864.5	30000.9	857.4	3742.2	2008.7	650.1	1500.0	2956.20
.25	8.68	15.76	9.97	.04?	.???	.04?	.000	2954.15	97.??
.011417	630.	650.	680.	0	0	0	.00	662.?0	760.00

*SECNO 14.000

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

14.000	6.32	2966.72	2966.72	2962.65	2967.??	?.??	?.??	.??	2?5?.??
29000.0	3516.7	1401.??	11478.1	458.4	680.3	.4?.??	680.?	?.??	3?8.??
.26	7.66	16.28	8.14	.056	.?2?	.04?	.00?	2956.??	?6.??
.007617	500.	520.	540.	0	12	?	.0?	502.??	5??.??

*SECNO 14.300
ETCARD, BRIDGE STENCL= 110.00 STENCR= 530.00
3640 SECTION NOT HIGH ENOUGH241462.900 3001.600 2959.3001000??.0?? 2984.922 2

3370 NORMAL BRIDGE, NRD= 10 MIN ELTRD= 2974.83 MAX ELLO= 2981.48

3470 ENCROACHMENT STATIONS= 110.0 530.0 TYPE= 2 TARGET= 480.000

14.300	8.46	2967.?6	2967.??	2962.??	2969.??	?.??	.?4	.??	2952.??
29000.0	53.0	21070.5	7?7?.?	10.6	.?14.?	1146.?	691.?	198.?	2962.??
.26	3.20	13.05	6.67	.065	.???	.04?	.000	295?.??	???.??
.005447	70.	80.	90.	?	15	?	.??	4?3.??	5??.??

*SECNO 14.600
ETCARD, BRIDGE STENCL= 110.00 STENCR= 530.00
3640 SECTION NOT HIGH ENOUGH160??.?0? ???.?? 2?5?.??100???.?? 2?? . ?? 2

3301 HV CHANGED MORE THAN HVINS

3370 NORMAL BRIDGE, NRD= 10 MIN ELTRD= 2974.?? MAX ELLO= 2 ?1.48

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	KV	AL	OLOSS	ENERGY ELEV
Q	QLOB	QCH	QROE	ALOB	ACH	AROB	VOL	TAV	RYSMAX ELEV
TIME	VLOB	VCH	VROE	XLOB	XNCH	XROB	WTN	ELMIN	SCRIT
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	ICC	ICONT	CORAR	TOPWID	LMIN

3470 ENCROACHMENT STATIONS= 110.0 590.0 TYPE= 1 TARGET= 400.000

14.600	9.44	2968.74	2967.18	2964.12	2970.28	1.54	.22	.16	2971.00
29000.0	63.7	20432.2	8504.1	22.7	1826.0	1386.8	695.3	136.6	2982.00
.26	2.60	11.18	6.13	.055	.032	.045	.000	2958.30	121.25
.003382	53.	53.	53.	4	19	0	.00	467.69	363.95

*SECNO 15.000

15.000	8.40	2969.10	2968.56	2964.69	2971.03	1.54	.55	.26	2971.64
29000.0	5065.9	10957.7	13976.4	709.1	725.2	1606.2	704.0	160.8	2982.00
.27	7.14	15.15	8.07	.055	.032	.045	.000	2958.70	121.25
.006571	121.	121.	121.	2	15	0	.00	542.51	554.10

*SECNO 16.000

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

16.000	8.27	2973.37	2973.12	2970.40	2974.60	1.30	1.49	.19	2975.69
29000.0	9736.7	7264.2	11977.2	1019.5	1149.3	1606.2	744.3	264.1	2982.00
.28	7.39	14.12	9.19	.042	.032	.045	.000	2960.10	121.25
.006495	550.	550.	490.	2	15	0	.00	755.16	662.47

CCHV= .100 CEHV= .300
*SECNO 17.000

17.000	7.62	2976.02	2975.66	2970.22	2977.30	1.30	1.50	.42	2978.04
29000.0	11249.1	7668.1	10081.8	280.1	667.0	2111.2	775.4	216.9	2982.00
.30	7.69	13.05	9.10	.042	.032	.044	.000	2960.50	45.95
.007675	334.	498.	369.	2	15	0	.00	788.11	27.34

1480 NH CARD USED
*SECNO 18.000

18.000	6.65	2981.88	2981.59	2978.05	2982.23	1.30	1.50	.54	2983.05
29000.0	24755.4	3822.0	4221.6	2848.5	29.2	1.0	826.0	344.0	2982.00
.32	8.78	13.56	9.08	.036	.032	.044	.000	2977.20	121.25
.004819	830.	770.	830.	2	15	0	.00	821.71	102.06

SECNO	DEPTH	CWSEL	CRWS	WSEL	LG	HV	HL	VLOB	LEFTBNK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TW	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST
*SECNO 19.000									
19.000	6.63	2986.83	2986.36	2984.01	2980.17	1.35	4.34	.00	3002.70
29000.0	22735.5	5636.4	628.1	2722.6	444.6	112.4	874.5	24.7	3001.40
.34	6.35	12.69	3.59	.000	.032	.000	.000	2965.20	16.50
.007057	620.	610.	600.	1	12	0	.00	83.58	640.01
1490 NH CARD USED									
*SECNO 20.000									
20.000	7.29	2992.99	2992.98	2990.64	2986.87	1.63	6.39	.20	2996.80
29000.0	11377.1	4141.6	1258.3	1424.3	230.8	1049.3	627.2	207.7	2988.20
.36	6.34	16.35	9.62	.042	.032	.041	.000	2965.70	36.50
.011246	720.	730.	745.	2	3	4	.00	630.01	672.17
1490 NH CARD USED									
*SECNO 21.000									
21.000	10.07	3002.47	3002.37	2999.01	2994.27	2.81	8.37	.44	3006.00
29000.0	12280.9	6673.9	10035.1	1312.0	415.0	1022.9	999.7	264.4	2998.20
.38	9.06	16.05	7.57	.044	.032	.043	.000	2962.40	39.60
.007607	1080.	1060.	1000.	2	3	5	.00	96.14	654.42
*SECNO 22.000									
22.000	10.11	3009.01	3008.74	3005.67	3010....	...5	8.62	.65	3014.60
29000.0	2090.2	7994.8	18915.0	402.0	572..	1758.7	1078.9	290.2	3000.60
.42	5.20	13.97	5.76	.045	.032	.041	.000	2998.30	50.96
.004793	1020.	1020.	1000.	3	4	6	.00	662.10	713.07
*SECNO 22.500									
22.500	8.56	3011.66	3011.31	3008.36	3012.79	2.10	2.43	.02	3014.80
29000.0	.0	5484.2	23515.8	.0	420.8	3352.2	1119.7	304.1	3009.30
.43	.00	12.86	7.01	.000	.032	.041	.000	3013.10	17.66
.006374	490.	490.	420.	2	14	6	.00	974.11	992.24

*SECNO 23.000

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

SECNO	DEPTH	SWSEL	CRIWS	WtdLK	LOB	LV	hL	vLOBS	Critical Elev
Q	QLOB	QCh	QROB	ALOB	ACH	vROB	VCC	TWP	Critical Elev
TIME	VLOB	Vch	VROB	zhL	zhCH	zhR	WTP	ELMIN	Beta
SLOPE	XLOBL	XLCh	XLOBR	ITRIAL	ISO	ICONT	CONVR	TOPWID	ENDST
23.000	8.26	3015.26	3015.25	3014.99	3014.97	1.01	.00	.05	3011.41
29000.0	1910.6	9977.3	17112.4	868.2	7814.1	2046.4	1024.3	218.7	3012.83
.45	5.19	14.22	7.87	.065	.032	.045	.000	3015.00	97.22
.008039	490.	490.	423.	0	0	0	.00	3015.00	929.01

1490 NH CARD USED
*SECNO 24.000

3265 DIVIDED FLOW

24.000	8.00	3023.90	3023.45	3020.56	3025.22	1.33	6.06	.03	3020.30
29000.0	10554.6	3669.3	14755.6	1262.6	261.2	1789.5	1227.9	332.8	3019.70
.48	8.36	14.10	8.25	.041	.035	.045	.000	3019.90	55.11
.009019	975.	980.	980.	0	15	0	.30	866.60	969.71

*SECNO 24.100

24.100	7.78	3028.28	3027.64	3025.14	3029.30	1.02	4.05	.01	3022.60
29000.0	2161.3	3180.7	23655.0	405.2	268.1	3046.3	1271.3	344.1	3023.61
.49	5.33	12.10	7.83	.050	.035	.048	.000	3020.60	172.54
.006295	550.	540.	540.	2	10	0	.00	933.52	1104.03

*SECNO 25.000

25.000	6.51	3031.61	3031.22	3029.19	3032.14	1.14	3.56	.02	3026.29
29000.0	2397.8	2751.8	23250.4	522.3	235.3	2450.3	1014.7	356.1	3027.80
.51	5.74	13.38	7.92	.050	.035	.042	.000	3028.30	37.72
.008156	510.	510.	500.	2	7	0	.10	972.76	1078.91

1490 NH CARD USED
*SECNO 25.100

25.100	8.61	3034.91	3034.52	3031.80	3035.16	.98	2.64	.01	3030.01
29000.0	3478.8	4804.4	20716.8	700.1	196.1	3102.3	1356.2	368.1	3029.80
.53	4.97	12.64	6.65	.050	.035	.040	.000	3031.30	15.47
.004042	360.	400.	430.	2	11	0	.00	1014.76	1092.70

1490 NH CARD USED
*SECNO 26.000

26.000	7.21	3037.51	3036.98	3033.87	3036.84	.78	2.03	.00	3033.73
29000.0	3859.4	2185.8	22954.8	94.1	196.1	4147.8	1402.1	357.1	3035.11
.55	3.87	10.61	6.31	.060	.035	.040	.000	3032.70	26.21
.005013	470.	470.	460.	2	14	0	.00	1056.80	1118.11

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IBC	ICONT	CORAR	TOPWID	ENDST

*SECNO 27.000

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = .61

27.000	5.47	3041.67	3041.61	3041.80	3043.04	1.14	4.38	.18	3040.13
29000.0	1546.1	5017.5	22436.4	2722.1	403.8	2945.8	1436.2	396.4	3041.18
.57	5.53	12.43	7.62	.052	.032	.044	.000	1036.40	170.03
.011357	675.	670.	530.	2	19	0	.00	1212.15	1386.48

1490 NH CARD USED
*SECNO 26.000

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

26.000	6.30	3046.70	3046.70	3043.93	3048.29	1.59	5.13	.14	3040.40
29000.0	5601.1	12324.6	10874.1	832.4	956.6	1367.1	1491.4	437.4	3044.20
.56	6.73	13.10	7.22	.045	.032	.042	.000	1240.60	139.36
.008214	390.	450.	450.	3	3	0	.00	1101.11	1166.56

*SECNO 29.000

29.000	7.68	3052.68	3052.51	3049.75	3054.28	1.40	5.13	.09	3046.56
29000.0	14695.7	5958.9	8345.4	1886.7	306.8	1057.7	1536.7	420.4	3046.60
.60	7.79	16.25	7.89	.050	.035	.034	.000	3045.00	122.91
.011150	590.	640.	660.	2	11	0	.00	838.56	961.48

1490 NH CARD USED
*SECNO 30.000

3265 DIVIDED FLOW

3301 HV CHANGED MORE THAN HVINS

30.000	1.44	3058.24	3057.62	3055.23	3054.19	.71	4.60	.09	3054.69
29000.0	11445.6	4928.3	12626.1	1931.2	1.1.1	1246.1	1278.7	1.1.1	1.1.1
.62	5.67	10.35	5.68	.050	.034	.047	.000	1.1.1	1.1.1
.005794	560.	625.	675.	1	1	1	.00	1.1.1	1.1.1

SECNO	DEPTH	CWSEL	CRWC	WSEL	EG	HV	NL	CLOSS	CTRL
Q	QLOB	QCH	QROB	ELOB	HCH	HROB	TW	TWA	
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	CLOSM	
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IBC	ICONT	CONRAT	NOPRWT	ERXSI

1490 NH CARD USED
*SECNO 31.000
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

31.000	6.36	3063.66	3063.66	3060.71	3064.76	1.00	4.01	.12	3060....
29000.0	6532.1	6333.6	16164.3	1067.6	2.2	2070.2	1450.6	486.6	3060.71
.64	6.13	15.07	6.81	.047	.052	.040	.000	1359.60	269.06
.008223	681.	680.	692.	0	0	0	.00	1283.1.	1350.01

*SECNO 32.000

3265 DIVIDED FLOW

32.000	7.07	3070.47	3070.06	3067.78	3071.63	1.16	4.66	.01	3067.00
29000.0	1695.7	7978.9	19330.4	325.1	601.6	3172.8	1725.3	475.9	3069.75
.67	5.22	12.35	6.09	.060	.036	.007	.000	1068.49	335.72
.009213	835.	835.	721.	3	16	1	.00	1260.17	1220.76

*SECNO 33.000

33.000	9.30	3078.50	3076.40	3076.01	3078.93	1.43	4.22	.06	3071.00
29000.0	5684.2	5351.0	17594.8	870.2	522.0	2714.7	1742.3	442.9	3073.15
.70	6.87	17.49	6.47	.069	.031	.021	.000	1141.20	318.36
.012385	850.	850.	730.	2	14	1	.00	1134.04	1342.54

1490 NH CARD USED
*SECNO 34.000

3301 HV CHANGED MORE THAN HVINS

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 1.01

34.000	8.01	3085.41	3084.28	3082.19	3086....	.78	27	.09	3077.30
29000.0	4534.3	6996.9	21468.2	830..	201.	2.3 4.8	1677.4	526.1	3082.19
.72	6.1.	16.0.	7.1.	..48	....	....	....	3077.47	4....
.005394	830.	830.	730.	3	14	1	....	1284.02	1489.39

*SECNO 35.000

SECNO	DEPTH	CWSEL	CRITWS	×SELK	EG	HV	[illegible]	CLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	AGH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	AOL	XNCH	ANA	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

3265 DIVIDED FLOW

3280 CROSS SECTION 35.00 EXTENDED .11 FEET

3301 HV CHANGED MORE THAN HVINS

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

35.000	6.71	3090.11	3090.11	3087.[illegible]	3091.44	1.[illegible]	0.0[illegible]	.[illegible]	3087.40
29000.0	20029.2	5804.3	3166.6	2586.7	395.2	66[illegible].[illegible]	1[illegible].[illegible]	537.4	3166.[illegible]
.75	7.74	14.69	3.65	.052	.052	.06[illegible]	.[illegible]6[illegible]	[illegible]3.40	[illegible].[illegible]
.011156	750.	750.	560.	0	12	[illegible]	.[illegible]1	[illegible]3.41	.64[illegible].[illegible]

1490 NH CARD USED
×SECNO 36.000

36.000	7.66	3095.36	3095.01	3092.[illegible]	3096.61	[illegible].2[illegible]	[illegible].1[illegible]	.01	3[illegible].[illegible]
29000.0	21566.5	6768.4	665.1	5485.[illegible]	486.[illegible]	1[illegible].[illegible]	.[illegible].[illegible]	564.2	[illegible]6[illegible].[illegible]
.77	6.19	14.62	7.61	.054	.21[illegible]	.[illegible].[illegible]	.[illegible]3[illegible]	[illegible]6[illegible].[illegible]	37.[illegible]
.007769	550.	570.	600.	3	8	[illegible]	.[illegible]1	[illegible]82.[illegible]	.[illegible]8[illegible].[illegible]

1490 NH CARD USED
×SECNO 37.000

37.000	7.20	3101.00	3100.47	3097.85	3102.04	1.64	[illegible].41	.02	30[illegible].10
29000.0	25411.0	3566.2	.8	[illegible]524.[illegible]	[illegible]7[illegible].[illegible]	.9	[illegible]2[illegible].[illegible]	[illegible]8[illegible].[illegible]	3[illegible].60
.79	7.21	13.13	.21	.052	.[illegible]3	.06[illegible]	.[illegible]0[illegible]	30[illegible].[illegible]6	[illegible]11.[illegible]2
.005[illegible]	620.	620.	620.	2	11	[illegible]	.[illegible]0	1023.[illegible]6	.[illegible]3[illegible].[illegible]3

[illegible] RUN EXECUTED 27OCT94 16:36:23

HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERROR, ETC.

CANADA DEL ORO

SUMMARY PRINTOUT TABLE 150

	SECNO	XLOB	ELTRD	ELLOB	ELMIN	Q	CWSEL	CRIWS	EG	VLOB	VCH	AREA	AREA
	1.000	.00	.00	.00	2877.90	5200.00	2882.00	2881.28	2882.07	80.70	6.44	1193.58	678.84
DJ	1.000	.00	.00	.00	2877.90	12600.00	2883.02	2882.74	2883.39	80.67	8.57	2400.69	1423.34
	1.000	.00	.00	.00	2877.90	17300.00	2883.50	2883.12	2884.16	78.98	9.36	3035.62	1969.55
	1.000	.00	.00	.00	2877.90	29000.00	2884.40	2883.98	2885.30	80.73	11.06	4250.37	3227.51
*	2.000	570.00	.00	.00	2884.00	5200.00	2888.17	2888.17	2888.82	108.27	8.76	1028.75	504.42
* DK	2.000	570.00	.00	.00	2884.00	12600.00	2889.21	2889.21	2890.17	111.21	11.64	2064.16	1419.76
*	2.000	570.00	.00	.00	2884.00	17300.00	2889.72	2889.79	2891.60	106.78	12.51	2616.00	1879.23
*	2.000	570.00	.00	.00	2884.00	29000.00	2891.59	2891.59	2892.98	117.84	14.56	3604.30	2894.43
*	3.000	685.00	.00	.00	2892.30	5200.00	2896.16	2896.16	2896.78	97.21	8.47	1276.23	634.26
* DL	3.000	685.00	.00	.00	2892.30	12600.00	2897.18	2897.18	2898.06	95.12	11.65	2127.65	1312.48
*	3.000	685.00	.00	.00	2892.30	17300.00	2897.64	2897.64	2899.79	101.66	12.91	2558.56	1703.69
*	3.000	685.00	.00	.00	2892.30	29000.00	2898.49	2898.49	2900.03	118.93	15.61	3373.29	2693.25
*	4.000	935.00	.00	.00	2903.50	5200.00	2904.50	2904.50	2905.22	87.91	6.25	1028.59	631.63
* DM	4.000	935.00	.00	.00	2903.50	12600.00	2905.67	2905.67	2906.72	83.03	11.08	1957.30	1418.02
	4.000	935.00	.00	.00	2903.50	17300.00	2906.16	2906.17	2907.41	82.34	12.21	2422.43	1872.19
	4.000	935.00	.00	.00	2903.50	29000.00	2907.40	2907.17	2908.61	86.46	14.42	3361.44	3316.46
*	4.500	375.00	.00	.00	2901.00	5200.00	2905....	2905.00	2905....	24.11	6.56	977.10	810.19
* DJ	4.500	375.00	.00	.00	2901.00	12600.00	2906.23	2906.23	2906.28	23.96	11.10	1821.54	1401....
*	4.500	375.00	.00	.00	2901.00	17300.00	2906....	2906....	2906....	6....	12....	2475.16	2....
*	4.500	375.00	.00	.00	2901.00	29000.00	2907....	2907....	2907....	....	14....	3423.24	3...
	5.000	375.00	.00	.00	2...	5200.00	2911.00	2...	2...	99.00	8....	1...	...
DO	5.000	375.00	.00	.00	2...	12600.00	2...	2...	2...	...	...	1...	1...
	5.000	375.00	.00	.00	2...	17300.00	2...	2...	2...	87....	...	2...	...
	5.000	375.00	.00	.00	2...	29000.00	2...	2...	2...	96....	14....	3...	...
*	6.000	710.00	.00	.00	2...	...	2...	2...	2...	...	...	...	...
* DP	6.000	710.00	.00	.00	2...	12600.00	2...	2...	2...	12....	12....	1...	...
*	6.000	710.00	.00	.00	2...	17300.00	2...	2...	2...	...	...	2...	...
*	6.000	710.00	.00	.00	2...	29000.00	2...	2...	2...	...	15....	3...	...

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	SECNO	XLOH	ELTRO	ELLO	ELMA	W	WSEL	CWSEL	Qo	Qtrib	Vel	AREA	WIDTH
	7.000	800.00	.00	.00	2926.50	5200.00	2924.48	2924.48	2923.00	76.01	6.83	1072.17	586.78
DQ	7.000	800.00	.00	.00	2926.50	12600.00	2925.81	2925.52	2925.40	66.92	10.75	2052.64	1422.74
	7.000	800.00	.00	.00	2926.50	17500.00	2926.15	2925.95	2927.00	77.76	11.36	2577.58	1964.31
	7.000	800.00	.00	.00	2926.50	29000.00	2927.15	2926.77	2928.10	82.34	13.31	3525.13	3161.12
	8.000	740.00	.00	.00	2926.30	5200.00	2929.73	2929.48	2930.00	73.49	7.69	692.36	610.90
DR	8.000	740.00	.00	.00	2926.30	12600.00	2931.60	2931.60	2933.66	58.10	9.27	1957.39	1756.02
	8.000	740.00	.00	.00	2926.30	17500.00	2932.43	2932.13	2933.34	58.21	10.28	2500.21	2334.14
	8.000	740.00	.00	.00	2926.30	29000.00	2933.11	2933.11	2934.07	60.89	12.17	3507.73	3639.43
	9.000	610.00	.00	.00	2932.20	5200.00	2936.68	2935.68	2936.33	99.38	7.14	689.63	521.64
DS	9.000	610.00	.00	.00	2932.20	12600.00	2936.81	2936.81	2937.60	81.47	6.66	2025.35	1416.13
	9.000	610.00	.00	.00	2932.20	17500.00	2937.24	2937.24	2938.22	81.01	7.56	2523.47	1920.70
	9.000	610.00	.00	.00	2932.20	29000.00	2937.58	2937.38	2939.40	75.48	10.72	3376.38	2960.87
	10.000	660.00	.00	.00	2936.60	5200.00	2941.61	2941.60	2942.27	64.82	5.32	1193.17	574.52
DT	10.000	660.00	.00	.00	2936.60	12600.00	2942.73	2942.44	2943.38	56.29	6.21	2045.90	1291.48
	10.000	660.00	.00	.00	2936.60	17500.00	2943.13	2942.82	2943.73	56.87	7.11	2506.55	1771.67
	10.000	660.00	.00	.00	2936.60	29000.00	2944.11	2943.71	2945.20	57.44	10.47	3593.39	3109.00
	11.000	450.00	.00	.00	2943.10	5200.00	2946.36	2946.36	2946.62	4.38	3.09	1677.68	974.17
DU	11.000	450.00	.00	.00	2943.10	12600.00	2947.28	2947.28	2947.93	4.38	3.09	2031.93	1019.68
	11.000	450.00	.00	.00	2943.10	17500.00	2947.78	2947.78	2948.31	4.38	3.09	2230.36	1118.17
	11.000	450.00	.00	.00	2943.10	29000.00	2948.98	2948.98	2949.31	4.38	3.09	3474.56	2849.48
	12.000	655.00	.00	.00	2951.00	5200.00	2953.93	2953.93	2954.03	63.06	3.01	1125.48	577.03
DV	12.000	655.00	.00	.00	2951.00	12600.00	2954.91	2954.91	2955.40	63.06	3.01	2143.42	1374.67
	12.000	655.00	.00	.00	2951.00	17500.00	2955.37	2955.37	2955.83	63.06	3.01	2621.48	1869.21
	12.000	655.00	.00	.00	2951.00	29000.00	2956.41	2956.41	2957.00	63.06	12.78	3668.00	3213.00
	13.000	650.00	.00	.00	2954.60	5200.00	2958.01	2958.00	2958.22	64.22	3.01	928.06	577.04
DW	13.000	650.00	.00	.00	2954.60	12600.00	2959.00	2958.75	2960.00	160.07	12.66	1552.54	1231.20
	13.000	650.00	.00	.00	2954.60	17500.00	2959.43	2959.03	2960.69	99.93	12.72	2099.77	1795.60
	13.000	650.00	.00	.00	2954.60	29000.00	2960.43	2960.29	2960.26	114.11	10.76	2738.23	2714.11
	14.000	520.00	.00	.00	2956.40	5200.00	2960.68	2960.68	2960.88	1.72	3.01	630.84	577.03
DX	14.000	520.00	.00	.00	2956.40	12600.00	2961.81	2961.81	2962.08	66.06	12.24	1627.20	1340.66
	14.000	520.00	.00	.00	2956.40	17500.00	2962.24	2962.24	2962.69	72.96	11.66	2085.11	1648.65
	14.000	520.00	.00	.00	2956.40	29000.00	2963.32	2963.32	2963.66	84.27	10.58	2727.23	2260.10
	14.300	80.00	2974.80	2961.40	2959.30	5200.00	2961.97	2961.97	2962.38	37.44	9.46	937.48	580.77
	14.300	80.00	2974.80	2961.40	2959.30	12600.00	2963.04	2962.94	2963.60	42.48	9.11	1752.11	1160.14
	14.300	80.00	2974.80	2961.40	2959.30	17500.00	2963.58	2963.38	2964.20	45.18	10.38	2115.41	2354.56
	14.300	80.00	2974.80	2961.40	2959.30	29000.00	2964.78	2964.58	2965.66	54.27	10.05	2777.23	3020.04
	14.600	80.00	2974.80	2961.40	2962.20	5200.00	2964.12	2964.12	2964.38	28.44	9.78	1137.93	1031.67
DY	14.600	80.00	2974.80	2961.40	2962.20	12600.00	2965.23	2965.23	2965.73	28.44	9.78	1974.60	2077.78
	14.600	80.00	2974.80	2961.40	2962.20	17500.00	2965.77	2965.77	2966.28	28.44	9.78	2399.95	2641.11
	14.600	80.00	2974.80	2961.40	2962.20	29000.00	2966.97	2966.97	2967.31	33.82	10.04	3287.32	4000.11

	SECNO	XLOC	ELTRO	ELLO	ELMIN	Q	LWSEL	CRIWS	...	LOSS	VEL	AREA	.01K
	15.000	121.00	.00	.00	2960.70	5200.00	2964....	2966....	2966.72	61.47	7	759.36	576.10
	15.000	121.00	.00	.00	2960.70	12800.00	2966.42	2966.42	2967....	78.62	12.77	1618.99	1432.71
D2	15.000	121.00	.00	.00	2960.70	17500.00	2966....	2967.15	2967....	84....	14.02	2013.66	1947.41
	15.000	121.00	.00	.00	2960.70	23000.00	2967....	2968.86	2969....	90.71	15.15	3040.46	3577.42
	16.000	560.00	.00	.00	2965.10	5200.00	2969....	2971.42	2971....	64.39	2	1104.25	732.57
	16.000	560.00	.00	.00	2965.10	12800.00	2971.36	2971.36	2971.97	84.28	11.72	2150.45	1596.94
EA	16.000	560.00	.00	.00	2965.10	17500.00	2971....	2972.00	2972....	91.44	12.73	2826.73	1996.78
	16.000	560.00	.00	.00	2965.10	23000.00	2972....	2973.12	2974....	98.50	14.12	3798.16	3599.91
	17.000	490.00	.00	.00	2966.50	5200.00	2970....	2973....	2973....	64....	1	1144.38	810.21
	17.000	490.00	.00	.00	2966.50	12800.00	2973....	2974.30	2974....	84....	10.41	2022.47	1506.44
EB	17.000	490.00	.00	.00	2966.50	17500.00	2973....	2974.81	2975....	91....	11.38	2814.43	2194.65
	17.000	490.00	.00	.00	2966.50	23000.00	2974.32	2975.86	2976....	98.78	12.63	3840.41	3010.32
	18.000	770.00	.00	.00	2975.20	5200.00	2979....	2979.32	2979....	64....	8.85	974....	549.21
	18.000	770.00	.00	.00	2975.20	12800.00	2979....	2979....	2979....	84....	11.11	1811.28	1286.60
EC	18.000	770.00	.00	.00	2975.20	17500.00	2979....	2980....	2980....	91....	12.41	2510.83	1725.83
	18.000	770.00	.00	.00	2975.20	23000.00	2980....	2981....	2981....	98....	13.76	3410.85	3036.24
	19.000	610.00	.00	.00	2980.20	5200.00	2984....	2985....	2985....	64....	7.80	1041.28	649.70
	19.000	610.00	.00	.00	2980.20	12800.00	2985.26	2985....	2986....	84.30	9....	1993.51	1618.68
ED	19.000	610.00	.00	.00	2980.20	17500.00	2985.64	2985.43	2986....	91.06	10.83	2461.47	2221.79
	19.000	610.00	.00	.00	2980.20	23000.00	2986.20	2986.20	2987....	97.97	12.09	3280.16	3452.08
	20.000	730.00	.00	.00	2990.70	5200.00	2993.34	2993.34	2994....	64.96	8....	1042.30	776.69
	20.000	730.00	.00	.00	2990.70	12800.00	2993.52	2993.52	2994.36	85.34	10.23	1911.41	1547.13
EE	20.000	730.00	.00	.00	2990.70	17500.00	2993.84	2993.84	2994.24	92.08	11.06	2242.83	1721.15
	20.000	730.00	.00	.00	2990.70	23000.00	2994.34	2994.34	2994....	98....	12.09	3028.58	2704.64
	21.000	1060.00	.00	.00	2992.40	5200.00	2999.31	2999.31	3000.21	58.94	9.94	924.58	695.27
	21.000	1060.00	.00	.00	2992.40	12800.00	3000.67	3000.67	3001.50	80.28	12.67	1770.34	1549.57
EF	21.000	1060.00	.00	.00	2992.40	17500.00	3001.23	3001.23	3002.05	86.96	14.21	2196.93	2026.98
	21.000	1060.00	.00	.00	2992.40	23000.00	3002.47	3002.47	3003.27	94....	15.85	3054.17	3029.10
	22.000	1020.00	.00	.00	2996.10	5200.00	3000....	3001.69	3002.41	62.77	8.58	1000.12	781.00
	22.000	1020.00	.00	.00	2996.10	12800.00	3001....	3002....	3003....	83....	11....	1914.04	1579.37
EG	22.000	1020.00	.00	.00	2996.10	17500.00	3002.11	3002.62	3003.60	90....	12.22	2611.11	2478.31
	22.000	1020.00	.00	.00	2996.10	23000.00	3003.11	3003.74	3004.84	97....	13.69	3572.35	3580.01
	22.500	490.00	.00	.00	3000.00	5200.00	3004....	3004....	3005....	64....	7.96	1130.41	897.69
	22.500	490.00	.00	.00	3000.00	12800.00	3004.76	3004.76	3005....	84....	10.49	2124.69	1810.65
EH	22.500	490.00	.00	.00	3000.00	17500.00	3005....	3005....	3006....	91....	11....	2849.04	2784.34
	22.500	490.00	.00	.00	3000.00	23000.00	3005....	3006....	3007....	98....	12.06	3911.41	4032.00
	23.000	490.00	.00	.00	3007.00	5200.00	3010....	3010....	3010....	64....	7.96	1130.41	897.69
	23.000	490.00	.00	.00	3007.00	12800.00	3010....	3010....	3011....	84....	10.49	2124.69	1810.65
EI	23.000	490.00	.00	.00	3007.00	17500.00	3010....	3011....	3011....	91....	11....	2849.04	2784.34
	23.000	490.00	.00	.00	3007.00	23000.00	3011....	3012....	3012....	98....	12.06	3911.41	4032.00

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	TOPWS	VCH	AREA	.01K
*	24.000	980.00	.00	.00	3015.90	5200.00	3020.98	3020.58	3021.80	82.84	9.20	976.70	575.66
BJ	24.000	980.00	.00	.00	3015.90	12800.00	3022.12	3022.03	3023.02	94.19	11.81	1869.29	1318.91
	24.000	980.00	.00	.00	3015.90	17500.00	3022.79	3022.52	3023.70	85.51	12.23	2399.83	1892.47
	24.000	980.00	.00	.00	3015.90	29000.00	3023.90	3023.48	3025.22	90.19	14.13	3313.30	3053.69
	24.100	540.00	.00	.00	3020.50	5200.00	3025.34	3025.31	3025.66	75.15	9.14	1139.66	599.93
EK	24.100	540.00	.00	.00	3020.50	12800.00	3026.56	3026.22	3027.21	84.06	10.11	2210.61	1599.24
	24.100	540.00	.00	.00	3020.50	17500.00	3027.06	3026.67	3027.80	86.93	11.00	2669.38	2139.01
	24.100	540.00	.00	.00	3020.50	29000.00	3028.20	3027.64	3029.30	82.95	12.10	3766.59	3655.14
	25.000	510.00	.00	.00	3023.30	5200.00	3029.19	3029.16	3029.71	78.05	9.37	1157.46	588.61
EL	25.000	510.00	.00	.00	3023.30	12800.00	3030.21	3030.02	3030.93	85.41	11.52	2129.55	1385.04
	25.000	510.00	.00	.00	3023.30	17500.00	3030.76	3030.38	3031.57	81.44	12.00	2655.92	1939.19
	25.000	510.00	.00	.00	3023.30	29000.00	3031.81	3031.22	3032.91	81.56	13.36	3664.40	3211.21
*	25.100	400.00	.00	.00	3026.30	5200.00	3032.53	3032.53	3033.05	43.08	8.31	1383.02	792.24
* EM	25.100	400.00	.00	.00	3026.30	12800.00	3033.39	3033.39	3034.15	63.82	11.19	2365.74	1602.23
	25.100	400.00	.00	.00	3026.30	17500.00	3033.86	3033.86	3034.66	67.34	12.05	2888.88	2132.56
	25.100	400.00	.00	.00	3026.30	29000.00	3034.91	3034.52	3035.66	60.42	12.64	4193.91	3730.77
	26.000	470.00	.00	.00	3030.60	5200.00	3036.17	3036.04	3036.53	66.72	8.14	1262.44	651.41
EU	26.000	470.00	.00	.00	3030.60	12800.00	3036.38	3036.34	3036.76	46.88	6.36	2695.14	1869.52
	26.000	470.00	.00	.00	3030.60	17500.00	3036.88	3036.14	3037.36	46.16	9.12	3328.05	2575.64
	26.000	470.00	.00	.00	3030.60	29000.00	3037.81	3036.98	3038.51	50.13	10.61	4487.80	4095.94
*	27.000	670.00	.00	.00	3036.40	5200.00	3039.80	3039.80	3040.25	93.45	8.05	1206.94	537.80
*	27.000	670.00	.00	.00	3036.40	12800.00	3040.54	3040.51	3041.21	128.86	10.50	2042.66	1127.60
* EO	27.000	670.00	.00	.00	3036.40	17500.00	3040.95	3040.90	3041.80	127.80	11.12	2527.44	1549.01
*	27.000	670.00	.00	.00	3036.40	29000.00	3041.87	3041.81	3043.00	113.57	12.43	3628.49	2721.25
*	28.000	450.00	.00	.00	3040.40	5200.00	3043.93	3043.93	3044.65	73.31	7.79	935.31	607.34
*	28.000	450.00	.00	.00	3040.40	12800.00	3045.15	3045.15	3046.18	75.82	10.10	1878.22	1470.03
* EP	28.000	450.00	.00	.00	3040.40	17500.00	3045.83	3045.63	3046.86	81.76	11.38	2301.73	1935.36
*	28.000	450.00	.00	.00	3040.40	29000.00	3046.70	3046.70	3048.29	82.14	13.10	3295.32	3199.70
*	29.000	640.00	.00	.00	3045.00	5200.00	3049.75	3049.75	3050.48	84.43	9.80	1028.46	565.85
*	29.000	640.00	.00	.00	3045.00	12800.00	3050.94	3050.94	3052.05	107.15	13.14	1894.85	1234.24
EQ	29.000	640.00	.00	.00	3045.00	17500.00	3051.53	3051.46	3052.78	108.16	14.16	2564.69	1682.53
	29.000	640.00	.00	.00	3045.00	29000.00	3052.66	3052.51	3054.28	111.50	16.25	3511.21	2746.36
*	30.000	620.00	.00	.00	3049.80	5200.00	3055.29	3055.29	3055.98	55.26	9.66	1157.03	675.48
ER	30.000	620.00	.00	.00	3049.80	12800.00	3056.44	3056.40	3057.26	68.80	12.00	2336.67	1548.52
	30.000	620.00	.00	.00	3049.80	17500.00	3057.04	3056.76	3057.88	64.87	12.53	3023.83	2172.83
	30.000	620.00	.00	.00	3049.80	29000.00	3058.24	3057.62	3059.15	57.96	13.35	4535.65	3809.15
*	31.000	680.00	.00	.00	3055.30	5200.00	3060.71	3060.71	3061.38	75.04	9.89	872.88	600.29
*	31.000	680.00	.00	.00	3055.30	12800.00	3062.12	3062.12	3063.14	76.33	12.25	2035.85	1465.06
* ES	31.000	680.00	.00	.00	3055.30	17500.00	3062.70	3062.70	3063.70	79.20	13.03	2675.96	2018.06
*	31.000	680.00	.00	.00	3055.30	29000.00	3063.66	3063.66	3064.96	82.23	15.07	3857.13	3198.02

	SECNO	XLOC	ELTRD	ELLO	ELMIN	Q	CWSEL	IFLWO	EL	10*C	.01	AREA	.01R
	32.000	835.00	.00	.00	3063.40	5000.00	3067.78	3073.78	3066.14	7....	.00	1825.00	814.86
ET	32.000	835.00	.00	.00	3063.40	12500.00	3068.81	3068.77	3081....	33.05	10.00	2356.03	1226.31
	32.000	835.00	.00	.00	3063.40	17500.00	3069.32	3069.23	3079.28	78.07	11.00	2983.14	1769.29
	32.000	835.00	.00	.00	3063.40	25000.00	3070.47	3070.38	3071.63	52.10	10.23	4099.34	3021.04
	33.000	850.00	.00	.00	3068.20	5000.00	3070.00	3070.10	3070.70	61.71	9.97	1809.11	1241.91
	33.000	850.00	.00	.00	3068.20	12500.00	3071.49	3071....	3078.11	90.20	12.15	2462.62	1847.77
EK	33.000	850.00	.00	.00	3068.20	17500.00	3071.91	3071....	3078.11	90.20	12.15	2462.62	1847.77
	33.000	850.00	.00	.00	3068.20	25000.00	3072....	3072....	3078.11	90.20	12.15	2462.62	1847.77
	34.000	890.00	.00	.00	3077.40	5000.00	3080.19	3081.79	3082.60	70.52	8.88	1693.01	904.62
	34.000	890.00	.00	.00	3077.40	12500.00	3082.00	3083.0...	3084....	98....	9.00	2007.72	1505....
EV	34.000	890.00	.00	.00	3077.40	17500.00	3082....	3083....	3086....	58.07	9.01	3033.69	2290.57
	34.000	890.00	.00	.00	3077.40	25000.00	3083.41	3084.18	3088....	80.94	9.98	3331.81	3346.82
	35.000	750.00	.00	.00	3063.40	5000.00	3067.36	3067....	3066.60	78.67	....	1778....	921.59
	35.000	750.00	.00	.00	3063.40	12500.00	3068.31	3068....	3067.80	97.47	10....	2422....	1491.46
EW	35.000	750.00	.00	.00	3063.40	17500.00	3068....	3068.71	3070.1	106.57	11.48	2986.72	1844.41
	35.000	750.00	.00	.00	3063.40	25000.00	3069.11	3069.2...	3071.44	114.56	14.19	3612....	2243.61
	36.000	570.00	.00	.00	3067.60	5000.00	3070....	3070.3	3071....	84.61	1	1....7	1....87
	36.000	570.00	.00	.00	3067.60	12500.00	3071.34	3071....	3073.80	82.84	12.61	2885.98	1772.93
EX	36.000	570.00	.00	.00	3067.60	17500.00	3071.74	3071....	3074....	78....	13.05	3398....	2117.72
	36.000	570.00	.00	.00	3067.60	25000.00	3072.31	3072.41	3076.11	7....	14.62	4078.57	2538.33
	37.000	620.00	.00	.00	3070.80	5000.00	3073....	3073.4	3073.3.	81.31	1	12....8	7....3
	37.000	620.00	.00	.00	3070.80	12500.00	3073....	3074....	....	92.58	10.62	2410.46	1....42
EY	37.000	620.00	.00	.00	3070.80	17500.00	3073.88	3074.42	3101.47	103.1.	11.11	3020.23	1.98.62
	37.000	620.00	.00	.00	3070.80	25000.00	3074.61	3075.47	3102.04	98.00	10.23	3796.77	2320.50

CANADA DEL ORO

SUMMARY PRINTOUT TABLE 150

	SECNO	G	CHAN	[illegible]	DIA[illegible]	[illegible]	[illegible]	AL[illegible]
		1.000	5200.00	2681.00	.00	.00	.00	[illegible]	.00
	DJ	1.000	12800.00	2680.02	[illegible]	.00	[illegible]	[illegible]	[illegible]
		1.000	17500.00	2681.50	.48	.00	.00	[illegible]	.00
		1.000	29000.00	2684.41	.10	.00	.00	[illegible]	.00
*		2.000	5200.00	2686.17	.00	[illegible]	.00	[illegible]	670.00
*		2.000	12800.00	2889.21	1.04	6.19	.00	1096.61	670.00
*	DK	2.000	17500.00	2889.70	.50	6.26	.00	1105.28	670.00
*		2.000	29000.00	2890.59	.89	6.19	.00	1120.15	670.00
*		3.000	5200.00	2696.26	.00	6.00	.00	916.[illegible]	665.00
*		3.000	12800.00	2897.18	.92	[illegible]	.00	[illegible]	665.00
*	DL	3.000	17500.00	2897.64	.46	2.36	.00	545.46	665.00
*		3.000	29000.00	2898.49	.85	7.69	.00	[illegible]	665.00
*		4.000	5200.00	2904.53	.00	8.27	.00	[illegible]	660.00
*		4.000	12800.00	2905.67	1.14	8.49	.00	[illegible]	660.00
	DM	4.000	17500.00	2906.18	.51	8.55	.00	[illegible]	660.00
		4.000	29000.00	2907.40	1.22	8.51	.00	[illegible]	[illegible]
*		4.500	5200.00	2908.03	.00	[illegible]	.00	[illegible]	[illegible]
*		4.500	12800.00	2909.25	[illegible]	8.04	.00	[illegible]	[illegible]
*	DN	4.500	17500.00	2909.72	.48	[illegible]	.00	[illegible]	[illegible]
*		4.500	29000.00	2910.[illegible]	.74	[illegible]	.00	[illegible]	[illegible]
		5.000	5200.00	2911.00	.00	[illegible]	.00	[illegible]	[illegible]
		5.000	12800.00	2912.31	1.31	[illegible]	.00	[illegible]	[illegible]
	DO	5.000	17500.00	2912.92	.61	[illegible]	.00	[illegible]	[illegible]
		5.000	29000.00	2914.11	[illegible]	[illegible]	.00	[illegible]	[illegible]
*		6.000	5200.00	2917.[illegible]	[illegible]	[illegible]	.00	[illegible]	[illegible]
*		6.000	12800.00	2319.00	[illegible]	[illegible]	.00	[illegible]	[illegible]
*	DP	6.000	17500.00	2919.51	[illegible]	[illegible]	.00	[illegible]	[illegible]
*		6.000	29000.00	2920.[illegible]	[illegible]	[illegible]	.00	[illegible]	[illegible]
*		7.000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	DQ	7.000	12800.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		7.000	17500.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		7.000	29000.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		8.000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
*		8.000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
*	DR	8.000	17500.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	640.00
*		8.000	29000.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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	SECNO	Q	CWSEL	DIFWSF	[illegible]	[illegible]	[illegible]	[illegible]
	9.000	5200.00	2935.66	.01	[illegible]	.00	[illegible]	[illegible]
	9.000	12800.00	2936.61	1.15	[illegible]	.00	[illegible]	[illegible]
DS	9.000	17500.00	2937.24	.43	[illegible]	.00	[illegible]	[illegible]
	9.000	29000.00	2937.90	.24	[illegible]	.00	[illegible]	[illegible]
	10.000	5200.00	2941.65	.00	[illegible]	.00	[illegible]	[illegible]
	10.000	12800.00	2942.70	.88	[illegible]	.00	[illegible]	[illegible]
DT	10.000	17500.00	2943.15	.46	[illegible]	.00	[illegible]	[illegible]
	10.000	29000.00	2944.21	1.02	[illegible]	.00	[illegible]	[illegible]
	11.000	5200.00	2946.31	.00	[illegible]	.00	[illegible]	[illegible]
	11.000	12800.00	2947.36	.93	[illegible]	.00	[illegible]	[illegible]
DU	11.000	17500.00	2947.76	.48	[illegible]	.00	[illegible]	[illegible]
	11.000	29000.00	2948.58	.93	[illegible]	.00	[illegible]	[illegible]
	12.000	5200.00	2951.31	.00	[illegible]	.00	[illegible]	[illegible]
	12.000	12800.00	2952.37	1.06	[illegible]	.00	[illegible]	[illegible]
DV	12.000	17500.00	2952.86	.49	[illegible]	.00	[illegible]	[illegible]
	12.000	29000.00	2954.91	1.03	[illegible]	.00	[illegible]	[illegible]
	13.000	5200.00	2956.58	.00	[illegible]	.00	[illegible]	[illegible]
	13.000	12800.00	2957.76	1.17	[illegible]	.00	[illegible]	[illegible]
DW	13.000	17500.00	2958.33	.58	[illegible]	.00	[illegible]	[illegible]
	13.000	29000.00	2961.29	1.47	[illegible]	.00	[illegible]	[illegible]
	14.000	5200.00	2962.69	.00	[illegible]	.00	[illegible]	[illegible]
	14.000	12800.00	2963.81	1.05	[illegible]	.00	[illegible]	[illegible]
DX	14.000	17500.00	2964.33	.48	[illegible]	.00	[illegible]	[illegible]
	14.000	29000.00	2966.72	1.34	[illegible]	.00	[illegible]	[illegible]
	14.300	5200.00	2968.77	.01	[illegible]	.00	430.07	60.01
	14.300	12800.00	2969.94	1.19	1.03	.27	461.09	60.06
	14.300	17500.00	2970.53	.61	1.49	2.52	466.17	60.31
	14.300	29000.00	2967.76	1.42	1.03	.27	438.11	60.00
	14.600	5200.00	2964.11	.00	.36	.01	-39.21	60.01
	14.600	12800.00	2965.00	1.34	.32	1.74	-41.71	60.00
DY	14.600	17500.00	2965.34	.66	.01	2.62	-44.31	60.00
	14.600	29000.00	2968.74	1.55	.38	4.11	-41.01	60.00
	15.000	5200.00	2964.13	.01	.67	.01	-111.71	-120.01
	15.000	12800.00	2966.47	1.76	.61	.03	-121.91	-120.02
DZ	15.000	17500.00	2967.26	.98	.01	4.74	-126.91	-120.01
	15.000	29000.00	2969.10	1.71	.58	7.41	-116.01	-120.00
	16.000	5200.00	2970.49	.01	1.15	.01	-183.71	-180.01
	16.000	12800.00	2971.58	1.61	5.16	.03	-191.91	-180.02
EA	16.000	17500.00	2972.08	.91	7.11	.01	-196.91	-180.01
	16.000	29000.00	2973.11	1.71	11.21	.01	-186.01	-180.00

	SECNO								
	17.000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	17.000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
EB	17.000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	17.000	29000.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	18.000	5200.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	18.000	12800.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
EC	18.000	17500.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	18.000	29000.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	19.000	5200.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	19.000	12800.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
ED	19.000	17500.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	19.000	29000.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	20.000	5200.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	20.000	12800.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
EE	20.000	17500.00	2992.04	.83	6.71	1.47	617.66	1.00	[illegible]
	20.000	29000.00	2982.93	.15	6.11	2.45	833.61	700.00	[illegible]
	21.000	5200.00	2994.31	.00	6.00	.00	500.00	500.00	[illegible]
	21.000	12800.00	3000.67	1.05	7.10	1.10	81.27	81.27	[illegible]
EF	21.000	17500.00	3001.23	.56	7.11	1.51	619.76	1000.00	[illegible]
	21.000	29000.00	3002.47	1.04	9.41	1.11	1000.00	1.00	[illegible]
	22.000	5200.00	3003.17	.00	6.00	.00	500.00	500.00	[illegible]
	22.000	12800.00	3007.23	1.03	8.13	1.03	81.27	81.27	[illegible]
EG	22.000	17500.00	3007.72	.48	8.61	1.48	619.76	1000.00	[illegible]
	22.000	29000.00	3008.92	1.04	9.64	1.04	1000.00	1.00	[illegible]
	22.500	5200.00	3009.63	.00	6.00	.00	500.00	500.00	[illegible]
	22.500	12800.00	3009.96	1.03	8.03	1.03	81.27	490.00	[illegible]
EH	22.500	17500.00	3010.11	.48	8.51	1.48	619.76	1000.00	[illegible]
	22.500	29000.00	3011.06	1.04	9.54	1.04	1000.00	1.00	[illegible]
	23.000	5200.00	3011.36	.00	6.00	.00	500.00	500.00	[illegible]
	23.000	12800.00	3011.69	1.03	8.03	1.03	81.27	490.00	[illegible]
EI	23.000	17500.00	3011.84	.48	8.51	1.48	619.76	1000.00	[illegible]
	23.000	29000.00	3012.79	1.04	9.54	1.04	1000.00	1.00	[illegible]
	24.000	5200.00	3013.09	.00	6.00	.00	500.00	500.00	[illegible]
	24.000	12800.00	3013.42	1.03	8.03	1.03	81.27	490.00	[illegible]
EJ	24.000	17500.00	3013.57	.48	8.51	1.48	619.76	1000.00	[illegible]
	24.000	29000.00	3014.52	1.04	9.54	1.04	1000.00	1.00	[illegible]
	24.100	5200.00	3015.22	.00	6.00	.00	500.00	500.00	[illegible]
	24.100	12800.00	3015.55	1.03	8.03	1.03	81.27	490.00	[illegible]
EK	24.100	17500.00	3015.70	.48	8.51	1.48	619.76	1000.00	[illegible]
	24.100	29000.00	3016.65	1.04	9.54	1.04	1000.00	1.00	[illegible]

	SECNO	Y	CWSEL	DIFWSP	[illegible]	DIFWS	[illegible]	ELCm
	25.000	5200.00	3029.19	.00	1.65	.00	1621.30	510.00
EL	25.000	12800.00	3030.21	1.02	3.68	1.06	1608.29	520.00
	25.000	17500.00	3030.76	.54	3.67	1.85	1621.55	510.00
	25.000	29000.00	3031.61	1.06	1.80	2.02	1621.74	510.00
*	25.100	5200.00	3032.53	.00	3.14	.00	1119.49	490.00
*	25.100	12800.00	3033.09	.00	3.11	.00	1109.82	490.00
EM	25.100	17500.00	3033.63	.44	3.11	1.30	1192.22	480.00
	25.100	29000.00	3034.91	1.06	3.10	2.36	1214.56	490.00
	26.000	5200.00	3035.17	.00	2.64	.00	1.87.60	470.00
EL	26.000	12800.00	3036.38	1.21	2.79	1.21	1[illegible]	470.00
	26.000	17500.00	3036.86	.51	2.85	1.72	1247.85	470.00
	26.000	29000.00	3037.81	.93	2.80	2.64	1270.61	470.00
*	27.000	5200.00	3039.80	.00	4.82	.00	1[illegible]	450.00
*	27.000	12800.00	3040.54	.74	4.16	.74	1125.38	450.00
ED	27.000	17500.00	3040.95	.41	4.06	1.15	1174.29	440.00
*	27.000	29000.00	3041.87	.92	4.05	2.07	1216.11	450.00
*	28.000	5200.00	3043.93	.00	4.18	.00	700.[illegible]	450.00
*	28.000	12800.00	3045.15	1.22	4.13	1.22	[illegible].08	450.00
EP	28.000	17500.00	3045.63	.48	4.12	1.70	1[illegible].01	450.00
*	28.000	29000.00	3046.70	1.07	4.11	2.7[illegible]	[illegible].37	450.00
*	29.000	5200.00	3044.75	.00	[illegible]	[illegible]	[illegible].[illegible]	440.00
*	29.000	12800.00	3[illegible]	[illegible]	[illegible]	[illegible]	[illegible].[illegible]	440.00
EQ	29.000	17500.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible].[illegible]	[illegible]
	29.000	29000.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible].[illegible]	[illegible]
*	30.000	5200.00	3035.29	.00	[illegible]	.00	[illegible]	620.00
	30.000	12800.00	3036.44	1.16	1.[illegible]	1.16	1144.66	620.00
EQ	30.000	17500.00	3037.04	.61	[illegible]	1.76	1[illegible]	620.00
	30.000	29000.00	3038.24	1.21	2.[illegible]	2.96	1[illegible]	620.00
*	31.000	5200.00	3040.71	.00	[illegible]	.00	[illegible]	600.00
*	31.000	12800.00	3042.[illegible]	1.41	[illegible]	1.[illegible]	1[illegible]	600.00
ES	31.000	17500.00	3042.[illegible]	.56	[illegible]	1.[illegible]	1[illegible]	600.00
*	31.000	29000.00	3043.[illegible]	.76	[illegible]	2.[illegible]	1[illegible]	600.00
*	32.000	5200.00	3043.78	.00	[illegible]	.00	[illegible]	600.00
	32.000	12800.00	3044.81	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
ET	32.000	17500.00	3045.32	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	32.000	29000.00	3046.47	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
*	33.000	5200.00	3[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
*	33.000	12800.00	3[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
EU	33.000	17500.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	33.000	29000.00	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

	SECNO	Q	CWSEL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	34.000	5200.00	3062.19	.00	5.13	.00	[illegible]	0.00
EV	34.000	12800.00	3063.55	1.36	6.26	2.00	[illegible]	0.00
	34.000	17500.00	3064.19	.64	7.09	1.11	[illegible]	0.00
x	34.000	29000.00	3068.41	1.22	9.91	3.11	[illegible]	0.00
	35.000	5200.00	3067.51	.00	5.37	.00	[illegible]	0.00
EV	35.000	12800.00	3068.68	1.16	6.50	2.00	[illegible]	0.00
	35.000	17500.00	3069.19	.51	6.91	1.00	[illegible]	0.00
x	35.000	29000.00	3076.11	1.92	9.04	2.04	[illegible]	0.00
x	36.000	5200.00	3072.37	.00	4.93	.00	[illegible]	0.00
	36.000	12800.00	3073.54	1.16	6.86	2.00	[illegible]	0.00
EV	36.000	17500.00	3074.23	.68	7.07	1.00	[illegible]	0.00
	36.000	29000.00	3085.00	1.10	9.20	2.1	[illegible]	0.00
	37.000	5200.00	3097.55	.00	5.46	.00	[illegible]	0.00
EV	37.000	12800.00	3099.04	1.49	6.77	2.00	[illegible]	0.00
	37.000	17500.00	3099.86	.81	6.61	1.00	[illegible]	0.00
	37.000	29000.00	3101.00	1.13	8.64	3.15	[illegible]	0.00

SUMMARY OF ERRORS AND SPECIAL NOTES

CAUTION SECNO= 2.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 2.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY
CAUTION SECNO= 2.000 PROFILE= 2 CRITICAL DEPTH ASSUMED
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WARNING SECNO= 15.000 PROFILE= 1 CONVEYANCE CHANGE OUTSIDE APPLICABLE RANGE

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WARNING SECNO= 27.000 PROFILE= 2 [illegible] FLOW FAILS
WARNING SECNO= 27.000 PROFILE= 3 [illegible] FLOW FAILS
WARNING SECNO= 27.000 PROFILE= 4 [illegible] FLOW FAILS

CAUTION SECNO= 28.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
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WARNING SECNO= 34.000 PROFILE= 1 CRAZY SPEC. CHECK - USING MINIMUM SPECIFIC ENERGY

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FLOOD INSURANCE ZONE DATA FOR SUMMER VILLAGE

FLOOD HAZARD FACTOR FOR ENTIRE REACH DURING SECTION

SECTION NUMBER	CUMULATIVE DISTANCE	ELEVATION DIFFERENCE BETWEEN BASE FLOOD AND		
		[illegible]	[illegible]	[illegible]
1.000	0.	[illegible]	[illegible]	[illegible]
2.000	570.	[illegible]	[illegible]	[illegible]
3.000	1235.	[illegible]	[illegible]	[illegible]
4.000	[illegible]	[illegible]	[illegible]	[illegible]
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5.000	2945.	[illegible]	[illegible]	[illegible]
6.000	3695.	[illegible]	[illegible]	[illegible]
7.000	4450.	[illegible]	[illegible]	[illegible]
8.000	5190.	[illegible]	[illegible]	[illegible]
9.000	5906.	[illegible]	[illegible]	[illegible]
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13.000	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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24.100	16727.	[illegible]	[illegible]	[illegible]
25.000	17427.	[illegible]	[illegible]	[illegible]
25.100	[illegible]	[illegible]	[illegible]	[illegible]
26.000	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
27.000	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]

WEIGHTED AVG FOR REACH -1.70 -.03 ....

FHF FOR THE REACH = .03 WITH 95.0 PERCENT OF THE FLOW WITHIN .1 TO .1
ZONE FOR THE REACH = A 1

Normal program termination

HEC-2 SEC NO.	LETTER	COMMENTS
1	DJ	Limit of Study
2	DK	
3	DL	
4	DM	
4.5	DN	
5	DO	
6	DP	
7	DQ	
8	DR	
9	DS	
10	DT	
11	DU	Wilds Road
12	DV	
13	DW	
14	DX	
14.3		
14.6	DY	Golder Ranch Road Bridge
15	DZ	
16	EA	
17	EB	
18	EC	
19	ED	
20	EE	
21	EF	
22	EG	
22.5	EH	
23	EI	
24	EJ	
24.1	EK	
25	EL	
25.1	EM	
26	EN	
27	EO	
28	EP	
29	EQ	
30	ER	
31	ES	
32	ET	
33	EU	
34	EV	
35	EW	
36	EX	
37	EY	Edwin Road Pima-Pinal County Line Limit of Study

HEC2 S/N: 1353000090 HMVersion: 6.60 Data File: FLOODWY1.HC2

```
**********************************************
*  HEC-2 WATER SURFACE PROFILES              *
*                                            *
*  Version   4.6.2;  May 1991                *
*                                            *
*  RUN DATE    27OCT94    TIME   16:25:59    *
**********************************************
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****************************************
*  U.S. ARMY CORPS OF ENGINEERS        *
*  HYDROLOGIC ENGINEERING CENTER       *
*  609 SECOND STREET, SUITE D          *
*  DAVIS, CALIFORNIA 95616-4687        *
*         (916) 756-1104               *
****************************************
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X     X  XXXXXXX   XXXXX             XXXXX
X     X  X        X     X           X     X
X     X  X        X                       X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X        X                  X
X     X  X        X     X            X
X     X  XXXXXXX   XXXXX             XXXXXXX
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:::::::::::::::::::::::::::::::::::::::::::::
:::::::::::::::::::::::::::::::::::::::::::::
:::                                       :::
:::   FULL MICRO-COMPUTER IMPLEMENTATION   :::
:::                                       :::
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============================
H A E S T A D  M E T H O D S
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37 Brookside Road * Waterbury, Connecticut 06708 * (203) 755-1666

FLOODWAY

THIS RUN EXECUTED 27OCT94 16:26:00

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**************************************
 HEC-2 WATER SURFACE PROFILES

 Version   4.6.2;  May 1991
**************************************


T1      UPPER CANADA DEL ORO FLOOD INSURANCE STUDY  --  FLOODWAY (UNENCROACHED)
T2      CATALINA STATE PARK BOUNDARY TO PINAL COUNTY LINE
T3      CANADA DEL ORO
T4      CONSULTANT:  DAVID EVANS & ASSOCIATES, INC     DEA JOB NO. PCDT0010
T5                   3845 N. BUSINESS CENTER DRIVE     PHONE: (602) 292-2160
T6                   TUCSON, AZ 85705                  FAX: (602) 292-9131
T6      DAVID EVANS & ASSOCIATES PROJECT MANAGER:  MATT FLICK
T7      CLIENT: PIMA COUNTY DEPT. OF TRANS. & FLOOD CONTROL DISTRICT
T8              201 N. STONE AVENUE                    ACTIVITY # 4FUCD0
T9              TUCSON, AZ 85701                       PHONE: (602) 740-6350
T9      PIMA COUNTY FLOOD CONTROL DISTRICT PROJECT MANAGER:  STEVE CASILLAS
T9*************************************************************************************
T9***** 100-YEAR ANALYSIS  - Q100=17500 CFS  - STARTING WSE = 2883.5          **
T9*************************************************************************************

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

       0         2         0         0     0.008         0         0         0    2883.5         0

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

       1         0        -1         0         0         0        -1         0         0         0


J3  VARIABLE CODES FOR SUMMARY PRINTOUT

     150       110       115       200                   38        27        28        21        53
      22        54

J5  LPRNT    NUMSEC                  ********REQUESTED SECTION NUMBERS********

     -10       -10

NC    0.045     0.045     0.032       0.1         0.3
QT        2     17500     17500
  *****  DOWNSTREAM OF GUN RANGE EMBANKMENTS  *****
ET                         7.1                                          621      1314.5
  *****  BOWMAN ROAD  *****
  *****  CATALINA STATE PARK  *****
  ***** DJ *****
NH        4      .050    1008.4      .040     1171.7       .032     1314.5       .070     1464.8
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X1         1        70    1171.7    1314.5         0         0         0
GR    2889.9       0.0    2887.1      13.4    2880.4      29.4    2880.3      44.4    2881.4      58.0
GR    2881.8      81.1    2882.2     117.9    2883.0     153.5    2883.3     189.8    2882.9     219.3
GR    2880.0     229.8    2880.1     239.6    2881.2     246.9    2881.8     262.9    2881.8     281.6
GR    2881.0     295.7    2881.0     316.2    2883.0     337.3    2882.7     360.4    2882.1     391.4
GR    2882.2     406.8    2881.4     442.8    2881.1     471.8    2881.2     497.7    2878.6     509.9
GR    2878.9     538.5    2880.9     545.7    2881.5     579.9    2881.4     591.3    2879.5     598.6
GR    2879.3     609.5    2880.6     617.4    2879.5     625.8    2880.9     633.4    2882.0     647.2
GR    2881.3     659.7    2877.9     665.8    2877.9     672.3    2881.6     684.9    2881.5     716.1
GR    2882.4     724.1    2882.6     743.5    2881.6     755.1    2881.6     762.5    2881.7     797.8
GR    2882.4     825.6    2880.4     832.1    2882.0     842.4    2881.6     858.3    2882.4     870.2
GR    2881.2     896.4    2881.7     908.4    2880.8     918.2    2881.5     928.6    2881.5    1008.4
GR    2880.4    1015.9    2880.4    1029.0    2880.1    1082.3    2880.5    1113.0    2880.7    1140.0
GR    2880.8    1171.7    2880.2    1223.4    2879.3    1228.0    2879.5    1252.4    2880.0    1293.6
GR    2881.1    1314.5    2881.3    1341.7    2884.9    1380.9    2886.9    1413.3    2895.5    1464.8
  ***** DOWNSTREAM OF GUN RANGE EMBANKMENTS *****
  ***** DK *****

ET                          7.1                                   310      1001.4
NC       .05       .070       .03         .1         .3
X1         2         57     887.2    1001.4        600       580       570
GR    2893.2       0.0    2886.4      21.0    2886.0      24.4    2886.0      31.0    2884.0      48.7
GR    2884.7      56.8    2886.1      71.7    2888.3      81.3    2887.3      89.2    2887.2     103.6
GR    2886.8     120.0    2886.1     132.4    2888.1     151.3    2886.9     172.5    2887.6     180.9
GR    2887.1     232.3    2887.6     286.0    2887.3     362.8    2887.7     417.8    2887.1     424.9
GR    2887.8     439.0    2887.9     468.4    2887.6     508.5    2887.9     529.9    2887.7     567.4
GR    2884.8     574.4    2884.8     587.3    2885.7     590.7    2884.9     596.8    2886.3     608.8
GR    2888.0     628.6    2888.4     645.0    2888.9     663.5    2887.2     672.4    2887.2     693.9
GR    2888.8     710.5    2889.1     780.5    2887.9     792.3    2887.1     816.9    2888.8     835.0
GR    2888.7     862.3    2887.9     887.2    2887.3     900.0    2885.3     905.4    2885.4     917.0
GR    2886.9     923.5    2886.9     933.8    2885.4     939.8    2885.0     989.0    2887.4    1001.4
GR    2887.3    1016.8    2887.1    1044.2    2887.3    1079.5    2888.3    1095.9    2889.8    1117.5
GR    2890.6    1131.3    2894.1    1153.2
  ***** UPSTREAM OF GUN RANGE EMBANKMENTS *****
  ***** DL *****

NC      .050       .044       .032
ET                          7.1                                   251       811
X1         3         41     697.6     769.6       650       700       685
GR    2908.8       0.0    2903.8      16.0    2905.1      32.5    2894.6      64.9    2894.9     102.1
GR    2894.9     144.9    2894.8     211.5    2894.1     230.0    2895.1     265.3    2894.7     288.8
GR    2895.4     310.6    2895.4     359.2    2894.4     387.8    2895.3     407.2    2895.5     434.3
GR    2895.6     464.7    2895.6     496.5    2895.3     565.8    2895.1     622.6    2895.1     681.6
GR    2895.3     697.6    2892.3     702.7    2892.3     751.0    2896.7     769.6    2894.6     781.3
GR    2894.5     808.1    2894.4     845.8    2895.0     861.8    2894.3     883.6    2895.0     897.0
GR    2894.2     919.0    2895.3     944.1    2895.3     959.9    2894.9     964.8    2896.1     972.1
GR    2901.1    1066.2    2902.6    1095.5    2912.2    1145.1    2910.9    1149.6    2911.7    1158.3
GR    2916.4    1168.6
  ***** CROSS-SECTION GROUND POINTS INCORPORATE SURVEY DATA THAT REFLECT
  ***** CHANGES WHICH OCCURRED IN THE FLOODING OF JANUARY 1993 (NEW INPUT DATA
  ***** USES WHOLE NUMBER STATIONING)
  ***** DM *****
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NC     .050       .044       .032
ET                           7.1                                          427        825
X1        4         45        443        557        975        885        935
GR   2918.5        0.0     2915.3       24.3     2913.6       48.3     2910.8       75.5     2908.6       97.9
GR   2907.6      127.7     2906.1      150.7     2904.6      158.2     2904.2      172.2     2905.2      201.1
GR   2905.4      225.5     2905.0      266.1     2904.0      314.0     2903.0      360.8     2903.0      389.6
GR   2904.2        393     2903.9        443     2900.9        461     2900.7        497     2900.5        533
GR   2904.0        549     2901.7        553     2903.3        557     2902.8        599     2902.9      627.1
GR   2902.8      677.7     2902.7      731.3     2903.1      787.5     2903.8      844.5     2903.8      894.9
GR   2903.8      951.7     2904.6      971.1     2905.1     1006.8     2904.2     1010.5     2904.3     1022.1
GR   2905.0     1029.3     2905.6     1048.6     2906.3     1071.4     2907.5     1096.6     2908.5     1122.1
GR   2908.9     1144.6     2915.4     1179.6     2928.7     1247.1     2928.5     1262.9     2927.9     1268.3
  ***** CROSS-SECTION GROUND POINTS INCORPORATE SURVEY DATA THAT REFLECT
  ***** CHANGES WHICH OCCURRED IN THE FLOODING OF JANUARY 1993 (NEW INPUT DATA
  ***** USES WHOLE NUMBER STATIONING)
  CROSS-SECTION 4.5 ADDED FOR COMPUTATIONAL STABILITY BETWEEN SECNOs 4 & 5
  ***** DN *****

NC      0.05      0.046      0.032
ET                           7.1                                          159        649
X1       4.5         23        179        287        350        325        375          0       2900          0
GR        14          0        6.1         20        6.3         29          8         38        8.5         47
GR         8        105          5        110        5.2        156        7.6        179        6.7        201
GR       5.2        214          4        216        3.8        245        3.6        274        5.2        287
GR       6.4        292        6.5        445          8        645        7.9        850          9        895
GR         9        945        9.4        995       15.5       1045
  ***** CROSS-SECTION GROUND POINTS INCORPORATE SURVEY DATA THAT REFLECT
  ***** CHANGES WHICH OCCURRED IN THE FLOODING OF JANUARY 1993 (NEW INPUT DATA
  ***** USES WHOLE NUMBER STATIONING)
  ***** DO *****

ET                           7.1                                           99        690
NH        5       .070         99       .032        179       .040      460.8         .1      637.2       .044
NH   1130.6
X1        5         29         99        179        350        325        375
GR   2920.4        0.0     2917.2         49     2912.9         99     2907.8        119     2907.8        141
GR   2907.3        163     2910.5        179     2910.0        229     2910.0      247.8     2909.7      297.5
GR   2909.3      344.9     2908.7      413.5     2909.3      460.8     2909.1      496.3     2908.7      521.9
GR   2908.8      562.2     2909.1      637.2     2909.5      686.9     2909.9      781.0     2910.9      833.5
GR   2912.1      869.4     2912.0      892.1     2910.9      926.3     2910.9      953.6     2912.0      984.2
GR   2911.7     1025.4     2911.3     1076.4     2915.3     1103.4     2923.8     1130.6
  ***** OP *****

ET                           7.1                                           28        486
NH        4       .070         28       .032         77       .046      282.7       .042     1119.8
X1        6         37         28         77        730        710        710
GR   2933.8        0.0     2927.2       15.3       2916         28     2914.1       32.4     2914.1       66.7
GR   2916.5       77.0     2916.7       90.4     2916.6      125.5     2916.1      162.3     2915.9      179.9
GR   2914.9      194.7     2916.7      213.7     2916.8      232.5     2916.3      246.1     2915.7      257.2
GR   2913.8      265.4     2916.1      273.2     2916.5      282.7     2916.4      369.2     2916.8      462.3
GR   2917.0      608.3     2917.8      684.6     2918.8      748.0     2918.6      815.5     2918.6      892.9
GR   2918.5      924.2     2917.0      930.9     2917.0      939.6     2918.6      947.4     2918.6      958.3
GR   2918.3     1007.2     2918.9     1029.1     2919.7     1048.8     2919.7     1067.4     2922.0     1099.4
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GR   2924.3     1116.4     2926.6     1119.8
  *****  ROLLINS ROAD  *****
  ***** DQ *****

ET                        7.1                                    22.2        550
NH        4        .07      22.2       .032       91.4       .047      399.3       .040     1099.7
X1        7         46      22.2       91.4        810        700        800
GR   2930.1        0.0    2929.7        6.8     2925.9       22.2     2920.6       34.9     2920.6       63.4
GR   2921.0       78.4    2923.6       91.4     2924.3      112.5     2924.1      130.0     2923.5      152.8
GR   2922.4      172.6    2922.4      186.0     2923.4      202.1     2923.8      215.4     2922.4      228.3
GR   2923.3      237.0    2923.5      252.5     2922.9      265.7     2922.7      281.1     2923.3      296.9
GR   2922.8      311.2    2920.5      319.3     2922.5      329.8     2923.1      343.8     2923.5      359.0
GR   2923.0      399.3    2923.0      479.8     2923.0      561.2     2922.6      584.7     2923.0      606.6
GR   2923.2      649.1    2923.7      719.4     2924.8      785.5     2925.0      847.4     2925.2      928.1
GR   2924.7      937.0    2924.6      954.9     2926.0      961.5     2926.7      977.8     2927.1     1015.2
GR   2927.3     1022.8    2929.2     1039.0     2930.3     1057.9     2930.9     1082.1     2932.4     1099.6
GR   2932.4     1099.7
  ***** CROSS-SECTION GROUND POINTS INCORPORATE SURVEY DATA THAT REFLECT
  ***** CHANGES WHICH OCCURRED IN THE FLOODING OF JANUARY 1993 (NEW INPUT DATA
  ***** USES WHOLE NUMBER STATIONING)
  ***** OR*****

ET                        7.1                                    11.5        451
NC      .048       .041       .032
X1         8         50          5        243        750        730        740
GR   2939.8        0.0    2936.6          5     2926.3         20     2926.4         70     2927.3         74
GR   2927.1        120      2927        127     2926.5        178     2926.6        220     2928.6        225
GR   2930.2        243    2929.8      265.7     2930.2      282.3     2930.6      311.3     2928.6      329.4
GR   2928.7      341.9    2929.7      350.8     2927.6      363.4     2927.4      368.7     2930.9      378.0
GR   2931.2      394.4    2931.2      418.8     2930.8      447.3     2930.4      482.1     2930.1      520.3
GR   2930.3      557.6    2930.3      588.7     2930.7      624.5     2930.6      670.9     2930.7      713.6
GR   2930.6      772.1    2930.3      799.3     2930.0      817.8     2930.4      824.7     2930.2      848.1
GR   2929.4      853.0    2930.8      863.3     2930.9      883.5     2931.3      897.7     2931.2      916.8
GR   2929.9      935.4    2930.2      946.8     2930.0      959.0     2930.7      975.2     2931.8      996.4
GR   2931.7     1019.5    2931.7     1036.0     2933.8     1059.7     2937.9     1105.6     2940.7     1123.0
  ***** CROSS-SECTION GROUND POINTS INCORPORATE SURVEY DATA THAT REFLECT
  ***** CHANGES WHICH OCCURRED IN THE FLOODING OF JANUARY 1993 (NEW INPUT DATA
  ***** USES WHOLE NUMBER STATIONING)
  ***** TROTTER PLACE / TROTTER ROAD  *****
  ***** DS *****

ET                        7.1                                      88        586
X1         9         62         88        380        640        575        610
GR   2950.0        0.0    2936.4         59     2934.9         88     2933.3         90     2933.3         99
GR   2935.4        111    2932.4        159     2932.3        180     2934.5        186     2934.1        259
GR   2934.0        305    2933.1        309     2932.7        359     2935.5        366     2936.1        380
GR   2932.8      398.7    2935.0      404.3     2935.0      427.2     2933.9      443.0     2935.8      461.6
GR   2936.1      477.2    2935.1      496.5     2932.2      503.8     2932.3      508.9     2934.5      517.8
GR   2934.1      531.1    2935.8      544.1     2935.9      557.7     2935.5      582.6     2935.7      637.3
GR   2936.5      687.3    2935.9      731.6     2935.1      772.5     2934.6      825.7     2935.3      834.0
GR   2934.7      843.6    2934.4      859.7     2934.4      873.2     2936.0      882.2     2935.2      894.5
GR   2935.3      933.3    2935.8      952.3     2934.7      966.7     2934.8      991.6     2936.2     1008.3
GR   2936.1     1022.2    2935.4     1046.9     2935.7     1077.0     2936.5     1125.1     2936.5     1201.3
GR   2937.6     1229.8    2946.7     1261.0     2949.4     1282.7     2949.1     1303.1     2947.2     1335.8
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GR   2948.4     1358.5     2947.2     1362.8     2948.4     1367.4     2948.8     1387.6     2949.0     1404.2
GR   2950.1     1423.3     2951.5     1431.8
  ***** CROSS-SECTION GROUND POINTS INCORPORATE SURVEY DATA THAT REFLECT
  ***** CHANGES WHICH OCCURRED IN THE FLOODING OF JANUARY 1993 (NEW INPUT DATA
  ***** USES WHOLE NUMBER STATIONING)
  *****  WILDS ROAD (WEST OF CDO)  *****
  ***** DT *****

ET                          7.1                                    45.7        630
NH        4        .052       29        .032       213        .044      369.1        .042     1270.8
X1       10          32       29         213       620         630        660
GR   2949.6         0.0   2947.8        14.7   2947.5          29     2939.2          61     2939.9       119.0
GR   2940.5         177   2941.5         188   2942.1         213     2941.8       220.9     2941.4       264.4
GR   2941.2       297.6   2941.0       324.7   2940.5       360.4     2938.6       369.1     2940.0       379.3
GR   2940.1       417.4   2940.5       441.2   2940.5       491.3     2940.1       544.8     2940.1       593.0
GR   2940.3       646.4   2940.5       724.7   2941.0       792.1     2940.4       831.3     2940.7       846.9
GR   2940.7       880.4   2940.9       924.0   2941.3       968.8     2942.2      1023.0     2943.8      1101.0
GR   2945.8      1175.9   2951.3      1270.8
  ***** CROSS-SECTION GROUND POINTS INCORPORATE SURVEY DATA THAT REFLECT
  ***** CHANGES WHICH OCCURRED IN THE FLOODING OF JANUARY 1993 (NEW INPUT DATA
  ***** USES WHOLE NUMBER STATIONING)
  ***** DU *****

ET                          7.1                                    53.2        630
  *****  ARABIAN CIRCLE  *****
NH        5         .05       45        .032       135        .042      527.7        .052      787.5        .042
NH   1106.1
X1       11          43       45         135       450         500        450
GR   2955.0         0.0   2952.9          20   2949.3          45     2948.3          53     2943.2          55
GR   2943.1          90   2943.2         125   2945.4         135     2945.9         155     2946.0       224.5
GR   2946.0       247.7   2945.6       280.9   2945.1       320.3     2945.8       337.9     2944.5       364.2
GR   2945.4       379.3   2944.9       403.9   2944.8       425.3     2944.0       438.2     2945.5       452.5
GR   2945.1       482.2   2943.7       501.4   2944.1       527.7     2945.0       549.0     2944.5       576.6
GR   2944.4       613.4   2945.1       641.2   2945.1       670.7     2944.7       702.7     2945.1       744.5
GR   2945.5       787.5   2946.0       833.9   2945.3       872.5     2945.7       893.2     2945.2       915.6
GR   2947.1       945.8   2946.0       961.4   2945.9       989.8     2946.6      1017.7     2947.4      1048.7
GR   2948.7      1077.0   2950.8      1105.5   2951.4      1106.1
  ***** DV *****

ET                          7.1                                   225         815
NC                                      0.3        0.5
NH        6        .060       56.5        .032       160.1        .058      237.1        .032      293.7        .052
NH    402.7        .042     1106.6
X1       12          46      237.1         293.7       650         650        655
GR   2960.0         0.0   2959.0          17.9   2954.8          56.5     2950.8       102.2     2950.8       113.1
GR   2951.5       134.4   2951.4         160.1   2951.4         196.0     2951.9       219.4     2952.0       237.1
GR   2948.3       253.4   2948.7         277.6   2951.5         293.7     2951.9       318.2     2951.9       340.5
GR   2951.1       363.1   2951.9         377.2   2951.7         402.7     2952.0       420.4     2951.1       442.3
GR   2951.1       470.6   2951.3         495.7   2951.1         549.3     2950.5       572.4     2950.9       589.9
GR   2951.1       616.2   2951.2         658.2   2951.3         697.3     2951.1       746.8     2951.2       794.2
GR   2950.5       808.4   2951.0         831.0   2951.1         880.5     2951.1       935.1     2951.8       953.6
GR   2950.5       965.9   2951.3         976.5   2951.4         996.8     2950.0      1010.3     2951.5      1020.3
GR   2951.9      1049.3   2955.2        1069.9   2955.4        1082.0     2954.8      1091.0     2958.6      1105.6
GR   2960.6      1106.6
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   *****  ET CARD (RIGHT ENCROACHMENT) DEFINES INEFFECTIVE FLOW AREA
   *****  DUE TO GOLDER RANCH ROAD BRIDGE
   ***** DW *****
ET                9.1        7.1                                          222.2         760          50         760
NC      .040      .042       .032
X1        13        53      222.2       286.9         630         630         650
GR      2972        50       2970          63        2968          70        2966          81        2964          90
GR    2960.3     100.0     2958.2       116.9      2957.4       131.5      2957.4       183.4      2959.9       198.9
GR    2960.3     222.2     2954.8       237.8      2954.8       280.0      2956.2       286.9      2956.2       304.6
GR    2956.0     330.1     2956.7       366.8      2956.8       414.7      2957.2       474.2      2956.9       514.6
GR    2957.8     546.3     2957.4       574.9      2955.3       585.8      2957.9       604.7      2957.5       649.9
GR    2956.3     665.8     2955.8       675.0      2957.9       690.4      2958.2       701.3      2957.9       725.5
GR    2957.5     753.9     2957.2       774.1      2958.7       793.8      2958.7       821.3      2958.7       865.9
GR    2958.6     905.7     2959.0       941.2      2959.0       970.8      2958.7      1009.5      2959.1      1013.2
GR    2957.9    1019.9     2957.4      1026.6      2958.3      1037.8      2958.1      1058.6      2956.5      1068.3
GR    2956.9    1077.3     2957.8      1090.4      2957.3      1099.8      2957.8      1119.6      2958.5      1145.6
GR    2958.4    1169.9     2960.4      1192.1      2962.7      1217.1
   *****  ET CARD (RIGHT ENCROACHMENT) DEFINES INEFFECTIVE FLOW AREA
   *****  DUE TO GOLDER RANCH ROAD BRIDGE
   ***** DX *****
ET                9.1        7.1                                          100         585         100         585
NC      .055      .045       .032
X1        14        57      168.2       277         500         540         520
GR      2972        45       2970          60        2968          71        2966          80        2964          92
GR    2963.3     100.0     2961.2       119.1      2959.8       143.6      2959.5       168.2      2958.6       171.2
GR    2958.6     179.7     2958.9       196.8      2958.8       214.6      2959.1       238.1      2958.4       248.7
GR    2958.4     263.8     2960.0       277.0      2961.8       294.0      2962.2       313.8      2962.3       333.5
GR    2961.4     358.0     2961.8       382.1      2962.0       421.8      2962.3       464.5      2962.4       480.7
GR    2962.8     496.3     2961.9       515.3      2961.9       542.0      2963.0       562.4      2963.1       573.1
GR    2962.0     579.4     2962.3       598.7      2963.4       613.9      2963.4       641.4      2962.8       668.9
GR    2962.8     688.6     2961.9       712.1      2962.0       723.4      2961.3       733.9      2963.1       752.7
GR    2963.0     777.1     2963.4       815.4      2963.3       838.5      2962.7       853.3      2962.9       878.6
GR    2963.8     912.7     2970.3       941.0      2970.9       951.7      2971.0       973.4      2970.5       983.6
GR    2966.8     998.9     2967.4      1022.7      2968.6      1057.3      2968.9      1087.6      2969.9      1103.0
GR    2970.0    1115.5     2970.0      1115.6
   *****  DOWNSTREAM SIDE OF GOLDER RANCH BRIDGE  *****
   *****  GR STATION 110 = GOLDER BRIDGE (P.C. W.O. 4BACS3) STATION 38+00
ET               9.11       7.11                                          110         590         110         590
X1      14.3       10        128         345          70          90          80
BT        10       110    2986.82     2981.82         120     2986.60     2981.60         128     2986.43     2981.43
BT       210    2984.6     2979.6         270     2983.33     2978.33         320     2982.24     2977.24         345
BT    2981.5    2976.5         585     2976.5     2971.46         590     2976.36     2971.36         660     2974.83
BT    2974.8
GR    2981.8       110        2970         120        2962         128        2960         210        2959.3       270
GR      2960       320        2962         345        2964         585        2970         590       2974.83       660
   ***** DY *****
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ET              9.11      7.11                                  110       590       110       590
X1    14.6                                    53        53       53
BT      10       110   2986.82   2981.82      120   2986.60   2981.60       128   2986.43   2981.43
BT     210    2984.6    2979.6       270   2983.33   2978.33       320   2982.24   2977.24       345
BT  2981.5    2976.5       585    2976.5   2971.46       590   2976.36   2971.36       660   2974.83
BT  2974.8
  ***** ET CARD (RIGHT ENCROACHMENT) DEFINES INEFFECTIVE FLOW AREA
  ***** DUE TO GOLDER RANCH ROAD BRIDGE
  ***** DZ *****

ET              9.1       7.1                                   251.1       654         0       692
NC     .055      .045      .032
X1       15        33     251.1     340.6       121       121       121
GR  2985.0       0.0    2981.6      27.2    2974.2      76.6    2967.9     119.8    2965.4     150.1
GR  2964.0     172.5    2962.1     210.4    2961.4     229.1    2961.8     251.1    2960.7     266.3
GR  2960.9     319.6    2961.9     340.6    2962.6     376.7    2963.1     417.2    2963.6     447.2
GR  2964.0     494.5    2964.8     518.1    2964.8     540.8    2964.9     607.3    2965.0     654.1
GR  2965.3     698.4    2965.1     734.4    2965.3     787.3    2965.5     825.7    2965.9     874.2
GR  2967.5     915.3    2970.3     932.6    2971.2     965.2    2971.0     985.7    2973.2    1011.9
GR  2975.3    1044.5    2976.6    1081.7    2978.4    1102.9
  ***** EA *****

ET                        7.1                                   224       782
NC     .042      .032      .048
X1       16        46     352.1     420.5       550       490       560
GR  2976.0       0.0    2972.5      31.3    2969.6      48.2    2969.6      58.7    2966.3      70.6
GR  2966.3      77.8    2969.6      88.8    2969.9     125.0    2967.5     133.1    2969.2     141.9
GR  2969.4     169.4    2969.3     213.3    2969.0     277.3    2969.5     290.2    2969.4     320.7
GR  2969.8     352.1    2965.1     358.3    2965.8     409.0    2967.7     420.5    2967.9     440.6
GR  2969.5     495.5    2968.2     508.0    2969.6     520.4    2969.1     541.0    2970.2     570.1
GR  2971.2     586.6    2970.4     596.7    2969.2     608.7    2970.0     624.1    2969.4     642.5
GR  2969.2     669.8    2970.1     701.2    2971.7     721.6    2972.7     740.3    2973.0     755.0
GR  2973.7     759.9    2970.6     768.5    2970.6     788.7    2969.9     814.9    2968.3     843.2
GR  2969.2     860.0    2969.6     883.1    2969.4     911.0    2970.2     936.7    2970.5     963.0
GR  2976.6    1004.3
  ***** EB *****

NC     .042      .044      .032       0.1       0.3
ET                        7.1                                   328       845.8
X1       17        39     744.4     845.8       334       369       490
GR  2982.0       0.0    2978.2      28.2    2974.0      62.4    2972.9      93.2    2972.5     123.8
GR  2971.3     134.1    2971.2     142.7    2969.7     149.8    2971.8     159.4    2971.9     170.6
GR  2971.4     193.6    2971.5     208.8    2972.2     224.8    2972.2     243.6    2970.5     256.8
GR  2971.1     275.5    2971.6     313.3    2971.6     342.6    2972.0     421.3    2972.3     512.4
GR  2972.7     613.6    2972.7     660.2    2973.2     708.8    2973.5     744.4    2968.5     781.6
GR  2969.8     830.6    2973.8     845.8    2973.2     872.1    2973.3     899.7    2975.1     933.3
GR  2977.1     967.5    2980.1    1007.8    2981.2    1025.5    2981.9    1036.2    2982.8    1061.6
GR  2984.3    1073.2    2985.0    1092.7    2985.6    1109.6    2989.2    1154.5
  ***** EC *****
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ET                          7.1                                   365       990
NH        4       .038      864.9       .056      923.6       .032      975.5      .044      1147.2
X1       18         42      923.6      975.5        680        770        770
GR     2992         38       2990         61       2988         69       2986        77        2984        85
GR   2981.9      100.0     2977.6      142.7     2977.6      155.8     2975.6     158.6     2975.6     167.1
GR   2977.2      182.6     2978.3      207.0     2978.4      221.2     2977.2     225.0     2977.2     257.7
GR   2978.4      264.4     2978.1      273.6     2978.2      294.0     2978.5     305.9     2977.0     313.0
GR   2977.0      346.3     2977.9      350.9     2977.9      396.0     2977.9     458.7     2978.7     529.9
GR   2978.7      608.2     2978.8      672.1     2978.7      762.1     2978.7     836.2     2978.7     864.9
GR   2979.8      871.4     2979.9      892.8     2980.1      912.4     2979.2     923.6     2975.2     938.7
GR   2975.3      957.3     2978.6      975.5     2980.1      997.4     2981.1    1017.1     2985.5    1078.5
GR   2992.8     1130.7     2993.1     1147.2
  ***** ED *****

ET                          7.1                                   264       789
NC      .038       .038       .032
X1       19         39      713.9        789        620        600        610
GR   2988.0        0.0     2985.0       28.0     2983.8       34.7     2983.5      49.0     2982.5      57.5
GR   2981.7       77.8     2982.1       95.4     2981.8      122.6     2981.7     141.2     2983.0     174.9
GR   2982.3      200.7     2981.9      225.2     2981.5      258.9     2981.9     283.6     2983.4     293.4
GR   2983.1      316.7     2982.9      358.9     2983.1      381.0     2983.1     410.5     2983.0     448.7
GR   2983.2      483.3     2983.3      521.6     2983.4      561.4     2983.6     591.4     2984.4     617.6
GR   2984.6      644.9     2984.4      660.1     2982.6      672.7     2982.0     693.0     2982.7     713.9
GR   2980.7      728.4     2980.7      743.0     2980.3      754.2     2980.2     776.3     2983.4     789.0
GR   2984.9      821.0     2988.1      866.8     2992.1      931.2     2995.5     964.1
  ***** EE *****

ET                          7.1                                   205       733
NH        5        .06      122.3       .040      481.9       .032      522.2      .040      765.2       .044
NH    915.3
X1       20         45      481.9      522.2        720        745        730
GR   2997.7        0.0     2996.0       12.2     2994.3       26.3     2991.1      56.2     2990.1      78.3
GR   2988.7      109.0     2988.6      122.3     2988.9      141.4     2988.9     177.2     2989.3     220.2
GR   2989.6      238.9     2989.5      252.7     2990.2      266.9     2989.3     292.3     2990.0     310.2
GR   2990.0      330.8     2990.2      354.9     2990.1      379.5     2990.2     398.4     2989.5     411.4
GR   2989.9      431.0     2990.6      448.6     2990.3      481.9     2985.7     490.3     2986.1     512.7
GR   2988.8      522.2     2989.3      550.9     2988.2      566.2     2989.0     578.1     2988.5     593.4
GR   2988.4      605.7     2988.9      623.9     2988.9      644.1     2989.1     673.9     2989.9     697.3
GR   2989.9      711.6     2989.0      740.6     2988.4      765.2     2988.6     790.6     2988.9     827.3
GR   2989.8      848.4     2993.3      874.5     2998.8      900.8     2999.7     915.2     2999.8     915.3
  ***** CROSS-SECTION 21 HAS BEEN MODIFIED TO REFLECT THE REALIGNMENT OF THE
  ***** CROSS-SECTION TO BETTER REFLECT FLOW PATTERNS
  ***** EF *****

ET                          7.1                                   220       592
  *****  HAWSER STREET  *****
NH        4       .060        67       .040       372       .032      423      .040      1020
X1       21         26       372        423      1080       1000     1060                2900
GR      110          0       108         25       106         47      104        67       102         88
GR      100        110        98        178        97        245       97       340        96        372
GR       94        378      92.4        380      92.4        400       94       403        96        410
GR       98        423        98        430        98        442     98.8       620      99.3        700
GR      100        745       102        822       104        875      106       925       108        978
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GR      110       1020
  ***** CROSS-SECTION GROUND POINTS INCORPORATE SURVEY DATA THAT REFLECT
  ***** CHANGES WHICH OCCURRED IN THE FLOODING OF JANUARY 1993 (NEW INPUT DATA
  ***** USES WHOLE NUMBER STATIONING)
  ***** EG *****

ET                          7.1                                     180         601
NC     .045        .041       .032
X1       22          47        180         241        1020        1000        1020
GR   3014.5         0.0     3009.6        46.3     3006.8        68.5     3006.3        93.1     3005.8       116.9
GR   3006.1       123.8     3005.1       132.6     3005.7       141.5     3004.3         155     3004.6         180
GR   2999.5         186     2999.4         210     2998.9         234     3000.8         241     3004.3         265
GR   3002.8         280     3002.2         288     3005.1         292     3004.6       349.1     3004.5       400.7
GR   3004.2       475.8     3004.8       492.5     3004.2       514.7     3004.3       545.0     3004.1       563.1
GR   3003.3       570.9     3004.3       591.8     3004.6       602.1     3004.6       639.5     3005.1       653.8
GR   3003.9       671.6     3004.0       691.0     3005.0       702.2     3004.0       718.1     3004.1       734.6
GR   3005.7       757.1     3006.0       779.3     3006.6       792.1     3006.1       810.2     3006.7       819.6
GR   3006.8       842.2     3006.1       845.8     3007.0       855.5     3007.1       875.0     3007.1       889.9
GR   3007.4       909.7     3016.4       928.5
  ***** CROSS-SECTION GROUND POINTS INCORPORATE SURVEY DATA THAT REFLECT
  ***** CHANGES WHICH OCCURRED IN THE FLOODING OF JANUARY 1993 (NEW INPUT DATA
  ***** USES WHOLE NUMBER STATIONING)
  ***** CROSS-SECTION 22.5 ADDED FOR COMPUTATIONAL STABILITY BETWEEN SECNOs
  ***** 22 AND 23.  GROUND DATA REFLECTS NEW SURVEY DATA OBTAINED
  ***** AFTER THE JANUARY, 1993 FLOODING.
  ***** EH *****

ET                          7.1                                    19.4         531
X1     22.5          25          0          81         490         423         490           0        3000           0
GR       24           0         3.8         29         3.3          40         3.5          50         3.8          61
GR      5.9          71         6.9         81           7         115         5.6         118         7.1         138
GR      5.9         152         7.8         161        8.1         170           8         270         8.8         370
GR      7.6         470         7.2         570          8         670         7.9         830        9.18         859
GR     9.34         870        8.97         881        8.5         920         9.5         985        26.1        1040
  ***** CROSS-SECTION GROUND POINTS INCORPORATE SURVEY DATA THAT REFLECT
  ***** CHANGES WHICH OCCURRED IN THE FLOODING OF JANUARY 1993 (NEW INPUT DATA
  ***** USES WHOLE NUMBER STATIONING)
  ***** EI *****

ET                          7.1                                     167         591
NC     .065        .043       .032
X1       23          50        167         276.3        490         423         490
GR   3025.0         0.0     3020.4        29.8     3016.3        63.3     3012.2        86.5     3010.9       105.3
GR   3011.1       125.0     3011.0       143.9     3010.0       160.6     3011.4         167     3007.6         192
GR   3007.3         210     3007.0         213     3007.0         228     3010.8         253     3010.2         275
GR   3012.3       276.3     3012.3       312.2     3012.2       333.4     3011.8       363.4     3011.5       387.8
GR   3011.2       417.1     3010.1       442.3     3011.4       464.2     3011.4       484.9     3011.9       503.4
GR   3012.4       525.1     3010.9       530.9     3012.1       537.1     3010.7       544.6     3010.6       564.1
GR   3010.4       594.9     3012.2       617.2     3011.4       631.2     3010.4       646.1     3011.9       661.5
GR   3011.9       681.3     3012.0       708.4     3012.0       730.7     3011.9       774.1     3011.0       782.3
GR   3010.8       804.9     3011.5       811.0     3011.6       830.8     3012.4       846.2     3012.4       861.4
GR   3012.1       877.3     3012.7       889.2     3013.3       906.9     3013.7       920.8     3026.8       956.2
  *****  SOUTH END OF AIRSTRIP  *****
  ***** EJ *****
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ET                      7.1                                     243       749
NH       6      .050    206.9      .032    291.5      .053    416.8      .035    455.1      .055
NH   576.3      .042    981.6
X1      24        45    416.8     455.1      975       980      980
GR  3030.0       0.0   3022.5      67.7   3019.9     109.5   3020.6     126.0   3020.4     148.0
GR  3020.9     179.4   3020.9     206.9   3019.4     232.6   3017.1     240.0   3018.0     252.2
GR  3018.0     276.7   3020.4     291.5   3020.6     309.0   3021.1     346.8   3020.7     369.8
GR  3021.0     386.0   3020.3     416.8   3016.0     425.7   3015.9     442.4   3019.7     455.1
GR  3020.1     463.3   3020.2     492.0   3019.6     509.8   3020.5     517.2   3019.3     533.8
GR  3018.8     550.2   3019.7     562.4   3019.1     576.3   3018.9     632.5   3020.3     641.9
GR  3020.1     659.4   3019.8     696.0   3019.7     736.2   3019.6     764.7   3019.3     798.3
GR  3019.0     828.5   3019.0     840.9   3018.5     848.2   3023.3     868.0   3024.1     877.1
GR  3024.3     899.1   3023.2     919.4   3023.6     937.5   3023.4     954.6   3035.4     981.6
  ***** CROSS-SECTION 24.1 ADDED FOR COMPUTATIONAL STABILITY
  ***** EK *****

ET                      7.1                                     312       850
NC      .050      .040     .035
X1      24.1        24      312       350       550       540      540
GR      3056       0.0     3050        35      3040        90     3032       140      3028       175
GR      3025       245     3024       290    3022.6       312   3020.5       320    3020.8       338
GR    3023.8       350     3024       380    3023.5       410     3024       450    3023.5       490
GR      3024       508     3025       620      3024       710     3024       840    3023.5       980
GR    3024.5      1040     3026      1090      3029      1115     3034      1140
  ***** EL *****

ET                      7.1                                     274       885
NC      .050      .042     .035
X1        25        51      274       303.4     510       500      510
GR  3043.3       0.0   3038.3      42.8   3030.6     107.9   3028.5     137.8   3028.2     148.5
GR  3029.3     169.7   3028.6     179.5   3028.3     202.4   3027.5     212.2   3028.6     222.3
GR  3028.9     231.9   3028.5     245.9   3028.6     260.9   3028.2     274.0   3024.9     279.5
GR  3023.8     283.3   3023.3     294.7   3027.8     303.4   3028.1     321.3   3028.1     332.4
GR  3029.2     346.3   3028.7     365.2   3028.3     398.1   3028.0     436.9   3028.5     458.0
GR  3028.3     480.3   3027.7     505.2   3027.5     519.6   3028.8     581.8   3028.8     599.3
GR  3026.7     649.7   3028.0     662.2   3027.5     677.3   3027.9     701.4   3028.3     722.6
GR  3029.4     732.4   3027.9     748.3   3027.8     763.0   3028.3     775.2   3028.0     814.1
GR  3029.0     829.0   3028.5     846.2   3028.2     880.2   3027.9     918.1   3027.5     942.9
GR  3027.1     972.2   3026.9     992.9   3026.5    1039.4   3026.2    1052.0   3026.2    1057.6
GR  3042.6    1095.3
  ***** CROSS-SECTION 25.1 ADDED FOR COMPUTATIONAL STABILITY
  ***** EM *****

NH       5      .050      315      .035      365      .042      650      .038     1220      .052
NH    1350
ET                      7.1                                     315       975
X1      25.1        23      315       365       380       430      400
GR      3050       0.0     3040        40      3034        85     3032       130      3032       220
GR      3031       290     3030       315    3026.3       335   3026.3       355      3029       365
GR    3031.8       440     3031       462      3032       505   3031.5       570      3032       650
GR    3031.5       760     3032       840      3031       950   3031.1      1100      3032      1220
GR      3034      1290     3044      1320      3054      1350
  ***** EN *****
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ET                          7.1                                     122.9        881
NH         5       .065     122.9       .032      157.2       .042  785.6       .036    1272.5       .052
NH    1419.7
X1        26         68     122.9      157.2        470        480    470
GR      3046         40      3044         65       3042         78   3040         89      3038         96
GR    3037.1      100.0    3033.5      109.1     3033.4      122.9 3030.7      134.3    3030.6      146.5
GR    3035.1      157.2    3034.9      176.4     3035.5      197.2 3035.3      220.7    3035.5      245.7
GR    3035.2      261.9    3034.6      283.7     3034.2      304.7 3033.4      314.9    3033.8      328.7
GR    3033.6      343.3    3034.2      370.1     3034.2      389.9 3033.3      404.1    3033.3      416.7
GR    3034.1      434.2    3033.5      449.4     3033.4      465.0 3034.0      475.9    3033.7      499.5
GR    3033.8      513.6    3033.7      538.6     3034.4      559.1 3034.8      579.0    3034.3      602.4
GR    3033.1      623.2    3033.6      640.2     3033.2      652.0 3034.2      663.1    3033.3      679.1
GR    3031.2      695.5    3031.6      701.9     3034.5      718.0 3034.6      741.2    3035.5      765.8
GR    3035.3      785.6    3035.6      802.3     3035.0      818.9 3034.9      834.3    3034.7      879.7
GR    3034.7      911.7    3034.6      951.5     3034.5      983.0 3034.4     1016.4    3034.4     1032.2
GR    3033.3     1046.9    3033.3     1098.3     3034.6     1122.1 3033.9     1131.9    3033.8     1164.6
GR    3033.7     1205.9    3033.8     1251.5     3034.3     1272.5 3035.3     1300.9    3036.4     1334.5
GR    3038.0     1379.1    3039.6     1415.0     3040.5     1419.7
  ***** EO *****

ET                          7.1                                     305        920
  ***** DIKE (WEST OF CHANNEL, CROSS-SECTIONS 27-29)
  ***** NOT CONSIDERED AS REGULATORY LEVEE
  ***** EFFECTIVE FLOW AREA NOT REDUCED
NC      .052        .044        .032
X1        27         54       309.9        410        675        590    670
GR    3054.0        0.0    3050.0         43.3     3047.7       76.7 3044.4      119.6    3040.7      193.7
GR    3040.7      212.5    3040.0      240.7     3039.1      250.0 3039.3      258.7    3039.5      273.2
GR    3037.6      284.1    3037.2      290.8     3040.8      309.9 3040.1      319.8    3039.0      332.4
GR    3039.1      337.6    3037.4      345.7     3037.0      357.5 3036.5      362.5    3036.5      368.8
GR    3036.4      392.8    3037.0      402.9     3041.1      410.0 3039.3      421.1    3039.9      447.2
GR    3039.6      478.5    3038.3      487.7     3039.1      504.0 3039.8      516.5    3039.2      533.6
GR    3039.4      556.8    3039.3      585.0     3039.0      630.5 3038.9      666.2    3038.9      704.9
GR    3038.8      789.1    3038.2      829.3     3038.4      887.4 3039.0      942.1    3039.2      989.9
GR    3038.8     1053.8    3038.9     1094.2     3038.8     1120.3 3038.2     1165.9    3038.9     1181.6
GR    3038.2     1210.6    3038.1     1237.2     3038.2     1266.3 3038.2     1304.4    3038.4     1329.9
GR    3038.7     1362.1    3039.7     1372.5     3041.0     1384.5 3049.4     1403.7
  ***** DIKE (WEST OF CHANNEL, CROSS-SECTIONS 27-29)
  ***** NOT CONSIDERED AS REGULATORY LEVEE
  ***** EFFECTIVE FLOW AREA NOT REDUCED
  ***** EP *****

ET                          7.1                                     390        805
  ***** DIKE (WEST OF CHANNEL, CROSS-SECTIONS 27-29)
  ***** NOT CONSIDERED AS REGULATORY LEVEE
  ***** EFFECTIVE FLOW AREA NOT REDUCED
NH         5         .05      207.8       .042      415.6       .032  588.7       .040     769.0       .044
NH    1274.9
X1        28         53       415.6      588.7          390        450    450
GR    3054.0        0.0    3052.6         35.5     3050.9       74.7 3048.1      103.6    3046.2      140.7
GR    3044.4      179.1    3043.7      192.6     3040.4      205.6 3040.7      207.8    3043.3      218.1
GR    3043.9      231.5    3043.5      250.3     3043.6      277.4 3043.5      311.6    3043.6      354.7
GR    3043.6      391.7    3043.4      415.6     3040.7      437.4 3040.7      450.4    3040.7      476.9
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GR   3041.4     485.9    3041.2     506.1    3040.9     524.4    3041.3     535.0    3041.0     559.3
GR   3040.6     579.9    3044.1     588.7    3046.3     613.5    3048.6     621.6    3043.1     638.8
GR   3043.1     661.8    3042.8     695.1    3042.2     729.2    3042.5     769.0    3042.6     802.0
GR   3042.8     836.4    3043.0     885.5    3043.3     920.6    3043.8     937.0    3045.0     953.6
GR   3044.3     972.7    3044.2     996.2    3044.7    1016.6    3045.1    1050.0    3046.2    1090.9
GR   3047.2    1123.0    3048.0    1148.4    3048.9    1167.4    3050.7    1198.6    3052.0    1210.5
GR   3051.0    1224.2    3053.6    1243.8    3061.4    1274.9
  ***** EQ *****

ET                          7.1                                    352        797
  ***** DIKE (WEST OF CHANNEL, CROSS-SECTIONS 27-29)
  ***** NOT CONSIDERED AS REGULATORY LEVEE
  ***** EFFECTIVE FLOW AREA NOT REDUCED
NC      .050       .054       .035
X1        29         59      645.7      698.6        590        660        640
GR   3062.0        0.0    3060.2       33.2    3055.2       90.0    3051.8     134.5    3049.8     203.1
GR   3050.0      224.5    3050.0      245.1    3048.6      252.7    3048.6     267.4    3049.7     274.8
GR   3048.8      320.6    3049.4      330.6    3049.4      375.6    3048.4     386.3    3048.8     395.4
GR   3049.0      407.6    3049.1      429.2    3049.1      441.5    3047.7     451.7    3048.6     462.2
GR   3048.7      482.9    3048.8      525.2    3048.8      547.5    3048.1     572.7    3046.8     579.5
GR   3046.7      593.8    3047.6      599.7    3046.9      645.7    3045.0     655.0    3045.1     664.3
GR   3045.9      674.3    3045.9      690.6    3046.8      698.6    3047.3     711.2    3047.3     753.2
GR   3047.4      778.1    3047.8      801.5    3048.4      829.0    3048.9     852.5    3048.8     870.3
GR   3049.3      893.1    3049.8      912.2    3050.8      933.2    3053.1     967.7    3055.6     995.1
GR   3057.2     1037.1    3055.4     1044.9    3055.7     1070.3    3055.3    1092.4    3056.3    1127.4
GR   3057.4     1158.2    3058.5     1200.4    3061.0     1280.6    3062.7    1353.4    3063.8    1410.0
GR   3065.6     1464.4    3066.3     1503.8    3068.4     1558.9    3069.8    1605.4
  ***** ER *****

ET                          7.1                                    469        906
  ***** DIKE (WEST OF CHANNEL)
  ***** NOT CONSIDERED AS REGULATORY LEVEE
  ***** EFFECTIVE FLOW AREA NOT REDUCED
NH        4       .050      675.2       .032      725.2       .041      998.9       .054     1720.9
X1       30         73      675.2      725.2        560        675        620
GR   3071.1        0.0    3069.1       28.1    3063.8       82.0    3059.2     118.4    3057.1     160.4
GR   3054.7      199.3    3054.7      218.7    3052.9      242.1    3053.9     252.1    3054.4     268.8
GR   3054.6      284.0    3054.8      312.9    3052.5      334.5    3054.6     349.6    3054.7     374.5
GR   3053.6      402.2    3054.2      438.8    3054.5      471.0    3053.7     486.2    3054.1     503.0
GR   3054.3      548.5    3054.8      585.0    3055.4      616.2    3054.4     643.0    3054.4     653.0
GR   3052.0      664.3    3051.8      675.2    3049.8      683.4    3050.1     693.3    3051.3     707.2
GR   3051.4      718.8    3052.2      725.2    3050.7      742.8    3054.6     764.9    3055.2     782.8
GR   3054.1      804.7    3053.1      844.3    3054.4      855.0    3054.9     883.9    3055.8     891.7
GR   3054.0      906.0    3053.7      921.7    3054.6      932.3    3053.8     945.8    3054.4     973.5
GR   3054.1      998.9    3052.9     1018.9    3055.8     1031.1    3063.3    1057.1    3056.5    1085.7
GR   3055.8     1107.0    3054.9     1125.3    3055.0     1154.4    3055.5    1184.9    3055.6    1217.7
GR   3055.9     1251.3    3056.2     1281.5    3055.1     1289.9    3056.1    1297.9    3055.9    1319.4
GR   3056.2     1361.7    3057.1     1391.7    3057.1     1430.2    3058.0    1454.8    3059.1    1488.4
GR   3059.8     1526.4    3060.3     1565.7    3061.1     1606.7    3061.8    1636.2    3060.7    1655.4
GR   3062.1     1673.5    3071.2     1713.2    3072.0     1720.9
  ***** ES *****
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ET                          7.1                                   576      1024
NH       7       .056      401.0      .036      457.9      .050   641.9      .032      702.9      .051
NH   767.6       .037      820.7      .048     2082.5
X1      31         73      641.9     702.9        681       690     680
GR  3080.0        0.0     3078.3      22.0     3075.2      59.5  3072.3      95.1     3069.9     121.0
GR  3066.7      175.6     3066.1     212.1     3063.9     264.2  3062.1     307.7     3061.2     346.8
GR  3060.3      385.8     3060.9     401.0     3059.8     420.4  3059.7     439.3     3061.0     457.9
GR  3061.0      480.9     3061.0     541.9     3061.2     563.0  3058.9     573.5     3058.4     588.9
GR  3059.6      599.7     3059.6     615.7     3060.7     628.5  3060.1     641.9     3055.4     664.6
GR  3055.3      682.0     3058.7     702.9     3060.1     715.9  3059.8     751.3     3056.2     767.6
GR  3056.2      779.5     3059.7     799.5     3060.1     810.9  3059.4     820.7     3060.4     835.2
GR  3060.5      859.7     3062.0     914.1     3057.8     941.8  3057.8     967.9     3058.4    1002.3
GR  3060.0     1020.8     3060.1    1045.7     3060.4    1084.2  3060.9    1140.6     3059.2    1152.6
GR  3062.1     1166.5     3062.0    1190.4     3061.5    1216.7  3061.5    1236.6     3062.9    1261.6
GR  3063.4     1290.7     3061.7    1415.1     3061.5    1471.2  3062.6    1522.6     3063.8    1556.9
GR  3065.3     1607.9     3066.7    1657.3     3068.8    1717.2  3069.9    1775.7     3070.4    1796.1
GR  3071.6     1844.9     3072.2    1862.4     3072.9    1884.0  3074.1    1915.5     3074.3    1952.4
GR  3072.5     1963.8     3072.5    1968.6     3075.2    1980.4  3075.7    2002.2     3075.0    2019.5
GR  3077.4     2037.3     3081.6    2074.5     3082.6    2082.5
  ***** ET *****

ET                          7.1                                   517.4    1104
NC      .060       .057      .036
X1        32         66      517.4     614.8        835       721     835
GR  3080.0        0.0     3080.0      26.9     3080.1      43.2  3079.5      75.9     3079.1     102.7
GR  3078.9      124.4     3079.6     145.9     3079.2     164.7  3078.9     178.5     3077.4     209.6
GR  3075.8      243.2     3074.3     290.1     3073.6     321.7  3072.5     352.4     3071.2     382.0
GR  3068.9      425.5     3067.2     471.8     3065.8     476.6  3065.9     495.7     3066.9     505.7
GR  3067.0      517.4     3063.4     536.5     3063.5     583.3  3065.4     589.7     3064.5     607.0
GR  3066.7      614.8     3067.6     628.4     3067.4     656.5  3066.7     678.1     3065.8     718.4
GR  3066.4      747.7     3066.5     778.1     3066.8     826.0  3067.1     853.3     3067.3     877.5
GR  3066.4      911.6     3066.7     927.4     3066.9     953.8  3066.6     975.7     3067.0    1013.2
GR  3066.8     1058.6     3066.7    1121.2     3067.2    1151.9  3067.2    1188.8     3066.6    1221.2
GR  3066.2     1254.2     3066.4    1308.9     3066.7    1359.5  3066.4    1380.2     3064.6    1389.2
GR  3065.9     1397.1     3066.1    1431.8     3072.4    1474.3  3072.7    1519.5     3071.5    1534.1
GR  3072.5     1549.4     3073.1    1567.3     3073.4    1586.8  3072.2    1616.3     3070.4    1623.5
GR  3073.0     1633.3     3075.5    1671.5     3076.2    1736.4  3078.1    1786.1     3079.1    1810.4
GR  3080.1     1817.7
  *****  CROSS-SECTION 33 HAS BEEN MODIFIED TO REFLECT THE REALIGNMENT OF THE
  *****  CROSS-SECTION TO BETTER MODEL FLOW PATTERNS
  ***** EU *****

ET                          7.1                                   415      1047
NC      .065       .057      .036
X1        33         40      445.3     488.6        850       730     850
GR  3090.2        0.0     3087.1      49.4     3083.5     115.0  3082.4     159.2     3080.1     198.2
GR  3077.3      233.8     3076.6     258.7     3075.9     279.9  3075.4     298.9     3072.4     309.7
GR  3071.6      321.4     3073.1     334.4     3072.8     340.0  3074.6     349.0     3075.2     371.2
GR  3074.7      392.4     3073.9     404.3     3073.9     418.0  3071.5     445.3     3069.2     453.5
GR  3070.5      467.5     3073.9     488.6     3074.0        520 3075.0        675       3076        820
GR  3076.5        875       3076       920       3074        970  3075       1060       3076       1220
GR    3076       1320       3078      1335       3080       1365 3080.5       1390       3080       1425
GR    3080       1470       3082      1525       3084       1610 3090         1655       3093       1690
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   ***** CROSS-SECTION 34 HAS BEEN MODIFIED TO REFLECT THE REALIGNMENT OF THE
   ***** CROSS-SECTION TO BETTER MODEL FLOW PATTERNS
   ***** EV *****
ET                      7.1                                     249.4       874
NH        5       .070      139.3       .037      190.6       .058      249.4       .036      291.5       .056
NH     1585
X1        34         45      249.4      291.5        890        700        890
GR   3093.4        0.0     3090.3       25.0     3086.6       64.7     3087.2       76.2     3085.4      102.8
GR   3081.3      139.3     3078.8      143.5     3079.2      160.9     3079.2      172.8     3081.2      190.6
GR   3082.4      199.1     3080.9      214.2     3079.9      235.1     3079.3      249.4     3077.5      262.2
GR   3077.4      274.4     3082.3      291.5     3081.2      312.4     3081.8      326.7     3081.5      362.7
GR   3081.2      393.3     3081.1      408.4     3079.8      420.8     3081.9      433.4     3080.9      456.2
GR   3080.9      484.3     3080.6      509.4     3080.1      530.7     3080.8      555.2     3079.7        593
GR     3080        600     3080.5        650       3080        780       3082        940       3083       1035
GR   3082.6       1085       3083       1180       3082       1245     3081.7       1252       3082       1262
GR     3084       1320       3082       1415       3084       1440       3086       1510     3086.3       1585
   ***** CROSS-SECTION 35 HAS BEEN MODIFIED TO REFLECT THE REALIGNMENT OF THE
   ***** CROSS-SECTION TO BETTER MODEL FLOW PATTERNS
   ***** EW *****
ET                      7.1                                     283       781.2
NC      .052       .057       .032
X1        35         50      706.1      781.2        750        580        750
GR   3096.0        0.0     3095.0        3.6     3086.5       95.5     3086.2      110.4     3085.7      158.7
GR   3085.6      195.7     3085.7      228.6     3085.8      265.4     3085.8      310.0     3085.8      359.1
GR   3084.8      364.0     3085.5      375.3     3086.0      387.4     3086.3      403.0     3085.4      418.0
GR   3085.6      431.5     3086.5      449.5     3086.4      463.9     3085.7      480.6     3086.3      497.2
GR   3085.2      525.4     3085.2      540.4     3085.9      558.8     3085.6      570.7     3084.9      582.2
GR   3086.1      593.8     3086.5      623.6     3087.1      658.7     3087.2      666.4     3087.4      706.1
GR   3084.4      720.1     3084.5      756.7     3083.4      761.8     3083.4      767.2     3088.0      781.2
GR     3088        860     3087.5        880       3088        920     3088.5       1025     3089.0       1120
GR   3089.6       1195     3089.2       1240     3089.9       1320     3089.0       1390       3090       1425
GR     3090       1570     3088.8       1582       3090       1595     3090.4       1625       3090       1640
   ***** CROSS-SECTION 36 HAS BEEN MODIFIED TO REFLECT THE REALIGNMENT OF THE
   ***** CROSS-SECTION TO BETTER MODEL FLOW PATTERNS
   ***** ET CARD (RIGHT ENCROACHMENT) DEFINES INEFFECTIVE FLOW AREA
   ***** DUE TO RIDGE LOCATED BETWEEN CROSS-SECTIONS 36 & 37
   ***** EX *****
ET                    9.1       7.1                                     585     1014.7         0       1391
NH        5       .054      949.6       .032     1014.7       .054      1480       .037      1675       .058
NH     1840
X1        36         45      949.6     1014.7        550        600        570
GR   3116.2        0.0     3101.7       35.7     3093.7       47.2     3094.1       55.7     3093.8       66.5
GR   3093.0       70.6     3092.5      139.2     3092.2      229.6     3092.3      325.8     3092.1      390.9
GR   3091.8      447.9     3091.0      536.4     3090.4      587.0     3090.1      654.7     3089.7      715.3
GR   3090.6      773.4     3090.0      796.7     3091.0      834.4     3091.6      879.2     3092.5      911.8
GR   3091.5      931.6     3091.2      949.6     3087.8      957.2     3087.8      963.8     3088.8      986.7
GR   3087.5      995.0     3087.5     1005.7     3090.6     1014.7     3092.3     1024.2     3092.8     1052.0
GR   3095.9     1073.9     3096.9     1106.7     3097.4     1143.0     3098.0     1184.5     3098.8       1205
GR   3098.5       1380       3098       1455     3097.2       1480       3098       1505       3099       1550
GR     3098       1600       3098       1675     3096.5       1690       3098       1745     3099.5       1840
   ***** EDWIN ROAD *****
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.**** PINAL COUNTY LINE *****
***** EY *****

ET			7.1				761	1128.8		
NH	4	.060	760.6	.046	1082.9	.035	1130.6	.059	1298.8	
X1	37	48	1082.9	1130.6	620	620	620			
GR	3112.4	0.0	3105.4	64.5	3103.1	73.5	3103.1	85.2	3104.0	90.9
GR	3099.6	120.6	3099.4	129.0	3098.9	134.1	3099.1	171.1	3099.3	220.6
GR	3099.2	258.8	3099.0	316.0	3098.4	366.4	3097.5	413.6	3097.4	450.6
GR	3097.0	489.5	3097.1	534.1	3096.9	579.1	3097.1	602.2	3096.8	624.3
GR	3096.9	641.6	3097.8	661.2	3097.9	694.4	3097.7	731.2	3095.2	760.6
GR	3094.9	796.0	3095.1	846.8	3097.7	874.2	3096.9	890.4	3095.3	901.5
GR	3095.3	924.6	3096.4	938.4	3096.7	968.7	3095.6	1002.2	3095.9	1014.3
GR	3097.1	1026.3	3095.9	1039.8	3098.3	1058.2	3098.8	1065.7	3097.1	1082.9
GR	3093.8	1090.6	3094.1	1115.4	3100.6	1130.6	3108.0	1212.7	3107.8	1220.0
GR	3108.4	1253.4	3113.5	1297.8	3113.7	1298.8				

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T1      UPPER CANADA DEL ORO FLOOD INSURANCE STUDY  --  FLOODWAY (ENCROACHED)
T2      CATALINA STATE PARK BOUNDARY TO PINAL COUNTY LINE
T3      CANADA DEL ORO
T4      CONSULTANT:  DAVID EVANS & ASSOCIATES, INC.     DEA JOB NO. PCDT0010
T5                   3845 N. BUSINESS CENTER DRIVE      PHONE: (602) 292-2160
T6                   TUCSON, AZ 85705                   FAX: (602) 292-9131
T7      CLIENT: PIMA COUNTY DEPT. OF TRANS. & FLOOD CONTROL DISTRICT
T8              201 N. STONE AVENUE                     ACTIVITY # 4FUCD0
T9              TUCSON, AZ 85701                        PHONE: (602) 740-6350
T9*************************************************************************
T9*****  100-YEAR ANALYSIS  -  Q100=17500 CFS  - STARTING WSE = 1' ABOVE      *
T9*************************************************************************

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

       0         3         0         0         0         0         0         0    2884.5         0

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

       2         0        -1         0         0         0        -1         0         0         0
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THIS RUN EXECUTED 27OCT94 16:26:29

****
HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991
****

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

CANADA DEL ORO

SUMMARY PRINTOUT

	SECNO	STENCL	STENCR	STCHL	SSTA	STCHR	ENDST	WORK MAP SECNO
	1.000	.00	.00	1171.70	22.00	1314.50	1365.66	DJ
	1.000	621.00	1314.50	1171.70	621.00	1314.50	1314.50	
*	2.000	.00	.00	887.20	10.80	1001.40	1116.08	DK
*	2.000	310.00	1001.40	887.20	310.00	1001.40	1001.40	
*	3.000	.00	.00	697.60	55.53	769.60	1000.99	DL
*	3.000	251.00	811.00	697.60	251.00	769.60	811.00	
	4.000	.00	.00	443.00	149.46	557.00	1067.53	DM
	4.000	427.00	825.00	443.00	427.00	557.00	825.00	
*	4.500	.00	.00	179.00	10.85	287.00	997.59	DN
*	4.500	159.00	649.00	179.00	159.00	287.00	649.00	
	5.000	.00	.00	99.00	98.78	179.00	1067.33	DO
	5.000	99.00	690.00	99.00	99.00	179.00	690.00	
*	6.000	.00	.00	28.00	24.00	77.00	1044.45	DP
*	6.000	28.00	486.00	28.00	28.00	77.00	486.00	
	7.000	.00	.00	22.20	21.11	91.40	965.43	DQ
	7.000	22.20	550.00	22.20	22.20	91.40	550.00	
*	8.000	.00	.00	5.00	11.51	243.00	1040.89	DR
*	8.000	11.50	451.00	5.00	11.50	243.00	451.00	
*	9.000	.00	.00	88.00	55.33	380.00	1220.51	DS
	9.000	86.00	586.00	88.00	88.00	380.00	586.00	
	10.000	.00	.00	29.00	45.66	213.00	1070.52	DT
	10.000	45.70	630.00	29.00	45.70	213.00	630.00	

	SECNO	STENCL	STENCR	STCHL	SSTA	STCHR	ENDST	WORK MAP SECNO
	11.000	.00	.00	45.00	53.20	135.00	1056.93	
	11.000	53.20	630.00	45.00	53.20	135.00	630.00	DU
	12.000	.00	.00	237.10	67.27	293.70	1061.52	
	12.000	225.00	815.00	237.10	225.00	293.70	815.00	DV
*	13.000	50.00	760.00	222.20	101.33	286.90	760.00	
	13.000	222.20	760.00	222.20	222.20	286.90	760.00	DW
*	14.000	100.00	585.00	168.20	100.00	277.00	585.00	
*	14.000	100.00	585.00	168.20	100.00	277.00	585.00	DX
	14.300	110.00	590.00	128.00	123.70	345.00	586.92	
	14.300	110.00	590.00	128.00	123.68	345.00	586.94	
	14.600	110.00	590.00	128.00	123.06	345.00	587.45	
	14.600	110.00	590.00	128.00	123.06	345.00	587.45	DY
*	15.000	.00	692.00	251.10	128.58	340.60	654.10	
*	15.000	251.10	654.00	251.10	251.10	340.60	654.00	DZ
	16.000	.00	.00	352.10	33.56	420.50	973.92	
	16.000	224.00	782.00	352.10	224.00	420.50	782.00	EA
*	17.000	.00	.00	744.40	55.86	845.80	927.76	
	17.000	328.00	845.80	744.40	328.00	845.80	845.80	EB
	18.000	.00	.00	923.60	109.46	975.50	1014.09	
	18.000	365.00	990.00	923.60	365.00	975.50	990.00	EC
	19.000	.00	.00	713.90	21.69	789.00	832.10	
	19.000	264.00	789.00	713.90	264.00	789.00	789.00	ED
	20.000	.00	.00	481.90	47.99	522.20	864.65	
*	20.000	205.00	733.00	481.90	205.00	522.20	733.00	EE
*	21.000	.00	.00	372.00	96.38	423.00	792.67	
*	21.000	220.00	592.00	372.00	220.00	423.00	592.00	EF
*	22.000	.00	.00	180.00	62.02	241.00	910.15	
	22.000	180.00	601.00	180.00	180.00	241.00	601.00	EG
	22.500	.00	.00	.00	19.36	81.00	968.36	
*	22.500	19.40	531.00	.00	19.40	81.00	531.00	EH
*	23.000	.00	.00	167.00	75.97	276.30	921.76	
*	23.000	167.00	591.00	167.00	167.00	276.30	591.00	EI
	24.000	.00	.00	416.80	65.06	455.10	865.91	
	24.000	243.00	749.00	416.80	243.00	455.10	749.00	EJ

	SECNO	STENCL	STENCR	STCHL	SSTA	STCHR	ENDST	WORK MAP SECNO
	24.100	.00	.00	312.00	196.17	350.00	1099.10	EK
	24.100	312.00	850.00	312.00	312.00	350.00	850.00	
	25.000	.00	.00	274.00	106.54	303.40	1068.09	EL
	25.000	274.00	885.00	274.00	274.00	303.40	885.00	
	25.100	.00	.00	315.00	88.81	365.00	1284.07	EM
	25.100	315.00	975.00	315.00	315.00	365.00	975.00	
	26.000	.00	.00	122.90	100.54	157.20	1348.10	EN
	26.000	122.90	881.00	122.90	122.90	157.20	881.00	
*	27.000	.00	.00	309.90	188.62	410.00	1384.07	EO
*	27.000	305.00	920.00	309.90	305.00	410.00	920.00	
*	28.000	.00	.00	415.60	152.87	588.70	1069.69	EP
*	28.000	390.00	805.00	415.60	390.00	588.70	805.00	
	29.000	.00	.00	645.70	143.57	698.60	944.23	EQ
	29.000	352.00	797.00	645.70	352.00	698.60	797.00	
	30.000	.00	.00	675.20	161.47	725.20	1389.50	ER
*	30.000	469.00	906.00	675.20	469.00	725.20	906.00	
*	31.000	.00	.00	641.90	293.18	702.90	1525.48	ES
	31.000	576.00	1024.00	641.90	576.00	702.90	1024.00	
	32.000	.00	.00	517.40	417.53	614.80	1453.53	ET
	32.000	517.40	1104.00	517.40	517.40	614.80	1104.00	
*	33.000	.00	.00	445.30	229.86	488.60	1332.07	EU
	33.000	415.00	1047.00	445.30	415.00	488.60	1047.00	
	34.000	.00	.00	249.40	113.54	291.50	1446.79	EV
	34.000	249.40	874.00	249.40	249.40	291.50	874.00	
	35.000	.00	.00	706.10	67.11	781.20	1585.53	EW
	35.000	283.00	781.20	706.10	283.00	781.20	781.20	
	36.000	.00	1391.00	949.60	46.48	1014.70	1061.89	EX
	36.000	585.00	1014.70	949.60	585.00	1014.70	1014.70	
	37.000	.00	.00	1082.90	118.91	1130.60	1128.85	EY
	37.000	761.00	1128.80	1082.90	761.00	1130.60	1128.80	

CANADA DEL ORO

SUMMARY PRINTOUT TABLE 110

	SECNO	CWSEL	DIFKWS	EG	TOPWID	QLOB	QCH	QROB	PERENC	STENCL	STCHL	STCHR	STENCR
DI	1.000	2883.50	.00	2884.16	1343.66	12667.25	4574.33	258.42	.00	.00	1171.70	1314.50	.00
	1.000	2884.50	1.00	2885.43	693.50	11156.82	6343.18	.00	693.50	621.00	1171.70	1314.50	1314.50
* DK	2.000	2889.70	.00	2890.80	1105.28	11160.92	5426.99	912.10	.00	.00	887.20	1001.40	.00
*	2.000	2890.68	.97	2892.14	691.40	10270.92	7229.07	.00	691.40	310.00	887.20	1001.40	1001.40
* DL	3.000	2897.64	.00	2898.70	945.46	9068.45	4330.76	4100.79	.00	.00	697.60	769.60	.00
*	3.000	2898.62	.98	2900.28	560.00	10224.91	6016.98	1258.11	560.00	251.00	697.60	769.60	811.00
DM	4.000	2906.18	.00	2907.41	918.07	2482.86	6758.64	8258.50	.00	.00	443.00	557.00	.00
	4.000	2907.05	.87	2908.87	398.00	252.08	8678.18	8569.74	398.00	427.00	443.00	557.00	825.00
* DN	4.500	2909.72	.00	2910.91	986.74	2910.39	6530.02	8059.59	.00	.00	179.00	287.00	.00
*	4.500	2910.32	.60	2912.14	490.00	450.69	8238.70	8810.61	490.00	159.00	179.00	287.00	649.00
DO	5.000	2912.92	.00	2913.60	988.55	.00	3541.73	13958.27	.00	.00	99.00	179.00	.00
	5.000	2913.86	.94	2914.63	591.00	.00	4276.10	13223.90	591.00	99.00	99.00	179.00	690.00
* DP	6.000	2919.52	.00	2920.64	1020.44	18.18	3427.01	14054.81	.00	.00	28.00	77.00	.00
*	6.000	2920.03	.51	2921.83	458.00	.00	4184.94	13315.06	458.00	28.00	28.00	77.00	486.00
DQ	7.000	2926.16	.00	2927.05	944.32	.07	3716.60	13783.32	.00	.00	22.20	91.40	.00
	7.000	2927.16	1.00	2928.27	527.80	.00	4644.22	12855.78	527.80	22.20	22.20	91.40	550.00
* DR	8.000	2932.13	.00	2933.34	1029.39	.00	12060.75	5439.25	.00	.00	5.00	243.00	.00
*	8.000	2932.36	.23	2934.33	439.50	.00	14773.89	2726.11	439.50	11.50	5.00	243.00	451.00
* DS	9.000	2937.24	.00	2938.21	1165.16	179.70	9542.79	7777.50	.00	.00	88.00	380.00	.00
	9.000	2937.74	.50	2939.49	498.00	.00	13106.10	4393.89	498.00	88.00	88.00	380.00	586.00
DT	10.000	2943.18	.00	2943.99	1024.85	.00	4305.67	13194.33	.00	.00	29.00	213.00	.00
	10.000	2944.19	1.01	2945.29	584.30	.00	6404.93	11095.07	584.30	45.70	29.00	213.00	630.00
DU	11.000	2947.78	.00	2948.74	1003.72	.00	4323.00	13177.00	.00	.00	45.00	135.00	.00
	11.000	2948.31	.53	2949.83	576.80	.00	5522.35	11977.65	576.80	53.20	45.00	135.00	630.00
DV	12.000	2953.86	.00	2954.69	994.25	2288.71	2897.42	12313.87	.00	.00	237.10	293.70	.00
	12.000	2954.83	.97	2956.03	590.00	140.67	3930.15	13429.18	590.00	225.00	237.10	293.70	815.00
* DW	13.000	2960.13	.00	2961.58	648.54	1518.43	4060.25	11921.31	710.00	50.00	222.20	286.90	760.00
	13.000	2960.47	.33	2961.93	537.80	.00	4257.87	13242.13	537.80	222.20	222.20	286.90	760.00
* DK	14.000	2965.22	.00	2967.08	485.00	2001.04	9543.06	5955.90	485.00	100.00	168.20	277.00	585.00
*	14.000	2965.21	-.01	2967.08	485.00	2001.33	9556.64	5942.03	485.00	100.00	168.20	277.00	585.00
	14.300	2966.31	.00	2967.69	463.22	22.50	13524.73	3952.77	480.00	110.00	128.00	345.00	590.00
	14.300	2966.33	.02	2967.70	463.26	22.63	13511.29	3966.08	480.00	110.00	128.00	345.00	590.00

	SECNO	CWSEL	DIFKWS	EG	TOPWID	QLOB	QCH	QROB	PERENC	STENCL	STCHL	STCHR	STENCR
	14.600	2966.94	.00	2967.99	464.38	26.64	13125.22	4348.14	480.00	110.00	128.00	345.00	590.00
	14.600	2966.95	.01	2968.00	464.40	26.68	13121.62	4351.69	480.00	110.00	128.00	345.00	590.00
*	15.000	2967.17	.00	2968.91	525.52	2964.98	7734.60	6800.42	692.00	.00	251.10	340.60	692.00
*	15.000	2967.73	.56	2969.76	402.90	.00	8655.14	8844.86	402.90	251.10	251.10	340.60	654.00
	16.000	2972.11	.00	2972.83	905.39	5163.05	3407.34	8929.61	.00	.00	352.10	420.50	.00
	16.000	2972.85	.74	2974.07	543.46	3100.75	4563.23	9836.02	558.00	224.00	352.10	420.50	782.00
*	17.000	2974.80	.00	2975.94	871.90	11616.92	5517.85	365.23	.00	.00	744.40	845.80	.00
	17.000	2975.72	.92	2977.35	517.80	10136.34	7363.66	.00	517.80	328.00	744.40	845.80	845.80
	18.000	2980.95	.00	2981.88	904.64	14663.21	2678.85	157.94	.00	.00	923.60	975.50	.00
	18.000	2981.94	.99	2983.11	625.00	13706.20	3574.74	219.06	625.00	365.00	923.60	975.50	990.00
	19.000	2985.67	.00	2986.69	810.41	13275.35	4000.56	224.09	.00	.00	713.90	789.00	.00
	19.000	2986.56	.88	2988.04	525.00	12038.75	5461.25	.00	525.00	264.00	713.90	789.00	789.00
	20.000	2991.98	.00	2993.24	816.66	6501.91	3067.37	7930.72	.00	.00	481.90	522.20	.00
*	20.000	2992.97	.98	2994.55	528.00	6363.24	3766.57	7370.18	528.00	205.00	481.90	522.20	733.00
*	21.000	3001.24	.00	3002.69	696.29	7507.98	5008.06	4983.97	.00	.00	372.00	423.00	.00
*	21.000	3001.84	.60	3003.89	372.00	7020.82	5944.70	4534.48	372.00	220.00	372.00	423.00	592.00
*	22.000	3007.62	.00	3008.83	848.13	922.48	6249.60	10327.92	.00	.00	180.00	241.00	.00
	22.000	3008.57	.95	3010.02	421.00	.00	7037.42	10462.58	421.00	180.00	180.00	241.00	601.00
	22.500	3010.51	.00	3011.46	968.99	.00	4274.04	13225.96	.00	.00	.00	81.00	.00
*	22.500	3011.38	.87	3012.92	511.60	.00	5633.55	11866.45	511.60	19.40	.00	81.00	531.00
*	23.000	3014.06	.00	3015.40	845.81	1109.87	7252.53	9137.60	.00	.00	167.00	276.30	.00
*	23.000	3015.01	.95	3016.98	424.00	.00	9325.45	8174.55	424.00	167.00	167.00	276.30	591.00
	24.000	3022.79	.00	3023.76	800.84	6021.72	2676.88	8801.41	.00	.00	416.80	455.10	.00
	24.000	3023.79	.99	3025.03	506.00	5186.57	3368.89	8944.54	506.00	243.00	416.80	455.10	749.00
	24.100	3027.08	.00	3027.86	902.93	1156.22	2397.05	13946.73	.00	.00	312.00	350.00	.00
	24.100	3027.98	.90	3029.06	538.00	.00	2848.04	14651.96	538.00	312.00	312.00	350.00	850.00
	25.000	3030.76	.00	3031.57	961.55	1534.85	2101.25	13863.90	.00	.00	274.00	303.40	.00
	25.000	3031.73	.97	3032.76	611.00	.00	2466.52	15033.48	611.00	274.00	274.00	303.40	885.00
	25.100	3033.83	.00	3034.68	1195.26	1840.19	3928.94	11730.87	.00	.00	315.00	365.00	.00
	25.100	3034.71	.88	3035.80	660.00	.00	4500.12	12999.88	660.00	315.00	315.00	365.00	975.00
	26.000	3036.88	.00	3037.36	1247.56	198.36	1590.36	15711.28	.00	.00	122.90	157.20	.00
	26.000	3037.86	.97	3038.52	758.10	.00	2008.88	15491.12	758.10	122.90	122.90	157.20	881.00
*	27.000	3040.95	.00	3041.83	1194.29	782.92	3475.09	13241.99	.00	.00	309.90	410.00	.00
*	27.000	3041.95	1.00	3043.48	615.00	27.43	5491.33	11981.24	615.00	305.00	309.90	410.00	920.00

	SECNO	CWSEL	DIFKWS	EG	TOPWID	QLOB	QCH	QROB	PERENC	STENCL	STCHL	STCHR	STENCR
* EP	28.000	3045.63	.00	3046.88	891.88	2868.72	8732.60	5898.68	.00	.00	415.60	588.70	.00
*	28.000	3046.43	.80	3048.47	400.55	483.89	11721.80	5294.30	415.00	390.00	415.60	588.70	805.00
EQ	29.000	3051.53	.00	3052.78	800.66	8132.59	4334.25	5033.17	.00	.00	645.70	698.60	.00
	29.000	3052.49	.96	3053.96	445.00	8680.75	5021.31	3797.93	445.00	352.00	645.70	698.60	797.00
ER	30.000	3057.03	.00	3057.88	1179.96	6636.45	3871.69	6991.86	.00	.00	675.20	725.20	.00
*	30.000	3058.04	1.00	3059.97	437.00	5168.36	5682.64	6649.00	437.00	469.00	675.20	725.20	906.00
* ES	31.000	3062.70	.00	3063.76	1148.50	3469.71	4681.33	9348.96	.00	.00	641.90	702.90	.00
	31.000	3063.67	.97	3065.16	448.00	1614.51	5705.29	10180.20	448.00	576.00	641.90	702.90	1024.00
ET	32.000	3069.32	.00	3070.28	1036.01	866.85	5774.47	10858.68	.00	.00	517.40	614.80	.00
	32.000	3070.09	.77	3071.65	586.60	.00	7625.90	9874.10	586.60	517.40	517.40	614.80	1104.00
* EU	33.000	3077.61	.00	3078.71	1102.21	3736.61	4134.12	9629.27	.00	.00	445.30	488.60	.00
	33.000	3078.41	.80	3079.93	632.00	1207.97	4993.77	11298.25	632.00	415.00	445.30	488.60	1047.00
EV	34.000	3084.19	.00	3084.67	1333.26	3048.20	2227.55	12224.25	.00	.00	249.40	291.50	.00
	34.000	3085.18	.99	3085.84	624.60	.00	2743.68	14756.32	624.60	249.40	249.40	291.50	874.00
EW	35.000	3089.13	.00	3090.17	1089.63	12610.32	4068.90	820.77	.00	.00	706.10	781.20	.00
	35.000	3089.94	.82	3091.45	498.20	12167.60	5332.40	.00	498.20	283.00	706.10	781.20	781.20
EX	36.000	3094.20	.00	3095.23	1015.41	12238.46	4971.72	289.82	1391.00	.00	949.60	1014.70	1391.00
	36.000	3095.11	.91	3096.72	429.70	11201.98	6298.02	.00	429.70	585.00	949.60	1014.70	1014.70
EY	37.000	3099.85	.00	3100.67	1009.94	14928.55	2571.45	.00	.00	.00	1082.90	1130.60	.00
	37.000	3100.82	.97	3102.43	367.80	14015.42	3484.58	.00	367.80	761.00	1082.90	1130.60	1128.80

CANADA DEL ORO

SUMMARY PRINTOUT TABLE 150

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
DJ	1.000	.00	.00	.00	2877.90	17500.00	2883.50	2883.12	2884.16	78.95	9.36	3035.83	1969.55
	1.000	.00	.00	.00	2877.90	17500.00	2884.50	2883.82	2885.43	66.64	10.05	2466.35	2143.80
* DK	2.000	570.00	.00	.00	2884.00	17500.00	2889.70	2889.70	2890.80	108.73	12.51	2610.06	1678.27
*	2.000	570.00	.00	.00	2884.00	17500.00	2890.68	2890.68	2892.14	93.56	13.26	2227.55	1809.21
* DL	3.000	685.00	.00	.00	2892.30	17500.00	2897.64	2897.64	2898.70	101.66	12.91	2558.58	1735.69
*	3.000	685.00	.00	.00	2892.30	17500.00	2898.62	2898.62	2900.28	103.70	14.81	2068.53	1718.46
DM	4.000	935.00	.00	.00	2900.50	17500.00	2906.18	2906.17	2907.41	85.54	12.21	2422.43	1892.16
	4.000	935.00	.00	.00	2900.50	17500.00	2907.05	2906.82	2908.87	81.49	13.30	1803.99	1938.62
* DN	4.500	375.00	.00	.00	2903.60	17500.00	2909.72	2909.72	2910.91	86.13	12.37	2495.16	1885.62
*	4.500	375.00	.00	.00	2903.60	17500.00	2910.32	2910.32	2912.14	92.99	13.89	1906.05	1814.78
DO	5.000	375.00	.00	.00	2907.30	17500.00	2912.92	2912.35	2913.60	69.78	10.22	2965.35	2094.99
	5.000	375.00	.00	.00	2907.30	17500.00	2913.86	2912.62	2914.63	53.76	10.15	2748.60	2386.75
* DP	6.000	710.00	.00	.00	2913.80	17500.00	2919.52	2919.52	2920.64	102.10	13.75	2396.70	1731.88
*	6.000	710.00	.00	.00	2913.80	17500.00	2920.03	2920.03	2921.83	123.21	15.28	1770.35	1576.56
DQ	7.000	800.00	.00	.00	2920.50	17500.00	2926.16	2925.95	2927.05	77.78	11.38	2577.58	1984.31
	7.000	800.00	.00	.00	2920.50	17500.00	2927.16	2926.44	2928.27	65.87	11.75	2254.81	2156.25
* DR	8.000	740.00	.00	.00	2926.30	17500.00	2932.13	2932.13	2933.34	56.21	10.23	2500.21	2334.14
*	8.000	740.00	.00	.00	2926.30	17500.00	2932.36	2932.36	2934.33	73.11	12.01	1701.07	2046.65
* DS	9.000	610.00	.00	.00	2932.20	17500.00	2937.24	2937.24	2938.21	83.01	9.56	2523.47	1920.70
	9.000	610.00	.00	.00	2932.20	17500.00	2937.74	2937.74	2939.49	100.64	11.46	1727.66	1744.40
DT	10.000	660.00	.00	.00	2938.60	17500.00	2943.18	2942.83	2943.99	97.57	9.13	2506.59	1771.67
	10.000	660.00	.00	.00	2938.60	17500.00	2944.19	2943.58	2945.29	78.68	10.01	2148.21	1972.96
DU	11.000	450.00	.00	.00	2943.10	17500.00	2947.78	2947.64	2948.74	95.29	11.91	2563.30	1792.71
	11.000	450.00	.00	.00	2943.10	17500.00	2948.31	2948.27	2949.83	107.68	13.60	1975.06	1686.45
DV	12.000	655.00	.00	.00	2948.30	17500.00	2953.86	2953.59	2954.69	86.63	11.56	2626.28	1880.21
	12.000	655.00	.00	.00	2948.30	17500.00	2954.83	2954.41	2956.03	82.26	12.86	2196.27	1929.51
* DW	13.000	650.00	.00	.00	2954.80	17500.00	2960.13	2960.13	2961.58	114.40	13.65	1974.73	1636.16
	13.000	650.00	.00	.00	2954.80	17500.00	2960.47	2960.26	2961.93	100.92	13.34	1939.17	1742.05
* DX	14.000	520.00	.00	.00	2958.40	17500.00	2965.22	2965.22	2967.08	73.05	13.68	1982.08	2047.56
*	14.000	520.00	.00	.00	2958.40	17500.00	2965.21	2965.21	2967.08	73.81	13.73	1975.09	2037.00
	14.300	80.00	2974.83	2981.43	2959.30	17500.00	2966.34	2965.66	2967.69	46.23	10.41	2103.65	2573.69
	14.300	80.00	2974.83	2981.43	2959.30	17500.00	2966.33	2965.66	2967.70	45.65	10.37	2112.59	2590.10

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
DY	14.600	53.00	2974.83	2981.43	2959.30	17500.00	2966.94	2965.66	2967.99	31.13	9.13	2397.72	3136.40
	14.600	53.00	2974.83	2981.43	2959.30	17500.00	2966.95	2965.66	2968.00	31.02	9.12	2400.67	3142.28
* DZ	15.000	121.00	.00	.00	2960.70	17500.00	2967.17	2967.13	2968.91	80.98	14.03	2011.73	1944.74
*	15.000	121.00	.00	.00	2960.70	17500.00	2967.73	2967.73	2969.76	82.98	14.41	1778.71	1921.14
EA	16.000	560.00	.00	.00	2965.10	17500.00	2972.11	2971.47	2972.83	59.11	7.95	2627.75	2276.09
	16.000	560.00	.00	.00	2965.10	17500.00	2972.85	2972.30	2974.07	73.13	9.53	2011.87	2046.41
* EB	17.000	490.00	.00	.00	2968.50	17500.00	2974.80	2974.80	2975.94	87.22	11.89	2349.86	1873.85
	17.000	490.00	.00	.00	2968.50	17500.00	2975.72	2975.64	2977.35	86.65	13.22	1936.55	1880.04
EC	18.000	770.00	.00	.00	2975.20	17500.00	2980.95	2980.77	2981.88	81.76	11.38	2388.40	1935.34
	18.000	770.00	.00	.00	2975.20	17500.00	2981.94	2981.72	2983.11	75.27	12.46	2169.34	2017.14
ED	19.000	610.00	.00	.00	2980.20	17500.00	2985.67	2985.39	2986.69	73.29	11.19	2329.78	2044.18
	19.000	610.00	.00	.00	2980.20	17500.00	2986.56	2986.39	2988.04	81.72	12.89	1932.34	1935.81
EE	20.000	730.00	.00	.00	2985.70	17500.00	2991.98	2991.97	2993.24	110.54	14.43	2194.15	1664.50
*	20.000	730.00	.00	.00	2985.70	17500.00	2992.97	2992.97	2994.55	94.10	14.92	1921.49	1804.06
* EF	21.000	1060.00	.00	.00	2992.40	17500.00	3001.24	3001.24	3002.69	73.84	14.18	2161.30	2036.55
*	21.000	1060.00	.00	.00	2992.40	17500.00	3001.84	3001.84	3003.89	78.72	15.48	1730.18	1972.39
* EG	22.000	1020.00	.00	.00	2998.90	17500.00	3007.62	3007.62	3008.83	50.10	12.83	2580.05	2472.46
	22.000	1020.00	.00	.00	2998.90	17500.00	3008.57	3008.19	3010.02	47.35	12.91	2113.25	2543.27
EH	22.500	490.00	.00	.00	3003.30	17500.00	3010.51	3010.41	3011.46	69.58	12.10	2639.42	2097.90
*	22.500	490.00	.00	.00	3003.30	17500.00	3011.38	3011.38	3012.92	76.95	13.65	2000.22	1995.01
* EI	23.000	490.00	.00	.00	3007.00	17500.00	3014.06	3014.06	3015.40	84.42	12.71	2369.24	1904.66
*	23.000	490.00	.00	.00	3007.00	17500.00	3015.01	3015.01	3016.98	83.53	13.83	1786.08	1914.80
EJ	24.000	980.00	.00	.00	3015.90	17500.00	3022.79	3022.52	3023.76	85.45	12.22	2400.42	1893.16
	24.000	980.00	.00	.00	3015.90	17500.00	3023.79	3023.19	3025.03	79.32	13.11	2119.93	1964.90
EK	24.100	540.00	.00	.00	3020.50	17500.00	3027.08	3026.67	3027.86	66.97	11.01	2668.94	2138.46
	24.100	540.00	.00	.00	3020.50	17500.00	3027.98	3027.45	3029.06	69.46	11.31	2178.20	2099.74
EL	25.000	510.00	.00	.00	3023.30	17500.00	3030.76	3030.38	3031.57	81.42	12.00	2656.16	1939.46
	25.000	510.00	.00	.00	3023.30	17500.00	3031.73	3031.16	3032.76	78.24	12.12	2264.35	1978.44
EM	25.100	400.00	.00	.00	3026.30	17500.00	3033.83	3033.65	3034.68	67.36	12.05	2888.59	2132.25
	25.100	400.00	.00	.00	3026.30	17500.00	3034.71	3034.52	3035.80	65.41	12.17	2337.44	2163.71
EJ	26.000	470.00	.00	.00	3030.60	17500.00	3036.88	3036.14	3037.36	46.16	9.12	3328.05	2575.64
	26.000	470.00	.00	.00	3030.60	17500.00	3037.86	3036.97	3038.52	48.21	9.67	2796.41	2520.36
* EO	27.000	670.00	.00	.00	3036.40	17500.00	3040.95	3040.90	3041.83	127.63	11.12	2527.44	1549.01
*	27.000	670.00	.00	.00	3036.40	17500.00	3041.95	3041.95	3043.46	126.97	13.32	1932.97	1553.03

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
*	28.000	450.00	.00	.00	3040.40	17500.00	3045.63	3045.63	3046.88	81.91	11.33	2300.21	1933.62
* EP	28.000	450.00	.00	.00	3040.40	17500.00	3046.43	3046.43	3048.47	85.18	12.90	1659.08	1896.13
	29.000	640.00	.00	.00	3045.00	17500.00	3051.53	3051.46	3052.78	107.95	14.17	2366.45	1684.30
EQ	29.000	640.00	.00	.00	3045.00	17500.00	3052.49	3051.98	3053.96	87.01	14.08	2069.36	1876.06
	30.000	620.00	.00	.00	3049.80	17500.00	3057.03	3056.78	3057.88	64.97	12.54	3022.11	2171.14
* ER	30.000	620.00	.00	.00	3049.80	17500.00	3058.04	3058.04	3059.97	84.78	15.84	1881.00	1900.57
*	31.000	680.00	.00	.00	3055.30	17500.00	3062.70	3062.70	3063.76	75.12	13.02	2677.08	2019.09
ES	31.000	680.00	.00	.00	3055.30	17500.00	3063.67	3063.12	3065.16	67.00	13.62	2063.70	2137.91
	32.000	835.00	.00	.00	3063.40	17500.00	3069.32	3069.23	3070.28	96.19	11.80	2888.13	1784.32
ET	32.000	835.00	.00	.00	3063.40	17500.00	3070.09	3070.07	3071.65	108.55	13.51	2193.20	1679.64
*	33.000	850.00	.00	.00	3069.20	17500.00	3077.61	3077.61	3078.71	105.39	14.64	2898.85	1704.66
EU	33.000	850.00	.00	.00	3069.20	17500.00	3078.41	3078.33	3079.93	104.52	15.75	2347.81	1711.77
	34.000	890.00	.00	.00	3077.40	17500.00	3084.19	3083.36	3084.67	58.07	9.65	3655.89	2296.39
EV	34.000	890.00	.00	.00	3077.40	17500.00	3085.18	3083.92	3085.84	60.16	10.07	2895.68	2256.21
	35.000	750.00	.00	.00	3083.40	17500.00	3089.13	3088.96	3090.17	108.97	12.65	2580.92	1676.41
EW	35.000	750.00	.00	.00	3083.40	17500.00	3089.94	3089.63	3091.45	107.86	13.91	2030.20	1685.01
	36.000	570.00	.00	.00	3087.50	17500.00	3094.20	3094.01	3095.23	76.74	13.04	2895.31	1997.70
EX	36.000	570.00	.00	.00	3087.50	17500.00	3095.11	3094.72	3096.72	82.96	14.29	2069.64	1921.37
	37.000	620.00	.00	.00	3093.80	17500.00	3099.85	3099.45	3100.67	100.71	11.75	2626.73	1743.82
EY	37.000	620.00	.00	.00	3093.80	17500.00	3100.82	3100.22	3102.43	102.61	13.24	1778.51	1727.62

CANADA DEL ORO

SUMMARY PRINTOUT TABLE 150

	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
DJ	1.000	17500.00	2883.50	.00	.00	.00	1343.66	.00
	1.000	17500.00	2884.50	1.00	.00	1.00	693.50	.00
* DK	2.000	17500.00	2889.70	.00	6.20	.00	1105.28	570.00
*	2.000	17500.00	2890.68	.97	6.18	.97	691.40	570.00
* DL	3.000	17500.00	2897.64	.00	7.93	.00	945.46	685.00
*	3.000	17500.00	2898.62	.98	7.94	.98	560.00	685.00
DM	4.000	17500.00	2906.18	.00	8.55	.00	918.07	935.00
	4.000	17500.00	2907.05	.87	8.43	.87	398.00	935.00
* DN	4.500	17500.00	2909.72	.00	3.54	.00	986.74	375.00
*	4.500	17500.00	2910.32	.60	3.27	.60	490.00	375.00
DO	5.000	17500.00	2912.92	.00	3.20	.00	988.55	375.00
	5.000	17500.00	2913.86	.94	3.54	.94	591.00	375.00
* DP	6.000	17500.00	2919.52	.00	6.60	.00	1020.44	710.00
*	6.000	17500.00	2920.03	.51	6.17	.51	458.00	710.00
DQ	7.000	17500.00	2926.16	.00	6.64	.00	944.32	800.00
	7.000	17500.00	2927.16	1.00	7.13	1.00	527.80	800.00
* DR	8.000	17500.00	2932.13	.00	5.97	.00	1029.39	740.00
*	8.000	17500.00	2932.36	.23	5.20	.23	439.50	740.00
* DS	9.000	17500.00	2937.24	.00	5.11	.00	1165.16	610.00
	9.000	17500.00	2937.74	.50	5.38	.50	498.00	610.00
DT	10.000	17500.00	2943.18	.00	5.94	.00	1024.85	660.00
	10.000	17500.00	2944.19	1.01	6.44	1.01	584.30	660.00
DU	11.000	17500.00	2947.78	.00	4.59	.00	1003.72	450.00
	11.000	17500.00	2948.31	.53	4.12	.53	576.80	450.00
DV	12.000	17500.00	2953.86	.00	6.08	.00	994.25	655.00
	12.000	17500.00	2954.83	.97	6.52	.97	590.00	655.00
* DW	13.000	17500.00	2960.13	.00	6.28	.00	648.54	650.00
	13.000	17500.00	2960.47	.33	5.64	.33	537.60	650.00
* DX	14.000	17500.00	2965.22	.00	5.09	.00	465.00	520.00
*	14.000	17500.00	2965.21	-.01	4.74	-.01	465.00	520.00
	14.300	17500.00	2966.31	.00	1.08	.00	463.22	80.00
	14.300	17500.00	2966.33	.02	1.12	.02	463.26	80.00

	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
DV	14.600	17500.00	2966.94	.00	.63	.00	464.38	53.00
	14.600	17500.00	2966.95	.01	.62	.01	464.40	53.00
*	15.000	17500.00	2967.17	.00	.23	.00	525.52	121.00
* DZ	15.000	17500.00	2967.73	.56	.78	.56	402.90	121.00
EA	16.000	17500.00	2972.11	.00	4.94	.00	905.39	560.00
	16.000	17500.00	2972.85	.74	5.12	.74	543.46	560.00
*	17.000	17500.00	2974.80	.00	2.69	.00	871.70	490.00
EB	17.000	17500.00	2975.72	.92	2.87	.92	517.80	490.00
EC	18.000	17500.00	2980.95	.00	6.14	.00	904.64	770.00
	18.000	17500.00	2981.94	.99	6.22	.99	625.00	770.00
ED	19.000	17500.00	2985.67	.00	4.73	.00	810.41	610.00
	19.000	17500.00	2986.56	.88	4.62	.88	525.00	610.00
EE	20.000	17500.00	2991.98	.00	6.31	.00	816.66	730.00
*	20.000	17500.00	2992.97	.98	6.41	.98	528.00	730.00
*	21.000	17500.00	3001.24	.00	9.26	.00	696.29	1060.00
* EF	21.000	17500.00	3001.84	.60	8.88	.60	372.00	1060.00
* EG	22.000	17500.00	3007.62	.00	6.38	.00	848.13	1020.00
	22.000	17500.00	3008.57	.95	6.73	.95	421.00	1020.00
EH	22.500	17500.00	3010.51	.00	2.90	.00	968.99	490.00
*	22.500	17500.00	3011.38	.87	2.81	.87	511.60	490.00
*	23.000	17500.00	3014.06	.00	3.55	.00	845.81	490.00
* EI	23.000	17500.00	3015.01	.95	3.63	.95	424.00	490.00
EJ	24.000	17500.00	3022.79	.00	8.73	.00	800.84	980.00
	24.000	17500.00	3023.79	.99	8.78	.99	506.00	980.00
EK	24.100	17500.00	3027.08	.00	4.29	.00	902.93	540.00
	24.100	17500.00	3027.98	.90	4.19	.90	538.00	540.00
EL	25.000	17500.00	3030.76	.00	3.67	.00	961.55	510.00
	25.000	17500.00	3031.73	.97	3.74	.97	611.00	510.00
EM	25.100	17500.00	3033.83	.00	3.07	.00	1195.26	400.00
	25.100	17500.00	3034.71	.88	2.96	.88	960.00	400.00
EN	26.000	17500.00	3036.88	.00	3.05	.00	1247.56	470.00
	26.000	17500.00	3037.86	.97	3.15	.97	756.10	470.00
*	27.000	17500.00	3040.95	.00	4.06	.00	1194.29	670.00
* EO	27.000	17500.00	3041.95	1.00	4.09	1.00	615.00	670.00

	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
* EP	28.000	17500.00	3045.63	.00	4.68	.00	891.88	450.00
*	28.000	17500.00	3046.43	.80	4.48	.80	400.55	450.00
EQ	29.000	17500.00	3051.53	.00	5.91	.00	800.66	640.00
	29.000	17500.00	3052.49	.96	6.06	.96	445.00	640.00
ER	30.000	17500.00	3057.03	.00	5.50	.00	1179.96	620.00
*	30.000	17500.00	3058.04	1.00	5.54	1.00	437.00	620.00
* ES	31.000	17500.00	3062.70	.00	5.67	.00	1148.50	680.00
	31.000	17500.00	3063.67	.97	5.64	.97	448.00	680.00
ET	32.000	17500.00	3069.32	.00	6.62	.00	1036.01	835.00
	32.000	17500.00	3070.09	.77	6.42	.77	586.60	835.00
* EU	33.000	17500.00	3077.61	.00	8.29	.00	1102.21	850.00
	33.000	17500.00	3078.41	.80	8.32	.80	632.00	850.00
EV	34.000	17500.00	3084.19	.00	6.58	.00	1333.26	890.00
	34.000	17500.00	3085.18	.99	6.77	.99	624.60	890.00
EW	35.000	17500.00	3089.13	.00	4.93	.00	1089.63	750.00
	35.000	17500.00	3089.94	.82	4.76	.82	498.20	750.00
EX	36.000	17500.00	3094.20	.00	5.07	.00	1015.41	570.00
	36.000	17500.00	3095.11	.91	5.17	.91	429.70	570.00
EY	37.000	17500.00	3099.85	.00	5.65	.00	1009.94	620.00
	37.000	17500.00	3100.82	.97	5.71	.97	367.80	620.00

SUMMARY OF ERRORS AND SPECIAL NOTES

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CAUTION SECNO=      2.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=      2.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=      2.000  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=      2.000  PROFILE=  2  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=      3.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=      3.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=      3.000  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=      3.000  PROFILE=  2  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=      4.500  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=      4.500  PROFILE=  1  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=      4.500  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=      4.500  PROFILE=  2  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=      6.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=      6.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=      6.000  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=      6.000  PROFILE=  2  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=      8.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=      8.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=      8.000  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=      8.000  PROFILE=  2  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=      9.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=      9.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=     13.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     13.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=     14.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     14.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     14.000  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     14.000  PROFILE=  2  MINIMUM SPECIFIC ENERGY

WARNING SECNO=     15.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
CAUTION SECNO=     15.000  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     15.000  PROFILE=  2  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=     17.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     17.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=     20.000  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     20.000  PROFILE=  2  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=     21.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     21.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY
CAUTION SECNO=     21.000  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=     21.000  PROFILE=  2  MINIMUM SPECIFIC ENERGY
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 CAUTION SECNO=     22.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
 CAUTION SECNO=     22.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY

 CAUTION SECNO=     22.500  PROFILE=  2  CRITICAL DEPTH ASSUMED
 CAUTION SECNO=     22.500  PROFILE=  2  MINIMUM SPECIFIC ENERGY

 CAUTION SECNO=     23.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
 CAUTION SECNO=     23.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY
 CAUTION SECNO=     23.000  PROFILE=  2  CRITICAL DEPTH ASSUMED
 CAUTION SECNO=     23.000  PROFILE=  2  MINIMUM SPECIFIC ENERGY

 WARNING SECNO=     27.000  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
 CAUTION SECNO=     27.000  PROFILE=  2  CRITICAL DEPTH ASSUMED
 CAUTION SECNO=     27.000  PROFILE=  2  MINIMUM SPECIFIC ENERGY

 CAUTION SECNO=     28.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
 CAUTION SECNO=     28.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY
 CAUTION SECNO=     28.000  PROFILE=  2  CRITICAL DEPTH ASSUMED
 CAUTION SECNO=     28.000  PROFILE=  2  MINIMUM SPECIFIC ENERGY

 CAUTION SECNO=     30.000  PROFILE=  2  CRITICAL DEPTH ASSUMED
 CAUTION SECNO=     30.000  PROFILE=  2  MINIMUM SPECIFIC ENERGY

 CAUTION SECNO=     31.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
 CAUTION SECNO=     31.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY

 CAUTION SECNO=     33.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
 CAUTION SECNO=     33.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY
```

Floodway width summary: CANADA DEL ORO
Profile No. 2

Section Number	Elevation Increase	Top Width	Left Encroach Station	Left Sta Distance From Center	Center Station	Right Sta Distance From Center	Right Encroach Station
1.000	1.00	693.50	621.00	622.10	1243.10	71.40	1314.50
2.000	.97	691.40	310.00	634.30	944.30	57.10	1001.40
3.000	.98	560.00	251.00	482.60	733.60	77.40	811.00
4.000	.87	398.00	427.00	73.00	500.00	325.00	825.00
4.500	.60	490.00	159.00	74.00	233.00	416.00	649.00
5.000	.94	591.00	99.00	40.00	139.00	551.00	690.00
6.000	.51	458.00	28.00	24.50	52.50	433.50	486.00
7.000	1.00	527.80	22.20	34.60	56.80	493.20	550.00
8.000	.23	439.50	11.50	112.50	124.00	327.00	451.00
9.000	.50	498.00	88.00	146.00	234.00	352.00	586.00
10.000	1.01	584.30	45.70	75.30	121.00	509.00	630.00
11.000	.53	576.80	53.20	36.80	90.00	540.00	630.00
12.000	.97	590.00	225.00	40.40	265.40	549.60	815.00
13.000	.33	537.80	222.20	32.35	254.55	505.45	760.00
14.000	-.01	485.00	100.00	122.60	222.60	362.40	585.00
14.300	.02	480.00	110.00	126.50	236.50	353.50	590.00
14.600	.01	480.00	110.00	126.50	236.50	353.50	590.00
15.000	.56	402.90	251.10	44.75	295.85	358.15	654.00
16.000	.74	558.00	224.00	162.30	386.30	395.70	782.00
17.000	.92	517.80	328.00	467.10	795.10	50.70	845.80
18.000	.99	625.00	365.00	584.55	949.55	40.45	990.00
19.000	.88	525.00	264.00	487.45	751.45	37.55	789.00
20.000	.98	528.00	205.00	297.05	502.05	230.95	733.00
21.000	.60	372.00	220.00	177.50	397.50	194.50	592.00
22.000	.95	421.00	180.00	30.50	210.50	390.50	601.00
22.500	.87	511.60	19.40	21.10	40.50	490.50	531.00
23.000	.95	424.00	167.00	54.65	221.65	369.35	591.00
24.000	.99	506.00	243.00	192.95	435.95	313.05	749.00
24.100	.90	538.00	312.00	19.00	331.00	519.00	850.00
25.000	.97	611.00	274.00	14.70	288.70	596.30	885.00
25.100	.88	660.00	315.00	25.00	340.00	635.00	975.00
26.000	.97	758.10	122.90	17.15	140.05	740.95	881.00
27.000	1.00	615.00	305.00	54.95	359.95	560.05	920.00
28.000	.80	415.00	390.00	112.15	502.15	302.85	805.00
29.000	.96	445.00	352.00	320.15	672.15	124.85	797.00
30.000	1.00	437.00	469.00	231.20	700.20	205.80	906.00
31.000	.97	448.00	576.00	96.40	672.40	351.60	1024.00
32.000	.77	586.60	517.40	48.70	566.10	537.90	1104.00
33.000	.80	632.00	415.00	51.95	466.95	580.05	1047.00
34.000	.99	624.60	249.40	21.05	270.45	603.55	874.00
35.000	.82	498.20	283.00	460.65	743.65	37.55	781.20
36.000	.91	429.70	585.00	397.15	982.15	32.55	1014.70
37.000	.97	367.80	761.00	345.75	1106.75	22.05	1128.80

FLOODWAY DATA, CANADA DEL ORO
PROFILE NO. 2

STATION	FLOODWAY WIDTH	FLOODWAY SECTION AREA	FLOODWAY MEAN VELOCITY	WATER SURFACE ELEVATION WITH FLOODWAY	WITHOUT FLOODWAY	DIFFERENCE
1.000	693.	2466.	7.1	2884.5	2883.5	1.0
2.000	691.	2228.	7.9	2890.7	2889.7	1.0
3.000	560.	2069.	8.5	2898.6	2897.6	1.0
4.000	398.	1804.	9.7	2907.1	2906.2	.9
4.500	490.	1906.	9.2	2910.3	2909.7	.6
5.000	591.	2749.	6.4	2913.8	2912.9	.9
6.000	458.	1770.	9.9	2920.0	2919.5	.5
7.000	528.	2255.	7.8	2927.2	2926.2	1.0
8.000	439.	1701.	10.3	2932.3	2932.1	.2
9.000	498.	1728.	10.1	2937.7	2937.2	.5
10.000	584.	2148.	8.1	2944.2	2943.2	1.0
11.000	577.	1975.	8.9	2948.3	2947.8	.5
12.000	590.	2196.	8.0	2954.9	2953.9	1.0
13.000	538.	1939.	9.0	2960.4	2960.1	.3
14.000	485.	1975.	8.9	2965.2	2965.2	.0
14.300	463.	2113.	8.3	2966.3	2966.3	.0
14.600	464.	2401.	7.3	2966.9	2966.9	.0
15.000	403.	1779.	9.8	2967.8	2967.2	.6
16.000	558.	2012.	8.7	2972.8	2972.1	.7
17.000	518.	1937.	9.0	2975.7	2974.8	.9
18.000	625.	2169.	8.1	2981.9	2980.9	1.0
19.000	525.	1932.	9.1	2986.6	2985.7	.9
20.000	528.	1921.	9.1	2993.0	2992.0	1.0
21.000	372.	1730.	10.1	3001.8	3001.2	.6
22.000	421.	2113.	8.3	3008.6	3007.6	1.0
22.500	512.	2000.	8.7	3011.4	3010.5	.9
23.000	424.	1786.	9.8	3015.0	3014.1	.9
24.000	506.	2120.	8.3	3023.8	3022.8	1.0
24.100	538.	2178.	8.0	3028.0	3027.1	.9
25.000	611.	2264.	7.7	3031.8	3030.8	1.0
25.100	660.	2337.	7.5	3034.7	3033.8	.9
26.000	758.	2796.	6.3	3037.9	3036.9	1.0
27.000	615.	1933.	9.1	3041.9	3040.9	1.0
28.000	415.	1659.	10.5	3046.4	3045.6	.8
29.000	445.	2069.	8.5	3052.5	3051.5	1.0
30.000	437.	1881.	9.3	3058.0	3057.0	1.0
31.000	448.	2064.	8.3	3063.7	3062.7	1.0
32.000	587.	2193.	8.0	3070.1	3069.3	.8
33.000	632.	2348.	7.5	3078.4	3077.5	.8
34.000	625.	2896.	6.0	3085.2	3084.2	1.0
35.000	498.	2030.	8.6	3089.9	3089.1	.8
36.000	430.	2070.	8.5	3095.1	3094.2	.9

FLOODWAY DATA, CANADA DEL ORO
PROFILE NO. 2

STATION	FLOODWAY WIDTH	FLOODWAY SECTION AREA	FLOODWAY MEAN VELOCITY	WATER SURFACE ELEVATION WITH FLOODWAY	WITHOUT FLOODWAY	DIFFERENCE
37.000	368.	1779.	9.8	3100.6	3099.8	1.0

Normal program termination

HEC-2 SEC NO.	LETTER	COMMENTS
1	DJ	Limit of Study
2	DK	
3	DL	
4	DM	
4.5	DN	
5	DO	
6	DP	
7	DQ	
8	DR	
9	DS	
10	DT	
11	DU	Wilds Road
12	DV	
13	DW	
14	DX	
14.3		
14.6	DY	Golder Ranch Road Bridge
15	DZ	
16	EA	
17	EB	
18	EC	
19	ED	
20	EE	
21	EF	
22	EG	
22.5	EH	
23	EI	
24	EJ	
24.1	EK	
25	EL	
25.1	EM	
26	EN	
27	EO	
28	EP	
29	EQ	
30	ER	
31	ES	
32	ET	
33	EU	
34	EV	
35	EW	
36	EX	
37	EY	Edwin Road Pima-Pinal County Line Limit of Study

CATALINA STATE PARK

LIMIT OF STUDY

ZONE AE

ROLLING ST

QUARTER CORNER

MATCHLINE SEE SHEET 2

E 1,009,000
N 530,000

E 1,010,000

N 529,000
E 1,011,000

E 1,012,000

E 1,013,000

N 530,000

E 1,014,000
N 531,000

No. 14
2971.07

No. 15
3106.38

No. 39

No. 16
2901.03

No. 41
3035.2

STEREO ELEV.
No. 37
2923.96

DJ DK DL DM DN DO DP DQ

LEGEND

- 100 YEAR FLOOD LIMITS
- 500 YEAR FLOOD LIMITS
- FLOODWAY LIMITS
- CROSS SECTIONS

Draft

PLATE INDEX

DAVID EVANS AND ASSOCIATES, INC.
ENGINEERS, SURVEYORS, PLANNERS, LANDSCAPE ARCHITECTS
3845 N. BUSINESS CENTER DR., TUCSON, ARIZONA 85705-2394
(602)292-2160 FAX(602)292-9139

200 0 200 400 600
100
GRAPHIC SCALE IN FEET

NOTE: MAP BASED ON 1"=200' TOPOGRAPHIC MAPPING PREPARED BY COOPER AERIAL SURVEY INC. FROM PHOTOGRAPHS TAKEN IN MAY 1992, CONTRACT NO. C.A.S. 920514. ADDITIONS AND ADJUSTMENTS MADE BY DAVID EVANS & ASSOC.

ELEVATIONS BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929.

LETTER OF MAP REVISION WORK MAP
UPPER CANADA DEL ORO WASH
PIMA COUNTY, ARIZONA

SHEET 1 OF 4 PCDTOOIC

E 1,010,000 N 538,000 | N 539,000 | E 1,011,000 N 540,000 | N 541,000 | E 1,012,000 N 542,000 | N 543,000 | E 1,013,000

E 1,010,000 | N 537,000 | E 1,011,000

APPLETON AVE | HOOVER AVE | SCHLEGEL LN | GOLDER LN | WILLIAMS RD | ZONE AE

MATCH LINE SEE SHEET 1

MATCH LINE SEE SHEET 3

LEGEND

- 100 YEAR FLOOD LIMITS
- 500 YEAR FLOOD LIMITS
- FLOODWAY LIMITS
- CROSS SECTIONS

PLATE INDEX

Draft

DAVID EVANS AND ASSOCIATES, INC.
ENGINEERS, SURVEYORS, PLANNERS, LANDSCAPE ARCHITECTS
3645 N. BUSINESS CENTER DR., TUCSON, ARIZONA 85705-2919
(602)292-2160 FAX(602)292-9131

200 100 0 200 400 600

GRAPHIC SCALE IN FEET

NOTE: MAP BASED ON 1"=200' TOPOGRAPHIC MAPPING PREPARED BY COOPER AERIAL SURVEY INC. FROM PHOTOGRAPHS TAKEN IN MAY 1992, CONTRACT NO. C.A.S. 920514. ADDITIONS AND ADJUSTMENTS MADE BY DAVID EVANS & ASSOC.

ELEVATIONS BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929.

LETTER OF MAP REVISION WORK MAP

UPPER CANADA DEL ORO WASH

PIMA COUNTY, ARIZONA

SHEET 2 OF 4 PCDT0010

E 1,013,000 E 1,013,000 N 544,000 N 545,000 E 1,014,000 N 546,000 N 547,000 E 1,015,000 N 548,000 N 549,000 E 1,016,000

SEE SHEET 2

MATCH LINE

ZONE AE

STEREO ELEV. No. 28 2999.6

STEREO ELEV. No. 25 3037.6

STEREO ELEV. No. 26 3175.0

STEREO ELEV. No. 6 3053.8

STEREO ELEV. No. 7 3106.08

DEL ORO WASH

EF EG EH EI EJ EK EL EM EN EO EP EQ

MATCH LINE

SEE SHEET 4

LEGEND

- 100 YEAR FLOOD LIMITS
- 500 YEAR FLOOD LIMITS
- FLOODWAY LIMITS
- CROSS SECTIONS

200 0 200 400 600

100 GRAPHIC SCALE IN FEET

NOTE: MAP BASED ON 1"=200' TOPOGRAPHIC MAPPING PREPARED BY COOPER AERIAL SURVEY INC. FROM PHOTOGRAPHS TAKEN IN MAY 1992, CONTRACT NO. C.A.S. 920514. ADDITIONS AND ADJUSTMENTS MADE BY DAVID EVANS & ASSOC.

ELEVATIONS BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929.

PLATE INDEX

Draft

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LETTER OF MAP REVISION WORK MAP

UPPER CANADA DEL ORO WASH

PIMA COUNTY, ARIZONA

PCDT0010

SEE SHEET 3

MATCH LINE

E 1,020,000

E 1,021,000

N 534,000

E 1,022,000

ROAD

ZONE AE

STEREO ELEV. No. 22 3055.1

No. 4 3156.93

STEREO ELEV. No. 23 3076.0

No. 3 3076.56

LIMIT OF STUDY

COUNTY

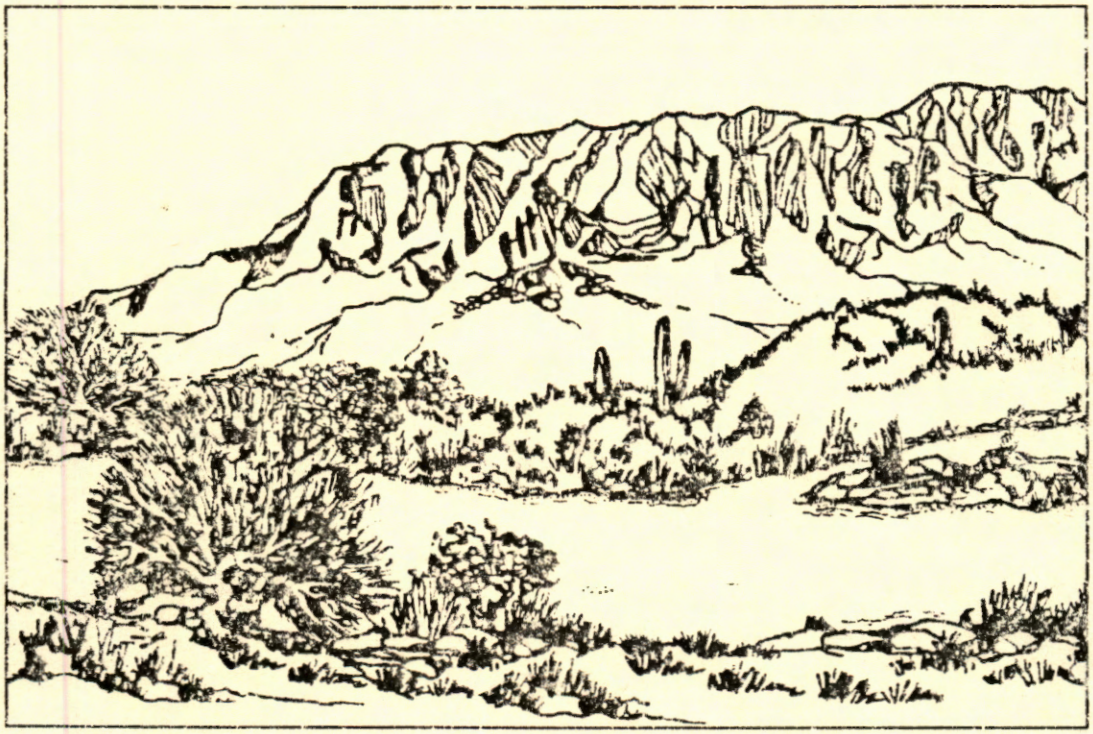
PINAL

JUSTIN LANE

E1 E2 E3 E4 E5 E6 E7 E8 E9 E10 E11 E12 E13 E14 E15 E16 E17 E18 E19 E20 E21 E22 E23 E24 E25 E26 E27 E28 E29 E30 E31 E32 E33 E34 E35 E36 E37 E38 E39 E40

River Management Study
file copy

FLOOD CONTROL STUDY
FOR
CANADA DEL ORO WASH
CATALINA, ARIZONA



PIMA COUNTY FLOOD CONTROL DISTRICT

NOVEMBER 1991

FLOOD CONTROL STUDY
FOR
CANADA DEL ORO WASH

CATALINA, ARIZONA

Prepared for the
Pima County Board of Supervisors
sitting as the
Flood Control District Board of Directors

Dan Eckstrom
Raul Grijalva
Greg Lunn
Ed Moore
Reg Morrison

Prepared by
The Pima County Department of Transportation
and Flood Control District
Flood Control Planning and Development Division

John M. Bernal
Director

November 4, 1991

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EXECUTIVE SUMMARY

The Cañada del Oro (CDO) Wash area located near Catalina, Arizona, offers a rural lifestyle in a small town setting, while providing the amenities of a large metropolitan area nearby. Drawn by the scenic environment, residents settled along the CDO near Catalina during the late 1960's and early 1970's, prior to the adoption of floodplain management regulations by the Pima County Flood Control District (District) in 1974.

It has long been recognized that a large flood on the CDO near Catalina would have disastrous consequences for floodplain residents. During a 100-year or base flood, virtually the entire valley floor would be inundated. Although historically few flooding complaints have been recorded for this area by the District, and the nature of the complaints has generally not been serious, the potential for loss of life and extensive damage due to a major flood in the area is cause for concern.

Working maps showing the floodway and floodplain boundaries in the study area were first developed by the U.S. Geological Survey in 1979, and were used by the District to regulate development in floodprone areas. In 1983, the Federal Emergency Management Agency (FEMA) published the first floodway and floodplain maps, based on the work maps issued in 1979. The FEMA Flood Insurance Study (FIS) indicates flow depths of three to eight feet (3-8') above the main channel, and velocities of 4.6 to 9.7 feet per second (fps) across the floodway. A general rule-of-thumb is that it is difficult for an average person to stand in flowing water if the product of depth and velocity exceeds the numerical value of ten (10). Based on the depths and velocities in the FIS, residents of 36 dwellings located in the floodway will be exposed to extremely hazardous conditions during a 100-year flood.

The dangers posed by flooding to area residents have been well-known and widely publicized since the mid-1960's. Golder Dam, located approximately four miles upstream of the Lago del Oro Study Area, was constructed in 1964 to create a large lake as the central attraction to a planned residential subdivision. Soon after it began to fill, the dam was found to be leaking. After determining that uncertainties regarding dam stability constituted a danger to life and property in downstream areas, the Arizona State Water Commission in 1981 ordered that the dam be breached. Due to the increased attention focused on the area by the construction of Golder Dam, even after the dam was breached, the dangers to downstream residents from a major flood were readily apparent.

At the request of the Pima County Department of Transportation and Flood Control District (District), the Arizona Department of Water Resources (ADWR) in 1981 conducted a two-phase study to address solutions to the CDO flooding problems near Catalina. Several structural and two non-structural alternatives were evaluated. Based on a cost/benefit ratio, ADWR concluded that three options were feasible and should be investigated further: 1) constructing levees to protect the densely-populated western portion of the floodplain, 2) acquiring floodprone properties, and 3) installing a flood warning system. Although the flood warning system would not provide flood control to area residents, it was recommended as a protective measure to reduce the potential for loss of life and for incurring flood damage along the study reach.

Beginning in 1983, a flood-warning system was installed along this reach of the CDO. The National Weather Service, ADWR, the Tucson-Pima County Department of Emergency Services, and the District jointly sponsor the ALERT (Automated Local Evaluation in Real Time) flood warning system. Currently, two stream and seven precipitation gages are operating in the watershed upstream of the study area, providing 1 1/2 to 3 hours warning to area residents.

The District has been actively engaged in acquiring floodprone land as a means of providing non-structural flood control since 1984, when voters first approved using bond monies for buying flood-damaged land and for relocating residents of flood-damaged properties. As part of a 1985 Board-adopted Floodprone Land Acquisition Program, several areas were identified as priorities for acquisition, including the four-mile reach along the CDO near Catalina, between the Pinal County line and Catalina State Park in the vicinity of Lago del Oro Parkway. In 1986, voters authorized bond funding to acquire improved and unimproved property, the latter to prevent future flood damages.

On July 24, 1990, a large storm caused flooding along several watercourses in eastern Pima County, including the CDO near Catalina. Although the impact of the storm was greater in other locations, residents' concerns about flooding, which had possibly been eased somewhat by the absence of serious damage during the October 1983 flood, were rekindled. Three formal requests for the District to acquire floodprone land in this area were received after the July 24 storm, and renewed attention has been focused on acquiring floodprone land in this area.

This report was prepared at the request of the Director of the Pima County Department of Transportation and Flood Control District, to obtain a current estimate for acquiring floodprone land along the CDO near Catalina, to aid in evaluating how acquiring property along this portion of the CDO satisfies the goals of the Floodprone Land Acquisition Program, and to gage the fiscal impacts of acquiring floodprone land in this area on the overall acquisition program. It is also intended to serve as a guide in evaluating individual requests from area property owners to purchase floodprone land.

There are 10 conventional and 26 manufactured homes located in the floodway, 7 conventional and 39 manufactured homes located in the floodplain outside the floodway, and 9 manufactured homes located in the erosion hazard area outside both the floodway and floodplain throughout the study reach. Projected acquisition costs for land and improvements are: $4.7 million for the entire floodway (312 acres), $3.3 million for only residentially-developed floodway property (96 acres), $4.4 million for the floodplain outside the floodway (244 acres), and $1.1 million to acquire the erosion hazard area outside the floodway and floodplain (68 acres). The cost of acquiring the floodway and floodplain is estimated at $9.1 million (556 acres). Pertinent acquisition data are summarized in the table following the Executive Summary.

Due to the extremely hazardous conditions expected during a 100-year flood, exacerbated by a probable loss of roadway access and the dangers associated with rescue operations, it is recommended that parcels with habitable structures (dwellings) located in the floodway be acquired, subject to the availability of funding, for those property owners who so request it. As additional funding becomes available, parcels in the floodplain or erosion hazard area with dwellings which are not consistent with the Floodplain and Erosion Hazard Management Ordinance and which are likely to incur serious damage during a 100-year flood should be acquired next. Vacant property in the floodway should also be acquired, to preserve the environmental attributes and hydraulic integrity of this reach. A detailed listing of recommendations is provided in the Recommendations Section of the report.

Based on the severity of the flood hazards to which residents are exposed, and the relatively large number of dwellings located in the floodway (36), the CDO near Catalina should be rated as among the top of the District-wide Priority 1 listings for acquisition, together with the Tanque Verde Wash between Bonanza Avenue and Forty-Niners country Club, property located in the CDO floodway between La Cholla Boulevard and Overton Road, and the Black Wash between the headwaters and Ajo Highway.

Several measures are recommended which will prevent the worsening of an aleady dangerous situation in this area. Strict enforcement of floodplain management regulations is needed. Enforcement action should be pursued as necessary for those dwellings which are illegally located in hazardous areas, i.e. those constructed or installed without permits, and after the adoption of the first Floodplain Management Ordinance, or those constructed or installed in violation of permit conditions. A monitoring program, including quarterly field visits and an annual overflight, should be initiated to ensure compliance with current regulations. Waivers and variances should not be granted for new construction in hazardous areas, as the threat posed by flooding is significant; additionally future costs to acquire the property will likely be increased if the property is improved.

Finally, due to channel changes which have impacted the floodway since the original FEMA mapping, it is recommended that the FEMA floodplain and floodway maps be revised. The FEMA restudy should be initiated as soon as possible in order to establish the most accurate flooding and erosion data for evaluating and prioritizing parcels to be acquired.

EXECUTIVE SUMMARY
TABLE

Acquisition Cost for Cañada del Oro Wash
Pima County Line to Catalina State Park

Zone	Cost (Dollars x 1000)	Acres
Floodway	$4,663	312
Floodplain	$4,458	244
Floodway and Floodplain	$9,121	556
Floodway (with dwellings only)	$3,338	96
Erosion Hazard Area	$1,047	68

*note: the cost estimate is based on assumed current market values and contingency costs

I. INTRODUCTION

1.1 INTRODUCTION

The Cañada del Oro Wash (CDO) along Lago del Oro Parkway near Catalina provides an attractive setting for those desiring a rural lifestyle. Located about 17 miles northeast of downtown Tucson, the scenic watercourse provides open space needed for equestrian and other recreational uses, and offers the benefits of living in a small community, while at the same time offering the amenities of a larger metropolitan center nearby (Fig. 1).

Residents living in the floodplain and particularly in the floodway along this reach of the CDO are, however, exposed to very severe flood and erosion hazards. Many settled along the CDO floodplain in the late 1960's and early 1970's, before the word "floodplain" was part of our everyday vocabulary, and prior to the adoption of federal and local floodplain management regulations. The Federal Emergency Management Agency (FEMA) in 1979 issued preliminary floodway and floodplain maps for Pima County, including the study area, and in 1983 published the first Floodway and Floodplain Maps and Flood Insurance Study (FIS) for Pima County, based on the 1979 data. When the preliminary data were first made available in 1979, the dangers to residents were quantified.

Many of the properties and dwellings along this portion of the CDO are located in the floodway or floodplain (Figs. 2 and 5) as designated on the 1983 FEMA maps [1]. In the event of a 100-year flood, most of the valley floor would be inundated, with no vehicular access to evacuate to safe and higher ground. According to the FIS, flow depths of three to eight feet (3-8') are likely above the main channel, with expected velocities of 4.6 to 9.7 feet per second, depending on channel cross-section configuration. A basic rule-of-thumb is that it is difficult for an average person to stand in water when the product of the flow depth and velocity exceeds the numerical value of ten (10). Clearly residents' lives will be in jeopardy should they be caught in the floodway during a 100-year flood. Loss of property is a secondary, but very important concern.

Although historically there have been few CDO flood-damage complaints of a serious nature in this area (section 2.2), District staff as well as residents realize the potential hazard. The Board of Supervisors formally recognized the hazard in 1985 when bond

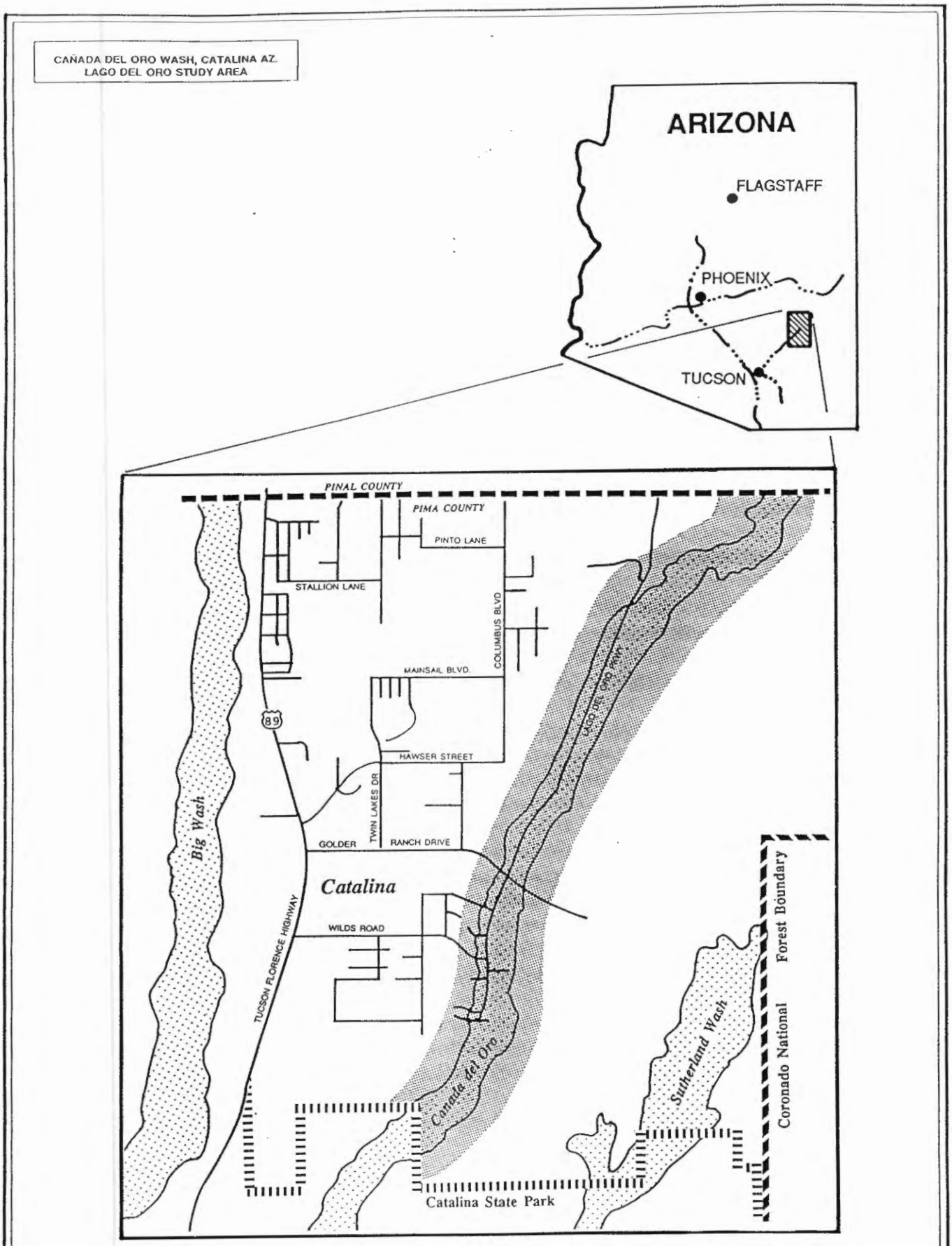
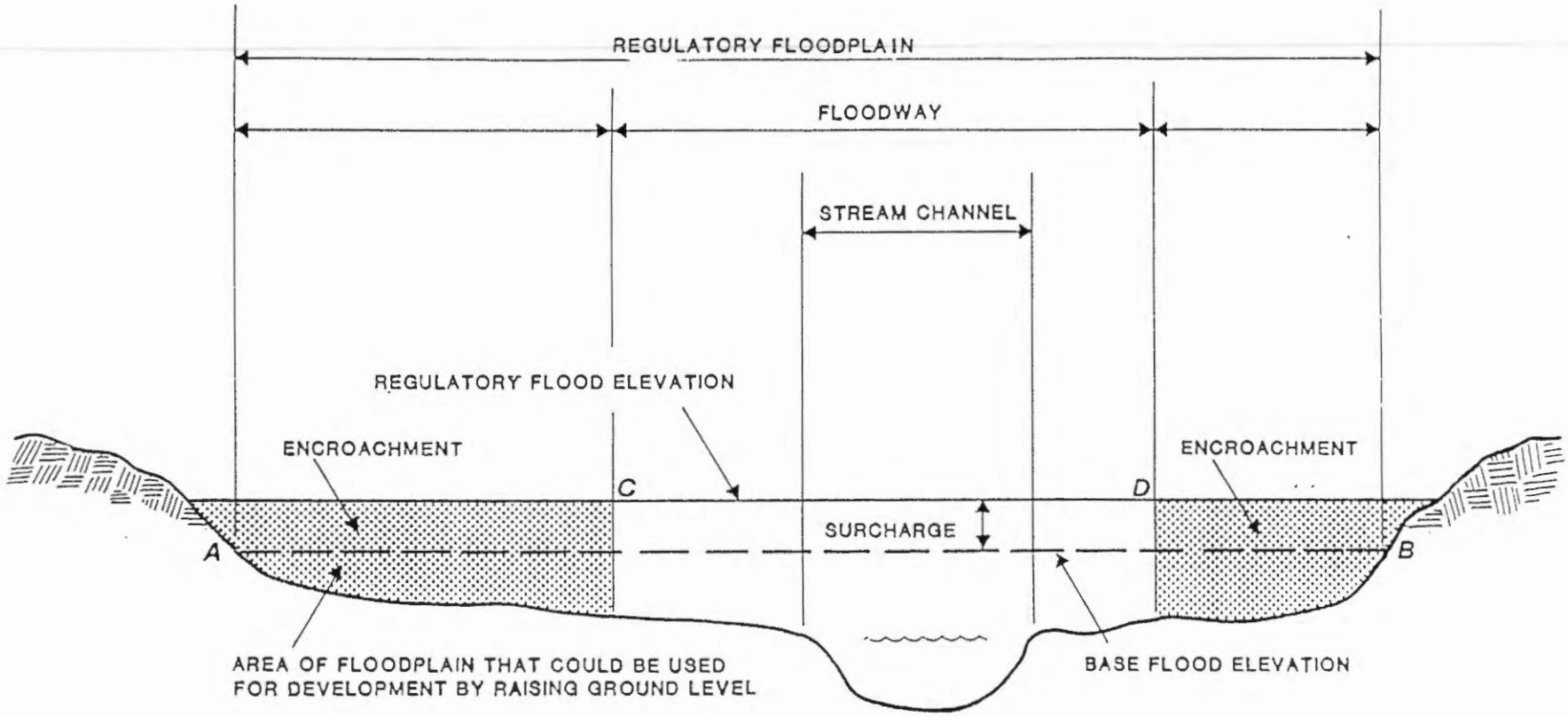


FIGURE 1
LOCATION OF STUDY REACH

CAÑADA DEL ORO WASH, CATALINA AZ.
LAGO DEL ORO STUDY AREA



LINE *AB* IS THE BASE FLOOD ELEVATION (100 YEAR FLOOD)
LINE *CD* IS THE REGULATORY FLOOD ELEVATION (1.0 FOOT ABOVE BASE FLOOD ELEVATION.)
SURCHARGE IS NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT), OR LESS IF SPECIFIED BY COUNTY

FIGURE 2

SCHEMATIC OF FLOODWAY
AND FLOODPLAIN

funding of $40 million was approved for the Floodprone Land Acquisition Program. A priority listing was developed as part of the adopted program, and the CDO from Catalina State Park north to the Pinal County Line was identified as a top priority area for acquisition (Appendix A).

The Lago del Oro study area, an approximately four-mile reach extending along the CDO near Catalina, is located in Township 14 South, Range 11 East, and comprises portions of Sections 1, 2, 10, 11, 15, and 22 (Fig. 3). A brief description of land use and development in the study area follows.

Most property has been developed for residential use, with the majority of the dwellings consisting of manufactured homes. Residences are most heavily concentrated in Section 15, with Sections 10, 22, and 11 containing fewer residences, respectively. No residential structures are located in floodprone or erosion hazard areas in Sections 1 and 2. Approximately two businesses are located in the area. Lago del Oro Parkway, a public road, extends from the southern end of Section 15 northeast to mid-way in Section 2. Golder Ranch Road Bridge, also publicly-owned, extends across the CDO in Section 15 and provides all-weather access to some residents along the eastern side of the CDO Wash. A privately-owned airfield runway extends from the northwest corner of Section 11 northeast into Section 2. Many non-habitable structures such as storage sheds and animal housing are present.

1.2 PURPOSE

In response to a request by the Director of the Pima County Department of Transportation and Flood Control District, this report has been prepared to: 1) provide a 1991 cost estimate for acquiring floodprone land and associated improvements in the study reach, 2) aid in evaluating how acquiring land along the CDO near Catalina satisfies the goals of the Floodprone Land Acquisition Program, 3) gage the fiscal impacts of acquisition in this area on the overall Floodprone Land Acquisition Program, and 4) serve as a basis for responding to individual requests to acquire property within the study area. Three formal acquisition requests were submitted to the District from area property owners after the July 24, 1990 flood. Additionally, when compared with drainage assessments for other identified priority acquisition areas, such as the Black Wash, this report can provide further guidance in determining the order of acquisition.

PINAL COUNTY
PIMA COUNTY
EDWIN ROAD
SIERRA TUCSON
RAIL N ROAD
COLUMBUS BLVD
LAGO DEL ORO PKWY
GOLDER RANCH DRIVE
WILDS ROAD
BOWMAN ROAD
ROLLINS ROAD
T 11 S, R 14 E

FIGURE 3

AERIAL PHOTOGRAPH OF STUDY AREA

STUDY AREA

N

SCALE 1' = 1000'

PHOTO DATE: MARCH 1990

CANADA DEL ORO WASH, CATALINA AZ
LAGO DEL ORO STUDY AREA

1.3 OBJECTIVES AND TASKS

Specific objectives include:

1. Compile the available history of flooding and flood-related problems in the study area;

2. Identify those properties and residences lying within a federally-designated floodway or floodplain, and those lying within the erosion setback area as specified by the Pima County Floodplain and Erosion Hazard Management Ordinance;

3. Assess the adequacy of using a) the existing FEMA Floodway and Floodplain maps to analyze existing 1991 conditions, and b) the current erosion hazard setback for this area as defined in the Floodplain and Erosion Hazard Management Ordinance;

4. Estimate the cost of acquiring floodprone property (floodway, floodplain, and erosion hazard areas), including purchasing conventional dwellings and relocating residents, in accordance with Pima County Acquisition Procedures;

5. Compare solutions previously offered for the existing flooding and flood-related problems in the study area to the selected alternative (acquisition);

6. Evaluate the acquisition of property in this area in context with overall District-wide acquisition priorities, and with the Five-Year Floodprone Land Acquisition Program.

In order to satisfy the objectives listed above, the following tasks are identified:

1. Review all documents available for history on flooding and flood-related problems in the study area. This includes historical aerial photographs, reports written previously, newspaper articles, and drainage complaint and floodplain use permit files maintained by the District;

2. Prepare aerial and aerial-topographic maps of the study area, and delineate the floodway, floodplain, and erosion hazard boundaries on said maps;

3. Superimpose the assessor's parcel boundary data on the aerial-topographic map;

4. Identify the number of residential structures on each parcel. Estimate a) the cost to acquire property in the floodway, floodplain, and erosion hazard area, and b) the cost to acquire only property with residential dwellings which are located in the floodway ;

5. Identify measures which can be taken to reduce the possibility of flood or flood-related damage to structures;

6. Compare the costs associated with previously-identified solution alternatives to the current cost estimate for acquiring floodprone property.

II. REGIONAL CHARACTERISTICS AND FLOOD HISTORY

2.1 REGIONAL ATTRIBUTES

The CDO flowing through the Catalina area remains one of the few major watercourses in eastern Pima County which exists mostly in its natural state. By offering cultural, aesthetic, and recreational amenities, the watercourse adds to the overall appeal of the metropolitan Tucson area to visitors and residents alike.

A 1986 study of local riparian areas prepared by the University of Arizona [2] identified this reach of the CDO as a major extension of riparian habitat, suitable as a corridor for wildlife movement, horseback riding, and hiking. Phase 1 of the Eastern Pima County Trail System Master Plan [3], adopted by the Board of Supervisors in the fall of 1989, identified this portion of the CDO as a Primary Trail, and further identified it as a first priority candidate trail for acquisition. According to the Plan, "The network is to expand on the existing and planned river park system to connect with all major public lands. Priority selections for these recreational trails take advantage, where possible, of locations that offer the community multiple benefits such as flood control, groundwater recharge, wildlife habitat preservation, and open space protection."

2.1.1 Watershed Characteristics - The headwaters of the CDO originate on the northern side of the Catalina Mountains at an elevation of about 8200 feet, just west of Mount Lemmon. Flowing north down the back slopes of the Catalina Mountains into Pinal County, the CDO turns gradually northwest and then abruptly to the southwest, draining towards Pima County and flowing southwest through the study area, located just south of the Pinal County line (Fig. 4). The contributing watershed area is approximately 63 square miles at the upstream end of the study reach. The description which follows was modified slightly from that in the ADWR Phase I Study [4].

The upstream mountainous areas of the watershed are characterized by rock outcrops covered by thin soils with ponderosa pine, juniper, oak, and mountain grasses. Channel slopes are steep, averaging 15% to 25%. Continuing downstream through the foothills transition zone to the lower elevation areas, the vegetation changes from juniper, oak, mesquite, and mountain brush to desert trees and brush and cactus. Channel slope decreases from 12% to 3%. Alluvial soils in the lower elevation areas consist predominantly of gravelly and sandy loam.

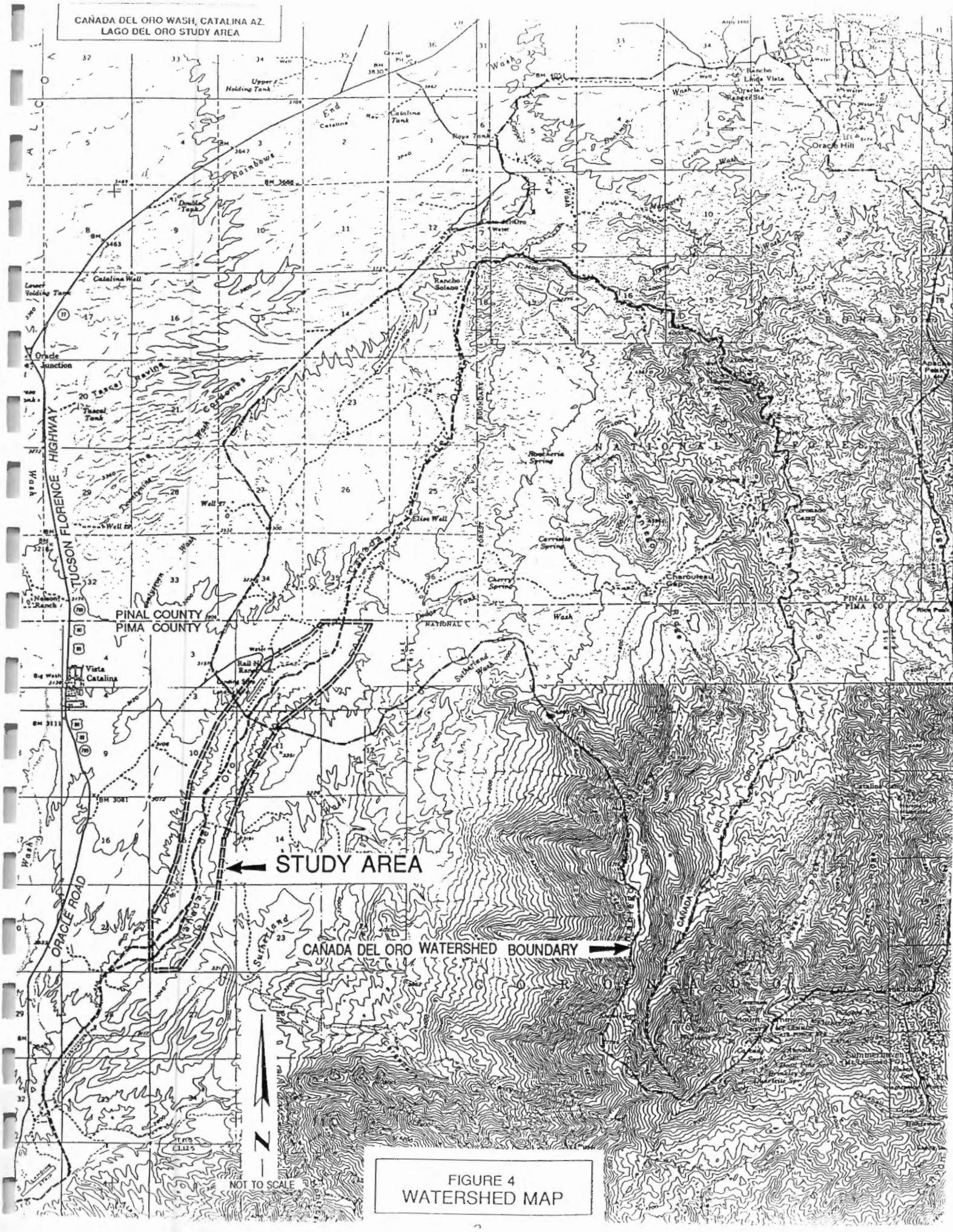


FIGURE 4
WATERSHED MAP

The Catalina residential area along the CDO is similar to other upstream lowlands areas, although channel slopes are milder, averaging 1% to 2%. The CDO geologic floodplain in the study area is well-confined within a valley, and the main channel, consisting of coarse sandy alluvium, meanders loosely back and forth across the flat valley bottom. The vegetation is typical of the low elevation desert floor around Tucson, with the land adjoining the main watercourse channel containing medium density mesquite, other desert trees, and perennial brushy vegetation.

Average annual rainfall varies from about 30 inches up near Mount Lemmon to approximately 12 inches in the Catalina residential area. Snowmelt runoff contributes flow at the upstream reaches of the watershed, however the CDO near the Catalina area flows only in response to summer and winter rainfall-generating storms.

2.1.2 Watercourse Characteristics - As mentioned in the previous section, the CDO at the Pinal County line drains an upstream watershed of approximately 63 square miles, with a 100-year discharge of 17,500 cubic feet per second (cfs), according to the 1983 FEMA Flood Insurance Study (FIS) [5]. Traversing the study area in a northeast-southwest direction, the floodplain is 800 to 1000 feet wide, lying along the base of the western-most fringe of the Catalina Mountains. The relatively flat valley bottom is well-confined on both sides: to the east by the relatively steep slopes of the transition zone Catalina fringe, and to the west by less-steep but still pronounced slopes. The valley floor is heavily vegetated, with desert shrubs, grasses, and trees, including numerous mesquite, prevalent along the floodplain.

The main channel of the CDO traversing the study area is well-defined with a sandy bottom, varying between 30 to 50 feet in width, and between two to four feet in depth. The slope of the valley floor is between 1% to 2 %. For the first mile downstream of the Pinal County line the main channel is somewhat braided, however it assumes a more well-defined and single channel section at the northern end of the airstrip, and continues downstream as a well-defined channel throughout the study reach. Near the shooting range, at the downstream end of the study area, the channel again assumes a braided profile. Throughout the study reach, the channel meanders loosely back and forth across the floodplain, gradually moving from one edge of the valley floor across to the opposite edge (Fig. 3).

According to the 1983 Flood Insurance Study, the 100-year or base flood water surface elevation varies from three to eight (3-8) feet above the main channel flow line, and is up to three feet deep over adjacent floodplain areas. Average velocities in the floodway vary from 4.6 to 9.7 feet per second, depending on cross-section configuration. According to the ADWR Phase I Study and based on preliminary calculations, the main channel has a capacity for between 500 to 2000 cfs, or approximately the 2-year event. Larger flows, such as 50- and 100-year events, would be expected to inundate the entire valley floor, causing widespread and severe damage. Due to the highly erosive nature of the sandy soils throughout the channel reach, bed scour and bank erosion are expected to be significant during a major flood.

A comparison of the 1963 to March 1990 aerial photographs showed that the main channel has widened slightly and is susceptible to braiding. With few exceptions, one being near the shooting range at the downstream end of the study reach, the general lateral orientation of the main channel has not changed appreciably since 1963. The shift in channel alignment near the shooting range is discussed in more detail in section 3.2.1. In three locations the channel has changed from a very-braided to a more-confined configuration: near the northern end of the airstrip in section 2, near the Golder Ranch Road bridge in section 15, and at the southern end of the study reach just upstream of the shooting range.

2.1.3 Development Along the Watercourse - Prior to 1960, the community of Catalina stretched mostly along the east side of the Tucson-Florence Highway, with little residential development along the CDO. By 1960, the Tucson metropolitan area population had quadrupled in 20 years, from 58,000 in 1940 to 243,000 [6]. The sparsely-populated Catalina area offered a rural and scenic living environment located only 15 miles from metropolitan Tucson and its amenities, and residents began to settle along the floodplain of the CDO near Catalina in the late 1960's. Two of the earliest platted subdivisions were recorded in 1971 and early 1972: Ranch Acres Estates and Chaparral Estates No. 2, located in the southwest and northwest quarters of section 15, respectively.

Unregulated residential development occurred along the floodplain until the mid 1970's, when the Pima County Floodplain Management Ordinance was adopted and enforced [7]. Written policy in 1980 established erosion hazard setbacks along major watercourses, including the CDO [8]. By 1983, when the first FEMA floodplain and floodway maps for this area were published, much of the development present today was already established.

Since 1983, development in and adjacent to the CDO floodplain has been closely regulated by the Pima County Floodplain Management Ordinance, since amended and renamed the Pima County Floodplain and Erosion Hazard Management Ordinance [9]. The Ordinance has prohibited residential development in the floodway, and requires that, for any habitable* structure constructed in the floodplain, the finished floor elevation must be elevated at least one foot above the 100-year water surface elevation. The Ordinance also prohibits constructing structures designed for human habitation where the product of the depth of flow in feet, d, times the square of the velocity, in feet per second, exceeds 18 ($dv^2 > 18$) for greater than 30 minutes, and where surrounding floodwater depth is greater than three feet. Based on the provisions of said Ordinance, many existing residential structures would not be permitted by current regulations.

2.2 HISTORICAL PERSPECTIVES ON FLOODING

Mere mention of the words "flood control" is likely to raise the interest, if not the ire, of residents along the CDO in the study area. Having settled along the watercourse before floodplain management practices were recognized and publicized, residents may wonder why they weren't made aware of the dangers of buying and settling along the wash, or they may doubt the possibility that such a big flood could occur along the study reach. Some property owners are unhappy when they become aware of current floodplain management regulations which prohibit or regulate construction in the floodplain and erosion hazard areas. Some resent regulatory agencies for causing the demise of Golder Dam, which was viewed by local residents as a flood control facility, although it was not designed for this purpose and was, in fact, a hazard, as discussed in section 2.2.2 below. Based on a historical perspective, it is clear that no easy solution exists to the flooding problems along the CDO near Catalina.

2.2.1 Flood History - The only comprehensive study conducted to date to assess potential solutions to CDO flooding problems in this area, a two-phase study completed by the Arizona Department of

* A "habitable structure" is one which is designed for human habitation full or part-time, and includes commercial as well as residential buildings. Because only a handful of the habitable structures located in the study area are used for commercial purposes, the words "habitable" and "residential" are used interchangeably. The words "residence" and "dwelling" are also used interchangeably.

Water Resources (ADWR) in March 1982 [4, 10], found no recorded flood flow information for the study reach prior to 1960. Details of the ADWR study are provided in section 2.3. No incidents of flood damage to residential property were recorded from the beginning of the reach development in the early 1960's to the ADWR report in 1982. Before 1980, several instances of water release from Golder Dam, located 4 miles upstream, caused bank erosion and traffic disruption at dip crossings. A December 1978 storm caused significant flow in streams draining the Catalina Mountains, but no damage occurred in the Catalina area. The storm produced significant runoff above Golder Dam only and the dam contained the discharge. No streamflow gauges existed in the area at that time.

During the October 1983 flood, the study area did not experience the brunt of the impact as compared to other major watercourses in Pima County. Bank erosion widened the existing main channel in the study area by amounts varying from 10 to 150 feet, with much of the reach experiencing relatively little widening. Aerial photographs dated October 2, 1983, indicate that direct erosion damage to residences occurred at only one location, where bank erosion near Trotter Road left a manufactured home overhanging the channel bank. That manufactured home has since been removed. Erosion also damaged roadway dip crossings and drainage structures, disrupting access to the area. Channel bed relocation occurred in only one place and did not result in damages. Areas adjacent to the main channel were subject to inundation at locations where the channel capacity was exceeded, particularly at major channel bends. The District received no reports of damage to residences due to flooding, but the overbank inundation undoubtedly inconvenienced residents and may have damaged structures.

2.2.2 Golder Dam - Golder Dam, located along the CDO about four river miles upstream of the Pima-Pinal County line, was constructed in 1964 to form a recreational lake which would be the central attraction to a planned subdivision. The subdivision was never constructed, however the dam, 130-feet high and earth-filled with a storage capacity of about 9500 acre-feet, has been surrounded by controversy since it was built.

Because the lake was designed to remain full at all times for recreational purposes, it was designed with a very minimal outflow structure (one 24-inch culvert) and no emergency spillways. It is also important to note that as the lake was designed to remain full at all times, no flood control would be provided. However, because

the owner (Lloyd W. Golder, III) was unable to keep the lake full behind the dam, it did provide some capacity for retaining floodwater, as smaller flows were impounded behind the dam and were prevented from continuing downstream.

Leakage under the dam was discovered almost immediately after the reservoir started filling, and in 1966 the dam was declared unsafe by the Arizona Highway Department. Repairs were ordered, however attempts to repair the dam failed. The leakage continued, and the dam was again declared unsafe in 1972 by the Arizona Water Commission Office of Dam Safety. When a large storm caused water to rise 75 feet behind the dam in February 1979, dam safety concerns were again raised and a review was initiated. It was subsequently determined that the dam posed a serious flood hazard to downstream residents, due to the likelihood of catastrophic failure during a large flood. The cost to modify the dam was estimated at $1.6 million. Controversy arose when some experts reported that, due to geotechnical considerations, the dam could never be made safe, and should be breached. Downstream residents contended that the dam should be repaired or modified to provide flood control benefits. The Arizona State Water Commission ordered the dam breached, and between May and July of 1980 a large notch was cut in the dam [11].

2.2.3 Drainage Complaints - All drainage complaint files currently available in the District's Floodplain Management office, i.e. since 1979, were reviewed. The majority of complaints included problems not directly attributable to CDO flooding, such as minor grading complaints, dumping in the main CDO channel, sheds or other accessory structures placed in the floodplain, and minor roadside and roadway drainage problems. Some complaints about bank erosion along the CDO were recorded, however only in one instance was a residential structure threatened, when a manufactured home was left overhanging the main CDO channel bank as mentioned in section 2.2.1 above.

The most serious of the complaints, in Section 10, regarded sediment inundation of a building site from a steep tributary wash draining into the CDO from the east. This report does not address the acknowledged severe drainage and sediment deposition problems resulting from tributary flow down the steep slopes along the western fringe of the Catalina Mountains, but rather addresses only those problems directly attributable to CDO flooding. Finally, it is important to note that this office has only a record of complaints that were formally filed with the District's Floodplain Management Section.

2.3 PREVIOUS STUDIES

In response to concerns raised by the construction of and subsequent leakage from Golder Dam, studies were conducted regarding the benefits provided by and integrity of the dam. These studies were briefly mentioned in subsection 2.2.2. The 1983 Federal Emergency Management Agency Flood Insurance Study (FEMA FIS) included mapping the 100-year floodplain and floodway throughout the study area, and is discussed in more detail in section 3.2. The FEMA study did not account for the presence of Golder Dam.

Under the provisions of Arizona Revised Statutes (A.R.S.) 45-2309, since renumbered to 48-3617, the Pima County Flood Control District in 1980 requested assistance from the Arizona Department of Water Resources (ADWR) to find a solution to flooding problems along the CDO near Catalina. In response to this request, a two-phase study was conducted by ADWR: Phase I covered channelization and levee options, and nonstructural alternatives; Phase II addressed the feasibility of constructing a dam upstream on the CDO to provide flood control benefits to downstream residents. These studies are summarized below.

2.3.1 Phase I ADWR Study, March 1982 - Three structural and two non-structural alternatives were evaluated with the objective of minimizing the cost/benefit ratio for each potential solution. The three structural alternatives, Plans A, B, and C, were limited to channelization and levee options, as described below:

a) Plan A: Channelize the entire reach (3.1 miles), at a total project cost of **$12.4 million** for 100-year protection.

b) Plan B: Channelize only the densely-developed areas (2.1 miles), at a cost of **$9.05 million** for 100-year event protection.

c) Plan C: Construct two earthen levees along the western side of the CDO to prevent inundation of the more densely-populated western floodplain, at a total cost of **$5.2 million** for 100-year protection.

The two non-structural alternatives consisted of:

d) Purchasing the floodplain and floodway, at a cost of **$4.5 million.**

e) Installing a flood warning system. Although during a large flood this would not reduce major structural damage, it would reduce the possibility of loss of life. Installation costs were estimated at **$100,000.**

The ADWR study concluded that structural alternatives were preferred because floodwater would be controlled while leaving the residential development largely in place. Only channelization alternative C had a favorable cost/benefit ratio, and it was only marginally favorable. Acquisition was considered disruptive to residents due to relocation considerations, although it too had a favorable cost/benefit ratio. It was recommended that a flood warning system be installed.

Due to high cost, extensive environmental impacts, and alterations to the hydraulic and sediment transport regimes of the watercourse, structural alternatives were not pursued. In the ten years since the completion of the ADWR study, the importance of preserving natural riverine environments has become increasingly recognized, at both a local and federal level. One result is that under provisions of the Clean Water Act, a 404 Permit would be required. This is often a lengthy and expensive process, making the structural alternatives more costly than previously anticipated. Another result is that relocation of residents from acquired floodprone lands is viewed not as disruptive but as beneficial for property owners and the general public, as evidenced by the increasing numbers of acquisition requests received by the District since 1986.

As mentioned in the Executive Summary, and discussed in more detail in sub-section 4.1.1 of this report, the estimated 1991 cost to acquire the floodway and floodplain is $9.1 million, which is double the 1981 cost estimated in the ADWR report. Although insufficient documentation was provided in the ADWR report to ascertain how that number was obtained, two significant items were noticed: 1) the 1981 cost estimate was based on acquiring 380 acres compared with 556 acres in 1991, and 2) it was assumed in the ADWR report that vacant land would be acquired through an easement at 50% of the fee value of the land. It is unclear how it was determined by ADWR that 380 acres would need to be acquired.

2.3.2 Phase II ADWR Study, March 1982 - The feasibility of using a floodwater retarding structure (i.e., a dam) to reduce flood hazards to area residents was assessed. Two specific locations

were evaluated: A) Brave Bull Ranch, located just downstream of the Pima/Pinal County line, and B) the original Golder Dam site. Modifications to the existing Golder Dam needed to provide protection for the 100-year event were also analyzed.

It was determined that a new dam at Brave Bull, at a cost of **$22 million**, would eliminate residential flood damage for the 100-year flood. Repair of and modifications to Golder Dam, at a cost of **$6 million**, would reduce flood discharge in the affected residential areas by only 10 percent; additional floodplain management or structural improvements would be required to provide a greater level of flood protection. The cost/benefit ratios of both alternatives indicated they were not economically justifiable.

2.3.3 Summary of Findings of ADWR Studies - Several alternatives, including channelization, levee, and dam options, were evaluated. Of the three channelization and levee options analyzed, only one, constructing levees to protect the most-densely populated residential area on the west side of the CDO, had an economically-justifiable cost/benefit ratio. Of the two dam options, only the Brave Bull dam offered flood protection for the 100-year event, however both dam options had cost/benefit ratios which were unjustifiable. Acquiring floodprone land appeared to be a viable alternative requiring further study. It was recommended that a flood warning system be installed.

2.4 FLOOD WARNING SYSTEM

In response to concern about flooding in the area, and based on an intergovernmental agreement between ADWR, the National Weather Service (NWS), and the District, the ALERT project (Automated Local Evaluation in Real Time) was started in 1983 to provide advanced storm monitoring and early warning to residents along the CDO near Catalina. The ALERT system is a telemetric, electronic system which senses and transmits precipitation and stream gage data via radio frequency signals to three base stations, where they are received, processed and stored in computers.

Several stream and precipitation gages were installed in the CDO basin in both Pinal and Pima counties in the spring of 1983. At present, two stream and seven precipitation gages are operating in the watershed upstream of the study area. Data from the rain gages provide early warning of the possibility of flooding, as well as the relative magnitude of flooding to expect; data from the stream

gages confirm the severity of flooding. Although the District is not authorized to issue weather advisories or initiate evacuation notices to the general public, the District does provide technical support to the National Weather Service and the Tucson/Pima County Department of Emergency Services, both of whom are authorized to do so [6].

III. PROPERTIES LOCATED IN FLOODPRONE OR EROSION HAZARD AREAS

3.1 PROCEDURES USED TO DELINEATE FLOODWAY, FLOODPLAIN, AND EROSION HAZARD BOUNDARIES

The most recently available aerial photographic map with topographic contours, based on McLain data from 1984 and 1985, was used as a base map. Assessor's parcel boundary information was superimposed. According to Rick Lyons, Appraisal Supervisor in the Assessor's Office, the Assessor's maps are current to at least January of 1991. The floodway, floodplain, and erosion hazard boundaries were obtained using the methods described below, and were added to the base map (Fig. 5).

3.1.1 Floodway and Floodplain - The CDO near the Catalina area was mapped as part of the original FEMA Flood Insurance Study (FEMA FIS), initiated in the late 1970's. Based on this study, FEMA in 1983 issued Federal Insurance Rate Maps (FIRMs) and Floodway Maps which delineate the floodplain and floodway boundaries, respectively. These boundaries were used for this study. Floodplain limits were obtained from FIRM panel numbers 445 B, 465 B, and 1035 B, and floodway limits were obtained from Floodway Map panel numbers 3 A,B and 4 A,B. Sub-section 3.2.1 discusses the adequacy of using the 1983 FEMA FIS floodway and floodplain limits.

3.1.2 Erosion Hazard Area - Per Article XII of the Pima County Floodplain and Erosion Hazard Management Ordinance No. 1988-FC2, the building setback along this reach of the CDO Wash is two-hundred and fifty (250) feet. According to Article IV of the referenced Ordinance, the setback is measured "... from the top edge of the highest channel bank or the edge of the base flood water surface elevation, whichever is closer to the channel centerline." In this case, the setback is measured from the edge of the highest channel bank, that primary channel bank adjacent to the sandy wash bottom. Sub-section 3.2.2 discusses the adequacy of using this definition of erosion hazard area.

3.2 ASSESSMENT OF ADEQUACY OF USING THE EXISTING FLOODWAY, FLOODPLAIN, AND EROSION HAZARD BOUNDARIES

A visual inspection of Fig. 5 shows five or six locations where the floodway cuts through the main CDO channel, and one location where the CDO main channel lies entirely outside the floodway. The former occurs throughout the study reach where the FEMA maps show

the main channel centerline juxtaposed with the edge of the floodway boundary, and the latter occurs at the downstream end of the study reach, near the shooting range.

3.2.1 Adequacy of FEMA Maps - Two factors which are most likely to cause significant changes in the location of the floodway and floodplain along this reach of the CDO are major flood events and man-made changes. Because a reference in the 1983 FIS indicated the channel geometry cross-sections were surveyed in 1976, aerial photographs were examined from 1974, the closest date to 1976 readily available. It was determined that the main channel of the CDO in 1974 corresponds with the channel centerline as shown on the FEMA FIRM and Floodway maps. An examination of the historical aerial photographs indicates that at the locations where the floodway cuts through the main channel, grading (probably unpermitted) has caused the channel location to shift outward slightly. No structures are impacted by these changes. Near the shooting range at the downstream end of the study reach, the original channel has been diverted to the north approximately 400 to 600 feet (also probably unpermitted). This diversion has also been away from all structures.

The designed man-made change having the greatest impact in the area was the construction of the Golder Ranch Road bridge at the Golder Ranch Road alignment in 1988. Spanning 486 feet, the bridge was designed to convey the 100-year flow through the bridge opening while allowing the upstream water surface elevation to rise no more than one foot. The current FEMA Floodplain and Floodway Maps, based on the original study published in 1983, do not account for the bridge.

As mentioned previously in section 2.2.1, the October 1983 flood, although having less of an impact on the study area than on other major watercourses in Pima County, did result in channel widening in selected locations, and resulted in one change in channel location, however the overall impact on the mapped floodway and floodplain was not significant. Other floods occurring between 1976 and the present have impacted the Catalina area to a lesser extent.

Based on this qualitative review of the impact of large floods and man-made changes since the original FEMA mapping, it was determined that, although some changes have occurred to the channel geometry which would impact the original floodway and floodplain boundaries,

the existing delineations are adequate for the purposes of generating a cost estimate to acquire floodprone areas along this reach of the CDO. It is likely that the referenced channel changes would result in some dwellings being flooded which were not previously flooded; and some dwellings which were flooded before the channel changes might not be flooded now. However the overall number is not expected to change significantly.

Channel changes caused by major floods since 1979 are not sufficiently significant to warrant a FEMA restudy, however, when considered in conjunction with channel widening and grading changes caused by installing the Golder Ranch Road bridge, and grading at other locations along the main channel, a FEMA restudy of the floodplain and floodway is warranted.

3.2.2 Adequacy of Existing Erosion Hazard Setback - The erosion hazard setback as specified in the Floodplain Management Ordinance is more ideally suited for washes with a straight alignment than for meandering streams, such as the CDO near Catalina. Although the overall alignment of the geologic floodplain is relatively straight, the main low-flow channel forms pronounced meanders in some reaches and is braided in other areas, indicating the dynamic nature of the watercourse. Given the highly erodible nature of the soils in the area, the main channel location would be expected to change in several areas in response to a large flood.

The changes to the main channel resulting from the October 1983 flood, however, were not as great as would be expected. Comparison of 1963 and 1990 aerial photographs indicated little overall change in the plan form of the main channel, except where man-made changes occurred, as mentioned in sub-section 3.2.1. No earlier aerial photographs of the study area were found. Besides the October 1983 flood, no large flows have been recorded for this area since 1963. Because the erosion hazard setback is relatively large, 250 feet from the main channel bank, and residences must be placed outside this setback, the existing setback is adequate for the purposes of this study.

3.3 IDENTIFICATION OF AFFECTED PROPERTIES

For the purposes of this study, an affected parcel or property is one which lies partly or wholly within the 100-year floodplain, floodway, or erosion hazard area as delineated on Fig. 5. Three primary tasks aided in identifying affected properties and the

degree to which they are impacted: 1) a list was compiled of all parcels which are located wholly or partly within the floodway, floodplain, or erosion hazard area; 2) because most land in the area is vacant or supports residential use, it was necessary to determine if a parcel is vacant and, if not, the number and type of residential structures (conventional or manufactured home) located on affected properties and within affected areas; and 3) the drainage complaint files for this area were reviewed. Data assembled to complete item numbers 1 and 2 above are listed in Appendix B.

3.3.1 Parcels in the Floodway, Floodplain, or Erosion Hazard Area To identify the location of a parcel with respect to floodprone areas, the floodway, floodplain, and erosion hazard areas are assumed to be separate and distinct from each other. That is, a parcel classified as lying within the floodway only lies entirely in the floodway. A parcel classified as lying within the floodplain only is entirely in the floodplain and not in the floodway or erosion hazard area. Similarly, a parcel classified as lying within the erosion hazard area only is outside the floodway and floodplain. A parcel which lies partly in the floodway and partly in the floodplain is considered as being in the floodway and floodplain, and so on.

3.3.2 Residences in the Floodway, Floodplain, or Erosion Hazard Area - The method used to estimate the cost of acquiring property requires knowing how many residential structures are on the property, if they are considered conventional or manufactured homes, and whether they are owner-occupied or leased. These data were obtained from the Assessor's Office, and are current as of January, 1991 (Appendix B). Although a parcel may lie partly within the floodplain or floodway, the dwelling may be located outside of the floodprone areas (floodway or floodplain, and erosion hazard area). It was assumed that only land and conventional dwellings lying within floodprone areas would be acquired. The most recently available aerial photograph (March, 1990) was checked to see if the dwelling is located in the floodway, floodplain, or erosion hazard area.

3.3.3 Summary of Findings and Comparison With 1981 Data - Table 1 on page 27 shows the distribution of property and dwellings within the floodway, floodplain, and erosion hazard areas, by section. There are 10 conventional and 26 manufactured homes located in the floodway, 7 conventional and 39 manufactured homes located in the

floodplain outside the floodway, and 9 manufactured homes located in the erosion hazard area outside both the floodway and floodplain throughout the study reach.

Comparing these with the 1981 data from the ADWR report shows that the number of conventional homes in the floodway and floodplain has decreased slightly, from 20 to 17, while the number of manufactured homes has almost doubled, from 37 to 65. Comparing 1980 and 1990 aerial photographs shows that about 10 additional manufactured homes are located in the floodway, and approximately 18 are located in the floodplain outside the floodway. A review of the District's floodplain use permit files has been initiated, and District staff will conduct a field investigation to determine how many of these buildings are in fact residential dwellings. Staff will also investigate whether the buildings were constructed prior to the adoption of 1) the first local Floodplain Management Ordinance in 1974, or 2) the first FEMA Floodway and Floodplain maps in 1979. Enforcement action will be pursued as appropriate.

3.3.4 Recent Acquisition Requests from Property Owners - Three formal requests to purchase floodprone properties in this area have been submitted to the District within the past year: one in section 11, for parcel number 222-32-007 (Coleman); and two in section 15, for parcel numbers 222-38-0400 (Bowers), and 222-38-039 (Bowerman). Both the Coleman and Bowers parcels have dwellings located in the floodway (one conventional and two manufactured homes, respectively, see Fig. 5). The Bowerman parcel is unimproved, and is outside of but adjacent to the floodway. The western third of the parcel is located in the floodplain, and the remainder is in the erosion hazard setback. District staff has completed drainage assessments on each parcel (Appendix C). Staff recommends acquiring the Coleman and Bowers properties.

3.4 SEVERITY OF EXISTING FLOOD HAZARD

Should a large flood occur on this portion of the CDO, the severity of the flood hazard to which residents will be exposed cannot be over-emphasized. The hydrodynamic force of rapidly flowing water, expected large-scale channel bed and bank erosion, and flooded roadways which are impassable to conventional vehicles will result in dangerous evacuation conditions at best. In addition to the threat of loss of life is the expected loss of millions of dollars of property and associated improvements.

According to the original FEMA Flood Insurance Study, average flow depths vary between three to eight feet above the main channel bottom, and flow velocities vary between 4.6 to 9.7 feet per second across the floodway. Because an average person would have difficulty standing in three-foot deep water flowing at a velocity of four feet per second, it is apparent that at the expected depths and velocities, rescues would be difficult, and residents caught in the river valley during flooding would be exposed to life-threatening conditions.

IV. ANALYSIS OF ALTERNATIVES

4.1 REMEDIAL ACTION ALTERNATIVES

Based on the results of the ADWR studies summarized in sections 2.3.1 and 2.3.2, two alternatives were identified for further study: 1) constructing levees to protect the more-densely populated western side of the floodplain, and 2) acquiring floodprone land. A third alternative not considered previously is installing flood-damage mitigation measures to existing structures located in the floodprone areas ("floodproofing").

To be consistent with the Board-adopted Acquisition Program (Appendix A), and due to the disruptive environmental impacts which would result from constructing major levees along the western floodplain, the levee option was not investigated further in this study. "Floodproofing" measures were also not investigated further, as follows. According to Article IX, Section B.2.g of the Floodplain and Erosion Hazard Management Ordinance, structures designed for human habitation are only permitted where the product of the flow depth d, in feet, times the square of the flow velocity v, in feet per second, of the surrounding floodwaters does not exceed 18 ($dv^2 \leq 18$) for more than 30 minutes, and the surrounding floodwater depth is no greater than three feet. It is likely that flow depth and velocity would exceed the dv^2 criterion for many if not most of the structures located in the floodway and floodplain. Due to safety concerns, "floodproofing" measures are not feasible in this area.

Since the early-to-mid 1980's, both in Pima County and across the country, non-structural alternatives have been gaining prominence over structural flood control alternatives as a means of mitigating the impacts associated with damaging floods. In May 1986, voters authorized $20 million in bonds to acquire floodprone lands, including acquiring improved and unimproved property to prevent future flood damages. As part of the documentation prepared for the bond acquisition program, locations were identified based on a priority system, and the CDO near Catalina was rated as a first priority candidate for acquisition.

4.1.1 Floodprone Land Acquisition - Acquisition costs for the floodway, floodplain, and erosion hazard areas were based on preliminary estimates provided by the Property Management Division staff of the Pima County Department of Transportation and Flood Control District. As mentioned previously, Table 1 lists the number of dwellings in floodprone areas and the acreage of floodprone land by section. Table 2 lists the cost to acquire the floodway, floodplain, and erosion hazard area, also by section, and the cost to acquire only floodway properties with residential dwellings. Projected acquisition costs are **$4.7 million for the entire floodway, $4.4 million for the floodplain outside the floodway,** and **$1.1 million to acquire the erosion hazard area** outside the floodway and floodplain. The cost of acquiring the **floodway and floodplain is estimated at $9.1 million.** The estimated cost to acquire only floodway properties with dwellings is **$3.3 million.**

TABLE 1

Canada Del Oro Wash, Pima County Line to Catalina State Park
Floodprone Areas and Development, T11S, R14E

	SECTION						
	1	**2**	**10**	**11**	**15**	**22**	**Total**
AREA, acres							
Floodway	34	91	44	26	60	57	312
Floodplain[1]	21	60	33	10	64	56	244
Erosion Hazard[2]	11	12	8	5	18	14	68
PARCELS							
Total #[3]	10	12	21	14	68	27	152
Floodway[4]	6	8	21	11	43	20	109
Floodplain[4]	9	12	21	12	51	25	130
DWELLINGS							
Floodway	0	0	3C/1M[5]	1C/3M	22M	6C	10C/26M
Floodplain	0	0	2C/9M	0	1C/26M	4C	7C/39M
Erosion Hazard	0	0	0	0	9M	0	9M
UNIMPROVED PARCELS							
Floodway[4]	6	8	10	9	19	5	57
Floodplain[4]	9	11	10	10	21	7	68

1 Acres in floodplain outside floodway
2 Acres in erosion hazard area outside floodway and floodplain
3 The total number of parcels which contain a portion lying in the FW, FP, or EHA
4 A parcel was considered lying in the FW/FP if any portion of the parcel is in the FW/FP
5 M = manufactured, C = conventional

TABLE 2

Estimated Acquisition Costs
Canada Del Oro Wash, Catalina
In Dollars X1000

All values include land and conventional dwelling costs. Manufactured homes are generally not acquired by the District.

	SECTION						
	1	**2**	**10**	**11**	**15**	**22**	**Total**
Floodway	$170	$273	$705	$325	$1,930	$1,260	**$4,663**
Floodplain[1]	$105	$180	$840	$50	$2,263	$1,020	**$4,458**
Floodway (with dwellings only)[2]	0	0	$607	$220	$1,481	$1,030	**$3,338**
Erosion Hazard Area[3]	$55	$36	$80	$25	$711	$140	**$1,047**

1 Areas in floodplain outside floodway
2 Areas in floodway with dwellings only (does not include vacant land)
3 Areas in erosion hazard area outside of floodway and floodplain

4.2 COST COMPARISON: 1982 ADWR ALTERNATIVES VS. 1991 ACQUISITION

Cost estimates for alternative solutions to flood-related problems along the study reach are as follows:

(a) Channelize entire reach (3.1 miles)	**$12.4 million** 1981 dollars
(b) Channelize densely-developed areas (2.1 miles)	**$9.05 million** 1981 dollars
(c) Construct levees along west side only through densely-developed areas (2.0 miles)	**$5.2 million** 1981 dollars
(d) New Dam at Brave Bull	**$22 million** 1981 dollars
(e) Repair and Modify Golder Dam*	**$6 million** 1981 dollars
(f) Acquire Floodway and Floodplain	**$4.5 million** 1981 dollars
(g) Acquire Floodway	**$4.7 million**
Acquire Floodplain	**$4.4 million**
Acquire Floodway and Floodplain	**$9.1 million**
Acquire only Floodway Property with dwellings	**$3.3 million**
Acquire Erosion Hazard Area	**$1.1 million** 1991 dollars

* This cost estimate would reduce flood peak discharge in the residential areas by only 10% for the 100-year flood. Costs of additional structural mitigation were not calculated.

While the acquisition cost estimate based on 1991 dollars cannot be directly compared to the estimates for remedial action based on 1981 dollars, relative comparisons can be made. As found in the 1982 ADWR studies, the cost of providing 100-year flood protection via structural options is very high. Only alternative (c), constructing levees to protect the western side of the floodplain at a cost of $5.2 million, had a justifiable cost-benefit ratio. Alternative (f), acquiring land in the floodway and floodplain for $4.7 million, also had a favorable cost-benefit ratio. Alternatives costing substantially more than $5 million had unfavorable cost-benefit ratios.

Also noteworthy is that the estimated cost to acquire the entire floodplain in 1991 dollars is twice that in 1981 dollars. Reasons for this discrepancy are not entirely clear as documentation was not provided in the 1982 ADWR report, however two likely causes are: 1) the 1981 cost estimate included acquiring 380 acres compared with 556 acres in 1991; and 2) it was assumed in the ADWR report that vacant land would be acquired through an easement at 50% of the fee value of the land. It is unclear how it was determined that 380 acres would need to be acquired.

In addition to these two primary causes for the large variability between the 1981 and 1991 acquisition cost estimates, two additional contributing factors include: 1) higher values for both land and improvements in 1991 as compared to 1981, and 2) the larger number of dwellings in the floodway and floodplain in 1991: 20 conventional and 37 manufactured homes in the floodway and floodplain in 1981 versus 17 conventional and 65 manufactured homes in 1991.

4.3 SUMMARY OF ALTERNATIVES

Installing flood damage mitigation measures would not be appropriate in the study area. As mentioned in section 4.1, the expected flow depths and velocities would exceed the criteria specified in the Floodplain Management Ordinance, for many if not most of the dwellings in the floodplain and floodway. Therefore most of these structures would not be allowed.

For cases in which these criteria are satisfied, flood damage mitigation measures could be installed. Should a major flood occur, residents might be able to evacuate before the worst flooding occurs, based on information obtained from the flood

warning system, which can provide up to 1 1/2-hours warning based on stream gage data, and up to 3-hours warning based on rain gage data. During a major flow, roadway access to the area would be difficult. Evacuation by helicopter might be possible, but would be dangerous at best. Due to overriding concerns about residents' safety, installing "floodproofing" measures is not considered a reasonable solution to the flooding problems along the CDO near Catalina.

As mentioned in section 4.1, in light of the recent emphasis on nonstructural mitigation practices, constructing levees on the western side of the watercourse is not recommended.

Alternative (g), acquiring floodprone land in the study area, is preferred from a safety perspective. The threat to residents of loss of life and property would be eliminated. While the cost associated with total acquisition of the floodway and floodplain is high, acquisition of only residentially-developed floodway property by those owners who so request it would lower the cost significantly, thereby making this a more attractive option. Moving residents out of the most dangerous areas would reduce the need to conduct dangerous rescue operations. Finally, residents' concerns about the disruption imposed by relocating may be assuaged when compared to the potential impacts of a major flood, should they remain in the floodway.

Besides the overall safety benefit, additional advantages provided by acquisition include: preserving the overbank storage areas, thereby moderating the flood peak discharge and flow velocities; maintaining the natural sediment transport regime; preserving increased groundwater infiltration and groundwater recharge by maintaining a large surface area over which infiltration can occur; preserving the natural open space area while protecting the existing ecosystem; providing recreational areas for hiking and horseback riding; and maintaining the overall rural, aesthetic character of the area.

4.4 COMPARISON OF FLOODPRONE LAND ACQUISITION NEAR CATALINA WITH OTHER DISTRICT-WIDE ACQUISITION PRIORITIES

Recently the Flood Control Planning and Development Division authored a five-year plan to guide continued implementation of the priorities established for the Floodprone Land Acquisition Program. The 1985 Board-adopted priority locations for acquisition included eight areas: 1) Tanque Verde Wash, from Bonanza Avenue (formerly Jones Road) to Forty-Niner Country Club Estates, 2) CDO from La Cholla to Overton, 3) Black Wash, Ajo Way to headwaters, 4) CDO, from Catalina State Park to Pinal County line, 5) Santa Cruz River near U.S. Highway 89, 6) Fairview/Limberlost area, 7) High School Wash, and 8) Rolling Hills Wash. To date, property has been acquired along Tanque Verde Creek, the CDO from La Cholla Boulevard to Overton Road and from Catalina State Park to the Pinal County line, and along the Black Wash. The recent Five-Year Guidance Plan recommends that acquisition be continued in these four areas.

Based on the current FEMA Flood Insurance Study and the District's Black Wash Administrative Floodway Study, average flow depths and velocities in the four areas recommended for continued acquisition are hazardous. The Tanque Verde Creek area is particularly hazardous, and several conventional homes are located in the floodway and floodplain. Should a large flood occur, the property losses would be higher than in any of the other areas identified for continued acquisition. Because numerous acquisitions have occurred along the CDO from La Cholla Boulevard to Overton Road, acquisition should be undertaken to complete the reach length as described in the 1983 Cañada del Oro River Management Plan. Several parcels have been acquired in the Black Wash, and continued emphasis is recommended. Because only two parcels have been acquired to date along the CDO near Catalina, acquisition in this area should not take precedence over the areas where acquisition has been actively pursued.

V. RECOMMENDATIONS

Specific recommendations for acquiring property and for reducing residents' exposure to flooding and flood-related damage along the CDO near Catalina are:

1) Conduct a restudy of the FEMA floodplain and floodway maps to better ascertain which properties are at risk;

2) Develop a priority list of parcels to be considered for acquisition using the existing Board of Supervisors-adopted guidelines, with modifications as discussed below, and consistent with new information provided by a FEMA restudy;

3) Acquire parcels which have habitable structures located in the floodway, on a request basis and subject to available funding. Because dwellings on two properties are located in the floodway and will be exposed to extremely hazardous conditions in the event of a major flood on the CDO, and as the property owners (Bowers and Coleman) have submitted formal acquisition requests to the District, staff recommends that these two parcels be acquired with expediency;

4) Acquire parcels, on a request basis and subject to available funding, which have habitable structures located in the floodplain or erosion hazard area that are inconsistent with the current Floodplain and Erosion Hazard Management Ordinance, and which are likely to incur flood or erosion damage;

5) Acquire vacant parcels located in the floodway, on a request basis and subject to available funding, to preserve the environmental attributes and protect the hydraulic integrity of this reach of the CDO;

6) Recommend to property owners that flood insurance be obtained for all insurable structures in the floodplain;

7) Direct staff to investigate a) which residential structures in the floodway and floodplain were "grandfathered in", i.e. those present prior to the adoption of local floodplain management regulations in 1974, and those present prior to the release of the preliminary FEMA Floodway and Floodplain maps in 1979, and b) which structures were installed or constructed illegally. For those structures which constitute violations, enforcement action is recommended;

8) Institute a program to monitor construction and installation activity in floodprone areas. It is recommended that quarterly field investigations and an annual overflight be conducted to ensure compliance with current regulations. Enforcement action should be pursued for observed violations; and

9) Strict enforcement in applying the regulations contained in the Floodplain Management and Erosion Hazard Ordinance is recommended to the Flood Control District Board of Directors.

Basis for Recommendations

Current floodplain management regulations as prescribed in the Floodplain and Erosion Hazard Management Ordinance prohibit constructing buildings in the floodway, and place restrictions on constructing in the floodplain. Approving waivers and variances in this area may result in a life-threatening situation, and will probably increase the cost to acquire the property in the future, as the property will likely include improvements associated with the waiver or variance. Consistency in applying the regulations should not be compromised, and strict enforcement is advised. Should any variance be granted, one condition of the variance should be a covenant running with the land, stating that the District will not pursue acquisition of the improved property.

The obvious channel changes and therefore, changes in the location of the floodway, have occurred due to grading, diversion, and the installation of the Golder Ranch Road bridge. Most development in the floodway is prohibited by the Floodplain and Erosion Hazard Management Ordinance. The floodplain and floodway boundaries should be revised based on a restudy of the FEMA floodway maps so as to better ascertain which properties are at risk.

Based on the results of this investigation and previous studies, it is recommended that parcels which have habitable structures located in the federally-mapped floodway be acquired, as requested by property owners and as funding is available. Priority of acquisition should be based on proximity to the main CDO channel and the likelihood of severe damage being incurred. After a property has been acquired, all structures should be dismantled and removed from the hazardous areas. Properties which have residential structures located in the floodplain and erosion hazard areas that are inconsistent with current Floodplain Management Ordinance regulations and which are likely to incur damage should be acquired next, followed by acquiring vacant property located in the floodway.

It should be noted that the acquisition priorities as recommended above differ somewhat from the 1985 Board-adopted priorities, in that the latter assigned a higher priority to acquiring unimproved (vacant) parcels in the floodway rather than to acquiring improved, occupied residential property located outside the floodway but in the floodplain. According to documentation provided in Appendix A, the Board-adopted guidelines can be altered when acquisition fulfills community goals, i.e. in this case relocating residents from dangerous areas. Based on this study of the Lago del Oro reach along the CDO near Catalina, it is felt that the slight modification of acquisition priority is consistent with the philosophy and intent of the 1985 Board-adopted priorities.

It must be emphasized that the floodprone land acquisition program is voluntary, and that residents will not be forcibly removed from their homes. Individuals requesting acquisition are encouraged to submit appraisals and a historical documentation of flood damage incurred. Satisfactory agreement on all costs involved must be reached between the District and property owners. Decisions to acquire property are subject to the availability of funds, and must be weighed against other District-wide acquisition requests. The District is generally not interested in acquiring manufactured homes because of their limited utility for public purposes.

Finally, as listed in more detail in Appendix A, acquiring vacant property in the floodway would provide multiple community benefits including: attenuating the peak discharge by providing overbank storage and conveyance capacity, promoting groundwater recharge through infiltration through the natural channel bottom, providing an open space area for recreational and aesthetic purposes, and reducing the need for structural flood control projects in this area.

VI. REFERENCES

[1] Federal Emergency Management Agency, Flood Insurance Rate Map, Pima County, Arizona. Panel numbers 445 B, 465 B, and 1035 B. Flood Boundary and Floodway Maps, panel numbers 3 and 4. February, 1983.

[2] University of Arizona, School of Renewable Natural Resources, Critical and Sensitive Wildlife Habitats of Eastern Pima County. 1986.

[3] Dames & Moore, Eastern Pima County Trail System Master Plan, prepared for Pima County Parks and Recreation Department. August, 1989.

[4] Anderson-Nichols & Co., Inc., Phase I (Channelization /Levees) Reconnaissance Level Study of the Cañada del Oro Wash Flood Control Project, Catalina, Arizona. Prepared for the Arizona Department of Water Resources. March, 1982.

[5] Federal Emergency Management Agency , Flood Insurance Study for Eastern Pima County. February, 1983.

[6] Pima County Flood Control District Comprehensive Program, Pima County Department of Transportation & Flood Control District, Planning & Development Division. December, 1990.

[7] Pima County Board of Supervisors, Floodplain Management Ordinance No. 1974-86. December, 1974.

[8] Huckelberry, C.H., Pima County Department of Transportation and Flood Control District, written memorandum. 1980.

[9] Pima County Board of Supervisors, Pima County Floodplain and Erosion Hazard Management Ordinance No. 1988-FC2. December, 1988.

[10] Anderson-Nichols & Co., Inc., Phase II Reconnaissance Level Study of the Cañada del Oro Wash Flood Control Project. Prepared for the Arizona Department of Water Resources. March, 1982.

[11] Pima County Department of Transportation and Flood Control District, unpublished staff reports.

MATCH LINE A-A'

MATCH LINE B-B

WILDS RD.

TROTTER RD.

TROTTER PL.

ROLLINS RD.

LAGO DEL ORO PARKWAY

222-39

222-38

222-28

222-32

222-31

222-47

222-48

222-40

222-35

STATE LAND BOUNDARY

Canada del Oro

HORSE TRACK

GOLDER RANCH RD.

SCHROEDER RD.

SHOOTING RANGE

CATALINA STATE PARK

SOUTHERN STUDY REACH

16 15
21 22

N

0 200' 400'

Scale in feet (approx.)

T 11 S, R 14 E
portions of
Sections 10,11,15, 22

Prepared
for
PIMA COUNTY DEPARTMENT OF TRANSPORTATION
& FLOOD CONTROL DISTRICT
Planning & Development Division

June 1991

Floodway (FEMA)

Floodplain (FEMA)

Erosion Hazard Boundary

Flow Direction

FIGURE 5
PROPERTY OWNERSHIP
WITHIN STUDY AREA
SOUTHERN REACH

Sources: FEMA 1983
McLain Photo Topo Base 1984,1985

Pima County makes no warranties, implied or expressed, with respect to information shown on this map.

CANADA DEL ORO WASH, CATALINA, AZ.
LAGO DEL ORO STUDY AREA

EDWIN RD.

NORTHERN OUTFALL

RAIL N RD.

LAGO DEL ORO PARKWAY

AIRSTRIP

Canada del Oro

CANADA DEL ORO WASH

222-01

222-02

222-32

STATE LAND BOUNDARY

MATCHLINE B–B'

21 25 28 19 19K 19L 27 26 19A 29A 62A 30 86 85 88 83 84 82 81 80 78 79 13F 13G 13D 02 03 04 13E 05

3 2 10 11

2 1 11 12

N

0 200' 400'

Scale in feet (approx.)

T 11 S, R 14 E
portions of
Sections 1,2,10,11

Sources: FEMA 1983
McLain Photo Topo Base 1984,1985

Pima County makes no warranties, implied or expressed, with respect to information shown on this map.

Floodway (FEMA)

Floodplain (FEMA)

Erosion Hazard Boundary

Flow Direction

FIGURE 5
PROPERTY OWNERSHIP WITHIN STUDY AREA NORTHERN REACH

Prepared
for
PIMA COUNTY DEPARTMENT OF TRANSPORTATION
& FLOOD CONTROL DISTRICT
Planning & Development Division

June 1991

CANADA DEL ORO WASH, CATALINA, AZ.
LAGO DEL ORO STUDY AREA

APPENDIX A

1985 BOARD-ADOPTED PROGRAM CONCEPT:

FLOODPRONE LAND ACQUISITION

Board of Supervisors Memorandum

Subject: Floodprone Land Acquisition Program

RECOMMENDATION:

It is recommended that the Board of Supervisors approve bond funding in the approximate amount of $40 million in general obligation bonds of either Pima County or the Flood Control District. This funding will allow more land beset by critical flood hazards to be acquired in the immediate future, at the lowest overall cost.

REPORT:

Flood control has been traditionally accomplished through the construction of structural improvements such as channels, levees, and similar facilities for the purpose of protecting real and personal property from flood and erosion damage. In the last ten years, enactment of floodplain management regulations emphasizing nonstructural flood control measures has been used to prevent future flood losses. More recently, the acquisition of floodprone lands has been increasingly recognized and successfully used as a method of preventing future flood damages.

Flood damage reduction through floodprone land acquisition is a viable and effective flood control tool which assists government in its role of assuring public safety, while contributing to other community goals such as recreation and open space.

The Flood Control District has specific statutory authority to acquire property under the Arizona Revised Statue 45-2343. "Powers, duties and immunities of district and board:".

Previous programs have been initiated immediately after natural flood disasters in almost all cases. The October, 1983, flood caused significant damage to real and personal property within Pima County. In response, $8.3 million of the budgeted $63.8 million Flood Repair and Flood Hazard Mitigation Bond Issue was earmarked for damaged properties.

The acquisition of floodprone lands provide multiple community benefits which would include natural moderation of floods by reducing flood velocities, increased groundwater infiltration within natural channels, protection of flora and fauna within natural floodplain habitats, preservation of open space in the urban environment, recreational areas for picnicking and other activities, and reduction of flood losses, emergency relief needed, and structural flood control works.

There are direct economic benefits for the acquisition of floodprone lands when considering the removal of flood hazards through either acquisition or the construction of flood control facilities. It is also clear that in some cases, construction of flood control facilities is appropriate and the most economical response for flood hazard mitigation. Priorities have been set for acquisition of floodprone lands that fulfill community goals of flood storage, groundwater recharge, recreation, open space, or completion of parcel acquisition within a designated area. When considering these, emphasis should be given to flood storage and groundwater recharge.

Based on the previous, I recommend bond funding to allow more land beset by critical flood hazards to be acquired in the immediate future, at the lowest overall cost.

Respectfully submitted,

C. Huckelberry

C. H. Huckelberry, RLS, PE
Director
Department of Transportation and Flood Control District
12/5/85

CHH:ac

FLOOD DAMAGE REDUCTION THROUGH FLOODPRONE LAND ACQUISITION

PROGRAM CONCEPT

Traditionally, flood control has been accomplished through the construction of structural improvements such as channels, levees, dams, and similar facilities for the purpose of protecting real and personal property from flood and erosion damage. In the last ten years land use regulation by enactment of floodplain management regulations emphasizing nonstructural flood control measures has been used to prevent future flood loss by controlling occupation in or adjacent to flood hazard areas. More recently, the acquisition of floodprone lands has been increasingly recognized and successfully used as a method of preventing future flood damages.

Today flood control in its broader application includes (1) the physical construction of flood control facilities to protect real and personal property from flood and erosion hazards; (2) the imposition of land use regulations through floodplain management to prevent unwise occupation of flood hazard areas; and (3) acquisition of real and personal property to remove improvements from flood hazard areas by demolition, returning the flood-hazard areas to their natural condition prior to encroachment by man.

Flood damage reduction through floodprone land acquisition is a viable and effective flood control tool which assists government in its role of assuring public safety, while contributing to other community goals such as recreation and open space.

PROGRAM BENEFITS

The acquisition of floodprone lands provides multiple community benefits. These benefits are:

- natural moderation of floods by reducing flood velocities, flood peaks, and flood depths
- water quality maintenance by natural infiltration and filtration of storm water runoff and reduction of downstream siltation and debris
- increased groundwater infiltration within natural channels, enhancing groundwater recharge which is necessary to support human use and prevent land subsidence due to groundwater overdraft
- protection of flora and fauna by maintaining and preserving natural floodplain habitats
- providing and preserving natural open space
- providing natural areas in an urban environment
- providing recreational areas for hiking, picnicking, bicycling, and equestrian activities
- direct and indirect economic benefits from reduced flood losses; reduced public costs of disaster assistance and emergency relief; reduced public costs of emergency operations during flood disaster; avoidance of costs

of structural flood control works; decreasing the cost of water treatment for water quality maintenance; reducing the cost of water supply (from groundwater recharge).

PROGRAM AUTHORITY

The (County) Flood Control District has specific statutory authority to acquire property under the Arizona Revised Statutes.

§ 45-2343. "Powers, duties and immunities of district and board:

C. A district organized under this article, acting through its board of directors, may:

1. Acquire by eminent domain or otherwise rights-of-way for and construct, operate and maintain flood control works and storm drainage facilities within or without the district for benefit of the district.

2. Acquire by eminent domain or otherwise and own and dispose of real and personal property within the boundaries of the district. Section 9-403 does not apply to a flood control district organized under this article."

PREVIOUS PROGRAMS

Acquisition programs have been initiated immediately after natural flood disasters in almost all cases. The initiation such acquisition programs reflects floodplain regulations that prohibit rebuilding and reoccupation of floodprone areas after a specified percent (50) of flood damage has occurred. The October, 1983 flood caused significant damage to private, real, and personal property within Pima County. In response to this significant damage, $8.3 million of the (year) $63.8 million Flood Repair and Flood Hazard Mitigation Bond Issue was specifically earmarked for acquisition of flood damaged properties.

Appendix 1 lists all properties which have been acquired pursuant to the acquisiton and relocation program contained in the flood repair and flood hazard mitigation bond issue. In addition, the floodplain management ordinance prohibits specific improvements in certain floodprone areas as required by Federal and State regulations. Acquiring these hazardous floodprone areas assures that the goals of floodplain management and the community are best achieved, by insuring they remain natural and will not require costly structural flood control improvements due to development pressures.

CONTINUING PROGRAM

The Flood Control District was established in 1978 by mandate of the State legislature. The tax rate since 1980 has varied between $0.47 and $0.52 per $100 of assessed valuation which has increased between $5.5 million and $10.1 million annually. During the early years of the District, funding was utilized primarily for operating expenses and construction of flood control works.

For the first time in Fiscal Year 1985-86, a substantial portion of Flood Control District revenues are dedicated to acquisition of floodprone lands. $1.8 million of District funds will be used to continue acquiring properties which have been severely flood damaged or are subject to such damage due to their proximity to a flood hazard, such as residential property located within a defined floodway on a major river system.

Based on our desire to continue the acquisition program, long term plans call for budgeting $1 to $3 million each fiscal year for the foreseeable future. However, this level of annual funding will not satisfy either the short term goal of acquiring existing areas in immediate threat of flooding or the long term goal of acquiring larger parcels for upstream detention/retention facilities for flood storage and demonstration groundwater recharge projects.

ECONOMIC COMPARISON OF FLOOD HAZARD REDUCTION THROUGH ACQUISITION VERSUS FLOOD CONTROL WORKS CONSTRUCTION

While acquisition benefits of floodprone lands, such as open space, habitat preservation and groundwater recharge cannot be economically quantified, a direct economic comparison can be made between acquisition which eliminates flood damage potential and the construction of flood control works which provide flood hazard mitigation. Three comparisons will be cited: two of which demonstrate the obvious economic benefits of acquisition and relocation; and the remaining example which demonstrates that certain flood hazards can best be eliminated through structural measures.

The first example is in an area known as Cardinal-Los Reales. In this location, a mobile home subdivision occupied the floodway of the west branch of the Santa Cruz River. Flooding in the particular area was severe and recurrent over the last ten years. In a joint study Pima County and the Arizona Department of Water Resources examined flood control alternatives for the area. The construction of a flood control facility to eliminate recurring flood damage in the area was estimated to cost $3.5 million, while the acquisition and removal of improvements to the property was estimated to cost $2.0 million. Funding for acquisition/relocation was allocated to this area from the 1984 Flood Repair and Flood Hazard Mitigation Bond issue and $0.46 million was spent for complete acquisition of improved property and relocation of inhabitants.

In the second example, residents in the Catalina area were occupying a floodplain of the upper Canada del Oro Wash under the mistaken belief that the Golder Dam provided flood protection. A study sponsored by Pima County and the Arizona Department of Water Resourses initiated after the breaching of Golder Dam examined various alternatives for eliminating flood hazards to Catalina area residents located in the Canada del Oro Wash floodplain. The construction of a flood control facility to protect residents from flood hazards of the Canada del Oro Wash and its tributaries was estimated to cost $12.4 million. The estimated cost of acquisition/relocation was $4.5 million. Due to the fact that major flood damage has not occurred within the upper basin of the Canada del Oro Wash, acquisition and relocation of flood susceptible properties has not been actively pursued. However, several acquisitions have occurred on a voluntary basis.

To demonstrate the fact that there are appropriate circumstances for structural measures to eliminate flood hazards, the last example indicates the economic benefit of constructing flood control facilities versus acquiring and relocating flood suseptible properties. The area which now comprises the Town of Oro Valley was developed in the early 1960's, almost entirely within the floodplain of the Canada del Oro Wash. A significant portion of tne residential center of the town was constructed within the floodway of the Canada del Oro Wash. Pima County and the Arizona Department of Water Resources constructed a joint flood control levee system to protect the town from the flood hazards of the Canada del Oro Wash. This project cost approximately $6.5 million. To acquire and relocate the property which has been protected by the construction of the Oro Valley/ Canada del Oro Project, would have cost $20 to $25 million.

Through these examples it is clear there are direct economic benefits for the acquisition of floodprone lands when considering the removal of flood hazards through either acquisition or the construction of flood control facilities. It is also clear that in some cases, construction of flood control facilities is appropriate and the most economical response for flood hazard mitigation.

1984 BOND ISSUE PRIORITIES

The following priorities were used in developing the acquisition and relocation program for the 1984 Flood Repair and Flood Hazard Mitigation Bond Issue. These priorities were structured to reflect actual October, 1983, flood damage to property. They are:

A. Improved property where there has been a total loss of personal and real property and where there is no salvage value or the possibility to reclaim lost property.

B. Improved property receiving more than 50 percent damage from a flood and no approved or programmed flood control project will remove the threat of future flood or erosion damage.

C. Improved property with less than 50 percent damage from a flood and no approved or programmed flood control project which will remove the threat of future flood or erosion damage.

D. Improved property which is subject to constant flood hazard with damage occurring at least three out of five years.

E. Previously undamaged unimproved property which is subject to severe flood or erosion hazards and is located in a defined floodway.

F. Improved and unimproved property which is floodprone for which there exists an approved open space and recreation plan which is consistent with sound principles of floodplain management.

FUTURE PRIORITIES

Based on the fact that most flood damaged properties have been acquired through the 1984 Flood Repair and Flood Hazard Mitigation Bond issue, the following priorities are recommended for continuing floodprone land acquisition program.

Priority 1:

Improved real property occupied for residential use where flood damage has been experienced in three out of the last five years.

Priority 2:

Improved real property occupied for residential use located in a designated floodway.

Priority 3:

Unimproved real property which is located in a designated floodway.

Priority 4:

Improved real property occupied for residential use which lies outside a designated floodway, but within a regulatory 100 year floodplain.

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Priority 5:

Unimproved real property which lies outside designated floodway, but within a regulatory 100 year floodplain.

These priorities can be altered when acquisition of floodprone land fulfills other community goals of flood storage, groundwater recharge, recreation, open space, or completion of parcel acquisition within a designated area. When considering these, emphasis should be given to flood storage and groundwater recharge.

PRIORITY LOCATIONS FOR ACQUISITION

Based on the criteria specified in the previous sections, the following general priorities for funding of future acquisitions are specified by watercourse.

	Location	Priority
1.	**Tanque Verde Wash**	
	A. Craycroft Road to the Wilmot Road alignment	3
	B. Jones Road to the Forty-Niner Country Club	1
	C. Forty-Niner Country Club to Coronado National Forest boundary	2
2.	**Canada del Oro**	
	A. La Cholla Boulevard to Overton Road	1
	B. Catalina State Park north to County Line	1
3.	**Sabino Creek**	
	A. Tanque Verde Wash to Coronado National Forest boundary	2
4.	**Rillito River**	
	A. Southern Pacific Railroad to La Cholla Boulevard	2
	B. Country Club alignment to Craycroft Road including	
	Bend area	3
	Alamo Wash confluence	4
	Columbus Boulevard area	4
5.	**Pantano Wash**	
	A. Craycroft Road to Glenn Street alignment	3
	B. Golf Links to Houghton Road	3
	C. Houghton Road to Los Reales Road	5
6.	**Agua Caliente Wash**	
	A. Jones Road to Houghton Road	3
	B. Fort Lowell Road to Coronado National Forest	3
7.	**Rincon Creek**	
	A. Confluence with Pantano Wash to Camino Loma Alta including Rancho Pequinous area	3
8.	**Santa Cruz River**	
	A. Sanders Road to Avra Valley Road	4
	B. 29th Street to Ajo Way	4
	C. U.S. Highway 89 vicinity	1
	D. Canoa - Amado area	3,5
9.	**Pima Wash**	
	A. Oracle Road to Coronado National Forest boundary	2,3
10.	**Black Wash**	
	A. Ajo Way to headwaters	1
11.	**Miscellaneous areas**	
	A. Tributary foothills washes	2
	B. Fairview/Limberlost area	1
	C. High School Wash	1
	D. Rolling Hills Wash	1

7/a

LAND COSTS

The cost of acquiring floodprone lands is related to:

A. The cost of acquiring improvements constructed upon the land. Generally, the cost of acquisition has been set at improvement replacement value rather than either market value or depreciated value; and

B. The cost of the real property, the value of which is established by comparable sales or an estimate of value considering the flood hazard encumbrance.

Based on historical value trends in Pima County and Tucson, floodprone land acquisition should be carried out as soon as possible in order to minimize future costs. While the cost component for improvement replacement is relatively predictable, rising only with the consumer price index, the value of real property has been escalating at a much more rapid rate within the last twenty years. Based on the rapid urban growth rate and expansion of metropolitan Pima County which has occurred, it is unlikely that real property value acceleration will decline in the foreseeable future. Depending upon the size of acquisition, location, and immediate surrounding property values, the value of real property in a floodway has varied from a low of $1,000 per acre to a high of $20,000 per acre with the average value today being in the range of $7,500 to $12,500 per acre.

As an example of increased land cost with time, Pima County purchased right-of-way for Ina Road west of Interstate 10 in 1973 at a cost of $500 per acre. Several years later the price increased to $1,000 per acre when parcels began to be assembled for the Ina Road Wastewater Treatment Plant. The last large parcel for the site was acquired in 1981 at the appraised value of $10,000 per acre. Another example of the rapid increase of land values is the Kolb Corridor through Davis Monthan Air Force Base. Most of the right-of-way for this project was purchased for $10,000 per acre; three years later land along the route is now selling for $60,000 per acre.

Due to external influences that affect real estate markets, there can be no accurate long term forecast of land values in Pima County. Appraisers and real estate analysts will not forecast longer than 12 to 24 months in advance. Most analysts are predicting a 10 to 15 percent increase in value (appreciation rate) for commercial properties between 1985 and 1986. General appreciation rules for land banking require land values to double in three years to justify the holding costs of taxes and interest. For speculative property, investors look for a doubling of actual investment within two years. However, this rate of appreciation is only applicable to high risk investments.

To provide a quick, historical reference illustrating land appreciation, two general locations have been examined where land value increases over time have been documented. This data is summarized in Appendix 2. In examining Appendix 2, it is obvious that land values have increased dramatically over the last few years, and are anticipated to further increase in the future and will influence the value of floodprone properties. It would be prudent to maximize purchase of floodprone land as quickly as funding permits possible.

SUMMARY

Pima County's floodprone area acquisition program should be continued and significantly increased in scale. In order to sufficiently expand the program, bond funding in the approximate amount of $40 million should be made available general obligation bonds

8/a

of either Pima County or the Flood Control District. This magnitude of funding will allow more land beset by critical flood hazards to be acquired in the immediate future, at the lowest overall cost.

CHH:ac
10/31/85

APPENDIX B

LISTING OF PARCELS AND DWELLINGS

IN

FLOODPRONE AREAS

PARCELS AND DWELLINGS LOCATED IN FLOODPRONE AREAS
CANADA DEL ORO WASH, T11S R14E
CATALINA STATE PARK TO PINAL COUNTY LINE

SECTION 1

TAX CODE *	# OF DWELLINGS	LAND LOCATION	DWELLING LOCATION
222-01-019	V	FW, FP	-
222-01-019K	V	FP	-
222-01-019L	V	FP	-
222-01-021	V	FW, FP, EH	-
222-01-025	V	FW, FP, EH	-
222-01-026	V	FW, FP, EH	-
222-01-027	V	FP	-
222-01-028	V	FW, FP	-
222-01-029A	V	FW, FP, EH	-
222-01-030	V	EH	-

V = VACANT
C = CONVENTIONAL DWELLING
MH = MANUFACTURED HOME
FW = IN FLOODWAY
FP = IN FLOODPLAIN, OUTSIDE FLOODWAY
EH = IN EROSION HAZARD AREA, OUTSIDE FLOODPLAIN AND FLOODWAY
0 = OUTSIDE FLOODPLAIN, FLOODWAY, EROSION HAZARD AREA
* = DATA FROM PRELIMINARY 1991 TAX ROLLS

PARCELS AND DWELLINGS LOCATED IN FLOODPRONE AREAS
CANADA DEL ORO WASH, T11S R14E
CATALINA STATE PARK TO PINAL COUNTY LINE

SECTION 2

TAX CODE *	# OF DWELLINGS	LAND LOCATION	DWELLING LOCATION
222-02-019A	1C	FP	0
222-02-062A	V	FW, FP, EH	-
222-02-078	V	FW, FP	-
222-02-079	V	FW, FP	-
222-02-080	V	FW, FP	-
222-02-081	V	FP	-
222-02-082	V	FP	-
222-02-083	V	FP	-
222-02-083	V	FP	-
222-02-084	V	FW, FP, EH	-
222-02-085	V	FW, FP	-
222-02-086	V	FW, FP, EH	-
222-02-088	V	FW, FP, EH	-

V = VACANT
C = CONVENTIONAL DWELLING
MH = MANUFACTURED HOME
FW = IN FLOODWAY
FP = IN FLOODPLAIN, OUTSIDE FLOODWAY
EH = IN EROSION HAZARD AREA, OUTSIDE FLOODPLAIN AND FLOODWAY
0 = OUTSIDE FLOODPLAIN, FLOODWAY, EROSION HAZARD AREA
* = DATA FROM PRELIMINARY 1991 TAX ROLLS

ASSUME DWELLING OWNER-OCCUPIED UNLESS MARKED "LEASED"

PARCELS AND DWELLINGS LOCATED IN FLOODPRONE AREAS
CANADA DEL ORO WASH, T11S R14E
CATALINA STATE PARK TO PINAL COUNTY LINE

SECTION 10

TAX CODE *	# OF DWELLINGS	LAND LOCATION	DWELLING LOCATION
222-28-005	V	FW, FP	-
222-28-078	V	FW, FP	-
222-28-079	V	FW, FP	-
222-28-080	V	FW, FP	-
222-28-081A	V	FW, FP	-
222-28-082	1C	FW, FP	FW
222-28-081B	1MH	FW, FP	FW
222-31-018	1C	FW, FP	FP
222-31-019	V	FW, FP	-
222-31-020	V	FW, FP	-
222-31-021	1MH	FW, FP	FP
222-31-022	4MH	FW, FP	FP
222-31-023	2MH	FW, FP	FP
222-31-024	V	FW, FP	-

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FW = IN FLOODWAY
FP = IN FLOODPLAIN, OUTSIDE FLOODWAY
EH = IN EROSION HAZARD AREA, OUTSIDE FLOODPLAIN AND FLOODWAY
0 = OUTSIDE FLOODPLAIN, FLOODWAY, EROSION HAZARD AREA
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ASSUME DWELLING OWNER-OCCUPIED UNLESS MARKED "LEASED"

PARCELS AND DWELLINGS LOCATED IN FLOODPRONE AREAS
CANADA DEL ORO WASH, T11S R14E
CATALINA STATE PARK TO PINAL COUNTY LINE

SECTION 10 continued

TAX CODE *	# OF DWELLINGS	LAND LOCATION	DWELLING LOCATION
222-31-025	1C	FW, FP	0
222-31-026	1C	FW, FP	0
222-31-027	2MH	FW, FP	FP
222-31-028	1C	FW, FP	FP
222-31-043	V	FW, FP, EH	-
222-31-044	2C	FW, FP, EH	FW
222-31-047	V	FW, FP	-

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MH = MANUFACTURED HOME
FW = IN FLOODWAY
FP = IN FLOODPLAIN, OUTSIDE FLOODWAY
EH = IN EROSION HAZARD AREA, OUTSIDE FLOODPLAIN AND FLOODWAY
0 = OUTSIDE FLOODPLAIN, FLOODWAY, EROSION HAZARD AREA
* = DATA FROM PRELIMINARY 1991 TAX ROLLS

ASSUME DWELLING OWNER-OCCUPIED UNLESS MARKED "LEASED"

PARCELS AND DWELLINGS LOCATED IN FLOODPRONE AREAS
CANADA DEL ORO WASH, T11S R14E
CATALINA STATE PARK TO PINAL COUNTY LINE

SECTION 11

TAX CODE	# OF DWELLINGS	LAND LOCATION	DWELLING LOCATION
222-32-002	V	FW, FP	-
222-32-003	V	FW	-
222-32-004	3MH	FW, FP	FW
222-32-005	V	FW, FP	-
222-32-006	V	FW	-
222-32-007	1C	FW, FP, EH	FW
222-32-008	V	FW, FP, EH	-
222-32-010	V	FP, EH	-
222-32-011	V	FW, FP, EH	-
222-32-012A	V	FW, FP,	-
222-32-013D	V	FP, EH	-
222-32-013E	V	FW, FP, EH	-
222-32-013F	V	FW, FP, EH	-
222-32-013G	V	FW, FP, EH	-

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MH = MANUFACTURED HOME
FW = IN FLOODWAY
FP = IN FLOODPLAIN, OUTSIDE FLOODWAY
EH = IN EROSION HAZARD AREA, OUTSIDE FLOODPLAIN AND FLOODWAY
0 = OUTSIDE FLOODPLAIN, FLOODWAY, EROSION HAZARD AREA
* = DATA FROM PRELIMINARY 1991 TAX ROLLS

ASSUME DWELLING OWNER-OCCUPIED UNLESS MARKED "LEASED"

PARCELS AND DWELLINGS LOCATED IN FLOODPRONE AREAS
CANADA DEL ORO WASH, T11S R14E
CATALINA STATE PARK TO PINAL COUNTY LINE

SECTION 15

TAX CODE *	# OF DWELLINGS	LAND LOCATION	DWELLING LOCATION
222-35-007	V	FW, FP, EH	-
222-35-008	V	FW, FP	-
222-35-009	V	FW, FP	-
222-35-013	V	FW, FP	-
222-35-014	1C	FW, FP	FP
222-35-015	V	FW, FP	-
222-35-016	V	FW, FP	-
222-35-017A	V	FW, FP	-
222-35-017B	V	FW, FP	-
222-35-018	1MH	FW	FW
222-35-019A	1MH	FW	FW
222-35-019B	V	FW	-
222-35-020	2MH	FW	FW
222-35-021	3MH	FW, FP, EH	FP
222-35-022	V	FW, FP, EH	-

V = VACANT
C = CONVENTIONAL DWELLING
MH = MANUFACTURED HOME
FW = IN FLOODWAY
FP = IN FLOODPLAIN, OUTSIDE FLOODWAY
EH = IN EROSION HAZARD AREA, OUTSIDE FLOODPLAIN AND FLOODWAY
0 = OUTSIDE FLOODPLAIN, FLOODWAY, EROSION HAZARD AREA
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ASSUME DWELLING OWNER-OCCUPIED UNLESS MARKED "LEASED"

PARCELS AND DWELLINGS LOCATED IN FLOODPRONE AREAS
CANADA DEL ORO WASH, T11S R14E
CATALINA STATE PARK TO PINAL COUNTY LINE

SECTION 15 continued

TAX CODE *	# OF DWELLINGS	LAND LOCATION	DWELLING LOCATION
222-35-025	1MH	EH	0
222-38-018	1MH	EH	0
222-38-019	V	FW, FP	-
222-38-020	V	FW	-
222-38-029	2MH	FW, FP, EH	EH
222-38-030	2MH	EH	EH
222-38-036	2MH	EH	EH
222-38-037	2MH	FW, FP, EH	-
222-38-038	1MH	EH	EH
222-38-039	V	FW, FP, EH	-
222-38-040	2MH	FW	FW
222-38-041	V	FW, FP, EH	-

V = VACANT
C = CONVENTIONAL DWELLING
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FW = IN FLOODWAY
FP = IN FLOODPLAIN, OUTSIDE FLOODWAY
EH = IN EROSION HAZARD AREA, OUTSIDE FLOODPLAIN AND FLOODWAY
0 = OUTSIDE FLOODPLAIN, FLOODWAY, EROSION HAZARD AREA
* = DATA FROM PRELIMINARY 1991 TAX ROLLS

ASSUME DWELLING OWNER-OCCUPIED UNLESS MARKED "LEASED"

PARCELS AND DWELLINGS LOCATED IN FLOODPRONE AREAS
CANADA DEL ORO WASH, T11S R14E
CATALINA STATE PARK TO PINAL COUNTY LINE

SECTION 15 continued

TAX CODE *	# OF DWELLINGS	LAND LOCATION	DWELLING LOCATION
222-38-042	3MH	FW, FP, EH	FW
222-38-043	1MH	EH	0
222-38-045	V	EH	-
222-38-046	1MH	EH	0
222-38-049	V	EH	-
222-38-052	V	EH	-
222-38-053	V	EH	-
222-39-022	1MH	FP	0
222-39-023	3MH	FP	FP
222-39-029	3MH	FP	0
222-39-030	1MH "LEASED"	FP	FP
222-39-031	1MH	FP	FP
222-39-032	V	FP	-
222-39-038	2MH	FP	FP
222-39-039	1MH	FP	FP
222-39-040	2MH	FP	FP
222-39-047	2MH	FP	0

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ASSUME DWELLING OWNER-OCCUPIED UNLESS MARKED "LEASED"

PARCELS AND DWELLINGS LOCATED IN FLOODPRONE AREAS
CANADA DEL ORO WASH, T11S R14E
CATALINA STATE PARK TO PINAL COUNTY LINE

SECTION 15 continued

TAX CODE *	# OF DWELLINGS	LAND LOCATION	DWELLING LOCATION
222-39-048	3MH	FP	0
222-39-052	4MH	FW, FP	FP
222-39-053	1MH	FW, FP	FP
222-39-054	1MH	FW, FP	FW
222-39-055	3MH	FW, FP	FW
222-39-056	1MH	FW, FP	FW
222-39-057	1MH	FW, FP	FW
222-39-058	V	FW, FP	-
222-39-059	2MH	FW, FP	FW
222-39-060	1MH	FW, FP	FW
222-39-061	2MH	FW, FP	FW
222-39-062	3MH	FW, FP	2FW, 1FP
222-39-063	1MH	FW, FP	FP
222-39-064	2MH	FW, FP	FP
222-39-065	2MH	FW, FP	FP
222-39-066	2MH	FW, FP	FP
222-39-067	1MH "LEASED"	FW, FP	FP

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MH = MANUFACTURED HOME
FW = IN FLOODWAY
FP = IN FLOODPLAIN, OUTSIDE FLOODWAY
EH = IN EROSION HAZARD AREA, OUTSIDE FLOODPLAIN AND FLOODWAY
0 = OUTSIDE FLOODPLAIN, FLOODWAY, EROSION HAZARD AREA
* = DATA FROM PRELIMINARY 1991 TAX ROLLS

ASSUME DWELLING OWNER-OCCUPIED UNLESS MARKED "LEASED"

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PARCELS AND DWELLINGS LOCATED IN FLOODPRONE AREAS
CANADA DEL ORO WASH, T11S R14E
CATALINA STATE PARK TO PINAL COUNTY LINE

SECTION 15 continued

TAX CODE *	# OF DWELLINGS	LAND LOCATION	DWELLING LOCATION
222-40-037	V	FW, FP	-
222-40-038	V	FW, FP	-
222-40-039	V	FW, FP	-
222-40-040	V	FW, FP	-
222-40-041	V	FW, FP	-
222-40-042	V	FW, FP	-
222-40-043	V	FW, FP	-

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MH = MANUFACTURED HOME
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EH = IN EROSION HAZARD AREA, OUTSIDE FLOODPLAIN AND FLOODWAY
0 = OUTSIDE FLOODPLAIN, FLOODWAY, EROSION HAZARD AREA
* = DATA FROM PRELIMINARY 1991 TAX ROLLS

ASSUME DWELLING OWNER-OCCUPIED UNLESS MARKED "LEASED"

PARCELS AND DWELLINGS LOCATED IN FLOODPRONE AREAS
CANADA DEL ORO WASH, T11S R14E
CATALINA STATE PARK TO PINAL COUNTY LINE

SECTION 22

TAX CODE *	# OF DWELLINGS	LAND LOCATION	DWELLING LOCATION
222-47-002	V	FW, FP	-
222-47-003	1C	FW, FP	FP
222-47-004	V	FW, FP	-
222-47-005	1C	FW, FP	FW
222-47-006	1C	FP	FP
222-47-007	1C "LEASED"	FW, FP	FP
222-47-008	1C	FW	FW
222-47-009	V	FP	-
222-47-010	V	FP	-
222-47-014	V	FP	-
222-47-019	1C	FW, FP	FW
222-47-020	1C	FW, FP	FW
222-47-021	V	FW, FP, EH	-

V = VACANT
C = CONVENTIONAL DWELLING
MH = MANUFACTURED HOME
FW = IN FLOODWAY
FP = IN FLOODPLAIN, OUTSIDE FLOODWAY
EH = IN EROSION HAZARD AREA, OUTSIDE FLOODPLAIN AND FLOODWAY
0 = OUTSIDE FLOODPLAIN, FLOODWAY, EROSION HAZARD AREA
* = DATA FROM PRELIMINARY 1991 TAX ROLLS

ASSUME DWELLING OWNER-OCCUPIED UNLESS MARKED "LEASED"

PARCELS AND DWELLINGS LOCATED IN FLOODPRONE AREAS
CANADA DEL ORO WASH, T11S R14E
CATALINA STATE PARK TO PINAL COUNTY LINE

SECTION 22 continued

TAX CODE *	# OF DWELLINGS	LAND LOCATION	DWELLING LOCATION
222-47-022	V	FW, FP	-
222-47-023	1C	FW, FP, EH	FW
222-47-024	V	FW	-
222-47-025	V	FW, FP, EH	-
222-47-026	V	FW, FP, EH	-
222-47-027	V	FW, FP, EH	-
222-47-028	1C	FW, FP	FP
222-47-029	V	FP	-
222-48-002	V	FW, FP	-
222-48-003	1C	FW, FP	FW
222-48-004	V	FW, FP, EH	-
222-48-005	V	FW, FP	-
222-48-006	V	FP	-
222-48-007	V	FP	-

V = VACANT
C = CONVENTIONAL DWELLING
MH = MANUFACTURED HOME
FW = IN FLOODWAY
FP = IN FLOODPLAIN, OUTSIDE FLOODWAY
EH = IN EROSION HAZARD AREA, OUTSIDE FLOODPLAIN AND FLOODWAY
0 = OUTSIDE FLOODPLAIN, FLOODWAY, EROSION HAZARD AREA
* = DATA FROM PRELIMINARY 1991 TAX ROLLS

ASSUME DWELLING OWNER-OCCUPIED UNLESS MARKED "LEASED"

APPENDIX C

DRAINAGE ASSESSMENTS

FOR THE

BOWERMAN, COLEMAN, AND BOWERS PROPERTIES

MEMORANDUM

Department of Transportation and Flood Control District

DATE: August 26, 1991

): Tom Burke, Manager
Property Management

FROM: Dave Smutzer, Manager
Flood Control Plng. & Dev.

IBJECT: **The Bowerman Property Drainage Assessment**

Request Origin: The property owner, Mr. Bowerman, applied for a Floodplain Use Permit, was denied, appealed, and was again denied. Under the Flood Control District's floodprone land acquisition program, the Pima County Board of Supervisors directed the staff to negotiate acquisition of the site. An offer of $13,000 was made for the parcel in mid-1988, but this offer was rejected by Mr. Bowerman. Recently, Mr. Bowerman has indicated, through a telephone conversation with an aide to Mr. Ed Moore, that he wishes to sell the property to the District. Based upon this request, the parcel is again being evaluated as part of the overall floodprone land acquisition strategy being developed for the Canada Del Oro Wash in the Catalina, Arizona area.

Location and Description: The 1.0-acre parcel, tax code #222-38-0390, is located on Wilds Road, Tucson, Arizona (S15-T11-R14). The parcel is outlined on the attached aerial photograph and is adjacent to the Canada Del Oro (CDO) Wash. No specific street address is available for the property. No major improvements have been made to the property.

Mr. Bowerman purchased two one-acre parcels; one unimproved parcel adjacent to the east bank of the CDO Wash (the subject parcel), and a second parcel adjacent to the first. Improvements were made to the second, eastern-most parcel. The subject parcel remains unimproved due to continual denial of the required Floodplain Use Permit. Recently, Mr. Bowerman sold the improved parcel to Mr. Carlson.

Current Flood Status: The attached Flood Insurance Rate Map (FIRM) panel shows the western one-third of the property lies within the CDO 100-year floodplain. Additionally, the entire property lies within the 250-foot erosion hazard zone applicable to this portion of the Canada Del Oro Wash.

1/11

The parcel does not appear to lie within the currently defined CDO floodway. The District is requesting a restudy of the CDO floodway which may result in a redefinition of the regulatory limits of the CDO Floodway in the vicinity of the parcel.

Historical Flood Status: In September 1984, Mr. Bowerman acquired the property. On 11/4/84, Mr. Bowerman filed an application for a floodplain use permit. In a letter dated 1/21/85, the permit was denied because the parcel was within the erosion hazard area of the CDO Wash. Mr. Bowerman appealed in a letter dated 2/29/88, and the appeal was again denied in a letter dated 3/25/88.

Justification of the denials was explained in a letter dated 11/24/87, in which it was stated that the mobile home Mr. Bowerman proposed for the property "would be approximately twenty feet from the 100 year flood limit and one hundred and twenty feet from the low flow channel. The soils do not appear to be able to withstand the erosive forces of large floods such as a 100 year regulatory event."

In mid-1988, the District offered to purchase the property for $13,000, but was refused by Mr. Bowerman.

Applicable Studies: The Reconnaissance Level Study of the Canada Del Oro Wash Flood Control Project (Arizona Department of Water Resources, January 1982) developed a flood control plan for the Upper CDO watershed. The study recommended purchase of flood prone properties and installation of a flood warning system as nonstructural measures to reduce flood damage in the vicinity of Mr. Bowerman's property. The study also recommended bank protection or levees as structural methods of protecting floodprone residential areas. The Critical and Sensitive Wildlife Habitats of Eastern Pima County study, conducted by the University of Arizona School of Renewable resources, designated the CDO area around the property as a major extension of riparian habitat, suitable for animal movement, hiking, and horseback riding.

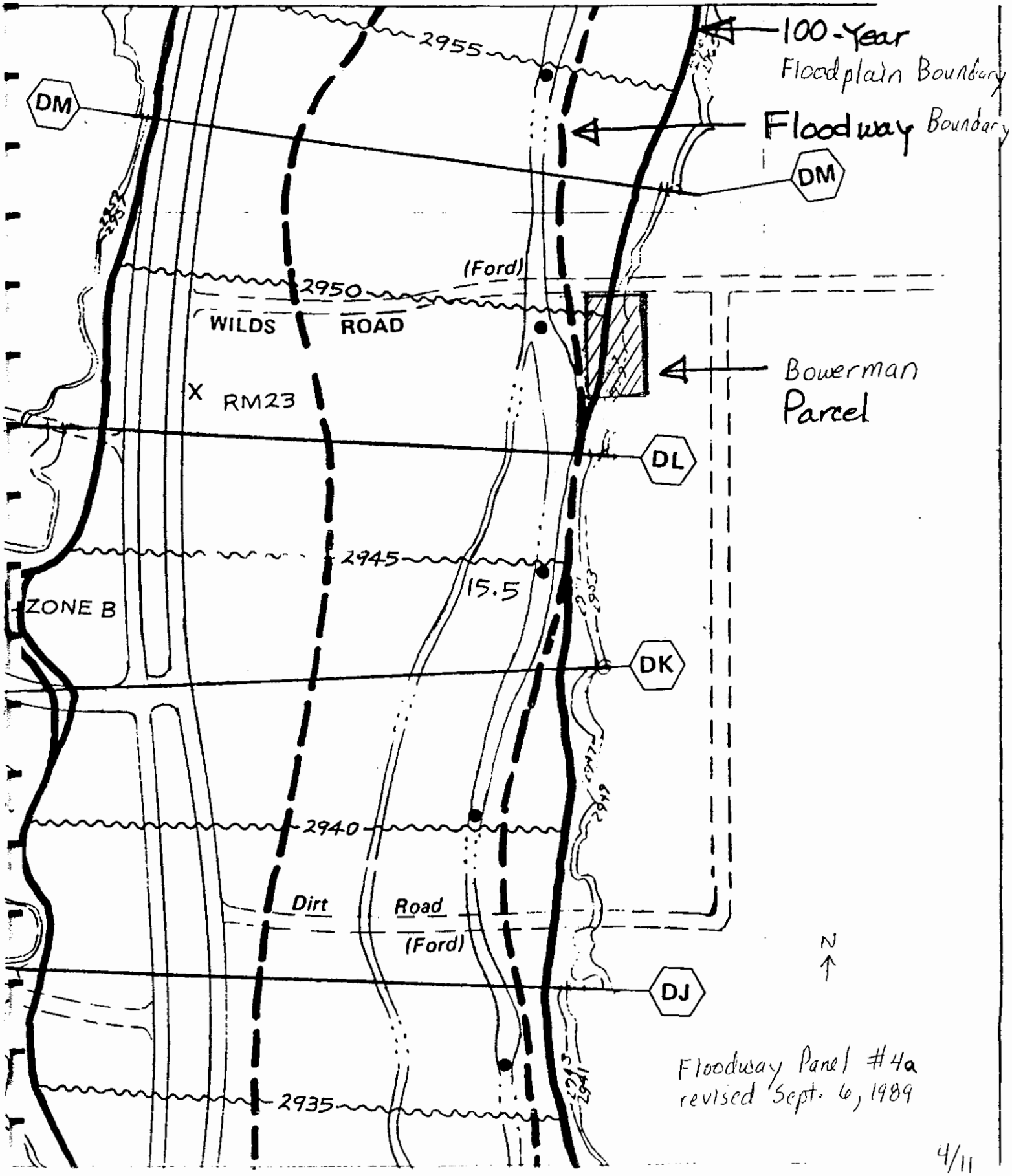
Staff Recommendation: Based upon the understanding the property owner rejected the District's acquisition offer made in 1988, the staff recommends against acquiring the property at this time. The parcel has a low property acquisition priority ranking for the CDO Wash, as well as County-wide, because it is undeveloped and not currently located within the defined CDO Wash floodway.

RMD/rmd

Attachments

xc: Thomas Helfrich
Rose Doolen

MATCH TO PANEL 3b



Floodway Panel #4a
revised Sept. 6, 1989

4/11

CDO

MEMORANDUM

DEPARTMENT OF TRANSPORTATION AND FLOOD CONTROL DISTRICT

DATE: October 5, 1990

TO: The Honorable Greg Lunn, Member
Board of Supervisors

FROM: John M. Bernal
Director

SUBJECT: Coleman Property Along Canada Del Oro Wash

As you will recall, Mr. William Coleman submitted an August 21, 1990, letter requesting that his home and property be considered for acquisition by Pima County because of flooding and erosion danger. The Flood Control District staff has conducted a drainage assessment for Mr. Coleman's property; and an October 5, 1990, draft copy of this assessment is included for your information.

Please note that this assessment identifies the existence of a floodplain use permit granted in 1981 that required Mr. Coleman to hold Pima County harmless from flooding and erosion damage upon the property. The enclosed maps show that 90 percent of the property lies within the CDO 100-year floodway. Therefore, acquisition of Mr. Coleman's property is an appropriate action and one that was recommended by the 1982 Reconnaissance Level Study completed by the Arizona Department of Water Resources. The Flood Control District is prepared to move forward with this acquisition; however, we prefer to advance acquisitions along the Canada Del Oro Wash under a comprehensive flood control strategy approach for this major watercourse.

We are initiating a flood control study for the Canada Del Oro Wash that will be completed within the next six to nine months. However, the initial work involved in this study is to gather all necessary data to determine the specific flooding conditions in existence and to quantify the number of parcels, residential dwellings, and undeveloped lots within the floodplain and floodway and to determine the total current market value of these properties. This initial data gathering will be completed within four to six weeks.

After completion of the data gathering effort, particularly as it relates to floodprone properties, the District will be prepared to recommend to the Board of Supervisors a preliminary acquisition program with recognition of the ultimate acquisition costs for the entire CDO Wash area. At that time, we would be prepared to move forward with the Coleman acquisition unless a Board decision directed us to do otherwise.

If you have any questions regarding this matter, please contact me.

JMB:cm

Enclosures

c: C. H. Huckelberry, Assistant County Manager
Dave Smutzer, Manager, Flood Control Planning and Development

5/11

MEMORANDUM

Department of Transportation and Flood Control District

DATE: October 5, 1990

TO: Tom Burke
Property Management

FROM: Thomas Helfrich
Planning Division

SUBJECT: **Coleman Property Drainage Assessment.**

Request Origin: In an August 21, 1990 letter (attached) to Supervisor Greg Lunn, William Coleman requested that his home and property be considered for acquisition by Pima County because flooding and erosion danger. Mr. Coleman stated that his property was severely damaged in the flood of 1983, and that recent upstream development has increased flooding hazards to his property. Mr. Coleman added that he was unable to leave his property four times during the 1990 monsoon season.

Location and Description: The 2.5 acre property, tax code #222-32-0070, is located at 15700 North Lago Del Oro Parkway, Tucson, Arizona (S 10-11, T11S, R14E), on the Canada Del Oro Wash (CDO). The hand drawn map included in Mr. Coleman's letter appears to be incorrect. The location and size of the property and access easement, as determined by staff from its legal description, are shown on the attached aerial photograph. The property contains a single family residence and a swimming pool.

Current flood Status: The attached Flood Insurance Rate Map (FIRM), shows the property and access easement lie completely within Zone A4 of the CDO 100-year floodplain. The Zone A4 designates an area of known 100-year flood elevations. The attached Flood Boundary and Floodway Map shows 90% of the property and 75% of the access easement lying within the CDO 100-year floodway. The property, dwelling, swimming pool, and access easement lie completely within the CDO 500 foot erosion hazard setback. The dwelling and pool are located approximately 25 feet from the dominant low flow CDO channel.

Historical Flood Status: Floodplain Management files show a Floodplain Use Permit was granted in May 1981 for building a pool and enclosed wall adjacent to the residence. Floodplain Management determined then that the proposed improvement would have negligible influence upon the existing floodplain. Because of potential flooding hazards to the property, the Colemans were required to record a Declaration of Restrictions and Covenants, holding Pima County harmless from flooding and erosion damage upon the property. The declaration also limited property use to that allowed in the Floodplain Use Permit and Floodplain Ordinance. The recorded declaration is included in the Coleman Floodplain Use Permit file. No copy of the Floodplain Use Permit exists in the file and the issuance status of the permit is unknown.

A drainage complaint (#82-192) was filed by Mr. Coleman with Floodplain Management in September 1982. Mr. Coleman stated that upstream sand and gravel mining of the CDO widened the channel and threatened his property. An investigation by Floodplain Management

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staff revealed that unauthorized sand and gravel mining, and channel overbank stripping was done when a private contractor prepared to install equipment for resurfacing work on State Highway 89. Floodplain Management staff determined the excavations posed a threat to downstream properties, prevented further excavation, and made recommendations for returning the channel and overbank to natural condition.

Applicable Studies: The Reconnaissance Level Study of the Canada Del Oro Wash Flood Control Project (Arizona Department of Water Resources, January 1982) developed a flood control plan for the Upper CDO watershed. The study recommended purchase of flood prone properties and installation of a flood warning system as nonstructural measures to reduce flood damage in the Coleman property vicinity. The study also recommended bank protection or levees as structural methods of protecting flood prone residential areas. The Critical and Sensitive Wildlife Habitats of Eastern Pima County study, conducted by the UA School of Renewable resources, designated the CDO area around the property as a major extension of riparian habitat, suitable for animal movement, hiking, and horseback riding.

Supplementary Information: The nearest Pima County property acquisition to date is limited to an easement for the Golder Ranch Drive Bridge, located approximately 2 miles downstream from the Coleman property.

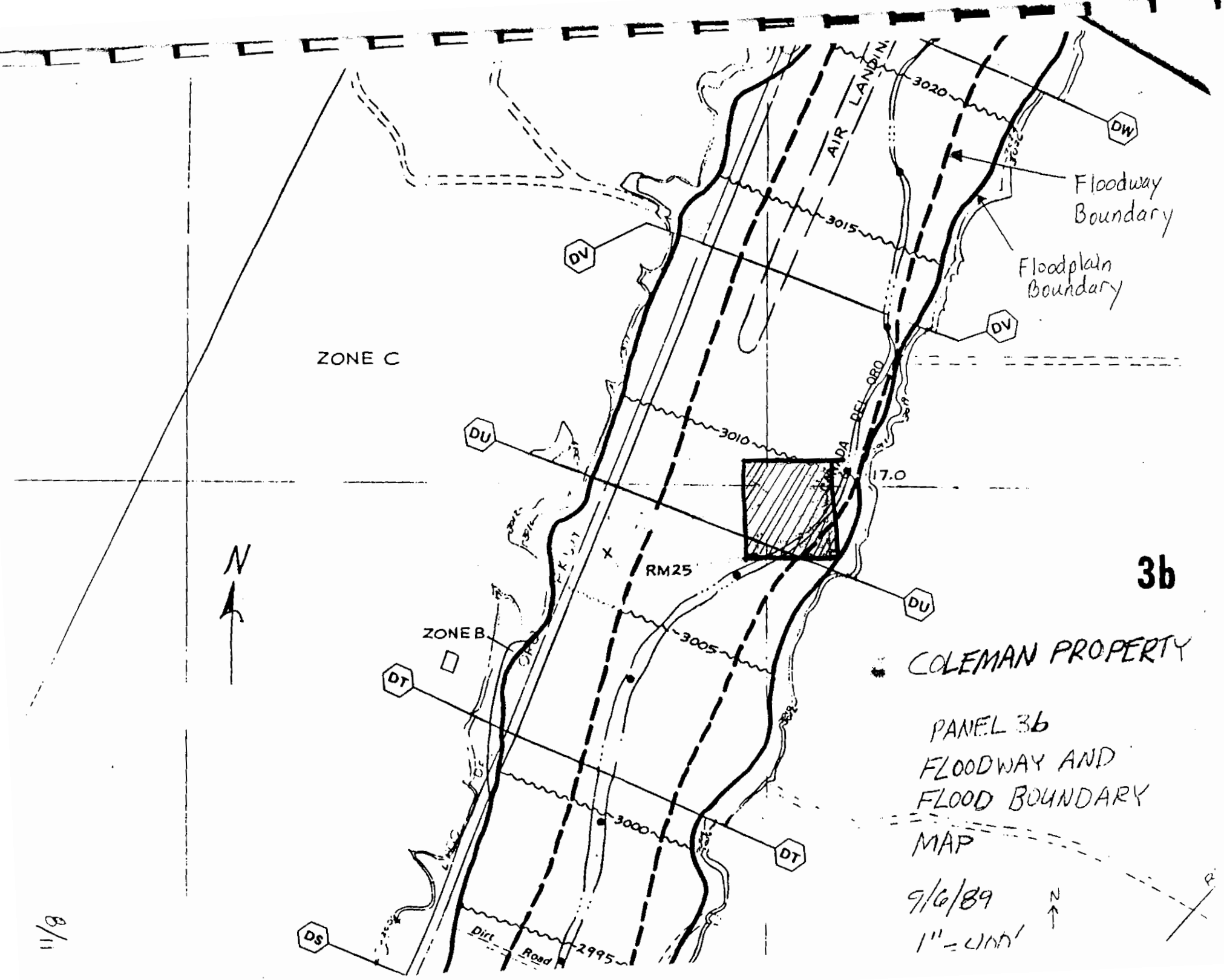
Staff Recommendation:

TJH/hjs

Attachments

xc: Dave Smutzer

7/11


AIR LANDING
3020
DW
Floodway Boundary
3015
DV
Floodplain Boundary
DV
ZONE C
DU
3010
17.0
N
RM25
DU
3b
ZONE B
3005
COLEMAN PROPERTY
DT
PANEL 3b
FLOODWAY AND
FLOOD BOUNDARY
MAP
3000
DT
9/6/89
1" = 400'
N
DS
Dirt Road
2995
8/11

MEMORANDUM

Department of Transportation and Flood Control Distric

DATE: August 10, 1990

TO: Tom Burke
Property Management

FROM: Thomas Helfrich
Planning Division

SUBJECT: **Bowers Property Drainage Assessment (#222-38-0400).**

This assessment was initiated by a July 10, 1990 letter to the District from Lamar and LuAnn Bowers, indicating their property, located in the Canada Del Oro (CDO) Wash in Catalina, Arizona, was recently inundated by floodwaters (on July 7, 1990). The Bowers believed their property is subject to further flooding and erosion danger and have asked the District to consider acquiring it (see attached letter).

The Bowers letter incorrectly accused Pima County Flood Control District of causing their flooding problems by breaching the Golder Dam. The Dam was in fact breached by the Arizona Water Commission in 1980, after studies concluded that the dam design and construction was unsafe. The dam was built ten years before the existence of Pima County's Floodplain Ordinance and was thus never subject to Pima County Flood Control District regulation.

The five acre Bowers property contains a mobile home, three small sheds and a garage. The parcel location is shown on the attached Flood Insurance Rate Map (FIRM) and Flood Boundary and Floodway Map (FBFM). These maps show the parcel and its structures lying completely within the boundaries of both the CDO 100-year floodplain and 100-year floodway. In addition, the entire parcel is located within the 500 foot erosion hazard setback for the CDO. The river reach containing the parcel has been classified by the UA School of Renewable Resources as a Class I Habitat: a major extension of riparian habitat suitable for horseback riding and hiking.

Comparison between 1979, 1983 and 1988 aerial photographs (attached) shows that general channel widening has occurred within the reach containing the property. Historical flow information for the CDO suggests the current channel width probably resulted from the October 1983 flood, as seen in the 1983 photograph. In general, the photographs show that abrupt channel widening and erosion may occur, as shown in the 1983 and 1988 photographs of the widened channel area just south of the Bowers property.

Observation of all available aerial photographs from 1979 to the present shows that the Bowers' mobile home and smaller outbuildings were installed between 1979 and 1983. A garage sized structure was installed between 1983 and 1986. No record exists in the Floodplain Management Section files of issuance

9/11

of Floodplain Use Permits for any of the structures. As such, any onsite improvement placed in a regulated flood and erosion hazard area without a Floodplain Use Permit conflicts with the Pima County Flood Plain Management Ordinance.

A neighbor of the Bowers filed a drainage complaint about their property in January 1990, accusing the Bowers of dumping construction debris into the CDO along the west bank, immediately south of Wilds Road. The presence of construction debris in the channel was verified by a site inspection on March 3, 1990.

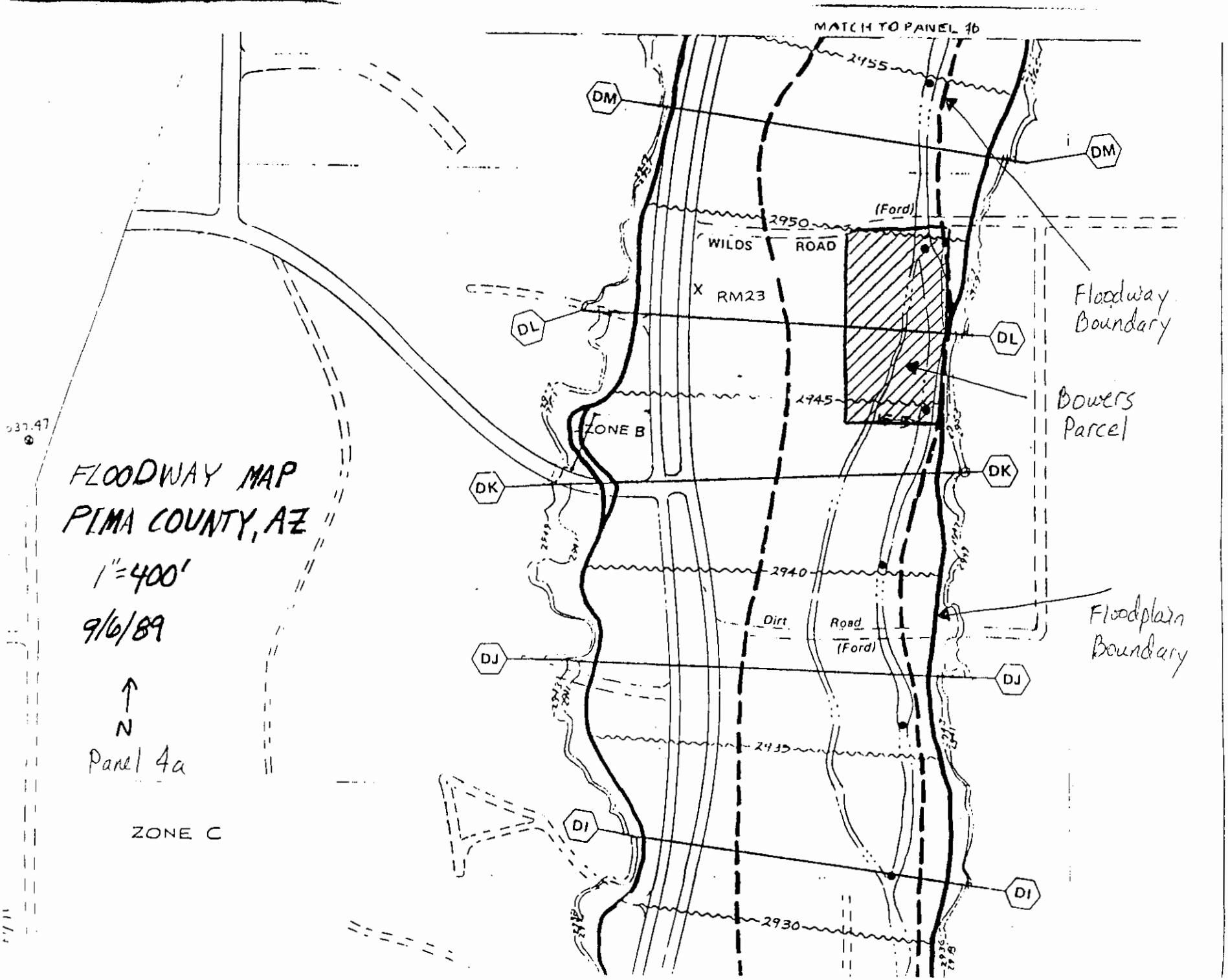
A subsequent inspection on July 19, 1990 revealed that most of the construction debris had apparently washed away. High water marks were seen on the Bowers property at that time. They indicated recent flooding caused low velocity flow to reach the channel-side edge of the Bowers' mobile home.

Based upon the parcel's proximity to the floodway of the CDO, the evidence of channel widening shown in the photographs, and the quality of the associated riparian habitat, the staff recommends that the Bowers property be acquired if a fair price is negotiable.

xc: Bill Howells

TJH/hjs

Attachments


MATCH TO PANEL 4b
2955
DM
DM
(Ford)
2950
WILDS ROAD
X RM23
DL
DL
Floodway Boundary
Bowers Parcel
2945
ZONE B
DK
DK
2940
Dirt Road
(Ford)
Floodplain Boundary
DJ
DJ
2935
DI
DI
2930
FLOODWAY MAP
PIMA COUNTY, AZ
1"=400'
9/6/89
N
Panel 4a
ZONE C

PINAL COUNTY
PIMA COUNTY

EDWIN RD.

NORTHERN STUDY REACH

RAIL N RD.

222-02

222-01

222-32

Canada del Oro

LAGO DEL ORO PARKWAY

AIRSTRIP

STATE LAND BOUNDARY

MATCHLINE B-B'

21 25 28 19 19K 19L 27 26 19A 29A 62A 30 86 85 84 88 83 82 81 80 78 79 02 03 04 05 13F 13G 13D 13E

3 2
10 11

2 1
11 12

N

0 200 400'
Scale in Feet
Approx.

Sources: FEMA 1983
McLain Photo Topo Base 1984,1985

Pima County makes no warranties, implied or expressed, with respect to information shown on this map.

- Floodway (FEMA)
- Floodplain (FEMA)
- Erosion Hazard Boundary
- Flow Direction

CANADA DEL ORO WASH

MAP A

T 11 S, R 14 E
Portions of
Sections 1, 2, 10, 11

Prepared
for
PIMA COUNTY DEPARTMENT OF TRANSPORTATION
& FLOOD CONTROL DISTRICT
Planning & Development Division

June 1991

Fig. 5 1/2

MATCH LINE A-A'

MATCH LINE B-B'

WILDS RD.

TROTTER RD.

TROTTER PL.

ROLLINS RD.

LAGO DEL ORO PARKWAY

222-39

222-38

222-28

222-32

222-31

222-47

222-48

222-40

222-35

222-39

222-38

Cañada del Oro

STATE LAND BOUNDARY

HORSE TRACK

COLDER RANCH RD.

SCHROEDER RD.

WILDS RD.

CATALINA STATE PARK
SOUTHERN STUDY REACH

SHOOTING RANGE

16 15
21 22

10 11
15 14

MATCH LINE A-A'

CANADA DEL ORO WASH

MAP B

T 11 S, R 14 E
Portions of
Sections 10,15, 22

Prepared
for
PIMA COUNTY DEPARTMENT OF TRANSPORTATION
& FLOOD CONTROL DISTRICT
Planning & Development Division

June 1991

- Floodway (FEMA)
- Floodplain (FEMA)
- Erosion Hazard Boundary
- Flow Direction

N

0 200 400'
Scale in Feet
Approx.

Sources: FEMA 1983
McLain Photo Topo Base 1984,1985

Pima County makes no warranties, implied or expressed, with respect to information shown on this map.

MEMORANDUM

Riv. Mgmt. Studies CDO/Catalina

Department of Transportation and Flood Control District

DATE: December 31, 1991

TO: Thomas J. Helfrich
Chief Hydrologist

FROM: Joanne Hershenhorn JH
Principal Hydrologist

SUBJECT: **Flood Control Study for CDO, Catalina, Arizona**
Actions Needed Based on Recommendations in Report

Based on the nine (9) recommendations (attached) listed in the study, which was adopted by the District's Board of Directors on December 3, 1991, I recommend the following actions be taken:

I. Conduct a restudy of the FEMA Floodway and Floodplain Maps

1. Steps should be taken to initiate this process. Aerial and topographic data will need to be generated - an SOW for this has been written. An SOW should also be written for a consultant to conduct the restudy, and cost estimates should be prepared. To determine an appropriate priority for this restudy, the relative need and cost estimate should be compared with the next two fiscal years' budget and project priority list.

II. Safety Concerns: Evaluate At-Risk Properties, and Develop a Priority List

Because it will be a while before the restudy information will be available, we should:

1. Develop a Priority List for At-Risk Properties

Using the information in Appendix B of the Flood Control Study for Cañada del Oro Wash, Catalina, Arizona (Study) as a starting reference, and the most recent aerial photos available (March, 1990), the number and type of structures located in each of the three hazard areas (floodway, floodplain, and erosion hazard setback) should be determined based on a field investigation. The type of each structure should also be noted. Using all available information, a priority list should be developed for at-risk structures.

2. Evaluate Permitting History

Staff should investigate the permitting history for structures in this area. A listing must be compiled of what regulations were applicable when, how they were enforced, and which structures have permits (and which do not, and the most likely reason why not). Because the permitting history will be sketchy until the early 1980's, some decisions will need to made regarding the cutoff date for when permits should be present in our files.

III. Notification of Property Owners and Enforcement

1. Public Notification

I recommend that a public meeting be held in Catalina, to advise residents of the severity of the situation, notify them that an enforcement program is being developed, answer questions, and solicit input. After the public meeting, and based on the priority list, property owners should be notified by mail of at-risk structures and the basis for the determination. Those with unpermitted structures (that were not grandfathered) should be required to obtain permits, and advised that enforcement will be pursued. Property owners should be further advised, in the mailing, that flood insurance should be obtained, as applicable.

2. Enforcement

An enforcement program should be developed and pursued.

IV. Acquisition

1. Develop Priority List for Acquisition

According to the recommendations and priorities established in the Study, in accordance with the priority list developed in II.1. above, and verified by field investigation and a historical review of the permitting files, property should be acquired as requested by property owners, and as funding permits. Structures which were constructed without permits when the permitting process was well-established are to be prioritized accordingly. Acquisitions are to conform to CDO

guidelines of Five-Year Guidance Plan. Because this area is rated lower than other acquisition areas, little funding will be available over the next few years, however there is some flexibility in the overall prioritization.

V. Monitoring

A monitoring program should be instituted as recommended, including field investigation and overflights. Enforcement is to be pursued.

VI. Database Management System

All data should be managed in a database management system, such as Dbase-IV, for example. The files must be well-documented and accessible to staff. Spreadsheets may be helpful too. This should be initiated concurrent with II. above. The files shall be updated as new information becomes available.

****

ACTION.CDO

V. RECOMMENDATIONS

Specific recommendations for acquiring property and for reducing residents' exposure to flooding and flood-related damage along the CDO near Catalina are:

1) Conduct a restudy of the FEMA floodplain and floodway maps to better ascertain which properties are at risk;

2) Develop a priority list of parcels to be considered for acquisition using the existing Board of Supervisors-adopted guidelines, with modifications as discussed below, and consistent with new information provided by a FEMA restudy;

3) Acquire parcels which have habitable structures located in the floodway, on a request basis and subject to available funding. Because dwellings on two properties are located in the floodway and will be exposed to extremely hazardous conditions in the event of a major flood on the CDO, and as the property owners (Bowers and Coleman) have submitted formal acquisition requests to the District, staff recommends that these two parcels be acquired with expediency;

4) Acquire parcels, on a request basis and subject to available funding, which have habitable structures located in the floodplain or erosion hazard area that are inconsistent with the current Floodplain and Erosion Hazard Management Ordinance, and which are likely to incur flood or erosion damage;

5) Acquire vacant parcels located in the floodway, on a request basis and subject to available funding, to preserve the environmental attributes and protect the hydraulic integrity of this reach of the CDO;

6) Recommend to property owners that flood insurance be obtained for all insurable structures in the floodplain;

7) Direct staff to investigate a) which residential structures in the floodway and floodplain were "grandfathered in", i.e. those present prior to the adoption of local floodplain management regulations in 1974, and those present prior to the release of the preliminary FEMA Floodway and Floodplain maps in 1979, and b) which structures were installed or constructed illegally. For those structures which constitute violations, enforcement action is recommended;

8) Institute a program to monitor construction and installation activity in floodprone areas. It is recommended that quarterly field investigations and an annual overflight be conducted to ensure compliance with current regulations. Enforcement action should be pursued for observed violations; and

9) Strict enforcement in applying the regulations contained in the Floodplain Management and Erosion Hazard Ordinance is recommended to the Flood Control District Board of Directors.

Basis for Recommendations

Current floodplain management regulations as prescribed in the Floodplain and Erosion Hazard Management Ordinance prohibit constructing buildings in the floodway, and place restrictions on constructing in the floodplain. Approving waivers and variances in this area may result in a life-threatening situation, and will probably increase the cost to acquire the property in the future, as the property will likely include improvements associated with the waiver or variance. Consistency in applying the regulations should not be compromised, and strict enforcement is advised. Should any variance be granted, one condition of the variance should be a covenant running with the land, stating that the District will not pursue acquisition of the improved property.

The obvious channel changes and therefore, changes in the location of the floodway, have occurred due to grading, diversion, and the installation of the Golder Ranch Road bridge. Most development in the floodway is prohibited by the Floodplain and Erosion Hazard Management Ordinance. The floodplain and floodway boundaries should be revised based on a restudy of the FEMA floodway maps so as to better ascertain which properties are at risk.

Based on the results of this investigation and previous studies, it is recommended that parcels which have habitable structures located in the federally-mapped floodway be acquired, as requested by property owners and as funding is available. Priority of acquisition should be based on proximity to the main CDO channel and the likelihood of severe damage being incurred. After a property has been acquired, all structures should be dismantled and removed from the hazardous areas. Properties which have residential structures located in the floodplain and erosion hazard areas that are inconsistent with current Floodplain Management Ordinance regulations and which are likely to incur damage should be acquired next, followed by acquiring vacant property located in the floodway.

River Mgmt. Study file
CDO/Catalina

NOTES/ACTION

	1991 -	0001 -	0007
		0020 -	0027
		0039 -	0043
		0046 -	0053
		0073 -	0081
		0084 -	0088
		0091 -	0092
		0094 -	0100
Tax Credits	1988 -	88 -	8822
	1989 -	89 -	8603
	1990 -	90 -	8456 - 8457
		90 -	8459
	1991 -	91 -	8001 - 8027
		91 -	8033 - 8043
		91 -	8047 - 8062
		91 -	8068 - 8074

... FLOOD CONTROL DISTRICT BOARD

A. AGREEMENT, CONTRACT, AND/OR AMENDMENT

Consent Calendar ?

Urban Engineering, Supplemental Agreement, Amendment No. 5, Santa Cruz Linear Park, St. Mary's to Grant, to provide changes to plans due to lot deletions and additions of soil cement on East bank, Flood Control Capital Improvement Fund, contract amount $12,738.50 increase (07-04-U-111603-0889) Flood Control

B. QUIT CLAIM DEED

Transfer of title of property located within Section 27, of Township 13 South, Range 14 East, from Flood Control District to Pima County for River Road right-of-way. (District 1)

5-0

C. FLOOD CONTROL STUDY

Staff requests approval of the Canada Del Oro Wash, Catalina, AZ, Flood Control Study including staff recommendations. (District 1)