CITY OF SCOTTSDALE
DESERT GREENBELT PROJECT

Pima Road Channel Hydrology Report

by: The Greiner Team

The Desert Greenbelt
SCOTTSDALE, ARIZONA

Registered Professional Engineer (Civil)
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ARIZONA, U.S.A.

FEBRUARY 1995

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PIMA-HYD.GRE

INTRODUCTION

The City of Scottsdale has retained Greiner, Inc. to perform the preliminary design for the proposed Desert Greenbelt project. The Desert Greenbelt will serve as a backbone system for safely conveying stormwater from locations where they are not naturally contained through inhabited areas, to an area where they will be retained. The runoff is generated from the mountain ranges and high desert areas to the north of the site during storms. With this project, the Sonoran Desert will be preserved and protected to the maximum extent possible, and cultural and recreational benefits for the entire city will also be incorporated.

The project encompasses three areas: the Pima Road Channel, the Reata Pass/Beardsley Wash and the Rawhide Wash. This report summarizes the hydrologic study for the proposed Pima Road Channel. The studies for the other two areas are documented in separate reports.

The proposed Pima Road Channel alignment is about five miles long, stretching from Jomax Road to Union Hills Drive and parallel to Pima Road. The channel will cross Pima Road from east to west at Deer Valley Road through a bridge and discharge to a planned detention basin, Basin 53R, near Union Hills Drive (see Figure 1). A maximum metered flow of 2,500 cfs outlets from Basin 53R, passes under the proposed Outer Loop and discharges into the Tournament Players Club's (TPC) retention basin at Hayden Road. Major conceptual collector channels located along Happy Valley Road, Pinnacle Peak Road, Deer Valley Road alignment, Beardsley Road and the north side of Thompson Peak Parkway (TPP) will be incorporated to this project.

PURPOSE OF STUDY

The purpose of this hydrologic study is to identify the peak discharges for the design of the Pima Road channel, collector channels, apex structures, Detention Basin 53R and bridge structures.

WATERSHED DESCRIPTION

The total tributary drainage area to the Pima Road Channel is about 11.5 square miles (see Figure 2). The drainage area extends northeasterly from the various roadway crossings at slopes varying from four percent in the extreme upper portions to about 2.3 percent in the braided washes in the lower extremity. The terrain is typical Sonoran Desert dominated by creosote bush, with some saltbush, desert thorn and mesquite in the vicinity of the washes, as well as a scattering of ocotillo, saguaro, palo verde, ironwood and hackberry. The amount of actual vegetative cover is very low, being generally less than 30 percent.

The watershed soil in the lower extremities is composed of hyperthermic arid soils of the Antho-Valencia Association. These are composed of deep and moderately deep, moderately fine-textured, nearly level to gently-sloping loam soils on alluvial fans. The soils in the middle and upper reaches are hyperthermic arid soils of the Ebon-Pimant-Tremant Association. These are composed of deep, moderately-fine and fine-textured, and moderately fine-textured, gently-sloping gravelly and very-gravelly clay and clay loam soils on old alluvial fans at the base of the mountains, principally Pinnacle Peak. A very small number of the watersheds in the upper

elevation of Pinnacle Peak consist of hyperthermic arid soils of the Chirioni-Gachado-Rock Outcrop Association. These are composed of shallow and very shallow, gravelly and cobbly, moderately-coarse and coarse textured, moderately-sloping to very steep soils and rock outcrops on hills and mountains. The soils in all but the most upper extremities have a moderate rate of infiltration and water capacity, and are classified as Group "B". The soils in the most upper regions, having a very slow infiltration rate and water capacity, are classified as Group "D".

EXISTING FLOODING CONDITIONS

There are many tributaries to the proposed Pima Road Channel; among them is the Pinnacle Peak Wash. Originating on the east side of Pinnacle Peak, Pinnacle Peak Wash travels to the south where it is diverted to follow Alma School Road until reaching its apex approximately two-thirds of a mile north of Happy Valley Road. From this point an alluvial fan exists whose boundaries include properties in Desert Highlands, Eagles Glen and some individual land ownerships. Pima Road will be protected from the flooding by these tributaries by the Pima Road Channel. The Pima Road Channel should resolve the various existing flooding concerns of residents of the area west of Pima Road. Figure 1 shows the area west of Pima which will be protected by the Pima Road Channel. Figure 2 shows the upstream watershed areas tributary to the proposed channel.

HYDROLOGIC BACKGROUND

The methodology for this study follows the guidelines and criteria provided in the drainage manual by the City of Scottsdale. The 7.5-minute U.S.G.S. topographic maps were utilized for subarea delineations. The U.S. Army Corps of Engineers' HEC-1 Hydrologic Computer Program was used for the analysis.

The hydrologic models created by Water Resources Associates, Inc. (WRA) (MP94.6I) and modified by the City of Scottsdale (OLP.6), were used as the base model for the Desert Greenbelt. These base models were modified whenever the sizes of sub-basins and the routing locations were changed as a result of the channel design. These changes occurred when the collector system, the proposed TPP and DC Ranch plans were incorporated into the channel system. The HEC-1 model created by Gilbertson Associates for the drainage of Grayhawk Development of Detention Basin 53R was added to the Pima Road Channel HEC-1 model to represent the basin's purpose of reducing peak inflows to a maximum outflow of 2,500 cfs per an agreement between ADOT and the City of Scottsdale.

HYDROLOGIC PARAMETERS

The increase in runoff due to future urbanization was simulated by adding the percentage of impervious cover to the runoff curve number. The kinematic wave procedure was used to determine the runoff hydrographs of the sub-basin areas. A modified Puls channel routing procedure, using an eight-point cross-section, was used for all the major interceptor channels proposed as part of the regional drainage plan. Channel geometry was based on normal depth calculations for typical reaches of each channel (see Figure 3). Routing lengths were adjusted from the original model due to the flow restrictions along the TPP.

SCS curve number (CN) methodology was used for interception, depression and infiltration losses, using Antecedent Moisture Condition II. The same curve number/hydrologic soil group relationship used in the original model was applied for the adjusted drainage sub-basins.

This area of Scottsdale receives a rainfall depth of between 3.3 and 3.6 inches for the 100-year, 6-hour event, as presented in the National Oceanic and Atmospheric Administration (NOAA) Atlas 2. The 100-year, 6-hour event which had been used in the FEMA study, was used for this study. (3.3 or 3.6 inches ?)

The majority of the soils within the basin are composed of Group B and Group D. Soils in Group B have moderately low runoff potential and those in Group D have high runoff potential; that is, the infiltration rate is very slow. Although a 6-hour duration was considered for the analysis, the CN's used were selected based on a 24-hour storm in the original W.R.A. model and were used in this study. JD and PH records were used to simulate the hypothetical storm distribution.

Manning's coefficients of 0.02 and 0.024 were used for the main channel respectively south and north of Deer Valley Road and 0.035 for man-made earth collector channels. The collector channels adjacent to Happy Valley Road and the TPP were modeled as well finished shotcrete-lined with a "n" value of 0.019.

HYDROLOGIC SIMULATION

The watershed for the Pima Road Channel above Basin 53R covers an area of approximately 8.4 square miles. It was divided into 23 sub-basins for analysis with the considerations of the TPP, the Pima Road Channel and collector channels as hydrologic barriers. In Figure 2, the location of each sub-basin was displayed with the indication of concentration points along the flow routing paths. The configurations of the main channel and collector channels used for routing were depicted in Figure 3.

The drainage plan for the Grayhawk development, a 1,600-acre portion of Core North located west of Pima Road between Deer Valley and Union Hills, has been prepared by Gilbertson Associates. See Figure 4 for the location of this development. The flows without Reata Pass improvements were used for the preliminary design of the Pima Road Channel from Deer Valley Road to the TPC. The HEC-1 model of Grayhawk's on-site drainage by Gilbertson Associates was added to the Pima Channel modeling at Detention Basin 53R.

A schematic flow diagram of the Pima Road Channel was provided in Figure 5.

SUMMARY OF RESULTS

For the Desert Greenbelt Pima Road Channel Model (PIMA3), hydrologic output data were generated for future, fully developed watershed conditions. The results were analyzed and compared with other previous models. These models included Model MP9R.6I prepared by Water Resources Associates, Inc. and Model OLP.6 prepared by the City of Scottsdale. The latter was a modification of Model MP9R.6I. Table 1 shows the various conditions used for each model's setup and Table 2 summarizes the estimated peak flows at different locations along the Pima Road Channel.

For the Pima Road Channel, Model PIMA3 used a top width of 95 feet to the north of Deer Valley Road and 80 feet to the south of Deer Valley Road (see Figure 3). Model MP9R.6I used a top width of 92 feet and 112 feet on the north and south of Deer Valley Road, respectively. Model OLP.6 considered a top width of 132 feet for the entire channel. The "n" values used in the first two models were 0.045 and 0.035, respectively, for both main channel and overbank areas. The "n" values used by the City varied from 0.035 to 0.055 for the overbank areas and 0.035 to 0.045 for the main channel. The drainage sub-basins were adjusted in each model due to different drainage routings.

The peak discharges at Detention Basin 53R near Union Hills Drive were found to be 7,474 cfs for Model PIMA3, 6,147 cfs for Model OLP.6 and 5,066 cfs for Model MP9R.6I. Considering the different assumptions between the models, listed in Table 1, the results are quite comparable.

For the Southern Alternate Alignment, Model PIMA4, after removing Cell 1 of Basin 53R, a flow of 7,441 cfs outlets into the TPC.

TABLE 1 – CONDITIONS USED IN HEC-1 MODELS			
Conditions	*PIMA2 & 3*	*OLP.6*	*MP9R.6I*
Future Land Use	Yes	Yes	Yes
Upstream Diversion at Desert Highlands	No	Yes	Yes
Latest TPP Alignment	Yes	No	No
Conceptual Collector System	Yes	No	No
Pima Channel Top Width (ft) (North of Deer Valley Rd)	95	132	92
Pima Channel Top Width (ft) (South of Deer Valley Rd)	80	132	112
Manning's "n" Overbank Area: Main Channel:	 0.024-0.04 0.02-0.024	 .035-.055 .035-.045	 0.045 0.035
Peak Inflow to Basin 53R	7,474	6,146	5,066

TABLE 2 – SUMMARY OF HYDROLOGIC RESULTS		
Concentration Point	*Location*[1]	*PIMA3 Peak Flow (cfs)*
A	Pima Rd. Channel at Jomax Rd. (D.S. of Sub 30N)	968 (0.76)*
B	Pima Rd. Channel at Happy Valley Rd. (C31A)	4,265 (3.37)
C	Pima Rd. Channel at Pinnacle Peak Rd. (C36L1)	5,181 (4.62)
D	Pima Rd. Channel at Los Gatos Dr. (C36R2)	5,343 (5.00)
E	Pima Rd. Channel at Deer Valley Rd. (C51A2)	6,562 (6.62)
F	Pima Rd. Channel at Thompson Peak Parkway (C52A2)	6,783 (7.02)
G	Pima Rd. Channel at Beardsley Rd. (C52E2)	7,323 (7.87)
H	Pima Rd. Channel at Hualapai Dr. (Use Flow at C52E2)	7,323 (7.87)
I	Flow to Detention Basin from Pima Channel (B53R)	7,474 (8.40)
I	Total inflow to Detention Basin Cell 1 (C1I)	7,546[2] (11.28)
I	Total outflow from Detention Basin (CELL1)	2,293[2] (11.28)
CAP	Total outflow into TPC (PIMA3)	2,319[2] (11.53)
RC1I	Total outflow into TPC (PIMA4)	7,441[2] (11.28)

NOTES:

* Accumulated drainage area in square miles.

(1) See drainage areas shown in Figure 2.

(2) Including runoff from Grayhawk Development.

REFERENCES

1. Final Report – Upper Indian Bend Wash Regional Drainage and Flood Control Plan by Water Resources Associates, Inc., July, 1992.

2. 7.5 Minute U.S.G.S. Quadrangle Topographic Map of McDowell Peak, Arizona, Scale 1"=2000', 1965 edition and Photorevised 1982.

3. Aerial Maps, City of Scottsdale, Scale: 1"=400'.

4. Hydrology, Design Standards and Policies, City of Scottsdale, Revised January 1993.

5. HEC-1 Flood Hydrograph Package – Users Manual, U.S. Army Corps of Engineers, Hydrologic Engineering Center, September 1990 Edition.

6. Soil Survey of Aguila-Carefree Area, Parts of Maricopa and Pinal Counties, Arizona, Soil Conservation Services, Latest Edition.

7. FIRM Flood Insurance Rate Map, Maricopa County, Arizona and Incorporated Areas, FEMA, April 1988.

8. Rawhide/Pinnacle Peak Wash Alignment Study by City of Scottsdale, Arizona, November, 1992.

9. Unit Drainage Plan for Grayhawk with Technical Memorandum, Gilbertson Associates, Inc., March 21, 1994.

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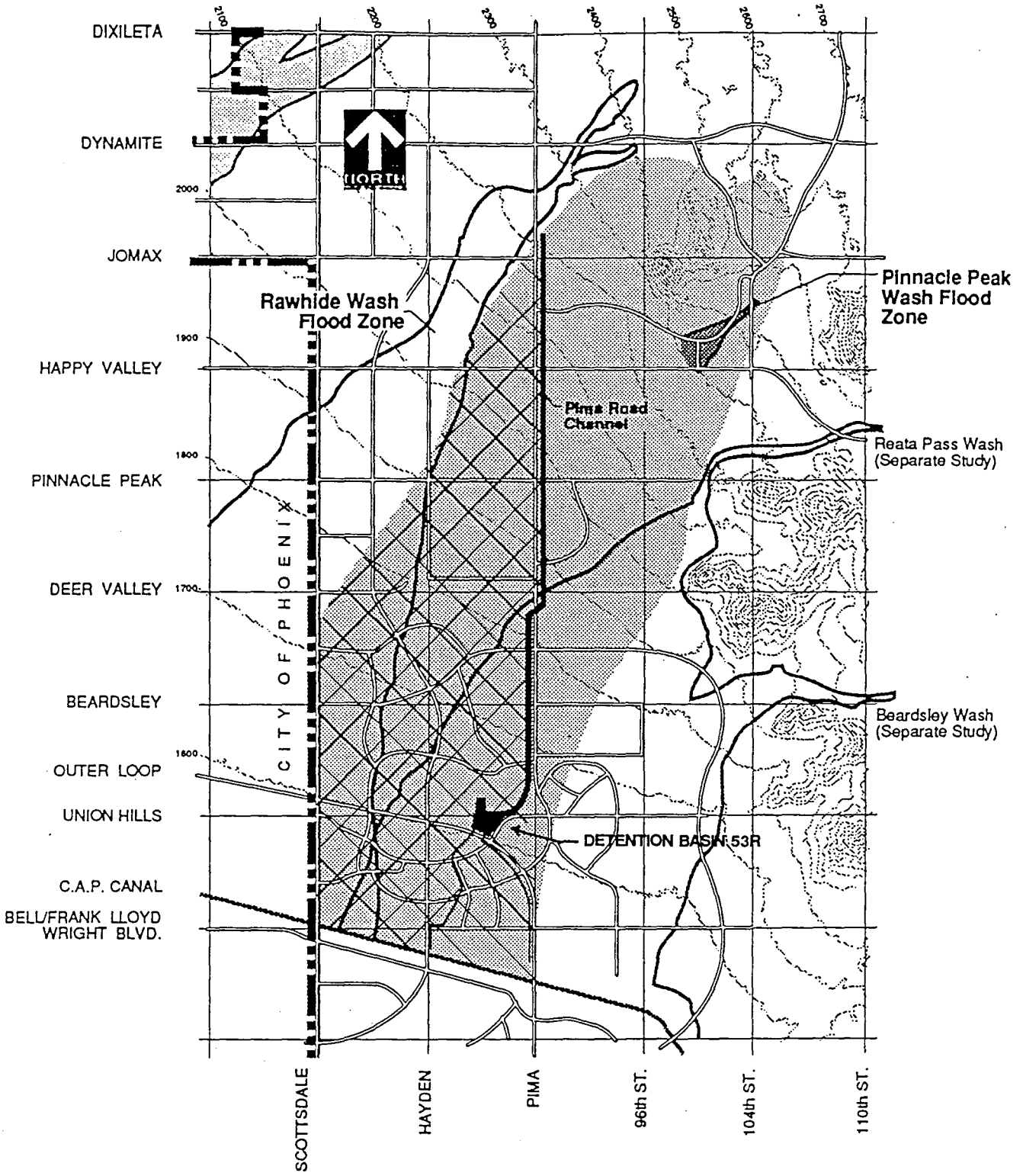


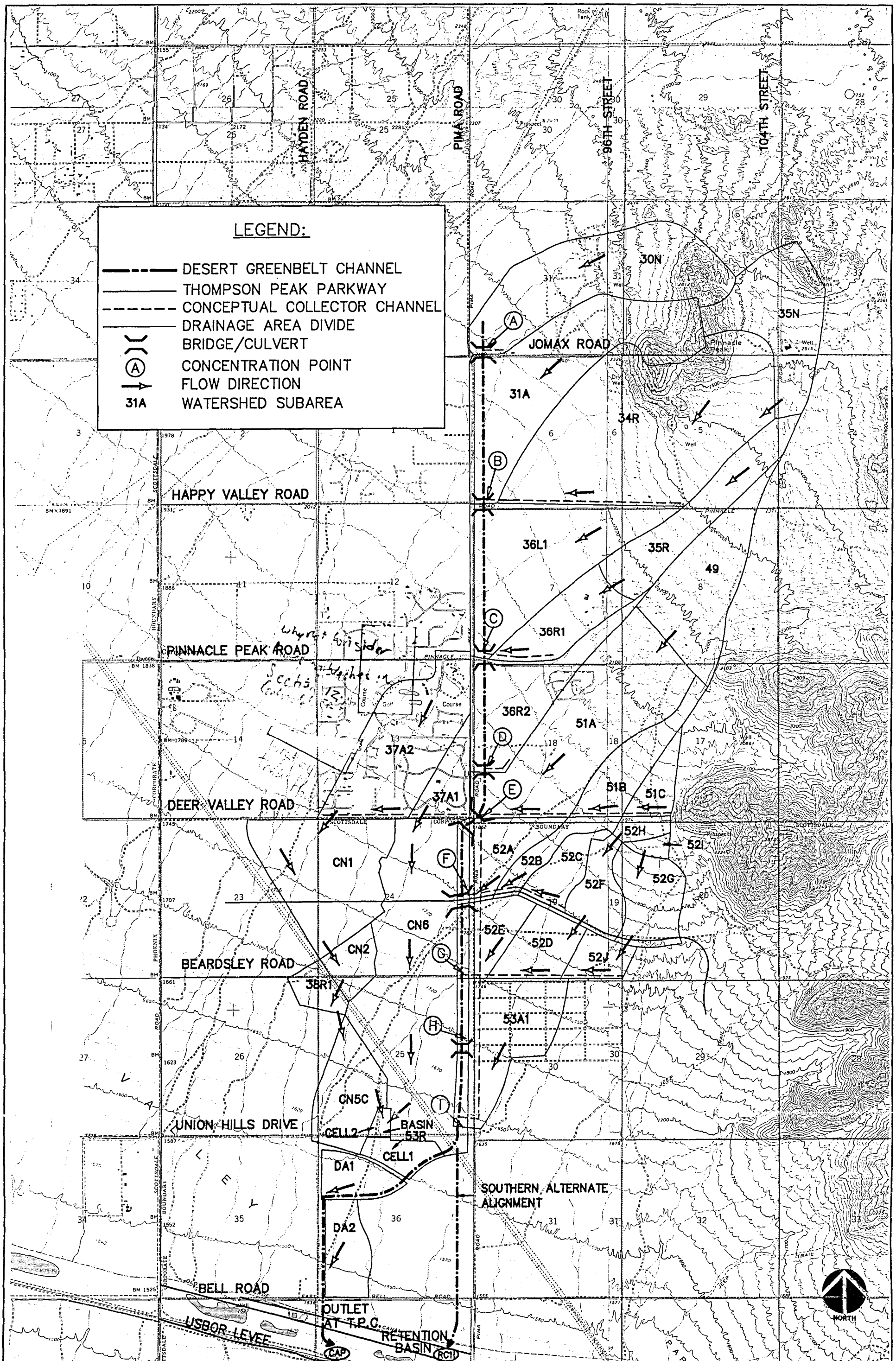
Legend

Pima Road Watershed

Area of watershed impacted by Pima Road Channel

Figure #1

Pima Road Watershed Impacts and Flood Zone



Pima Road Channel
Drainage Area Map
Overall View

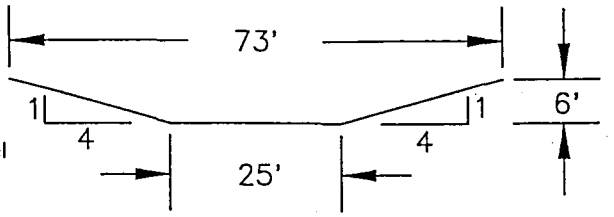
Greiner

1"=3000'

Figure 2

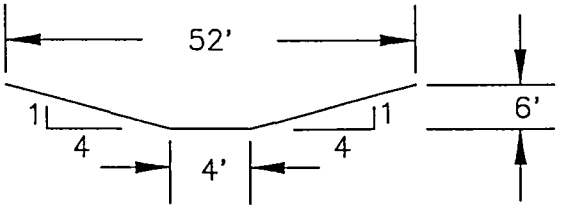
The Desert Greenbelt

Earthen Landscaped Collector Channel
n=0.035



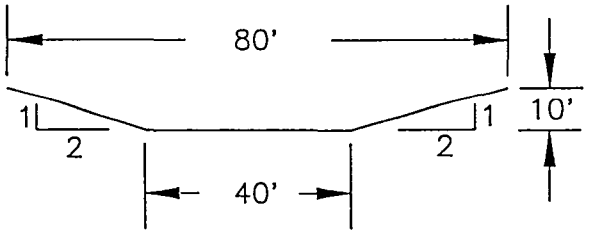
1

Shotcrete Lined Collector Channel
n=0.019



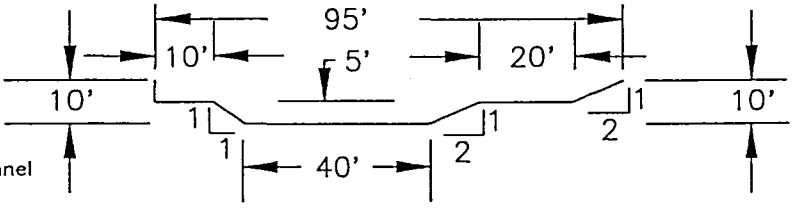
2

Proposed Pima Road Channel
South of Dear Valley Road
n=0.020



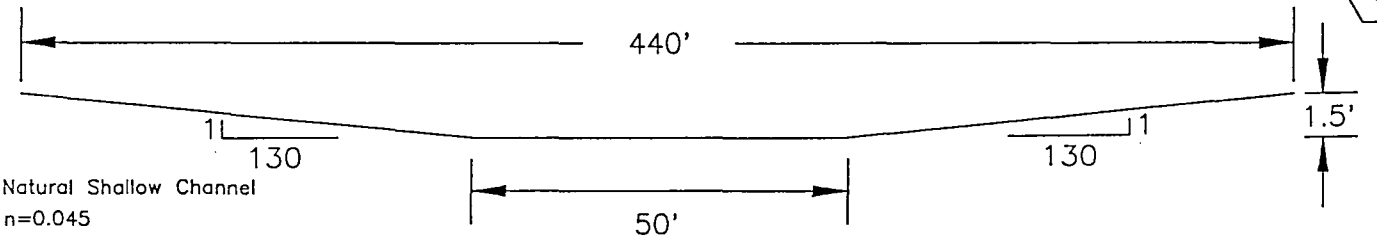
3

Proposed Pima Road Channel
North of Dear Valley Road
n=0.04, 0.026, 0.028
Looking Downstream



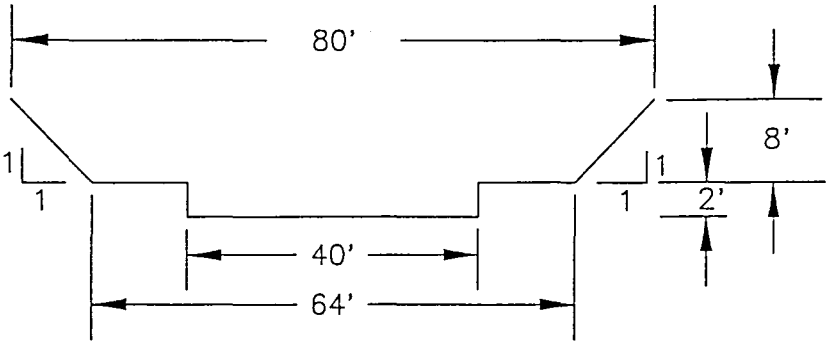
4

Natural Shallow Channel
n=0.045



5

Improved Natural Channel
Downstream of SUB 35N
n=0.035 (From Ward)



6

The Desert Greenbelt
Scottsdale Bond Project 1989 "Our Future In Progress"

Greiner, Inc.

* Not to Scale

CONFIGURATIONS FOR THE PIMA ROAD CHANNEL
& COLLECTOR CHANNELS
FIGURE 3

P:\CADD\RW2.DWG

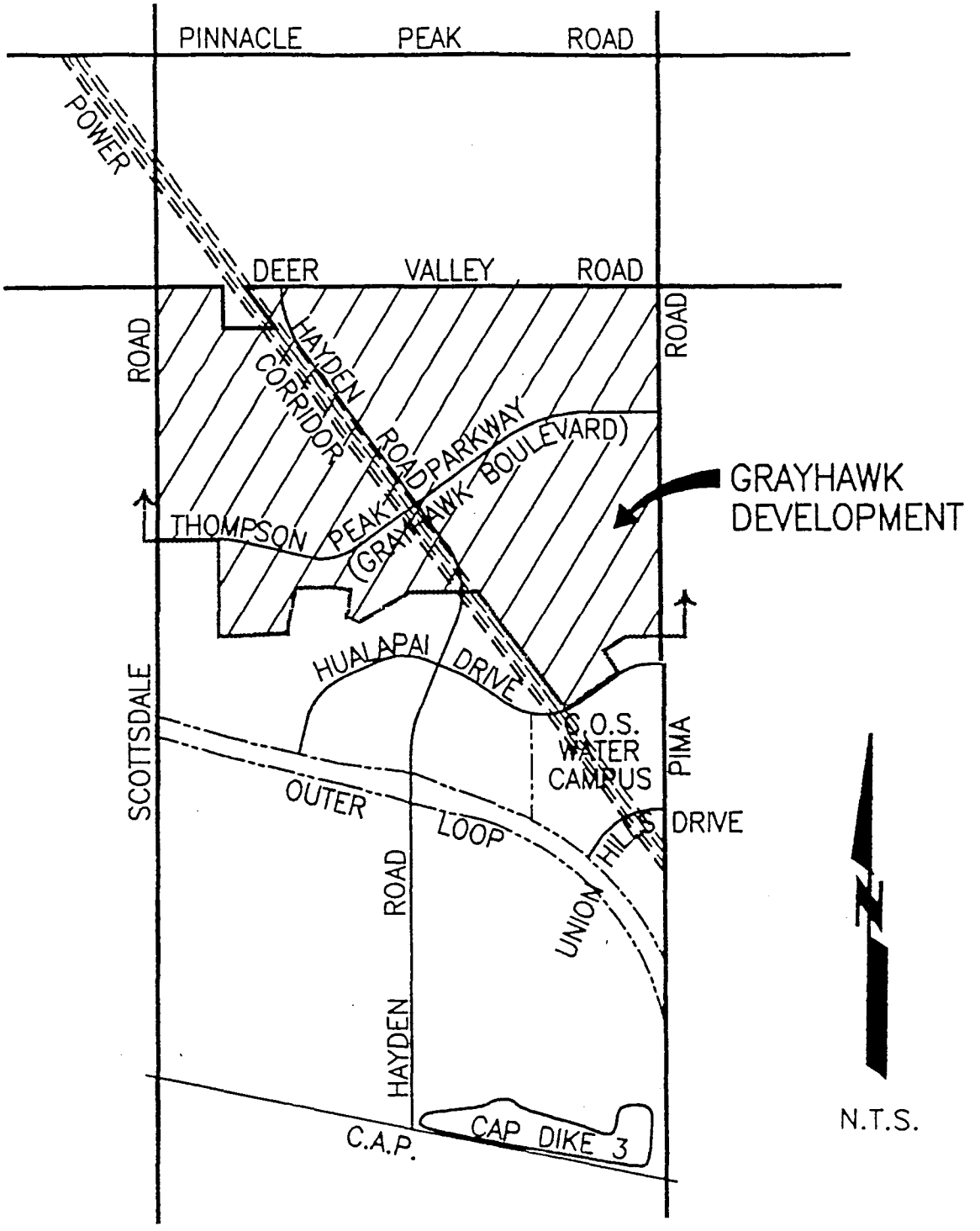
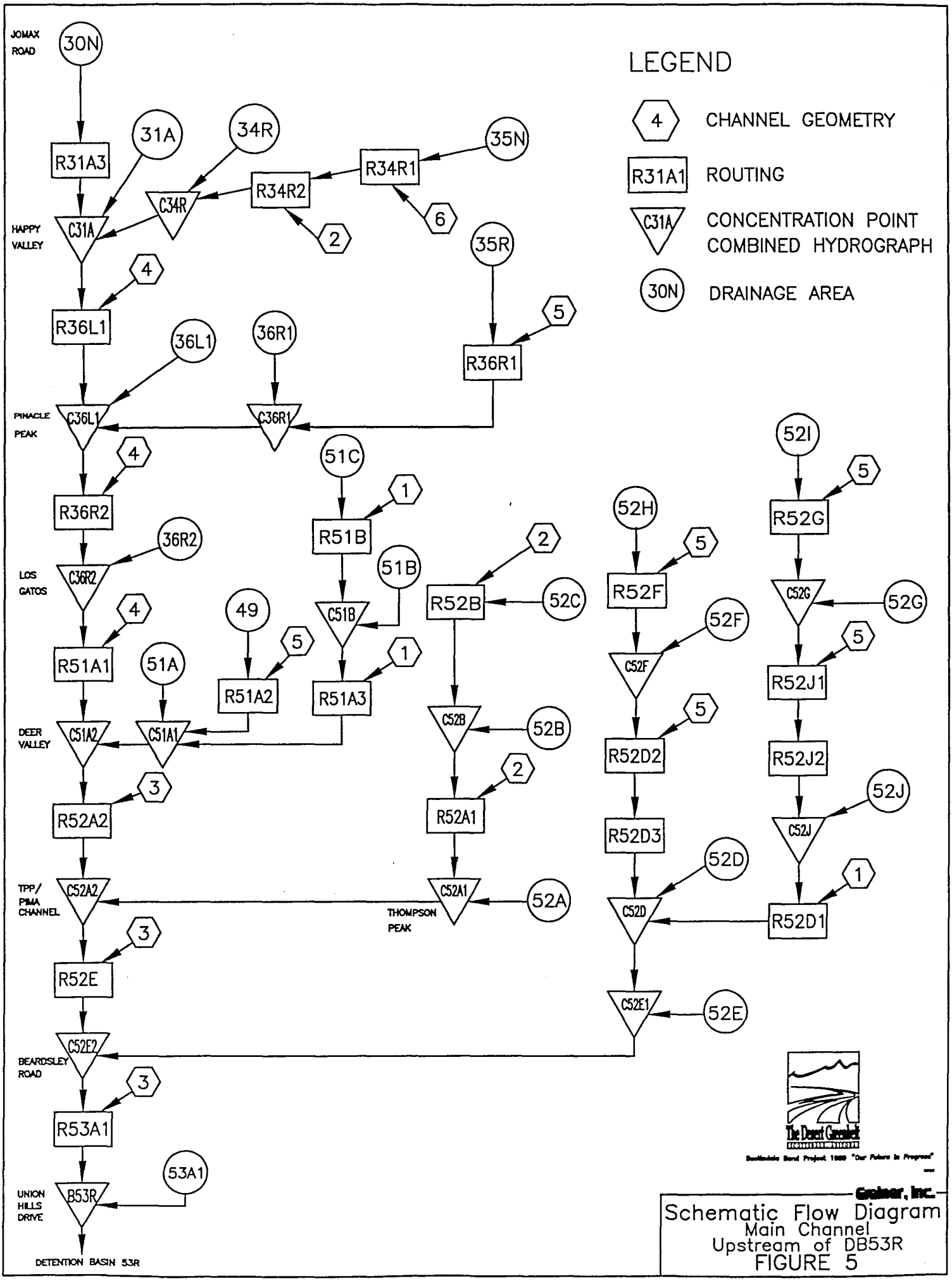


Figure #4

Grayhawk Development Vicinty Map



Schematic Flow Diagram
Main Channel
Upstream of DB53R
FIGURE 5

APPENDIX

HEC-1 PRINTOUTS

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*            SEPTEMBER 1990            *
*             VERSION 4.0              *
*                                      *
*  RUN DATE  02/11/1995  TIME  11:20:32 *
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*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
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XXXXXXX  XXXX     X       XXXXX  X
X     X  X        X              X
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X     X  XXXXXXX   XXXXX         XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

   1          ID       FILE NAME: PIMA3.DAT  (BASIN 53R AND FLOW ROUTED TO CAP VIA HAYDEN
   2          ID       ROAD ALIGNMENT)
   3          ID
   4          ID       LATEST TPP ALIGNMENT INCORPORATED AS OF SEPTEMBER, 1994
   5          ID
   6          ID       100-YR, 6-HR STORM FOR PRECIPITATION WITH CN'S BASED UPON 24-HR
   7          ID
   8          ID       THE REATA PASS WASH CHANNEL IS IN-PLACE
   9          ID
  10          ID       INCORPORATES COLLECTOR CHANNELS PROPOSED BY C.O.S. TO
  11          ID       CUT OFF FLOWS WHICH ORIGINALLY CONTINUED TO THE SOUTH AND MAY NOT HAVE
  12          ID       IMPACTED THE ORIGINALLY PROPOSED PIMA CHANNEL
  13          ID
  14          ID       THIS MODEL REFLECTS ALL D.A. ADJUSTMENTS MADE TO MODEL F3.24I AND FLOW
  15          ID       DIVERSIONS NEAR RAWHIDE WASH APEX & PINNACLE PEAK.
  16          ID
  17          ID       LOW-FLOW CULVERT DIVERSIONS ARE DE-ACTIVATED
  18          ID       100% OF REATA PASS FAN IS DIVERTED SOUTH TO CAP DIKE 4
  19          ID
  20          ID       FUTURE LAND-USE COMPUTED BASED ON A WEIGHTING FROM THE ORIGINAL D.A.
  21          ID       FUTURE LAND-USE DENSITIES FROM OCT 1987 GENERAL PLAN, BRW PLANS, AND
  22          ID       THE TONTO FOOTHILLS PLAN, ALL SCOTTSDALE RESIDENTIAL AREAS HAVE THE
```

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 23          ID        PERCENT OF IMPERVIOUS COVER ADJUSTED FOR NAOS REQUIREMENTS.
 24          ID
 25          ID        THIS FILE IS A REVISION TO BOB WARD'S MODIFICATION TO THE ORIGINAL
 26          ID        UPPER INDIAN BEND WASH REGIONAL FLOOD CONTROL & DRAINAGE PLAN
 27          ID        DEVELOPED BY BOB WARD AND MODIFICATIONS MADE IN OLP MODELS
 28          ID
 29          ID        ORIGINAL FILE NAME: MP9R.24I (SUB 30N THRU 53A1)
 30          ID        BASE MODEL MP9R.24I MODIFIED TO REFLECT C.O.S. & G.W. LARSONS
 31          ID        & ASSC. CORE NORTH PLAN DATED JUNE 16, 1992
 32          ID
             *DIAGRAM
 33          IT       5 30SEP94       0     300
 34          IO       5       0
 35          JD           .0001
 36          JD            .001
 37          JD             .01
 38          JD              .1
 39          JD              .5
 40          JD               1
 41          JD               5
 42          JD              25
 43          JD              50

 44          KK     30N     SUB
 45          KM        RUNOFF FROM SUB-BASIN 30N (@ JOMAX RD)
 46          BA   .7600
 47          PH                     .84    1.53    2.46    2.75    2.94    3.31
 48          LS              82     6.6
 49          UK     110   .0408     .20     100
 50          RK   10640   .0371    .045            TRAP      50     100
1                                          HEC-1 INPUT                                          PAGE  2

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 51          KK   R31A3
 52          KM        ROUTE FLOW DOWN PIMA ROAD CHANNEL TO OUTLET OF SUB 31A
 53          KM        MANNING'S VALUE OF 0.024 FOR SANDY SOIL
 54          RS       2    FLOW      -1
 55          RC    .024    .024    .024    5000   .0194
 56          RX       0       6      12      24      74      86      92      98
 57          RY       8       6       4       0       0       4       6       8

 58          KK     34R     SUB
 59          KM        RUNOFF FROM SUB 34R
 60          KM        MANNING'S VALUE OF 0.019 FOR SHOTCRETE COLLECTOR
 61          BA  1.3600
 62          LS            76.6    11.7
 63          UK     110   .0408     .20     100
 64          RK    7850   .0548    .045     .54    TRAP      50     100
 65          RK    6500   .0372    .019            TRAP       4       4

 66          KK     35N     SUB
 67          KM        RUNOFF FROM SUB-BASIN 35N
 68          KM        THIS BASIN DRAINS TO A CBC AT THE EAST SIDE OF DESERT HIGHLANDS
 69          KM        D.A. HAS BEEN UPDATED TO REFLECT CHANGE FROM REATA PASS SENSITIVITY
 70          KM        STUDY PUBLISHED IN FEB 1992
 71          BA   .4563
 72          LS              82    31.8
 73          UK     265   .0381     .20     100
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```
 74          RK    5200   .0269    .045       0    TRAP      25       4

 75          KK   R34R1
 76          KM        ROUTE 35N TO UPSTREAM END OF THE IMPROVED CHANNEL ALONG
 77          KM        EXISTING NATURAL CHANNEL
 78          RS       2    FLOW      -1
 79          RC     .04     .04     .04    5800   .0367
 80          RX       0       8      20      20      60      60      72      80
 81          RY      10       2       2       0       0       2       2      10

 82          KK   R34R2
 83          KM        ROUTE R34R1 TO OUTET OF SUB 34R
 84          KM        THERE IS NO ADDITIONAL AREA CONTRIBUTING AT THIS LOCATION.  THIS
 85          KM        ADDITIONAL ROUTING REACH IS NEEDED DUE TO A PROPOSED IMPROVED CHANNEL
 86          KM        WHICH WILL CUTOFF THIS FLOW AND DIRECT IT TO THE WEST.  THE IMPROVED
 87          KM        CHANNEL HAS 4:1 SIDE SLOPES, 4' BOTTOM WIDTH AND SHOTCRETE LINING
 88          RS       1    FLOW      -1
 89          RC    .019    .019    .019    6500   .0372
 90          RX       0       8      16      24      28      36      44      52
 91          RY       6       4       2       0       0       2       4       6

 92          KK    C34R
 93          KM        COMBINE HYDROGRAPHS OF SUB 34R & R34R2
 94          HC       2
```



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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 95          KK     31A     SUB
 96          KM        RUNOFF FROM SUB 31A
 97          BA   .7980
 98          LS            78.5     9.1
 99          UK     102   .0213     .10     100
100          RK   10500   .0581    .045    .560    TRAP       8       2
101          RK    5600   .0194    .045            TRAP      40       2

102          KK    C31A
103          KM        COMBINE HYDROGRAPHS OF SUB 31A, C34R & R31A3 (@ HAPPY VALLEY)
104          HC       3

105          KK   R36L1
106          KM        ROUTE FLOW DOWN PIMA ROAD CHANNEL FROM C31A TO OUTLET OF SUB 36L1
107          KM        MANNING'S VALUE FOR PROPOSED CHANNEL
108          RS       2    FLOW      -1
109          RC    .040    .024    .028    5100   .0194
110          RX       0      10      30      40      80      85      95      96
111          RY      10       5       5       0       0       5       5      10

112          KK    36R1     SUB
113          KM        RUNOFF FROM SUB 36R1
114          BA   .2810
115          LS              72    19.5
116          UK     116   .0213     .10     100
117          RK    5450   .0330    .045            TRAP      50     130

118          KK     35R     SUB
119          KM        RUNOFF FROM SUB 35R
120          KM        D.A. HAS BEEN UPDATED TO REFLECT CHANGE FROM REATA PASS SENSITIVITY
121          KM        STUDY PUBLISHED IN FEB 1992
```

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122          BA   .3660
123          LS              77    10.4
124          UK    265   .0381     .20     100
125          RK   7700   .0375    .045            TRAP      50     100

126          KK   R36R1
127          KM        ROUTE SUB 35R TO OUTLET OF SUB 36L1
128          RS      4    FLOW      -1
129          RC   .045    .045    .045    5450   .0330
130          RX      0      65     130     195     245     310     375     440
131          RY    1.5     1.0     0.5       0       0     0.5     1.0     1.5

132          KK   C36R1
133          KM        COMBINE HYDROGRAPHS OF SUB 36R1 & R36R1
134          HC      2

135          KK   36L1     SUB
136          KM        RUNOFF FROM SUB 36L1
137          BA   .5980
138          LS            73.4    10.4
139          UK    116   .0213     .10     100
140          RK   5800   .0379    .045     .30    TRAP      50     130
141          RK   5100   .0167    .045            TRAP      50       4
```



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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


142          KK   C36L1
143          KM        COMBINE HYDROGRAPHS OF R36L1, SUB 36L1 & C36R1 (@ PINNACLE PEAK)
144          HC      3

145          KK   R36R2
146          KM        ROUTE C36L1 TO OUTLET OF SUB 36R2
147          RS      1    FLOW      -1
148          RC    .04    .024    .028    3900   .0205
149          RX      0      10      30      40      80      85      95      96
150          RY     10       5       5       0       0       5       5      10

151          KK   36R2     SUB
152          KM        RUNOFF FROM SUB 36R2
153          BA   .3759
154          LS            72.2    18.6
155          UK    250   .0213     .10     100
156          RK   4000   .0325    .045            TRAP      50     130

157          KK   C36R2
158          KM        COMBINE HYDROGRAPHS OF R36R2 & SUB 36R2 (@ LOS GATOS)
159          HC      2

160          KK   R51A1
161          KM        ROUTE C36R2 TO OUTLET OF SUB 51A ALONG PIMA ALIGNMENT
162          RS      1    FLOW      -1
163          RC    .04    .024    .028    1500   .0200
164          RX      0      10      30      40      80      85      95      96
165          RY     10       5       5       0       0       5       5      10

166          KK     49     SUB
167          KM        RUNOFF FROM SUB 49
168          BA   .4610
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169          LS            78.5     7.7
170          UK     135   .0758     .20     100
171          RK    5400   .0370    .045            TRAP      30       3

172          KK   R51A2
173          KM        ROUTE SUB 49 TO OUTLET OF SUB 51A
174          RS       5    FLOW      -1
175          RC    .045    .045    .045    6400   .0329
176          RX       0      65     130     195     245     310     375     440
177          RY     1.5     1.0     0.5       0       0     0.5     1.0     1.5

178          KK     51C     SUB
179          KM        RUNOFF FROM SUB 51C
180          BA   .0957
181          LS            74.0    16.1
182          UK      76   .0213     .10     100
183          RK    2500   .0320    .045     .05    TRAP      25      25
184          RK    1750   .0286    .045            TRAP      25       4
```



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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


185          KK    R51B
186          KM        ROUTE SUB 51C TO OUTLET OF SUB 51B
187          KM        MANNING'S VALUE OF 0.035 FOR CONSTRUCTED EARTH COLLECTOR
188          RS       1    FLOW      -1
189          RC    .035    .035    .035    1850   .0216
190          RX       0       8      16      24      49      57      65      73
191          RY       6       4       2       0       0       2       4       6

192          KK     51B     SUB
193          KM        RUNOFF FROM SUB 51B
194          BA   .2123
195          LS           71.90    13.1
196          UK      94   .0213     .10     100
197          RK    4000   .0300    .045     .10    TRAP      50      25
198          RK    1850   .0216    .045            TRAP      25       4

199          KK    C51B
200          KM        COMBINE HYDROGRAPHS OF R51B & SUB 51B
201          HC       2

202          KK   R51A3
203          KM        ROUTE C51B TO OUTLET OF SUB 51A
204          RS       1    FLOW      -1
205          RC    .045    .045    .045    3000   .0200
206          RX       0       8      16      24      49      57      65      73
207          RY       6       4       2       0       0       2       4       6

208          KK     51A     SUB
209          KM        RUNOFF FROM SUB 51A
210          BA   .8585
211          LS            71.9    13.8
212          UK      94   .0213     .10     100
213          RK    6400   .0329    .045            TRAP    1500       2

214          KK   C51A1
215          KM        COMBINE HYDROGRAPHS OF R51A2, SUB 51A & R51A3
216          HC       3
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217          KK   C51A2
218          KM        COMBINE HYDROGRAPHS OF C51A1 & R51A1 (@ DEER VALLEY RD)
219          HC       2

220          KK   R52A2
221          KM        ROUTE C51A2 ALONG PIMA CHANNEL TO TPP
222          RS       1    FLOW      -1
223          RC     .02     .02     .02    2700   .0241
224          RX       0       5      10      20      60      70      75      80
225          RY      10     7.5       5       0       0       5     7.5      10
1                                          HEC-1 INPUT                                                          PAGE  6

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


226          KK    52C     SUB
227          KM        RUNOFF FROM SUB-BASIN 52C
228          BA   .1246
229          LS            67.7    17.0
230          UK      76   .0213     .10     100
231          RK    2500   .0320    .045    .025    TRAP      50      25
232          RK    1700   .0118    .019            TRAP       4       4

233          KK    R52B
234          KM        ROUTE SUB 52C TO OUTLET OF SUB 52B
235          RS       1    FLOW      -1
236          RC    .019    .019    .019    1450   .0103
237          RX       0       8      16      24      28      36      44      52
238          RY       6       4       2       0       0       2       4       6

239          KK    52B     SUB
240          KM        RUNOFF FROM SUB-BASIN 52B
241          BA   .1030
242          LS           69.66    19.3
243          UK      76   .0213     .10     100
244          RK    2900   .0310    .045     .05    TRAP      50      30
245          RK    1450   .0103    .019            TRAP       4       4

246          KK    C52B
247          KM        COMBINE HYDROGRAPHS OF SUB 52B AND R52B
248          HC       2

249          KK   R52A1
250          KM        ROUTE C52B TO OUTLET OF SUB 52A
251          RS       1    FLOW      -1
252          RC    .019    .019    .019     600   .0167
253          RX       0       8      16      24      28      36      44      52
254          RY       6       4       2       0       0       2       4       6

255          KK    52A     SUB
256          KM        RUNOFF FROM SUB-BASIN 52A
257          BA   .1677
258          LS           72.50    22.4
259          UK      76   .0213     .10     100
260          RK    2900   .0310    .045            TRAP      50      30

261          KK   C52A1
262          KM        COMBINE HYDROGRAPHS OF R52A1 AND SUB 52A
263          HC       2
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264          KK   C52A2
265          KM        COMBINE HYDROGRAPHS OF R52A2 & C52A1 (@ TPP/PIMA RD CHANNEL)
266          HC       2
1                                        HEC-1 INPUT                                                    PAGE  7

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


267          KK    R52E
268          KM        ROUTE C52A2 ALONG PIMA CHANNEL TO BEARDSLEY RD NEAR OUTLET OF SUB 52E
269          RS       1    FLOW      -1
270          RC     .02     .02     .02    2500   .0240
271          RX       0       5      10      20      60      70      75      80
272          RY      10     7.5       5       0       0       5     7.5      10

273          KK     52I     SUB
274          KM        RUNOFF FROM SUB-BASIN 52I
275          BA   .0267
276          LS            74.0    16.1
277          UK      76   .0213     .10     100
278          RK    1200   .0250    .045            TRAP      50      25

279          KK    R52G
280          KM        ROUTE SUB 52I TO OUTLET OF SUB 52G
281          RS       1    FLOW      -1
282          RC    .045    .045    .045    3000   .0333
283          RX       0      65     130     195     245     310     375     440
284          RY     1.5     1.0     0.5       0       0     0.5     1.0     1.5

285          KK     52G     SUB
286          KM        RUNOFF FROM SUB-BASIN 52G
287          BA   .2161
288          LS            74.0    20.6
289          UK      76   .0213     .10     100
290          RK    3000   .0333    .045     .05    TRAP      50      25
291          RK    2200   .0091    .019            TRAP       4       4

292          KK    C52G
293          KM        COMBINE HYDROGRAPHS OF SUB-BASIN 52G AND R52G
294          HC       2

295          KK    R52J
296          KM        ROUTE C52G TO COLLECTOR CHANNEL IN SUB 52J
297          RS       1    FLOW      -1
298          RC    .045    .045    .045    1200   .0417
299          RX       0      65     130     195     245     310     375     440
300          RY     1.5     1.0     0.5       0       0     0.5     1.0     1.5

301          KK     52J     SUB
302          KM        RUNOFF FROM SUB-BASIN 52J
303          BA   .0803
304          LS            74.0    20.8
305          UK      76   .0213     .10     100
306          RK    1200   .0417    .045    0.04    TRAP      50      25
307          RK    2200   .0114    .045            TRAP      25       4

308          KK    C52J
309          KM        COMBINE HYDROGRAPHS OF R52J & SUB 52J
310          HC       2
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 311          KK   R52D1
 312          KM        ROUTE C52J ALONG COLLECTOR CHANNEL TO SUB 52D
 313          RS       1    FLOW      -1
 314          RC    .045    .045    .045    2700   .0148
 315          RX       0       8      16      24      49      57      65      73
 316          RY       6       4       2       0       0       2       4       6

 317          KK     52H     SUB
 318          KM        RUNOFF FROM SUB-BASIN 52H
 319          BA   .0473
 320          LS              74    16.1
 321          UK      76   .0213     .10     100
 322          RK    1200   .0250    .045            TRAP      50      25

 323          KK    R52F
 324          KM        ROUTE SUB 52H TO OUTLET OF SUB-BASIN 52F
 325          RS       1    FLOW      -1
 326          RC    .045    .045    .045    3200   .0313
 327          RX       0       8      16      24      49      57      65      73
 328          RY       6       4       2       0       0       2       4       6

 329          KK     52F     SUB
 330          KM        RUNOFF FROM SUB-BASIN 52F
 331          BA   .1431
 332          LS           71.94    18.5
 333          UK      76   .0213     .10     100
 334          RK    3200   .0313    .045     .54    TRAP      50      25
 335          RK    1800   .0056    .019            TRAP       4       4

 336          KK    C52F
 337          KM        COMBINE HYDROGRAPHS OF SUB 52F & R52F
 338          HC       2

 339          KK   R52D2
 340          KM        ROUTE C52F TO OUTLET OF SUB 52D
 341          RS       1    FLOW      -1
 342          RC    .045    .045    .045    2100   .0333
 343          RX       0       8      16      24      49      57      65      73
 344          RY       6       4       2       0       0       2       4       6

 345          KK     52D     SUB
 346          KM        RUNOFF FROM SUB-BASIN 52D
 347          BA   .1854
 348          LS           74.0    20.8
 349          UK      76   .0213     .10     100
 350          RK    2100   .0333    .045    .065    TRAP      50      25
 351          RK    2700   .0148    .045            TRAP      25       4

 352          KK    C52D
 353          KM        COMBINE HYDROGRAPHS OF SUB 52D, R52D1 & R52D2
 354          HC       3
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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355          KK     52E     SUB
356          KM        RUNOFF FROM SUB 52E
357          BA   .1543
358          LS            74.0    20.8
359          UK      76   .0213     .10     100
360          RK    2600   .0269    .045            TRAP      50      25

361          KK   C52E1
362          KM        COMBINE HYDROGRAPHS OF C52D & SUB 52E
363          HC       2

364          KK   C52E2
365          KM        COMBINE HYDROGRAPHS OF R52E & C52E1 (@ BEARDSLEY RD)
366          HC       2

367          KK   R53A1
368          KM        ROUTE C52E2 ALONG PIMA CHANNEL TO OUTLET OF SUB 53A1
369          RS       1    FLOW      -1
370          RC     .02     .02     .02    3800   .0211
371          RX       0       5      10      20      60      70      75      80
372          RY      10     7.5       5       0       0       5     7.5      10

373          KK    53A1     SUB
374          KM        RUNOFF FROM SUB 53A1
375          BA   .5309
376          LS            74.0    23.9
377          UK      67   .0213     .10     100
378          RK    3500   .0229    .045     .38    TRAP      50      40
379          RK    5000   .0210    .045            TRAP      25       4

380          KK    B53R
381          KM        THIS REPRESENTS FLOW ENTERING DETENTION BASIN 53R FROM THE GREENBELT
382          HC       2

383          KK    37A1     SUB
384          KM        RUNOFF FROM SUB-BASIN 37A1
385          BA   .1500
386          LS              74    24.8
387          UK      61   .0213     .10     100
388          RK    3000   .0237    .045            TRAP      50     130

389          KK   37AE1      CP
390          KM        ROUTE 37A1 THROUGH SUB CN6 TO POWER
391          KM        CORRIDOR.
392          RS       4    FLOW      -1
393          RC    .055    .045    .055   10500     .03
394          RX       0       8      15      15      35      35      42      50
395          RY      10       2       2       0       0       2       2      10
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

396          KK     CN6     SUB
397          KM        RUNOFF FROM SUB CN6 (REVISED: 5/1/90)(REVISED: 5/10/94)
398          KM        MANNING'S VALUE OF 0.018 FOR STREET FLOW
399          BA   1.254
400          LS              74    40.3
401          UK     100   .0150     .15     100
```

```
402        RK    1400   .0100    .018   .1921    TRAP      30       5
403        RK    9000   .0070    .045            TRAP     100      20

404        KK    37A2     SUB
405        KM        RUNOFF FROM SUB-BASIN 37A2
406        BA   .5265
407        LS              74    24.8
408        UK      61   .0213     .10     100
409        RK    4800   .0237    .045            TRAP      50     130

410        KK    CNC3      CP
411        KM        ROUTE 37A2 TO CP CNC3
412        RS       1    FLOW      -1
413        RC    .055    .035    .055    3000   .0125
414        RX       0       8      20      20      60      60      72      80
415        RY      10       2       2       0       0       2       2      10

416        KK    CNC4      CP
417        KM        ROUTE CP CNC3 THROUGH GOLF COURSE TO CP CNC4
418        KM        BW=100',  Z=1:1
419        RS       1    FLOW      -1
420        RC    .055    .035    .055    4200   .0070
421        RX       0       8      20      20     120     120     132     140
422        RY      10       2       2       0       0       2       2      10

423        KK     CN1     SUB
424        KM        RUNOFF FROM SUB CN1
425        KM        COLLECTOR CHANNEL HAS BEEN ADDED TO SIMULATE STREET FLOW
426        KM        THIS SAME COLLECTOR CHANNEL IS USED FOR ALL CORE NORTH SUB-BASINS
427        KM        (REVISED 5/10/94)
428        BA   .5781
429        LS              74    22.8
430        UK     100   .0150     .15     100
431        RK    1400   .0100    .018    .147    TRAP      30       5
432        RK    6000   .0070    .040            TRAP     100      20

433        KK    CNC5      CP
434        KM        COMBINE CP CNC4 & SUB CN1
435        HC       2

436        KK   DB1.1      CP
437        KM        ROUTE CP CNC5 TO DETENTION BASIN 38R1 LOCATED AT THE INTXN OF HAYDEN
438        KM        ROAD & THOMPSON PEAK PARKWAY.
439        RS       1    FLOW      -1
440        RC    .055    .035    .055    1200   .0150
441        RX       0       8      20      20      60      60      72      80
442        RY      10       2       2       0       0       2       2      10
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LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

443        KK     CN2     SUB
444        KM        RUNOFF FROM SUB CN2 (REVISED: 5/1/90)(REVISED 5/10/94)
445        BA   .0861
446        LS              74    28.1
447        UK     100   .0150     .15     100
448        RK    1000   .0100    .018    .111    TRAP      30       5
449        RK    5000   .0150    .045            TRAP      25       2
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```
450        KK     DB1       CP
451        KM        COMBINE CP DB1.1, SUB CN2
452        KM        THIS IS THE TOTAL FLOW INTO DETENTION BASIN No.1
453        HC       2
454        ZW            A=INFLOW             B=38R1             C=FLOW

455        KK   38R-1      DAM
456        KM        PERFORM RESERVOIR ROUTING OPERATION FOR DETENTION BASIN No.1 (38R-1)
457        RS       1    STOR       0
458        SV       0      63
459        SQ       0     700
460        SE       0       5
461        ST       5     300     2.9     1.5
462        ZW            A=OUTFLOW            B=38R1             C=FLOW

463        KK   DB2.1      CP
464        KM        ROUTE OUTFLOW FROM DETENTION BASIN 38R1 TO DETENTION BASIN 53R (CELL2)
465        KM        (REVISED 5/10/94)
466        RS       1    FLOW      -1
467        RC    .055    .045    .055    4160   .0058
468        RX       0       5      10      15      35      40      45      50
469        RY    1750    1746    1744    1742    1742    1744    1746    1750

470        KK     DB3       CP
471        KM        COMBINE CP DB2.1, SUB CN6, & CP 37AE1
472        KM        THIS IS THE TOTAL INFLOW TO DETENTION BASIN 53R (CELL2)
473        HC       3
474        ZW            A=INFLOW             B=CELL2            C=FLOW

475        KK   CELL2
476        KM        DETENTION BASIN 53R, CELL2 RESERVOIR ROUTING (REVISED 5/10/94)
477        RS       1    STOR       0
478        SV       0    20.9    42.7    65.3    88.7   112.9     138
479        SQ       0      60     150     225     285     330     380
480        SE    1609    1611    1613    1615    1617    1619    1621
481        ST    1621     400     2.9     1.5
482        ZW            A=OUTFLOW            B=CELL2            C=FLOW

483        KK    CN5C      SUB
484        KM        RUNOFF FROM SUB CN5C (REVISED 5/10/94)
485        BA    .284
486        LS              74
487        UK     100   .0150     .15     100
488        RK     500   .0100    .018    .119    TRAP      30       5      10
489        RK    3980   .0150    .035            TRAP      50       2      10
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LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


490        KK     C1I
491        KM        COMBINE OUTFLOW FROM CELL2 WITH INFLOW FROM PIMA RD. CHANNEL
492        HC       3
493        ZW            A=INFLOW             B=CELL1            C=FLOW

494        KK   CELL1
495        KM     DETENTION BASIN LOCATED SOUTH OF THE WATER CAMPUS, 53R (CELL1)
496        KM     DISCHARGE IS MODELED THROUGH 2-10'X10' RCB CULVERTS
497        KM     INLET ELEV. AT 1592.00 FEET
498        KM     OUTLET ELEV. AT 1590.50 FEET
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```
 499          RS       1    STOR       0
 500          SV       0    49.8   101.6   155.5   211.4   269.4   329.5   391.6
 501          SQ       0     250     500     900    1400    1900    2300    2525
 502          SE    1592    1594    1596    1598    1600    1602    1604    1606
 503          ST    1606     800     2.9     1.5
 504          ZW            A=OUTFLOW            B=CELL1            C=FLOW

 505          KK     CPX1
 506          KM     ROUTE OUTFLOW FROM DETENTION BASIN 53R-CELL #1 (PROPOSED OUTER LOOP
 507          KM     FREEWAY) TO CPX (HAYDEN ROAD/UNION HILLS DRIVE)
 508          KM     MANNING'S VALUE OF 0.03 FOR CONSTRUCTED TURF CHANNEL
 509          RS       2    FLOW      -1
 510          RC    0.03    0.03    0.03    3200   0.009
 511          RX       0      10      20      50      70     100     110     120
 512          RY       5     2.5       0       0       0       0     2.5       5

 513          KK     DA1     SUB
 514          KM     RUNOFF FROM SUB DA1
 515          BA   0.078
 516          LS              71      16
 517          UK     300   0.009     0.1     100
 518          RK    1400   0.014   0.045            TRAP       5       4

 519          KK     CPX
 520          KM     COMBINE HYDROGRAPH FROM DA1 AND CHANNEL FLOW
 521          HC       2

 522          KK     CPY1
 523          KM     ROUTE CHANNEL FLOW FROM CPX (HAYDEN/UNION HILLS) TO CPY (HAYDEN/BELL)
 524          RS       2    FLOW      -1
 525          RC    0.02    0.02    0.02    3500   0.014
 526          RX       0   11.25    22.5    32.5    37.5    47.5   58.75      70
 527          RY   5.625  2.8125       0       0       0       0  2.8125   5.625

 528          KK     DA2     SUB
 529          KM     RUNOFF FROM SUB DA2
 530          BA   0.171
 531          LS              74      19
 532          UK     450   0.014     0.1     100
 533          RK    1400   0.009   0.045            TRAP       5       4
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 534          KK     CPY
 535          KM     COMBINE HYDROGRAPH FROM DA2 AND CHANNEL FLOW
 536          HC       2

 537          KK     CAP
 538          KM     ROUTE  CHANNEL FLOW FROM CPY (HAYDEN/BELL) TO CAP BASIN #3
 539          RS       1    FLOW      -1
 540          RC    0.02    0.02    0.02    1200   0.013
 541          RX       0   11.25    22.5    32.5    37.5    47.5   58.75      70
 542          RY   5.625  2.8125       0       0       0       0  2.8125   5.625
 543          ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT
LINE (V) ROUTING (--->) DIVERSION OR PUMP FLOW

```
NO.     (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

 44       30N
            V
            V
 51     R31A3
            .
            .
 58         .         34R
            .           .
            .           .
 66         .           .         35N
            .           .           V
            .           .           V
 75         .           .       R34R1
            .           .           V
            .           .           V
 82         .           .       R34R2
            .           .           .
            .           .           .
 92         .        C34R............
            .           .
            .           .
 95         .           .         31A
            .           .           .
            .           .           .
102      C31A........................
            V
            V
105     R36L1
            .
            .
112         .        36R1
            .           .
            .           .
118         .           .         35R
            .           .           V
            .           .           V
126         .           .       R36R1
            .           .           .
            .           .           .
132         .       C36R1............
            .           .
            .           .
135         .           .        36L1
            .           .           .
            .           .           .
142     C36L1........................
            V
            V
145     R36R2
            .
            .
151         .        36R2
            .           .
            .           .
157     C36R2............
            V
            V
```

```
160     R51A1
            .
            .
166         .          49
            .           V
            .           V
172         .       R51A2
            .           .
            .           .
178         .           .         51C
            .           .           V
            .           .           V
185         .           .        R51B
            .           .           .
            .           .           .
192         .           .           .         51B
            .           .           .           .
            .           .           .           .
199         .           .        C51B............
            .           .           V
            .           .           V
202         .           .       R51A3
            .           .           .
            .           .           .
208         .           .           .         51A
            .           .           .           .
            .           .           .           .
214         .       C51A1........................
            .           .
            .           .
217     C51A2............
            V
            V
220     R52A2
            .
            .
226         .         52C
            .           V
            .           V
233         .        R52B
            .           .
            .           .
239         .           .         52B
            .           .           .
            .           .           .
246         .        C52B............
            .           V
            .           V
249         .       R52A1
            .           .
            .           .
255         .           .         52A
            .           .           .
            .           .           .
261         .       C52A1............
            .           .
            .           .
264     C52A2............
            V
            V
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267       R52E
            .
            .
273         .        52I
            .          V
            .          V
279         .       R52G
            .          .
            .          .
285         .          .         52G
            .          .           .
            .          .           .
292         .       C52G............
            .          V
            .          V
295         .       R52J
            .          .
            .          .
301         .          .         52J
            .          .           .
            .          .           .
308         .       C52J............
            .          V
            .          V
311         .      R52D1
            .          .
            .          .
317         .          .         52H
            .          .           V
            .          .           V
323         .          .        R52F
            .          .           .
            .          .           .
329         .          .           .        52F
            .          .           .          .
            .          .           .          .
336         .          .        C52F............
            .          .           V
            .          .           V
339         .          .       R52D2
            .          .           .
            .          .           .
345         .          .           .        52D
            .          .           .          .
            .          .           .          .
352         .       C52D........................
            .          .
            .          .
355         .          .         52E
            .          .           .
            .          .           .
361         .      C52E1............
            .          .
            .          .
364      C52E2............
            V
            V
367      R53A1
            .
            .
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373          .        53A1
             .          .
             .          .
380       B53R............
             .
             .
383          .        37A1
             .          V
             .          V
389          .       37AE1
             .          .
             .          .
396          .          .         CN6
             .          .          .
             .          .          .
404          .          .          .       37A2
             .          .          .         V
             .          .          .         V
410          .          .          .       CNC3
             .          .          .         V
             .          .          .         V
416          .          .          .       CNC4
             .          .          .         .
             .          .          .         .
423          .          .          .         .         CN1
             .          .          .         .           .
             .          .          .         .           .
433          .          .          .       CNC5............
             .          .          .         V
             .          .          .         V
436          .          .          .      DB1.1
             .          .          .         .
             .          .          .         .
443          .          .          .         .         CN2
             .          .          .         .           .
             .          .          .         .           .
450          .          .          .        DB1............
             .          .          .         V
             .          .          .         V
455          .          .          .      38R-1
             .          .          .         V
             .          .          .         V
463          .          .          .      DB2.1
             .          .          .         .
             .          .          .         .
470          .        DB3........................
             .          V
             .          V
475          .       CELL2
             .          .
             .          .
483          .          .        CN5C
             .          .          .
             .          .          .
490       C1I........................
             V
             V
494       CELL1
             V
             V
```

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505         CPX
              .
              .
513           .         DA1
              .           .
              .           .
519         CPX............
              V
              V
522         CPY
              .
              .
528           .         DA2
              .           .
              .           .
534         CPY............
              V
              V
537         CAP
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            SEPTEMBER 1990            *
*             VERSION 4.0              *
*                                      *
*  RUN DATE  02/11/1995  TIME  11:20:32 *
*                                      *
****************************************
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****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

FILE NAME: PIMA3.DAT (BASIN 53R AND FLOW ROUTED TO CAP VIA HAYDEN ROAD ALIGNMENT)

LATEST TPP ALIGNMENT INCORPORATED AS OF SEPTEMBER, 1994

100-YR, 6-HR STORM FOR PRECIPITATION WITH CN'S BASED UPON 24-HR

THE REATA PASS WASH CHANNEL IS IN-PLACE

INCORPORATES COLLECTOR CHANNELS PROPOSED BY C.O.S. TO
CUT OFF FLOWS WHICH ORIGINALLY CONTINUED TO THE SOUTH AND MAY NOT HAVE
IMPACTED THE ORIGINALLY PROPOSED PIMA CHANNEL

THIS MODEL REFLECTS ALL D.A. ADJUSTMENTS MADE TO MODEL F3.24I AND FLOW
DIVERSIONS NEAR RAWHIDE WASH APEX & PINNACLE PEAK.

LOW-FLOW CULVERT DIVERSIONS ARE DE-ACTIVATED
100% OF REATA PASS FAN IS DIVERTED SOUTH TO CAP DIKE 4

FUTURE LAND-USE COMPUTED BASED ON A WEIGHTING FROM THE ORIGINAL D.A.
FUTURE LAND-USE DENSITIES FROM OCT 1987 GENERAL PLAN, BRW PLANS, AND
THE TONTO FOOTHILLS PLAN, ALL SCOTTSDALE RESIDENTIAL AREAS HAVE THE
PERCENT OF IMPERVIOUS COVER ADJUSTED FOR NAOS REQUIREMENTS.

THIS FILE IS A REVISION TO BOB WARD'S MODIFICATION TO THE ORIGINAL

```
*** FDKRUT - NEWTON RAPHSON FAILEDFIXED POINT ITERATION USED - ITERATION=  1



*** FDKRUT - NEWTON RAPHSON FAILEDFIXED POINT ITERATION USED - ITERATION=  1


   -----DSS---ZOPEN:  Version: 6-EA;  Existing File Opened
                      Unit:  71,  File: PIMA3.DSS
 -----DSS---ZWRITE Unit  71; Vers.    7:  /INFLOW/38R1/FLOW/29SEP1994/5MIN//
 -----DSS---ZWRITE Unit  71; Vers.    7:  /INFLOW/38R1/FLOW/30SEP1994/5MIN//
 -----DSS---ZWRITE Unit  71; Vers.    7:  /INFLOW/38R1/FLOW/01OCT1994/5MIN//
 -----DSS---ZWRITE Unit  71; Vers.    7:  /OUTFLOW/38R1/FLOW/29SEP1994/5MIN//
 -----DSS---ZWRITE Unit  71; Vers.    7:  /OUTFLOW/38R1/FLOW/30SEP1994/5MIN//
 -----DSS---ZWRITE Unit  71; Vers.    7:  /OUTFLOW/38R1/FLOW/01OCT1994/5MIN//
 -----DSS---ZWRITE Unit  71; Vers.    7:  /INFLOW/CELL2/FLOW/29SEP1994/5MIN//
 -----DSS---ZWRITE Unit  71; Vers.    7:  /INFLOW/CELL2/FLOW/30SEP1994/5MIN//
 -----DSS---ZWRITE Unit  71; Vers.    7:  /INFLOW/CELL2/FLOW/01OCT1994/5MIN//
 -----DSS---ZWRITE Unit  71; Vers.    7:  /OUTFLOW/CELL2/FLOW/29SEP1994/5MIN//
 -----DSS---ZWRITE Unit  71; Vers.    7:  /OUTFLOW/CELL2/FLOW/30SEP1994/5MIN//
 -----DSS---ZWRITE Unit  71; Vers.    7:  /OUTFLOW/CELL2/FLOW/01OCT1994/5MIN//
 -----DSS---ZWRITE Unit  71; Vers.    7:  /INFLOW/CELL1/FLOW/29SEP1994/5MIN//
 -----DSS---ZWRITE Unit  71; Vers.    7:  /INFLOW/CELL1/FLOW/30SEP1994/5MIN//
 -----DSS---ZWRITE Unit  71; Vers.    7:  /INFLOW/CELL1/FLOW/01OCT1994/5MIN//
 -----DSS---ZWRITE Unit  71; Vers.    7:  /OUTFLOW/CELL1/FLOW/29SEP1994/5MIN//
 -----DSS---ZWRITE Unit  71; Vers.    7:  /OUTFLOW/CELL1/FLOW/30SEP1994/5MIN//
 -----DSS---ZWRITE Unit  71; Vers.    7:  /OUTFLOW/CELL1/FLOW/01OCT1994/5MIN//
1
                                        RUNOFF SUMMARY
                                   FLOW IN CUBIC FEET PER SECOND
                                 TIME IN HOURS,  AREA IN SQUARE MILES

                                 PEAK   TIME OF    AVERAGE FLOW FOR MAXIMUM PERIOD      BASIN    MAXIMUM    TIME OF
        OPERATION       STATION  FLOW    PEAK                                          AREA     STAGE    MAX STAGE
+                                                   6-HOUR     24-HOUR     72-HOUR

        HYDROGRAPH AT
+                         30N    968.    3.50        140.        35.         34.       .76

        ROUTED TO
-                        R31A3   924.    3.50        140.        35.         34.       .76

        HYDROGRAPH AT
-                         34R   1764.    3.42        216.        54.         52.      1.36

        HYDROGRAPH AT
-                         35N   1112.    3.17        104.        26.         25.       .46

        ROUTED TO
-                        R34R1   961.    3.33        104.        26.         25.       .46

        ROUTED TO
-                        R34R2   879.    3.42        104.        26.         25.       .46

        2 COMBINED AT
+                         C34R  2616.    3.42        319.        81.         78.      1.82
```

	HYDROGRAPH AT						
	31A	1507.	3.25	132.	33.	32.	.80
	3 COMBINED AT						
+	C31A	4265.	3.33	585.	148.	142.	3.37
	ROUTED TO						
+	R36L1	4328.	3.42	585.	148.	142.	3.37
	HYDROGRAPH AT						
+	36R1	341.	3.33	43.	11.	11.	.28
	HYDROGRAPH AT						
+	35R	386.	3.50	58.	15.	14.	.37
	ROUTED TO						
	R36R1	312.	3.83	57.	15.	14.	.37
	2 COMBINED AT						
	C36R1	412.	3.75	99.	26.	25.	.65
	HYDROGRAPH AT						
	36L1	600.	3.50	83.	21.	20.	.60
	3 COMBINED AT						
	C36L1	5181.	3.42	763.	193.	186.	4.62
	ROUTED TO						
	R36R2	5030.	3.50	762.	193.	186.	4.62
	HYDROGRAPH AT						
+	36R2	502.	3.33	57.	14.	14.	.38
	2 COMBINED AT						
+	C36R2	5343.	3.42	817.	207.	199.	5.00
	ROUTED TO						
+	R51A1	5375.	3.50	817.	207.	199.	5.00
	HYDROGRAPH AT						
+	49	1047.	3.17	75.	19.	18.	.46
	ROUTED TO						
	R51A2	550.	3.50	75.	19.	18.	.46
	HYDROGRAPH AT						
	51C	169.	3.25	15.	4.	4.	.10
	ROUTED TO						
	R51B	142.	3.33	15.	4.	4.	.10
	HYDROGRAPH AT						
	51B	272.	3.33	29.	7.	7.	.21
	2 COMBINED AT						
	C51B	415.	3.33	44.	11.	11.	.31
	ROUTED TO						
+	R51A3	340.	3.42	44.	11.	11.	.31

	HYDROGRAPH AT						
+	51A	606.	3.58	116.	30.	29.	.86
	3 COMBINED AT						
+	C51A1	1415.	3.50	233.	60.	57.	1.63
	2 COMBINED AT						
+	C51A2	6562.	3.50	1035.	263.	253.	6.62
	ROUTED TO						
+	R52A2	6590.	3.50	1035.	263.	253.	6.62
	HYDROGRAPH AT						
+	52C	152.	3.25	16.	4.	4.	.12
	ROUTED TO						
+	R52B	145.	3.33	16.	4.	4.	.12
	HYDROGRAPH AT						
+	52B	151.	3.25	15.	4.	4.	.10
	2 COMBINED AT						
+	C52B	283.	3.25	31.	8.	7.	.23
	ROUTED TO						
+	R52A1	277.	3.25	31.	8.	7.	.23
	HYDROGRAPH AT						
+	52A	354.	3.17	28.	7.	7.	.17
	2 COMBINED AT						
+	C52A1	529.	3.25	58.	15.	14.	.40
	2 COMBINED AT						
+	C52A2	6783.	3.50	1087.	276.	266.	7.02
	ROUTED TO						
+	R52E	6764.	3.50	1087.	276.	266.	7.02
	HYDROGRAPH AT						
+	52I	58.	3.17	4.	1.	1.	.03
	ROUTED TO						
+	R52G	19.	3.33	4.	1.	1.	.03
	HYDROGRAPH AT						
+	52G	390.	3.25	36.	9.	9.	.22
	2 COMBINED AT						
+	C52G	407.	3.25	40.	10.	10.	.24
	ROUTED TO						
+	R52J	355.	3.33	40.	10.	10.	.24
	HYDROGRAPH AT						
+	52J	157.	3.17	13.	3.	3.	.08
	2 COMBINED AT						
+	C52J	477.	3.25	53.	13.	13.	.32

	ROUTED TO						
+		R52D1	395.	3.42	53.	13.	13.	.32
	HYDROGRAPH AT						
+		52H	101.	3.17	7.	2.	2.	.05
	ROUTED TO						
+		R52F	57.	3.25	7.	2.	2.	.05
	HYDROGRAPH AT						
+		52F	294.	3.17	22.	5.	5.	.14
	2 COMBINED AT						
+		C52F	336.	3.17	29.	7.	7.	.19
	ROUTED TO						
+		R52D2	280.	3.25	29.	7.	7.	.19
	HYDROGRAPH AT						
+		52D	355.	3.25	31.	8.	7.	.19
	3 COMBINED AT						
+		C52D	892.	3.25	113.	28.	27.	.70
	HYDROGRAPH AT						
+		52E	346.	3.17	26.	6.	6.	.15
	2 COMBINED AT						
+		C52E1	1120.	3.25	138.	35.	34.	.85
	2 COMBINED AT						
+		C52E2	7323.	3.50	1213.	309.	297.	7.87
	ROUTED TO						
+		R53A1	7135.	3.58	1212.	309.	297.	7.87
	HYDROGRAPH AT						
+		53A1	999.	3.25	92.	23.	22.	.53
	2 COMBINED AT						
+		B53R	7474.	3.50	1295.	330.	318.	8.40
	HYDROGRAPH AT						
+		37A1	270.	3.25	26.	7.	6.	.15
	ROUTED TO						
+		37AE1	174.	3.58	26.	7.	6.	.15
	HYDROGRAPH AT						
+		CN6	1684.	3.42	262.	67.	64.	1.25
	HYDROGRAPH AT						
+		37A2	874.	3.25	93.	23.	23.	.53
	ROUTED TO						
+		CNC3	764.	3.33	93.	23.	23.	.53
	ROUTED TO						
+		CNC4	535.	3.50	92.	23.	23.	.53

	HYDROGRAPH AT						
+	CN1	732.	3.42	98.	25.	24.	.58
	2 COMBINED AT						
+	CNC5	1204.	3.42	190.	48.	46.	1.10
	ROUTED TO						
+	DB1.1	1187.	3.50	190.	48.	46.	1.10
	HYDROGRAPH AT						
+	CN2	137.	3.25	16.	4.	4.	.09
	2 COMBINED AT						
+	DB1	1262.	3.50	205.	52.	50.	1.19
	ROUTED TO						
+	38R-1	477.	4.00	201.	52.	50.	1.19
	ROUTED TO						
+	DB2.1	461.	4.25	199.	52.	50.	1.19
	3 COMBINED AT						
+	DB3	1879.	3.50	477.	125.	120.	2.59
	ROUTED TO						
+	CELL2	371.	5.58	329.	124.	119.	2.59
	HYDROGRAPH AT						
+	CN5C	380.	3.25	33.	8.	8.	.28
	3 COMBINED AT						
+	C1I	7546.	3.58	1607.	453.	437.	11.28
	ROUTED TO						
+	CELL1	2293.	4.33	1411.	452.	436.	11.28
	ROUTED TO						
+	CPX	2293.	4.42	1409.	452.	435.	11.28
	HYDROGRAPH AT						
+	DA1	101.	3.25	11.	3.	3.	.08
	2 COMBINED AT						
+	CPX	2301.	4.42	1413.	455.	438.	11.36
	ROUTED TO						
+	CPY	2300.	4.50	1413.	454.	438.	11.36
	HYDROGRAPH AT						
+	DA2	250.	3.25	27.	7.	7.	.17
	2 COMBINED AT						
+	CPY	2319.	4.42	1423.	461.	444.	11.53
	ROUTED TO						
+	CAP	2319.	4.50	1423.	461.	444.	11.53

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

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1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*            SEPTEMBER 1990            *
*             VERSION 4.0              *
*                                      *
* RUN DATE  02/11/1995  TIME  11:27:05 *
*                                      *
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****************************************
*                                      *
*   U.S. ARMY CORPS OF ENGINEERS       *
*   HYDROLOGIC ENGINEERING CENTER      *
*         609 SECOND STREET            *
*      DAVIS, CALIFORNIA 95616         *
*          (916) 756-1104              *
*                                      *
****************************************
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X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X       XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  1           ID        FILE NAME: PIMA4.DAT  (WITHOUT BASIN 53R, WITH FLOW ROUTED ALONG PIMA
  2           ID        ROAD TO CAP)
  3           ID
  4           ID        LATEST TPP ALIGNMENT INCORPORATED AS OF SEPTEMBER, 1994
  5           ID
  6           ID        100-YR, 6-HR STORM FOR PRECIPITATION WITH CN'S BASED UPON 24-HR
  7           ID
  8           ID        THE REATA PASS WASH CHANNEL IS IN-PLACE
  9           ID
 10           ID        INCORPORATES COLLECTOR CHANNELS PROPOSED BY C.O.S. TO
 11           ID        CUT OFF FLOWS WHICH ORIGINALLY CONTINUED TO THE SOUTH AND MAY NOT HAVE
 12           ID        IMPACTED THE ORIGINALLY PROPOSED PIMA CHANNEL
 13           ID
 14           ID        THIS MODEL REFLECTS ALL D.A. ADJUSTMENTS MADE TO MODEL F3.24I AND FLOW
 15           ID        DIVERSIONS NEAR RAWHIDE WASH APEX & PINNACLE PEAK.
 16           ID
 17           ID        LOW-FLOW CULVERT DIVERSIONS ARE DE-ACTIVATED
 18           ID        100% OF REATA PASS FAN IS DIVERTED SOUTH TO CAP DIKE 4
 19           ID
 20           ID        FUTURE LAND-USE COMPUTED BASED ON A WEIGHTING FROM THE ORIGINAL D.A.
 21           ID        FUTURE LAND-USE DENSITIES FROM OCT 1987 GENERAL PLAN, BRW PLANS, AND
 22           ID        THE TONTO FOOTHILLS PLAN, ALL SCOTTSDALE RESIDENTIAL AREAS HAVE THE
```

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 23          ID        PERCENT OF IMPERVIOUS COVER ADJUSTED FOR NAOS REQUIREMENTS.
 24          ID
 25          ID        THIS FILE IS A REVISION TO BOB WARD'S MODIFICATION TO THE ORIGINAL
 26          ID        UPPER INDIAN BEND WASH REGIONAL FLOOD CONTROL & DRAINAGE PLAN
 27          ID        DEVELOPED BY BOB WARD AND MODIFICATIONS MADE IN OLP MODELS
 28          ID
 29          ID        ORIGINAL FILE NAME: MP9R.24I (SUB 30N THRU 53A1)
 30          ID        BASE MODEL MP9R.24I MODIFIED TO REFLECT C.O.S. & G.W. LARSONS
 31          ID        & ASSC. CORE NORTH PLAN DATED JUNE 16, 1992
 32          ID
             *DIAGRAM
 33          IT       5 30SEP94       0     300
 34          IO       5       0
 35          JD           .0001
 36          JD            .001
 37          JD             .01
 38          JD              .1
 39          JD              .5
 40          JD               1
 41          JD               5
 42          JD              25
 43          JD              50

 44          KK     30N     SUB
 45          KM        RUNOFF FROM SUB-BASIN 30N (@ JOMAX RD)
 46          BA   .7600
 47          PH                     .84    1.53    2.46    2.75    2.94    3.31
 48          LS              82     6.6
 49          UK     110   .0408     .20     100
 50          RK   10640   .0371    .045           TRAP      50     100
1                                          HEC-1 INPUT                                          PAGE  2

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 51          KK   R31A3
 52          KM        ROUTE FLOW DOWN PIMA ROAD CHANNEL TO OUTLET OF SUB 31A
 53          KM        MANNING'S VALUE OF 0.024 FOR SANDY SOIL
 54          RS       2    FLOW      -1
 55          RC    .024    .024    .024    5000   .0194
 56          RX       0       6      12      24      74      86      92      98
 57          RY       8       6       4       0       0       4       6       8

 58          KK     34R     SUB
 59          KM        RUNOFF FROM SUB 34R
 60          KM        MANNING'S VALUE OF 0.019 FOR SHOTCRETE COLLECTOR
 61          BA  1.3600
 62          LS           76.6    11.7
 63          UK     110   .0408     .20     100
 64          RK    7850   .0548    .045     .54    TRAP      50     100
 65          RK    6500   .0372    .019            TRAP       4       4

 66          KK     35N     SUB
 67          KM        RUNOFF FROM SUB-BASIN 35N
 68          KM        THIS BASIN DRAINS TO A CBC AT THE EAST SIDE OF DESERT HIGHLANDS
 69          KM        D.A. HAS BEEN UPDATED TO REFLECT CHANGE FROM REATA PASS SENSITIVITY
 70          KM        STUDY PUBLISHED IN FEB 1992
 71          BA   .4563
 72          LS              82    31.8
 73          UK     265   .0381     .20     100
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 74          RK    5200   .0269    .045       0    TRAP      25       4

 75          KK   R34R1
 76          KM        ROUTE 35N TO UPSTREAM END OF THE IMPROVED CHANNEL ALONG
 77          KM        EXISTING NATURAL CHANNEL
 78          RS       2    FLOW      -1
 79          RC     .04     .04     .04    5800   .0367
 80          RX       0       8      20      20      60      60      72      80
 81          RY      10       2       2       0       0       2       2      10

 82          KK   R34R2
 83          KM        ROUTE R34R1 TO OUTET OF SUB 34R
 84          KM        THERE IS NO ADDITIONAL AREA CONTRIBUTING AT THIS LOCATION.  THIS
 85          KM        ADDITIONAL ROUTING REACH IS NEEDED DUE TO A PROPOSED IMPROVED CHANNEL
 86          KM        WHICH WILL CUTOFF THIS FLOW AND DIRECT IT TO THE WEST.  THE IMPROVED
 87          KM        CHANNEL HAS 4:1 SIDE SLOPES, 4' BOTTOM WIDTH AND SHOTCRETE LINING
 88          RS       1    FLOW      -1
 89          RC    .019    .019    .019    6500   .0372
 90          RX       0       8      16      24      28      36      44      52
 91          RY       6       4       2       0       0       2       4       6

 92          KK    C34R
 93          KM        COMBINE HYDROGRAPHS OF SUB 34R & R34R2
 94          HC       2
```



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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 95          KK     31A     SUB
 96          KM        RUNOFF FROM SUB 31A
 97          BA   .7980
 98          LS            78.5     9.1
 99          UK     102   .0213     .10     100
100          RK   10500   .0581    .045    .560    TRAP       8       2
101          RK    5600   .0194    .045            TRAP      40       2

102          KK    C31A
103          KM        COMBINE HYDROGRAPHS OF SUB 31A, C34R & R31A3 (@ HAPPY VALLEY)
104          HC       3

105          KK   R36L1
106          KM        ROUTE FLOW DOWN PIMA ROAD CHANNEL FROM C31A TO OUTLET OF SUB 36L1
107          RS       2    FLOW      -1
108          RC    .040    .024    .028    5100   .0194
109          RX       0      10      30      40      80      85      95      96
110          RY      10       5       5       0       0       5       5      10

111          KK    36R1     SUB
112          KM        RUNOFF FROM SUB 36R1
113          BA   .2810
114          LS              72    19.5
115          UK     116   .0213     .10     100
116          RK    5450   .0330    .045            TRAP      50     130

117          KK     35R     SUB
118          KM        RUNOFF FROM SUB 35R
119          KM        D.A. HAS BEEN UPDATED TO REFLECT CHANGE FROM REATA PASS SENSITIVITY
120          KM        STUDY PUBLISHED IN FEB 1992
121          BA   .3660
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122          LS              77    10.4
123          UK     265   .0381     .20     100
124          RK    7700   .0375    .045            TRAP      50     100

125          KK   R36R1
126          KM        ROUTE SUB 35R TO OUTLET OF SUB 36L1
127          RS       4    FLOW      -1
128          RC    .045    .045    .045    5450   .0330
129          RX       0      65     130     195     245     310     375     440
130          RY     1.5     1.0     0.5       0       0     0.5     1.0     1.5

131          KK   C36R1
132          KM        COMBINE HYDROGRAPHS OF SUB 36R1 & R36R1
133          HC       2

134          KK    36L1     SUB
135          KM        RUNOFF FROM SUB 36L1
136          BA   .5980
137          LS            73.4    10.4
138          UK     116   .0213     .10     100
139          RK    5800   .0379    .045     .30    TRAP      50     130
140          RK    5100   .0167    .045            TRAP      50       4
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


141          KK   C36L1
142          KM        COMBINE HYDROGRAPHS OF R36L1, SUB 36L1 & C36R1 (@ PINNACLE PEAK)
143          HC       3

144          KK   R36R2
145          KM        ROUTE C36L1 TO OUTLET OF SUB 36R2
146          RS       1    FLOW      -1
147          RC     .04    .024    .028    3900   .0205
148          RX       0      10      30      40      80      85      95      96
149          RY      10       5       5       0       0       5       5      10

150          KK    36R2     SUB
151          KM        RUNOFF FROM SUB 36R2
152          BA   .3759
153          LS            72.2    18.6
154          UK     250   .0213     .10     100
155          RK    4000   .0325    .045            TRAP      50     130

156          KK   C36R2
157          KM        COMBINE HYDROGRAPHS OF R36R2 & SUB 36R2 (@ LOS GATOS)
158          HC       2

159          KK   R51A1
160          KM        ROUTE C36R2 TO OUTLET OF SUB 51A ALONG PIMA ALIGNMENT
161          RS       1    FLOW      -1
162          RC     .04    .024    .028    1500   .0200
163          RX       0      10      30      40      80      85      95      96
164          RY      10       5       5       0       0       5       5      10

165          KK      49     SUB
166          KM        RUNOFF FROM SUB 49
167          BA   .4610
168          LS            78.5     7.7
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169          UK     135   .0758     .20     100
170          RK    5400   .0370    .045            TRAP      30       3

171          KK   R51A2
172          KM        ROUTE SUB 49 TO OUTLET OF SUB 51A
173          RS       5    FLOW      -1
174          RC    .045    .045    .045    6400   .0329
175          RX       0      65     130     195     245     310     375     440
176          RY     1.5     1.0     0.5       0       0     0.5     1.0     1.5

177          KK     51C     SUB
178          KM        RUNOFF FROM SUB 51C
179          BA   .0957
180          LS            74.0    16.1
181          UK      76   .0213     .10     100
182          RK    2500   .0320    .045     .05    TRAP      25      25
183          RK    1750   .0286    .045            TRAP      25       4
1                                          HEC-1 INPUT                                                    PAGE  5

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


184          KK    R51B
185          KM        ROUTE SUB 51C TO OUTLET OF SUB 51B
186          RS       1    FLOW      -1
187          RC    .045    .045    .045    1850   .0216
188          RX       0       8      16      24      49      57      65      73
189          RY       6       4       2       0       0       2       4       6

190          KK     51B     SUB
191          KM        RUNOFF FROM SUB 51B
192          BA   .2123
193          LS           71.90    13.1
194          UK      94   .0213     .10     100
195          RK    4000   .0300    .045     .10    TRAP      50      25
196          RK    1850   .0216    .045            TRAP      25       4

197          KK    C51B
198          KM        COMBINE HYDROGRAPHS OF R51B & SUB 51B
199          HC       2

200          KK   R51A3
201          KM        ROUTE C51B TO OUTLET OF SUB 51A
202          RS       1    FLOW      -1
203          RC    .045    .045    .045    3000   .0200
204          RX       0       8      16      24      49      57      65      73
205          RY       6       4       2       0       0       2       4       6

206          KK     51A     SUB
207          KM        RUNOFF FROM SUB 51A
208          BA   .8585
209          LS            71.9    13.8
210          UK      94   .0213     .10     100
211          RK    6400   .0329    .045            TRAP    1500       2

212          KK   C51A1
213          KM        COMBINE HYDROGRAPHS OF R51A2, SUB 51A & R51A3
214          HC       3

215          KK   C51A2
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216          KM        COMBINE HYDROGRAPHS OF C51A1 & R51A1 (@ DEER VALLEY RD)
217          HC       2

218          KK   R52A2
219          KM        ROUTE C51A2 ALONG PIMA CHANNEL TO TPP
220          RS       1    FLOW      -1
221          RC     .02     .02     .02    2700   .0241
222          RX       0       5      10      20      60      70      75      80
223          RY      10     7.5       5       0       0       5     7.5      10

224          KK     52C     SUB
225          KM        RUNOFF FROM SUB-BASIN 52C
226          BA   .1246
227          LS            67.7    17.0
228          UK      76   .0213     .10     100
229          RK    2500   .0320    .045    .025    TRAP      50      25
1                                          HEC-1 INPUT                                                    PAGE  6

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

230          RK    1700   .0118    .019            TRAP       4       4

231          KK    R52B
232          KM        ROUTE SUB 52C TO OUTLET OF SUB 52B
233          RS       1    FLOW      -1
234          RC    .019    .019    .019    1450   .0103
235          RX       0       8      16      24      28      36      44      52
236          RY       6       4       2       0       0       2       4       6

237          KK     52B     SUB
238          KM        RUNOFF FROM SUB-BASIN 52B
239          BA   .1030
240          LS           69.66    19.3
241          UK      76   .0213     .10     100
242          RK    2900   .0310    .045     .05    TRAP      50      30
243          RK    1450   .0103    .019            TRAP       4       4

244          KK    C52B
245          KM        COMBINE HYDROGRAPHS OF SUB 52B AND R52B
246          HC       2

247          KK   R52A1
248          KM        ROUTE C52B TO OUTLET OF SUB 52A
249          RS       1    FLOW      -1
250          RC    .019    .019    .019     600   .0167
251          RX       0       8      16      24      28      36      44      52
252          RY       6       4       2       0       0       2       4       6

253          KK     52A     SUB
254          KM        RUNOFF FROM SUB-BASIN 52A
255          BA   .1677
256          LS           72.50    22.4
257          UK      76   .0213     .10     100
258          RK    2900   .0310    .045            TRAP      50      30

259          KK   C52A1
260          KM        COMBINE HYDROGRAPHS OF R52A1 AND SUB 52A
261          HC       2

262          KK   C52A2
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263          KM        COMBINE HYDROGRAPHS OF R52A2 & C52A1 (@ TPP/PIMA RD CHANNEL)
264          HC       2

265          KK    R52E
266          KM        ROUTE C52A2 ALONG PIMA CHANNEL TO BEARDSLEY RD NEAR OUTLET OF SUB 52E
267          RS       1    FLOW     -1
268          RC     .02     .02     .02    2500   .0240
269          RX       0       5      10      20      60      70      75      80
270          RY      10     7.5       5       0       0       5     7.5      10
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

271          KK     52I     SUB
272          KM        RUNOFF FROM SUB-BASIN 52I
273          BA   .0267
274          LS            74.0    16.1
275          UK      76   .0213     .10     100
276          RK    1200   .0250    .045            TRAP      50      25

277          KK    R52G
278          KM        ROUTE SUB 52I TO OUTLET OF SUB 52G
279          RS       1    FLOW     -1
280          RC    .045    .045    .045    3000   .0333
281          RX       0      65     130     195     245     310     375     440
282          RY     1.5     1.0     0.5       0       0     0.5     1.0     1.5

283          KK     52G     SUB
284          KM        RUNOFF FROM SUB-BASIN 52G
285          BA   .2161
286          LS            74.0    20.6
287          UK      76   .0213     .10     100
288          RK    3000   .0333    .045     .05    TRAP      50      25
289          RK    2200   .0091    .019            TRAP       4       4

290          KK    C52G
291          KM        COMBINE HYDROGRAPHS OF SUB-BASIN 52G AND R52G
292          HC       2

293          KK    R52J
294          KM        ROUTE C52G TO COLLECTOR CHANNEL IN SUB 52J
295          RS       1    FLOW     -1
296          RC    .045    .045    .045    1200   .0417
297          RX       0      65     130     195     245     310     375     440
298          RY     1.5     1.0     0.5       0       0     0.5     1.0     1.5

299          KK     52J     SUB
300          KM        RUNOFF FROM SUB-BASIN 52J
301          BA   .0803
302          LS            74.0    20.8
303          UK      76   .0213     .10     100
304          RK    1200   .0417    .045    0.04    TRAP      50      25
305          RK    2200   .0114    .045            TRAP      25       4

306          KK    C52J
307          KM        COMBINE HYDROGRAPHS OF R52J & SUB 52J
308          HC       2

309          KK   R52D1
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310          KM        ROUTE C52J ALONG COLLECTOR CHANNEL TO SUB 52D
311          RS       1    FLOW      -1
312          RC    .045    .045    .045    2700   .0148
313          RX       0       8      16      24      49      57      65      73
314          RY       6       4       2       0       0       2       4       6
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

315          KK     52H     SUB
316          KM        RUNOFF FROM SUB-BASIN 52H
317          BA   .0473
318          LS              74    16.1
319          UK      76   .0213     .10     100
320          RK    1200   .0250    .045            TRAP      50      25

321          KK    R52F
322          KM        ROUTE SUB 52H TO OUTLET OF SUB-BASIN 52F
323          RS       1    FLOW      -1
324          RC    .045    .045    .045    3200   .0313
325          RX       0       8      16      24      49      57      65      73
326          RY       6       4       2       0       0       2       4       6

327          KK     52F     SUB
328          KM        RUNOFF FROM SUB-BASIN 52F
329          BA   .1431
330          LS           71.94    18.5
331          UK      76   .0213     .10     100
332          RK    3200   .0313    .045     .54    TRAP      50      25
333          RK    1800   .0056    .019            TRAP       4       4

334          KK    C52F
335          KM        COMBINE HYDROGRAPHS OF SUB 52F & R52F
336          HC       2

337          KK   R52D2
338          KM        ROUTE C52F TO OUTLET OF SUB 52D
339          RS       1    FLOW      -1
340          RC    .045    .045    .045    2100   .0333
341          RX       0       8      16      24      49      57      65      73
342          RY       6       4       2       0       0       2       4       6

343          KK     52D     SUB
344          KM        RUNOFF FROM SUB-BASIN 52D
345          BA   .1854
346          LS           74.0    20.8
347          UK      76   .0213     .10     100
348          RK    2100   .0333    .045    .065    TRAP      50      25
349          RK    2700   .0148    .045            TRAP      25       4

350          KK    C52D
351          KM        COMBINE HYDROGRAPHS OF SUB 52D, R52D1 & R52D2
352          HC       3

353          KK     52E     SUB
354          KM        RUNOFF FROM SUB 52E
355          BA   .1543
356          LS           74.0    20.8
357          UK      76   .0213     .10     100
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 358          RK    2600   .0269    .045            TRAP      50      25
1                                          HEC-1 INPUT                                                          PAGE  9

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 359          KK   C52E1
 360          KM        COMBINE HYDROGRAPHS OF C52D & SUB 52E
 361          HC       2

 362          KK   C52E2
 363          KM        COMBINE HYDROGRAPHS OF R52E & C52E1 (@ BEARDSLEY RD)
 364          HC       2

 365          KK   R53A1
 366          KM        ROUTE C52E2 ALONG PIMA CHANNEL TO OUTLET OF SUB 53A1
 367          RS       1    FLOW      -1
 368          RC     .02     .02     .02    3800   .0211
 369          RX       0       5      10      20      60      70      75      80
 370          RY      10     7.5       5       0       0       5     7.5      10

 371          KK    53A1     SUB
 372          KM        RUNOFF FROM SUB 53A1
 373          BA   .5309
 374          LS            74.0    23.9
 375          UK      67   .0213     .10     100
 376          RK    3500   .0229    .045     .38    TRAP      50      40
 377          RK    5000   .0210    .045            TRAP      25       4

 378          KK    B53R
 379          KM        THIS REPRESENTS FLOW ENTERING DETENTION BASIN 53R FROM THE GREENBELT
 380          HC       2

 381          KK    37A1     SUB
 382          KM        RUNOFF FROM SUB-BASIN 37A1
 383          BA   .1500
 384          LS              74    24.8
 385          UK      61   .0213     .10     100
 386          RK    3000   .0237    .045            TRAP      50     130

 387          KK   37AE1      CP
 388          KM        ROUTE 37A1 THROUGH SUB CN6 TO POWER
 389          KM        CORRIDOR.
 390          RS       4    FLOW      -1
 391          RC    .055    .045    .055   10500     .03
 392          RX       0       8      15      15      35      35      42      50
 393          RY      10       2       2       0       0       2       2      10

 394          KK     CN6     SUB
 395          KM        RUNOFF FROM SUB CN6 (REVISED: 5/1/90)(REVISED: 5/10/94)
 396          BA   1.254
 397          LS              74    40.3
 398          UK     100   .0150     .15     100
 399          RK    1400   .0100    .018   .1921    TRAP      30       5
 400          RK    9000   .0070    .045            TRAP     100      20
1                                          HEC-1 INPUT                                                          PAGE 10

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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401          KK    37A2      SUB
402          KM        RUNOFF FROM SUB-BASIN 37A2
403          BA   .5265
404          LS              74    24.8
405          UK      61   .0213     .10     100
406          RK    4800   .0237    .045            TRAP      50     130

407          KK    CNC3      CP
408          KM        ROUTE 37A2 TO CP CNC3
409          RS       1    FLOW      -1
410          RC    .055    .035    .055    3000   .0125
411          RX       0       8      20      20      60      60      72      80
412          RY      10       2       2       0       0       2       2      10

413          KK    CNC4      CP
414          KM        ROUTE CP CNC3 THROUGH GOLF COURSE TO CP CNC4
415          KM        BW=100',  Z=1:1
416          RS       1    FLOW      -1
417          RC    .055    .035    .055    4200   .0070
418          RX       0       8      20      20     120     120     132     140
419          RY      10       2       2       0       0       2       2      10

420          KK     CN1      SUB
421          KM        RUNOFF FROM SUB CN1
422          KM        COLLECTOR CHANNEL HAS BEEN ADDED TO SIMULATE STREET FLOW
423          KM        THIS SAME COLLECTOR CHANNEL IS USED FOR ALL CORE NORTH SUB-BASINS
424          KM        (REVISED 5/10/94)
425          BA   .5781
426          LS              74    22.8
427          UK     100   .0150     .15     100
428          RK    1400   .0100    .018    .147    TRAP      30       5
429          RK    6000   .0070    .040            TRAP     100      20

430          KK    CNC5      CP
431          KM        COMBINE CP CNC4 & SUB CN1
432          HC       2

433          KK   DB1.1      CP
434          KM        ROUTE CP CNC5 TO DETENTION BASIN 38R1 LOCATED AT THE INTXN OF HAYDEN
435          KM        ROAD & THOMPSON PEAK PARKWAY.
436          RS       1    FLOW      -1
437          RC    .055    .035    .055    1200   .0150
438          RX       0       8      20      20      60      60      72      80
439          RY      10       2       2       0       0       2       2      10

440          KK     CN2      SUB
441          KM        RUNOFF FROM SUB CN2 (REVISED: 5/1/90)(REVISED 5/10/94)
442          BA   .0861
443          LS              74    28.1
444          UK     100   .0150     .15     100
445          RK    1000   .0100    .018    .111    TRAP      30       5
446          RK    5000   .0150    .045            TRAP      25       2
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

447          KK     DB1      CP
448          KM        COMBINE CP DB1.1, SUB CN2
449          KM        THIS IS THE TOTAL FLOW INTO DETENTION BASIN No.1
```

```
450          HC       2
451          ZW            A=INFLOW             B=38R1             C=FLOW

452          KK   38R-1     DAM
453          KM        PERFORM RESERVOIR ROUTING OPERATION FOR DETENTION BASIN No.1 (38R-1)
454          RS       1    STOR       0
455          SV       0      63
456          SQ       0     700
457          SE       0       5
458          ST       5     300     2.9     1.5
459          ZW            A=OUTFLOW            B=38R1             C=FLOW

460          KK   DB2.1      CP
461          KM        ROUTE OUTFLOW FROM DETENTION BASIN 38R1 TO DETENTION BASIN 53R (CELL2)
462          KM        (REVISED 5/10/94)
463          RS       1    FLOW      -1
464          RC    .055    .045    .055    4160   .0058
465          RX       0       5      10      15      35      40      45      50
466          RY    1750    1746    1744    1742    1742    1744    1746    1750

467          KK     DB3      CP
468          KM        COMBINE CP DB2.1, SUB CN6, & CP 37AE1
469          KM        THIS IS THE TOTAL INFLOW TO DETENTION BASIN 53R (CELL2)
470          HC       3
471          ZW            A=INFLOW             B=CELL2            C=FLOW

472          KK   CELL2
473          KM        DETENTION BASIN 53R, CELL2 RESERVOIR ROUTING (REVISED 5/10/94)
474          RS       1    STOR       0
475          SV       0    20.9    42.7    65.3    88.7   112.9     138
476          SQ       0      60     150     225     285     330     380
477          SE    1609    1611    1613    1615    1617    1619    1621
478          ST    1621     400     2.9     1.5
479          ZW            A=OUTFLOW            B=CELL2            C=FLOW

480          KK    CN5C     SUB
481          KM        RUNOFF FROM SUB CN5C (REVISED 5/10/94)
482          BA    .284
483          LS              74
484          UK     100   .0150     .15     100
485          RK     500   .0100    .018    .119    TRAP      30       5      10
486          RK    3980   .0150    .035            TRAP      50       2      10

487          KK     C1I
488          KM        COMBINE OUTFLOW FROM CELL2 WITH INFLOW FROM PIMA RD. CHANNEL
489          HC       3
490          ZW            A=INFLOW             B=CELL1            C=FLOW
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

491          KK    RC1I
492          KM        ROUTE C1I ALONG PIMA ROAD VIA CHANNEL TO OUTLET AT TPC
493          RS       1    FLOW      -1
494          RC     .02     .02     .02    7000   .0137
495          RX       0       5      10      20      60      70      75      80
496          RY      10     7.5       5       0       0       5     7.5      10
497          ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

 NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

  44        30N
              V
              V
  51      R31A3
              .
              .
  58          .         34R
              .           .
              .           .
  66          .           .         35N
              .           .           V
              .           .           V
  75          .           .       R34R1
              .           .           V
              .           .           V
  82          .           .       R34R2
              .           .           .
              .           .           .
  92          .        C34R............
              .           .
              .           .
  95          .           .         31A
              .           .           .
              .           .           .
 102        C31A........................
              V
              V
 105      R36L1
              .
              .
 111          .        36R1
              .           .
              .           .
 117          .           .         35R
              .           .           V
              .           .           V
 125          .           .       R36R1
              .           .           .
              .           .           .
 131          .       C36R1............
              .           .
              .           .
 134          .           .        36L1
              .           .           .
              .           .           .
 141      C36L1........................
              V
              V
 144      R36R2
              .
              .
 150          .        36R2
              .           .
              .           .
```

```
156     C36R2............
            V
            V
159     R51A1
            .
            .
165         .          49
            .           V
            .           V
171         .       R51A2
            .           .
            .           .
177         .           .         51C
            .           .           V
            .           .           V
184         .           .        R51B
            .           .           .
            .           .           .
190         .           .           .         51B
            .           .           .           .
            .           .           .           .
197         .           .        C51B............
            .           .           V
            .           .           V
200         .           .       R51A3
            .           .           .
            .           .           .
206         .           .           .         51A
            .           .           .           .
            .           .           .           .
212         .       C51A1........................
            .           .
            .           .
215     C51A2............
            V
            V
218     R52A2
            .
            .
224         .         52C
            .           V
            .           V
231         .        R52B
            .           .
            .           .
237         .           .         52B
            .           .           .
            .           .           .
244         .        C52B............
            .           V
            .           V
247         .       R52A1
            .           .
            .           .
253         .           .         52A
            .           .           .
            .           .           .
259         .       C52A1............
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262     C52A2............
            V
            V
265      R52E
            .
            .
271         .        52I
            .          V
            .          V
277         .       R52G
            .          .
            .          .
283         .          .        52G
            .          .          .
            .          .          .
290         .       C52G............
            .          V
            .          V
293         .       R52J
            .          .
            .          .
299         .          .        52J
            .          .          .
            .          .          .
306         .       C52J............
            .          V
            .          V
309         .      R52D1
            .          .
            .          .
315         .          .        52H
            .          .          V
            .          .          V
321         .          .       R52F
            .          .          .
            .          .          .
327         .          .          .        52F
            .          .          .          .
            .          .          .          .
334         .          .       C52F............
            .          .          V
            .          .          V
337         .          .      R52D2
            .          .          .
            .          .          .
343         .          .          .        52D
            .          .          .          .
            .          .          .          .
350         .       C52D........................
            .          .
            .          .
353         .          .        52E
            .          .          .
            .          .          .
359         .      C52E1............
            .          .
            .          .
362     C52E2............
            V
            V
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365     R53A1
           .
           .
371        .        53A1
           .          .
           .          .
378     B53R............
           .
           .
381        .        37A1
           .          V
           .          V
387        .       37AE1
           .          .
           .          .
394        .          .         CN6
           .          .          .
           .          .          .
401        .          .          .        37A2
           .          .          .          V
           .          .          .          V
407        .          .          .        CNC3
           .          .          .          V
           .          .          .          V
413        .          .          .        CNC4
           .          .          .          .
           .          .          .          .
420        .          .          .          .         CN1
           .          .          .          .          .
           .          .          .          .          .
430        .          .          .        CNC5............
           .          .          .          V
           .          .          .          V
433        .          .          .       DB1.1
           .          .          .          .
           .          .          .          .
440        .          .          .          .         CN2
           .          .          .          .          .
           .          .          .          .          .
447        .          .          .         DB1............
           .          .          .          V
           .          .          .          V
452        .          .          .       38R-1
           .          .          .          V
           .          .          .          V
460        .          .          .       DB2.1
           .          .          .          .
           .          .          .          .
467        .         DB3......................
           .          V
           .          V
472        .       CELL2
           .          .
           .          .
480        .          .         CN5C
           .          .          .
           .          .          .
487     C1I......................
           V
           V
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-----DSS---ZWRITE Unit  71; Vers.    6:  /OUTFLOW/38R1/FLOW/01OCT1994/5MIN//
-----DSS---ZWRITE Unit  71; Vers.    6:  /INFLOW/CELL2/FLOW/29SEP1994/5MIN//
-----DSS---ZWRITE Unit  71; Vers.    6:  /INFLOW/CELL2/FLOW/30SEP1994/5MIN//
-----DSS---ZWRITE Unit  71; Vers.    6:  /INFLOW/CELL2/FLOW/01OCT1994/5MIN//
-----DSS---ZWRITE Unit  71; Vers.    6:  /OUTFLOW/CELL2/FLOW/29SEP1994/5MIN//
-----DSS---ZWRITE Unit  71; Vers.    6:  /OUTFLOW/CELL2/FLOW/30SEP1994/5MIN//
-----DSS---ZWRITE Unit  71; Vers.    6:  /OUTFLOW/CELL2/FLOW/01OCT1994/5MIN//
-----DSS---ZWRITE Unit  71; Vers.    6:  /INFLOW/CELL1/FLOW/29SEP1994/5MIN//
-----DSS---ZWRITE Unit  71; Vers.    6:  /INFLOW/CELL1/FLOW/30SEP1994/5MIN//
-----DSS---ZWRITE Unit  71; Vers.    6:  /INFLOW/CELL1/FLOW/01OCT1994/5MIN//
1
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RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	30N	968.	3.50	140.	35.	34.	.76		
+	ROUTED TO	R31A3	924.	3.50	140.	35.	34.	.76		
+	HYDROGRAPH AT	34R	1764.	3.42	216.	54.	52.	1.36		
+	HYDROGRAPH AT	35N	1112.	3.17	104.	26.	25.	.46		
+	ROUTED TO	R34R1	961.	3.33	104.	26.	25.	.46		
+	ROUTED TO	R34R2	879.	3.42	104.	26.	25.	.46		
+	2 COMBINED AT	C34R	2616.	3.42	319.	81.	78.	1.82		
+	HYDROGRAPH AT	31A	1507.	3.25	132.	33.	32.	.80		
+	3 COMBINED AT	C31A	4265.	3.33	585.	148.	142.	3.37		
+	ROUTED TO	R36L1	4328.	3.42	585.	148.	142.	3.37		
+	HYDROGRAPH AT	36R1	341.	3.33	43.	11.	11.	.28		
+	HYDROGRAPH AT	35R	386.	3.50	58.	15.	14.	.37		
+	ROUTED TO	R36R1	312.	3.83	57.	15.	14.	.37		
+	2 COMBINED AT	C36R1	412.	3.75	99.	26.	25.	.65		

	HYDROGRAPH AT						
+	36L1	600.	3.50	83.	21.	20.	.60
	3 COMBINED AT						
+	C36L1	5181.	3.42	763.	193.	186.	4.62
	ROUTED TO						
+	R36R2	5030.	3.50	762.	193.	186.	4.62
	HYDROGRAPH AT						
+	36R2	502.	3.33	57.	14.	14.	.38
	2 COMBINED AT						
+	C36R2	5343.	3.42	817.	207.	199.	5.00
	ROUTED TO						
+	R51A1	5375.	3.50	817.	207.	199.	5.00
	HYDROGRAPH AT						
+	49	1047.	3.17	75.	19.	18.	.46
	ROUTED TO						
+	R51A2	550.	3.50	75.	19.	18.	.46
	HYDROGRAPH AT						
+	51C	169.	3.25	15.	4.	4.	.10
	ROUTED TO						
+	R51B	138.	3.33	15.	4.	4.	.10
	HYDROGRAPH AT						
+	51B	272.	3.33	29.	7.	7.	.21
	2 COMBINED AT						
+	C51B	411.	3.33	44.	11.	11.	.31
	ROUTED TO						
+	R51A3	336.	3.42	44.	11.	11.	.31
	HYDROGRAPH AT						
+	51A	606.	3.58	116.	30.	29.	.86
	3 COMBINED AT						
+	C51A1	1415.	3.50	233.	60.	57.	1.63
	2 COMBINED AT						
+	C51A2	6562.	3.50	1035.	263.	253.	6.62
	ROUTED TO						
+	R52A2	6589.	3.50	1035.	263.	253.	6.62
	HYDROGRAPH AT						
+	52C	152.	3.25	16.	4.	4.	.12
	ROUTED TO						
+	R52B	145.	3.33	16.	4.	4.	.12
	HYDROGRAPH AT						
+	52B	151.	3.25	15.	4.	4.	.10

	2 COMBINED AT						
+	C52B	283.	3.25	31.	8.	7.	.23
	ROUTED TO						
+	R52A1	277.	3.25	31.	8.	7.	.23
	HYDROGRAPH AT						
+	52A	354.	3.17	28.	7.	7.	.17
	2 COMBINED AT						
+	C52A1	529.	3.25	58.	15.	14.	.40
	2 COMBINED AT						
+	C52A2	6782.	3.50	1087.	276.	266.	7.02
	ROUTED TO						
+	R52E	6763.	3.50	1087.	276.	266.	7.02
	HYDROGRAPH AT						
+	52I	58.	3.17	4.	1.	1.	.03
	ROUTED TO						
+	R52G	19.	3.33	4.	1.	1.	.03
	HYDROGRAPH AT						
+	52G	390.	3.25	36.	9.	9.	.22
	2 COMBINED AT						
+	C52G	407.	3.25	40.	10.	10.	.24
	ROUTED TO						
+	R52J	355.	3.33	40.	10.	10.	.24
	HYDROGRAPH AT						
+	52J	157.	3.17	13.	3.	3.	.08
	2 COMBINED AT						
+	C52J	477.	3.25	53.	13.	13.	.32
	ROUTED TO						
+	R52D1	395.	3.42	53.	13.	13.	.32
	HYDROGRAPH AT						
.	52H	101.	3.17	7.	2.	2.	.05
	ROUTED TO						
.	R52F	57.	3.25	7.	2.	2.	.05
	HYDROGRAPH AT						
.	52F	294.	3.17	22.	5.	5.	.14
	2 COMBINED AT						
.	C52F	336.	3.17	29.	7.	7.	.19
	ROUTED TO						
	R52D2	280.	3.25	29.	7.	7.	.19
	HYDROGRAPH AT						
+	52D	355.	3.25	31.	8.	7.	.19

	3 COMBINED AT						
+		C52D	892.	3.25	113.	28.	27.	.70
	HYDROGRAPH AT						
+		52E	346.	3.17	26.	6.	6.	.15
	2 COMBINED AT						
+		C52E1	1120.	3.25	138.	35.	34.	.85
	2 COMBINED AT						
+		C52E2	7321.	3.50	1213.	309.	297.	7.87
	ROUTED TO						
+		R53A1	7136.	3.58	1212.	309.	297.	7.87
	HYDROGRAPH AT						
+		53A1	999.	3.25	92.	23.	22.	.53
	2 COMBINED AT						
+		B53R	7470.	3.50	1295.	330.	318.	8.40
	HYDROGRAPH AT						
+		37A1	270.	3.25	26.	7.	6.	.15
	ROUTED TO						
+		37AE1	174.	3.58	26.	7.	6.	.15
	HYDROGRAPH AT						
+		CN6	1684.	3.42	262.	67.	64.	1.25
	HYDROGRAPH AT						
+		37A2	874.	3.25	93.	23.	23.	.53
	ROUTED TO						
+		CNC3	764.	3.33	93.	23.	23.	.53
	ROUTED TO						
+		CNC4	535.	3.50	92.	23.	23.	.53
	HYDROGRAPH AT						
+		CN1	732.	3.42	98.	25.	24.	.58
	2 COMBINED AT						
+		CNC5	1204.	3.42	190.	48.	46.	1.10
	ROUTED TO						
+		DB1.1	1187.	3.50	190.	48.	46.	1.10
	HYDROGRAPH AT						
+		CN2	137.	3.25	16.	4.	4.	.09
	2 COMBINED AT						
+		DB1	1262.	3.50	205.	52.	50.	1.19
	ROUTED TO						
+		38R-1	477.	4.00	201.	52.	50.	1.19
	ROUTED TO						
+		DB2.1	461.	4.25	199.	52.	50.	1.19

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        3 COMBINED AT
                          DB3      1879.    3.50        477.        125.        120.       2.59

        ROUTED TO
                         CELL2       371.    5.58        329.        124.        119.       2.59

        HYDROGRAPH AT
+                         CN5C       380.    3.25         33.          8.          8.        .28

        3 COMBINED AT
+                          C1I      7546.    3.58       1607.        453.        437.      11.28

        ROUTED TO
+                         RC1I      7441.    3.58       1603.        453.        437.      11.28
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SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	INTERPOLATED TO COMPUTATION INTERVAL DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)
FOR STORM = 1 STORM AREA (SQ MI) =				.00					
30N	MANE	3.07	982.70	208.37	1.73	5.00	975.53	210.00	1.73

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .7045E+02 OUTFLOW= .7022E+02 BASIN STORAGE= .8658E-02 PERCENT ERROR= .3

FOR STORM = 2 STORM AREA (SQ MI) =				.00					
30N	MANE	3.07	982.70	208.37	1.73	5.00	975.52	210.00	1.73

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .7045E+02 OUTFLOW= .7022E+02 BASIN STORAGE= .8658E-02 PERCENT ERROR= .3

FOR STORM = 3 STORM AREA (SQ MI) =				.01					
30N	MANE	3.07	982.62	208.37	1.73	5.00	975.45	210.00	1.73

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .7044E+02 OUTFLOW= .7022E+02 BASIN STORAGE= .8658E-02 PERCENT ERROR= .3

FOR STORM = 4 STORM AREA (SQ MI) =				.10					
30N	MANE	3.07	981.82	208.37	1.73	5.00	974.73	210.00	1.73

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .7042E+02 OUTFLOW= .7019E+02 BASIN STORAGE= .8670E-02 PERCENT ERROR= .3

FOR STORM = 5 STORM AREA (SQ MI) =				.50					
30N	MANE	3.08	977.54	208.39	1.73	5.00	970.67	210.00	1.73

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .7030E+02 OUTFLOW= .7005E+02 BASIN STORAGE= .9794E-02 PERCENT ERROR= .4