Section

INTRODUCTION

Tatum Wash is a tributary of Indian Bend Wash (IBW). Tatum Wash begins in the Phoenix Mountain Preserve which is located in north Phoenix between Shea Boulevard and Lincoln Drive and between 40th Street and Tatum Boulevard. The wash collects and conveys flows in a northeasterly direction from the mountain preserves to the IBW. No official floodplain has been delineated, but many homes north of Shea Boulevard have been flooded from relatively low frequency events, events less than the 10- year event.

The City of Phoenix submitted Tatum Wash to the Flood Control District Of Maricopa County for consideration as a flood control project.

PROBLEM

Tatum Wash is a natural wash that begins in the Phoenix Mountain Preserves. The wash is a well-defined channel from its origin to a few hundred feet south of Shea Boulevard. A few hundred feet upstream (south) of Shea Boulevard, the banks of Tatum Wash end and the flows transition from channel flow to sheet flow and spread out onto a vacant lot abutting Shea Boulevard. A single catch basin was placed on the south side of Shea Boulevard with the construction of the Shea Boulevard Storm Drain Project to intercept the 1-yr flows. Flows in excess of the 1-yr event spill onto Shea Boulevard depositing heavy debris that is picked up in the wash's upper reach. In addition to

closing Shea Boulevard, the flows continue overland through a developed residential neighborhood flooding homes and closing streets before it outfalls into the IBW.

The natural wash upstream (south) of Shea Boulevard does not have the capacity to convey the entire 100-year flow event within its banks. A previous analysis of Tatum Wash determined that the wash in its present condition has the capacity to convey approximately 621 cfs without any breakouts. The analysis further determined that minor improvements at various breakout locations could increase its conveyance capacity to 1,000 cfs. For this reason, the inlet spillway for the detention basin was sized to accommodate 1,000 cfs.

UTILITIES

She Boulevard has a number of existing utlilities located with the road rights-of-way. The outfall for the detention basin must cross three existing utilities before connecting into the existing 78" storm drain line. The three utilities are a 4" gas line, an abandoned 6" water line, and a 15" sewer line. No conflict exists, but the detention basin outfall pipe comes very near to the sewer line as it crosses over it. Because of the close proximity, the existing sewer line will be replaced with ductile iron pipe (DIP). The DIP replacement will serve two purposes: one, it will provide more clearance between the lines because it has a thinner structural section than the vcp pipe that it is replacing; and two, it will be stronger and not susceptible to cracking from trench settlement like the existing vcp pipe would be.

RIGHT-OF-WAY AND EASEMENTS

The limits of the detention basin and the channel inlet improvements fit within existing drainage easements and the single parcel purchased for this project. Tatum Wash is confined within an existing 100-foot easement with manmade banks between 40th Street and the site of the detention basin. Along the each side of the 100-foot easement, there is an additional 15-foot drainage easement recorded and along the parcel's northern boundary for the western portion of the property there is a 5-foot drainage easement. Other non-drainage easements exist on the parcel: there is a 15-foot sewer easement paralleling the parcel's western boundary and a slope easement along the property's northern boundary. The slope easement is no longer needed because the road is at the same grade as the surrounding property and will remain so after construction of the basin.

Hydraulic Analysis

Inlet Spillway

The inlet spillway collects runoff from Tatum Wash and conveys the flows into the sediment/detention basin. The inlet spillway is a baffled chute spillway. The chute blocks within the spillway dissipate the energy of the falling flows before they reach the floor of the basin. This design was selected over constructing an energy dissipator at the end or bottom of the drop to facilitate removing sediment and debris from the floor of the basin. This design also does not rely on tailwater to facilitate energy dissipation.

Tatum Wash inlet channel immediately upstream of the spillway has the capacity to convey the entire 100-year event of 2,315 cfs without overtopping its banks provided that it could make it to the basin. Hydraulic analysis of the existing channel found that the current 100-yr discharge of Tatum is unlikely to make it to the inlet structure because the flows would break-out of the banks upstream of 44th Street and at 44th Street. The existing wash's current capacity is approximately 620 cfs and could be increased to 1,000 cfs with only minor channel improvements to the natural wash. For this reason, the spillway was sized to accommodate flows of 1,000 cfs

Large diameter dumped rip rap is being placed around the inlet spillway in the event that any flows greater than the design amount reach the spillway. The minimum side wall height of the spillway is 4 feet 8 inches which is greater than the depth of flow for a discharge of 2,300 cfs, but the rip rap will protect the structure from splashing which will exceed the minimum wall height for this amount of discharge.

Outlet works

The outlet works consist of a rectangular concrete structure constructed back into the front (north) side slope of the basin. The structure has two ungated orifices in the side and grates at the top to allow flows to be discharged into a 42" pipe which will convey the flows to an existing 78" storm drain in Shea Boulevard. Flap gates or backflow preventers will be placed on the two 24" orifices to prevent flows in the storm drain from entering the sedimentation/detention basin. The elevation of the grated top of

the outlet structure is set one foot below the emergency spillway to capture water in case the openings become clogged.

Through research of the design calculations for the storm drain in Shea Boulevard, it was determined that the storm drain has the capacity to collect 81 cfs from the Tatum Wash. The existing inlet will be removed and a new outlet structure will be built to drain the basin. The outlet was sized to limit the discharges to the 81 cfs when there are flows of 440 cfs in the storm drain This amount was defined as being the 2-yr return event by the City of Phoenix's Shea Boulevard Drainage Study dated May 1976. To determine the tailwater condition for the outlet structure, the hydraulic gradeline for 520 cfs (440 in the storm darin plus 80 cfs from Tatum Wash) was modeled using Storm Cadd and using the elevations for the storm drain from as-builts for project ST-75091.01 dated 1-18-80 beginning at its outfall, the Indian Bend Wash (IBW). When the storm drain is empty, the outlet structure will be able to pass 151 cfs before flows will begin discharging over the emergency spillway.

	Peak Inflow (cfs)	Peak Discharge to Storm Drain(cfs)	Peak Discharge to Emergency Spillway (cfs)
Pre-Project	2315	80	N/A
Post Phase 1 Project	2315	*151	2164
**Post Phase 2 Project	383	82	0

* Exceeds discharge of 81 cfs; assumption is zero tailwater in Shea Boulevard storm drain.

** Phase 2 – upstream basin in the Phoenix Mountain Preserves containing 145 Ac-Ft of storage

Phase 2 - Mountain Preserve Basin(s)

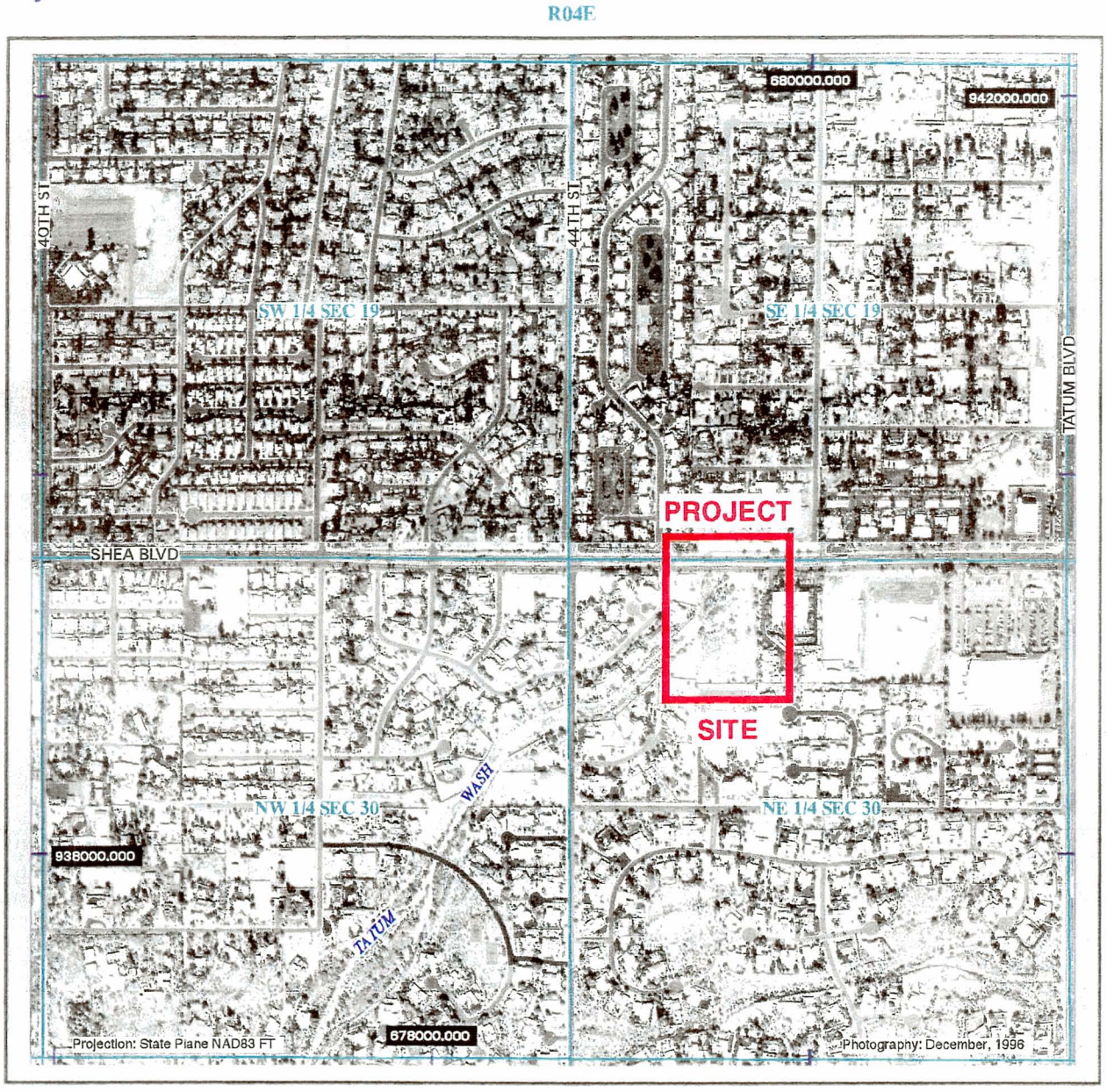
The sedimentation/detention basin at Shea Boulevard is only the first phase in solving the flooding problems. The basin's size is small and lends itself well to solving the sediment problem caused by runoff from the Phoenix Mountain Preserves, but only provides flood protection from approximately the 2-yr rainfall event. Additional basins place higher up in the watershed are necessary to provite 100-yr flood protection to the area south of Shea Boulevard.

For the purpose of a sizing future basin(s) upstream in the mountain preserves, Phase 2, the existing HEC-1 model was modified to include 145 Ac-Ft of storage in the mountain preserves. This amount was derived through an iterative process by increasing the amount of storage at a proposed site for a future basin until no flows from the 100-yr event exited the proposed lower detention/sedimentation basin via the emergency spillway. The outlet during this event was assumed to be unclogged and functioning properly limiting discharge to the existing storm drain in Shea Boulevard to 82 cfs (See HEC-1 output file: TTM-100.dat).

More detailed hydraulics will be required when actually sizing a detention basin(s) upstream in the mountain preserves than only providing 145 Ac-Ft of storage. Design parameters for the outlet will include that the outflows do not exceed the capacity of the existing channel for the reach between the mountain preserves (existing capacity is approximately 620 cfs) and the proposed Tatum Wash Detention Basin No. 1, include that the outflows do not exceed the 1,000 cfs capacity of the spillway into Tatum Wash

Detention Basin No. 1, and that the outflows combined with the runoff from the 100-yr event does not cause any flows to exit the detention/sedimentation basin at Shea Boulevard via the emergency spillway.

TATUM WASH
DETENTION BASIN NO. 1
DESIGN REPORT
AUGUST, 1997



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION
PROJECT No. 580040

Tatum Wash Detention No. 1

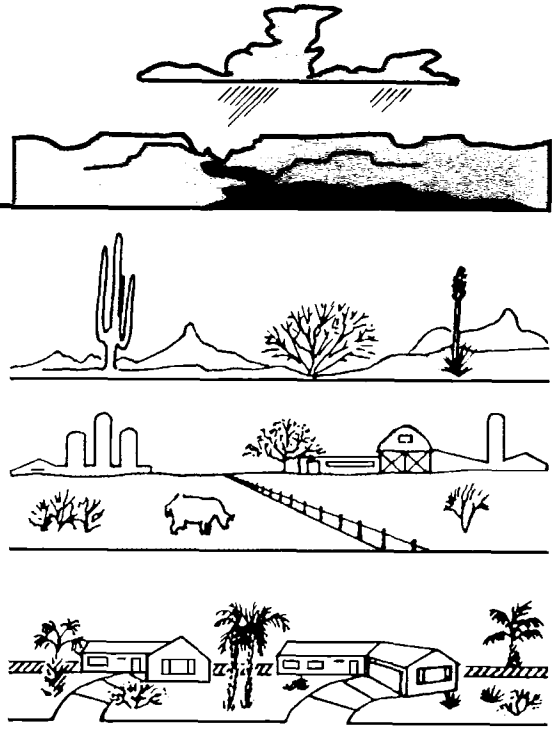
DESIGN REPORT

April, 1997

Prepared For:
Flood Control District of Maricopa County
2801 West Durango
Phoenix, Arizona 85009
Michael S. Ellegood, P.E.
Chief Engineer & General Manager

Prepared by:
Engineering Division
Flood Control District of Maricopa County

FCD Project No. 580040



FLOOD CONTROL DISTRICT OF *MARICOPA* COUNTY

PRELIMINARY DESIGN SUBMITTAL
TATUM WASH
DETENTION BASIN NO 1

PRELIMINARY DESIGN
SUBMITTAL
TATUM WASH
DETENTION BASIN NO 1

Tatum Wash Detention Basin No. 1

TABLE OF CONTENTS

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1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             SEPTEMBER 1990            *
*              VERSION 4.0              *
*                                       *
*  RUN DATE  07/22/1997  TIME  15:39:24 *
*                                       *
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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  X        X              X
XXXXXXX  XXXX     X        XXXXX X
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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


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

   1          ID   TATUM WASH PROJECT SUB-AREAS 1 AND 2  COMBINED  - 2/9/95
   2          ID   100YR-6HR STORM = 3.20". ASSUMED NORMAL CONDITION W/ DTHETA=0.250
   3          ID   STORM SIZE = 2.28 SQ. MI (TOTAL AREA)
   4          ID   HYDROGRAPH PLOT FOR 5 DETENTION BASIN SITES (*.DSS)
   5          ID   DETENTION BASIN A LOCATED SOUTH OF SHEA BLVD
   6          ID   SPILLWAY IS OVER THE S/W INTO THE ROAD
   7          ID   LOW FLOW OUTLET INCLUDED FOR TATUM BASIN
   8          ID   NO BASIN SIZING SHOWN IN THE PHX MTN PRESERVES
   9          ID   FILE:TTM-NOW.DAT
              *DIAGRAM
  10          IT       2  1JAN96     0001     2000
  11          IO       5

  12          KK     S1B
  13          KM   SUB-BASIN S1B
  14          KM   6-HOUR RAINFALL, PATTERN NO. 1.88 WAS USED TO FIND TC & R FOR THIS BASIN
  15          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .978
  16          KO       5
  17          BA    .230
  18          IN      15
  19          KM   RAINFALL DEPTH OF 3.20 WAS SPACIALLY REDUCED AS SHOWN BY THE PB RECORD
  20          PB   3.131
  21          KM   THE FOLLOWING PC RECORD USED A 6-HOUR STORM WITH A PATTERN No. OF 1.88
  22          PC    .000    .009    .016    .025    .034    .042    .051    .059    .067    .076
  23          PC    .087    .100    .120    .160    .248    .442    .711    .846    .904    .939
  24          PC    .951    .964    .976    .988   1.000
  25          LG    .200    .250   4.300    .500  35.000
  26          UC    .363    .185
  27          UA       0       3       5       8      12      20      43      75      90      96
  28          UA     100

  29          KK    RS1B
  30          KM    ROUTING THROUGH S1C
  31          KO       5
  32          RS       3    FLOW      -1
  33          RC    .035    .035    .035    2138    .028
  34          RX       0      36      66      90     126     150     168     228
  35          RY       7       7       7       0       0       4       6      22

  36          KK     S1A
  37          KM   SUB-BASIN S1A
  38          KO       5
  39          BA    .330
  40          LG    .200    .250   4.300    .500  35.000
  41          UC    .363    .185
  42          UA       0       3       5       8      12      20      43      75      90      96
  43          UA     100

  44          KK    RS1A
  45          KM    ROUTING THROUGH S1C
  46          KO       5
  47          RS       3    FLOW      -1
  48          RC    .035    .035    .035    2025    .030
  49          RX       0     0.5       1     126     136     251     252     253
  50          RY       5       5       5       0       0       5       5       5
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LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  51          KK     S1C
  52          KM   SUB-BASIN S1C
  53          KO       5
  54          BA    .110
  55          LG    .200    .250   4.300    .500  35.000
  56          UC    .329    .265
  57          UA       0       3       5       8      12      20      43      75      90      96
  58          UA     100

  59          KK    CP1C
```

```
 60          KM    ADDITION OF 3 HYDROGRAPHS
 61          KM    POTENTIAL DETENTION BASIN SITE 1
 62          KO       5
 63          HC       3

 64          KK   RCP1C
 65          KM    ROUTING THROUGH S1E
 66          KO       5
 67          RS       5     FLOW       -1
 68          RC    .035    .035     .035    3600     .017
 69          RX       0      42       72      84      120      138      180      216
 70          RY       9     8.5        4       0        0        4        6        8

 71          KK     S1D
 72          KM   SUB-BASIN S1D
 73          KO       5
 74          BA    .310
 75          LG    .200    .250    4.300    .500   35.000
 76          UC    .363    .205
 77          UA       0       3        5       8       12       20       43       75       90       96
 78          UA     100

 79          KK    RS1D
 80          KM    ROUTING THROUGH S1E
 81          KO       5
 82          RS       3     FLOW       -1
 83          RC    .035    .035     .035    2138     .019
 84          RX       0      36       72      96      132      168      204      240
 85          RY       8       6        4       0        0        8       10       11

 86          KK     S1E
 87          KM   SUB-BASIN S1E
 88          KO       5
 89          BA    .510
 90          LG    .200    .250    4.300    .500   35.000
 91          UC    .433    .242
 92          UA       0       3        5       8       12       20       43       75       90       96
 93          UA     100
1                                        HEC-1 INPUT                                          PAGE  3
LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 94          KK    CP1E
 95          KM    CONCENTRATION OF 3 HYDROGRAPHS
 96          KM    POTENTIAL DETENTION BASIN SITE 2
 97          KO       5
 98          HC       3

 99          KK   RCP1E
100          KM    ROUTING THROUGH S1F
101          KO       5
102          RS       3     FLOW       -1
103          RC    .035    .035     .035    2250     .014
104          RX       0      48       84     120      144      180      240      288
105          RY      12      10        6       2        0        8       10       11

106          KK     S1F
107          KM   SUB-BASIN S1F
108          KO       5
109          BA    .280
110          LG    .200    .250    4.300    .500   35.000
111          UC    .413    .300
112          UA       0       3        5       8       12       20       43       75       90       96
113          UA     100

114          KK    CP1F
115          KM    POTENTIAL DETENTION BASIN SITE 3
116          KO       5
117          HC       2

118          KK    PARK
119          KO       3
120          KM   CITY OF PHX EQUESTRIAN PARK IN MTN PRESERVES
121          KM   PROPOSED FUTURE PHASE OF TATUM WASH PROJECT
122          KM   NOT USED FOR THIS RUN TO DETERMINE PHASE 1 CONDITION
123          DT   DIV1        0
124          DI       0   10000
125          DQ       0       0

126          KK    RCFI
127          KO       5
128          RS       2     FLOW       -1
129          RC    .035     .03     .035  1100.0  0.0009
130          RX       0      30       60      90      120      150      180      210
131          RY       5       3        1       0        0        1        3        5

132          KK    S2A1
133          KM   SUB-BASIN S2A1
134          KO       5
135          BA   0.056
136          LG   0.150   0.250    4.300   0.400   35.000
137          UC   0.217   0.155
138          UA       0       3        5       8       12       20       43       75       90       96
139          UA     100
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LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

140          KK   CP2A1
141          KM   COMBINE AT 40TH STREET
142          KM   POTENTIAL DETENTION BASIN SITE 4
143          KO       5
144          HC       2

145          KK   RCP21
146          KO       5
```

```
147          RS       2    FLOW      -1
148          RC    .035     .03     .035     1360    .0162
149          RX       0      30       40       50       70       80      110      130
150          RY       8       6        2        0        0        2        4        6

151          KK    S2A2
152          KO       5
153          BA   0.039
154          LG    0.10    0.20    4.30    0.40    15.0
155          UC   0.471   0.595
156          UA       0       5       16       30       65       77       84       90       94       97
157          UA     100

158          KK   CP2A2
159          KM   COMBINE AT FANFOL DRIVE  (NO DIVERSION AS PER FIELD INSPECTION)
160          KO       5
161          HC       2

162          KK   RCP22
163          KO       5
164          RS       1    FLOW      -1
165          RC    .035     .03     .035    820.0   0.0106
166          RX       0      30       70       80      100      110    110.5      120
167          RY       8       7        6        0        0        4        6        8

168          KK    S2B
169          KM   SUB-BASIN S2B
170          KO       5
171          BA   0.027
172          LG   0.100   0.250   4.300   0.400  15.000
173          UC   0.246   0.221
174          UA       0       5       16       30       65       77       84       90       94       97
175          UA     100

176          KK    CP2B
177          HC       2

178          KK   RCP2B
179          KO       5
180          RS       1    FLOW      -1
181          RC    .035    0.03    0.035    680.0   0.0088
182          RX       0      10       20       70      120      130      140      200
183          RY     2.5       2        2        0        0        1        2        3
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1 HEC-1 INPUT PAGE 5

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

184          KK    S2C
185          KM   SUB-BASIN S2C
186          KO       5
187          BA   0.028
188          LG   0.100   0.250   4.300   0.400  15.000
189          UC   0.250   0.214
190          UA       0       5       16       30       65       77       84       90       94       97
191          UA     100

192          KK    CP2C
193          KM   CROSSING THRU VIA ESTRELLA ALIGNMENT
194          KO       5
195          HC       2

196          KK   RCP2C
197          KO       5
198          RS       2    FLOW      -1
199          RC    .035     .03     .035   1040.0   0.0144
200          RX       0      50       70      100      120      130      140      180
201          RY       4       5        3        0        0        1        2      2.5

202          KK    S2D
203          KM   SUB-BASIN S2D
204          KO       5
205          BA   0.024
206          LG   0.100   0.250   4.300   0.400  15.000
207          UC   0.288   0.292
208          UA       0       5       16       30       65       77       84       90       94       97
209          UA     100

210          KK    S2I
211          KM   SUB-BASIN S2I
212          KO       5
213          BA   0.028
214          LG   0.100   0.250   4.300   0.400   20.00
215          UC   0.233   0.227
216          UA       0       5       16       30       65       77       84       90       94       97
217          UA     100

218          KK   CP2DI
219          KO       5
220          HC       3

221          KK   RCPDI
222          KO       5
223          RS       3    FLOW      -1
224          RC    .035     .03     .035   2059.0   0.0107
225          RX       0      30       40       90      100    100.5      101      110
226          RY       5       3        1        0        0        1        3        3
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1 HEC-1 INPUT PAGE 6

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

227          KK    S2E
228          KM   SUB-BASIN S2E
229          KO       5
230          BA   0.033
231          LG    0.10   0.250   4.300   0.400  20.000
232          UC   0.367   0.443
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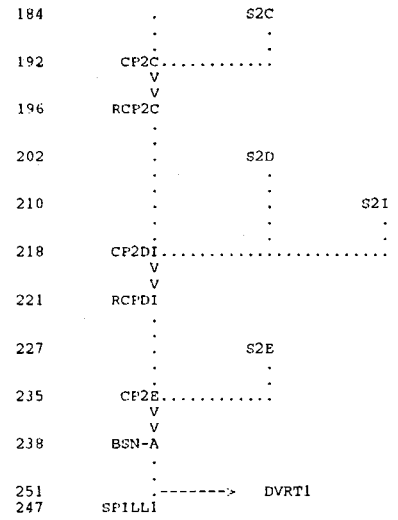

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*            SEPTEMBER 1990             *
*             VERSION 4.0               *
*                                       *
*  RUN DATE  07/22/1997  TIME  15:39:24 *
*                                       *
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*************************************
*                                   *
*    U.S. ARMY CORPS OF ENGINEERS   *
*    HYDROLOGIC ENGINEERING CENTER  *
*          609 SECOND STREET        *
*        DAVIS, CALIFORNIA 95616    *
*           (916) 756-1104          *
*                                   *
*************************************
```

TATUM WASH PROJECT SUB-AREAS 1 AND 2 COMBINED - 2/9/95
100YR-6HR STORM = 3.20". ASSUMED NORMAL CONDITION W/ DTHETA=0.250
STORM SIZE = 2.28 SQ. MI (TOTAL AREA)
HYDROGRAPH PLOT FOR 5 DETENTION BASIN SITES (*.DSS)
DETENTION BASIN A LOCATED SOUTH OF SHEA BLVD
SPILLWAY IS OVER THE S/W INTO THE ROAD
LOW FLOW OUTLET INCLUDED FOR TATUM BASIN
NO BASIN SIZING SHOWN IN THE PHX MTN PRESERVES
FILE:TTM-NOW.DAT

*** ERROR *** SPECIFIED START AND END DATES RESULT IN TOO MANY TIME PERIODS

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                      IPLOT          0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                      NMIN           2  MINUTES IN COMPUTATION INTERVAL
                     IDATE      1JAN96  STARTING DATE
                     ITIME        0001  STARTING TIME
                        NQ         300  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE      1JAN96  ENDING DATE
                    NDTIME        0959  ENDING TIME
                     ICENT          19  CENTURY MARK

                  COMPUTATION INTERVAL      .03 HOURS
                      TOTAL TIME BASE     9.97 HOURS

        ENGLISH UNITS
             DRAINAGE AREA          SQUARE MILES
             PRECIPITATION DEPTH    INCHES
             LENGTH, ELEVATION      FEET
             FLOW                   CUBIC FEET PER SECOND
             STORAGE VOLUME         ACRE-FEET
             SURFACE AREA           ACRES
             TEMPERATURE            DEGREES FAHRENHEIT

 16 KO          OUTPUT CONTROL VARIABLES
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                      QSCAL          0.  HYDROGRAPH PLOT SCALE

 31 KO          OUTPUT CONTROL VARIABLES
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                      IPLOT          0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

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                      QSCAL          0.  HYDROGRAPH PLOT SCALE

 46 KO          OUTPUT CONTROL VARIABLES
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 53 KO          OUTPUT CONTROL VARIABLES
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233           UA       0       5      16      30      65      77      84      90      94      97
234           UA     100

235           KK    CP2E
236           KM    AT SHEA BLVD, POTENTIAL DETENTION BASIN SITE 5
237           HC       2

238           KK    BSN-A
239           KO       2       0
240           ZW    A=TATUM  B=INFLOW  C=FLOW  E=2MIN  F=WO
241           KM    DETENTION BASIN LOCATED ON THE SOUTH SIDE OF SHEA BLVD
242           ZW    A=TATUM  B=OUTFLOW C=STAGE E=2MIN  F=WO
243           RS       1    STOR      -1
244           SV       0    3.13    7.63   12.51   17.80   23.49   29.61   32.83   36.16   36.16
245           SQ       0       0      21      30      57      72      83     151     395    1061
246           SE  1380.5    1382    1384    1386    1388    1390    1392    1393    1394    1395

247           KK  SPILL1
248           KM    ACTUAL LOW FLOWS GO TO SHEA STORM DRAIN
249           KM    DIVERSION BASED UPON STAGED OUTLET
250           KM    LOW FLOW WILL BE CONSIDERED FOR SIZING UPPER BASIN
251           DT    DVRT1
252           DI       0      50      83     395    2400
253           DQ       0      50      83     151     151
254           ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

   12        S1B
              V
              V
   29       RS1B
              .
              .
   36          .          S1A
               .           V
               .           V
   44          .         RS1A
               .           .
               .           .
   51          .           .          S1C
               .           .            .
               .           .            .
   59       CP1C.........................
              V
              V
   64       RCP1C
              .
              .
   71          .          S1D
               .           V
               .           V
   79          .         RS1D
               .           .
               .           .
   86          .           .          S1E
               .           .            .
               .           .            .
   94       CP1E.........................
              V
              V
   99       RCP1E
              .
              .
  106          .          S1F
               .           .
               .           .
  114       CP1F............
              .
              .
  123          .-------->   DIV1
  118       PARK
              V
              V
  126       RCFI
              .
              .
  132          .         S2A1
               .           .
               .           .
  140       CP2A1...........
              V
              V
  145       RCP21
              .
              .
  151          .         S2A2
               .           .
               .           .
  158       CP2A2...........
              V
              V
  162       RCP22
              .
              .
  168          .          S2B
               .           .
               .           .
  176       CP2B............
              V
              V
  178       RCP2B
              .
              .
```

```
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

  62 KO         OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

  66 KO         OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

  73 KO         OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

  81 KO         OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

  88 KO         OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

  97 KO         OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

 101 KO         OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

 108 KO         OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

 116 KO         OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE


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


            **************
            *            *
 118 KK     *    PARK    *
            *            *
            **************

 119 KO         OUTPUT CONTROL VARIABLES
                    IPRNT           3  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE
                        CITY OF PHX EQUESTRIAN PARK IN MTN PRESERVES
                        PROPOSED FUTURE PHASE OF TATUM WASH PROJECT
                        NOT USED FOR THIS RUN TO DETERMINE PHASE 1 CONDITION

     DT         DIVERSION
                    ISTAD       DIV1   DIVERSION HYDROGRAPH IDENTIFICATION

     DI            INFLOW         .00  10000.00

     DQ      DIVERTED FLOW         .00       .00

                                                                    ***

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

                      DIVERSION HYDROGRAPH    DIV1

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR        72-HR       9.97-HR
+   (CFS)       (HR)
                    (CFS)
+       0.       .03                   0.           0.           0.           0.
                  (INCHES)          .000         .000         .000         .000
                   (AC-FT)            0.           0.           0.           0.

                  CUMULATIVE AREA =    1.77 SQ MI

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

                      HYDROGRAPH AT STATION     PARK

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR        72-HR       9.97-HR
+   (CFS)       (HR)
                    (CFS)
+    2212.      4.33                  337.         204.         204.         204.
                  (INCHES)         1.772        1.783        1.783        1.783
                   (AC-FT)           167.         168.         168.         168.

                  CUMULATIVE AREA =    1.77 SQ MI


 127 KO         OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
```

```
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

134 KO          OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

143 KO          OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

146 KO          OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

152 KO          OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

160 KO          OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

163 KO          OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

170 KO          OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

179 KO          OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

186 KO          OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

194 KO          OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

197 KO          OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

204 KO          OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

212 KO          OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

219 KO          OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

222 KO          OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

229 KO          OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

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

          **************
          *            *
238 KK    *    BSN-A   *
          *            *
          **************

239 KO          OUTPUT CONTROL VARIABLES
                    IPRNT           2  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE
                        DETENTION BASIN LOCATED ON THE SOUTH SIDE OF SHEA BLVD

                HYDROGRAPH ROUTING DATA

243 RS          STORAGE ROUTING
                    NSTPS           1  NUMBER OF SUBREACHES
                     ITYP        STOR  TYPE OF INITIAL CONDITION
                    RSVRIC      -1.00  INITIAL CONDITION
                        X         .00 WORKING R AND D COEFFICIENT
```

244 SV	STORAGE	.0	3.1	7.6	12.5	17.8	23.5	29.6	32.8	36.2	36.2
245 SQ	DISCHARGE	0.	0.	21.	30.	57.	72.	83.	151.	395.	1061.
246 SE	ELEVATION	1380.50	1382.00	1384.00	1386.00	1388.00	1390.00	1392.00	1393.00	1394.00	1395.00

***

HYDROGRAPH AT STATION BSN-A

DA MON HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA MON HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA MON HRMN	ORD	OUTFLOW	STORAGE	STAGE
1 JAN 0001	1	0.	3.1	1382.0	1 JAN 0321	101	22.	8.0	1384.2	1 JAN 0641	201	69.	37.4	1394.9
1 JAN 0003	2	0.	3.1	1382.0	1 JAN 0323	102	22.	8.1	1384.2	1 JAN 0643	202	68.	37.4	1394.9
1 JAN 0005	3	0.	3.1	1382.0	1 JAN 0325	103	22.	8.2	1384.2	1 JAN 0645	203	66.	37.4	1394.9
1 JAN 0007	4	0.	3.1	1382.0	1 JAN 0327	104	22.	8.3	1384.3	1 JAN 0647	204	64.	37.4	1394.9
1 JAN 0009	5	0.	3.1	1382.0	1 JAN 0329	105	22.	8.4	1384.3	1 JAN 0649	205	62.	37.4	1394.9
1 JAN 0011	6	0.	3.1	1382.0	1 JAN 0331	106	23.	8.5	1384.4	1 JAN 0651	206	61.	37.4	1394.9
1 JAN 0013	7	0.	3.1	1382.0	1 JAN 0333	107	23.	8.6	1384.4	1 JAN 0653	207	59.	37.4	1394.9
1 JAN 0015	8	0.	3.1	1382.0	1 JAN 0335	108	23.	8.8	1384.5	1 JAN 0655	208	57.	37.4	1394.9
1 JAN 0017	9	0.	3.1	1382.0	1 JAN 0337	109	23.	8.9	1384.5	1 JAN 0657	209	55.	37.4	1394.9
1 JAN 0019	10	0.	3.1	1382.0	1 JAN 0339	110	24.	9.0	1384.6	1 JAN 0659	210	53.	37.4	1394.9
1 JAN 0021	11	0.	3.1	1382.0	1 JAN 0341	111	24.	9.2	1384.6	1 JAN 0701	211	51.	37.4	1394.9
1 JAN 0023	12	0.	3.1	1382.0	1 JAN 0343	112	24.	9.4	1384.7	1 JAN 0703	212	49.	37.4	1394.9
1 JAN 0025	13	0.	3.1	1382.0	1 JAN 0345	113	25.	9.6	1384.8	1 JAN 0705	213	47.	37.4	1394.8
1 JAN 0027	14	0.	3.1	1382.0	1 JAN 0347	114	25.	9.9	1384.9	1 JAN 0707	214	45.	37.4	1394.8
1 JAN 0029	15	0.	3.1	1382.0	1 JAN 0349	115	26.	10.2	1385.0	1 JAN 0709	215	43.	37.4	1394.8
1 JAN 0031	16	0.	3.1	1382.0	1 JAN 0351	116	26.	10.6	1385.2	1 JAN 0711	216	41.	37.4	1394.8
1 JAN 0033	17	0.	3.1	1382.0	1 JAN 0353	117	27.	11.0	1385.4	1 JAN 0713	217	39.	37.4	1394.8
1 JAN 0035	18	0.	3.1	1382.0	1 JAN 0355	118	28.	11.6	1385.6	1 JAN 0715	218	38.	37.4	1394.8
1 JAN 0037	19	0.	3.1	1382.0	1 JAN 0357	119	30.	12.3	1385.9	1 JAN 0717	219	36.	37.4	1394.8
1 JAN 0039	20	0.	3.1	1382.0	1 JAN 0359	120	33.	13.1	1386.2	1 JAN 0719	220	34.	37.4	1394.8
1 JAN 0041	21	0.	3.1	1382.0	1 JAN 0401	121	38.	14.1	1386.6	1 JAN 0721	221	33.	37.4	1394.8
1 JAN 0043	22	0.	3.1	1382.0	1 JAN 0403	122	44.	15.2	1387.0	1 JAN 0723	222	31.	37.4	1394.8
1 JAN 0045	23	0.	3.2	1382.0	1 JAN 0405	123	51.	16.5	1387.5	1 JAN 0725	223	30.	37.4	1394.8
1 JAN 0047	24	0.	3.2	1382.0	1 JAN 0407	124	58.	18.2	1388.1	1 JAN 0727	224	29.	37.4	1394.8
1 JAN 0049	25	0.	3.2	1382.0	1 JAN 0409	125	63.	20.1	1388.8	1 JAN 0729	225	28.	37.4	1394.8
1 JAN 0051	26	0.	3.2	1382.0	1 JAN 0411	126	69.	22.4	1389.6	1 JAN 0731	226	27.	37.4	1394.8
1 JAN 0053	27	0.	3.2	1382.0	1 JAN 0413	127	75.	25.1	1390.5	1 JAN 0733	227	26.	37.4	1394.8
1 JAN 0055	28	0.	3.2	1382.0	1 JAN 0415	128	81.	28.3	1391.6	1 JAN 0735	228	25.	37.4	1394.8
1 JAN 0057	29	0.	3.2	1382.0	1 JAN 0417	129	131.	31.9	1392.7	1 JAN 0737	229	23.	37.4	1394.8
1 JAN 0059	30	0.	3.2	1382.0	1 JAN 0419	130	354.	35.6	1393.8	1 JAN 0739	230	22.	37.4	1394.8
1 JAN 0101	31	0.	3.2	1382.0	1 JAN 0421	131	1837.	37.4	1397.5	1 JAN 0741	231	21.	37.4	1394.8
1 JAN 0103	32	0.	3.2	1382.0	1 JAN 0423	132	1988.	37.4	1397.8	1 JAN 0743	232	20.	37.4	1394.8
1 JAN 0105	33	0.	3.2	1382.0	1 JAN 0425	133	2120.	37.4	1398.0	1 JAN 0745	233	19.	37.4	1394.8
1 JAN 0107	34	0.	3.2	1382.0	1 JAN 0427	134	2221.	37.4	1398.1	1 JAN 0747	234	18.	37.4	1394.8
1 JAN 0109	35	0.	3.2	1382.0	1 JAN 0429	135	2286.	37.4	1398.2	1 JAN 0749	235	17.	37.4	1394.8
1 JAN 0111	36	0.	3.2	1382.0	1 JAN 0431	136	2315.	37.4	1398.3	1 JAN 0751	236	16.	37.4	1394.8
1 JAN 0113	37	0.	3.2	1382.0	1 JAN 0433	137	2308.	37.4	1398.2	1 JAN 0753	237	15.	37.4	1394.8
1 JAN 0115	38	0.	3.2	1382.0	1 JAN 0435	138	2271.	37.4	1398.2	1 JAN 0755	238	14.	37.4	1394.8
1 JAN 0117	39	1.	3.2	1382.1	1 JAN 0437	139	2209.	37.4	1398.1	1 JAN 0757	239	13.	37.4	1394.8
1 JAN 0119	40	1.	3.3	1382.1	1 JAN 0439	140	2130.	37.4	1398.0	1 JAN 0759	240	13.	37.4	1394.8
1 JAN 0121	41	1.	3.3	1382.1	1 JAN 0441	141	2039.	37.4	1397.8	1 JAN 0801	241	12.	37.4	1394.8
1 JAN 0123	42	1.	3.3	1382.1	1 JAN 0443	142	1942.	37.4	1397.7	1 JAN 0803	242	12.	37.4	1394.8
1 JAN 0125	43	1.	3.3	1382.1	1 JAN 0445	143	1838.	37.4	1397.5	1 JAN 0805	243	11.	37.4	1394.8
1 JAN 0127	44	1.	3.3	1382.1	1 JAN 0447	144	1732.	37.4	1397.4	1 JAN 0807	244	10.	37.4	1394.8
1 JAN 0129	45	1.	3.4	1382.1	1 JAN 0449	145	1627.	37.4	1397.2	1 JAN 0809	245	10.	37.4	1394.8
1 JAN 0131	46	1.	3.4	1382.1	1 JAN 0451	146	1520.	37.4	1397.1	1 JAN 0811	246	9.	37.4	1394.8
1 JAN 0133	47	1.	3.4	1382.1	1 JAN 0453	147	1414.	37.4	1396.9	1 JAN 0813	247	9.	37.4	1394.8
1 JAN 0135	48	2.	3.5	1382.2	1 JAN 0455	148	1313.	37.4	1396.7	1 JAN 0815	248	8.	37.4	1394.8
1 JAN 0137	49	2.	3.5	1382.2	1 JAN 0457	149	1217.	37.4	1396.6	1 JAN 0817	249	8.	37.4	1394.8
1 JAN 0139	50	2.	3.6	1382.2	1 JAN 0459	150	1129.	37.4	1396.5	1 JAN 0819	250	8.	37.4	1394.8
1 JAN 0141	51	3.	3.7	1382.2	1 JAN 0501	151	1046.	37.4	1396.3	1 JAN 0821	251	7.	37.4	1394.8
1 JAN 0143	52	3.	3.8	1382.3	1 JAN 0503	152	968.	37.4	1396.2	1 JAN 0823	252	7.	37.4	1394.8
1 JAN 0145	53	3.	3.8	1382.3	1 JAN 0505	153	897.	37.4	1396.1	1 JAN 0825	253	7.	37.4	1394.8
1 JAN 0147	54	4.	3.9	1382.3	1 JAN 0507	154	827.	37.4	1396.0	1 JAN 0827	254	7.	37.4	1394.8
1 JAN 0149	55	4.	4.0	1382.4	1 JAN 0509	155	762.	37.4	1395.9	1 JAN 0829	255	6.	37.4	1394.8
1 JAN 0151	56	5.	4.1	1382.4	1 JAN 0511	156	706.	37.4	1395.8	1 JAN 0831	256	6.	37.4	1394.8
1 JAN 0153	57	5.	4.2	1382.5	1 JAN 0513	157	652.	37.4	1395.8	1 JAN 0833	257	6.	37.4	1394.8
1 JAN 0155	58	5.	4.3	1382.5	1 JAN 0515	158	601.	37.4	1395.7	1 JAN 0835	258	6.	37.4	1394.8
1 JAN 0157	59	6.	4.4	1382.6	1 JAN 0517	159	558.	37.4	1395.6	1 JAN 0837	259	5.	37.4	1394.8
1 JAN 0159	60	6.	4.5	1382.6	1 JAN 0519	160	521.	37.4	1395.6	1 JAN 0839	260	5.	37.4	1394.8
1 JAN 0201	61	7.	4.6	1382.6	1 JAN 0521	161	484.	37.4	1395.5	1 JAN 0841	261	5.	37.4	1394.8
1 JAN 0203	62	7.	4.7	1382.7	1 JAN 0523	162	449.	37.4	1395.5	1 JAN 0843	262	5.	37.4	1394.8
1 JAN 0205	63	8.	4.8	1382.7	1 JAN 0525	163	417.	37.4	1395.4	1 JAN 0845	263	4.	37.4	1394.8
1 JAN 0207	64	8.	4.9	1382.8	1 JAN 0527	164	390.	37.4	1395.4	1 JAN 0847	264	4.	37.4	1394.8
1 JAN 0209	65	9.	5.0	1382.8	1 JAN 0529	165	366.	37.4	1395.3	1 JAN 0849	265	4.	37.4	1394.8
1 JAN 0211	66	9.	5.1	1382.9	1 JAN 0531	166	341.	37.4	1395.3	1 JAN 0851	266	4.	37.4	1394.8
1 JAN 0213	67	9.	5.2	1382.9	1 JAN 0533	167	316.	37.4	1395.3	1 JAN 0853	267	4.	37.4	1394.8
1 JAN 0215	68	10.	5.3	1382.9	1 JAN 0535	168	293.	37.4	1395.2	1 JAN 0855	268	3.	37.4	1394.8
1 JAN 0217	69	10.	5.4	1383.0	1 JAN 0537	169	271.	37.4	1395.2	1 JAN 0857	269	3.	37.4	1394.8
1 JAN 0219	70	11.	5.4	1383.0	1 JAN 0539	170	254.	37.4	1395.2	1 JAN 0859	270	3.	37.4	1394.8
1 JAN 0221	71	11.	5.5	1383.1	1 JAN 0541	171	239.	37.4	1395.1	1 JAN 0901	271	3.	37.4	1394.8
1 JAN 0223	72	12.	5.6	1383.1	1 JAN 0543	172	224.	37.4	1395.1	1 JAN 0903	272	3.	37.4	1394.8
1 JAN 0225	73	12.	5.7	1383.2	1 JAN 0545	173	209.	37.4	1395.1	1 JAN 0905	273	2.	37.4	1394.8
1 JAN 0227	74	13.	5.8	1383.2	1 JAN 0547	174	195.	37.4	1395.1	1 JAN 0907	274	2.	37.4	1394.8
1 JAN 0229	75	13.	5.9	1383.2	1 JAN 0549	175	183.	37.4	1395.1	1 JAN 0909	275	2.	37.4	1394.8
1 JAN 0231	76	13.	6.0	1383.3	1 JAN 0551	176	172.	37.4	1395.0	1 JAN 0911	276	2.	37.4	1394.8
1 JAN 0233	77	14.	6.1	1383.3	1 JAN 0553	177	162.	37.4	1395.0	1 JAN 0913	277	2.	37.4	1394.8
1 JAN 0235	78	14.	6.2	1383.4	1 JAN 0555	178	154.	37.4	1395.0	1 JAN 0915	278	2.	37.4	1394.8
1 JAN 0237	79	15.	6.3	1383.4	1 JAN 0557	179	147.	37.4	1395.0	1 JAN 0917	279	2.	37.4	1394.8
1 JAN 0239	80	15.	6.3	1383.4	1 JAN 0559	180	142.	37.4	1395.0	1 JAN 0919	280	1.	37.4	1394.8
1 JAN 0241	81	15.	6.4	1383.5	1 JAN 0601	181	137.	37.4	1395.0	1 JAN 0921	281	1.	37.4	1394.8
1 JAN 0243	82	16.	6.5	1383.5	1 JAN 0603	182	131.	37.4	1395.0	1 JAN 0923	282	1.	37.4	1394.8
1 JAN 0245	83	16.	6.6	1383.5	1 JAN 0605	183	125.	37.4	1395.0	1 JAN 0925	283	1.	37.4	1394.8
1 JAN 0247	84	17.	6.7	1383.6	1 JAN 0607	184	120.	37.4	1395.0	1 JAN 0927	284	1.	37.4	1394.8
1 JAN 0249	85	17.	6.7	1383.6	1 JAN 0609	185	114.	37.4	1394.9	1 JAN 0929	285	1.	37.4	1394.8
1 JAN 0251	86	17.	6.8	1383.6	1 JAN 0611	186	109.	37.4	1394.9	1 JAN 0931	286	1.	37.4	1394.8
1 JAN 0253	87	18.	6.9	1383.7	1 JAN 0613	187	105.	37.4	1394.9	1 JAN 0933	287	1.	37.4	1394.8
1 JAN 0255	88	18.	7.0	1383.7	1 JAN 0615	188	101.	37.4	1394.9	1 JAN 0935	288	1.	37.4	1394.8
1 JAN 0257	89	18.	7.1	1383.7	1 JAN 0617	189	97.	37.4	1394.9	1 JAN 0937	289	1.	37.4	1394.8

1	JAN	0259	90	19.	7.1	1383.8	*	1 JAN 0619	190	93.	37.4	1394.9	*	1 JAN 0939	290	1.	37.4	1394.8
1	JAN	0301	91	19.	7.2	1383.8	*	1 JAN 0621	191	90.	37.4	1394.9	*	1 JAN 0941	291	1.	37.4	1394.8
1	JAN	0303	92	19.	7.3	1383.8	*	1 JAN 0623	192	87.	37.4	1394.9	*	1 JAN 0943	292	1.	37.4	1394.8
1	JAN	0305	93	20.	7.4	1383.9	*	1 JAN 0625	193	84.	37.4	1394.9	*	1 JAN 0945	293	0.	37.4	1394.8
1	JAN	0307	94	20.	7.4	1383.9	*	1 JAN 0627	194	82.	37.4	1394.9	*	1 JAN 0947	294	0.	37.4	1394.8
1	JAN	0309	95	21.	7.5	1384.0	*	1 JAN 0629	195	79.	37.4	1394.9	*	1 JAN 0949	295	0.	37.4	1394.8
1	JAN	0311	96	21.	7.6	1384.0	*	1 JAN 0631	196	77.	37.4	1394.9	*	1 JAN 0951	296	0.	37.4	1394.8
1	JAN	0313	97	21.	7.7	1384.0	*	1 JAN 0633	197	75.	37.4	1394.9	*	1 JAN 0953	297	0.	37.4	1394.8
1	JAN	0315	98	21.	7.8	1384.1	*	1 JAN 0635	198	73.	37.4	1394.9	*	1 JAN 0955	298	0.	37.4	1394.8
1	JAN	0317	99	21.	7.8	1384.1	*	1 JAN 0637	199	72.	37.4	1394.9	*	1 JAN 0957	299	0.	37.4	1394.8
1	JAN	0319	100	22.	7.9	1384.1	*	1 JAN 0639	200	71.	37.4	1394.9	*	1 JAN 0959	300	0.	37.4	1394.8
							*						*					

****

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	9.97-HR
+ (CFS)	(HR)					
		(CFS)				
+ 2315.	4.50		310.	188.	188.	188.
		(INCHES)	1.439	1.447	1.447	1.447
		(AC-FT)	154.	155.	155.	155.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	9.97-HR
+ (AC-FT)	(HR)				
37.	4.33	37.	24.	24.	24.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	9.97-HR
+ (FEET)	(HR)				
1398.25	4.50	1394.92	1390.17	1390.17	1390.17

CUMULATIVE AREA = 2.01 SQ MI

-----DSS---ZOPEN: Version: 6-EA; Existing File Opened
Unit: 71, File: TTM-NOW.DSS
-----DSS---ZWRITE Unit 71; Vers. 7: /TATUM/OUTFLOW/FLOW/01JAN1996/2MIN/WO/
-----DSS---ZWRITE Unit 71; Vers. 7: /TATUM/OUTFLOW/STAGE/01JAN1996/2MIN/WO/
1

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	S1B	319.	4.20	44.	27.	27.	.23		
+	ROUTED TO	RS1B	311.	4.27	44.	27.	27.	.23		
+									1.04	4.27
+	HYDROGRAPH AT	S1A	458.	4.20	63.	38.	38.	.33		
+	ROUTED TO	RS1A	450.	4.27	63.	38.	38.	.33		
+									1.49	4.27
+	HYDROGRAPH AT	S1C	138.	4.20	21.	13.	13.	.11		
+	3 COMBINED AT	CP1C	892.	4.27	128.	77.	77.	.67		
+	ROUTED TO	RCP1C	881.	4.33	128.	77.	77.	.67		
+									2.30	4.33
+	HYDROGRAPH AT	S1D	418.	4.20	59.	36.	36.	.31		
+	ROUTED TO	RS1D	413.	4.27	59.	36.	36.	.31		
+									1.40	4.27
+	HYDROGRAPH AT	S1E	647.	4.27	97.	59.	59.	.51		
+	3 COMBINED AT	CP1E	1911.	4.30	284.	172.	172.	1.49		
+	ROUTED TO	RCP1E	1895.	4.33	284.	172.	172.	1.49		
+									5.06	4.33
+	HYDROGRAPH AT	S1F	331.	4.27	53.	32.	32.	.28		
+	2 COMBINED AT	CP1F	2212.	4.33	337.	204.	204.	1.77		
+	DIVERSION TO	DIV1	0.	4.33	0.	0.	0.	1.77		
+	HYDROGRAPH AT	PARK	2212.	4.33	337.	204.	204.	1.77		
+	ROUTED TO	RCFI	2171.	4.40	337.	204.	204.	1.77		
+									4.93	4.40
+	HYDROGRAPH AT	S2A1	88.	4.10	11.	7.	7.	.06		
	2 COMBINED AT									

+		CP2A1	2219.	4.40	348.	211.	211.	1.83	
	ROUTED TO								
+		RCP21	2213.	4.43	348.	211.	211.	1.83	
+									3.99 4.43
	HYDROGRAPH AT								
+		S2A2	32.	4.30	7.	4.	4.	.04	
	2 COMBINED AT								
+		CP2A2	2244.	4.43	355.	215.	215.	1.87	
	ROUTED TO								
+		RCP22	2244.	4.43	355.	215.	215.	1.87	
+									5.51 4.43
	HYDROGRAPH AT								
+		S2B	36.	4.07	4.	3.	3.	.03	
	2 COMBINED AT								
+		CP2B	2261.	4.43	359.	218.	218.	1.89	
	ROUTED TO								
+		RCP2B	2252.	4.47	359.	218.	218.	1.89	
+									2.84 4.47
	HYDROGRAPH AT								
+		S2C	37.	4.07	5.	3.	3.	.03	
	2 COMBINED AT								
+		CP2C	2268.	4.47	364.	221.	221.	1.92	
	ROUTED TO								
+		RCP2C	2268.	4.47	364.	221.	221.	1.92	
+									3.49 4.47
	HYDROGRAPH AT								
+		S2D	28.	4.10	4.	2.	2.	.02	
	HYDROGRAPH AT								
+		S2I	38.	4.07	5.	3.	3.	.03	
	3 COMBINED AT								
+		CP2DI	2301.	4.47	372.	226.	226.	1.97	
	ROUTED TO								
+		RCPDI	2291.	4.50	372.	226.	226.	1.97	
+									3.65 4.50
	HYDROGRAPH AT								
+		S2E	32.	4.17	6.	3.	3.	.03	
	2 COMBINED AT								
+		CP2E	2315.	4.50	378.	229.	229.	2.01	
	ROUTED TO								
+		BSN-A	2315.	4.50	310.	188.	188.	2.01	
+									1398.25 4.50
	DIVERSION TO								
+		DVRT1	151.	4.50	66.	41.	41.	2.01	
	HYDROGRAPH AT								
+		SPILL1	2164.	4.50	244.	147.	147.	2.01	

*** NORMAL END OF HEC-1 ***

-----DSS---ZCLOSE Unit: 71, File: TTM-NOW.DSS
Pointer Utilization: .25
Number of Records: 2
File Size: 16.9 Kbytes
Percent Inactive: .00

```
1**************************************
*                                    *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)*
*         SEPTEMBER 1990             *
*           VERSION 4.0              *
*                                    *
*  RUN DATE  07/10/1997  TIME  15:53:06*
*                                    *
**************************************
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```
**************************************
*                                    *
*    U.S. ARMY CORPS OF ENGINEERS    *
*    HYDROLOGIC ENGINEERING CENTER   *
*          609 SECOND STREET         *
*       DAVIS, CALIFORNIA 95616      *
*          (916) 756-1104            *
*                                    *
**************************************
```

```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X               X
XXXXXXX  XXXX     X       XXXXX   X
X     X  X        X               X
X     X  X        X     X         X
X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

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


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

   1          ID   TATUM WASH PROJECT SUB-AREAS 1 AND 2  COMBINED  - 2/9/95
   2          ID   100YR-6HR STORM = 3.20". ASSUMED NORMAL CONDITION W/ DTHETA=0.250
   3          ID   STORM SIZE = 2.28 SQ. MI (TOTAL AREA)
   4          ID   HYDROGRAPH PLOT FOR 5 DETENTION BASIN SITES (*.DSS)
   5          ID   DETENTION BASIN A LOCATED SOUTH OF SHEA BLVD
   6          ID   SPILLWAY IS OVER THE S/W INTO THE ROAD
   7          ID   NO LOW FLOW OUTLET IINCLUDED FOR PERSERVE BASIN SIZING
   8          ID   FILE:TTM-NO.DAT
              *DIAGRAM
   9          IT       2  1JAN96    0001    2000
  10          IO       5

  11          KK     S1B
  12          KM   SUB-BASIN S1B
  13          KM   6-HOUR RAINFALL, PATTERN NO. 1.88 WAS USED TO FIND TC & R FOR THIS BASIN
  14          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .978
  15          KO       5
  16          BA    .230
  17          IN      15
  18          KM   RAINFALL DEPTH OF 3.20 WAS SPACIALLY REDUCED AS SHOWN BY THE PB RECORD
  19          PB   3.131
  20          KM   THE FOLLOWING PC RECORD USED A 6-HOUR STORM WITH A PATTERN No. OF 1.88
  21          PC    .000    .009    .016    .025    .034    .042    .051    .059    .067    .076
  22          PC    .087    .100    .120    .160    .248    .442    .711    .846    .904    .939
  23          PC    .951    .964    .976    .988   1.000
  24          LG    .200    .250   4.300    .500  35.000
  25          UC    .363    .185
  26          UA       0       3       5       8      12      20      43      75      90      96
  27          UA     100

  28          KK    RS1B
  29          KM    ROUTING THROUGH S1C
  30          KO       5
  31          RS       3    FLOW      -1
  32          RC    .035    .035    .035    2138    .028
  33          RX       0      36      66      90     126     150     168     228
  34          RY       7       7       7       0       0       4       6      22

  35          KK     S1A
  36          KM   SUB-BASIN S1A
  37          KO       5
  38          BA    .330
  39          LG    .200    .250   4.300    .500  35.000
  40          UC    .363    .185
  41          UA       0       3       5       8      12      20      43      75      90      96
  42          UA     100

  43          KK    RS1A
  44          KM    ROUTING THROUGH S1C
  45          KO       5
  46          RS       3    FLOW      -1
  47          RC    .035    .035    .035    2025    .030
  48          RX       0     0.5       1     126     136     251     252     253
  49          RY       5       5       5       0       0       5       5       5
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LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  50          KK     S1C
  51          KM   SUB-BASIN S1C
  52          KO       5
  53          BA    .110
  54          LG    .200    .250   4.300    .500  35.000
  55          UC    .329    .265
  56          UA       0       3       5       8      12      20      43      75      90      96
  57          UA     100

  58          KK    CP1C
  59          KM    ADDITION OF 3 HYDROGRAPHS
```

```
 60          KM    POTENTIAL DETENTION BASIN SITE 1
 61          KO       5
 62          HC       3

 63          KK   RCP1C
 64          KM    ROUTING THROUGH S1E
 65          KO       5
 66          RS       5    FLOW      -1
 67          RC    .035    .035    .035    3600    .017
 68          RX       0      42      72      84     120     138     180     216
 69          RY       9     8.5       4       0       0       4       6       8

 70          KK    S1D
 71          KM   SUB-BASIN S1D
 72          KO       5
 73          BA    .310
 74          LG    .200    .250   4.300    .500  35.000
 75          UC    .363    .205
 76          UA       0       3       5       8      12      20      43      75      90      96
 77          UA     100

 78          KK    RS1D
 79          KM    ROUTING THROUGH S1E
 80          KO       5
 81          RS       3    FLOW      -1
 82          RC    .035    .035    .035    2138    .019
 83          RX       0      36      72      96     132     168     204     240
 84          RY       8       6       4       0       0       8      10      11

 85          KK    S1E
 86          KM   SUB-BASIN S1E
 87          KO       5
 88          BA    .510
 89          LG    .200    .250   4.300    .500  35.000
 90          UC    .433    .242
 91          UA       0       3       5       8      12      20      43      75      90      96
 92          UA     100
1                                        HEC-1 INPUT                                        PAGE  3

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

 93          KK    CP1E
 94          KM    CONCENTRATION OF 3 HYDROGRAPHS
 95          KM    POTENTIAL DETENTION BASIN SITE 2
 96          KO       5
 97          HC       3

 98          KK   RCP1E
 99          KM    ROUTING THROUGH S1F
100          KO       5
101          RS       3    FLOW      -1
102          RC    .035    .035    .035    2250    .014
103          RX       0      48      84     120     144     180     240     288
104          RY      12      10       6       2       0       8      10      11

105          KK    S1F
106          KM   SUB-BASIN S1F
107          KO       5
108          BA    .280
109          LG    .200    .250   4.300    .500  35.000
110          UC    .413    .300
111          UA       0       3       5       8      12      20      43      75      90      96
112          UA     100

113          KK    CP1F
114          KM    POTENTIAL DETENTION BASIN SITE 3
115          KO       5
116          HC       2

117          KK    PARK
118          KO       3
119          KM   CITY OF PHX EQUESTRIAN PARK IN MTN PRESERVE
120          KM   PROPOSED FUTURE PHASE OF TATUM WASH PROJECT
121          DT    DIV1     145
122          DI       0   10000
123          DQ       0   10000

124          KK    RCFI
125          KO       5
126          RS       2    FLOW      -1
127          RC    .035     .03    .035  1100.0  0.0009
128          RX       0      30      60      90     120     150     180     210
129          RY       5       3       1       0       0       1       3       5

130          KK    S2A1
131          KM   SUB-BASIN S2A1
132          KO       5
133          BA   0.056
134          LG   0.150   0.250   4.300   0.400  35.000
135          UC   0.217   0.155
136          UA       0       3       5       8      12      20      43      75      90      96
137          UA     100
1                                        HEC-1 INPUT                                        PAGE  4

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

138          KK   CP2A1
139          KM   COMBINE AT 40TH STREET
140          KM   POTENTIAL DETENTION BASIN SITE 4
141          KO       5
142          HC       2

143          KK   RCP21
144          KO       5
145          RS       2    FLOW      -1
146          RC    .035     .03    .035    1360   .0162
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147          RX       0      30      40      50      70      80     110     130
148          RY       8       6       2       0       0       2       4       6

149          KK    S2A2
150          KO       5
151          BA   0.039
152          LG    0.10    0.20    4.30    0.40    15.0
153          UC   0.471   0.595
154          UA       0       5      16      30      65      77      84      90      94      97
155          UA     100

156          KK   CP2A2
157          KM   COMBINE AT FANFOL DRIVE  (NO DIVERSION AS PER FIELD INSPECTION)
158          KO       5
159          HC       2

160          KK   RCP22
161          KO       5
162          RS       1    FLOW      -1
163          RC    .035     .03    .035   820.0  0.0106
164          RX       0      30      70      80     100     110   110.5     120
165          RY       8       7       6       0       0       4       6       8

166          KK    S2B
167          KM   SUB-BASIN S2B
168          KO       5
169          BA   0.027
170          LG   0.100   0.250   4.300   0.400  15.000
171          UC   0.246   0.221
172          UA       0       5      16      30      65      77      84      90      94      97
173          UA     100

174          KK    CP2B
175          HC       2

176          KK   RCP2B
177          KO       5
178          RS       1    FLOW      -1
179          RC    .035    0.03   0.035   680.0  0.0088
180          RX       0      10      20      70     120     130     140     200
181          RY     2.5       2       2       0       0       1       2       3
1                                        HEC-1 INPUT                                    PAGE  5

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

182          KK    S2C
183          KM   SUB-BASIN S2C
184          KO       5
185          BA   0.028
186          LG   0.100   0.250   4.300   0.400  15.000
187          UC   0.250   0.214
188          UA       0       5      16      30      65      77      84      90      94      97
189          UA     100

190          KK    CP2C
191          KM   CROSSING THRU VIA ESTRELLA ALIGNMENT
192          KO       5
193          HC       2

194          KK   RCP2C
195          KO       5
196          RS       2    FLOW      -1
197          RC    .035     .03    .035  1040.0  0.0144
198          RX       0      50      70     100     120     130     140     180
199          RY       4       5       3       0       0       1       2     2.5

200          KK    S2D
201          KM   SUB-BASIN S2D
202          KO       5
203          BA   0.024
204          LG   0.100   0.250   4.300   0.400  15.000
205          UC   0.288   0.292
206          UA       0       5      16      30      65      77      84      90      94      97
207          UA     100

208          KK    S2I
209          KM   SUB-BASIN S2I
210          KO       5
211          BA   0.028
212          LG   0.100   0.250   4.300   0.400   20.00
213          UC   0.233   0.227
214          UA       0       5      16      30      65      77      84      90      94      97
215          UA     100

216          KK   CP2DI
217          KO       5
218          HC       3

219          KK   RCPDI
220          KO       5
221          RS       3    FLOW      -1
222          RC    .035     .03    .035  2059.0  0.0107
223          RX       0      30      40      90     100   100.5     101     110
224          RY       5       3       1       0       0       1       3       3
1                                        HEC-1 INPUT                                    PAGE  6

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

225          KK    S2E
226          KM   SUB-BASIN S2E
227          KO       5
228          BA   0.033
229          LG    0.10   0.250   4.300   0.400  20.000
230          UC   0.367   0.443
231          UA       0       5      16      30      65      77      84      90      94      97
232          UA     100
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233          KK    CP2E
234          KM   AT SHEA BLVD, POTENTIAL DETENTION BASIN SITE 5
235          HC       2

236          KK   BSN-A
237          KO       2        0
238          ZW   A=TATUM  B=INFLOW  C=FLOW  E=2MIN  F=WO
239          KM   DETENTION BASIN LOCATED ON THE SOUTH SIDE OF SHEA BLVD
240          ZW   A=TATUM  B=OUTFLOW C=STAGE E=2MIN  F=WO
241          RS       1    STOR      -1
242          SV       0    3.13     7.63    12.51    17.80    23.49    29.61    32.83    36.16    36.16
243          SQ       0       0        0        0        0        0        0        0      126      893
244          SE  1380.5    1382     1384     1386     1388     1390     1392     1393     1394     1395

245          KK  SPILL1
246          KM   ACTUAL LOW FLOWS GO TO SHEA STORM DRAIN
247          KM   DIVERSION BASED UPON STAGED OUTLET
248          KM   LOW FLOW WILL BE CONSIDERED FOR SIZING UPPER BASIN
249          DT   DVRT1
250          DI       0       50      132     2400
251          DQ       0        0        0        1      — No outFlow to S.D.
252          ZZ
```

1

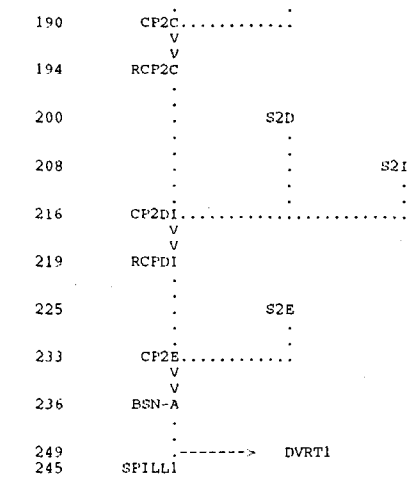
SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE NO.

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

(.) CONNECTOR (<----) RETURN OF DIVERTED OR PUMPED FLOW

```
 11        S1B
            V
            V
 28        RS1B
            .
            .
 35          .          S1A
             .           V
             .           V
 43          .         RS1A
             .           .
             .           .
 50          .           .          S1C
             .           .           .
             .           .           .
 58        CP1C.........................
            V
            V
 63        RCP1C
            .
            .
 70          .          S1D
             .           V
             .           V
 78          .         RS1D
             .           .
             .           .
 85          .           .          S1E
             .           .           .
             .           .           .
 93        CP1E.........................
            V
            V
 98        RCP1E
            .
            .
105          .          S1F
             .           .
             .           .
113        CP1F............
            .
            .
121         .-------->    DIV1
117       PARK
            V
            V
124       RCF1
            .
            .
130         .         S2A1
            .           .
            .           .
138       CP2A1............
            V
            V
143       RCP21
            .
            .
149         .         S2A2
            .           .
            .           .
156       CP2A2............
            V
            V
160       RCP22
            .
            .
166         .          S2B
            .           .
            .           .
174        CP2B............
            V
            V
176       RCP2B
            .
            .
182         .          S2C
            .           .
```



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
*****************************************
*                                       *
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*                                       *
*            SEPTEMBER 1990             *
*                                       *
*             VERSION 4.0               *
*                                       *
*                                       *
*                                       *
*  RUN DATE  07/10/1997  TIME  15:53:06 *
*                                       *
*                                       *
*                                       *
*****************************************
```

U.S. ARMY CORPS OF ENGINEERS
HYDROLOGIC ENGINEERING CENTER
609 SECOND STREET
DAVIS, CALIFORNIA 95616
(916) 756-1104

TATUM WASH PROJECT SUB-AREAS 1 AND 2 COMBINED - 2/9/95
100YR-6HR STORM = 3.20". ASSUMED NORMAL CONDITION W/ DTHETA=0.250
STORM SIZE = 2.28 SQ. MI (TOTAL AREA)
HYDROGRAPH PLOT FOR 5 DETENTION BASIN SITES (*.DSS)
DETENTION BASIN A LOCATED SOUTH OF SHEA BLVD
SPILLWAY IS OVER THE S/W INTO THE ROAD
NO LOW FLOW OUTLET IINCLUDED FOR PERSERVE BASIN SIZING
FILE:TTM-NO.DAT

*** ERROR *** SPECIFIED START AND END DATES RESULT IN TOO MANY TIME PERIODS

10 IO OUTPUT CONTROL VARIABLES

IPRNT	5	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

NMIN	2	MINUTES IN COMPUTATION INTERVAL
IDATE	1JAN96	STARTING DATE
ITIME	0001	STARTING TIME
NQ	300	NUMBER OF HYDROGRAPH ORDINATES
NDDATE	1JAN96	ENDING DATE
NDTIME	0959	ENDING TIME
ICENT	19	CENTURY MARK

COMPUTATION INTERVAL .03 HOURS
TOTAL TIME BASE 9.97 HOURS

ENGLISH UNITS

DRAINAGE AREA	SQUARE MILES
PRECIPITATION DEPTH	INCHES
LENGTH, ELEVATION	FEET
FLOW	CUBIC FEET PER SECOND
STORAGE VOLUME	ACRE-FEET
SURFACE AREA	ACRES
TEMPERATURE	DEGREES FAHRENHEIT

15 KO OUTPUT CONTROL VARIABLES

IPRNT	5	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

30 KO OUTPUT CONTROL VARIABLES

IPRNT	5	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

37 KO OUTPUT CONTROL VARIABLES

IPRNT	5	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

45 KO OUTPUT CONTROL VARIABLES

```
                    IPRNT             5  PRINT CONTROL
                    IPLOT             0  PLOT CONTROL
                    QSCAL            0.  HYDROGRAPH PLOT SCALE

   52 KO        OUTPUT CONTROL VARIABLES
                    IPRNT             5  PRINT CONTROL
                    IPLOT             0  PLOT CONTROL
                    QSCAL            0.  HYDROGRAPH PLOT SCALE

   61 KO        OUTPUT CONTROL VARIABLES
                    IPRNT             5  PRINT CONTROL
                    IPLOT             0  PLOT CONTROL
                    QSCAL            0.  HYDROGRAPH PLOT SCALE

   65 KO        OUTPUT CONTROL VARIABLES
                    IPRNT             5  PRINT CONTROL
                    IPLOT             0  PLOT CONTROL
                    QSCAL            0.  HYDROGRAPH PLOT SCALE

   72 KO        OUTPUT CONTROL VARIABLES
                    IPRNT             5  PRINT CONTROL
                    IPLOT             0  PLOT CONTROL
                    QSCAL            0.  HYDROGRAPH PLOT SCALE

   80 KO        OUTPUT CONTROL VARIABLES
                    IPRNT             5  PRINT CONTROL
                    IPLOT             0  PLOT CONTROL
                    QSCAL            0.  HYDROGRAPH PLOT SCALE

   87 KO        OUTPUT CONTROL VARIABLES
                    IPRNT             5  PRINT CONTROL
                    IPLOT             0  PLOT CONTROL
                    QSCAL            0.  HYDROGRAPH PLOT SCALE

   96 KO        OUTPUT CONTROL VARIABLES
                    IPRNT             5  PRINT CONTROL
                    IPLOT             0  PLOT CONTROL
                    QSCAL            0.  HYDROGRAPH PLOT SCALE

  100 KO        OUTPUT CONTROL VARIABLES
                    IPRNT             5  PRINT CONTROL
                    IPLOT             0  PLOT CONTROL
                    QSCAL            0.  HYDROGRAPH PLOT SCALE

  107 KO        OUTPUT CONTROL VARIABLES
                    IPRNT             5  PRINT CONTROL
                    IPLOT             0  PLOT CONTROL
                    QSCAL            0.  HYDROGRAPH PLOT SCALE

  115 KO        OUTPUT CONTROL VARIABLES
                    IPRNT             5  PRINT CONTROL
                    IPLOT             0  PLOT CONTROL
                    QSCAL            0.  HYDROGRAPH PLOT SCALE


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

            **************
            *            *
  117 KK    *     PARK   *
            *            *
            **************

  118 KO        OUTPUT CONTROL VARIABLES
                    IPRNT             3  PRINT CONTROL
                    IPLOT             0  PLOT CONTROL
                    QSCAL            0.  HYDROGRAPH PLOT SCALE
                         CITY OF PHX EQUESTRIAN PARK IN MTN PRESERVE
                         PROPOSED FUTURE PHASE OF TATUM WASH PROJECT

      DT        DIVERSION
                    ISTAD          DIV1  DIVERSION HYDROGRAPH IDENTIFICATION
                   DSTRMX        145.00  MAXIMUM VOLUME TO BE DIVERTED

      DI           INFLOW           .00  10000.00

      DQ      DIVERTED FLOW         .00  10000.00

                                                               ***

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

                     DIVERSION HYDROGRAPH      DIV1

  PEAK FLOW     TIME                         MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR       72-HR      9.97-HR
+   (CFS)       (HR)
                           (CFS)
+    2212.      4.33                292.        176.        176.        176.
                         (INCHES)  1.536       1.536       1.536       1.536
                          (AC-FT)   145.        145.        145.        145.

                     CUMULATIVE AREA =     1.77 SQ MI

      ***          ***          ***          ***          ***
                     HYDROGRAPH AT STATION     PARK

  PEAK FLOW     TIME                         MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR       72-HR      9.97-HR
+   (CFS)       (HR)
                           (CFS)
+     592.      4.97                 47.         28.         28.         28.
                         (INCHES)   .247        .247        .247        .247
                          (AC-FT)    23.         23.         23.         23.
```

```
                              CUMULATIVE AREA =     1.77 SQ MI

 125 KO          OUTPUT CONTROL VARIABLES
                        IPRNT             5  PRINT CONTROL
                        IPLOT             0  PLOT CONTROL
                        QSCAL            0.  HYDROGRAPH PLOT SCALE

 132 KO          OUTPUT CONTROL VARIABLES
                        IPRNT             5  PRINT CONTROL
                        IPLOT             0  PLOT CONTROL
                        QSCAL            0.  HYDROGRAPH PLOT SCALE

 141 KO          OUTPUT CONTROL VARIABLES
                        IPRNT             5  PRINT CONTROL
                        IPLOT             0  PLOT CONTROL
                        QSCAL            0.  HYDROGRAPH PLOT SCALE

 144 KO          OUTPUT CONTROL VARIABLES
                        IPRNT             5  PRINT CONTROL
                        IPLOT             0  PLOT CONTROL
                        QSCAL            0.  HYDROGRAPH PLOT SCALE

 150 KO          OUTPUT CONTROL VARIABLES
                        IPRNT             5  PRINT CONTROL
                        IPLOT             0  PLOT CONTROL
                        QSCAL            0.  HYDROGRAPH PLOT SCALE

 158 KO          OUTPUT CONTROL VARIABLES
                        IPRNT             5  PRINT CONTROL
                        IPLOT             0  PLOT CONTROL
                        QSCAL            0.  HYDROGRAPH PLOT SCALE

 161 KO          OUTPUT CONTROL VARIABLES
                        IPRNT             5  PRINT CONTROL
                        IPLOT             0  PLOT CONTROL
                        QSCAL            0.  HYDROGRAPH PLOT SCALE

 168 KO          OUTPUT CONTROL VARIABLES
                        IPRNT             5  PRINT CONTROL
                        IPLOT             0  PLOT CONTROL
                        QSCAL            0.  HYDROGRAPH PLOT SCALE

 177 KO          OUTPUT CONTROL VARIABLES
                        IPRNT             5  PRINT CONTROL
                        IPLOT             0  PLOT CONTROL
                        QSCAL            0.  HYDROGRAPH PLOT SCALE

 184 KO          OUTPUT CONTROL VARIABLES
                        IPRNT             5  PRINT CONTROL
                        IPLOT             0  PLOT CONTROL
                        QSCAL            0.  HYDROGRAPH PLOT SCALE

 192 KO          OUTPUT CONTROL VARIABLES
                        IPRNT             5  PRINT CONTROL
                        IPLOT             0  PLOT CONTROL
                        QSCAL            0.  HYDROGRAPH PLOT SCALE

 195 KO          OUTPUT CONTROL VARIABLES
                        IPRNT             5  PRINT CONTROL
                        IPLOT             0  PLOT CONTROL
                        QSCAL            0.  HYDROGRAPH PLOT SCALE

 202 KO          OUTPUT CONTROL VARIABLES
                        IPRNT             5  PRINT CONTROL
                        IPLOT             0  PLOT CONTROL
                        QSCAL            0.  HYDROGRAPH PLOT SCALE

 210 KO          OUTPUT CONTROL VARIABLES
                        IPRNT             5  PRINT CONTROL
                        IPLOT             0  PLOT CONTROL
                        QSCAL            0.  HYDROGRAPH PLOT SCALE

 217 KO          OUTPUT CONTROL VARIABLES
                        IPRNT             5  PRINT CONTROL
                        IPLOT             0  PLOT CONTROL
                        QSCAL            0.  HYDROGRAPH PLOT SCALE

 220 KO          OUTPUT CONTROL VARIABLES
                        IPRNT             5  PRINT CONTROL
                        IPLOT             0  PLOT CONTROL
                        QSCAL            0.  HYDROGRAPH PLOT SCALE

 227 KO          OUTPUT CONTROL VARIABLES
                        IPRNT             5  PRINT CONTROL
                        IPLOT             0  PLOT CONTROL
                        QSCAL            0.  HYDROGRAPH PLOT SCALE


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

              **************
              *            *
 236 KK       *   BSN-A    *
              *            *
              **************

 237 KO          OUTPUT CONTROL VARIABLES
                        IPRNT             2  PRINT CONTROL
                        IPLOT             0  PLOT CONTROL
                        QSCAL            0.  HYDROGRAPH PLOT SCALE
                           DETENTION BASIN LOCATED ON THE SOUTH SIDE OF SHEA BLVD

                HYDROGRAPH ROUTING DATA
```

```
241 RS          STORAGE ROUTING
                     NSTPS          1  NUMBER OF SUBREACHES
                      ITYP       STOR  TYPE OF INITIAL CONDITION
                     RSVRIC      -1.00  INITIAL CONDITION
                         X        .00 WORKING R AND D COEFFICIENT

242 SV          STORAGE          .0      3.1     7.6    12.5    17.8    23.5    29.6    32.8    36.2    36.2

243 SQ          DISCHARGE        0.      0.      0.     0.      0.      0.      0.      0.      126.    893.

244 SE          ELEVATION     1380.50 1382.00 1384.00 1386.00 1388.00 1390.00 1392.00 1393.00 1394.00 1395.00
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***

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HYDROGRAPH AT STATION BSN-A

****

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1	JAN	0001	1	0.	3.1	1382.0	1	JAN	0321	101	0.	3.8	1382.3	1	JAN	0641	201	87.	35.1	1393.7
1	JAN	0003	2	0.	3.1	1382.0	1	JAN	0323	102	0.	3.9	1382.3	1	JAN	0643	202	85.	35.1	1393.7
1	JAN	0005	3	0.	3.1	1382.0	1	JAN	0325	103	0.	3.9	1382.3	1	JAN	0645	203	83.	35.0	1393.7
1	JAN	0007	4	0.	3.1	1382.0	1	JAN	0327	104	0.	3.9	1382.3	1	JAN	0647	204	81.	35.0	1393.6
1	JAN	0009	5	0.	3.1	1382.0	1	JAN	0329	105	0.	3.9	1382.3	1	JAN	0649	205	79.	34.9	1393.6
1	JAN	0011	6	0.	3.1	1382.0	1	JAN	0331	106	0.	3.9	1382.4	1	JAN	0651	206	78.	34.9	1393.6
1	JAN	0013	7	0.	3.1	1382.0	1	JAN	0333	107	0.	3.9	1382.4	1	JAN	0653	207	76.	34.8	1393.6
1	JAN	0015	8	0.	3.1	1382.0	1	JAN	0335	108	0.	4.0	1382.4	1	JAN	0655	208	74.	34.8	1393.6
1	JAN	0017	9	0.	3.1	1382.0	1	JAN	0337	109	0.	4.0	1382.4	1	JAN	0657	209	72.	34.7	1393.6
1	JAN	0019	10	0.	3.1	1382.0	1	JAN	0339	110	0.	4.0	1382.4	1	JAN	0659	210	70.	34.7	1393.6
1	JAN	0021	11	0.	3.1	1382.0	1	JAN	0341	111	0.	4.1	1382.4	1	JAN	0701	211	69.	34.6	1393.5
1	JAN	0023	12	0.	3.1	1382.0	1	JAN	0343	112	0.	4.1	1382.4	1	JAN	0703	212	67.	34.6	1393.5
1	JAN	0025	13	0.	3.1	1382.0	1	JAN	0345	113	0.	4.2	1382.5	1	JAN	0705	213	65.	34.5	1393.5
1	JAN	0027	14	0.	3.1	1382.0	1	JAN	0347	114	0.	4.3	1382.5	1	JAN	0707	214	63.	34.5	1393.5
1	JAN	0029	15	0.	3.1	1382.0	1	JAN	0349	115	0.	4.3	1382.5	1	JAN	0709	215	61.	34.4	1393.5
1	JAN	0031	16	0.	3.1	1382.0	1	JAN	0351	116	0.	4.5	1382.6	1	JAN	0711	216	59.	34.4	1393.5
1	JAN	0033	17	0.	3.1	1382.0	1	JAN	0353	117	0.	4.6	1382.7	1	JAN	0713	217	57.	34.3	1393.5
1	JAN	0035	18	0.	3.1	1382.0	1	JAN	0355	118	0.	4.8	1382.7	1	JAN	0715	218	56.	34.3	1393.4
1	JAN	0037	19	0.	3.1	1382.0	1	JAN	0357	119	0.	5.0	1382.8	1	JAN	0717	219	54.	34.2	1393.4
1	JAN	0039	20	0.	3.1	1382.0	1	JAN	0359	120	0.	5.3	1383.0	1	JAN	0719	220	52.	34.2	1393.4
1	JAN	0041	21	0.	3.1	1382.0	1	JAN	0401	121	0.	5.6	1383.1	1	JAN	0721	221	50.	34.2	1393.4
1	JAN	0043	22	0.	3.1	1382.0	1	JAN	0403	122	0.	6.0	1383.3	1	JAN	0723	222	48.	34.1	1393.4
1	JAN	0045	23	0.	3.2	1382.0	1	JAN	0405	123	0.	6.5	1383.5	1	JAN	0725	223	47.	34.1	1393.4
1	JAN	0047	24	0.	3.2	1382.0	1	JAN	0407	124	0.	7.0	1383.7	1	JAN	0727	224	45.	34.0	1393.4
1	JAN	0049	25	0.	3.2	1382.0	1	JAN	0409	125	0.	7.6	1384.0	1	JAN	0729	225	43.	34.0	1393.3
1	JAN	0051	26	0.	3.2	1382.0	1	JAN	0411	126	0.	8.3	1384.3	1	JAN	0731	226	42.	33.9	1393.3
1	JAN	0053	27	0.	3.2	1382.0	1	JAN	0413	127	0.	8.9	1384.5	1	JAN	0733	227	40.	33.9	1393.3
1	JAN	0055	28	0.	3.2	1382.0	1	JAN	0415	128	0.	9.7	1384.8	1	JAN	0735	228	39.	33.9	1393.3
1	JAN	0057	29	0.	3.2	1382.0	1	JAN	0417	129	0.	10.4	1385.1	1	JAN	0737	229	37.	33.8	1393.3
1	JAN	0059	30	0.	3.2	1382.0	1	JAN	0419	130	0.	11.1	1385.4	1	JAN	0739	230	36.	33.8	1393.3
1	JAN	0101	31	0.	3.2	1382.0	1	JAN	0421	131	0.	11.8	1385.7	1	JAN	0741	231	34.	33.7	1393.3
1	JAN	0103	32	0.	3.2	1382.0	1	JAN	0423	132	0.	12.5	1386.0	1	JAN	0743	232	33.	33.7	1393.3
1	JAN	0105	33	0.	3.2	1382.0	1	JAN	0425	133	0.	13.2	1386.3	1	JAN	0745	233	32.	33.7	1393.3
1	JAN	0107	34	0.	3.2	1382.0	1	JAN	0427	134	0.	13.9	1386.5	1	JAN	0747	234	30.	33.6	1393.2
1	JAN	0109	35	0.	3.2	1382.0	1	JAN	0429	135	0.	14.5	1386.7	1	JAN	0749	235	29.	33.6	1393.2
1	JAN	0111	36	0.	3.2	1382.0	1	JAN	0431	136	0.	15.1	1387.0	1	JAN	0751	236	28.	33.6	1393.2
1	JAN	0113	37	0.	3.2	1382.0	1	JAN	0433	137	0.	15.6	1387.2	1	JAN	0753	237	27.	33.5	1393.2
1	JAN	0115	38	0.	3.2	1382.0	1	JAN	0435	138	0.	16.2	1387.4	1	JAN	0755	238	25.	33.5	1393.2
1	JAN	0117	39	0.	3.2	1382.0	1	JAN	0437	139	0.	16.6	1387.6	1	JAN	0757	239	24.	33.5	

1393.2													
1 JAN 0119	40	0.	3.2	1382.1 *	1 JAN 0439	140	0.	17.1	1387.7 *	1 JAN 0759	240	23.	33.4
1393.2													
1 JAN 0121	41	0.	3.3	1382.1 *	1 JAN 0441	141	0.	17.5	1387.9 *	1 JAN 0801	241	22.	33.4
1393.2													
1 JAN 0123	42	0.	3.3	1382.1 *	1 JAN 0443	142	0.	17.9	1388.0 *	1 JAN 0803	242	21.	33.4
1393.2													
1 JAN 0125	43	0.	3.3	1382.1 *	1 JAN 0445	143	0.	18.3	1388.2 *	1 JAN 0805	243	20.	33.4
1393.2													
1 JAN 0127	44	0.	3.3	1382.1 *	1 JAN 0447	144	0.	18.6	1388.3 *	1 JAN 0807	244	19.	33.3
1393.2													
1 JAN 0129	45	0.	3.3	1382.1 *	1 JAN 0449	145	0.	19.0	1388.4 *	1 JAN 0809	245	18.	33.3
1393.1													
1 JAN 0131	46	0.	3.3	1382.1 *	1 JAN 0451	146	0.	19.2	1388.5 *	1 JAN 0811	246	17.	33.3
1393.1													
1 JAN 0133	47	0.	3.3	1382.1 *	1 JAN 0453	147	0.	19.5	1388.6 *	1 JAN 0813	247	17.	33.3
1393.1													
1 JAN 0135	48	0.	3.3	1382.1 *	1 JAN 0455	148	0.	19.8	1388.7 *	1 JAN 0815	248	16.	33.2
1393.1													
1 JAN 0137	49	0.	3.3	1382.1 *	1 JAN 0457	149	0.	20.0	1388.8 *	1 JAN 0817	249	15.	33.2
1393.1													
1 JAN 0139	50	0.	3.3	1382.1 *	1 JAN 0459	150	0.	20.2	1388.9 *	1 JAN 0819	250	14.	33.2
1393.1													
1 JAN 0141	51	0.	3.3	1382.1 *	1 JAN 0501	151	0.	20.4	1388.9 *	1 JAN 0821	251	14.	33.2
1393.1													
1 JAN 0143	52	0.	3.3	1382.1 *	1 JAN 0503	152	0.	20.6	1389.0 *	1 JAN 0823	252	13.	33.2
1393.1													
1 JAN 0145	53	0.	3.4	1382.1 *	1 JAN 0505	153	0.	20.8	1389.1 *	1 JAN 0825	253	12.	33.2
1393.1													
1 JAN 0147	54	0.	3.4	1382.1 *	1 JAN 0507	154	0.	21.0	1389.1 *	1 JAN 0827	254	12.	33.1
1393.1													
1 JAN 0149	55	0.	3.4	1382.1 *	1 JAN 0509	155	0.	21.1	1389.2 *	1 JAN 0829	255	11.	33.1
1393.1													
1 JAN 0151	56	0.	3.4	1382.1 *	1 JAN 0511	156	0.	21.3	1389.2 *	1 JAN 0831	256	11.	33.1
1393.1													
1 JAN 0153	57	0.	3.4	1382.1 *	1 JAN 0513	157	0.	21.4	1389.3 *	1 JAN 0833	257	10.	33.1
1393.1													
1 JAN 0155	58	0.	3.4	1382.1 *	1 JAN 0515	158	0.	21.7	1389.4 *	1 JAN 0835	258	10.	33.1
1393.1													
1 JAN 0157	59	0.	3.4	1382.1 *	1 JAN 0517	159	0.	22.0	1389.5 *	1 JAN 0837	259	9.	33.1
1393.1													
1 JAN 0159	60	0.	3.4	1382.1 *	1 JAN 0519	160	0.	22.6	1389.7 *	1 JAN 0839	260	9.	33.1
1393.1													
1 JAN 0201	61	0.	3.4	1382.1 *	1 JAN 0521	161	0.	23.5	1390.0 *	1 JAN 0841	261	9.	33.1
1393.1													
1 JAN 0203	62	0.	3.4	1382.1 *	1 JAN 0523	162	0.	24.5	1390.3 *	1 JAN 0843	262	8.	33.0
1393.1													
1 JAN 0205	63	0.	3.4	1382.1 *	1 JAN 0525	163	0.	25.5	1390.7 *	1 JAN 0845	263	8.	33.0
1393.1													
1 JAN 0207	64	0.	3.5	1382.1 *	1 JAN 0527	164	0.	26.6	1391.0 *	1 JAN 0847	264	8.	33.0
1393.1													
1 JAN 0209	65	0.	3.5	1382.1 *	1 JAN 0529	165	0.	27.6	1391.3 *	1 JAN 0849	265	7.	33.0
1393.1													
1 JAN 0211	66	0.	3.5	1382.2 *	1 JAN 0531	166	0.	28.5	1391.6 *	1 JAN 0851	266	7.	33.0
1393.1													
1 JAN 0213	67	0.	3.5	1382.2 *	1 JAN 0533	167	0.	29.4	1391.9 *	1 JAN 0853	267	7.	33.0
1393.1													
1 JAN 0215	68	0.	3.5	1382.2 *	1 JAN 0535	168	0.	30.2	1392.2 *	1 JAN 0855	268	6.	33.0
1393.0													
1 JAN 0217	69	0.	3.5	1382.2 *	1 JAN 0537	169	0.	31.0	1392.4 *	1 JAN 0857	269	6.	33.0
1393.0													
1 JAN 0219	70	0.	3.5	1382.2 *	1 JAN 0539	170	0.	31.7	1392.7 *	1 JAN 0859	270	6.	33.0
1393.0													
1 JAN 0221	71	0.	3.5	1382.2 *	1 JAN 0541	171	0.	32.4	1392.9 *	1 JAN 0901	271	5.	33.0
1393.0													
1 JAN 0223	72	0.	3.5	1382.2 *	1 JAN 0543	172	7.	33.0	1393.1 *	1 JAN 0903	272	5.	33.0
1393.0													
1 JAN 0225	73	0.	3.5	1382.2 *	1 JAN 0545	173	28.	33.6	1393.2 *	1 JAN 0905	273	5.	33.0
1393.0													
1 JAN 0227	74	0.	3.5	1382.2 *	1 JAN 0547	174	45.	34.0	1393.4 *	1 JAN 0907	274	5.	33.0
1393.0													
1 JAN 0229	75	0.	3.6	1382.2 *	1 JAN 0549	175	59.	34.4	1393.5 *	1 JAN 0909	275	4.	32.9
1393.0													
1 JAN 0231	76	0.	3.6	1382.2 *	1 JAN 0551	176	71.	34.7	1393.6 *	1 JAN 0911	276	4.	32.9
1393.0													
1 JAN 0233	77	0.	3.6	1382.2 *	1 JAN 0553	177	80.	35.0	1393.6 *	1 JAN 0913	277	4.	32.9
1393.0													
1 JAN 0235	78	0.	3.6	1382.2 *	1 JAN 0555	178	88.	35.2	1393.7 *	1 JAN 0915	278	4.	32.9
1393.0													
1 JAN 0237	79	0.	3.6	1382.2 *	1 JAN 0557	179	94.	35.3	1393.7 *	1 JAN 0917	279	3.	32.9
1393.0													
1 JAN 0239	80	0.	3.6	1382.2 *	1 JAN 0559	180	99.	35.5	1393.8 *	1 JAN 0919	280	3.	32.9
1393.0													
1 JAN 0241	81	0.	3.6	1382.2 *	1 JAN 0601	181	103.	35.6	1393.8 *	1 JAN 0921	281	3.	32.9
1393.0													
1 JAN 0243	82	0.	3.6	1382.2 *	1 JAN 0603	182	106.	35.6	1393.8 *	1 JAN 0923	282	3.	32.9
1393.0													
1 JAN 0245	83	0.	3.6	1382.2 *	1 JAN 0605	183	108.	35.7	1393.9 *	1 JAN 0925	283	3.	32.9
1393.0													
1 JAN 0247	84	0.	3.6	1382.2 *	1 JAN 0607	184	110.	35.7	1393.9 *	1 JAN 0927	284	3.	32.9
1393.0													
1 JAN 0249	85	0.	3.6	1382.2 *	1 JAN 0609	185	111.	35.8	1393.9 *	1 JAN 0929	285	2.	32.9
1393.0													
1 JAN 0251	86	0.	3.7	1382.2 *	1 JAN 0611	186	111.	35.8	1393.9 *	1 JAN 0931	286	2.	32.9
1393.0													
1 JAN 0253	87	0.	3.7	1382.2 *	1 JAN 0613	187	110.	35.7	1393.9 *	1 JAN 0933	287	2.	32.9
1393.0													
1 JAN 0255	88	0.	3.7	1382.2 *	1 JAN 0615	188	110.	35.7	1393.9 *	1 JAN 0935	288	2.	32.9
1393.0													
1 JAN 0257	89	0.	3.7	1382.2 *	1 JAN 0617	189	108.	35.7	1393.9 *	1 JAN 0937	289	2.	32.9
1393.0													
1 JAN 0259	90	0.	3.7	1382.3 *	1 JAN 0619	190	107.	35.7	1393.9 *	1 JAN 0939	290	2.	32.9
1393.0													
1 JAN 0301	91	0.	3.7	1382.3 *	1 JAN 0621	191	106.	35.6	1393.8 *	1 JAN 0941	291	2.	32.9
1393.0													
1 JAN 0303	92	0.	3.7	1382.3 *	1 JAN 0623	192	104.	35.6	1393.8 *	1 JAN 0943	292	2.	32.9
1393.0													
1 JAN 0305	93	0.	3.7	1382.3 *	1 JAN 0625	193	102.	35.5	1393.8 *	1 JAN 0945	293	1.	32.9

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1393.0
   1 JAN 0307  94        0.      3.7  1382.3 *  1 JAN 0627 194     100.     35.5  1393.8 *  1 JAN 0947 294        1.     32.9
1393.0
   1 JAN 0309  95        0.      3.8  1382.3 *  1 JAN 0629 195      98.     35.4  1393.8 *  1 JAN 0949 295        1.     32.9
1393.0
   1 JAN 0311  96        0.      3.8  1382.3 *  1 JAN 0631 196      96.     35.4  1393.8 *  1 JAN 0951 296        1.     32.9
1393.0
   1 JAN 0313  97        0.      3.8  1382.3 *  1 JAN 0633 197      94.     35.3  1393.7 *  1 JAN 0953 297        1.     32.9
1393.0
   1 JAN 0315  98        0.      3.8  1382.3 *  1 JAN 0635 198      92.     35.3  1393.7 *  1 JAN 0955 298        1.     32.9
1393.0
   1 JAN 0317  99        0.      3.8  1382.3 *  1 JAN 0637 199      90.     35.2  1393.7 *  1 JAN 0957 299        1.     32.9
1393.0
   1 JAN 0319 100        0.      3.8  1382.3 *  1 JAN 0639 200      88.     35.2  1393.7 *  1 JAN 0959 300        1.     32.9
1393.0
                                     *                                              *
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*

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	9.97-HR
(CFS)	(HR)					
		(CFS)				
111.	6.17		29.	17.	17.	17.
		(INCHES)	.133	.133	.133	.133
		(AC-FT)	14.	14.	14.	14.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	9.97-HR
(AC-FT)	(HR)				
36.	6.17	29.	19.	19.	19.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	9.97-HR
(FEET)	(HR)				
1393.88	6.17	1391.81	1387.97	1387.97	1387.97

CUMULATIVE AREA = 2.01 SQ MI

```
    -----DSS---ZOPEN:  Version: 6-EA;  Existing File Opened
                       Unit:  71,  File: TTM-NO.DSS
 -----DSS---ZWRITE Unit  71; Vers.    7:  /TATUM/OUTFLOW/FLOW/01JAN1996/2MIN/WO/
 -----DSS---ZWRITE Unit  71; Vers.    7:  /TATUM/OUTFLOW/STAGE/01JAN1996/2MIN/WO/
1
```

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	S1B	319.	4.20	44.	27.	27.	.23		
ROUTED TO	RS1B	311.	4.27	44.	27.	27.	.23	1.04	4.27
HYDROGRAPH AT	S1A	458.	4.20	63.	38.	38.	.33		
ROUTED TO	RS1A	450.	4.27	63.	38.	38.	.33	1.49	4.27
HYDROGRAPH AT	S1C	138.	4.20	21.	13.	13.	.11		
3 COMBINED AT	CP1C	892.	4.27	128.	77.	77.	.67		
ROUTED TO	RCP1C	881.	4.33	128.	77.	77.	.67	2.30	4.33
HYDROGRAPH AT	S1D	418.	4.20	59.	36.	36.	.31		
ROUTED TO	RS1D	413.	4.27	59.	36.	36.	.31	1.40	4.27
HYDROGRAPH AT	S1E	647.	4.27	97.	59.	59.	.51		
3 COMBINED AT	CP1E	1911.	4.30	284.	172.	172.	1.49		
ROUTED TO	RCP1E	1895.	4.33	284.	172.	172.	1.49	5.06	4.33
HYDROGRAPH AT	S1F	331.	4.27	53.	32.	32.	.28		
2 COMBINED AT	CP1F	2212.	4.33	337.	204.	204.	1.77		
DIVERSION TO	DIV1	2212.	4.97	292.	176.	176.	1.77		
HYDROGRAPH AT	PARK	592.	4.97	47.	28.	28.	1.77		
ROUTED TO	RCF1	399.	5.17	47.	28.	28.	1.77	2.20	5.17

+	HYDROGRAPH AT	S2A1	88.	4.10	11.	7.	7.	.06	
+	2 COMBINED AT	CP2A1	402.	5.17	58.	35.	35.	1.83	
+	ROUTED TO	RCP21	398.	5.20	58.	35.	35.	1.83	
+									1.77 5.20
+	HYDROGRAPH AT	S2A2	32.	4.30	7.	4.	4.	.04	
+	2 COMBINED AT	CP2A2	408.	5.20	64.	39.	39.	1.87	
+	ROUTED TO	RCP22	403.	5.23	64.	39.	39.	1.87	
+									2.18 5.23
+	HYDROGRAPH AT	S2B	36.	4.07	4.	3.	3.	.03	
+	2 COMBINED AT	CP2B	404.	5.23	69.	42.	42.	1.89	
+	ROUTED TO	RCP2B	394.	5.27	69.	42.	42.	1.89	
+									1.22 5.27
+	HYDROGRAPH AT	S2C	37.	4.07	5.	3.	3.	.03	
+	2 COMBINED AT	CP2C	395.	5.27	73.	45.	45.	1.92	
+	ROUTED TO	RCP2C	392.	5.30	73.	45.	45.	1.92	
+									1.62 5.30
+	HYDROGRAPH AT	S2D	28.	4.10	4.	2.	2.	.02	
+	HYDROGRAPH AT	S2I	38.	4.07	5.	3.	3.	.03	
+	3 COMBINED AT	CP2DI	394.	5.30	82.	50.	50.	1.97	
+	ROUTED TO	RCPDI	379.	5.40	82.	50.	50.	1.97	
+									1.54 5.40
+	HYDROGRAPH AT	S2E	32.	4.17	6.	3.	3.	.03	
+	2 COMBINED AT	CP2E	383.	5.40	87.	53.	53.	2.01	
+	ROUTED TO	BSN-A	111.	6.17	29.	17.	17.	2.01	
+									1393.88 6.17
+	DIVERSION TO	DVRT1	0.	6.17	0.	0.	0.	2.01	
+	HYDROGRAPH AT	SPILL1	111.	6.17	29.	17.	17.	2.01	

*** NORMAL END OF HEC-1 *** — No Out-Flow to S.D.

```
-----DSS---ZCLOSE Unit:  71,   File: TTM-NO.DSS
          Pointer Utilization:    .25
          Number of Records:      2
          File Size:      16.9  Kbytes
          Percent Inactive:    .00
```

```
1*************************************
*                                   *
*   FLOOD HYDROGRAPH PACKAGE (HEC-1)*
*         SEPTEMBER 1990            *
*          VERSION 4.0              *
*                                   *
*  RUN DATE  07/22/1997  TIME  15:37:28*
*                                   *
*************************************
```


```
*************************************
*                                   *
*    U.S. ARMY CORPS OF ENGINEERS   *
*    HYDROLOGIC ENGINEERING CENTER  *
*         609 SECOND STREET         *
*       DAVIS, CALIFORNIA 95616     *
*           (916) 756-1104          *
*                                   *
*************************************
```


```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X                X
XXXXXXX  XXXX     X        XXXXX   X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS *HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.*

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


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

   1          ID   TATUM WASH PROJECT SUB-AREAS 1 AND 2  COMBINED  - 2/9/95
   2          ID   100YR-6HR STORM = 3.20". ASSUMED NORMAL CONDITION W/ DTHETA=0.250
   3          ID   STORM SIZE = 2.28 SQ. MI (TOTAL AREA)
   4          ID   HYDROGRAPH PLOT FOR 5 DETENTION BASIN SITES (*.DSS)
   5          ID   DETENTION BASIN A LOCATED SOUTH OF SHEA BLVD
   6          ID   SPILLWAY IS OVER THE S/W INTO THE ROAD
   7          ID   OUTLET IS A THREE STAGED ORIFICE
   8          ID   FILE:TTM-100.DAT
              *DIAGRAM
   9          IT       2  1JAN96    0001    2000
  10          IO       5

  11          KK     S1B
  12          KM   SUB-BASIN S1B
  13          KM   6-HOUR RAINFALL, PATTERN NO. 1.88 WAS USED TO FIND TC & R FOR THIS BASIN
  14          KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF .978
  15          KO       5
  16          BA    .230
  17          IN      15
  18          KM   RAINFALL DEPTH OF 3.20 WAS SPACIALLY REDUCED AS SHOWN BY THE PB RECORD
  19          PB   3.131
  20          KM   THE FOLLOWING PC RECORD USED A 6-HOUR STORM WITH A PATTERN No. OF 1.88
  21          PC    .000    .009    .016    .025    .034    .042    .051    .059    .067    .076
  22          PC    .087    .100    .120    .160    .249    .442    .711    .846    .904    .939
  23          PC    .951    .964    .976    .988   1.000
  24          LG    .200    .250   4.300    .500  35.000
  25          UC    .363    .185
  26          UA       0       3       5       8      12      20      43      75      90      96
  27          UA     100

  28          KK    RS1B
  29          KM    ROUTING THROUGH S1C
  30          KO       5
  31          RS       3    FLOW      -1
  32          RC    .035    .035    .035    2138    .028
  33          RX       0      36      66      90     126     150     168     228
  34          RY       7       7       7       0       0       4       6      22

  35          KK     S1A
  36          KM   SUB-BASIN S1A
  37          KO       5
  38          BA    .330
  39          LG    .200    .250   4.300    .500  35.000
  40          UC    .363    .185
  41          UA       0       3       5       8      12      20      43      75      90      96
  42          UA     100

  43          KK    RS1A
  44          KM    ROUTING THROUGH S1C
  45          KO       5
  46          RS       3    FLOW      -1
  47          RC    .035    .035    .035    2025    .030
  48          RX       0     0.5       1     126     136     251     252     253
  49          RY       5       5       5       0       0       5       5       5
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LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  50          KK     S1C
  51          KM   SUB-BASIN S1C
  52          KO       5
  53          BA    .110
  54          LG    .200    .250   4.300    .500  35.000
  55          UC    .329    .265
  56          UA       0       3       5       8      12      20      43      75      90      96
  57          UA     100

  58          KK    CP1C
  59          KM    ADDITION OF 3 HYDROGRAPHS
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```
   60          KM    POTENTIAL DETENTION BASIN SITE 1
   61          KO       5
   62          HC       3

   63          KK    RCP1C
   64          KM     ROUTING THROUGH S1E
   65          KO       5
   66          RS       5     FLOW      -1
   67          RC    .035    .035     .035     3600     .017
   68          RX       0      42       72       84      120      138      180      216
   69          RY       9     8.5        4        0        0        4        6        8

   70          KK     S1D
   71          KM    SUB-BASIN S1D
   72          KO       5
   73          BA    .310
   74          LG    .200    .250    4.300     .500   35.000
   75          UC    .363    .205
   76          UA       0       3        5        8       12       20       43       75       90       96
   77          UA     100

   78          KK    RS1D
   79          KM    ROUTING THROUGH S1E
   80          KO       5
   81          RS       3     FLOW      -1
   82          RC    .035    .035     .035     2138     .019
   83          RX       0      36       72       96      132      168      204      240
   84          RY       8       6        4        0        0        8       10       11

   85          KK     S1E
   86          KM    SUB-BASIN S1E
   87          KO       5
   88          BA    .510
   89          LG    .200    .250    4.300     .500   35.000
   90          UC    .433    .242
   91          UA       0       3        5        8       12       20       43       75       90       96
   92          UA     100
1                                          HEC-1 INPUT                                                  PAGE  3

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

   93          KK    CP1E
   94          KM    CONCENTRATION OF 3 HYDROGRAPHS
   95          KM    POTENTIAL DETENTION BASIN SITE 2
   96          KO       5
   97          HC       3

   98          KK    RCP1E
   99          KM     ROUTING THROUGH S1F
  100          KO       5
  101          RS       3     FLOW      -1
  102          RC    .035    .035     .035     2250     .014
  103          RX       0      48       84      120      144      180      240      288
  104          RY      12      10        6        2        0        8       10       11

  105          KK     S1F
  106          KM    SUB-BASIN S1F
  107          KO       5
  108          BA    .280
  109          LG    .200    .250    4.300     .500   35.000
  110          UC    .413    .300
  111          UA       0       3        5        8       12       20       43       75       90       96
  112          UA     100

  113          KK    CP1F
  114          KM    POTENTIAL DETENTION BASIN SITE 3
  115          KO       5
  116          HC       2

  117          KK    PARK
  118          KO       3
  119          KM    CITY OF PHX EQUESTRIAN PARK IN MTN PRESERVE
  120          KM    PROPOSED FUTURE PHASE OF TATUM WASH PROJECT
  121          DT     DIV1     145
  122          DI        0   10000
  123          DQ        0   10000

  124          KK     RCF1
  125          KO       5
  126          RS       2     FLOW      -1
  127          RC    .035     .03     .035   1100.0   0.0009
  128          RX       0      30       60       90      120      150      180      210
  129          RY       5       3        1        0        0        1        3        5

  130          KK     S2A1
  131          KM    SUB-BASIN S2A1
  132          KO       5
  133          BA   0.056
  134          LG   0.150   0.250    4.300    0.400   35.000
  135          UC   0.217   0.155
  136          UA       0       3        5        8       12       20       43       75       90       96
  137          UA     100
1                                          HEC-1 INPUT                                                  PAGE  4

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

  138          KK    CP2A1
  139          KM    COMBINE AT 40TH STREET
  140          KM    POTENTIAL DETENTION BASIN SITE 4
  141          KO       5
  142          HC       2

  143          KK    RCP21
  144          KO       5
  145          RS       2     FLOW      -1
  146          RC    .035     .03     .035     1360    .0162
```

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147          RX       0      30      40      50      70      80     110     130
148          RY       8       6       2       0       0       2       4       6

149          KK    S2A2
150          KO       5
151          BA   0.039
152          LG    0.10    0.20    4.30    0.40    15.0
153          UC   0.471   0.595
154          UA       0       5      16      30      65      77      84      90      94      97
155          UA     100

156          KK   CP2A2
157          KM   COMBINE AT FANFOL DRIVE  (NO DIVERSION AS PER FIELD INSPECTION)
158          KO       5
159          HC       2

160          KK   RCP22
161          KO       5
162          RS       1    FLOW      -1
163          RC    .035     .03    .035   820.0  0.0106
164          RX       0      30      70      80     100     110   110.5     120
165          RY       8       7       6       0       0       4       6       8

166          KK    S2B
167          KM   SUB-BASIN S2B
168          KO       5
169          BA   0.027
170          LG   0.100   0.250   4.300   0.400  15.000
171          UC   0.246   0.221
172          UA       0       5      16      30      65      77      84      90      94      97
173          UA     100

174          KK   CP2B
175          HC       2

176          KK   RCP2B
177          KO       5
178          RS       1    FLOW      -1
179          RC    .035    0.03   0.035   680.0  0.0088
180          RX       0      10      20      70     120     130     140     200
181          RY     2.5       2       2       0       0       1       2       3
1                                        HEC-1 INPUT                                    PAGE  5

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

182          KK    S2C
183          KM   SUB-BASIN S2C
184          KO       5
185          BA   0.028
186          LG   0.100   0.250   4.300   0.400  15.000
187          UC   0.250   0.214
188          UA       0       5      16      30      65      77      84      90      94      97
189          UA     100

190          KK   CP2C
191          KM   CROSSING THRU VIA ESTRELLA ALIGNMENT
192          KO       5
193          HC       2

194          KK   RCP2C
195          KO       5
196          RS       2    FLOW      -1
197          RC    .035     .03    .035  1040.0  0.0144
198          RX       0      50      70     100     120     130     140     180
199          RY       4       5       3       0       0       1       2     2.5

200          KK    S2D
201          KM   SUB-BASIN S2D
202          KO       5
203          BA   0.024
204          LG   0.100   0.250   4.300   0.400  15.000
205          UC   0.288   0.292
206          UA       0       5      16      30      65      77      84      90      94      97
207          UA     100

208          KK    S2I
209          KM   SUB-BASIN S2I
210          KO       5
211          BA   0.028
212          LG   0.100   0.250   4.300   0.400   20.00
213          UC   0.233   0.227
214          UA       0       5      16      30      65      77      84      90      94      97
215          UA     100

216          KK   CP2DI
217          KO       5
218          HC       3

219          KK   RCPDI
220          KO       5
221          RS       3    FLOW      -1
222          RC    .035     .03    .035  2059.0  0.0107
223          RX       0      30      40      90     100   100.5     101     110
224          RY       5       3       1       0       0       1       3       3
1                                        HEC-1 INPUT                                    PAGE  6

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

225          KK    S2E
226          KM   SUB-BASIN S2E
227          KO       5
228          BA   0.033
229          LG    0.10   0.250   4.300   0.400  20.000
230          UC   0.367   0.443
231          UA       0       5      16      30      65      77      84      90      94      97
232          UA     100
```
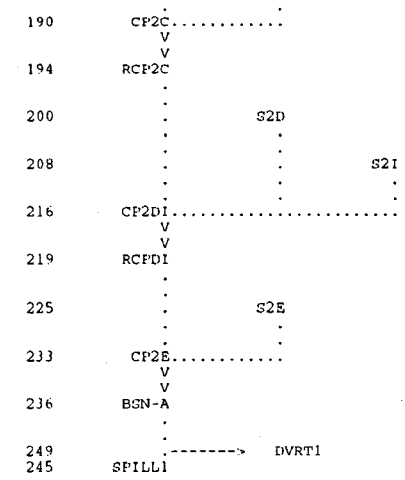

```
233           KK    CP2E
234           KM    AT SHEA BLVD, POTENTIAL DETENTION BASIN SITE 5
235           HC       2

236           KK    BSN-A
237           KO       2       0
238           ZW    A=TATUM  B=INFLOW  C=FLOW  E=2MIN  F=WO
239           KM    DETENTION BASIN LOCATED ON THE SOUTH SIDE OF SHEA BLVD
240           ZW    A=TATUM  B=OUTFLOW C=STAGE E=2MIN  F=WO
241           RS       1    STOR      -1
242           SV       0    3.13    7.63   12.51   17.80   23.49   29.61   32.83   36.16   36.16
243           SQ       0       0      21      30      57      72      83     151     395    1061
244           SE  1380.5    1382    1384    1386    1388    1390    1392    1393    1394    1395

245           KK  SPILL1
246           KM   ACTUAL LOW FLOWS GO TO SHEA STORM DRAIN
247           KM   DIVERSION BASED UPON STAGED OUTLET
248           KM   LOW FLOW WILL BE CONSIDERED FOR SIZING UPPER BASIN
249           DT   DVRT1
250           DI       0      50      83     395    2400
251           DQ       0      50      83     151     151
252           ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

   11          S1B
               V
               V
   28        RS1B
               .
               .
   35          .          S1A
               .            V
               .            V
   43          .         RS1A
               .            .
               .            .
   50          .            .          S1C
               .            .            .
               .            .            .
   58        CP1C.........................
               V
               V
   63        RCP1C
               .
               .
   70          .          S1D
               .            V
               .            V
   78          .         RS1D
               .            .
               .            .
   85          .            .          S1E
               .            .            .
               .            .            .
   93        CP1E.........................
               V
               V
   98        RCP1E
               .
               .
  105          .          S1F
               .            .
               .            .
  113        CP1F............
               .
               .
  121          .-------->    DIV1
  117        PARK
               V
               V
  124        RCF1
               .
               .
  130          .         S2A1
               .            .
               .            .
  138       CP2A1............
               V
               V
  143       RCP21
               .
               .
  149          .         S2A2
               .            .
               .            .
  156       CP2A2............
               V
               V
  160       RCP22
               .
               .
  166          .          S2B
               .            .
               .            .
  174        CP2B............
               V
               V
  176       RCP2B
               .
               .
  182          .          S2C
               .            .
```



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1**************************************
*                                    *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*            SEPTEMBER 1990            *
*             VERSION 4.0              *
*                                    *
*  RUN DATE  07/22/1997  TIME  15:37:28 *
*                                    *
**************************************
```

```
**************************************
*                                    *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*        DAVIS, CALIFORNIA 95616       *
*            (916) 756-1104            *
*                                    *
**************************************
```

TATUM WASH PROJECT SUB-AREAS 1 AND 2 COMBINED - 2/9/95
100YR-6HR STORM = 3.20". ASSUMED NORMAL CONDITION W/ DTHETA=0.250
STORM SIZE = 2.28 SQ. MI (TOTAL AREA)
HYDROGRAPH PLOT FOR 5 DETENTION BASIN SITES (*.DSS)
DETENTION BASIN A LOCATED SOUTH OF SHEA BLVD
SPILLWAY IS OVER THE S/W INTO THE ROAD
OUTLET IS A THREE STAGED ORIFICE
FILE:TTM-100.DAT

*** ERROR *** SPECIFIED START AND END DATES RESULT IN TOO MANY TIME PERIODS

```
 10 IO          OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                      NMIN          2  MINUTES IN COMPUTATION INTERVAL
                     IDATE      1JAN96  STARTING DATE
                     ITIME        0001  STARTING TIME
                        NQ         300  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE      1JAN96  ENDING DATE
                    NDTIME        0959  ENDING TIME
                     ICENT          19  CENTURY MARK

                  COMPUTATION INTERVAL      .03 HOURS
                      TOTAL TIME BASE     9.97 HOURS

        ENGLISH UNITS
             DRAINAGE AREA          SQUARE MILES
             PRECIPITATION DEPTH    INCHES
             LENGTH, ELEVATION      FEET
             FLOW                   CUBIC FEET PER SECOND
             STORAGE VOLUME         ACRE-FEET
             SURFACE AREA           ACRES
             TEMPERATURE            DEGREES FAHRENHEIT

 15 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE

 30 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE

 37 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE

 45 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE

 52 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE
```

```
 61 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

 65 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

 72 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

 80 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

 87 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

 96 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

100 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

107 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

115 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

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

            ***************
            *             *
117 KK      *    PARK     *
            *             *
            ***************

118 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          3  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                  CITY OF PHX EQUESTRIAN PARK IN MTN PRESERVE
                  PROPOSED FUTURE PHASE OF TATUM WASH PROJECT

     DT         DIVERSION
                     ISTAD        DIV1  DIVERSION HYDROGRAPH IDENTIFICATION
                    DSTRMX      145.00  MAXIMUM VOLUME TO BE DIVERTED

     DI           INFLOW          .00  10000.00

     DQ      DIVERTED FLOW        .00  10000.00

                                                                    ***

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

                    DIVERSION HYDROGRAPH     DIV1

  PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                          6-HR        24-HR        72-HR       9.97-HR
+   (CFS)       (HR)
                  (CFS)
+    2212.      4.33                     292.         176.         176.         176.
                (INCHES)                1.536        1.536        1.536        1.536
                 (AC-FT)                145.         145.         145.         145.

                CUMULATIVE AREA =    1.77 SQ MI

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

                    HYDROGRAPH AT STATION     PARK

  PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                          6-HR        24-HR        72-HR       9.97-HR
+   (CFS)       (HR)
                  (CFS)
+     592.      4.97                      47.          28.          28.          28.
                (INCHES)                .247         .247         .247         .247
                 (AC-FT)                23.          23.          23.          23.

                CUMULATIVE AREA =    1.77 SQ MI

125 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
```

```
132 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

141 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

144 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

150 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

158 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

161 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

168 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

177 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

184 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

192 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

195 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

202 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

210 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

217 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

220 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

227 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

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

          **************
          *            *
236 KK    *    BSN-A   *
          *            *
          **************

237 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           2  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                          DETENTION BASIN LOCATED ON THE SOUTH SIDE OF SHEA BLVD

                HYDROGRAPH ROUTING DATA

241 RS          STORAGE ROUTING
                     NSTPS           1  NUMBER OF SUBREACHES
                      ITYP        STOR  TYPE OF INITIAL CONDITION
                    RSVRIC       -1.00  INITIAL CONDITION
                         X         .00 WORKING R AND D COEFFICIENT

242 SV            STORAGE          .0       3.1       7.6      12.5      17.8      23.5      29.6      32.8      36.2      36.2
```

243 SQ	DISCHARGE	0.	0.	21.	30.	57.	72.	83.	151.	395.	1061.
244 SE	ELEVATION	1380.50	1382.00	1384.00	1386.00	1388.00	1390.00	1392.00	1393.00	1394.00	1395.00

***

HYDROGRAPH AT STATION BSN-A

DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
1	JAN	0001	1	0.	3.1	1382.0	1	JAN	0321	101	2.	3.6	1382.2	1	JAN	0641	201	82.	29.0	1391.8
1	JAN	0003	2	0.	3.1	1382.0	1	JAN	0323	102	2.	3.6	1382.2	1	JAN	0643	202	82.	29.0	1391.8
1	JAN	0005	3	0.	3.1	1382.0	1	JAN	0325	103	2.	3.6	1382.2	1	JAN	0645	203	82.	29.0	1391.8
1	JAN	0007	4	0.	3.1	1382.0	1	JAN	0327	104	2.	3.6	1382.2	1	JAN	0647	204	82.	28.9	1391.8
1	JAN	0009	5	0.	3.1	1382.0	1	JAN	0329	105	2.	3.6	1382.2	1	JAN	0649	205	82.	28.9	1391.8
1	JAN	0011	6	0.	3.1	1382.0	1	JAN	0331	106	2.	3.7	1382.2	1	JAN	0651	206	82.	28.8	1391.7
1	JAN	0013	7	0.	3.1	1382.0	1	JAN	0333	107	3.	3.7	1382.2	1	JAN	0653	207	81.	28.7	1391.7
1	JAN	0015	8	0.	3.1	1382.0	1	JAN	0335	108	3.	3.7	1382.2	1	JAN	0655	208	81.	28.7	1391.7
1	JAN	0017	9	0.	3.1	1382.0	1	JAN	0337	109	3.	3.7	1382.3	1	JAN	0657	209	81.	28.6	1391.7
1	JAN	0019	10	0.	3.1	1382.0	1	JAN	0339	110	3.	3.7	1382.3	1	JAN	0659	210	81.	28.5	1391.6
1	JAN	0021	11	0.	3.1	1382.0	1	JAN	0341	111	3.	3.8	1382.3	1	JAN	0701	211	81.	28.5	1391.6
1	JAN	0023	12	0.	3.1	1382.0	1	JAN	0343	112	3.	3.8	1382.3	1	JAN	0703	212	81.	28.4	1391.6
1	JAN	0025	13	0.	3.1	1382.0	1	JAN	0345	113	3.	3.9	1382.3	1	JAN	0705	213	81.	28.3	1391.6
1	JAN	0027	14	0.	3.1	1382.0	1	JAN	0347	114	4.	3.9	1382.4	1	JAN	0707	214	80.	28.2	1391.5
1	JAN	0029	15	0.	3.1	1382.0	1	JAN	0349	115	4.	4.0	1382.4	1	JAN	0709	215	80.	28.1	1391.5
1	JAN	0031	16	0.	3.1	1382.0	1	JAN	0351	116	5.	4.1	1382.4	1	JAN	0711	216	80.	28.0	1391.5
1	JAN	0033	17	0.	3.1	1382.0	1	JAN	0353	117	5.	4.2	1382.5	1	JAN	0713	217	80.	27.9	1391.4
1	JAN	0035	18	0.	3.1	1382.0	1	JAN	0355	118	6.	4.4	1382.6	1	JAN	0715	218	80.	27.8	1391.4
1	JAN	0037	19	0.	3.1	1382.0	1	JAN	0357	119	7.	4.6	1382.7	1	JAN	0717	219	79.	27.6	1391.4
1	JAN	0039	20	0.	3.1	1382.0	1	JAN	0359	120	8.	4.9	1382.8	1	JAN	0719	220	79.	27.5	1391.3
1	JAN	0041	21	0.	3.1	1382.0	1	JAN	0401	121	9.	5.2	1382.9	1	JAN	0721	221	79.	27.4	1391.3
1	JAN	0043	22	0.	3.1	1382.0	1	JAN	0403	122	11.	5.5	1383.1	1	JAN	0723	222	79.	27.3	1391.2
1	JAN	0045	23	0.	3.2	1382.0	1	JAN	0405	123	13.	6.0	1383.3	1	JAN	0725	223	79.	27.1	1391.2
1	JAN	0047	24	0.	3.2	1382.0	1	JAN	0407	124	15.	6.5	1383.5	1	JAN	0727	224	78.	27.0	1391.1
1	JAN	0049	25	0.	3.2	1382.0	1	JAN	0409	125	18.	7.0	1383.7	1	JAN	0729	225	78.	26.9	1391.1
1	JAN	0051	26	0.	3.2	1382.0	1	JAN	0411	126	21.	7.6	1384.0	1	JAN	0731	226	78.	26.7	1391.1
1	JAN	0053	27	0.	3.2	1382.0	1	JAN	0413	127	22.	8.2	1384.2	1	JAN	0733	227	78.	26.6	1391.0
1	JAN	0055	28	0.	3.2	1382.0	1	JAN	0415	128	23.	8.9	1384.5	1	JAN	0735	228	77.	26.4	1391.0
1	JAN	0057	29	0.	3.2	1382.0	1	JAN	0417	129	25.	9.5	1384.8	1	JAN	0737	229	77.	26.3	1390.9
1	JAN	0059	30	0.	3.2	1382.0	1	JAN	0419	130	26.	10.2	1385.1	1	JAN	0739	230	77.	26.1	1390.9
1	JAN	0101	31	0.	3.2	1382.0	1	JAN	0421	131	27.	10.8	1385.3	1	JAN	0741	231	77.	26.0	1390.8
1	JAN	0103	32	0.	3.2	1382.0	1	JAN	0423	132	28.	11.5	1385.6	1	JAN	0743	232	76.	25.8	1390.8
1	JAN	0105	33	0.	3.2	1382.0	1	JAN	0425	133	29.	12.1	1385.8	1	JAN	0745	233	76.	25.7	1390.7
1	JAN	0107	34	0.	3.2	1382.0	1	JAN	0427	134	31.	12.7	1386.1	1	JAN	0747	234	76.	25.5	1390.7
1	JAN	0109	35	0.	3.2	1382.0	1	JAN	0429	135	33.	13.2	1386.3	1	JAN	0749	235	75.	25.4	1390.6
1	JAN	0111	36	0.	3.2	1382.0	1	JAN	0431	136	36.	13.7	1386.4	1	JAN	0751	236	75.	25.2	1390.6
1	JAN	0113	37	0.	3.2	1382.0	1	JAN	0433	137	38.	14.1	1386.6	1	JAN	0753	237	75.	25.0	1390.5
1	JAN	0115	38	0.	3.2	1382.0	1	JAN	0435	138	40.	14.5	1386.8	1	JAN	0755	238	74.	24.9	1390.5
1	JAN	0117	39	0.	3.2	1382.0	1	JAN	0437	139	42.	14.9	1386.9	1	JAN	0757	239	74.	24.7	1390.4
1	JAN	0119	40	0.	3.2	1382.0	1	JAN	0439	140	44.	15.2	1387.0	1	JAN	0759	240	74.	24.5	1390.3
1	JAN	0121	41	1.	3.2	1382.0	1	JAN	0441	141	45.	15.5	1387.1	1	JAN	0801	241	74.	24.4	1390.3
1	JAN	0123	42	1.	3.2	1382.1	1	JAN	0443	142	47.	15.8	1387.3	1	JAN	0803	242	73.	24.2	1390.2
1	JAN	0125	43	1.	3.3	1382.1	1	JAN	0445	143	48.	16.1	1387.3	1	JAN	0805	243	73.	24.0	1390.2
1	JAN	0127	44	1.	3.3	1382.1	1	JAN	0447	144	49.	16.3	1387.4	1	JAN	0807	244	73.	23.9	1390.1
1	JAN	0129	45	1.	3.3	1382.1	1	JAN	0449	145	50.	16.5	1387.5	1	JAN	0809	245	72.	23.7	1390.1
1	JAN	0131	46	1.	3.3	1382.1	1	JAN	0451	146	51.	16.6	1387.6	1	JAN	0811	246	72.	23.5	1390.0
1	JAN	0133	47	1.	3.3	1382.1	1	JAN	0453	147	52.	16.7	1387.6	1	JAN	0813	247	72.	23.3	1389.9
1	JAN	0135	48	1.	3.3	1382.1	1	JAN	0455	148	52.	16.9	1387.6	1	JAN	0815	248	71.	23.2	1389.9
1	JAN	0137	49	1.	3.3	1382.1	1	JAN	0457	149	53.	16.9	1387.7	1	JAN	0817	249	71.	23.0	1389.8
1	JAN	0139	50	1.	3.3	1382.1	1	JAN	0459	150	53.	17.0	1387.7	1	JAN	0819	250	70.	22.8	1389.8
1	JAN	0141	51	1.	3.3	1382.1	1	JAN	0501	151	53.	17.1	1387.7	1	JAN	0821	251	70.	22.6	1389.7
1	JAN	0143	52	1.	3.3	1382.1	1	JAN	0503	152	54.	17.1	1387.7	1	JAN	0823	252	69.	22.5	1389.6
1	JAN	0145	53	1.	3.3	1382.1	1	JAN	0505	153	54.	17.2	1387.8	1	JAN	0825	253	69.	22.3	1389.6
1	JAN	0147	54	1.	3.3	1382.1	1	JAN	0507	154	54.	17.2	1387.8	1	JAN	0827	254	68.	22.1	1389.5
1	JAN	0149	55	1.	3.3	1382.1	1	JAN	0509	155	54.	17.2	1387.8	1	JAN	0829	255	68.	22.0	1389.5
1	JAN	0151	56	1.	3.3	1382.1	1	JAN	0511	156	54.	17.2	1387.8	1	JAN	0831	256	68.	21.8	1389.4
1	JAN	0153	57	1.	3.3	1382.1	1	JAN	0513	157	54.	17.2	1387.8	1	JAN	0833	257	67.	21.6	1389.3
1	JAN	0155	58	1.	3.3	1382.1	1	JAN	0515	158	54.	17.3	1387.8	1	JAN	0835	258	67.	21.5	1389.3
1	JAN	0157	59	1.	3.4	1382.1	1	JAN	0517	159	55.	17.5	1387.9	1	JAN	0837	259	66.	21.3	1389.2
1	JAN	0159	60	1.	3.4	1382.1	1	JAN	0519	160	57.	17.9	1388.0	1	JAN	0839	260	66.	21.1	1389.2
1	JAN	0201	61	1.	3.4	1382.1	1	JAN	0521	161	59.	18.6	1388.3	1	JAN	0841	261	65.	21.0	1389.1
1	JAN	0203	62	1.	3.4	1382.1	1	JAN	0523	162	61.	19.4	1388.6	1	JAN	0843	262	65.	20.8	1389.1
1	JAN	0205	63	1.	3.4	1382.1	1	JAN	0525	163	64.	20.3	1388.9	1	JAN	0845	263	64.	20.6	1389.0
1	JAN	0207	64	1.	3.4	1382.1	1	JAN	0527	164	66.	21.2	1389.2	1	JAN	0847	264	64.	20.5	1388.9
1	JAN	0209	65	1.	3.4	1382.1	1	JAN	0529	165	68.	22.0	1389.5	1	JAN	0849	265	64.	20.3	1388.9
1	JAN	0211	66	1.	3.4	1382.1	1	JAN	0531	166	70.	22.8	1389.7	1	JAN	0851	266	63.	20.1	1388.8
1	JAN	0213	67	1.	3.4	1382.1	1	JAN	0533	167	72.	23.4	1390.0	1	JAN	0853	267	63.	20.0	1388.8
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1	JAN	0219	70	1.	3.4	1382.1	1	JAN	0539	170	75.	25.2	1390.5	1	JAN	0859	270	61.	19.5	1388.6
1	JAN	0221	71	1.	3.4	1382.1	1	JAN	0541	171	76.	25.6	1390.7	1	JAN	0901	271	61.	19.3	1388.5
1	JAN	0223	72	1.	3.4	1382.1	1	JAN	0543	172	77.	26.1	1390.8	1	JAN	0903	272	61.	19.2	1388.5
1	JAN	0225	73	1.	3.4	1382.1	1	JAN	0545	173	77.	26.4	1391.0	1	JAN	0905	273	60.	19.0	1388.4
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1	JAN	0229	75	1.	3.4	1382.1	1	JAN	0549	175	78.	27.1	1391.2	1	JAN	0909	275	59.	18.7	1388.3
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1	JAN	0233	77	2.	3.5	1382.1	1	JAN	0553	177	79.	27.6	1391.3	1	JAN	0913	277	59.	18.4	1388.2
1	JAN	0235	78	2.	3.5	1382.1	1	JAN	0555	178	80.	27.8	1391.4	1	JAN	0915	278	58.	18.2	1388.1
1	JAN	0237	79	2.	3.5	1382.1	1	JAN	0557	179	80.	28.0	1391.5	1	JAN	0917	279	58.	18.1	1388.1
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1	JAN	0241	81	2.	3.5	1382.2	1	JAN	0601	181	81.	28.3	1391.6	1	JAN	0921	281	57.	17.8	1388.0
1	JAN	0243	82	2.	3.5	1382.2	1	JAN	0603	182	81.	28.5	1391.6	1	JAN	0923	282	56.	17.6	1387.9
1	JAN	0245	83	2.	3.5	1382.2	1	JAN	0605	183	81.	28.6	1391.7	1	JAN	0925	283	55.	17.5	1387.9
1	JAN	0247	84	2.	3.5	1382.2	1	JAN	0607	184	81.	28.7	1391.7	1	JAN	0927	284	54.	17.3	1387.8
1	JAN	0249	85	2.	3.5	1382.2	1	JAN	0609	185	82.	28.8	1391.7	1	JAN	0929	285	54.	17.2	1387.8
1	JAN	0251	86	2.	3.5	1382.2	1	JAN	0611	186	82.	28.9	1391.8	1	JAN	0931	286	53.	17.0	1387.7
1	JAN	0253	87	2.	3.5	1382.2	1	JAN	0613	187	82.	29.0	1391.8	1	JAN	0933	287	52.	16.9	1387.6
1	JAN	0255	88	2.	3.5	1382.2	1	JAN	0615	188	82.	29.0	1391.8	1	JAN	0935	288	52.	16.7	1387.6
1	JAN	0257	89	2.	3.5	1382.2	1	JAN	0617	189	82.	29.1	1391.8	1	JAN	0937	289	51.	16.6	1387.5
1	JAN	0259	90	2.	3.5	1382.2	1	JAN	0619	190	82.	29.1	1391.8	1	JAN	0939	290	50.	16.5	1387.5
1	JAN	0301	91	2.	3.5	1382.2	1	JAN	0621	191	82.	29.2	1391.9	1	JAN	0941	291	49.	16.3	1387.4
1	JAN	0303	92	2.	3.5	1382.2	1	JAN	0623	192	82.	29.2	1391.9	1	JAN	0943	292	49.	16.2	1387.4

1	JAN	0305	93	2.	3.5	1382.2	*	1 JAN 0625	193	82.	29.2	1391.9	*	1 JAN 0945	293	48.	16.1	1387.3
1	JAN	0307	94	2.	3.5	1382.2	*	1 JAN 0627	194	82.	29.2	1391.9	*	1 JAN 0947	294	47.	15.9	1387.3
1	JAN	0309	95	2.	3.6	1382.2	*	1 JAN 0629	195	82.	29.2	1391.9	*	1 JAN 0949	295	47.	15.8	1387.2
1	JAN	0311	96	2.	3.6	1382.2	*	1 JAN 0631	196	82.	29.2	1391.9	*	1 JAN 0951	296	46.	15.7	1387.2
1	JAN	0313	97	2.	3.6	1382.2	*	1 JAN 0633	197	82.	29.1	1391.8	*	1 JAN 0953	297	45.	15.5	1387.1
1	JAN	0315	98	2.	3.6	1382.2	*	1 JAN 0635	198	82.	29.1	1391.8	*	1 JAN 0955	298	45.	15.4	1387.1
1	JAN	0317	99	2.	3.6	1382.2	*	1 JAN 0637	199	82.	29.1	1391.8	*	1 JAN 0957	299	44.	15.3	1387.1
1	JAN	0319	100	2.	3.6	1382.2	*	1 JAN 0639	200	82.	29.1	1391.8	*	1 JAN 0959	300	44.	15.2	1387.0

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	9.97-HR
(CFS)	(HR)	(CFS)				
82.	6.43		64.	39.	39.	39.
		(INCHES)	.295	.298	.298	.298
		(AC-FT)	31.	32.	32.	32.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	9.97-HR
(AC-FT)	(HR)				
29.	6.43	22.	14.	14.	14.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	9.97-HR
(FEET)	(HR)				
1391.86	6.43	1389.22	1386.40	1386.40	1386.40

CUMULATIVE AREA = 2.01 SQ MI

-----DSS---ZOPEN: Version: 6-EA; Existing File Opened
Unit: 71, File: TTM-100.DSS
-----DSS---ZWRITE Unit 71; Vers. 7: /TATUM/OUTFLOW/FLOW/01JAN1996/2MIN/WO/
-----DSS---ZWRITE Unit 71; Vers. 7: /TATUM/OUTFLOW/STAGE/01JAN1996/2MIN/WO/

1

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	S1B	319.	4.20	44.	27.	27.	.23		
ROUTED TO	RS1B	311.	4.27	44.	27.	27.	.23	1.04	4.27
HYDROGRAPH AT	S1A	458.	4.20	63.	38.	38.	.33		
ROUTED TO	RS1A	450.	4.27	63.	38.	38.	.33	1.49	4.27
HYDROGRAPH AT	S1C	138.	4.20	21.	13.	13.	.11		
3 COMBINED AT	CP1C	892.	4.27	128.	77.	77.	.67		
ROUTED TO	RCP1C	881.	4.33	128.	77.	77.	.67	2.30	4.33
HYDROGRAPH AT	S1D	418.	4.20	59.	36.	36.	.31		
ROUTED TO	RS1D	413.	4.27	59.	36.	36.	.31	1.40	4.27
HYDROGRAPH AT	S1E	647.	4.27	97.	59.	59.	.51		
3 COMBINED AT	CP1E	1911.	4.30	284.	172.	172.	1.49		
ROUTED TO	RCP1E	1895.	4.33	284.	172.	172.	1.49	5.06	4.33
HYDROGRAPH AT	S1F	331.	4.27	53.	32.	32.	.28		
2 COMBINED AT	CP1F	2212.	4.33	337.	204.	204.	1.77		
DIVERSION TO	DIV1	2212.	4.97	292.	176.	176.	1.77		
HYDROGRAPH AT	PARK	592.	4.97	47.	28.	28.	1.77		
ROUTED TO	RCF1	399.	5.17	47.	28.	28.	1.77	2.20	5.17
HYDROGRAPH AT	S2A1	88.	4.10	11.	7.	7.	.06		
2 COMBINED AT	CP2A1	402.	5.17	58.	35.	35.	1.83		
ROUTED TO									

+		RCP21	398.	5.20	58.	35.	35.	1.83	
+									1.77 5.20
+	HYDROGRAPH AT	S2A2	32.	4.30	7.	4.	4.	.04	
+	2 COMBINED AT	CP2A2	408.	5.20	64.	39.	39.	1.87	
+	ROUTED TO	RCP22	403.	5.23	64.	39.	39.	1.87	
+									2.18 5.23
+	HYDROGRAPH AT	S2B	36.	4.07	4.	3.	3.	.03	
+	2 COMBINED AT	CP2B	404.	5.23	69.	42.	42.	1.89	
+	ROUTED TO	RCP2B	394.	5.27	69.	42.	42.	1.89	
+									1.22 5.27
+	HYDROGRAPH AT	S2C	37.	4.07	5.	3.	3.	.03	
+	2 COMBINED AT	CP2C	395.	5.27	73.	45.	45.	1.92	
+	ROUTED TO	RCP2C	392.	5.30	73.	45.	45.	1.92	
+									1.62 5.30
+	HYDROGRAPH AT	S2D	28.	4.10	4.	2.	2.	.02	
+	HYDROGRAPH AT	S2I	38.	4.07	5.	3.	3.	.03	
+	3 COMBINED AT	CP2DI	394.	5.30	82.	50.	50.	1.97	
+	ROUTED TO	RCPDI	379.	5.40	82.	50.	50.	1.97	
+									1.54 5.40
+	HYDROGRAPH AT	S2E	32.	4.17	6.	3.	3.	.03	
+	2 COMBINED AT	CP2E	383.	5.40	87.	53.	53.	2.01	
+	ROUTED TO	BSN-A	82.	6.43	64.	39.	39.	2.01	
+									1391.86 6.43
+	DIVERSION TO	DVRT1	82.	.03	64.	39.	39.	2.01	
+	HYDROGRAPH AT	SPILL1	0.	.03	0.	0.	0.	2.01	

*** NORMAL END OF HEC-1 ***

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          Pointer Utilization:   .25
          Number of Records:      2
          File Size:     16.9  Kbytes
          Percent Inactive:   .00
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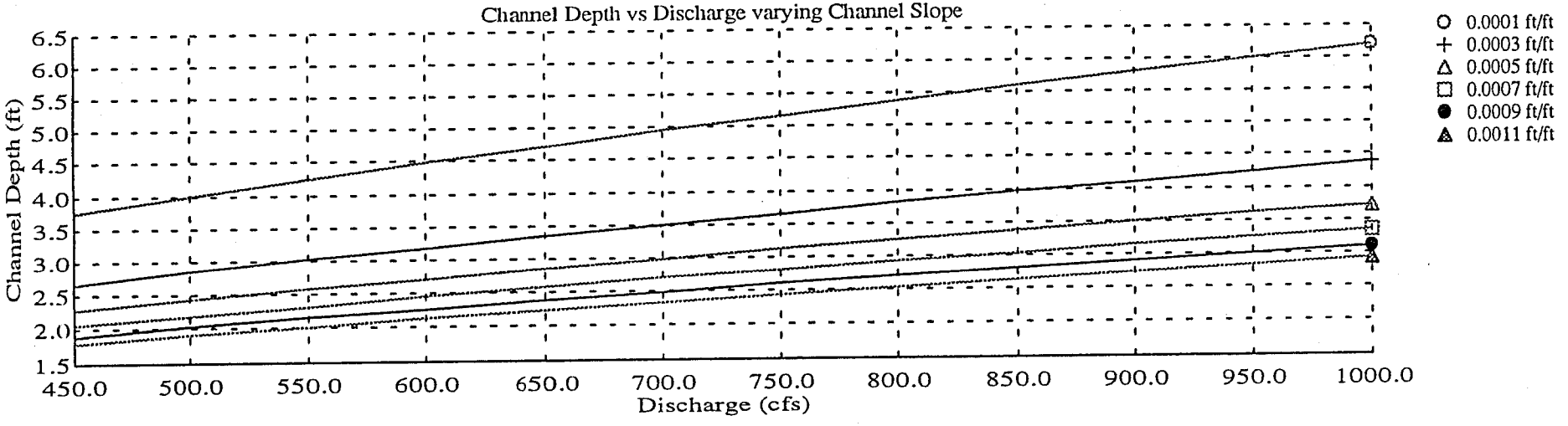
Curve
Plotted Curves for Rectangular Channel

Project Description	
Project File	c:\tatumwsh\dgn\project1.fm2
Worksheet	Basin Spillway Inlet Channel
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Constant Data	
Mannings Coefficient	0.018
Bottom Width	65.00 ft

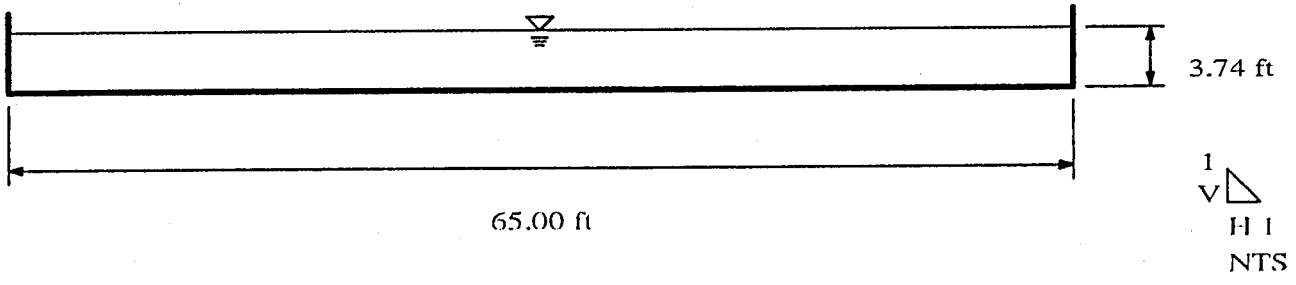
Input Data	Minimum	Maximum	Increment	
Discharge	450.00	1,000.00	50.00	cfs
Channel Slope	0.000100	0.001000	0.000200	ft/ft



Cross Section
Cross Section for Rectangular Channel

Project Description	
Project File	c:\tatumwsh\dgn\project1.fm2
Worksheet	Basin Spillway Inlet Channel
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.018	
Channel Slope	0.000100	ft/ft
Depth	3.74	ft
Bottom Width	65.00	ft
Discharge	450.00	cfs



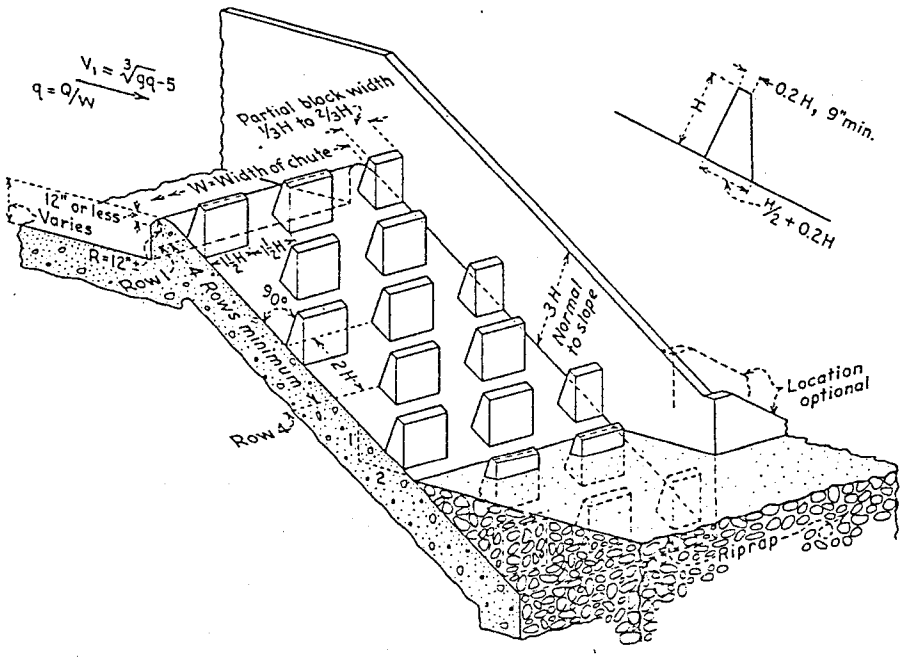


Figure 243. Basic proportions of a baffled chute spillway. 288—D—2807.

baffles should be buried as needed to protect against degradation.

(10) The chute training walls should be three times as high as the baffle piers measured normal to the floor. This wall height will contain the main flow and most of the splash. It is not necessary or practical to build the walls high enough to contain all the splash.

(11) Riprap should be placed at the downstream ends of the training walls to prevent erosion of the banks.

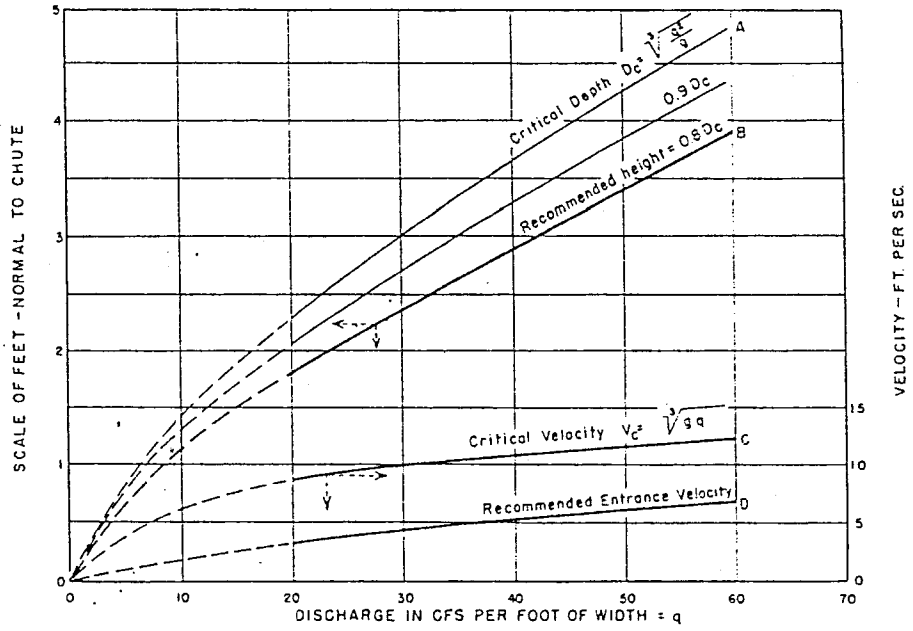


Figure 244. Recommended baffle pier heights and allowable velocities for baffled chute spillways. 288—D—2806.

Figure 242. Baffled apron drop spillway used at Conconully Dam in Washington. The flow shown passing over the spillway is about 50 cfs. P21–141–178NA.

(1) Determine the maximum expected discharge, Q.

(2) Determine unit design discharge $q=Q/W$, where W is the chute width. The chute width may depend on the upstream channel width, the downstream channel width, economy, topography, and frequency of discharge, as well as maximum discharge.

(3) Entrance velocity, V, should be as low as practical. Ideal conditions exist when $V_1=\sqrt[3]{gq}-5$, curve D, figure 244, for discharges up to 69 second-feet per foot of width. Velocities near critical, $V_c=\sqrt[3]{gq}$, curve C, figure 244, or above cause the flow to be thrown into the air after striking the first baffle pier. High velocities may cause the flow to pass completely over the next row or two of baffle piers. It is very important that proper flow conditions be provided at the entrance to the baffle apron because satisfactory performance of the entire structure may hinge on proper entrance flow conditions.

(4) A vertical offset between the approach channel floor and the chute is used to form a desirable uniform entrance velocity, V_1, and will vary in individual installations. A short radius curve provides a crest on the sloping chute. The first row of baffle piers should be placed no more than 12 inches in elevation below the crest. Alternate rows should be staggered to provide a baffle pier below each space and a space below each baffle pier.

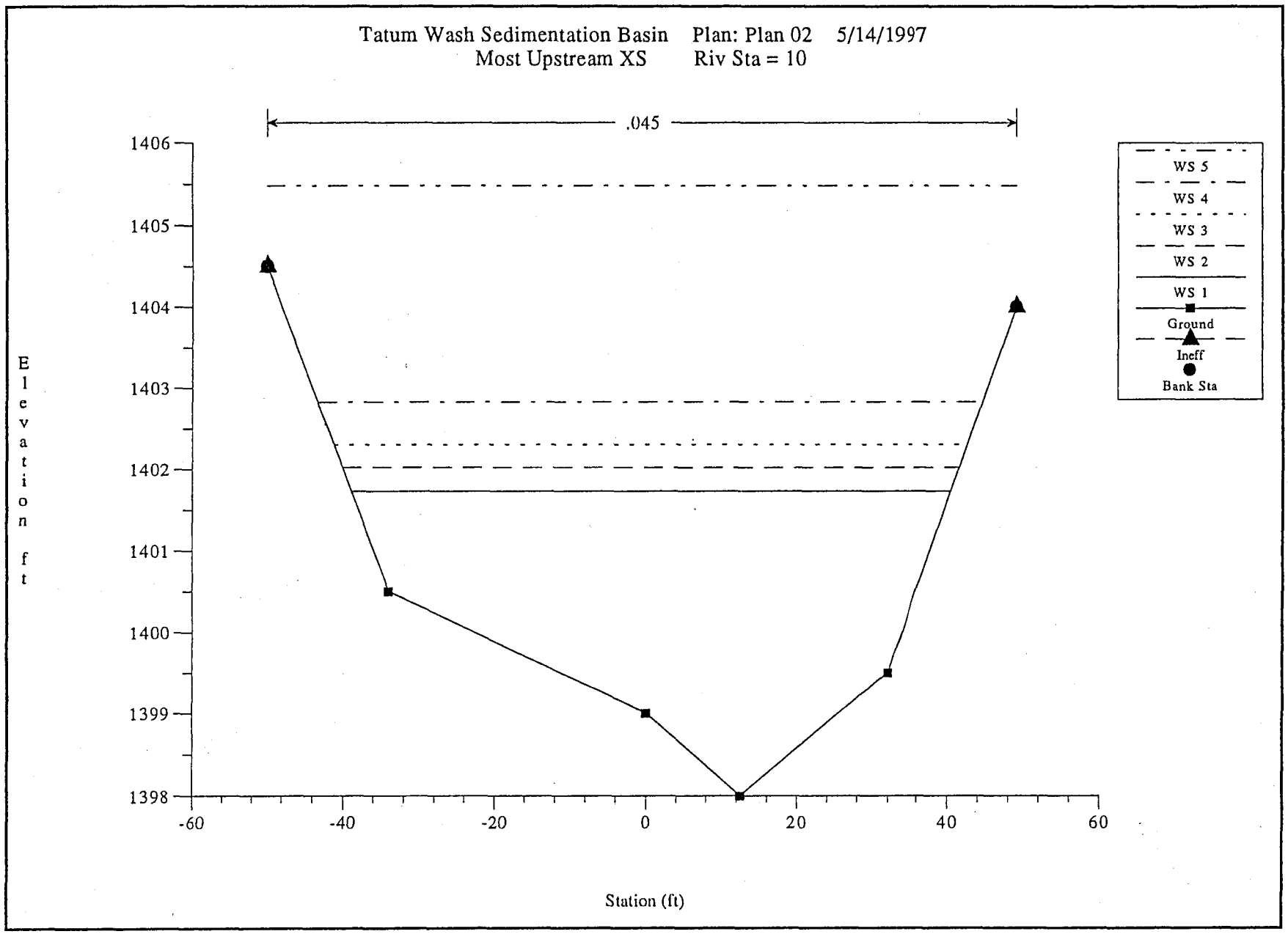
(5) The baffle pier height, H, should be about 0.8 D_c or 0.9 D_c, where the critical depth (D_c) for the rectangular chute is given by the formula $D_c=\sqrt[3]{q^2/g}$ and is shown by curve A of figure 244. Baffle pier height is not a critical dimension but should not be less than recommended.

(6) Baffle pier widths and spaces should be equal, preferably about one and one-half H, but not less than H. Other baffle pier dimensions are not critical hydraulically. Suggested cross sectional dimensions are given.

(7) Row spacing of baffle piers along the chute slope should be H divided by the slope, where the slope is given in decimal form. A 2:1 slope, 0.50 in decimal form, makes the row spacing equal to $2H$ parallel to the chute floor.

(8) The baffle piers are usually constructed with the upstream face normal to the chute floor surface; however, piers with vertical faces may be used. Vertical face piers tend to produce more splash and less bed scour, but the differences are minor.

(9) Four rows of baffle piers are needed to establish full control of the flow, although fewer rows have operated successfully. As many additional rows as required beyond the fourth maintain the control established upstream. At least one row of baffles should be buried below the outlet channel grade to protect against scour. Additional rows of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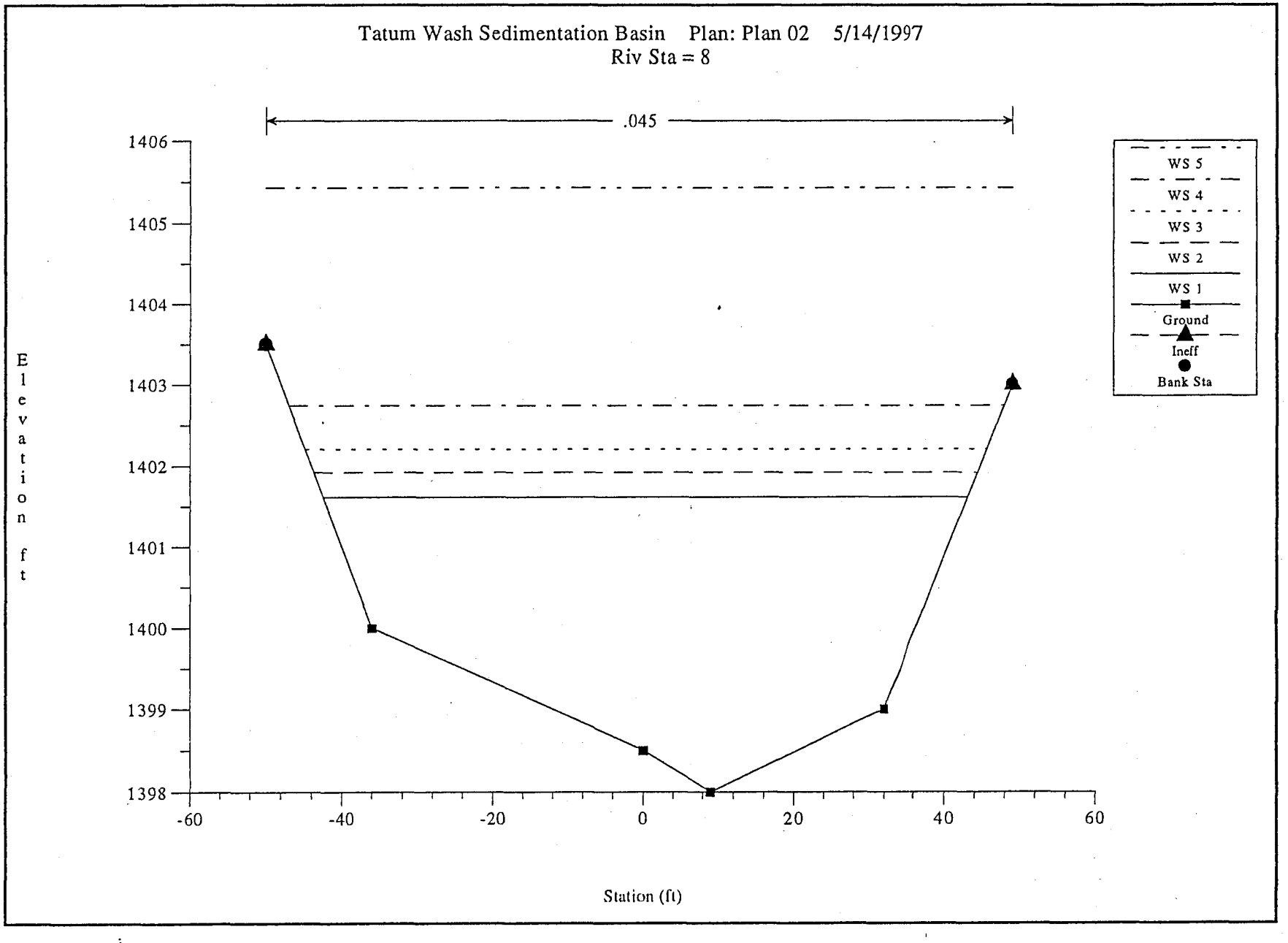
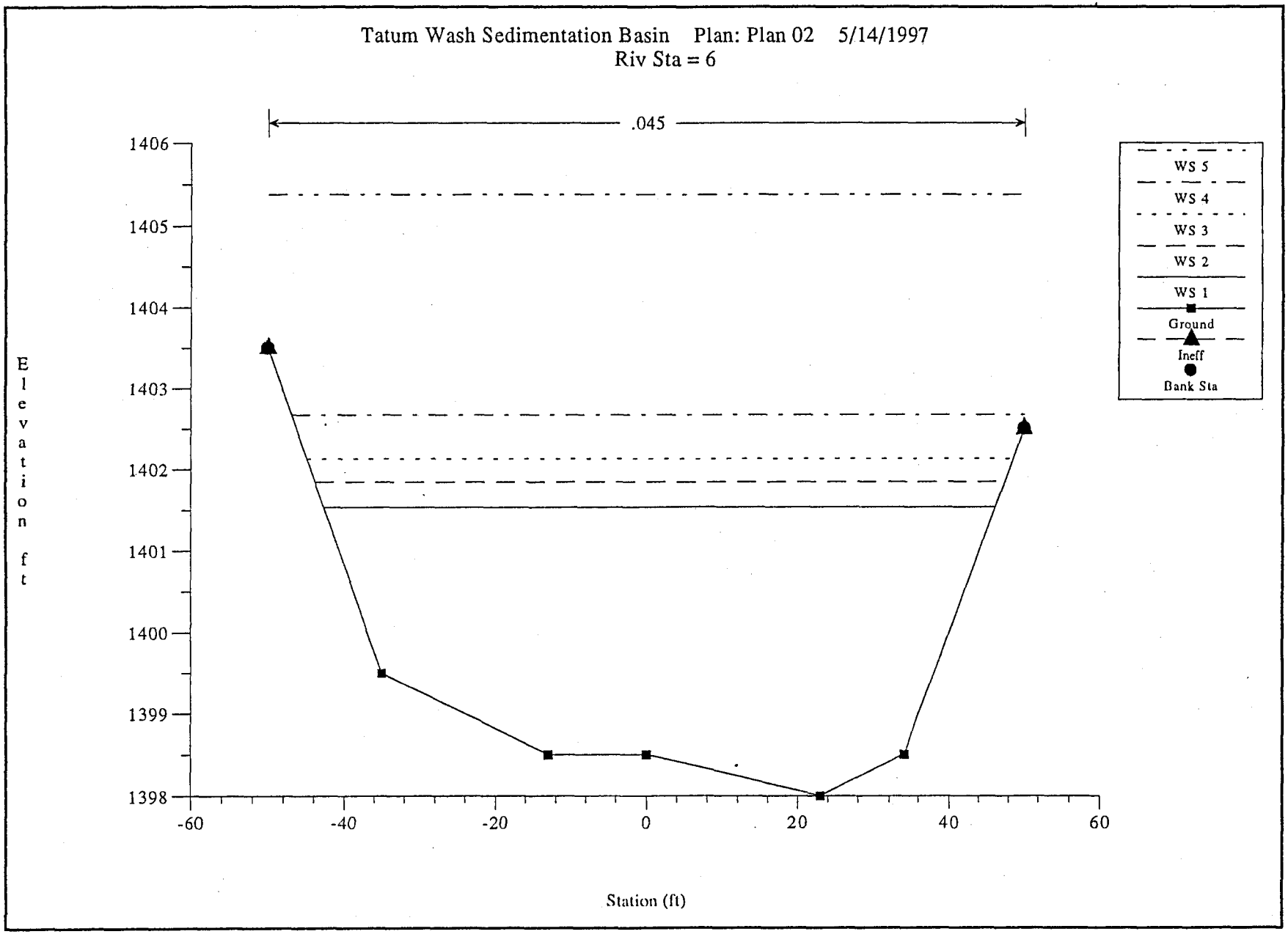
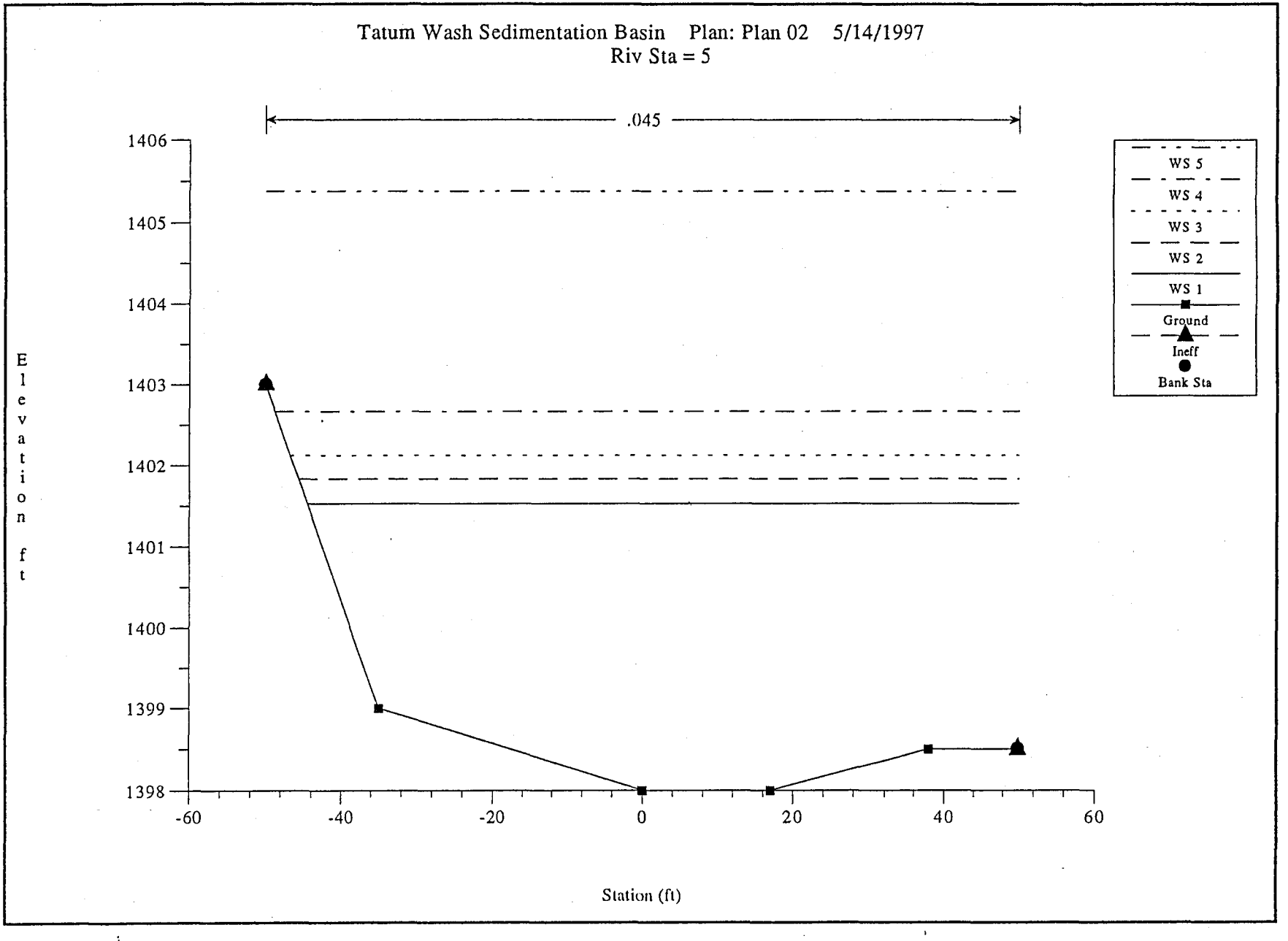
Most Upstream XS Riv Sta = 10
.045
1406
1405
1404
1403
1402
1401
1400
1399
1398
Elevation ft
-60
-40
-20
0
20
40
60
Station (ft)
WS 5
WS 4
WS 3
WS 2
WS 1
Ground
Ineff
Bank Sta


Tatum Wash Sedimentation Basin Plan: Plan 02 5/14/1997
Riv Sta = 8
.045
1406
1405
1404
1403
1402
1401
1400
1399
1398
Elevation ft
-60
-40
-20
0
20
40
60
Station (ft)
WS 5
WS 4
WS 3
WS 2
WS 1
Ground
Ineff
Bank Sta


Tatum Wash Sedimentation Basin Plan: Plan 02 5/14/1997
Riv Sta = 6
.045
WS 5
WS 4
WS 3
WS 2
WS 1
Ground
Ineff
Bank Sta
Elevation ft
1406
1405
1404
1403
1402
1401
1400
1399
1398
-60
-40
-20
0
20
40
60
Station (ft)


Tatum Wash Sedimentation Basin Plan: Plan 02 5/14/1997
Riv Sta = 5
.045
1406
1405
1404
1403
1402
1401
1400
1399
1398
Elevation ft
-60
-40
-20
0
20
40
60
Station (ft)
WS 5
WS 4
WS 3
WS 2
WS 1
Ground
Ineff
Bank Sta

HEC-RAS Plan: Plan 02 Reach: Tatum Wash 5/14/1997

River Sta.	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Prctn Loss (ft)	C. & E. Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
10	1401.91	1401.73	0.18	0.14	0.01		600.00		79.34
10	1402.21	1402.02	0.19	0.14	0.01		700.00		81.62
10	1402.50	1402.30	0.20	0.13	0.01		800.00		83.80
10	1403.04	1402.82	0.21	0.12	0.02		1000.00		87.86
10	1405.78	1405.48	0.30	0.09	0.01		2300.00		99.00
8	1401.75	1401.62	0.13	0.10	0.01		600.00		85.58
8	1402.06	1401.92	0.14	0.10	0.01		700.00		88.09
8	1402.35	1402.21	0.15	0.09	0.01		800.00		90.45
8	1402.90	1402.74	0.16	0.09	0.01		1000.00		94.85
8	1405.68	1405.43	0.25	0.07	0.01		2300.00		99.00
6	1401.64	1401.54	0.10	0.03	0.01		600.00		88.77
6	1401.95	1401.84	0.11	0.03	0.01		700.00		91.16
6	1402.25	1402.13	0.12	0.03	0.01		800.00		93.41
6	1402.81	1402.67	0.14	0.03	0.01		1000.00		96.90
6	1405.60	1405.38	0.22	0.03	0.01		2300.00		100.00
5	1401.60	1401.53	0.07	0.00	0.00		600.00		94.47
5	1401.91	1401.84	0.08	0.00	0.00		700.00		95.63
5	1402.21	1402.13	0.09	0.00	0.00		800.00		96.72
5	1402.77	1402.67	0.10	0.00	0.00		1000.00		98.75
5	1405.56	1405.37	0.19	0.00	0.00		2300.00		100.00

HEC-RAS Plan: Plan 02 Reach: Tatum Wash 5/14/1997

River Sta.	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
10	600.00	1398.00	1401.73	1400.58	1401.91	0.003573	3.37	178.14	79.34	0.40
10	700.00	1398.00	1402.02	1400.73	1402.21	0.003335	3.47	201.82	81.62	0.39
10	800.00	1398.00	1402.30	1400.87	1402.50	0.003145	3.56	224.93	83.80	0.38
10	1000.00	1398.00	1402.82	1401.13	1403.04	0.002862	3.71	269.72	87.86	0.37
10	2300.00	1398.00	1405.48	1402.47	1405.78	0.002006	4.39	524.41	99.00	0.34
8	600.00	1398.00	1401.62	1400.20	1401.75	0.002399	2.90	206.89	85.58	0.33
8	700.00	1398.00	1401.92	1400.34	1402.06	0.002277	3.00	233.25	88.09	0.33
8	800.00	1398.00	1402.21	1400.48	1402.35	0.002178	3.09	258.88	90.45	0.32
8	1000.00	1398.00	1402.74	1400.73	1402.90	0.002028	3.24	308.30	94.85	0.32
8	2300.00	1398.00	1405.43	1402.04	1405.68	0.001524	4.01	573.04	99.00	0.29
6	600.00	1398.00	1401.54	1399.84	1401.64	0.001694	2.57	233.12	88.77	0.28
6	700.00	1398.00	1401.84	1399.99	1401.95	0.001645	2.68	260.80	91.16	0.28
6	800.00	1398.00	1402.13	1400.13	1402.25	0.001603	2.78	287.60	93.41	0.28
6	1000.00	1398.00	1402.67	1400.37	1402.81	0.001526	2.95	339.01	96.90	0.28
6	2300.00	1398.00	1405.38	1401.67	1405.60	0.001274	3.78	608.22	100.00	0.27
5	600.00	1398.00	1401.53	1399.49	1401.60	0.001001	2.12	282.98	94.47	0.22
5	700.00	1398.00	1401.84	1399.62	1401.91	0.001000	2.24	312.33	95.63	0.22
5	800.00	1398.00	1402.13	1399.74	1402.21	0.001000	2.35	340.33	96.72	0.22
5	1000.00	1398.00	1402.67	1399.97	1402.77	0.001001	2.54	393.07	98.75	0.22
5	2300.00	1398.00	1405.37	1401.16	1405.56	0.001000	3.47	663.66	100.00	0.24

Baffle Drop

Ref. Design of Small Dams , Bureau of Reclamation, Second Ed 1973

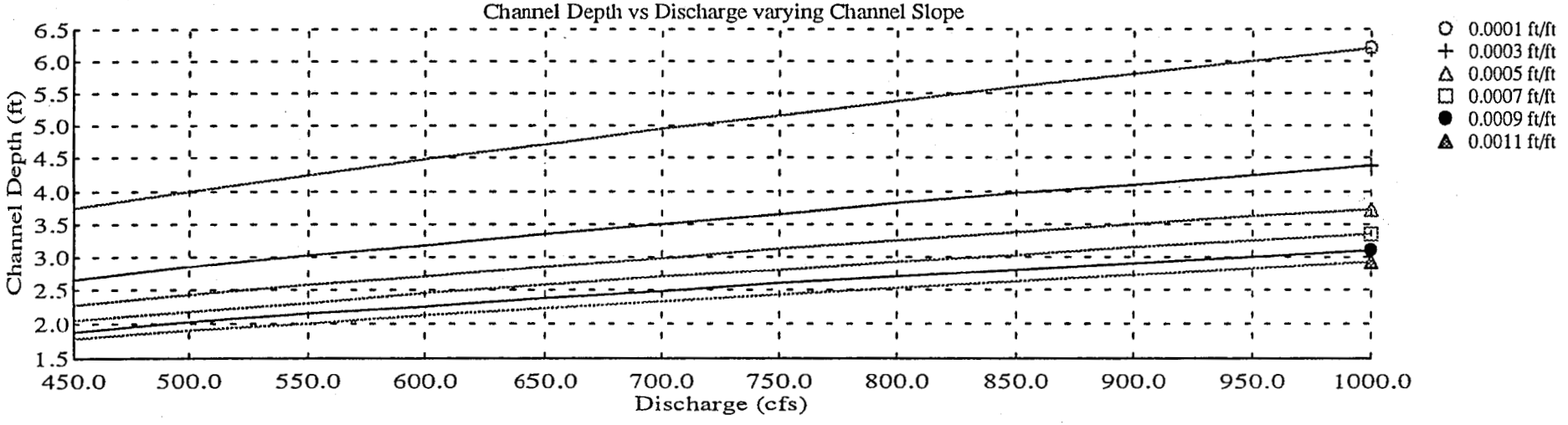
Discharge, Q (cfs)	450	600	800	1000	2300
Chute Width, W (ft)	65	65	65	65	65
Unit Discharge, q (cfs/ft)	6.92	9.23	12.31	15.38	35.38
Spillway height, Hs (ft)	14	14	14	14	14
Spillway Slope, Z:1	3.2	3.2	3.2	3.2	3.2
Entrance Velocity, V1 (fps) From HEC - 2 Run	2.38	2.57	2.78	2.95	3.78
Ideal Velocity, Vi=(qg)^1/3-5	1.06	1.67	2.35	2.91	5.44
Critical Velocity, Vc=(qg)^1/3	6.06	6.67	7.35	7.91	10.44
Critical Depth, Dc=(q2/g)^1/3	1.14	1.38	1.68	1.94	3.39
Baffle Height,H (ft)	0.91	1.11	1.34	1.56	2.71
Baffle Width, Wb (ft), 1.5H	1.37	1.66	2.01	2.33	4.07
Baffle Row Spacing, 2H	1.83	2.21	2.68	3.11	5.42
Number of Baffles per row	24	20	16	14	8
Number of rows	43	43	44	44	44
Wall Height, Hw (ft), 3H	2.74	3.32	4.02	4.67	8.13

Curve
Plotted Curves for Rectangular Channel

Project Description	
Project File	c:\tatumwsh\dgn\project1.fm2
Worksheet	Basin Spillway Inlet Channel
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Constant Data	
Mannings Coefficient	0.018
Bottom Width	65.00 ft

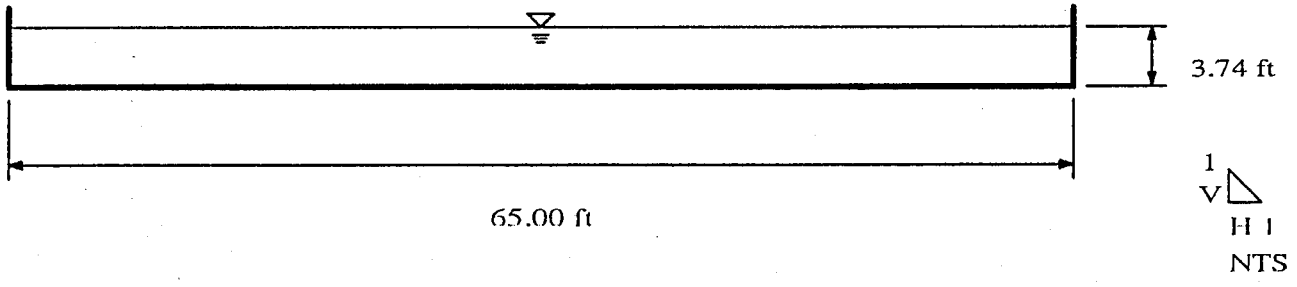
Input Data				
	Minimum	Maximum	Increment	
Discharge	450.00	1,000.00	50.00	cfs
Channel Slope	0.000100	0.001000	0.000200	ft/ft



Cross Section
Cross Section for Rectangular Channel

Project Description	
Project File	c:\tatumwsh\dgn\project1.fm2
Worksheet	Basin Spillway Inlet Channel
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.018	
Channel Slope	0.000100	ft/ft
Depth	3.74	ft
Bottom Width	65.00	ft
Discharge	450.00	cfs



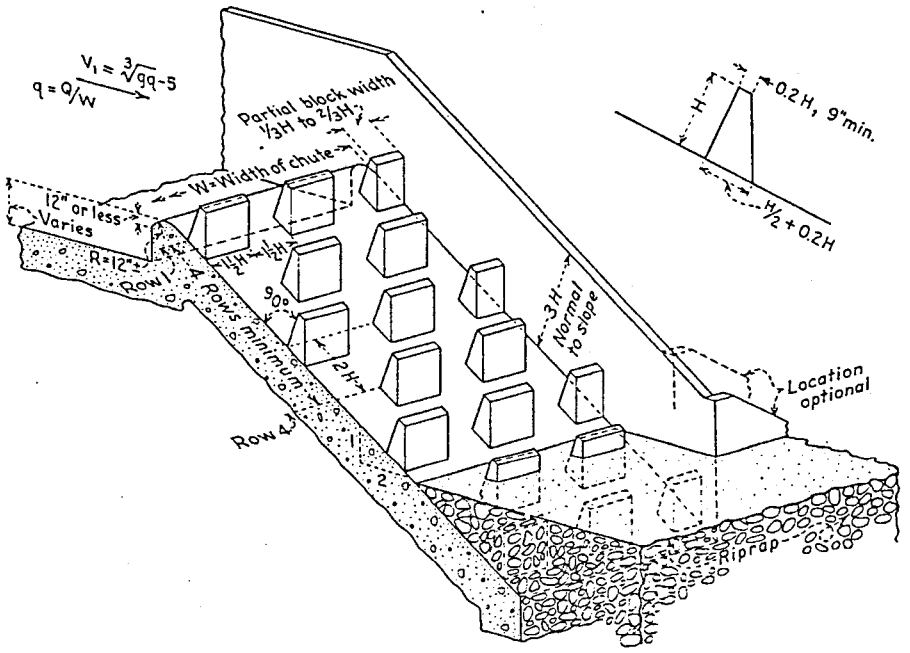


Figure 243. Basic proportions of a baffled chute spillway. 288—D—2807.

baffles should be buried as needed to protect against degradation.

(10) The chute training walls should be three times as high as the baffle piers measured normal to the floor. This wall height will contain the main flow and most of the splash. It is not necessary or practical to build the walls high enough to contain all the splash.

(11) Riprap should be placed at the downstream ends of the training walls to prevent erosion of the banks.

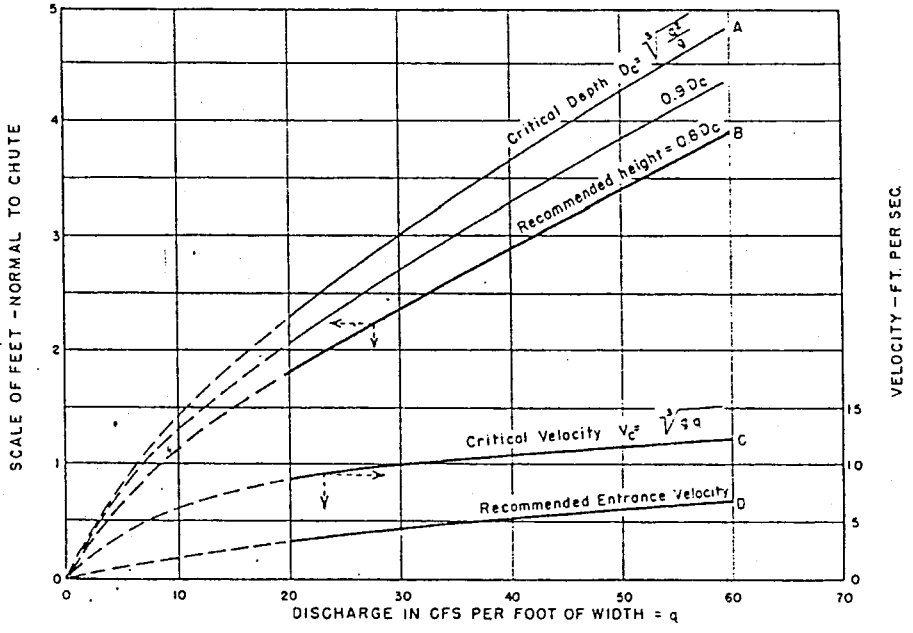


Figure 244. Recommended baffle pier heights and allowable velocities for baffled chute spillways. 288—D—2806.

Figure 242. Baffled apron drop spillway used at Conconully Dam in Washington. The flow shown passing over the spillway is about 50 cfs. P21–141–178NA.

(1) Determine the maximum expected discharge, Q.

(2) Determine unit design discharge $q=Q/W$, where W is the chute width. The chute width may depend on the upstream channel width, the downstream channel width, economy, topography, and frequency of discharge, as well as maximum discharge.

(3) Entrance velocity, V, should be as low as practical. Ideal conditions exist when $V_1=\sqrt[3]{gq}-5$, curve D, figure 244, for discharges up to 69 second-feet per foot of width. Velocities near critical, $V_c=\sqrt[3]{gq}$, curve C, figure 244, or above cause the flow to be thrown into the air after striking the first baffle pier. High velocities may cause the flow to pass completely over the next row or two of baffle piers. It is very important that proper flow conditions be provided at the entrance to the baffle apron because satisfactory performance of the entire structure may hinge on proper entrance flow conditions.

(4) A vertical offset between the approach channel floor and the chute is used to form a desirable uniform entrance velocity, V_1, and will vary in individual installations. A short radius curve provides a crest on the sloping chute. The first row of baffle piers should be placed no more than 12 inches in elevation below the crest. Alternate rows should be staggered to provide a baffle pier below each space and a space below each baffle pier.

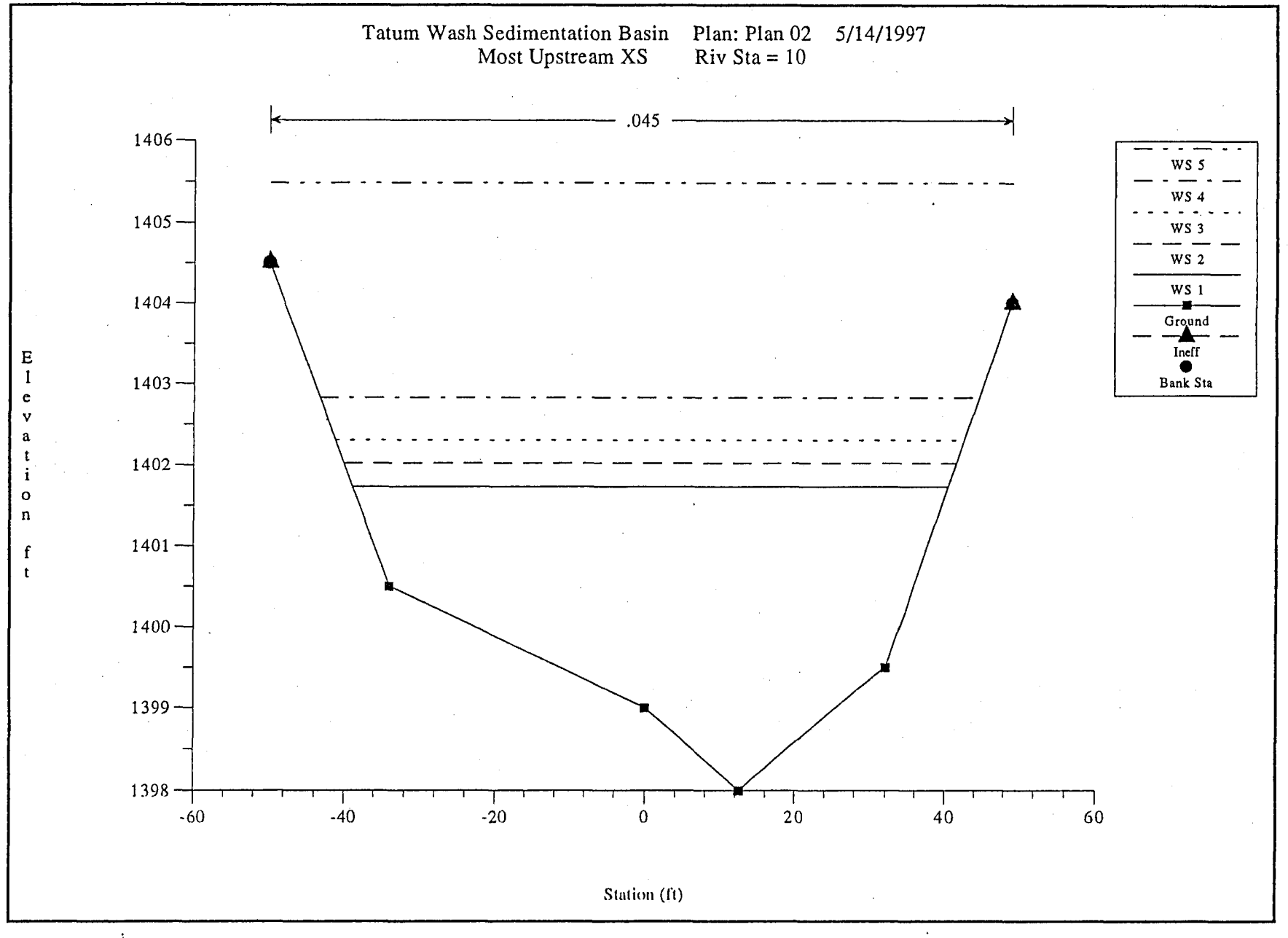
(5) The baffle pier height, H, should be about 0.8 D_c or 0.9 D_c, where the critical depth (D_c) for the rectangular chute is given by the formula $D_c=\sqrt[3]{q^2/g}$ and is shown by curve A of figure 244. Baffle pier height is not a critical dimension but should not be less than recommended.

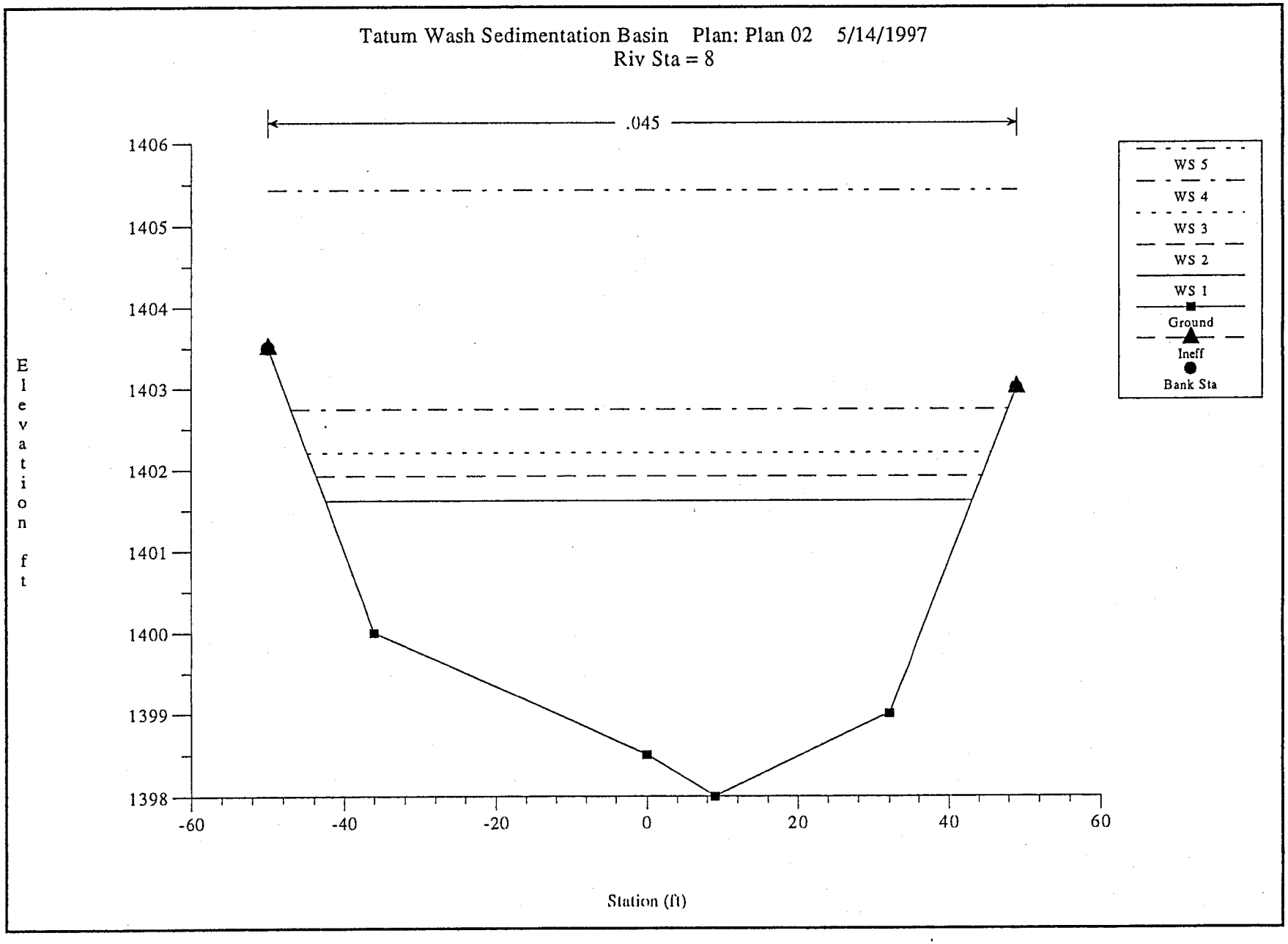
(6) Baffle pier widths and spaces should be equal, preferably about one and one-half H, but not less than H. Other baffle pier dimensions are not critical hydraulically. Suggested cross sectional dimensions are given.

(7) Row spacing of baffle piers along the chute slope should be H divided by the slope, where the slope is given in decimal form. A 2:1 slope, 0.50 in decimal form, makes the row spacing equal to $2H$ parallel to the chute floor.

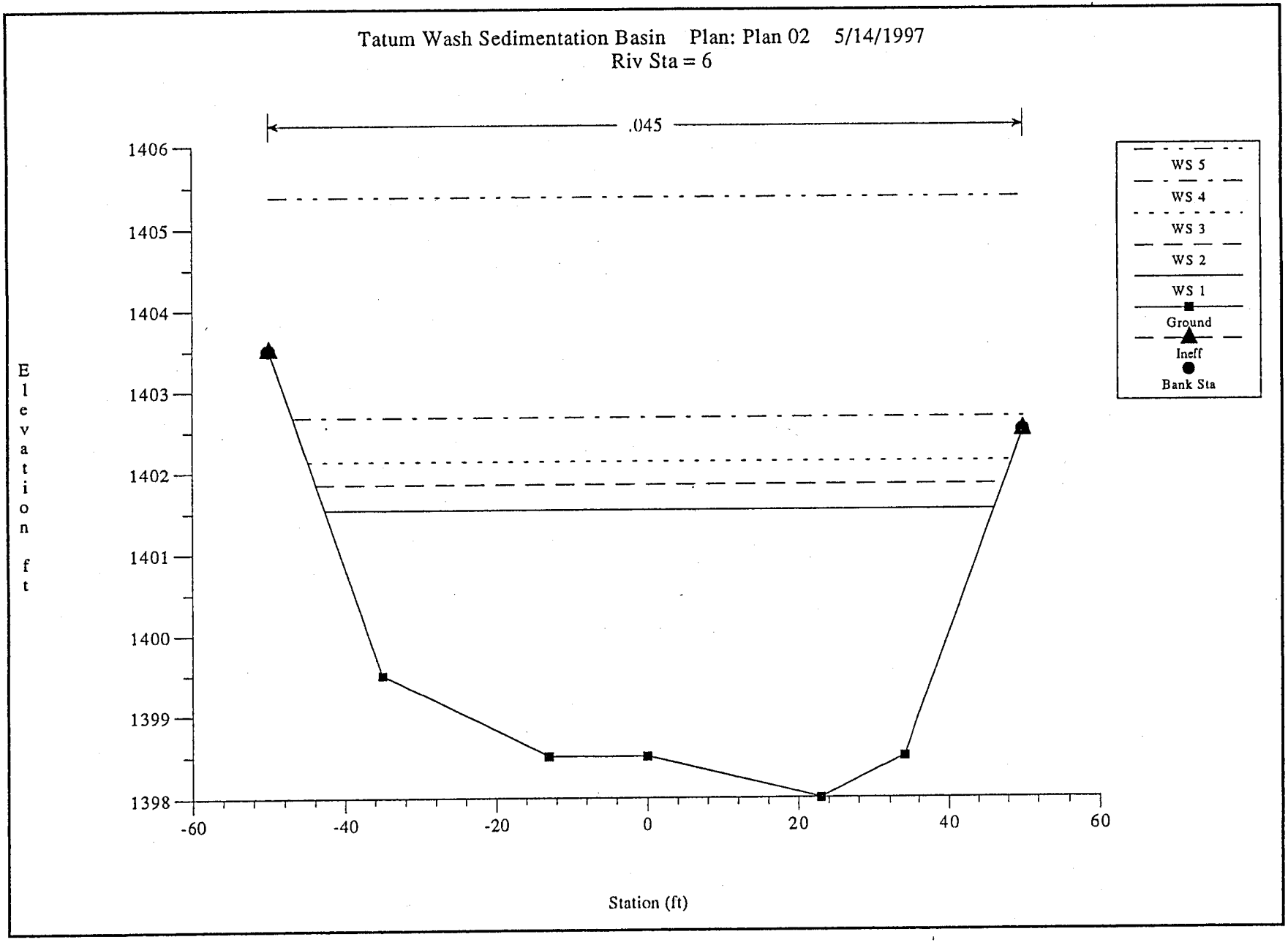
(8) The baffle piers are usually constructed with the upstream face normal to the chute floor surface; however, piers with vertical faces may be used. Vertical face piers tend to produce more splash and less bed scour, but the differences are minor.

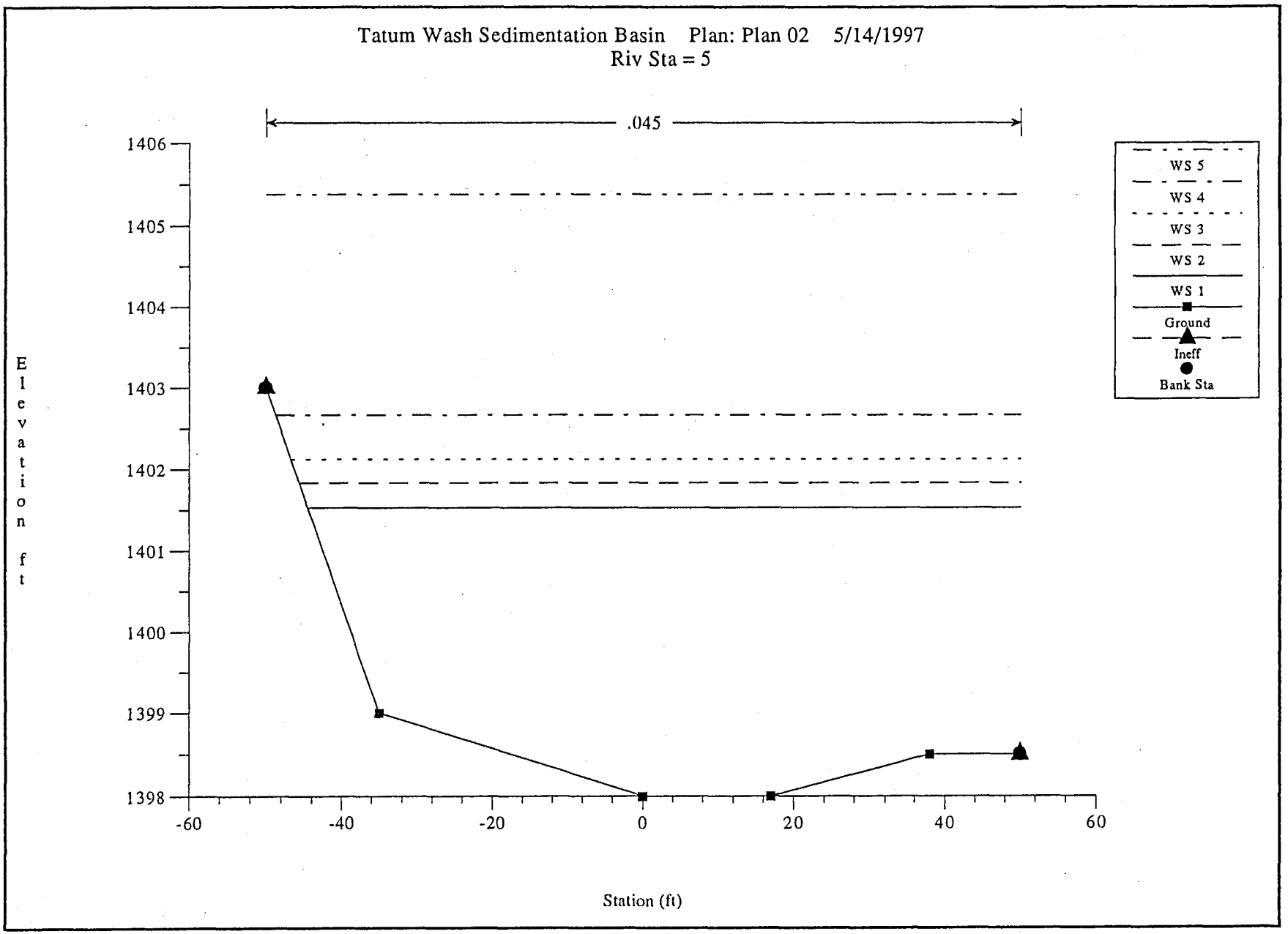
(9) Four rows of baffle piers are needed to establish full control of the flow, although fewer rows have operated successfully. As many additional rows as required beyond the fourth maintain the control established upstream. At least one row of baffles should be buried below the outlet channel grade to protect against scour. Additional rows of


Tatum Wash Sedimentation Basin Plan: Plan 02 5/14/1997
Most Upstream XS Riv Sta = 10
.045
1406
1405
1404
1403
1402
1401
1400
1399
1398
Elevation ft
-60
-40
-20
0
20
40
60
Station (ft)
WS 5
WS 4
WS 3
WS 2
WS 1
Ground
Ineff
Bank Sta


Tatum Wash Sedimentation Basin Plan: Plan 02 5/14/1997
Riv Sta = 8
.045
1406
1405
1404
1403
1402
1401
1400
1399
1398
Elevation ft
-60
-40
-20
0
20
40
60
Station (ft)
WS 5
WS 4
WS 3
WS 2
WS 1
Ground
Ineff
Bank Sta

Tatum Wash Sedimentation Basin Plan: Plan 02 5/14/1997
Riv Sta = 6



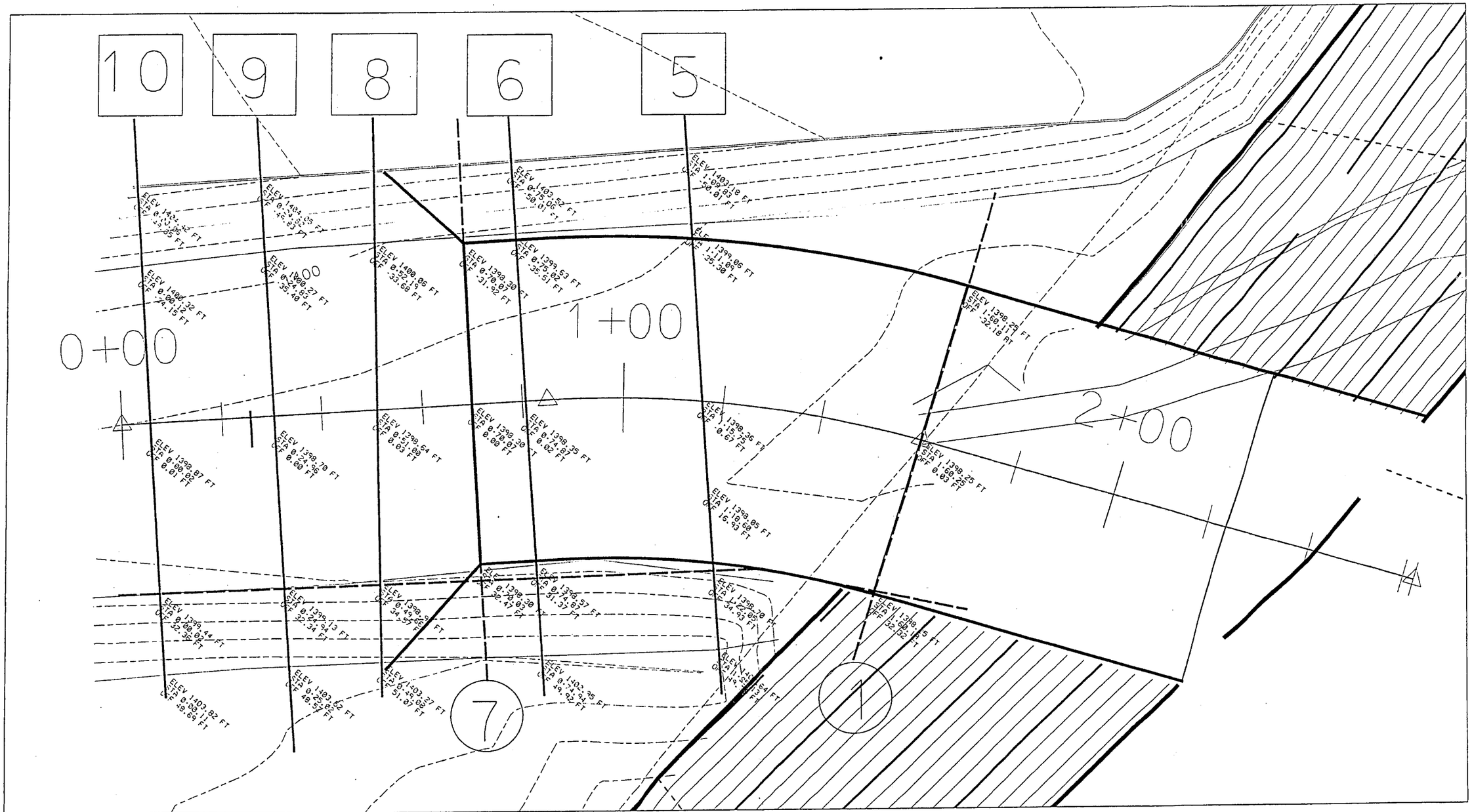

Tatum Wash Sedimentation Basin Plan: Plan 02 5/14/1997
Riv Sta = 5
.045
WS 5
WS 4
WS 3
WS 2
WS 1
Ground
Ineff
Bank Sta
Elevation ft
1406
1405
1404
1403
1402
1401
1400
1399
1398
-60
-40
-20
0
20
40
60
Station (ft)

HEC-RAS Plan: Plan 02 Reach: Tatum Wash 5/14/1997

River Sta.	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Prctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
10	1401.91	1401.73	0.18	0.14	0.01		600.00		79.34
10	1402.21	1402.02	0.19	0.14	0.01		700.00		81.62
10	1402.50	1402.30	0.20	0.13	0.01		800.00		83.80
10	1403.04	1402.82	0.21	0.12	0.02		1000.00		87.86
10	1405.78	1405.48	0.30	0.09	0.01		2300.00		99.00
8	1401.75	1401.62	0.13	0.10	0.01		600.00		85.58
8	1402.06	1401.92	0.14	0.10	0.01		700.00		88.09
8	1402.35	1402.21	0.15	0.09	0.01		800.00		90.45
8	1402.90	1402.74	0.16	0.09	0.01		1000.00		94.85
8	1405.68	1405.43	0.25	0.07	0.01		2300.00		99.00
6	1401.64	1401.54	0.10	0.03	0.01		600.00		88.77
6	1401.95	1401.84	0.11	0.03	0.01		700.00		91.16
6	1402.25	1402.13	0.12	0.03	0.01		800.00		93.41
6	1402.81	1402.67	0.14	0.03	0.01		1000.00		96.90
6	1405.60	1405.38	0.22	0.03	0.01		2300.00		100.00
5	1401.60	1401.53	0.07	0.00	0.00		600.00		94.47
5	1401.91	1401.84	0.08	0.00	0.00		700.00		95.63
5	1402.21	1402.13	0.09	0.00	0.00		800.00		96.72
5	1402.77	1402.67	0.10	0.00	0.00		1000.00		98.75
5	1405.56	1405.37	0.19	0.00	0.00		2300.00		100.00

HEC-RAS Plan: Plan 02 Reach: Tatum Wash 5/14/1997

River Sta.	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(fps)	(sq ft)	(ft)	
10	600.00	1398.00	1401.73	1400.58	1401.91	0.003573	3.37	178.14	79.34	0.40
10	700.00	1398.00	1402.02	1400.73	1402.21	0.003335	3.47	201.82	81.62	0.39
10	800.00	1398.00	1402.30	1400.87	1402.50	0.003145	3.56	224.93	83.80	0.38
10	1000.00	1398.00	1402.82	1401.13	1403.04	0.002862	3.71	269.72	87.86	0.37
10	2300.00	1398.00	1405.48	1402.47	1405.78	0.002006	4.39	524.41	99.00	0.34
9	600.00	1398.00	1401.62	1400.20	1401.75	0.002399	2.90	206.89	85.58	0.33
9	700.00	1398.00	1401.92	1400.34	1402.06	0.002277	3.00	233.25	88.09	0.33
9	800.00	1398.00	1402.21	1400.48	1402.35	0.002178	3.09	258.88	90.45	0.32
9	1000.00	1398.00	1402.74	1400.73	1402.90	0.002028	3.24	308.30	94.85	0.32
9	2300.00	1398.00	1405.43	1402.04	1405.68	0.001524	4.01	573.04	99.00	0.29
8	600.00	1398.00	1401.54	1399.84	1401.64	0.001694	2.57	233.12	88.77	0.28
8	700.00	1398.00	1401.84	1399.99	1401.95	0.001645	2.68	260.80	91.16	0.28
8	800.00	1398.00	1402.13	1400.13	1402.25	0.001603	2.78	287.60	93.41	0.28
8	1000.00	1398.00	1402.67	1400.37	1402.81	0.001526	2.95	339.01	96.90	0.28
8	2300.00	1398.00	1405.38	1401.67	1405.60	0.001274	3.78	608.22	100.00	0.27
7	600.00	1398.00	1401.53	1399.49	1401.60	0.001001	2.12	282.98	94.47	0.22
7	700.00	1398.00	1401.84	1399.62	1401.91	0.001000	2.24	312.33	95.63	0.22
7	800.00	1398.00	1402.13	1399.74	1402.21	0.001000	2.35	340.33	96.72	0.22
7	1000.00	1398.00	1402.67	1399.97	1402.77	0.001001	2.54	393.07	98.75	0.22
7	2300.00	1398.00	1405.37	1401.16	1405.56	0.001000	3.47	663.66	100.00	0.24



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Tatum Wash Detention Basin Outlet

Basin Outlet works that flow into 78" S.D. The assumption is that a maximum of 100 cfs can enter the SD after all events to drain the basin. The outlet structure will be outfitted with backflow preventers on all orifices entering the structure to keep the SD from outleting into the basin. All flows in excess of 1394 will spill into Shea Blvd.

Top of Basin 1394 Coefficient of discharge for square opening 0.59

Bottom of Basin 1380.5 Qo = Ca(2gh)^.5 Qw = CLH^3/2

	Outlet A		Outlet B		Outlet Spill		Emergency Spillway			Outlet into 78" SD		
Dia. of orifice (ft)	2		2		Length =	20	Length =	48		3.5		
Invert of orifice	1381		1385		Coefficier	3.1	Coefficient	2.63		1381		
Center of orifice	1382		1386		Elevation	1392	Elevation =	1393		1382.8		
Area of orifice (sf)	3.14		3.14									
Water Elevation	Available Head (ft)	Discharge (cfs)	Available Head (ft)	Discharge (cfs)	Available Head (ft)	Discharge (cfs)	Available Head (ft)	Discharge (cfs)	Total Discharg (cfs)	HW/D (ft)	*Discharge (cfs)	Storage Ac-Ft
1382	0	0.0	0	0.0	0	0.0	0	0.0	0	0.29		3.11
1383	1	14.9	0	0.0	0	0.0	0	0.0	15	0.57	22	
1384	2	21.0	0	0.0	0	0.0	0	0.0	21	0.86	40	7.59
1385	3	25.8	0	0.0	0	0.0	0	0.0	26	1.14	60	
1386	4	29.7	0	0.0	0	0.0	0	0.0	30	1.43	75	12.46
1387	5	33.2	1	14.9	0	0.0	0	0.0	48	1.71	90	
1388	6	36.4	2	21.0	0	0.0	0	0.0	57	2.00	100	17.72
1389	7	39.3	3	25.8	0	0.0	0	0.0	65	2.29	110	
1390	8	42.1	4	29.7	0	0.0	0	0.0	72	2.57	120	23.40
1391	9	44.6	5	33.2	0	0.0	0	0.0	78	2.86	130	
1392	10	47.0	6	36.4	0	0.0	0	0.0	83	3.14	140	29.50
1393	11	49.3	7	39.3	1	62.0	0	0.0	151	3.43	148	32.71
1394	12	51.5	8	42.1	2	175.4	1	126.2	395	3.71	155	36.03

* Discharge based upon Inlet Control nomographs from HEC 5(zero velocity head)

YOST AND GARDNER ENGINEERS

2619 NORTH THIRD STREET
PHOENIX, ARIZONA 85004

JOB NO. 5240
SHEET 4 OF 9
COMPUTED FRS
CHECKED
DATE

DESIGN COMPUTATIONS

PROJECT

Sta 99+30± 1 year - area 18 - Q = 48 c.f.s.
2 year " Q = 81 c.f.s.

Storm Drain Sized for 60 to 70 c.f.s.

use 48 c.f.s.

Weir - $Q = 2.67 L H^{3/2}$

H = 1' L req = 48 ÷ 2.67 = 18'
H = 1.1' L " = 48 ÷ (2.67 × 1.1537) = 15.6'
H = 1.25' L " = 48 ÷ (2.67 × 1.3975) = 12.9'
H = 1.5' L " = 48 ÷ (2.67 × 1.8371) = 9.8'

C-14.03 for Double 42" pipe 10'-6" + 2(2'-3") = 15' wide.
effective weir = 15' - 2'-9" = 12'-3"
Modify to 28'-20' wide 18' h = 1.1' 20' h = 1.1' use 18'

Q = 12 cfs H = 1' L req = 12 ÷ 2.67 = 4.5'

15" 1.23 sq ft.
18" 1.77
24" 3.14
30" 4.91
42" 7.07

C-14.03 for 30" 3'-6" + 2(1'-6") = 6'-6"
effective weir = 6'-6" - 2.0 = 4'-6" ok use Box 7'-6" × 3'

Size Pipe - DCB criteria -

Try 18" pipe. $DCB = \frac{1.5V^2}{2g} + d + 0.5 =$ 18" V = 6.78 DCB = 3.07 + 2. / 5.07

BK S/W = 92.28
Top. wall 92.78
Lip 90.78 W.S = 91.78 (0.5' below s/w)
℄ 18" 87.71

92.78 − 3.07 = 91.71

	36"	1.07 + 3 + .5	4.57	6.5' Deep 5.5 to 4 :
For Q = 48 cfs	30"	DCB = 2.22 + 2.5 + .5 =	5.22	Below Lip · 5' Deep.
use → 24 cfs	24"	" = 1.36 + 2 + .5 =	3.86	Below Lip · 6' Deep. 5' to 3'
"	18"	" 0.28 + 1.5 + .5 =	6.28	

Eq 36" 43×27 A=6.4 1.31 + 2.25 + .5 = 4.06 6' Deep.
Eq 24" 29×18 " 2.8 1.71 + 1.5 + .5 = 3.71 6' Deep

use Double 24" Better inlet conditions with 13½" Back wall.
Box 4'-10" × (14'-6" to 19)

```
------------------ Beginning Calculation Cycle ------------------
Discharge: 440.00 cfs  at node I-42
Discharge: 440.00 cfs  at node MH6
Discharge: 520.00 cfs  at node Basin Outlet
Discharge: 520.00 cfs  at node MH #7
Discharge: 520.00 cfs  at node MH8
Discharge: 520.00 cfs  at node MH9
Discharge: 520.00 cfs  at node MH10
Discharge: 520.00 cfs  at node MH11
Discharge: 520.00 cfs  at node MH12
Discharge: 520.00 cfs  at node MH13
Discharge: 520.00 cfs  at node Outlet
Beginning iteration 1
Discharge: 440.00 cfs  at node I-42
Discharge: 440.00 cfs  at node MH6
Discharge: 520.00 cfs  at node Basin Outlet
Discharge: 520.00 cfs  at node MH #7
Discharge: 520.00 cfs  at node MH8
Discharge: 520.00 cfs  at node MH9
Discharge: 520.00 cfs  at node MH10
Discharge: 520.00 cfs  at node MH11
Discharge: 520.00 cfs  at node MH12
Discharge: 520.00 cfs  at node MH13
Discharge: 520.00 cfs  at node Outlet
Discharge Convergence Achieved in 1 iterations: relative error:  0.0
Warning: No Duration data exists in IDF Table
Information: Outlet Known flow propagated from upstream junctions.
Information: MH13 Known flow propagated from upstream junctions.
Information: P2 Surcharged condition
Information: MH12 Known flow propagated from upstream junctions.
Information: P3 Surcharged condition
Information: MH11 Known flow propagated from upstream junctions.
Information: P4 Surcharged condition
Information: MH10 Known flow propagated from upstream junctions.
Information: P5 Surcharged condition
Information: MH9 Known flow propagated from upstream junctions.
Information: P6 Surcharged condition
Information: MH8 Known flow propagated from upstream junctions.
Information: P7 Surcharged condition
Information: MH #7 Known flow propagated from upstream junctions.
Information: P8 Surcharged condition
Information: P9 Surcharged condition
Information: MH6 Known flow propagated from upstream junctions.
Information: P10 Surcharged condition
--------------------- Calculations Complete ----------------------

** Analysis Options **
Friction method:  Manning's Formula
HGL Convergence Test:  0.001000
Maximum Network Traversals:  20
Number of Flow Profile Steps:  10
Discharge Convergence Test:  0.001000
Maximum Design Passes:  3
```

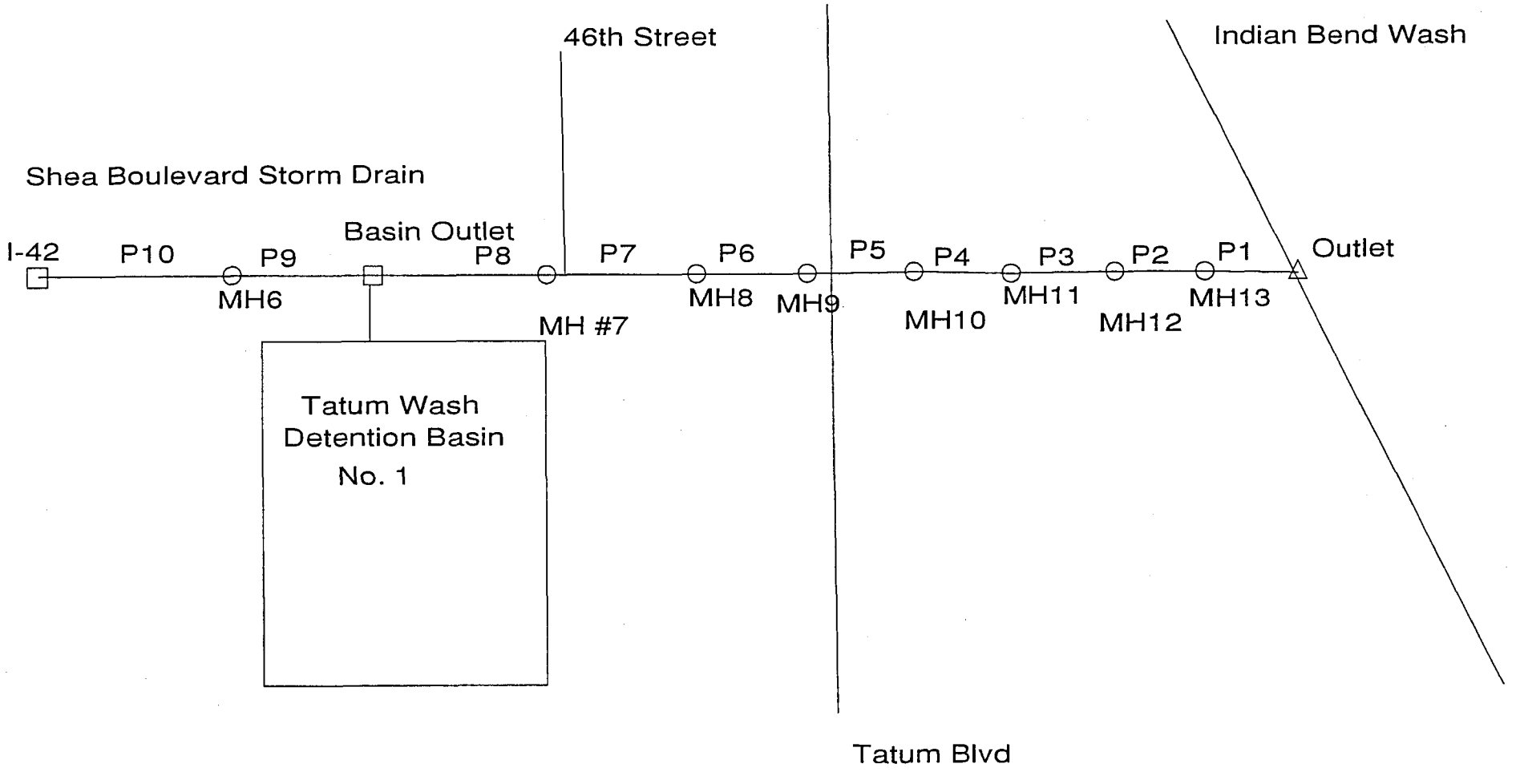
---------- Network Quick View ----------

				Hydraulic Grade	
Label	Length	Size	Discharge	Upstream	Downstream
P9	182.00	78 inch	440.00	1,393.78	1,392.50
P3	268.00	84 inch	520.00	1,364.88	1,363.10
P1	633.00	84 inch	520.00	1,358.87	1,354.27
P2	638.00	84 inch	520.00	1,363.10	1,358.87
P4	642.00	84 inch	520.00	1,369.13	1,364.88
P6	634.00	78 inch	520.00	1,382.17	1,375.93
P8	410.00	78 inch	520.00	1,392.50	1,388.47
P7	640.00	78 inch	520.00	1,388.47	1,382.17
P5	691.00	78 inch	520.00	1,375.93	1,369.13

P10	10.00	78 inch	440.00	1,393.85	1,393.78

		Elevations		
Label	Discharge	Ground	Upstream HGL	Downstream HGL
Outlet	520.00	1,356.50	1,354.27	1,354.27
MH11	520.00	1,368.20	1,364.88	1,364.88
MH9	520.00	1,380.00	1,375.93	1,375.93
Basin Out	520.00	1,393.00	1,392.50	1,392.50
MH6	440.00	1,396.00	1,393.78	1,393.78
MH #7	520.00	1,391.60	1,388.47	1,388.47
MH8	520.00	1,385.60	1,382.17	1,382.17
MH12	520.00	1,366.00	1,363.10	1,363.10
MH13	520.00	1,362.00	1,358.87	1,358.87
MH10	520.00	1,374.00	1,369.13	1,369.13
I-42	440.00	1,396.00	1,393.85	1,393.85

Elapsed: 0 minute(s) 2 second(s)



Hydraulic Grade Line Report W/O Basin Flows

---------- Calculations Complete ----------

** Analysis Options **
Friction method: Manning's Formula
HGL Convergence Test: 0.001000
Maximum Network Traversals: 20
Number of Flow Profile Steps: 10
Discharge Convergence Test: 0.001000
Maximum Design Passes: 3

---------- Network Quick View ----------

				Hydraulic Grade	
Label	Length	Size	Discharge	Upstream	Downstream
P9	182.00	78 inch	440.00	1,388.12	1,386.38
P3	268.00	84 inch	440.00	1,361.79	1,360.26
P1	633.00	84 inch	440.00	1,357.10	1,353.85
P2	638.00	84 inch	440.00	1,360.26	1,357.10
P4	642.00	84 inch	440.00	1,366.14	1,361.79
P6	634.00	78 inch	440.00	1,377.73	1,372.56
P8	410.00	78 inch	440.00	1,386.38	1,383.09
P7	640.00	78 inch	440.00	1,383.09	1,377.73
P5	691.00	78 inch	440.00	1,372.56	1,365.99
P10	10.00	78 inch	440.00	1,388.56	1,388.12

		Elevations		
Label	Discharge	Ground	Upstream HGL	Downstream HGL
Outlet	440.00	1,356.50	1,353.85	1,353.85
MH11	440.00	1,368.20	1,361.79	1,361.79
MH9	440.00	1,380.00	1,372.56	1,372.56
Basin Out	440.00	1,393.00	**1,386.38***	**1,386.38 ***
MH6	440.00	1,396.00	1,388.12	1,388.12
MH #7	440.00	1,391.60	1,383.09	1,383.09
MH8	440.00	1,385.60	1,377.73	1,377.73
MH12	440.00	1,366.00	1,360.26	1,360.26
MH13	440.00	1,362.00	1,357.10	1,357.10
MH10	440.00	1,374.00	1,366.14	1,366.14
I-42	440.00	1,396.00	1,388.56	1,388.56

Elapsed: 0 minute(s) 3 second(s)

* HGL was adjusted for datum difference (lowered .8 ft) and used for outlet analysis.

Principal Outlet Capacity with Tailwater

H = HWE - TWE

V=velocity, fps

$$V = (H/[(1+Ke/2g) +(n^2L/2.21R^(4/3))]$$

g = gravity =	32.2
Ke=entrance loss =	0.5
n = friction coeifficient =	0.013
D = diameter culvert (in) =	42
L =culvert length =	94
R =hydraulic radius , ft =	0.875
TWE = tailwater elevation =	1385.6
HWE = headwater elevation	

1+Ke/2g =	1.008
n^2L =	0.016
2.21R^(4/3) =	1.850

HWE	H	V	Q
Elevation			
1382	0	0.00	0.0
1383	0	0.00	0.0
1384	0	0.00	0.0
1385	0	0.00	0.0
1386	0.4	0.39	3.8
1387	1.4	1.38	13.2
1388	2.4	2.36	22.7
1389	3.4	3.35	32.2
1390	4.4	4.33	41.6
1391	5.4	5.31	51.1
1392	6.4	6.30	60.6
1393	7.4	7.28	70.0
1394	8.4	8.26	79.5

Table
Rating Table for Circular Channel

Project Description	
Project File	c:\haestad\fmw\project1.fm2
Worksheet	Tatum Wash Outlet Pipe
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Discharge

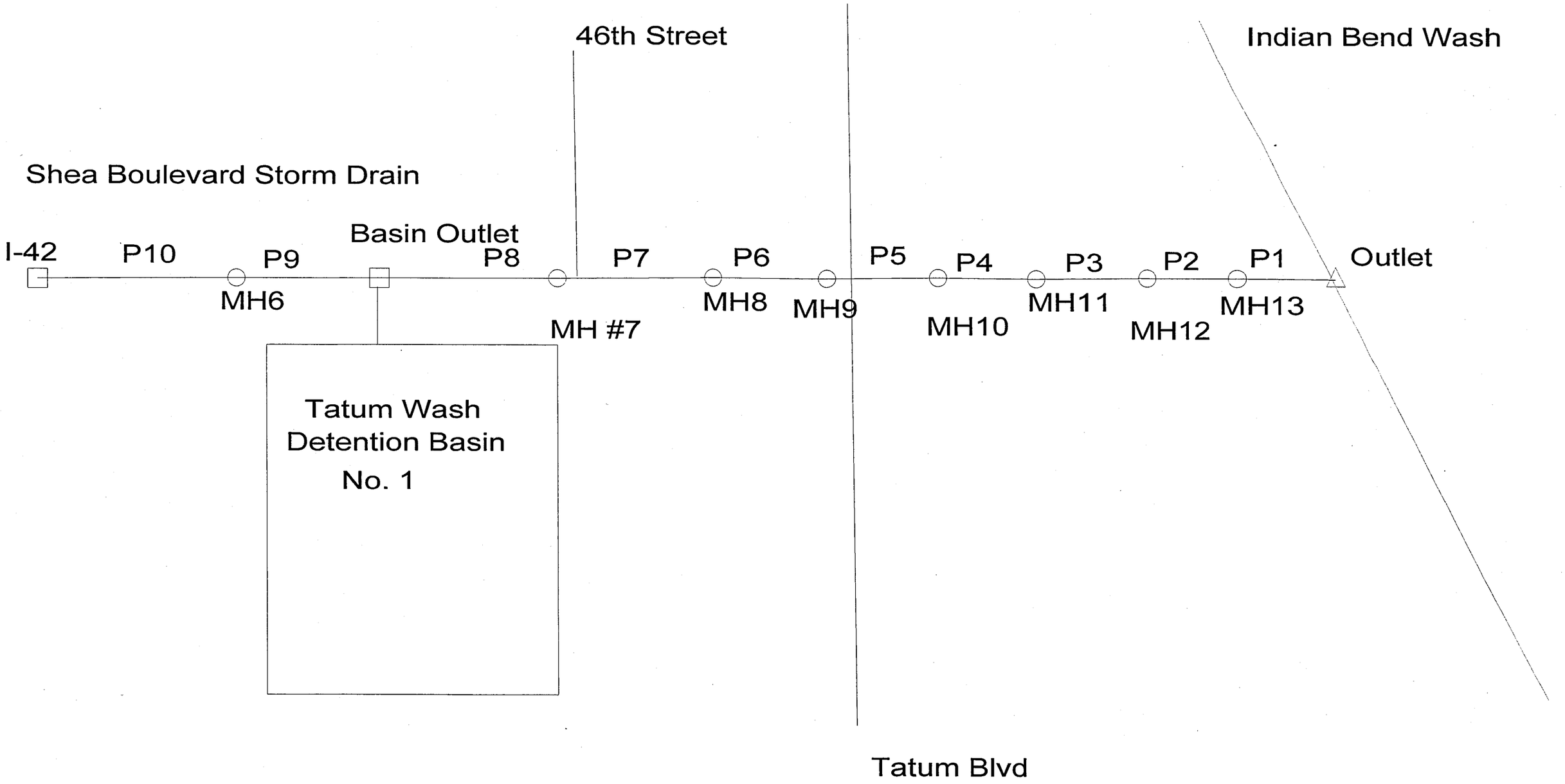
Constant Data		
Mannings Coefficient	0.013	
Channel Slope	0.002294	ft/ft
Diameter	42.00	in

Input Data			
	Minimum	Maximum	Increment
Depth	0.50	3.50	0.50 ft

Rating Table

Depth (ft)	Discharge (cfs)	Velocity (ft/s)
0.50	2.12	2.51
1.00	8.58	3.78
1.50	18.40	4.67
2.00	30.00	5.28
2.50	41.41	5.63
3.00	49.95	5.69
3.50	48.19	5.01

Meets & exceeds minimum Velocity as stipulated in Drainage Design Manual (4.2.2.2)



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
CONTRACT FCD 97-22
TATUM WASH DETENTION BASIN NO. 1

SPECIAL PROVISIONS

SECTION 201 - CLEARING AND GRUBBING

Clearing and grubbing shall conform to Section 201 of the MAG Uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 201.1 - Description

Add the following to this subsection:
The Contractor shall protect-in-place all of the perimeter masonry walls and footers during this operation.

Subsection 201.5 - Payment

Replace this subsection with the following:
The project construction limits shall be cleared of all trees, vegetation, trash and debris. Such material as collected shall be disposed of at an approved landfill site and shall be subject to landfill fees so assessed, which will be included in the unit price bid for this item. Weigh tickets from all landfill disposal must be furnished to the Engineer.

Payment for clearing and grubbing as such will be paid for at the lump sump price bid for, and shall be full compensation for all labor, equipment, disposing of refuse and all other items that are incidental or appurtenant.
ITEM 201 - CLEARING AND GRUBBING

Subsection 201.6 - Measurement, Removal, and Disposal of Trees:

Replace this subsection with the following:
No measurement shall be made for the removal and disposal of trees.

Subsection 201.7 - Payment, Removal, and Disposal of Trees:

Replace this subsection with the following:
No payment shall be made for the removal and disposal of trees as such; the cost thereof shall be included in the price of clearing and grubbing.

SECTION 202 - MOBILIZATION

Add this section to the MAG Uniform Standard Specifications

Subsection 202.1 - Description

The work under this section shall consist of preparatory work and operations, including but not limited to, the movement of personnel, equipment, supplies and incidentals to the project site; the establishment of all offices, buildings and other facilities necessary for work on the project, and for all other work and operations that must be performed and costs incurred prior to beginning work on various items on the project site.

Field Office:

No field office will be required for this project.

Subsection 202.1 - Payment

Payment shall be made on the basis of the lump sum price bid and shall be full compensation for supplying and furnishing all materials, facilities, and services and performing all work involved as specified herein. The lump sum price bid shall not exceed three (3%) percent of the total project bid amount exclusive of mobilization.
ITEM 202 -1 - MOBILIZATION

SECTION 206 - STRUCTURE EXCAVATION AND BACKFILL

Structure excavation and backfill shall conform to Section 206 of the MAG Uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 206.2 - Foundation Material Treatment

Add the following:

Foundation bearing surfaces shall be free of debris and water softened materials prior to placing concrete and reinforcing steel. Any loose or disturbed zones should be removed and replaced with compacted fill or lean concrete.

Subsection 206.4 - Structure Backfill

Add the following:

Compaction of structure backfill soils against embedded footings, walls, and headwall structures shall be accomplished to a minimum 95 percent of the maximum ASTM D698 density.

Compaction against wing walls, or channel lining within 3 feet of the walls or lining shall be accomplished using non-wheeled, hand operated compaction equipment only.

Backfill behind subsurface walls designed to support utilities, pavement, channels, or other facilities should be compacted to density criteria from Section 211. Backfills shall consist of free draining granular soils which exhibit low expansive potentials. The material shall be free of vegetation, debris, organic contaminants, and fragments larger than 6 inches in size.

Compaction operations shall be accomplished by mechanical methods. Water settling or jetting shall not be permitted.

On-site soils may be used in structural fills or backfills except for high plasticity on-site soils (P.I. > 12) which may not be used in structure fills or backfills. Imported soil used for fills under pavements, or channels, backfills around structures should be granular soils conforming to the following requirements:

Sieve Size	Percent Passing
3"	100
3/4"	60-80
#8	35-80
#200	0-12

(Arizona Test Method 201)

Note: Maximum size may be reduced at the Engineer's direction to satisfy trenching and landscape requirements, etc.

Subsection 206.5 - Payment

Replace this subsection with the following:

No payment will be made for structure excavation and backfill as such; the cost thereof shall be included in the bid price for the construction or installation of the items to which such excavation and backfill is incidental or appurtenant.

SECTION 211 - FILL CONSTRUCTION

Fill construction shall conform to Section 211 of the MAG Uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 211.1 - Description

Add the following:

Work under this item shall consist of filling to raise the grade for the maintenance access road around the perimeter of the detention basin and to fill low areas along both sides of the inlet spillway structure.

Subsection 211.3 - Compacting
Add the following:
Compaction of exposed site soil, backfill, fill, and base course materials shall be accomplished to the following density criteria:

Material	Minimum Percent Compaction (ASTM D698)
Subgrade Soil:	
Below structural elements	95
Below Pavement	95
Within three (3) feet of existing perimeter walls	85
Backfill:	
Below channel lining	95
Restoration of channel bank	95
Against structures	95

Compaction of granular soil below the channel lining should be accomplished at a moisture content between optimum minus 3 percent and optimum plus 3 percent.

Where existing Tatum Wash channel banks have been removed or re-graded for construction purposes, said banks shall be restored to original lines and grades. No separate payment will be made for the restoration of channel banks, but shall be considered incidental to related construction activities for which payment is provided.

On site undisturbed soils or compacted soils subsequently disturbed or removed by construction operations should be replaced by materials compacted as specified above.

Subsection 211.5 - Measurement
Replace this Subsection with the following:
No measurement will be made for fill construction. The estimated quantity for fill is 1,100 cubic yards.

Subsection 211.6 - Payment
Replace this Subsection with the following:
No payment will be made for fill construction, the cost thereof shall be included in the price bid for the Detention Basin Excavation to which such fill construction is considered incidental or appurtenant.

SECTION 215 - EARTHWORK FOR OPEN CHANNELS

Earthwork for open channels shall conform to Section 215 of the MAG Uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 215.1 - Description
Replace this subsection with the following:
Open channels for the purpose of this section shall mean open channels and basins where there is exposed cuts. The work in this section consists of excavation, fill, grading, and disposal of excavated and removed material for the construction of the detention basin and associated inlet channel.

Subsection 215.3 - Excavation
Add the following:
The soil boring logs and geotechnical report (see Subsection 102.4) indicate that ripping may be necessary for the moderately to strongly cemented material below 10 feet. The Contractor is encouraged to review the soil boring logs included in Appendix A of these Special Provisions, and the geotechnical report as discussed in Subsection 102.4.

Subsection 215.7 - Measurement
Replace this subsection with the following:
Measurement for excavation material on site for the detention basin and the inlet channel will be made according to the quantity of material excavated from natural ground to the finished grades shown on the plans. No measurement will be made for fill construction, imported material, or disposal of excess material. The Engineer will verify the quantities of excavation by a method which in his opinion is best suited to obtain an accurate determination.

Subsection 215.8 - Payment
Replace this subsection with the following:
Payment for excavation of material for the detention basin and associated inlet channel will be made on the basis of the price bid per cubic yard of excavation.
ITEM 215-1 - DETENTION BASIN EXCAVATION

220 - RIPRAP CONSTRUCTION

Riprap construction shall conform to Section 220 of the MAG Uniform Standard Specifications except as modified herein:

Subsection 220.1 - Description
Replace this subsection with the following:
The construction of riprap shall consist of furnishing and placing stone adjacent to the inlet spillway structure walls and at the base of the inlet spillway structure as shown on the plans and specified in the special provisions. Sacked concrete riprap will not be allowed.

Subsection 220.4 - Plain Riprap
Replace this subsection with the following:
The construction of plain riprap shall consist of furnishing and placing the stones as shown in the plans and as specified in these special provisions.

Riprap Gradation Table (D_{50} = 18")

Stone Size (in)	Percent Gradation
1.5 d_{50}	100
1.2 d_{50}	85
1.0 d_{50}	50
0.4 d_{50}	15

Subsection 220.7- Measurement
Replace this subsection with the following:
Riprap shall be measured by the cubic yard of the rock placed to the depth and neat lines as shown on the plans. No measurement will be made for riprap placed beyond the neat line as shown on the plan unless directed by the Engineer.

Subsection 220.8 - Payment
Replace this subsection with the following:
Payment for plain riprap shall be made on the basis of the price bid per cubic yard in place; within the limits of dimensions shown on the plans for bid items 220-1. Payment shall include labor, preparation of ground surfaces, excavation, rip rap, replacement of damaged areas, samples provided for the Engineer's approval and all other miscellaneous items required for rip rap construction.
ITEM 220-1 - PLAIN RIPRAP

SECTION 225 - WATERING

Water for compacting and dust control shall conform to Section 225 of the MAG Uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 225.1 - Description
Replace this subsection with the following:

The project site is located within a densely developed residential area. Therefore, pre-soaking prior to excavation, and continuous dust control efforts during construction will be required for this project. The Contractor will maintain adequate pre-soak conditions during excavation, and adequate dust control during loading and transport operations to minimize dust.

Subsection 225.2 - Water Supply
Replace this subsection with the following:
The Contractor is to use City of Phoenix water. The Contractor shall use only those hydrants designated by the City of Phoenix Water Services Department and in strict accordance with its requirements for hydrant use.

The Contractor shall contact the Water Services Department, Technical Support Group at 495-5601 to obtain a "Permit to Use Water from Fire Hydrant" and pay the required fees, which include both monthly services charges, plus the cost of the water per 100 cu. Ft units used.

Subsection 225.4 - Measurement
Replace this subsection with the following:
The Contractor must obtain a hydrant meter from the City of Phoenix to measurement the amount of water used. Measurement will be made based upon meter readings rounded to the nearest 100 cubic feet.

The Contractor shall furnish all connections, wrenches, valves and small tools that may be necessary to meet the requirements pertaining to the hydrant use.

Subsection 225.5 - Payment
Replace this subsection with the following:
Payment will be made on the basis of the price charged by the City of Phoenix per 100 cubic feet of water including taxes. Payment shall be for the cost of the water only; the cost of renting the meter, connecting and disconnecting the meter, applying the water including but not limited to the equipment, hauling, and labor, shall be considered incidental to the items for which watering is incidental.
ITEM 225-1 - WATERING

SECTION 301 - SUBGRADE PREPARATION
Subgrade preparation shall conform to Section 301 of the MAG uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 301.1 - Description
Replace this subsection with the following:
Subgrade preparation is for the detention basin maintenance access roads which are located along the east, west, and north sides of the detention basin.

Subsection 301.8 - Payment
Replace this subsection with the following:
No payment for subgrade preparation will be made as such; the cost thereof shall be included in the price of excavation.

SECTION 336 - PAVEMENT MATCHING AND SURFACING REPLACEMENT
Pavement matching and surfacing replacement shall conform to Section 336 of the MAG Uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 336.2.2 -Pavement to be Removed
Add the following to this subsection.
All pavement to be removed shall first be sawcut.

Subsection 336.3 - Types and Locations of Pavement and Surfacing Replacement
Add the following to this subsection.
The replacement of asphaltic concrete pavement shall be 12" in thickness and shall match the grades of the existing pavement.

The materials shall conform to MAG Sections 702 and 710, and the following:

Asphaltic Concrete Type	C-3/4
Mineral Filler	Portland Cement (1-1/2% by weight)
Asphalt Cement	AC-20

Subsection 336.4 - Measurement
Replace this subsection with the following:
Measurement for payment will be by the square yard. In computing the pay quantities for replacements, the pay width will be measured to the outside of the trench not to exceed the maximum trench widths as listed as listed in Table 601-1 of the MAG Standard Specifications and along the longitudinal length of the pipe including through junction structures and/or manholes or as directed by the Engineer. Any pavement replacement in excess of this amount shall be considered and included in the bid item for such that the work is incidental or appurtenant.

Subsection 336.5 - Payment
Replace this subsection with the following:
Payment for pavement matching and surfacing replacement shall be made on the basis of the price bid per square yard, including all materials and subgrade preparation.
ITEM 336-1 - PAVEMENT REPLACEMENT

SECTION 340 - CONCRETE CURB, GUTTER, SIDEWALK, DRIVEWAY AND ALLEY ENTRANCE
Concrete curb, gutter, sidewalk, and driveways shall conform to Section 340 of the MAG Uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 340.1 - Description
Add the following:
The work shall include the construction of concrete curb and gutter sections and sidewalk to replace and match existing curb, gutter, and sidewalk removed for the construction of the outlet pipe as identified in the plans.

The work also includes construction of concrete driveways with curb and gutter. Pavement removal and replacement necessary for construction of the driveways shall be considered incidental to the construction of the driveways (See Appendix 'B' for Driveway Detail P-1255-1).

Subsection 340.6 - Payment
Replace this subsection with the following:
Payment for concrete curb and gutter (MAG Det. 220 Type 'A') shall be made on the basis of the price bid per linear foot and shall be full compensation for all construction equipment, labor, materials, pavement removal and replacement if necessary, and all incidentals necessary to accomplish the work in conformance to the plans.
ITEM 340-1 - CONCRETE CURB AND GUTTER

Payment for concrete driveway entrance (COP Detail P-1255 and COP Detail P-1255-1, 9" thick) shall be made on the basis of the price bid per square foot and shall be full compensation for all construction equipment, labor, materials, pavement removal and replacement if necessary, and all incidentals necessary to accomplish the work in conformance to the plans.
ITEM 340-2 - CONCRETE DRIVEWAY ENTRANCE

Payment for concrete sidewalk (COP DET. P-1230) shall be made on the basis of the price bid per square foot and shall be full compensation for all construction equipment, labor, materials, and all incidentals necessary to accomplish the work in conformance to the plans. .
ITEM 340-4 - CONCRETE SIDEWALK

SECTION 350 - REMOVAL OF EXISTING IMPROVEMENTS
Removal of existing improvements shall conform to Section 350 of the MAG Uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 350.1 - Description
Add the following:
The work includes the removal and disposal of an existing drainage inlet, concrete channel lining and other obstacles to construction, unless it is specifically called out on the plans to be removed and salvaged or protected in place. Holes, cavities and trenches resulting from the removal of structures shall be backfilled if necessary in accordance with Sections 206 and 211. The disposal of all waste material removed under this item shall be the responsibility of the Contractor. The disposal site shall be approved by the Engineer.

If a Maricopa County landfill is selected for the disposal of waste materials and/or debris, a Maricopa County Landfill Use Permit will be required. Application for permit can be made at the Maricopa County Landfill Office, located at 2801 West Durango Street, Phoenix, Arizona 85009 (telephone (602) 269-2661). Charges will be levied on a volume basis for each load delivered to the landfill in accordance with the current fee schedule.

In computing the pay quantities for removals, the pay width or length will be measured to the outside of the trench not to exceed the maximum trench widths as listed in Table 601-1 of the MAG Standard Specifications and along the longitudinal length of the pipe. The pay amount for the junction structure shall be as shown on the plans. Any removals in excess of this amount unless directed to be removed by the Engineer will not be measured and shall be included in the bid item for such that the removal is incidental or appurtenant.

Subsection 350.4 - Payment
No payment shall be made for the removal of trees.

No payment will be made for the removal and disposal of existing AC pavement as such; the cost thereof shall be considered incidental to the work that such removal is incidental or appurtenant.

Payment for removal and disposal of the existing drainage structure shall be made on the basis of the lump sum price bid. Payment shall be full compensation for furnishing all labor, materials, tools and equipment, sawcutting, removal, hauling, disposal and all other items necessary to accomplish the work and shall include the cost of installing pipe plugs in the two remaining pipes in accordance with the MAG Detail 427.
ITEM 350-1 - REMOVE DRAINAGE INLET STRUCTURE

Payment for removal and disposal of the shotcrete lining shall be made on the basis of the lump sum price bid. Payment shall be full compensation for furnishing all labor, materials, tools and equipment, sawcutting, removal, hauling, disposal and all other that is incidental or appurtenant.
ITEM 350-2 - REMOVE SHOTCRETE LINING

Payment for removal and disposal of existing concrete curb and gutter shall be made on the basis of the price bid per linear foot. Payment shall be full compensation for furnishing all labor, materials, tools and equipment, sawcutting, removal, hauling, disposal and all other items necessary to accomplish the work.
ITEM 350-3 - REMOVE CURB AND GUTTER

Payment for removal and disposal of existing concrete sidewalk, driveways, and aprons shall be made on the basis of the price bid per square foot. Payment shall be full compensation for furnishing all labor, materials, tools and equipment, sawcutting, removal, hauling, disposal and all other items necessary to accomplish the work.
ITEM 350-4 - REMOVE SIDEWALK

SECTION 401 - TRAFFIC CONTROL

Traffic control shall conform to Section 401 of the MAG Uniform Standard Specifications and COP Supplement to MAG except as modified herein.

Subsection 401.1 – Description
Replace this subsection with the following:
This work shall consist of traffic control devices and flagmen or pilot cars in accordance with Section 401 of the COP Supplement and the City of Phoenix Traffic Barricade Manual, latest revision.

a. Traffic Control Devices
All traffic and/or traffic control devices on this project shall be provided, maintained and/or controlled as specified in the City of Phoenix Traffic Barricade Manual, latest revision.

b. Street Closure Permits
Permission to restrict city streets, sidewalks and alleys (street closure permits) shall be requested as specified in Section III of the City of Phoenix Traffic Barricade Manual.

c. Traffic Manual
Unless otherwise provided for in the following "General Traffic Regulations," all traffic on this project shall be regulated as specified in Section IV of the City of Phoenix Traffic Barricade Manual.

d. Prior Approval
No deviation to the "General Traffic Regulation" will be allowed or implemented unless submitted to the Engineer for review and approval two weeks prior to the proposed work.

Subsection 401.5 – General Traffic Regulations

a. Local Access Requirements
The Contractor shall maintain local access to all side streets, access roads, driveways, alleys, and parking lots at all times and shall notify residents 72 hours in advance of any restrictions which will affect their access. The Contractor shall restore the access as soon as possible. If the primary access cannot be restored in a timely manner, the Contractor shall provide an alternative, which shall be predetermined with the residents prior to imposing any restrictions. Any local street restrictions imposed shall be such that local area traffic circulation is maintained unless specified to be closed herein or as shown on the detour plans.

b. Flagging of Traffic
No flagging of traffic in the eastbound direction will be permitted during the peak traffic hours of 4:00 p.m. to 7:00 p.m. weekdays. No flagging of traffic in the westbound direction will be permitted during the peak traffic hours of 6:00 a.m. to 9:00 a.m. and 4:00 p.m. to 7:00 p.m. weekdays. Intermittent flagging of traffic in both directions will be allowed at all other times, and including between 7:00 p.m. Friday evenings and 6:00 a.m. Monday morning to facilitate construction and access for heavy construction equipment.

c. Traffic Control Plan
The Contractor shall submit a Traffic Control Plan (TCP) for approval, showing placement of all traffic control devices, including all conflicting signs to be covered/removed or relocated, or other features that may conflict with the placement of temporary signage. This plan shall be professionally drawn on a 24" x 36" reproducible medium, and shall be submitted to the Engineer at the Pre-Construction Conference meeting.

d. Business Access Requirements
Access shall be maintained to adjacent businesses at all times during their hours of operation. Access may be maintained by such measures as constructing driveways in half sections, or by providing bridging over new concrete. Properties having more than one point of access shall not have more than one access restricted for more than fourteen (14) calendar days at any given time. Access to adjacent driveways shall be provided during all non-working hours. Any business restrictions shall be coordinated with the affected business in writing at least seven (7) days prior to imposing restrictions.

e. Pedestrian Access Requirements
The Contractor shall ensure that all sidewalks on this project remain open and safely usable at all times. Such measures as backfilling or ramping to existing sidewalks, or providing alternate sidewalk areas adjacent to existing sidewalks may be used. In high pedestrian use areas, the

Engineer may request temporary hard-surface walkways, such as plywood sheets to be installed at no additional cost to the District.

f. Bus Stops
The Contractor shall maintain all existing bus stop locations on this project in a safe manner, or provide alternate bus stop locations as required by the Engineer.

g. Sanitation Pickup
The Contractor shall provide sanitation pickup for affected residents by relocating trash containers, or by providing alternative measures acceptable to the Sanitation Division of the City of Phoenix Public Works Department.

h. Special Notification Signs
The Contractor shall provide and install two variable message signs for advanced public notification in lieu of post mounted signs for restrictions on Shea Blvd. These signs shall display the information shown below in the following order:

* Location of Work
* Type of Restriction
* Time of Restriction
* Advisory Note

Signs should be placed to be seen from a distance of 300 feet, or as directed by the Engineer. These signs shall be installed two weeks prior to the start of construction for the restriction.

i. Special Sign Requirements
The Contractor shall provide, erect, and maintain informational and directional access signs that may be required by the Engineer. The cost shall be included in the bid item for Traffic Control Devices.

j. Traffic Control and Safety
At the time of the Pre-Construction Conference, the Contractor shall designate an employee, other than the Project Superintendent, who is well qualified and experienced in construction traffic and safety, to be available on the project site during all periods of construction to coordinate and maintain safe barricading whenever construction restricts traffic.

k. Coordination with COP Construction Traffic Control
The Contractor shall contact Tony Arviso at 262-6565 or John Perez at 495-6934 at Construction Traffic Control, City of Phoenix.

Subsection 401.5.1 – Special Traffic Regulations
Replace this subsection with the following:

a. Shea Blvd is considered a major street and the following lane closure restrictions will apply:

b. Saw cutting of existing pavement and/or replacement of permanent pavement shall be accomplished one lane at a time from 9:00 am to 4:00 pm on weekdays, and during daytime working hours on weekends, in order to minimize and mitigate night time construction noise, and impacts to peak travel times on Shea Blvd.

c. For construction of the junction structure in Shea Boulevard the Contractor shall maintain two lanes of traffic in each direction, allowing one lane closure in the eastbound direction and two lane closures in the westbound direction, by utilizing the north side frontage road as an additional westbound lane. The Contractor must provide a detour plan sealed by a Registered Engineer to the City of Phoenix for approval prior to the implementation of any such lane modifications, usages, and restrictions.

d. For construction of the outfall pipe in Shea Blvd. from the basin to the junction structure, the Contractor shall maintain two eastbound lanes, allowing one lane closure in the eastbound direction.

e. For construction of the junction structure and installation of the outfall pipe weekend work will be allowed, including night time hours, between 7:00 pm on Friday and 6:00 am on Monday, on non-holiday weekends after September 9. During weekend work two lanes (one lane in each direction) must be maintained at all times. As of 6:00 am on Monday, traffic restrictions and construction requirements as stated in items "c" and "d" above will apply. The Contractor must provide a traffic control plan to the City of Phoenix for approval prior to the implementation of any such lane modifications, usages, and restrictions.

f. For night time work on weekends the Contractor shall minimize noise disturbance to the surrounding residential areas by disengaging "back-up beepers" and utilizing back-up strobe lights with spotters, and by increasing the muffler capacities of all equipment.

g. Prior to excavation, the Contractor shall:
   1. Develop a haul route plan and obtain a no fee permit from COP Development Services Department
   2. Obtain COP Street Transportation Department approval of haul route, truck volumes and operating hours.
   3. Obtain COP Development Services Department grading permit, including Floodplain Section if applicable, for the proposed spoil location
   4. Street Transportation Department permit does not release Contractor from MAG Subsection 108.5 requirements.

h. For excavation and haul activities only, the right eastbound curb lane can be restricted from 7:00 am to 4:00 pm on weekdays and daytime working hours on weekends. During all other times, all eastbound lanes shall remain unrestricted. Ingress and egress access for the business immediately east of the project area must be addressed as part of any TCP.

i. Construction activities within Shea Blvd. will be restricted during the holiday season of November 15 through January 1. Construction activities that interfere with traffic flow on high volume streets such as Shea Blvd. must be carefully evaluated and imposed only when absolutely necessary.

Subsection 401.7 - Payment
Replace this subsection with the following:
Payment for traffic control, including all mobilization, signage, materials, and maintenance shall be made on the basis of the lump sum price bid.
ITEM 401 -1 - TRAFFIC CONTROL

Payment for off-duty City of Phoenix uniformed officers as mandated by the City of Phoenix will be on an as-used basis as determined by the Engineer. The Contractor shall submit documentation as required by the Engineer to support payment for this item. Payment for off-duty uniformed officers shall be made on the basis of the contract unit price per hour.
ITEM 401-2 - OFF-DUTY UNIFORMED OFFICER

SECTION 440 - SPRINKLER IRRIGATION SYSTEM INSTALLATION
Sprinkler irrigation system installation shall conform to Section 440 of the Mag Uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 440.1 - General:
Replace this subsection with the following:

The existing landscape irrigation system located along the sidewalk will be relocated and/or adjusted as necessary by the Contractor to keep the irrigation system operational at all times during construction. Such relocation and/or adjustment may be necessary during the removal of existing features and/or installation of new construction.

Subsection 440.3 - Pipe Installation:
Add the following:
The work under this section shall include and apply to the existing relocation/modification of the existing irrigation line located in the vicinity of the East and West driveway entrances. The relocation/modifications shall consist of making any necessary changes to keep the integrity of the system intact after removing any necessary landscaping within the road rights-of-way and construction of the driveways.

Subsection 440.8 - Measurement and Payment
No measurement or payment for irrigation shall be made as such; the cost thereof shall be considered incidental to the cost of those construction activities requiring such removal or adjustment.

SECTION 505 - CONCRETE STRUCTURES

Structural concrete shall conform to Section 505 of the MAG Uniform Standard Specifications except as modified herein.

Subsection 505.1 - Description
Add the following:
The work under this section shall consist of furnishing all labor, materials and equipment for the construction of all cast-in-place and other concrete structures including the concrete inlet spillway structure, the junction structure, and the basin outlet structure as located and indicated on the plans.

Concrete shall conform to the requirements of Section 725 of the MAG Uniform Standard Specifications, and mix designs shall additionally meet the requirements of Chapter 5, Section 5.3 of ACI STANDARD 318-89. The Contractor shall submit mix designs and certifications of conformance with the above requirements for the written approval of the Engineer.

Class "A" Concrete, f'c = 3,000 psi, shall be used for all concrete structures and concrete channel lining.

The use of Class F fly ash will be permitted in all concrete mixes, subject to approval of mix design by Engineer.

Transit Concrete mixes used on the project must carry current certification from ADOT or Arizona Rock Products Association.

The reinforcing steel shall conform to Section 727, Grade 60, of the MAG Uniform Standard Specifications.

The 3" PVC weep holes shall be installed as shown on the plans.

Shop Drawings shall be submitted for the following:
1. Product Data: Admixtures and patching materials.
2. Placement Drawings:
   a. Concrete, identifying location of each type of construction joint.
   b. Reinforcing steel.
3. Plastic Type Water Stops: Details of splices to be used and method of securing water stop in the forms and supporting water stop so as to maintain proper orientation and location during concrete placement.

Do not backfill against walls until concrete has obtained 28-day compressive strength. Place backfill simultaneously on both sides of wall, where required, to prevent differential pressures.

Subsection 505.6 - Placing Concrete

Add the following:

Place concrete in accordance with ACI 301-89. Prior to placing concrete, remove loose soil and water from excavation and subgrade and debris and foreign material from forms. Obtain Engineer's approval of subgrade before placing reinforcing steel. Check reinforcing steel for proper placement and correct discrepancies. Before depositing new concrete on old concrete, clean surface using sandblast or bushhammer or other mechanical means to obtain a 1/4-inch rough profile. Maximum vertical drop to final placement shall be 6 feet, when not guided with chutes or other devices to prevent segregation caused by impact with reinforcing. Do not use aluminum pipe or aluminum conveying devices.

Steps performed in preparation for placing concrete shall meet requirements and recommendations of ACI 304R-89 and ACI 301-89, except as modified herein. Ends of chutes, piping, hopper gates, and other points of concrete discharge throughout the conveying, hoisting, pumping, and placing system shall be designed and arranged for concrete to pass without becoming segregated. Do not use chutes longer than 50 feet. The minimum slopes of chutes shall be angled to allow concrete to readily flow without segregation. Conveyor belts shall be approved by Engineer; wiped clean with device which does not allow mortar to adhere to belt; and conveyor belts and chutes covered.

Provide standby pump, conveyor system, crane and concrete bucket, or other system onsite during placing, for adequate redundancy to ensure completion of concrete placement without cold joints in case of a primary placing equipment breakdown. Minimum pump hose (conduit) diameter shall be 4 inches. Replace pumping equipment and hoses (conduits) that are not functioning properly.

Provide intermediate construction joints at maximum spacing of 30 feet. Should placement sequence result in cold joint, install water stop in joint.

Limit size of each placement to allow for strength gain and volume change caused by shrinkage. Minimum time between adjacent placements for construction of the spillway floor slab shall be seven (7) days.

Consolidate concrete with internal vibrators with minimum frequency of 8,000 cycles per minute and amplitude required to consolidate concrete in section being placed. Provide at least one standby vibrator in operable condition at placement site prior to placing concrete. Consolidation equipment and methods shall conform with the requirements of ACI 309R-87. Provide sufficient windows in forms or limit form height to allow for concrete placement through windows and for visual observation of concrete. Vibration consolidation shall not exceed a distance of 5 feet from point of placement. Vibrate concrete in vicinity of joints to obtain impervious concrete there.

When vibrating concrete, apply approved vibrator at points spaced not farther apart than vibrator's effective radius. Apply close enough to forms to vibrate surface effectively but not damage form surfaces. Vibrate until concrete becomes uniformly plastic. Vibrator must penetrate fresh placed concrete and into previous layer of fresh concrete below.

Subsection 505.6.1 - Joints

Add the following:

To new concrete wall horizontal construction joints, thoroughly clean and saturate joint with water. Cover horizontal wall surfaces with minimum 2 inches of grout, as specified in Section 732, and immediately place concrete. Limit concrete lift placed immediately on top of grout to 12 inches thick. Thoroughly vibrate to mix and consolidate grout and concrete together.

To old concrete (greater than 60 days old), mechanically roughen existing concrete surfaces to a clean, rough surface using a "Blastrac" by Wheelabrator-Frye, Inc.; or "Porta-Shotblast" by Nelco Manufacturing Corp, to remove existing concrete surface, and provide a minimum roughness profile of 1/4-inch. Saturate surface with water for 24 hours, cover with 2 inches of grout, and place grout as specified for new concrete.

Construction joints shall be constructed as straight joints and made either vertical or horizontal. Concrete placement shall commence after the joint preparation is complete.

For construction joints, prior to placement of abutting concrete, clean contact surface by removing laitance and spillage from reinforcing steel and dowels. Then roughen surface to a minimum of 1/4-inch amplitude by either sandblasting after the concrete has fully cured, water blasting after the concrete has partially cured, or if the concrete is green, cutting the fresh concrete with high pressure water and hand tools. Perform cleaning so as not to damage water

stop, if one is present.

Join water stops at intersections to provide continuous seal. Center water stop on joint. Secure water stop in correct position to avoid displacement during concrete placement. Repair or replace damaged water stop. Place concrete and vibrate to obtain impervious concrete in the vicinity of all joints. For joints in slabs, make sure that the space beneath plastic water stop is completely filled with concrete. Also, during concrete placement, make a visual inspection of the entire water stop area. Limit concrete placement to elevation of water stop in first pass, vibrate the concrete under the water stop, lift the water stop to confirm full consolidation without voids, then place remaining concrete to full height of slab. Apply procedure to full length of plastic water stops.

Plastic water stops shall be installed in accordance with manufacturer's written instructions. Splice in accordance with the water stop manufacturer's written instructions using a thermostatically controlled heating iron. Butt splice unless specifically detailed otherwise. Allow at least 10 minutes before the new splice is pulled or strained in any way. Finished splices shall provide a cross section that is dense and free of porosity with tensile strength of not less than 80 percent of the unspliced materials. Wire looped plastic water stop may be substituted for plastic water stop.

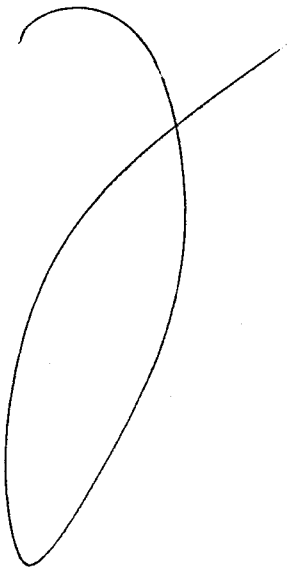
Subsection 505.8 - Curing

Add the following:

Use one of the following methods as approved by Engineer.

Walls shall have only water curing procedures used. Method 1: Leave concrete forms in place and keep entire surfaces of forms and concrete wet for 10 days. Method 2: Continuously sprinkle with water 100 percent of exposed surfaces for 10 days starting immediately after removal of forms.

Slabs shall use one of the following methods: Method 1: Protect surface by water ponding for 10 days; Method 2: Cover with burlap or cotton mats and keep continuously wet for 10 days; Method 3: Cover with 1-inch layer of wet sand, earth, or sawdust, and keep continuously wet for 10 days; or Method 4: Continuously sprinkle exposed surface for 10 days. Other agreed-upon methods that will keep moisture present and uniform at all times on surface of slabs. Do not use curing compounds.



Subsection 505.9 - Finishing Concrete
Add the following:

A heavy rake finish shall be applied to the floor of the inlet spillway structure prior to the sloping surface. The sloping surface of the spillway shall have a rough broom finish applied to the floor.

All exposed concrete structures including the concrete channel lining, inlet spillway structure, and the outlet structure shall be colored using a "light brown" admixture. The color shall conform to Davis Color "Flag Stone Brown #64" as manufactured by Davis Colors, or an approved equal, with respect to hue, value, and chroma. A test panel shall be made and the concrete color shall be approved by the Engineer prior to use. The color shall be added at the rate of 2 pounds per 94-pound sack of cement. The cost of the coloring is incidental to the cost of the concrete.

A clear protective water based coating shall be applied to all exposed concrete structure surface areas. The coating shall be Graffiti Protector #J-44, produced by Dayton Superior, or approved equal. The coating shall be clear and contain no coloring. The cost of the coating is incidental to the cost of the concrete.

A form liner shall be used for the finish on the north, east, and west vertical faces of the outlet structure. The form liner shall be VA D.O.T. Fractured Rib design, No. 367, uni-cast and/or multi-cast sheets as manufactured by Greenstreak, or approved equal. Form liners shall be prepared, placed and stripped per the manufacturer's requirements, recommendations and specifications. The form liner shall not infringe on or reduce the required thickness of the retaining wall as detailed on the plans. The cost of the form liner is incidental to the cost of the outlet structure.

Prior to starting patching work, obtain quantities of color-matched patching material and manufacturer's detailed instructions for use to provide a structural patch with finish to match adjacent surface. Develop patching techniques with epoxy manufacturer on mockup panel. Dress surface of patches that will remain exposed to view to match color and texture of adjacent surfaces. Patching of concrete shall provide a structurally sound surface finish, uniform in appearance or upgrade finish by other means until acceptable to Engineer.

For tops of walls, screed surfaces to true level planes. After initial water has been absorbed, float with wood float and trowel with steel trowel to smooth finish free from trowel marks.

Spray evaporation retardant onto surface of fresh flatwork concrete immediately after screeding to react with surface moisture. Reapply as needed to ensure a continuous moist surface until final finishing is completed.

Subsection 505.9.6 - Finishing and Patching Surfaces
Add the following new section:

When patching *defective* areas, remove *defective* concrete to a depth of sound concrete. Small shallow holes caused by air entrapment at surface of forms shall not be considered *defective* unless amount is so great as to be considered not the standard of the industry. Obtain Engineer's approval of chipping work.

Cut out honeycombed and *defective* areas. Cut edges perpendicular to surface at least 1 inch deep. Do not feather edges. Soak area with water for 24 hours. Patch with nonshrink grout as specified in Section 732. Finish surfaces to match adjacent concrete. Keep patches damp for minimum 7 days or spray with curing compound to minimize shrinking.

To patch form tie holes, fill with Category I grout as specified in Section 732. Use only enough water to dry pack. Compact grout using steel hammer and steel tool to drive grout to high density. Cure grout with water. Make sure color of patch after curing matches color of adjacent concrete.

Subsection 505.10 - Payment
Payment for concrete structures shall be made on the basis of the price bid cubic yard of concrete. Payment shall be full compensation for all labor, materials, reinforcing steel, access barriers, and grates, equipment, excavation and backfill, color admixture, protective coating, and all other items necessary and incidental to construct the structures complete in place according to the plans and these Special Provisions excluding the flapgates.
ITEM 505-1 - SPECIAL OUTLET STRUCTURE
ITEM 505-2 - SPECIAL INLET SPILLWAY

Payment for the Special Junction Structure shall be made on the lump sum price bid. Payment shall be full compensation for all labor, materials, reinforcing steel, equipment, excavation and backfill, color admixture, protective coating, and all other items necessary and incidental to construct the structures complete in place according to the plans and these Special Provisions.

ITEM 505-3 - SPECIAL JUNCTION STRUCTURE

SECTION 515 - STEEL STRUCTURES

Steel Structures shall conform to Section 515 of the MAG Uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 515.1 - Description

The work under this section shall consist of supplying and installing Waterman Model F-10 or approved equivalent flapgates and the inlet grates and access barriers and associated embedments for the outlet structure according to the plans and these Special Provisions.

All material for the inlet grate and access barrier shall be A36 steel.

The inlet grates, access barriers and associated embedments shall be galvanized in accordance with MAG Section 771.

Subsection 515.7 - Payment

No payment will be made for access barriers, or inlet grates and associated embedment angles as such, the cost thereof shall be included in cost of the Special Junction Structure. Payment for flapgates shall be made on the basis of the lump sum price bid per each. Payment shall be full compensation for all labor, materials, equipment, and all other items necessary to complete the work in place according to the plans and these Special Provisions.

ITEM 515-1 - 24" FLAP GATE

SECTION 520 - STEEL HANDRAILS

Steel handrails shall conform to Section 520 of the MAG Uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 520.1 - Description

Add the following:

The work under this section shall include providing and erecting steel handrails and pipe gates as shown in the plans.

All steel handrails and pipe gates shall be painted in accordance with MAG Section 790. The paint color shall be a light brown in color as approved by the Engineer.

Subsection 520.5 - Payment

Payment for handrails shall be made on the basis of the price bid per linear foot. Payment shall be full compensation for all labor, materials, equipment, and painting, and all other items necessary to complete the work in place according to the plans and these Special Provisions.

ITEM 520-1 - STEEL HANDRAILS

Payment for pipe gates shall be made on the basis of the lump sum price bid per each gate. Payment shall be full compensation for all labor, materials, equipment, and painting or galvanizing and all other items necessary to complete the work in place according to the plans and these Special Provisions.

ITEM 520-2 - STEEL PIPE GATE

SECTION 525 – PNEUMATICALLY PLACED CONCRETE

Subsection 525.1 – Description

Add the following:

The work under this section shall include the placement of shotcrete lining on the side slopes of the existing Tatum Wash upstream of the inlet spillway structure as shown in the plans.

Subsection 525.12 – Payment

Replace this subsection with the following:
Payment for shotcrete lining shall be measured on the basis of the price bid per square yard of exposed surface plus the area of any toedown. Payment shall be full compensation for all labor, materials, reinforcing steel, equipment, excavation and backfill, color admixture, coating, and all other items necessary and incidental to construct the lining complete in place according to the plans and these Special Provisions.
ITEM 525 -1 SHOTCRETE CHANNEL LINING

SECTION 601 - TRENCH EXCAVATION, BACKFILLING AND COMPACTION

Trench excavation, backfilling and compaction shall conform to Section 601 of the MAG Uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 601.4.2 - Bedding:
Add the following:
This work shall include the placement of cement-treated slurry bedding as specified on the plans and in these Special Provisions.

Cement-treated slurry bedding material shall conform to the gradation specified for bedding material to the requirements set forth in MAG Section 728. Cement-treated slurry shall have a slump of 8 to 11 inches and have a minimum of 25 psi compressive strength and a maximum of 1000 psi based on a 28 day test.

Cement-treated slurry bedding material shall be placed in a uniform manner that will prevent voids in, or segregation of, the bedding material, and will not float or shift the pipe. Cement-treated slurry bedding material shall be placed from bottom of pipe to pipe spring line. No backfilling above the cement-treated slurry shall be commenced until 24 hours after the cement-treated slurry has been placed.

Subsection 601.4.3 - Backfill:
Add the following:
The Contractor may opt to use cement treated slurry aggregate base course in place of native backfill. The backfill begins from the springline to within one (1) foot from the top of the trench.

Cement-treated slurry backfill material if used shall conform to the gradation specified for bedding material in the COP Supplement Subsection 601.4.2 and to the requirements set forth in MAG Section 728. Cement-treated slurry shall have a slump of 8 to 11 inches and have a minimum of 25 psi compressive strength and a maximum of 1000 psi based on a 28 day test.

Cement-treated slurry pipe backfill shall be placed in a uniform manner that will prevent voids in, or segregation of, the backfill to a maximum elevation one foot from the top of trench and as required per plans. No backfilling above the cement-treated slurry pipe backfill above the cement-treated slurry pipe backfill shall be commenced until 24 hours after the cement-treated slurry has been placed.

Subsection 601.6 - Payment:
No payment will be included in the proposal, nor direct payment made for trench excavation, foundation, bedding, backfilling, compaction, or placement of temporary pavement. The cost of these features of the work shall be included in the unit price bid per linear foot for furnishing and laying pipe.

SECTION 615 - SEWER LINE CONSTRUCTION

Sewer line construction shall conform to Section 615 of the MAG Uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 615.1 - Description
Add the following:
The work in this section shall include replacing the existing 15" sewer with ductile iron pipe at its crossing below the proposed 42" outlet structure pipe.

All ductile iron pipe shall be in accordance with AWWA C-150

A. Materials and Lining for Ductile Iron Sewer

All ductile iron pipe for conveying sewage shall be in accordance with AWWA C-150:

Ductile iron pipe with a minimum wall thickness of Class 52 may be substituted in lieu of the above.

The lining shall cover, at a minimum, the inner surfaces of the pipe and the fitting from the plain end or beveled spigot end to the rear of the gasket socket. If flanged fittings and pipe are included in the project, the lining must not be used on the face of the flange, however full face gaskets must be used to protect the ends of the pipe. At the ends of the pipe and fittings, the lining thickness shall taper for a distance of 4 inches to a minimum thickness of 10 mils.

All ductile iron sewer pipe shall have a protective lining with a nominal thickness of 40 mils and a minimum thickness of 35 mils of Protecto 401 (ceramic epoxy), Polythane (polyurethane), SewerCoat (calcium aluminate), or approved equal throughout the barrel area of the pipe. However, the lining in the bell area shall transition to a minimum thickness of 10 mils at the edge of the gasket socket. The 10 mil lining shall extend into the gasket socket area to a point where the gasket would overlap the lining when it is compressed due to pipe assembly during construction. The 10 mil lining shall also continue from inside the barrel area, around the spigot end of the pipe and along the outside of the pipe to a point where the center of the gasket of the next pipe section would contact the edge of the lining on the spigot end of the previous pipe section. The thickness of the linings shall be determined by using a dry film thickness magnetic gauge at four quadrants.

Each section of pipe and each fitting shall be tested and shall have an absence of holidays when tested by a suitable holiday detector. In all cases, the barrel area of the pipe shall be tested using a voltage of 7,500 volts and a dry conductive probe.

Holiday testing shall conform to ASTM G 62-87 and NACE Standards RP0274-74 and RP0188-90 (latest revision).

The pipe manufacturer shall be solely responsible for the quality of the lining and shall supply a certification as to compliance to the specification. The certification shall state specifically the following items:

1) All ductile sewer pipe and fittings have a protective lining of 40 mils (35 mils min) in the barrel area, 10 mils in the bell area and 10 mils minimum on the exterior of the spigot end.

2) Each section of pipe and each fitting have been tested for holidays utilizing a test voltage of 7,500 volts with a dry conductive probe in the barrel area and a test voltage of 67.5 volts with a wet sponge in both the bell area and the exterior of the spigot end, and no holidays were found.

3) The lining material used meets the current specifications and that the material was applied as required by the specification.

If the contractor makes a field cut of the lined ductile pipe, the Contractor shall comply with the recommendations of the pipe manufacturer in applying a field coating to the end of the pipe ends. In all cases, as a minimum, a 10 mils coating shall be applied to the pipe end and shall overlap the lining by four inches and extend around the pipe end and along the outside of the pipe a minimum of ten inches. The coating shall be allowed to dry before assembly. In addition, the overlapped surface of the lining shall be roughed up to produce a 3 to 5 mil profile over the entire surface. The end result of this process is to secure proper adhesion of the field coating.

B. Repair

Repair of the damaged sections of the lining shall be in accordance with the lining manufacturer's recommendation or as specified above so that the repair area is equal to the undamaged lined area in all respects. All damaged lined areas and holidays shall be repaired immediately after discovery.

Holiday testing may be required by the Engineer before pipe assembly when deemed appropriate. The testing and repair requirements shall follow the procedures called for in this specification and all costs for such repairs will be the responsibility of the Contractor.

There will be no other provisions for repair of the lining of DIP.

C. Protective Collar
In order to protect the exterior spigot end against abrasion and damage during shipping and handling, the manufacturer shall install temporary collars on the exterior of each spigot end of each pipe section. The manufacturer shall secure the collars to the pipe to prevent accidental removal during shipping and normal handling by the Contractor. The collars are not to be removed from the pipe until right before the pipe section is to be installed or field cut.

D. Sewer Inspection
The COP must TV inspect and approve the completed DIP sewer line installation after backfilling of the pipe has been done. The Contractor shall contact Gerry Arakaki at the WSD at 261-8229 a minimum of 48 hours in advance of the need to do the TV inspection.

Subsection 615.13 - Measurement and Payment
Replace this subsection with the following:
Measurement will be made horizontally along the length of the pipe rounded to the nearest foot including all fittings.

Payment for sewer pipe construction shall be made at the unit price bid per linear foot, and shall be full compensation for furnishing and installing the pipe, lining, and fittings complete in place, as specified, including excavation, removals if necessary, backfilling, compaction, sheeting and bracing, testing, and all incidental work not specifically covered in other pay items.
ITEM 615-1 - 15" DIP, CL 52

SECTION 618 - STORM DRAIN CONSTRUCTION

Storm drain construction shall conform to Section 618 of the MAG Uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 618.1 - Description
Add the following:
The work applies to the storm drain pipe connecting the outlet structure with the junction structure in Shea Boulevard.

Subsection 618.2 - Materials
Add the following:
Concrete pipe, joints, gaskets, and testing shall be according to MAG Section 735 and as specified below.

Location	Storm drain construction from the basin outlet structure to the storm drain junction structure.
Type	Rubber Gasketed Reinforced Concrete Pipe (RGRCP), ASTM C 76
Class	IV
Diameter	42 inch
Joints	Rubber Gasket Bell and Spigot

Subsection 618.5 - Measurement
Replace this subsection with the following:
Measurement will be made horizontally along the axis of the pipe rounded to the nearest foot including all fittings. Measurement shall extend from the inside face of the outlet to the inside face of the junction structure.

Subsection 618.6 - Payment
Payment for storm drain construction shall be made at the unit price bid per linear foot, and shall be full compensation for furnishing and installing the pipe and fittings complete in place, as specified, including excavation, removal of AC pavement, backfilling, compaction, sheeting and bracing, testing, and all incidental work not specifically covered in other pay items.
ITEM 618-1 - 42" RGRCP

SECTION 650 - INSTRUMENTATION CONDUIT

Add this section to the MAG Uniform Standard Specifications.

Subsection 650.1 - Description
The work in this section shall include installing galvanized and pvc conduit to facilitate the future installation of weather monitoring equipment.

Subsection 650.2 - Conduit
Galvanized and Schedule 80 PVC in 2-inch diameter as required. Pipe shall conform to ASTM D 1785. Use Schedule 80 fittings conforming to ASTM D 2467 withy primer and adhesive solvent connections conforming to ASTM D 2564. Install conduit as shown on plans. Provide and install 200-lb minimum test pull string in conduit.

Subsection 650.2 - Measurement
Measurement will be made horizontally along the length of the pipe rounded to the nearest foot including all fittings.

Subsection 650.2 - Payment
Payment for instrumentation conduit installation shall be made at the unit price bid per linear foot, and shall be full compensation for furnishing and installing the pipe and fittings, concrete collar, excavation, compaction, and all incidental work not specifically covered in other pay items to complete this item in-place as specified.
ITEM 650-1 - 2" Dia Instrumentation Conduit

SECTION 725 - PORTLAND CEMENT CONCRETE

Portland cement concrete shall conform to Section 725 of the MAG Uniform Standard Specifications and COP Supplement except as modified herein.

Subsection 725.2 - Portland Cement
Add the following:
Cement shall be Portland Cement, conforming to the requirements of ASTM C-150, Type II, unless noted otherwise on the plans or in the specifications.

Subsection 725.6 - Admixtures
Add the following:
When an air-entraining agent is authorized, the amount used will be limited to the extent that the amount of air by volume shall not be less than 4 percent nor more than 6 percent. Air-entraining agents complying with AASHTO M-154 or ASTM C-260 will be permitted as long as strength requirements are met. Any admixture shall be measured accurately by mechanical means into each batch by equipment and in a method approved by the Engineer.

BIDDING SCHEDULE

Engineer's Estimate

PROJECT: Tatum Wash Detention Basin No. 1

CONTRACT: FCD 97-22

ITEM NO.	DESCRIPTION	UNIT	APPROX QTY.	UNIT COST NUMBERS	EXTENDED AMOUNT
105 - 1	Partnering	LS	1	$5,000.00	$5,000.00
107 - 1	NPDES/ SWPPP Permits	LS	1	$5,000.00	$5,000.00
107 - 2	Public Information and Notification Allowance	LS	1	$25,000.00	$25,000.00
107 - 3	Project Signs Allowance	LS	1	$2,000.00	$2,000.00
201 - 1	Clearing and Grubbing	LS	1	$5,000.00	$5,000.00
202 - 1	Mobilization	LS	1	$15,000.00	$15,000.00
215 - 1	Detention Basin Excavation	CY	77,534	$5.50	$426,437.00
220 - 1	Plain Riprap	CY	289	$45.00	$13,005.00
225 - 1	Watering	100/CF	2,675	$1.19	$3,183.25
336 - 1	Pavement Replacement	SY	98	$35.00	$3,430.00
340 - 1	Concrete Curb & Gutter	LF	107	$7.50	$802.50
340 - 2	Concrete Driveway Entrance	SF	464	$5.00	$2,320.00
340 - 3	Concrete Sidewalk	SF	44	$3.00	$132.00
350 - 1	Remove Drainage Inlet Structure	LS	1	$1,500.00	$1,500.00
350 - 2	Remove Shotcrete Lining	LS	1	$3,000.00	$3,000.00
350 - 3	Remove Curb & Gutter	LF	107	$1.00	$107.00
350 - 4	Remove Sidewalk	SF	205	$1.00	$205.00
401 - 1	Traffic Control	LS	1	$10,000.00	$10,000.00
401 - 2	Off Duty Uniformed Officer	HR	400	$24.00	$9,600.00
505 - 1	Special Outlet Structure	CY	14	$400.00	$5,600.00
505 - 2	Special Inlet Spillway	CY	630	$400.00	$252,000.00
505 - 3	Special Junction Structure	LS	1	$15,000.00	$15,000.00
515 - 1	24" Flapgate	EA	2	$1,000.00	$2,000.00
520 - 1	Steel Handrails	LF	644	$25.00	$16,100.00
520 - 2	Steel Pipe Gate	EA	3	$1,200.00	$3,600.00
525 - 1	Shotcrete Channel Lining	SY	107	$28.00	$2,996.00
615 - 1	15" DIP, CL 52	LF	16	$120.00	$1,920.00
618 - 1	42" RGRCP	LF	108	$122.00	$13,176.00
650 - 1	2" Dia Instrumentation Conduit	LF	63	$6.00	$378.00
					$843,491.75

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PLANS FOR THE CONSTRUCTION OF:

TATUM WASH DETENTION BASIN NO. 1

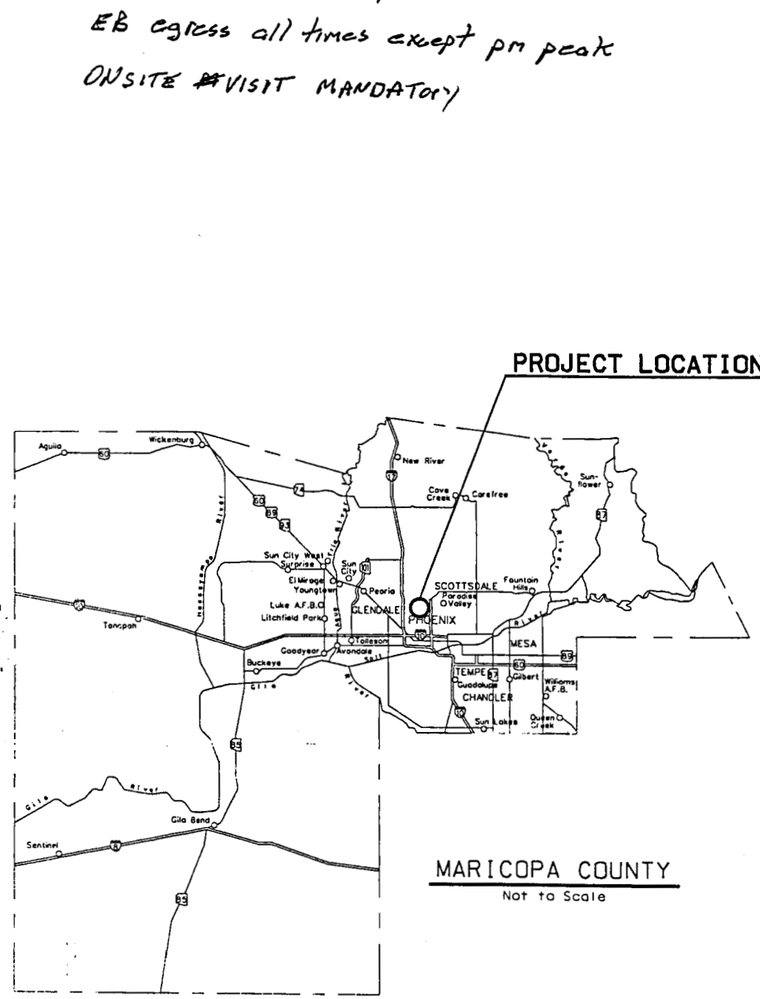
FCD PROJECT NO. 97-22

Shea 90K Veh/day

EB ingress egress only

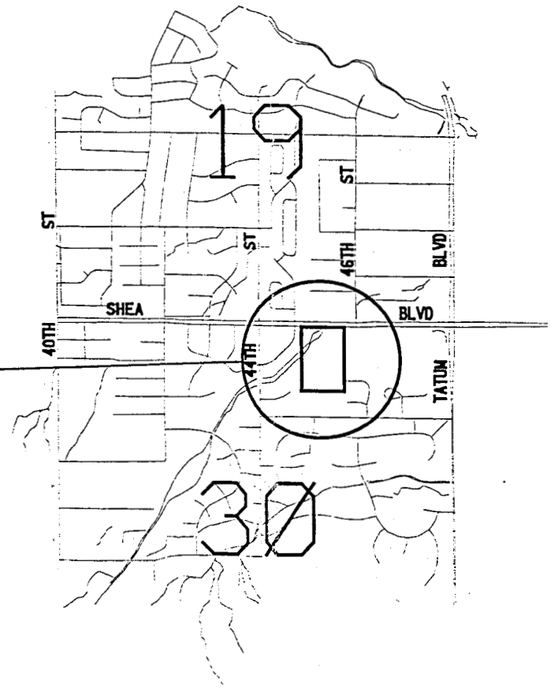
EB egress all times except pm peak

ONSITE ~~VISIT~~ MANDATORY



MARICOPA COUNTY

Not to Scale



VICINITY MAP

Not to Scale

INDEX OF SHEETS

SHEET NO.	TITLE
1	COVER SHEET, VICINITY MAP & INDEX OF SHEETS
2	SITE & DEMOLITION PLAN
3-4	GRADING PLAN
5	TYPICAL SECTIONS
6	SPILLWAY DETAILS
7	FENCE DETAILS

City of Phx

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

ISSUED FOR PUBLIC BIDDING BY:

CHIEF ENGINEER AND GENERAL MANAGER

BOARD OF DIRECTORS OF THE FLOOD CONTROL DISTRICT

DON STAPLEY - CHAIRMAN

DISTRICT 1	FULTON BROCK
DISTRICT 2	DON STAPLEY
DISTRICT 3	BETSEY BAYLESS
DISTRICT 4	JAN BREWER
DISTRICT 5	MARY ROSE WILCOX

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44TH STREET

TATUM WASH

15' DRN ESMT

100' DRAINAGE EASEMENT

LIMITS OF CONSTRUCTION

15' DRN ESMT

100'

EXST BLOCK WALL

578.25' (R)

R/W

80'

34'

29'

20'

9'

98

16'

SHEA BOULEVARD

EXST BLOCK WALL

329.83' (R)

5' DRN ESMT

329.5' (R)

15' DRN ESMT

12' SEWER ESMT

577.98' (R)

EXST BLOCK WALL

46TH STREET

263-1100 BLUE STAKE

BORING LOCATION AND NUMBER (SEE SPECIAL PROVISION)

LEGEND

REMOVE

1 REMOVE CONCRETE INLET STRUCTURE, 1 EA.

2 REMOVE SHOTCRETE CHANNEL LINING, 1 L.S. (SEE SHEET 4 FOR LIMITS)

CONSTRUCT

SCALE: 1"=30'

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

TATUM WASH DETENTION BASIN

	BY	DATE
DESIGNED	MAL	06/13/97
DRAWN	FC	06/13/97
CHECKED		

PRELIMINARY NOT FOR CONSTRUCTION

SITE & DEMOLITION PLAN

SHEET OF 2 9

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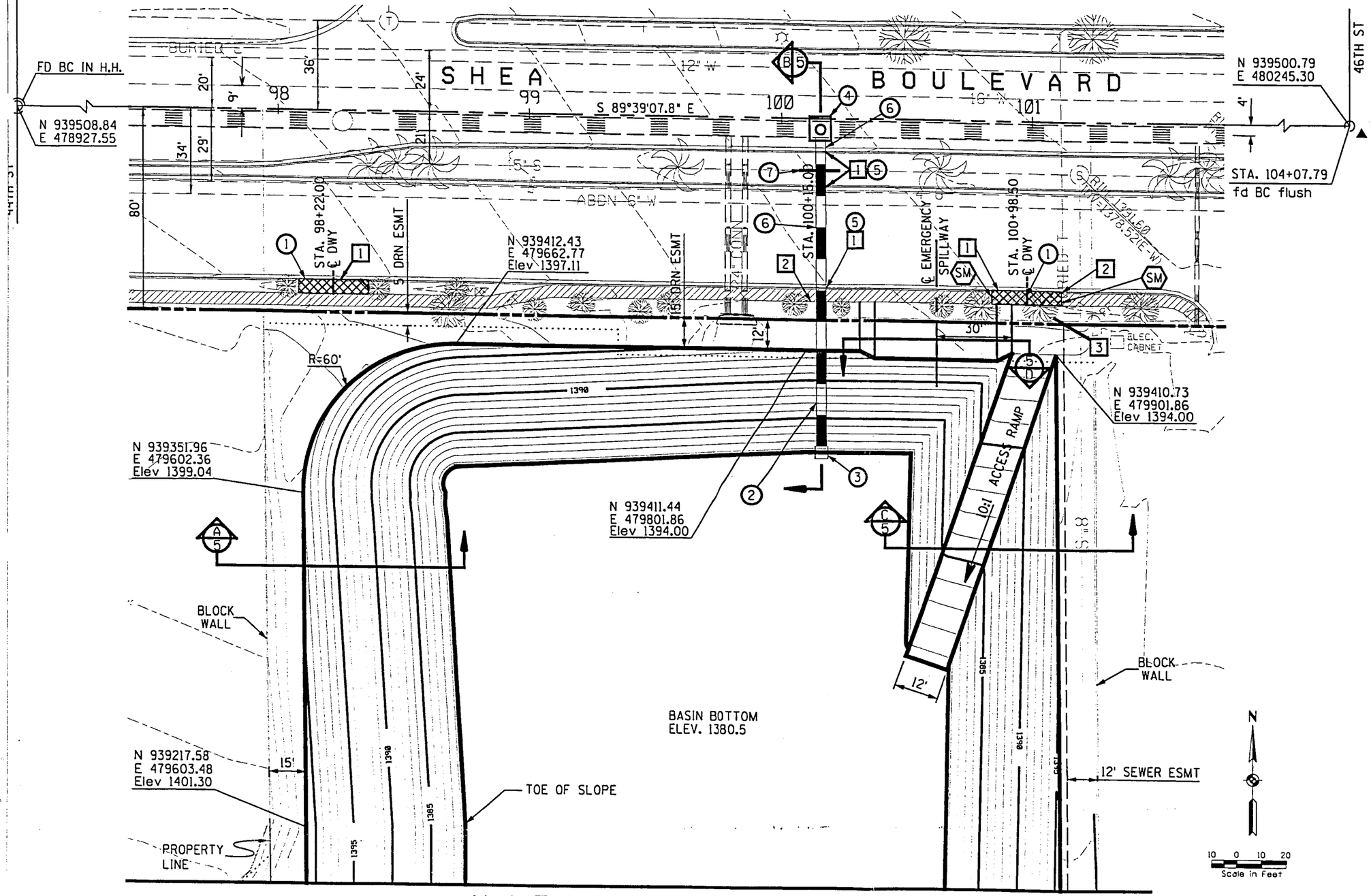

MATCH LINE SHEET 4

263-1100 BLUE STAKE

▲ BENCH MARK: BC FLUSH
INTERSECTION SHEA BLVD & 46TH ST.
ELEV. 1390.42

REMOVE

1. REMOVE CONCRETE CURB & GUTTER, 74 LF.
2. REMOVE CONCRETE SIDEWALK, 170 SF.
3. REMOVE TREE (NPI).

CONSTRUCT

1. CONSTRUCT NEW DRIVEWAY CITY OF PHOENIX DET P-1255, W=20, 4' WINGS, 280 SF TOTAL.
2. INSTALL 42' CLASS IV RGRCP
3. CONSTRUCT SPECIAL OUTLET STRUCTURE (SEE DETAILS SHT) 1 EA.
4. CONSTRUCT NEW MANHOLE/JUNCTION STRUCTURE (SEE DETAILS SHT) 1 EA.
5. CONSTRUCT CURB & GUTTER, MAG STD DET 220, TYPE 'A', 18 LF TOTAL.
6. REPLACE A.C. PAVEMENT, 34 SY.
7. INSTALL 15" DIP, CL 52, 16 LF

SM SAWCUT & MATCH EXISTING

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

TATUM WASH DETENTION BASIN

	BY	DATE
DESIGNED	MAL	06/12/97
DRAWN	FC	06/12/97
CHECKED		

PRELIMINARY NOT FOR CONSTRUCTION

NORTH HALF BASIN GRADING — SHEET OF 3 9

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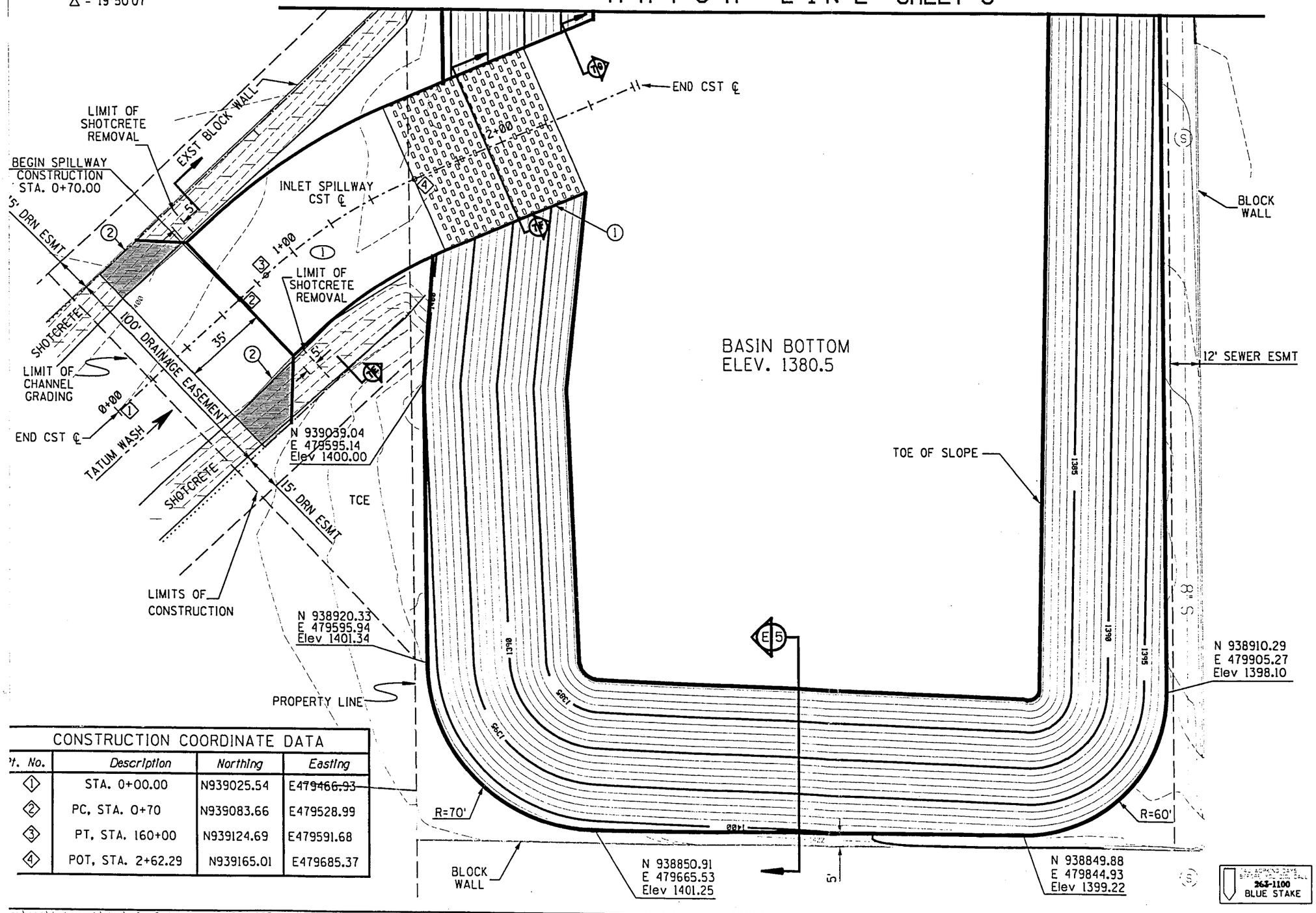
CURVE DATA:

① R = 217.50'
R = 38.03'
L = 75.30'
Δ = 19°50'07"

MATCH LINE SHEET 3



CONSTRUCTION COORDINATE DATA

Pt. No.	Description	Northing	Easting
①	STA. 0+00.00	N939025.54	E479466.93
②	PC, STA. 0+70	N939083.66	E479528.99
③	PT, STA. 160+00	N939124.69	E479591.68
④	POT, STA. 2+62.29	N939165.01	E479685.37

REMOVE

CONSTRUCT

① CONSTRUCT SPILLWAY STRUCTURE (SEE DETAIL SHEET)

② APPLY SHOTCRETE 6" THICK OVER 6x6-W4xW4.

N

10 0 10 20
Scale in Feet

▲ BENCH MARK: BC FLUSH
INTERSECTION SHEA BLVD & 46TH ST.
ELEV. 1390.42

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

TATUM WASH DETENTION BASIN

	BY	DATE
DESIGNED	MAL	06/13/97
DRAWN	FC	06/13/97
CHECKED		

PRELIMINARY NOT FOR CONSTRUCTION

SOUTH HALF BASIN GRADING

SHEET 4 OF 9

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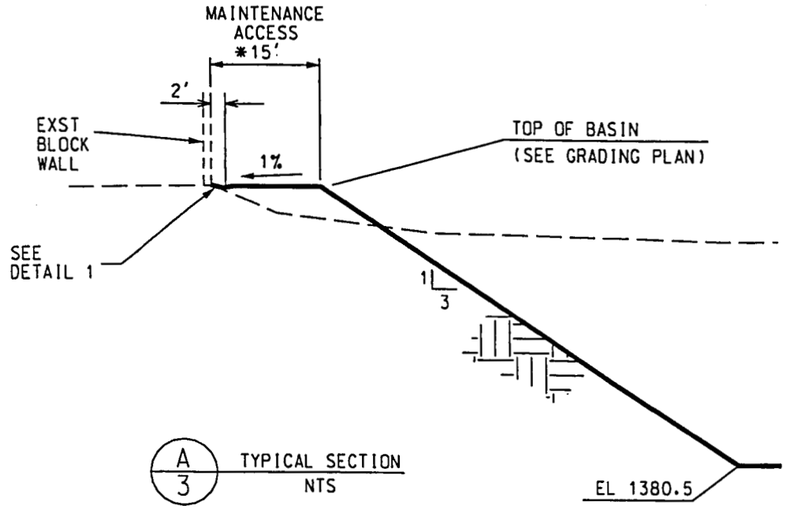
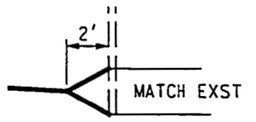
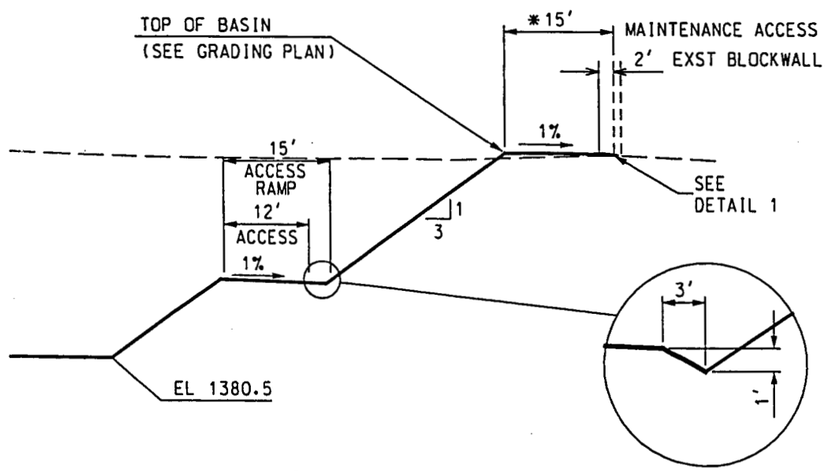


A/3 TYPICAL SECTION
NTS



3 DETAIL
NTS



C/3 TYPICAL SECTION
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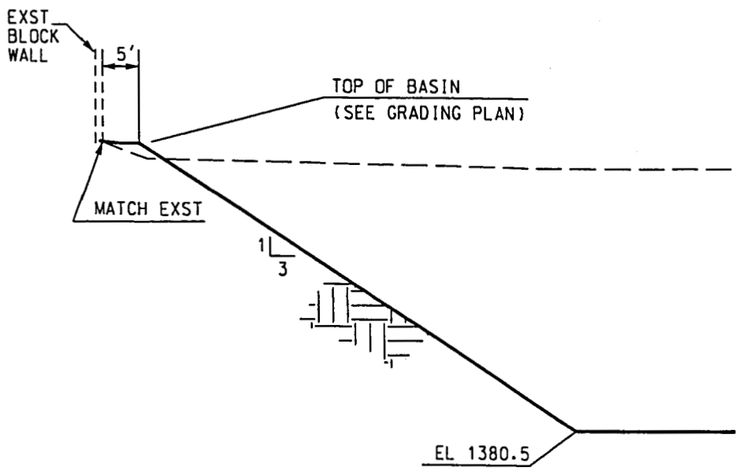

E/4 TYPICAL SECTION
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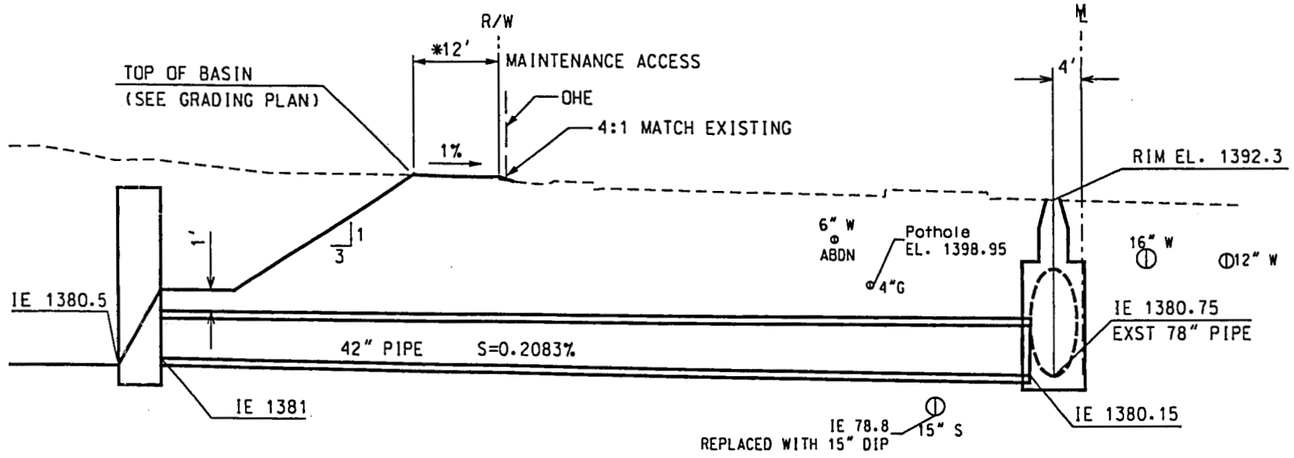
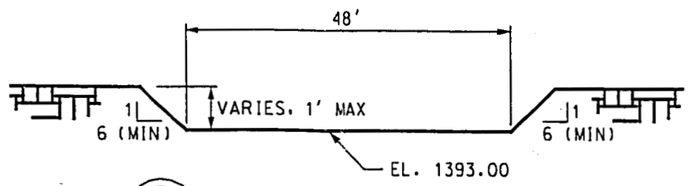


B/3 SECTION @ BASIN OUTLET
NTS



D/3 TYPICAL SECTION AT EMERGENCY SPILLWAY
NTS

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION

TATUM WASH DETENTION BASIN

	BY	DATE
DESIGNED	MAL	06/13/97
DRAWN	FC	06/13/97
CHECKED		

PRELIMINARY NOT FOR CONSTRUCTION

DETENTION BASIN CROSS SECTION

SHEET OF 5 9

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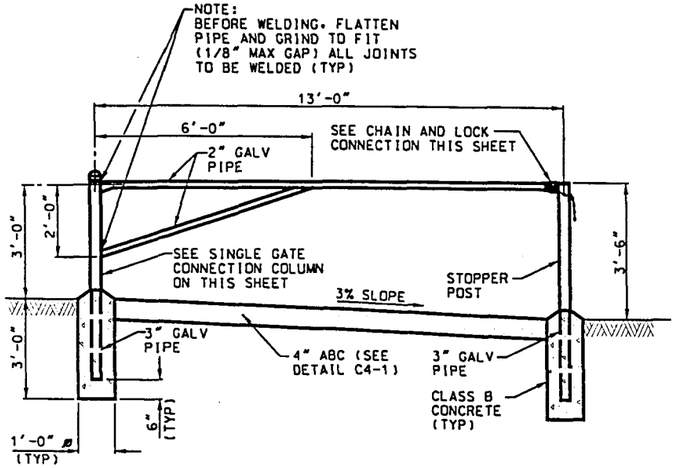
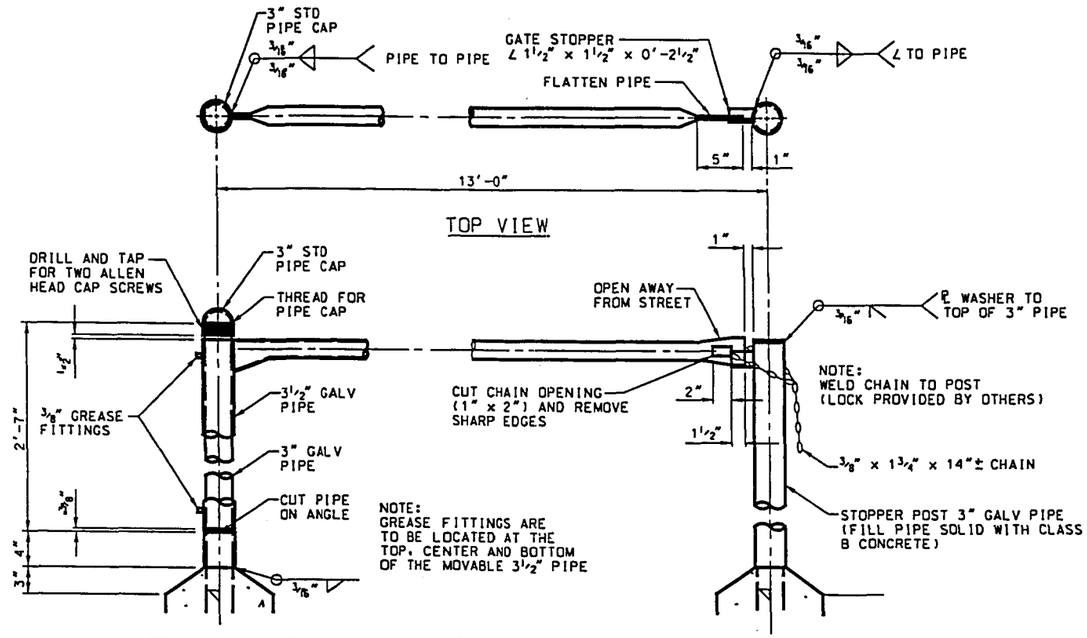


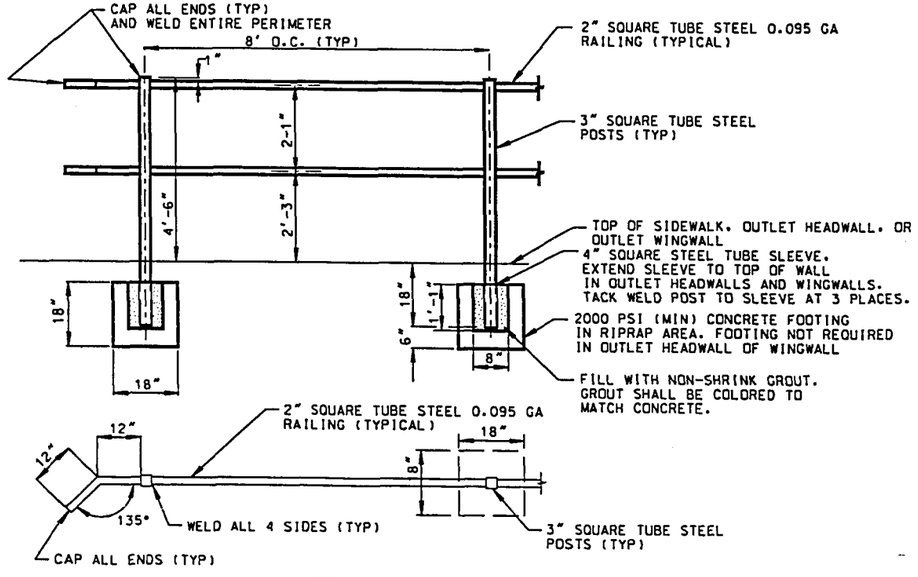
DETAIL C6-1
SINGLE GATE ELEVATION
NTS



SINGLE GATE CONNECTION TO COLUMN

DETAIL C6-2
NTS

SINGLE GATE STOPPER POST CHAIN AND LOCK CONNECTION



NOTES:

1. ALL SURFACES TO BE PAINTED PER SPECIAL PROVISIONS. COLOR TO BE DULL BLACK.
2. HANDRAIL TO BE INSTALLED AT TOWNLEY AVENUE SPILLWAY, DOUBLE 6'X4' CBC OUTLET HEADWALL, AND 48" RGRCP PIPE OUTLET HEADWALL.

STEEL RAILING DETAIL
NTS

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

TATUM WASH DETENTION BASIN

PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DESIGNED	MAL	06/12/97
DRAWN	FC	06/12/97
CHECKED		

FENCE DETAIL

SHEET OF 2 9

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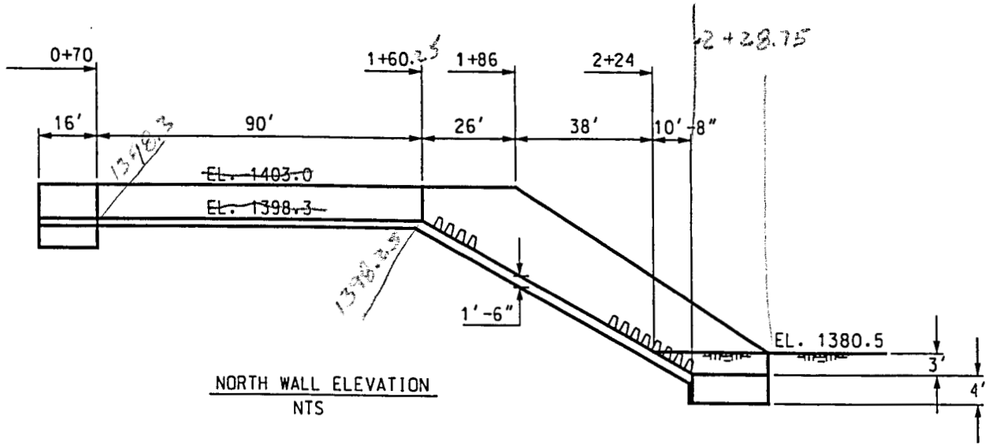
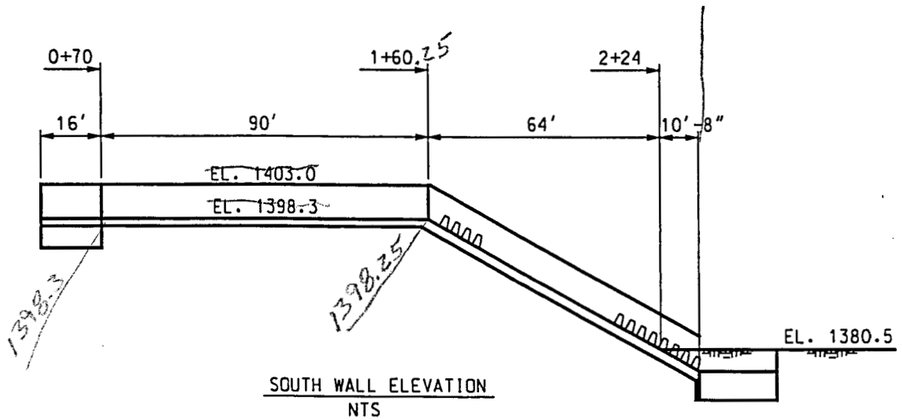


NORTH WALL ELEVATION
NTS



SOUTH WALL ELEVATION
NTS

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

TATUM WASH DETENTION BASIN

	BY	DATE
DESIGNED	KVH	06/13/97
DRAWN	FC	06/13/97
CHECKED		

REGISTERED PROFESSIONAL ENGINEER — PRELIMINARY NOT FOR CONSTRUCTION — ARIZONA, U.S.A.

DETENTION BASIN CROSS SECTION

SHEET 7 OF 9

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0+70 1398.30
1+60.25 1398.25
2+23.78 1380.5
2+62 1380.5

15' DRN ESMT

SHOTCRETE

21.4'

1400

2+55.71

PC STA. 1+60.30
N 939124.69
E 479591.64

PC STA. 0+85.00
N 939083.66
E 479528.99

BEGIN CONSTRUCTION
STA. 0+70.00

100' DRAINAGE EASEMENT

1+00

2+00

2+23.78

INLET CST ℄

END CST ℄
N 939165.01
E 479685.37

TATUM WASH

BEGIN CST ℄
STA. 0+00
N 939025.54
E 479528.93

SHOTCRETE

28.5'

15' DRN ESMT

2+23.78

1385

① R = 217.50'
T = 38.03'
L = 75.30'
Δ = 19°50'07"

N

10 0 5 10
Scale In Feet

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION

TATUM WASH DETENTION BASIN

		BY	DATE
PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	MAL	06/02/97
	DRAWN	FC	06/02/97
	CHECKED		

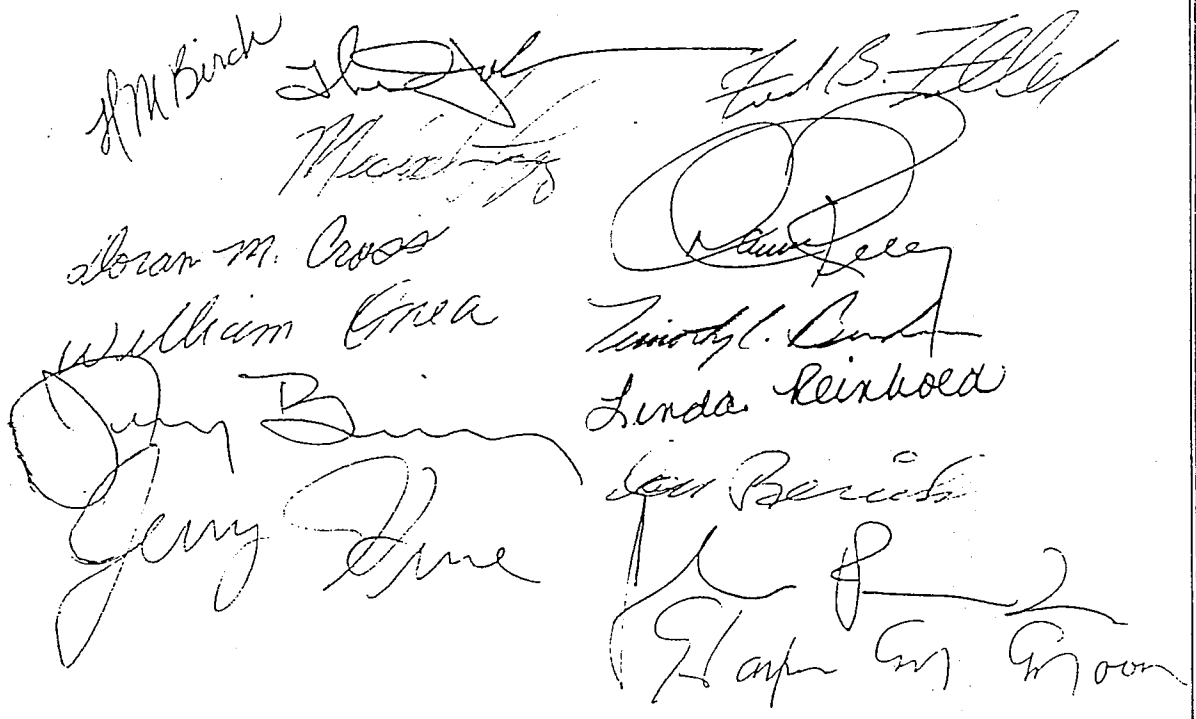
CHUTE BLOCK PLAN

SHEET OF 1 2

Project Charter

We, the team members of the Tatum Wash construction project team agree that we will commit to the below stated goals and work within a framework that says "Partnering."

- Complete project to meet or exceed specifications (quality)
- Harmony
- Open, clear and concise communications
- Complete on time
  - demobilized (150 days)
  - Payment 14 days later
- Zero unresolved issues (settle within 14 days)
- Realistic schedule with intent for it to be <u>used</u>
- Profitable to all
- Zero accidents
- A safe and continuous traffic flow
- Sensitivity to the public



PARTNERING SESSION

FOR

TATUM WASH
Flood Control District of Maricopa County

FINAL REPORT

Prepared By:

RH & ASSOCIATES
"Partnering Specialists"

4001 E. Bell Road # 114
Phoenix, AZ 85032
(602) 493-1947

2726 Shelter Island Drive #413
San Diego, California 92106
(619) 224-1966

Project # 7820495

PARTNERING SESSION WORKSHOP

Conducted on
October 21, 1997

PROJECT PARTNERS

Buesing Corporation
Flood Control District of Maricopa County
City of Phoenix
Cross Brothers Contracting, Inc.
CMX Constructors, Inc.
Arizona Construction Services

Facilitator:
Robin Halperin

PARTNERING WORKSHOP ATTENDEES
September 23, 1997

		PHONE	FAX
Buesing Corporation **1635 E. University Drive** **Phoenix, AZ 85034**			
Jerry Buesing	President	(602)276-5555	257-9096
Richard Candelaria	Asst. Project Manager	"	257-1778
Dave Reeg	Project Superintendent	"	"
Flood Control District of Maricopa County **2801 W. Durango** **Phoenix, AZ 85009**			
Heidi Birch	Contract Manager	(602) 506-8126	506-1663
Tim Burkeen	Construction Manager	(602) 506-4178	506-8165
Fred Fuller	Branch Construction Manager	(602) 506-4728	
Tom Johnson	PPM	(602) 506-4703	506-8561
Michael Lopez	Civil Branch Manager	(602) 506-8742	506-4601
Linda Reinbold	Administrative Assistant	(602) 506-8949	506-8165
City of Phoenix **200 W. Washington - 6th Floor** **Phoenix, AZ 85003-1611**			
John Perez, Jr.	Chief Engineering Tech. (Traffic/COP)	(602) 495-6934	495-0336
CMX Constructors Inc. **1515 E. Missouri - Ste. 115** **Phoenix, AZ 85014**			
Jerry Hine	Estimator	(602) 279-8436	279-8498

Cross Bros. Contracting, Inc.
P. O. Box 1918
Black Canyon City, AZ 85324

Doran M. Cross	President	(602) 374-5586	374-9286

Arizona Construction Services
740 E. Flynn Lane
Phoenix, AZ

William Onea	(602) 264-4611

PARTNERING IS.....

The team defined partnering based on each member's prior experiences.

- Improve quality
  - Happy Contractors do quality work!
  - Things done per the specifications are better
  - When we look at a set of plans or drawings, we see the same thing

- Provides for a "Win-Win" attitude
  - Mutual respect for each other
  - "You scratch my back, I'll scratch yours"
  - When one wins, everybody wins --team effort
  - No sink or swim mentality

- Shared Responsibility
  - No finger-pointing
  - No hidden agendas
  - Accepting--not shirking--responsibility
  - The whole is greater than the sum of the parts--although parts are equal

- Reduce claims and litigation
  - Change in attitude
  - Work together
  - "Our project" attitude
  - Pro-active approach
  - Teamwork versus adversarial attitudes
  - Clear expectations (stated up-front)

- Improve lines of communication
  - No surprises
  - Keep the public informed
  - Keep each other informed
  - Relationships improve communications
  - Immediate disclosure of problems
  - Do what you say you will do
  - Know who is responsible for what
  - Keep egos out of it

- Common focus and goals
  - "Our project" emphasis
  - Same end product in mind
  - One team, working together
  - Identify and resolve problems

GOAL SETTING

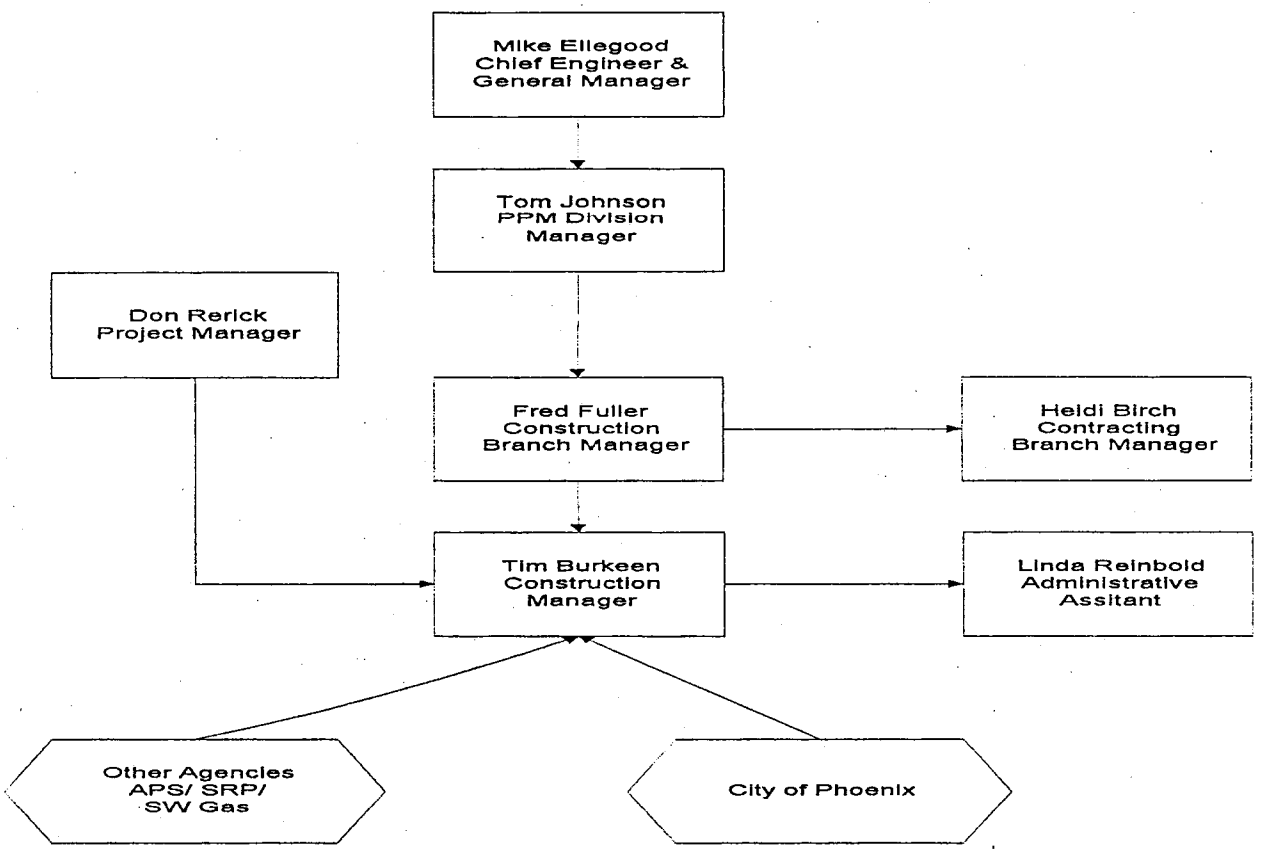
The team members discussed the overall goals of the project and developed the following list:

- Complete project to meet or exceed specifications (quality)
- Zero accidents
- A safe and continuous traffic flow
- Sensitivity to the public
- Harmony
- Open, clear and concise communications
- Complete on time
  * demobilized (150 days)
  * Payment 14 days later
- Zero unresolved issues (settle within 14 days)
- Realistic schedule with intent for it to be used
- Profitable to all

MISSION STATEMENT

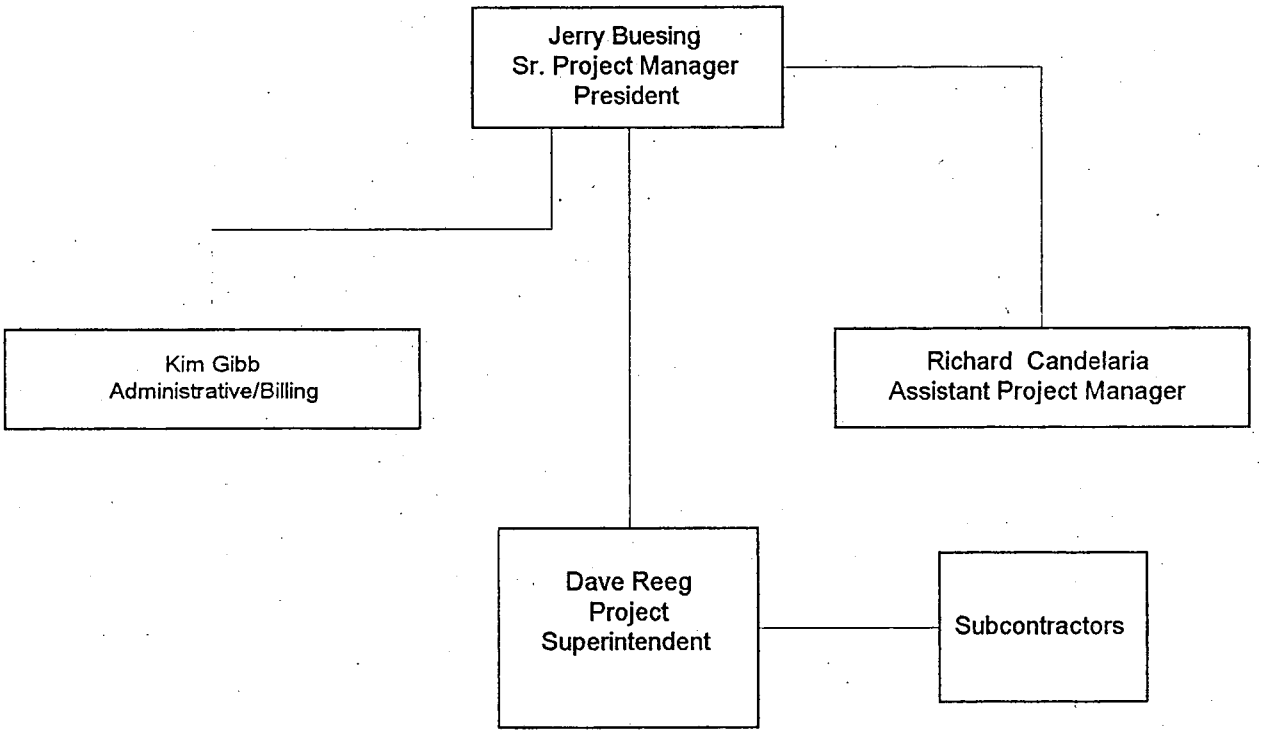
We, the team members of the Tatum Wash construction project team agree that we will commit to the above stated goals and work within a framework that says "Partnering."

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY



COMMUNICATION PLANS (CONT)

BUESING CORPORATION



COMMUNICATION PROCESSES

Inspections

- Tim to be involved everyday - all day
- Advance notification is requested
  - Placement cards utilized (24 hour notice)
- Anything that requires lab testing
  - Backfill
  - Compaction
  - Asphalt
  - Concrete placement
- City of Phoenix will be there daily as well to monitor traffic, etc.
- City of Phoenix must be notified prior to doing 15" sewer line

Partnering Follow-up

- There will be two informal follow-up meetings. The time and location will be determined and announced by Tim.

PROJECT ISSUES

1. Traffic Control
   * City of Phoenix Concerns
   * Hauling
     * Route
     * Holidays

2. Parking

3. Schedule
   * Work hours
   * Coordination
   * Scheduling testers

4. Public Relations

5. Dust & Noise Control

6. N.O.I.'s

ISSUE RESOLUTIONS

Prior to the workshop, several team members provided areas of concern that they wished to discuss during the workshop. Additional issues were identified at the workshop. The following represents those issues and the discussions relating to each one.

1. TRAFFIC CONTROL	
	➢ Traffic control must be legal and safe at all times ➢ Phoenix Police Department can be contracted if there are problems, as long as traffic control efforts are within legal limits
Haul Plan	➢ The haul plan has not been submitted and approved per our understanding at this time ➢ It needs to go to John who will send it through Development Services
	➢ Dave will get the haul plan to Tim and John (COP); if it has already been submitted, Dave will get a copy to them as soon as possible
	➢ During the holidays - non-peak hours for hauling is preferred (8:30-4:30) * John is more flexible in the Eastbound lanes than the Westbound lanes
Schedule	➢ Buesing handed out a schedule at this session ➢ Duration of haul is 6/7 weeks (may be altered based on the City of Phoenix needs)
NTP	➢ Notice to proceed expected within one week from today
Message Boards	➢ Variable message boards must be available * Need at least one week for public notice * Contractor will try to do this (preferably 2 weeks)
Traffic Load	➢ Reduction in traffic loads will be a "win-win" for all
2. PEDESTRIAN ROUTING	
ADA Requirements	➢ ADA requirements are the concern ➢ Pedestrian routing plan needs to be combined with the traffic plan (proper routing with accessability (ramps), keeping safety in mind, is the need)

ADA Requirements (cont)	➢ Need to look at the signage and comply
3. DETOUR PLAN	
	➢ The plan should be done by a registered traffic engineer rather than a Civil Engineer * This is already in the submittal package
	➢ John will look at what has been done up to this point, but really wants a "stamped plan"--will evaluate and advise
4. SIGNAGE	
Temporary	➢ Routing signs need to move or redirect traffic to an alternate route (off of the worksite area) ➢ John will help with verbiage if needed
5. LANE RESTRICTIONS	
	➢ Need to be per the specifications * Can drop to one lane on weekends * 2 lanes Westbound utilizing frontage at all times is acceptable * Peak hours congestion is a major concern --safety cannot be compromised
6. TRAFFIC CONTROL SPECIALIST	
	➢ John would prefer someone other than the Contractor ➢ Dave R. is this designated traffic control person. Dave explained how he foresees being able to fulfill this position and not have it interfere with his work as project manager. ➢ John will deal with this through protocol, but when traffic or safety may be compromised, he will go to the appropriate source immediately
7. COURTESY CALLS - TO CITY OF PHOENIX	
	➢ All emergency conditions or anything else going on affecting the City of Phoenix, call 262-6235 dispatcher ➢ "Keep them informed", it will go on to their database immediately ➢ Tim will be the contact person for this call

ISSUE RESOLUTIONS (CONT)

	➢ John will write all press releases, informing the public * This first call needs to be with information regarding the start date of the project (NTP)
	➢ Lead time for changed conditions (Keep it generic) must be noted ➢ Can call John directly
8. NIGHTWORK/NOISE	
	➢ Be aware of night time restrictions--will not limit work but could restrict some of it (noise mitigation/strobe lights)
	➢ At the first weekly meeting the team will take a look at how the work will proceed (include John at this meeting for input)
	➢ After the NTP, Jerry will set up a meeting (John would like to meet at 10:30 a.m.), regarding the noise issues and the night work issues * Attendees will be John, Richard, Tim, Jerry, Bill and Dave
9. PARKING	
Mechanics of operation	➢ Parking on the project is OK ➢ Vacant lots seem to be available and this is not anticipated to be a problem
10. CONDUCT	
	➢ Must be a good neighbor at all times ➢ Be sensitive--This is a high profile project with many concerns due to the heavy traffic problem in the area
11. NOTICE OF INTENT	
	➢ There is a Federal requirement if the project is larger than 5 acres * This project is smaller than that * Tim is going to check on this requirement and make sure that this team doesn't have to comply ➢ Tim will get with Dave on the control of the discharge * The goal is not to cause sediment at the end of the storm drain

CONFLICT MANAGEMENT PLAN

BUESING	FLOOD CONTROL DISTRICT

Level 1

Dave R.	Tim B.

Time: 1 day or TBD

Level 2

Jerry B.	Fred F.

Time:

Level 3

Jerry B.	Tom J.

Time:

RULES OF ESCALATION

1) Issues need to be clearly defined by all parties. Deal with pertinent facts, separate the technical issues from policy issues and business issues, maintain the original definition throughout the escalation process.
2) Once defined, document what the issue is and give a status review for the next level to consider, and utilize the appropriate form at every level.
3) Either party may initiate "escalation", but acknowledgment is required by both parties. Once "escalation" is initiated, the issue should be transmitted jointly by those involved from one level to the next level, to eventual resolution.
4) Once an issue is in the process, it should be resolved at the Level closest to the issue.

TEAM MAINTENANCE

The team discussed how it would maintain the Partnering spirit and how it would evaluate its performance relative to the set goals.

Partnering Follow-up

- The team agreed to look at a ***Partnering Rating Summary*** which RH & Associates will provide under separate cover for this project. From this summary, the team will verbally discuss the goals and evaluate the project.

- Two follow-up meetings will held, Tim will find a location and determine the time.

Close Out - RH & Associates recommends a close-out session be scheduled approximately six weeks prior to the end of the project.

- **Close Out Questionnaire**

  A final questionnaire should be completed. This should include questions pertaining to the team, communications, resources, problems, etc. The team members will also be asked how each perceived the accomplishments of the team in relation to the goals developed for this project.

- **Close Out Meeting**

  After the questionnaires have been completed and the team Charter rated, a final meeting should be held to discuss the positives of the project; the Partnering process; any negatives or suggestions for future projects. The use of a facilitator at this meeting is <u>not</u> usually required. However, RH is available if needed.

Reward Team Performance - The team talked about the importance of rewarding successful performance. Guidelines for rewarding successful performance include:

- Reward soon after the accomplishment - don't wait
- Be specific about what you're rewarding - set milestones to celebrate
- Be consistent - never take your team members for granted

SUMMARY EVALUATION OF THE PARTNERING RATING FORMS

The evaluation of the workshop provides an opportunity for participants to suggest ways to improve future workshops. Areas evaluated include the quality of the workshop, effectiveness of the facilitators and the process used.

Total Returned Forms =10

Criteria	Poor	Fair	Average	Good	Great
Length of workshop	--	--	50%	40%	10%
Understanding of partnering before workshop	--	10%	--	60%	30%
Understanding of partnering after workshop	--	--	--	30%	70%
Overall program content	--	--	10%	80%	10%
How would you rate the facility	--	--	40%	50%	10%
Did the workshop session meet expectations	--	--	10%	60%	30%
Effectiveness of facilitators presenting partnering	--	--	--	40%	60%
Effectiveness of facilitators with technical issues	--	--	10%	40%	50%
Adequate mix of participants	--	--	20%	50%	30%

EVALUATION COMMENTS BY PARTICIPANTS

What do you consider to be the strongest aspect of this workshop?

- The efforts put forth by Robin to be precise and on track
- The facilitator
- Good up front work
- All participating vocally
- Communication
- Exchange of ideas
- The cooperation of all those present
- Getting people together and "communicating" helps a great deal in any situation
- The facilitator was very direct and concise

PARTNERING WORKSHOP EVALUATION (CONT)

What do you consider to be the weakest aspect of this workshop?

- Some elements - such as communication techniques/skills skimmed over
- Not enough participants showed up
- Location
- Not everyone showed up that needed to

How can we make the Partnering workshops more effective?

- I think this was very good
- Arrange for a facility that has its' own parking
- Keep up the good work
- If more time was available for the workshop
- Could be a little shorter