WATERSHED MANAGEMENT LIBRARY

APPENDICES

SCATTER WASH DRAINAGE AND STORM DRAIN STUDY

CONCEPTUAL PLAN

VOLUME II

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PREPARED FOR:

CITY OF PHOENIX ENGINEERING DEPARTMENT

FLOODPLAIN MANAGEMENT

ST-886366

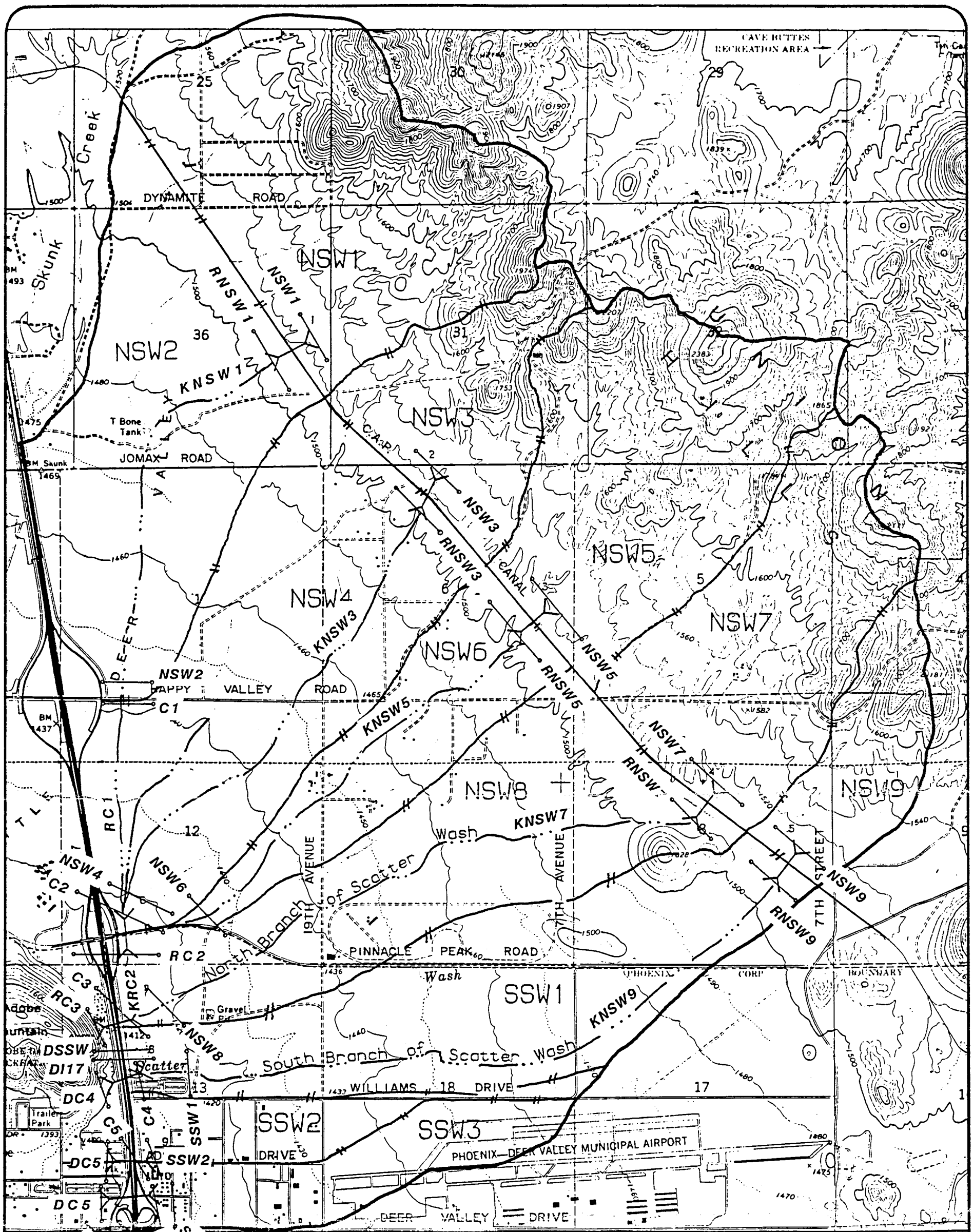
PREPARED BY:

GREINER, INC.

SEPTEMBER 1989

Engineering

Appendix B



CULVERT SUMMARY

I.D.	TYPE AND SIZE
1	42" STEEL PIPE
2	30" STEEL PIPE
3	42" STEEL PIPE
4	36" STEEL PIPE
5	30" STEEL PIPE
6	2-8'x7' RCBC
7	2-8'x7' RCBC
8	1-6'x7' RCBC
9	1-65"x40" CMP
10	1-6'x3' RCBC

LEGEND

- STUDY WATERSHED AREA BOUNDARY
- DRAINAGE SUBAREA BOUNDARY
- NSW1 DRAINAGE SUBAREA I.D.
- MAJOR CULVERT AND I.D.
- PRIMARY FLOW PATH
- HYDROGRAPH IDENTIFICATION (HEC-1)

2000 0 2000
scale feet
1"=2000'
20' C.I.

HYDROLOGY WORK MAP
DRAINAGE SUBAREAS AND MAJOR DRAINAGE FEATURES
CASE 1 AND CASE 2

Greiner

FIGURE 2

```
*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             FEBRUARY 1981             *
*           REVISED 31 JAN 85           *
*                                       *
*  RUN DATE 12-SEP-89    TIME  08:17:13 *
*                                       *
*****************************************
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*************************************
*                                   *
*    U.S. ARMY CORPS OF ENGINEERS   *
*  THE HYDROLOGIC ENGINEERING CENTER *
*          609 SECOND STREET        *
*       DAVIS, CALIFORNIA 95616     *
*  (916) 440-3285 OR (FTS) 448-3285 *
*                                   *
*************************************
```

```
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. THE VERSION RELEASED 31JAN85 CONTAINS NEW OPTIONS ON RL AND BA RECORDS, AND ADDS THE HL RECORD. SEE JANUARY 1985 INPUT DESCRIPTION FOR NEW DEFINITIONS.

CASE 1

EXISTING CONDITIONS

100-YR STORM

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

  1           ID         SCATTER WASH DRAINAGE AND STORM DRAIN STUDY
  2           ID         GREINER, INC., PHOENIX, AZ    MAY 1989
  3           ID         EXISTING CONDITIONS,   100-YR, 24-HR STORM
  4           IT       2                     300
  5           IN      30
  6           IO       5
              *DIAGRAM

  7           KK    NSW1
  8           KM    CALCULATE RUNOFF FROM DA NSW1
  9           PB    4.05
 10           PC       0    .005    .009    .010    .013    .019    .021    .028    .032    .044
 11           PC    .057    .100    .660    .745    .776    .800    .816    .830    .840    .850
 12           PC    .861    .868    .878    .884    .891    .900    .905    .912    .919    .923
 13           PC    .931    .934    .939    .944    .950    .958    .961    .963    .969    .971
 14           PC    .974    .979    .981    .985    .989    .991    .993    .996   1.000
 15           BA    1.37
 16           LS              83
 17           UD    0.26

 18           KK   RNSW1
 19           KM    ROUTE FLOW THRU CAP STRUCTURE
 20           RS       1    STOR      -1
 21           SV       0       4      17      52      96     148     209     279
 22           SE      15      16      17      18      19      20      21      22
 23           SL      15    9.62     0.6     0.5
 24           SS    21.9      50     3.0     1.5

 25           KK   RNSW1
 26           KM    ROUTE CULVERT DISCHARGE TO HAPPY VALLEY ROAD AND I-17
 27           RK    8000  0.0091    0.03               0              20

 28           KK    NSW2
 29           KM    CALCUALTE RUNOFF FROM DA NSW2
 30           BA    1.33
 31           LS          79.32
 32           UD    0.48

 33           KK      C1
 34           KM    COMBINE HYDROGRAPHS NSW1 AND NSW2
 35           HC       2

 36           KK     RC1
 37           KM    ROUTE HYDROGRAPH C1 TO PINNACLE PEAK ROAD
 38           RK    4000  0.0078    0.03               0      20     150

 39           KK    NSW3
 40           KM    CALCULATE RUNOFF FROM DA NSW3
 41           BA    0.54
 42           LS          82.7
 43           UD    0.24
```

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

 44           KK   KNSW1
 45           KM    ROUTE FLOW THRU CAP STRUCTURE
 46           RS       1    STOR      -1
 47           SV       0       2      11      34      62      96     135     180
 48           SE      15      16      17      18      19      20      21      22
 49           SL      15    4.91     0.6     0.5
 50           SS    21.9      50     3.0     1.5

 51           KK   KNSW3
 52           KM    ROUTE CULVERT DISCHARGE TO PINNACLE PEAK ROAD AT I-17
 53           RK   11000  0.0095    0.03                0                20

 54           KK    NSW4
 55           KM    CALCULATE RUNOFF FROM DA NSW4
 56           BA    1.52
 57           LS          75.78
 58           UD    0.47

 59           KK    NSW5
 60           KM    CALCULATE RUNOFF FROM DA NSW5
 61           BA    1.17
 62           LS           84.3
 63           UD    0.39

 64           KK   KNSW5
 65           KM    ROUTE FLOW THRU CAP STRUCTURE
 66           RS       1    STOR      -1
 67           SV       0       2       7      24      43      67      95     127
 68           SE      15      16      17      18      19      20      21      22
 69           SL      15    9.62     0.6     0.5
 70           SS    21.9      50     3.0     1.5

 71           KK   KNSW5
 72           KM    ROUTE CULVERT DISCHARGE TO PINNACLE PEAK ROAD AT I-17
 73           RK   10000  0.0095    0.03                0                20

 74           KK    NSW6
 75           KM    CALCULATE RUNOFF FROM DA NSW6
 76           BA     0.6
 77           LS          75.95
 78           UD    0.48

 79           KK      C2
 80           KM    COMBINE HYDROGRAPHS C1, NSW3, NSW4, NSW5, NSW6
 81           HC       5

 82           KK     RC2
 83           KM    ROUTE FLOW THRU PINNACLE PEAK ROAD CULVERTS
 84           RS       1    STOR      -1
 85           SV       0     .05     1.2     9.1    35.6      65    94.5     139
 86           SE      11      12      14      16      18      19      20      21
 87           SQ       0      54     254     528     936    2344    5278   10401
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 88           KK    KRC2
 89           KM    ROUTE CULVERT OUTFLOW TO I-17 CULVERTS
 90           RK    3000  0.0023    0.03                0      20      10

 91           KK    NSW7
 92           KM    CALCULATE RUNOFF FROM DA NSW7
 93           BA    0.96
 94           LS            81.6
 95           UD     0.4

 96           KK   RNSW7
 97           KM    ROUTE FLOW THRU CAP STRUCTURE
 98           RS       1    STOR      -1
 99           SV       0       2       9      30      55      85     120     160
100           SE      15      16      17      18      19      20      21      22
101           SL      15    7.07     0.6     0.5
102           SS    21.9      50     3.0     1.5

103           KK   RNSW7
104           KM    ROUTE CULVERT DISCHARGE TO I-17
105           RK   13000  0.0085    0.03                0              20

106           KK    NSW8
107           KM    CALCULATE RUNOFF FROM DA NSW8
108           BA    1.23
109           LS           75.99
110           UD    0.56

111           KK      C3
112           KM    COMBINE HYDROGRAPHS C2, NSW7, NSW8
113           HC       3

114           KK     RC3
115           KM    ROUTE FLOW THRU DETENTION BEHIND 2-8X7 RCBC AT I-17
116           RS       1    STOR      -1
117           SV       0   0.001    .220    1.16    8.44      17      30      49      67      76
118           SE     3.8       4       6       8      10      11      12      13    13.7      14
119           SQ       0       1     176     414     680     880    1091    1593    2678    3746

120           KK    DSSW
121           KM    DIVERT OVERFLOWS SOUTH TO SINGLE CULVERT AT MH PARK, AND WEST ONTO I-17
122           KM    DQ IS Q THRU 2-8X7 CULVERT (MAX 1312 CFS); DI IS TOTAL Q
123           DT     SSW
124           DI       1     880    1091    1593    2678    3746
125           DQ       1     880    1060    1184    1296    1312

126           KK    D117
127           KM    SEPARATE OUT WEST OVERFLOWS ONTO THE FRONTAGE ROAD AND MAINLINE I-17
128           KM    THESE FLOWS HEAD SOUTH AND EVENTUALLY ENTER THE DEER VALLEY INTERCHANGE
129           KM    REMAINING FLOWS CONTINUE SOUTH TO 6X7 BOX CULVERT ON SCATTER WASH AT I-17
130           DT     I17
131           DI      31     409    1382    2434
132           DQ       0       0     215     840
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 133          KK    NSW9
 134          KM    CALCULATE RUNOFF FROM DA NSW9
 135          BA    0.38
 136          LS            81.1
 137          UD    0.28

 138          KK   RNSW9
 139          KM    ROUTE FLOW THRU CAP STRUCTURE
 140          RS       1    STOR      -1
 141          SV       0       1       4      14      26      40      56      75
 142          SE      15      16      17      18      19      20      21      22
 143          SL      15    4.19    0.16     0.5
 144          SS    21.9      50     3.0     1.5

 145          KK   RNSW9
 146          KM    ROUTE CULVERT DISCHARGE TO I-17
 147          RK   14200  0.0078    0.03               0               20

 148          KK    SSW1
 149          KM    CALCULATE RUNOFF FROM DA SSW1
 150          BA    1.24
 151          LS           75.97
 152          UD    0.66

 153          KK      C4
 154          KM    COMBINE HYDROGRAPHS SSW, NSW9 AND SSW1--- SCATTER WASH FLOW EAST OF I-17
 155          HC       3

 156          KK     DC4
 157          KM    DIVERT FLOW ACROSS I-17 THRU 6X7 RCBC (MAX Q 510 CFS)
 158          DT    DDC4
 159          DI       0       1     510     511    1000    2000
 160          DQ       0       1     510     510     510     510

 161          KK    SSW2
 162          KM    CALCULATE RUNOFF FROM DA SSW2
 163          BA    0.28
 164          LS           76.32    30.0
 165          UD    0.29

 166          KK      C5
 167          KM    COMBINE HYDROGRAPHS SSW2 AND DDC4
 168          HC       2

 169          KK     DC5
 170          KM    DIVERT FLOW ACROSS I-17 THRU 65"X40" CMP AT ADOBE
 171          DT     DC5
 172          DI       0     115     116    1000    3000
 173          DQ       1     115     115     115     115
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 174          KK    SSW3
 175          KM    CALCULATE RUNOFF FROM DA SSW3
 176          BA    0.39
 177          LS          75.45    50.0
 178          UD    0.32

 179          KK      C6
 180          KM    COMBINE HYDROGRAPHS SSW3 AND C5
 181          HC       2

 182          KK     DC5
 183          KM    DIVERT FLOW ACROSS I-17 THRU 6X3 RCBC AT LOUISE
 184          KM    DI REPRESENTS TOTAL FLOW TO DEPRESSED INTERCHANGE AT DEER VALLEY RD.
 185          DT     DC5
 186          DI       0       1     156     157    1000    3000
 187          DQ       0       1     156     156     156     156

 188          KK    RI17
 189          KM    RETRIEVE HYDROGRAPH OF OVERFLOW ONTO I-17 MEDIAN
 190          DR     I17

 191          KK      C8
 192          KM   COMBINE HYDROGRAPH RI17 AND DC5 FOR TOTAL FLOW INTO DEER VALLEY INTERCHANGE
 193          KM           FROM SCATTER WASH DRAINAGE AREA
 194          HC       2

 195          KK    RES4
 196          KM    ROUTE FLOW THROUGH DEPRESSED SECTION TO WEST SIDE OF I-17
 197          RS       1    STOR      -1
 198          SV       0       1    15.9    37.7    53.8    61.3    74.1    99.0   129.5
 199          SE      82      84      90      94      96    96.8      98     100     102
 200          SQ       0       0       0       0       0       1     808    5403   13835

 201          KK    RNSW
 202          KM    RETRIEVE HYDROGRAPH FOR NORTH BRANCH OF SCATTER WASH
 203          DR     SSW

 204          KK    RSSW
 205          KM    RETRIEVE HYDROGRAPH FOR SOUTH BRANCH OF SCATTER WASH
 206          DR    DDC4

 207          KK      C7
 208          KM    COMBINE FOR TOTAL CULVERT DISCHARGE INTO SCATTER WASH WEST OF I-17
 209          HC       2
 210          ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

   7        NSW1
               V
               V
  18       RNSW1
               V
               V
  25       KNSW1
               .
               .
  28            .        NSW2
                .           .
                .           .
  33          C1............
               V
               V
  36         RC1
               .
               .
  39            .        NSW3
                .           V
                .           V
  44            .       RNSW1
                .           V
                .           V
  51            .       KNSW3
                .           .
                .           .
  54            .           .        NSW4
                .           .           .
                .           .           .
  59            .           .           .        NSW5
                .           .           .           V
                .           .           .           V
  64            .           .           .       KNSW5
                .           .           .           V
                .           .           .           V
  71            .           .           .       KNSW5
                .           .           .           .
                .           .           .           .
  74            .           .           .           .        NSW6
                .           .           .           .           .
                .           .           .           .           .
  79          C2..........................................
               V
               V
  82         RC2
               V
               V
  88        KRC2
               .
               .
  91            .        NSW7
                .           V
```

```
                .          v
 96             .       RNSW7
                .          v
                .          v
103             .       KNSW7
                .          .
                .          .
106             .          .        NSW8
                .          .           .
                .          .           .
111           C3.......................
               v
               v
114          RC3
                .
                .
123             .-------->     SSW
120         DSSW
                .
                .
130             .-------->     117
126         DI17
                .
                .
133             .        NSW9
                .          v
                .          v
138             .       RNSW9
                .          v
                .          v
145             .       KNSW9
                .          .
                .          .
148             .          .        SSW1
                .          .           .
                .          .           .
153           C4.......................
                .
                .
158             .-------->    DDC4
156          DC4
                .
                .
161             .        SSW2
                .          .
                .          .
166           C5............
                .
                .
171             .-------->     DC5
169          DC5
                .
                .
174             .        SSW3
                .          .
                .          .
179           C6............
                .
                .
185             .-------->     DC5
```

```
182          DC5
               .
               .
190            .            .<-------      117
188            .         RI17
               .            .
               .            .
191           C8............
               V
               V
195         RES4
               .
               .
203            .            .<-------      SSW
201            .         RNSW
               .            .
               .            .
206            .            .           .<------      DDC4
204            .            .         RSSW
               .            .            .
               .            .            .
207            .           C7............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
****************************************                                    ************************************
*                                      *                                    *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                    *   U.S. ARMY CORPS OF ENGINEERS
*            FEBRUARY 1981             *                                    *  THE HYDROLOGIC ENGINEERING CENTER
*          REVISED 31 JAN 85           *                                    *         609 SECOND STREET
*                                      *                                    *      DAVIS, CALIFORNIA 95616
*  RUN DATE 12-SEP-89    TIME  08:17:13 *                                    *  (916) 440-3285 OR (FTS) 448-3285
*                                      *                                    *
****************************************                                    ************************************
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                                SCATTER WASH DRAINAGE AND STORM DRAIN STUDY
                                GREINER, INC., PHOENIX, AZ    MAY 1989
                                EXISTING CONDITIONS,   100-YR, 24-HR STORM

  6 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      1    0  STARTING DATE
                      ITIME        0000  STARTING TIME
                         NQ         300  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      1    0  ENDING DATE
                     NDTIME        0958  ENDING TIME

                  COMPUTATION INTERVAL    0.03 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

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        0. TO       54.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        0. TO      176.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)
```

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	NSW1	2672.	6.13	339.	204.	204.	1.37		
ROUTED TO	RNSW1	101.	8.57	68.	41.	41.	1.37	19.79	8.60
ROUTED TO	KNSW1	101.	8.97	58.	35.	35.	1.37		
HYDROGRAPH AT	NSW2	1583.	6.33	283.	170.	170.	1.33		
2 COMBINED AT	C1	1609.	6.37	340.	205.	205.	2.70		
ROUTED TO	RC1	1532.	6.57	327.	197.	197.	2.70		
HYDROGRAPH AT	NSW3	1076.	6.10	132.	80.	80.	0.54		
ROUTED TO	RNSW1	45.	8.13	30.	18.	18.	0.54	18.65	8.17
ROUTED TO	KNSW3	45.	8.97	23.	14.	14.	0.54		
HYDROGRAPH AT	NSW4	1565.	6.37	280.	169.	169.	1.52		
HYDROGRAPH AT	NSW5	1948.	6.23	301.	181.	181.	1.17		
ROUTED TO	RNSW5	120.	8.03	78.	47.	47.	1.17	21.68	8.07
ROUTED TO	KNSW5	120.	8.63	64.	38.	38.	1.17		
HYDROGRAPH AT	NSW6	615.	6.37	111.	67.	67.	0.60		
5 COMBINED AT	C2	3521.	6.47	805.	485.	485.	6.53		
ROUTED TO	RC2	3003.	6.67	789.	475.	475.	6.53	19.22	6.67
ROUTED TO	KRC2	2967.	6.77	772.	465.	465.	6.53		
HYDROGRAPH AT	NSW7	1415.	6.27	224.	135.	135.	0.96		
ROUTED TO	RNSW7	77.	8.47	50.	30.	30.	0.96	20.10	8.47
ROUTED TO	KNSW7	77.	9.37	36.	21.	21.	0.96		
HYDROGRAPH AT	NSW8	1134.	6.47	228.	137.	137.	1.23		
3 COMBINED AT	C3	3853.	6.73	1035.	623.	623.	8.72		
ROUTED TO	RC3	3430.	6.90	1010.	608.	608.	8.72	13.91	6.90
DIVERSION TO	SSW	1307.	6.90	702.	423.	423.	8.72		
HYDROGRAPH AT	DSSW	2123.	6.90	308.	186.	186.	8.72		
DIVERSION TO	117	655.	6.90	55.	33.	33.	8.72		

HYDROGRAPH AT	DI17	1468.	6.90	233.	132.	132.	8.72		
HYDROGRAPH AT	NSW9	665.	6.13	87.	53.	53.	0.38		
ROUTED TO	RNSW9	12.	9.97	8.	5.	5.	0.38	19.96	9.97
ROUTED TO	KNSW9	12.	9.97	4.	2.	2.	0.38		
HYDROGRAPH AT	SSW1	1019.	6.57	228.	137.	137.	1.24		
3 COMBINED AT	C4	2281.	6.87	405.	292.	292.	10.34		
DIVERSION TO	DDC4	510.	6.87	230.	138.	138.	10.34		
HYDROGRAPH AT	DC4	1771.	6.87	255.	153.	153.	10.34		
HYDROGRAPH AT	SSW2	516.	6.13	72.	44.	44.	0.28		
2 COMBINED AT	C5	1870.	6.83	327.	198.	198.	10.62		
DIVERSION TO	DC5	115.	6.83	52.	32.	32.	10.62		
HYDROGRAPH AT	DC5	1755.	6.83	275.	165.	165.	10.62		
HYDROGRAPH AT	SSW3	791.	6.17	117.	72.	72.	0.39		
2 COMBINED AT	C6	1925.	6.83	392.	238.	238.	11.01		
DIVERSION TO	DC5	136.	6.83	72.	45.	45.	11.01		
HYDROGRAPH AT	DC5	1769.	6.83	320.	193.	193.	11.01		
HYDROGRAPH AT	RI17	635.	6.90	55.	33.	33.	0.00		
2 COMBINED AT	C8	2383.	6.87	375.	226.	226.	11.01		
ROUTED TO	RES4	2279.	6.93	284.	171.	171.	11.01	98.64	6.93
HYDROGRAPH AT	RNSW	1307.	6.90	702.	423.	423.	0.00		
HYDROGRAPH AT	RSSW	510.	6.17	230.	138.	138.	0.00		
2 COMBINED AT	C7	1817.	6.90	932.	561.	561.	0.00		

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

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*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*            FEBRUARY 1981              *
*                                       *
*          REVISED 31 JAN 85            *
*  RUN DATE 12-SEP-89    TIME  08:25:35 *
*                                       *
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*************************************
*                                   *
*    U.S. ARMY CORPS OF ENGINEERS   *
*  THE HYDROLOGIC ENGINEERING CENTER *
*        609 SECOND STREET          *
*       DAVIS, CALIFORNIA 95616     *
*  (916) 440-3285 OR (FTS) 448-3285 *
*                                   *
*************************************
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```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X               X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X               X
X     X  X        X     X         X
X     X  XXXXXXX   XXXXX         XXX
```

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. THE VERSION RELEASED 31JAN85 CONTAINS NEW OPTIONS ON RL AND BA RECORDS, AND ADDS THE HL RECORD. SEE JANUARY 1985 INPUT DESCRIPTION FOR NEW DEFINITIONS.

EXISTING CONDITIONS
2-YR STORM

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

   1          ID         SCATTER WASH DRAINAGE AND STORM DRAIN STUDY
   2          ID         GREINER, INC., PHOENIX, AZ    MAY 1989
   3          ID         EXISTING CONDITIONS,   2-YR, 24-HR STORM
   4          IT       2                     300
   5          IN      30
   6          IO       5
              ADIAGRAM

   7          KK    NSW1
   8          KH    CALCULATE RUNOFF FROM DA NSW1
   9          PB    1.57
  10          PC       0    .005    .009    .010    .013    .019    .021    .028    .032    .044
  11          PC    .037    .100    .660    .745    .776    .800    .816    .830    .840    .850
  12          PC    .861    .868    .878    .884    .891    .900    .905    .912    .919    .923
  13          PC    .931    .934    .939    .944    .950    .958    .961    .963    .969    .971
  14          PC    .974    .979    .981    .985    .989    .991    .993    .996   1.000
  15          BA    1.37
  16          LS              83
  17          UD    0.26

  18          KK   RNSW1
  19          KH    ROUTE FLOW THRU CAP STRUCTURE
  20          RS       1    STOR      -1
  21          SV       0       4      17      52      96     148     209     279
  22          SE      15      16      17      18      19      20      21      22
  23          SL      15    9.62     0.6     0.5
  24          SS    21.9      50     3.0     1.5

  25          KK   RNSW1
  26          KH    ROUTE CULVERT DISCHARGE TO HAPPY VALLEY ROAD AND I-17
  27          RK    8000  0.0091    0.03               0              20

  28          KK    NSW2
  29          KH    CALCUALTE RUNOFF FROM DA NSW2
  30          BA    1.33
  31          LS           79.32
  32          UD    0.48

  33          KK      C1
  34          KH    COMBINE HYDROGRAPHS NSW1 AND NSW2
  35          HC       2

  36          KK     RC1
  37          KH    ROUTE HYDROGRAPH C1 TO PINNACLE PEAK ROAD
  38          RK    4000  0.0078    0.03               0      20     150

  39          KK    NSW3
  40          KH    CALCULATE RUNOFF FROM DA NSW3
  41          BA    0.54
  42          LS           82.7
  43          UD    0.24
```

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

  44          KK   KNSW1
  45          KM    ROUTE FLOW THRU CAP STRUCTURE
  46          RS       1    STOR      -1
  47          SV       0       2      11      34      62      96     135     180
  48          SE      15      16      17      18      19      20      21      22
  49          SL      15    4.91     0.6     0.5
  50          SS    21.9      50     3.0     1.5

  51          KK   KNSW3
  52          KM    ROUTE CULVERT DISCHARGE TO PINNACLE PEAK ROAD AT I-17
  53          RK   11000  0.0095    0.03                0               20

  54          KK    NSW4
  55          KM    CALCULATE RUNOFF FROM DA NSW4
  56          BA    1.52
  57          LS          75.78
  58          UD    0.47

  59          KK    NSW5
  60          KM    CALCULATE RUNOFF FROM DA NSW5
  61          BA    1.17
  62          LS           84.3
  63          UD    0.39

  64          KK   KNSW5
  65          KM    ROUTE FLOW THRU CAP STRUCTURE
  66          RS       1    STOR      -1
  67          SV       0       2       7      24      43      67      95     127
  68          SE      15      16      17      18      19      20      21      22
  69          SL      15    9.62     0.6     0.5
  70          SS    21.9      50     3.0     1.5

  71          KK   KNSW5
  72          KM    ROUTE CULVERT DISCHARGE TO PINNACLE PEAK ROAD AT I-17
  73          RK   10000  0.0095    0.03                0               20

  74          KK    NSW6
  75          KM    CALCULATE RUNOFF FROM DA NSW6
  76          BA     0.6
  77          LS           75.95
  78          UD    0.48

  79          KK      C2
  80          KM    COMBINE HYDROGRAPHS C1, NSW3, NSW4, NSW5, NSW6
  81          HC       5

  82          KK     RC2
  83          KM    ROUTE FLOW THRU PINNACLE PEAK ROAD CULVERTS
  84          RS       1    STOR      -1
  85          SV       0     .05     1.2     9.1    35.6      65    94.5     139
  86          SE      11      12      14      16      18      19      20      21
  87          SQ       0      54     254     528     936    2344    5278   10401
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 88           KK    KRC2
 89           KM    ROUTE CULVERT OUTFLOW TO I-17 CULVERTS
 90           RK    3000  0.0023    0.03                0      20      10

 91           KK    NSW7
 92           KM    CALCULATE RUNOFF FROM DA NSW7
 93           BA    0.96
 94           LS            81.6
 95           UD     0.4

 96           KK   KNSW7
 97           KM    ROUTE FLOW THRU CAP STRUCTURE
 98           RS       1    STOR      -1
 99           SV       0       2       9      30      55      85     120     160
100           SE      15      16      17      18      19      20      21      22
101           SL      15    7.07     0.6     0.5
102           SS    21.9      50     3.0     1.5

103           KK   KNSW7
104           KM    ROUTE CULVERT DISCHARGE TO I-17
105           RK   13000  0.0085    0.03                0              20

106           KK    NSW8
107           KM    CALCULATE RUNOFF FROM DA NSW8
108           BA    1.23
109           LS           75.99
110           UD    0.56

111           KK      C3
112           KM    COMBINE HYDROGRAPHS C2, NSW7, NSW8
113           HC       3

114           KK     RC3
115           KM    ROUTE FLOW THRU DETENTION BEHIND 2-8X7 RCBC AT I-17
116           RS       1    STOR      -1
117           SV       0   0.001    .220    1.16    8.44      17      30      49      67      76
118           SE     3.8       4       6       8      10      11      12      13    13.7      14
119           SQ       0       1     176     414     680     880    1091    1593    2678    3746

120           KK    DSSW
121           KM    DIVERT OVERFLOWS SOUTH TO SINGLE CULVERT AT MH PARK, AND WEST ONTO I-17
122           KM    DQ IS Q THRU 2-8X7 CULVERT (MAX 1312 CFS); DI IS TOTAL Q
123           DT     SSW
124           DI       1     880    1091    1593    2678    3746
125           DQ       1     880    1060    1184    1296    1312

126           KK    DI17
127           KM    SEPARATE OUT WEST OVERFLOWS ONTO THE FRONTAGE ROAD AND MAINLINE I-17
128           KM    THESE FLOWS HEAD SOUTH AND EVENTUALLY ENTER THE DEER VALLEY INTERCHANGE
129           KM    REMAINING FLOWS CONTINUE SOUTH TO 6X7 BOX CULVERT ON SCATTER WASH AT I-17
130           DT     I17
131           DI      31     409    1382    2434
132           DQ       0       0     215     840
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 133          KK    NSW9
 134          KM    CALCULATE RUNOFF FROM DA NSW9
 135          BA    0.38
 136          LS            81.1
 137          UD    0.28

 138          KK   RNSW9
 139          KM    ROUTE FLOW THRU CAP STRUCTURE
 140          RS       1    STOR      -1
 141          SV       0       1       4      14      26      40      56      75
 142          SE      15      16      17      18      19      20      21      22
 143          SL      15    4.19    0.16     0.5
 144          SS    21.9      50     3.0     1.5

 145          KK   RNSW9
 146          KM    ROUTE CULVERT DISCHARGE TO I-17
 147          RK   14200  0.0078    0.03               0              20

 148          KK    SSW1
 149          KM    CALCULATE RUNOFF FROM DA SSW1
 150          BA    1.24
 151          LS            75.97
 152          UD    0.66

 153          KK      C4
 154          KM    COMBINE HYDROGRAPHS SSW, NSW9 AND SSW1--- SCATTER WASH FLOW EAST OF I-17
 155          HC       3

 156          KK     DC4
 157          KM    DIVERT FLOW ACROSS I-17 THRU 6X7 RCBC (MAX Q 510 CFS)
 158          DT    DDC4
 159          DI       0       1     510     511    1000    2000
 160          DQ       0       1     510     510     510     510

 161          KK    SSW2
 162          KM    CALCULATE RUNOFF FROM DA SSW2
 163          BA    0.28
 164          LS            76.32    30.0
 165          UD    0.29

 166          KK      C5
 167          KM    COMBINE HYDROGRAPHS SSW2 AND DDC4
 168          HC       2

 169          KK     DC5
 170          KM    DIVERT FLOW ACROSS 1-17 THRU 65"X40" CMP AT ADOBE
 171          DT     DC5
 172          DI       0     115     116    1000    3000
 173          DQ       1     115     115     115     115
```

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

 174          KK    SSW3
 175          KM    CALCULATE RUNOFF FROM DA SSW3
 176          BA    0.39
 177          LS          75.45    50.0
 178          UD    0.32

 179          KK      C6
 180          KM    COMBINE HYDROGRAPHS SSW3 AND C5
 181          HC       2

 182          KK     DC5
 183          KM    DIVERT FLOW ACROSS I-17 THRU 6X3 RCBC AT LOUISE
 184          KM    DI REPRESENTS TOTAL FLOW TO DEPRESSED INTERCHANGE AT DEER VALLEY RD.
 185          DT     DC5
 186          DI       0       1     156     157    1000    3000
 187          DQ       0       1     156     156     156     156

 188          KK    RI17
 189          KM    RETRIEVE HYDROGRAPH OF OVERFLOW ONTO I-17 MEDIAN
 190          DR     I17

 191          KK      C8
 192          KM   COMBINE HYDROGRAPH RI17 AND DC5 FOR TOTAL FLOW INTO DEER VALLEY INTERCHANGE
 193          KM           FROM SCATTER WASH DRAINAGE AREA
 194          HC       2

 195          KK    RES4
 196          KM    ROUTE FLOW THROUGH DEPRESSED SECTION TO WEST SIDE OF I-17
 197          RS       1    STOR      -1
 198          SV       0       1    15.9    37.7    53.8    61.3    74.1    99.0   129.5
 199          SE      82      84      90      94      96    96.8      98     100     102
 200          SQ       0       0       0       0       0       1     800    5403   13835

 201          KK    RNSW
 202          KM    RETRIEVE HYDROGRAPH FOR NORTH BRANCH OF SCATTER WASH
 203          DR     SSW

 204          KK    RSSW
 205          KM    RETRIEVE HYDROGRAPH FOR SOUTH BRANCH OF SCATTER WASH
 206          DR    DDC4

 207          KK      C7
 208          KM    COMBINE FOR TOTAL CULVERT DISCHARGE INTO SCATTER WASH WEST OF I-17
 209          HC       2
 210          ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

   7        NSW1
               V
               V
  18       RNSW1
               V
               V
  25       KNSW1
               .
               .
  28           .        NSW2
               .           .
               .           .
  33          C1............
               V
               V
  36         RC1
               .
               .
  39           .        NSW3
               .           V
               .           V
  44           .       RNSW1
               .           V
               .           V
  51           .       KNSW3
               .           .
               .           .
  54           .           .        NSW4
               .           .           .
               .           .           .
  59           .           .           .        NSW5
               .           .           .           V
               .           .           .           V
  64           .           .           .       KNSW5
               .           .           .           V
               .           .           .           V
  71           .           .           .       KNSW5
               .           .           .           .
               .           .           .           .
  74           .           .           .           .        NSW6
               .           .           .           .           .
               .           .           .           .           .
  79          C2.............................................
               V
               V
  82         RC2
               V
               V
  88        KRC2
               .
               .
  91           .        NSW7
               .           V
```

```
                .           V
 96             .       RNSW7
                .           V
                .           V
103             .       KNSW7
                .           .
                .           .
106             .           .        NSW8
                .           .           .
                .           .           .
111           C3.......................
               V
               V
114          RC3
                .
                .
123             .-------->     SSW
120         DSSW
                .
                .
130             .-------->     I17
126         DI17
                .
                .
133             .        NSW9
                .           V
                .           V
138             .       RNSW9
                .           V
                .           V
145             .       KNSW9
                .           .
                .           .
148             .           .        SSW1
                .           .           .
                .           .           .
153           C4.......................
                .
                .
158             .-------->    DDC4
156          DC4
                .
                .
161             .        SSW2
                .           .
                .           .
166           C5............
                .
                .
171             .-------->     DC5
169          DC5
                .
                .
174             .        SSW3
                .           .
                .           .
179           C6............
                .
                .
185             .-------->     DC5
```

```
182          DC5
               .
               .
190            .          .<-------     I17
188            .       RI17
               .          .
               .          .
191           C8...........
               V
               V
195         RES4
               .
               .
203            .          .<-------     SSW
201            .       RNSW
               .          .
               .          .
206            .          .          .<-------    DDC4
204            .          .       RSSW
               .          .          .
               .          .          .
207            .        C7............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
****************************************                                    ************************************
*                                      *                                    *                                  *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                    *   U.S. ARMY CORPS OF ENGINEERS   *
*             FEBRUARY 1981            *                                    * THE HYDROLOGIC ENGINEERING CENTER *
*           REVISED 31 JAN 85          *                                    *        609 SECOND STREET         *
*                                      *                                    *      DAVIS, CALIFORNIA 95616     *
*  RUN DATE 12-SEP-89    TIME  08:25:35 *                                    * (916) 440-3285 OR (FTS) 440-3285 *
*                                      *                                    *                                  *
****************************************                                    ************************************
```

SCATTER WASH DRAINAGE AND STORM DRAIN STUDY
GREINER, INC., PHOENIX, AZ MAY 1989
EXISTING CONDITIONS, 2-YR, 24-HR STORM

```
  6 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      1   0  STARTING DATE
                      ITIME       0000  STARTING TIME
                         NQ        300  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      1   0  ENDING DATE
                     NDTIME       0958  ENDING TIME

                 COMPUTATION INTERVAL    0.03 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

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        0. TO       54.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        0. TO      176.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)
```

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	NSW1	457.	6.17	61.	37.	37.	1.37		
ROUTED TO	RNSW1	66.	7.07	41.	25.	25.	1.37	17.01	7.07
ROUTED TO	KNSW1	66.	7.70	34.	20.	20.	1.37		
HYDROGRAPH AT	NSW2	202.	6.43	41.	25.	25.	1.33		
2 COMBINED AT	C1	203.	6.47	75.	45.	45.	2.70		
ROUTED TO	RC1	194.	6.90	68.	41.	41.	2.70		
HYDROGRAPH AT	NSW3	182.	6.13	23.	14.	14.	0.54		
ROUTED TO	RNSW1	29.	6.93	18.	11.	11.	0.54	16.49	6.93
ROUTED TO	KNSW3	29.	8.03	13.	8.	8.	0.54		
HYDROGRAPH AT	NSW4	151.	6.47	33.	20.	20.	1.52		
HYDROGRAPH AT	NSW5	345.	6.30	37.	35.	35.	1.17		
ROUTED TO	RNSW5	73.	7.20	45.	27.	27.	1.17	17.47	7.20
ROUTED TO	KNSW5	73.	7.90	36.	22.	22.	1.17		
HYDROGRAPH AT	NSW6	60.	6.47	13.	8.	8.	0.60		
5 COMBINED AT	C2	367.	6.87	163.	98.	98.	6.53		
ROUTED TO	RC2	340.	7.23	161.	97.	97.	6.53	14.63	7.23
ROUTED TO	KRC2	337.	7.40	152.	91.	91.	6.53		
HYDROGRAPH AT	NSW7	212.	6.33	37.	22.	22.	0.96		
ROUTED TO	RNSW7	48.	7.23	29.	17.	17.	0.96	17.02	7.27
ROUTED TO	KNSW7	48.	8.37	20.	12.	12.	0.96		
HYDROGRAPH AT	NSW8	113.	6.60	27.	16.	16.	1.23		
3 COMBINED AT	C3	409.	7.50	199.	120.	120.	8.72		
ROUTED TO	RC3	409.	7.57	198.	119.	119.	8.72	7.96	7.57
DIVERSION TO	SSW	409.	0.03	198.	119.	119.	8.72		
HYDROGRAPH AT	DSSW	0.	0.03	0.	0.	0.	8.72		
DIVERSION TO	117	0.	0.03	0.	0.	0.	8.72		

HYDROGRAPH AT	DI17	0.	0.03	0.	0.	0.	8.72		
HYDROGRAPH AT	NSW9	100.	6.20	14.	9.	9.	0.38		
ROUTED TO	RNSW9	8.	8.10	5.	3.	3.	0.38	17.09	8.10
ROUTED TO	KNSW9	8.	9.80	2.	1.	1.	0.38		
HYDROGRAPH AT	SSW1	102.	6.70	27.	16.	16.	1.24		
3 COMBINED AT	C4	102.	6.70	29.	17.	17.	10.34		
DIVERSION TO	DDC4	102.	0.03	29.	17.	17.	10.34		
HYDROGRAPH AT	DC4	0.	0.03	0.	0.	0.	10.34		
HYDROGRAPH AT	SSW2	119.	6.17	18.	11.	11.	0.28		
2 COMBINED AT	C5	119.	6.17	18.	11.	11.	10.62		
DIVERSION TO	DC5	115.	6.17	18.	11.	11.	10.62		
HYDROGRAPH AT	DC5	4.	6.17	0.	0.	0.	10.62		
HYDROGRAPH AT	SSW3	230.	6.17	36.	22.	22.	0.39		
2 COMBINED AT	C6	234.	6.17	36.	22.	22.	11.01		
DIVERSION TO	DC5	136.	6.17	32.	20.	20.	11.01		
HYDROGRAPH AT	DC5	78.	6.17	4.	2.	2.	11.01		
HYDROGRAPH AT	RI17	0.	0.03	0.	0.	0.	0.00		
2 COMBINED AT	C8	78.	6.17	4.	2.	2.	11.01		
ROUTED TO	RES4	0.	0.03	0.	0.	0.	11.01	90.34	6.40
HYDROGRAPH AT	RNSW	409.	7.57	198.	119.	119.	0.00		
HYDROGRAPH AT	RSSW	102.	6.70	29.	17.	17.	0.00		
2 COMBINED AT	C7	464.	7.00	226.	136.	136.	0.00		

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

```
*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             FEBRUARY 1981             *
*           REVISED 31 JAN 85           *
*                                       *
*  RUN DATE 12-SEP-89    TIME  08:26:41 *
*                                       *
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*************************************
*                                   *
*    U.S. ARMY CORPS OF ENGINEERS   *
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*          609 SECOND STREET        *
*       DAVIS, CALIFORNIA 95616     *
*  (916) 440-3285 OR (FTS) 448-3285 *
*                                   *
*************************************
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```
X     X  XXXXXXX   XXXXX           X
X    X   X        X     X         XX
X    X   X        X                X
XXXXXXX  XXXX     X        XXXXX   X
X    X   X        X                X
X    X   X        X     X          X
X    X   XXXXXXX   XXXXX          XXX
```

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EXISTING CONDITIONS
10-YR STORM

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

  1           ID         SCATTER WASH DRAINAGE AND STORM DRAIN STUDY
  2           ID         GREINER, INC., PHOENIX, AZ    MAY 1989
  3           ID         EXISTING CONDITIONS,   10-YR, 24-HR STORM
  4           IT       2                     300
  5           IN      30
  6           ID       5
              *DIAGRAM

  7           KK    NSW1
  8           KM    CALCULATE RUNOFF FROM DA NSW1
  9           PB    2.58
 10           PC       0    .005    .009    .010    .013    .019    .021    .028    .032    .044
 11           PC    .057    .100    .660    .745    .776    .800    .816    .830    .840    .850
 12           PC    .861    .868    .878    .884    .891    .900    .905    .912    .919    .923
 13           PC    .931    .934    .939    .944    .950    .958    .961    .963    .969    .971
 14           PC    .974    .979    .981    .985    .989    .991    .993    .996   1.000
 15           BA    1.37
 16           LS              83
 17           UD    0.26

 18           KK   KNSW1
 19           KM    ROUTE FLOW THRU CAP STRUCTURE
 20           RS       1    STOR      -1
 21           SV       0       4      17      52      96     148     209     279
 22           SE      15      16      17      18      19      20      21      22
 23           SL      15    9.62     0.6     0.5
 24           SS    21.9      50     3.0     1.5

 25           KK   KNSW1
 26           KM    ROUTE CULVERT DISCHARGE TO HAPPY VALLEY ROAD AND I-17
 27           RK    8000  0.0091    0.03               0              20

 28           KK    NSW2
 29           KM    CALCUALTE RUNOFF FROM DA NSW2
 30           BA    1.33
 31           LS           79.32
 32           UD    0.48

 33           KK      C1
 34           KM    COMBINE HYDROGRAPHS NSW1 AND NSW2
 35           HC       2

 36           KK     RC1
 37           KM    ROUTE HYDROGRAPH C1 TO PINNACLE PEAK ROAD
 38           RK    4000  0.0078    0.03               0      20     150

 39           KK    NSW3
 40           KM    CALCULATE RUNOFF FROM DA NSW3
 41           BA    0.54
 42           LS           82.7
 43           UD    0.24
```

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

  44          KK   KNSW1
  45          KM    ROUTE FLOW THRU CAP STRUCTURE
  46          RS       1    STOR      -1
  47          SV       0       2      11      34      62      96     135     180
  48          SE      15      16      17      18      19      20      21      22
  49          SL      15    4.91     0.6     0.5
  50          SS    21.9      30     3.0     1.5

  51          KK   KNSW3
  52          KM    ROUTE CULVERT DISCHARGE TO PINNACLE PEAK ROAD AT I-17
  53          RK   11000  0.0095    0.03               0               20

  54          KK    NSW4
  55          KM    CALCULATE RUNOFF FROM DA NSW4
  56          BA    1.52
  57          LS          75.78
  58          UD    0.47

  59          KK    NSW5
  60          KM    CALCULATE RUNOFF FROM DA NSW5
  61          BA    1.17
  62          LS            84.3
  63          UD    0.39

  64          KK   KNSW5
  65          KM    ROUTE FLOW THRU CAP STRUCTURE
  66          RS       1    STOR      -1
  67          SV       0       2       7      24      43      67      95     127
  68          SE      15      16      17      18      19      20      21      22
  69          SL      15    9.62     0.6     0.5
  70          SS    21.9      30     3.0     1.5

  71          KK   KNSW5
  72          KM    ROUTE CULVERT DISCHARGE TO PINNACLE PEAK ROAD AT I-17
  73          RK   10000  0.0095    0.03               0               20

  74          KK    NSW6
  75          KM    CALCULATE RUNOFF FROM DA NSW6
  76          BA     0.6
  77          LS            75.95
  78          UD    0.48

  79          KK      C2
  80          KM    COMBINE HYDROGRAPHS C1, NSW3, NSW4, NSW5, NSW6
  81          HC       5

  82          KK     KC2
  83          KM    ROUTE FLOW THRU PINNACLE PEAK ROAD CULVERTS
  84          RS       1    STOR      -1
  85          SV       0     .05     1.2     9.1    35.6      65    94.5     139
  86          SE      11      12      14      16      18      19      20      21
  87          SQ       0      54     254     528     936    2344    5278   10401
```

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

 88           KK    KRC2
 89           KM    ROUTE CULVERT OUTFLOW TO I-17 CULVERTS
 90           RK   3000  0.0023    0.03                0      20      10

 91           KK    NSW7
 92           KM    CALCULATE RUNOFF FROM DA NSW7
 93           BA    0.96
 94           LS            81.6
 95           UD     0.4

 96           KK   RNSW7
 97           KM    ROUTE FLOW THRU CAP STRUCTURE
 98           RS       1    STOR      -1
 99           SV       0       2       9      30      55      85     120     160
100           SE      15      16      17      18      19      20      21      22
101           SL      15    7.07     0.6     0.5
102           SS    21.9      50     3.0     1.5

103           KK   KNSW7
104           KM    ROUTE CULVERT DISCHARGE TO I-17
105           RK   13000  0.0085    0.03                0              20

106           KK    NSW8
107           KM    CALCULATE RUNOFF FROM DA NSW8
108           BA    1.23
109           LS           75.99
110           UD    0.56

111           KK      C3
112           KM    COMBINE HYDROGRAPHS C2, NSW7, NSW8
113           HC       3

114           KK     RC3
115           KM    ROUTE FLOW THRU DETENTION BEHIND 2-8X7 RCBC AT I-17
116           RS       1    STOR      -1
117           SV       0   0.001    .220    1.16    8.44      17      30      49      67      76
118           SE     3.8       4       6       8      10      11      12      13    13.7      14
119           SQ       0       1     176     414     680     880    1091    1593    2678    3746

120           KK    DSSW
121           KM    DIVERT OVERFLOWS SOUTH TO SINGLE CULVERT AT MH PARK, AND WEST ONTO I-17
122           KM    DQ IS Q THRU 2-8X7 CULVERT (MAX 1312 CFS); DI IS TOTAL Q
123           DT     SSW
124           DI       1     880    1091    1593    2678    3746
125           DQ       1     880    1060    1184    1296    1312

126           KK    DI17
127           KM    SEPARATE OUT WEST OVERFLOWS ONTO THE FRONTAGE ROAD AND MAINLINE I-17
128           KM    THESE FLOWS HEAD SOUTH AND EVENTUALLY ENTER THE DEER VALLEY INTERCHANGE
129           KM    REMAINING FLOWS CONTINUE SOUTH TO 6X7 BOX CULVERT ON SCATTER WASH AT I-17
130           DT     I17
131           DI      31     409    1382    2434
132           DQ       0       0     215     840
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 133          KK    NSW9
 134          KM    CALCULATE RUNOFF FROM DA NSW9
 135          BA    0.38
 136          LS            81.1
 137          UD    0.28

 138          KK   RNSW9
 139          KM    ROUTE FLOW THRU CAP STRUCTURE
 140          RS       1    STOR      -1
 141          SV       0       1       4      14      26      40      56      75
 142          SE      15      16      17      18      19      20      21      22
 143          SL      15    4.19    0.16     0.5
 144          SS    21.9      30     3.0     1.5

 145          KK   RNSW9
 146          KM    ROUTE CULVERT DISCHARGE TO I-17
 147          RK   14200  0.0078    0.03               0               20

 148          KK    SSW1
 149          KM    CALCULATE RUNOFF FROM DA SSW1
 150          BA    1.24
 151          LS            75.97
 152          UD    0.66

 153          KK      C4
 154          KM    COMBINE HYDROGRAPHS SSW, NSW9 AND SSW1--- SCATTER WASH FLOW EAST OF I-17
 155          HC       3

 156          KK     DC4
 157          KM    DIVERT FLOW ACROSS I-17 THRU 6X7 RCBC (MAX Q 510 CFS)
 158          DT    DDC4
 159          D1       0       1     510     511    1000    2000
 160          DQ       0       1     510     510     510     510

 161          KK    SSW2
 162          KM    CALCULATE RUNOFF FROM DA SSW2
 163          BA    0.28
 164          LS            76.32    30.0
 165          UD    0.29

 166          KK      C5
 167          KM    COMBINE HYDROGRAPHS SSW2 AND DDC4
 168          HC       2

 169          KK     DC5
 170          KM    DIVERT FLOW ACROSS I-17 THRU 65"X40" CMP AT ADOBE
 171          DT     DC5
 172          D1       0     115     116    1000    3000
 173          DQ       1     115     115     115     115
```

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

 174          KK    SSW3
 175          KM    CALCULATE RUNOFF FROM DA SSW3
 176          BA    0.39
 177          LS          75.45    50.0
 178          UD    0.32

 179          KK      C6
 180          KM    COMBINE HYDROGRAPHS SSW3 AND C5
 181          HC       2

 182          KK     DC5
 183          KM    DIVERT FLOW ACROSS I-17 THRU 6X3 RCBC AT LOUISE
 184          KM    DI REPRESENTS TOTAL FLOW TO DEPRESSED INTERCHANGE AT DEER VALLEY RD.
 185          DT     DC5
 186          DI       0       1     156     157    1000    3000
 187          DQ       0       1     136     156     156     156

 188          KK    R117
 189          KM    RETRIEVE HYDROGRAPH OF OVERFLOW ONTO I-17 MEDIAN
 190          DR     I17

 191          KK      C8
 192          KM   COMBINE HYDROGRAPH R117 AND DC5 FOR TOTAL FLOW INTO DEER VALLEY INTERCHANGE
 193          KM           FROM SCATTER WASH DRAINAGE AREA
 194          HC       2

 195          KK    RES4
 196          KM    ROUTE FLOW THROUGH DEPRESSED SECTION TO WEST SIDE OF I-17
 197          RS       1    STOR      -1
 198          SV       0       1    15.9    37.7    53.8    61.3    74.1    99.0   129.5
 199          SE      82      84      90      94      96    96.8      98     100     102
 200          SQ       0       0       0       0       0       1     800    5403   13835

 201          KK    RNSW
 202          KM    RETRIEVE HYDROGRAPH FOR NORTH BRANCH OF SCATTER WASH
 203          DR     SSW

 204          KK    RSSW
 205          KM    RETRIEVE HYDROGRAPH FOR SOUTH BRANCH OF SCATTER WASH
 206          DR    DDC4

 207          KK      C7
 208          KM    COMBINE FOR TOTAL CULVERT DISCHARGE INTO SCATTER WASH WEST OF I-17
 209          HC       2
 210          ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

   7        NSW1
               V
               V
  18       RNSW1
               V
               V
  25       KNSW1
               .
               .
  28           .        NSW2
               .           .
               .           .
  33          C1............
               V
               V
  36         RC1
               .
               .
  39           .        NSW3
               .           V
               .           V
  44           .       RNSW1
               .           V
               .           V
  51           .       KNSW3
               .           .
               .           .
  54           .           .        NSW4
               .           .           .
               .           .           .
  59           .           .           .        NSW5
               .           .           .           V
               .           .           .           V
  64           .           .           .       RNSW5
               .           .           .           V
               .           .           .           V
  71           .           .           .       KNSW5
               .           .           .           .
               .           .           .           .
  74           .           .           .           .        NSW6
               .           .           .           .           .
               .           .           .           .           .
  79          C2.............................................
               V
               V
  82         RC2
               V
               V
  88        KRC2
               .
               .
  91           .        NSW7
               .           V
```

```
                .          v
 96             .       RNSW7
                .          v
                .          v
103             .       KNSW7
                .          .
                .          .
106             .          .        NSW8
                .          .           .
                .          .           .
111           C3.......................
               v
               v
114          RC3
               .
               .
123            .------->     SSW
120         DSSW
               .
               .
130            .------->     I17
126         DI17
               .
               .
133            .        NSW9
               .          v
               .          v
138            .       RNSW9
               .          v
               .          v
145            .       KNSW9
               .          .
               .          .
148            .          .        SSW1
               .          .           .
               .          .           .
153           C4.......................
               .
               .
158            .------->    DDC4
156          DC4
               .
               .
161            .        SSW2
               .          .
               .          .
166           C5............
               .
               .
171            .------->     DC5
169          DC5
               .
               .
174            .        SSW3
               .          .
               .          .
179           C6............
               .
               .
185            .------->     DC5
```

```
182          DC5
               .
               .
190            .            .<-------      I17
188            .         RI17
               .            .
               .            .
191           C8............
               v
               v
195         RES4
               .
               .
203            .            .<-------      SSW
201            .         RNSW
               .            .
               .            .
206            .            .            .<-------     DDC4
204            .            .         RSSW
               .            .            .
               .            .            .
207            .          C7............
```

(AAA) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
****************************************                                    ************************************
*                                      *                                    *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                    *    U.S. ARMY CORPS OF ENGINEERS
*             FEBRUARY 1981            *                                    *  THE HYDROLOGIC ENGINEERING CENTER
*           REVISED 31 JAN 85          *                                    *          609 SECOND STREET
*                                      *                                    *       DAVIS, CALIFORNIA 95616
*  RUN DATE 12-SEP-89    TIME  08:26:41 *                                    *  (916) 440-3285 OR (FTS) 448-3285
*                                      *                                    *
****************************************                                    ************************************
```

SCATTER WASH DRAINAGE AND STORM DRAIN STUDY
GREINER, INC., PHOENIX, AZ MAY 1989
EXISTING CONDITIONS, 10-YR, 24-HR STORM

```
  6 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      1    0  STARTING DATE
                      ITIME        0000  STARTING TIME
                         NQ         300  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      1    0  ENDING DATE
                     NDTIME        0958  ENDING TIME

                 COMPUTATION INTERVAL    0.03 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

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        0. TO       54.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        0. TO      176.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)
```

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	NSW1	1269.	6.13	162.	98.	98.	1.37		
ROUTED TO	RNSW1	82.	7.77	54.	33.	33.	1.37	18.15	7.77
ROUTED TO	KNSW1	82.	8.23	46.	28.	28.	1.37		
HYDROGRAPH AT	NSW2	677.	6.37	126.	76.	76.	1.33		
2 COMBINED AT	C1	689.	6.40	172.	103.	103.	2.70		
ROUTED TO	RC1	658.	6.67	162.	97.	97.	2.70		
HYDROGRAPH AT	NSW3	511.	6.13	63.	38.	38.	0.54		
ROUTED TO	RNSW1	37.	7.57	25.	15.	15.	0.54	17.48	7.60
ROUTED TO	KNSW3	37.	8.37	18.	11.	11.	0.54		
HYDROGRAPH AT	NSW4	614.	6.40	116.	70.	70.	1.52		
HYDROGRAPH AT	NSW5	933.	6.27	147.	89.	89.	1.17		
ROUTED TO	RNSW5	96.	7.67	62.	37.	37.	1.17	19.31	7.67
ROUTED TO	KNSW5	96.	8.27	50.	30.	30.	1.17		
HYDROGRAPH AT	NSW6	242.	6.40	46.	28.	28.	0.60		
5 COMBINED AT	C2	1394.	6.57	392.	236.	236.	6.53		
ROUTED TO	RC2	920.	7.03	386.	233.	233.	6.53	17.92	7.03
ROUTED TO	KRC2	916.	7.17	374.	225.	225.	6.53		
HYDROGRAPH AT	NSW7	639.	6.27	104.	63.	63.	0.96		
ROUTED TO	RNSW7	61.	7.87	40.	24.	24.	0.96	18.25	7.87
ROUTED TO	KNSW7	61.	8.80	27.	17.	17.	0.96		
HYDROGRAPH AT	NSW8	447.	6.50	95.	57.	57.	1.23		
3 COMBINED AT	C3	1160.	6.97	496.	298.	298.	8.72		
ROUTED TO	RC3	1013.	7.57	492.	296.	296.	8.72	11.63	7.57
DIVERSION TO	SSW	994.	7.57	488.	294.	294.	8.72		
HYDROGRAPH AT	DSSW	20.	7.37	3.	2.	2.	8.72		
DIVERSION TO	117	0.	7.57	0.	0.	0.	8.72		

HYDROGRAPH AT	DI17	20.	7.57	3.	2.	2.	8.72		
HYDROGRAPH AT	NSW9	303.	6.17	40.	24.	24.	0.38		
ROUTED TO	RNSW9	10.	9.93	6.	4.	4.	0.38	18.24	9.97
ROUTED TO	KNSW9	10.	9.97	3.	2.	2.	0.38		
HYDROGRAPH AT	SSW1	402.	6.63	94.	57.	57.	1.24		
3 COMBINED AT	C4	402.	6.63	101.	61.	61.	10.34		
DIVERSION TO	DDC4	402.	0.03	101.	61.	61.	10.34		
HYDROGRAPH AT	DC4	0.	0.03	0.	0.	0.	10.34		
HYDROGRAPH AT	SSW2	262.	6.17	38.	23.	23.	0.28		
2 COMBINED AT	C5	262.	6.17	38.	23.	23.	10.62		
DIVERSION TO	DC5	115.	6.17	29.	18.	18.	10.62		
HYDROGRAPH AT	DC5	147.	6.17	9.	6.	6.	10.62		
HYDROGRAPH AT	SSW3	440.	6.17	66.	41.	41.	0.39		
2 COMBINED AT	C6	588.	6.17	76.	47.	47.	11.01		
DIVERSION TO	DC5	156.	6.17	45.	28.	28.	11.01		
HYDROGRAPH AT	DC5	432.	6.17	31.	19.	19.	11.01		
HYDROGRAPH AT	RI17	0.	0.03	0.	0.	0.	0.00		
2 COMBINED AT	C8	432.	6.17	31.	19.	19.	11.01		
ROUTED TO	RES4	0.	0.03	0.	0.	0.	11.01	92.80	6.67
HYDROGRAPH AT	RNSW	994.	7.57	488.	294.	294.	0.00		
HYDROGRAPH AT	RSSW	402.	6.63	101.	61.	61.	0.00		
2 COMBINED AT	C7	1225.	6.90	589.	355.	355.	0.00		

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

HYDROGRAPH AT	DI17	1627.	6.60	230.	115.	115.	6.21		
HYDROGRAPH AT	NSW9	715.	6.15	101.	53.	53.	0.38		
ROUTED TO	RNSW9	12.	11.95	12.	7.	7.	0.38	20.32	11.95
ROUTED TO	RNSW9	12.	11.95	9.	5.	5.	0.38		
HYDROGRAPH AT	SSW1	1581.	6.15	244.	131.	131.	0.62		
3 COMBINED AT	C4	2346.	6.50	480.	251.	251.	7.21		
DIVERSION TO	DDC4	510.	6.50	220.	120.	120.	7.21		
HYDROGRAPH AT	DC4	1836.	6.50	261.	131.	131.	7.21		
HYDROGRAPH AT	SSW2	407.	6.05	55.	30.	30.	0.14		
2 COMBINED AT	C5	1948.	6.50	316.	160.	160.	7.35		
DIVERSION TO	DC5	115.	6.50	43.	23.	23.	7.35		
HYDROGRAPH AT	DC5	1833.	6.50	273.	137.	137.	7.35		
HYDROGRAPH AT	SSW3	560.	6.10	79.	42.	42.	0.20		
2 COMBINED AT	C6	2018.	6.50	351.	179.	179.	7.55		
DIVERSION TO	DC5	156.	6.50	37.	31.	31.	7.55		
HYDROGRAPH AT	DC5	1862.	6.50	294.	148.	148.	7.55		
HYDROGRAPH AT	RI17	889.	6.60	63.	32.	32.	0.00		
2 COMBINED AT	C7	2684.	6.55	357.	179.	179.	7.55		
HYDROGRAPH AT	RNSW	1313.	6.60	828.	454.	454.	0.00		
HYDROGRAPH AT	RSSW	510.	5.80	220.	120.	120.	0.00		
2 COMBINED AT	C8	1823.	6.60	1039.	574.	574.	0.00		

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

```
*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             FEBRUARY 1981             *
*           REVISED 31 JAN 85           *
*                                       *
*  RUN DATE 12-SEP-89    TIME  08:18:20 *
*                                       *
*****************************************
```

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*************************************
*                                   *
*    U.S. ARMY CORPS OF ENGINEERS   *
*  THE HYDROLOGIC ENGINEERING CENTER *
*          609 SECOND STREET        *
*       DAVIS, CALIFORNIA 95616     *
*  (916) 440-3285 OR (FTS) 448-3285 *
*                                   *
*************************************
```

```
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. THE VERSION RELEASED 31JAN85 CONTAINS NEW OPTIONS ON RL AND BA RECORDS, AND ADDS THE HL RECORD. SEE JANUARY 1985 INPUT DESCRIPTION FOR NEW DEFINITIONS.

CASE 2

FUTURE CONDITIONS

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

  1           ID         SCATTER WASH DRAINAGE AND STORM DRAIN STUDY
  2           ID         GREINER, INC., PHOENIX, AZ    MAY 1989
  3           ID         FUTURE CONDITIONS,   100-YR, 24-HR STORM
  4           IT       3                     240
  5           IN      30
  6           IO       5
              *DIAGRAM

  7           KK    NSW1
  8           KM    CALCULATE RUNOFF FROM DA NSW1
  9           PB    4.05
 10           PC       0    .005    .009    .010    .013    .019    .021    .028    .032    .044
 11           PC    .057    .100    .660    .745    .776    .800    .816    .830    .840    .850
 12           PC    .861    .868    .878    .884    .891    .900    .905    .912    .919    .923
 13           PC    .931    .934    .939    .944    .950    .958    .961    .963    .969    .971
 14           PC    .974    .979    .981    .985    .989    .991    .993    .996   1.000
 15           BA    1.07
 16           LS               83    36.2
 17           UD    0.20

 18           KK   KNSW1
 19           KM    ROUTE FLOW THRU CAP STRUCTURE
 20           RS       1    STOR      -1
 21           SV       0       4      17      52      96     148     209     279
 22           SE      15      16      17      18      19      20      21      22
 23           SL      15    9.62     0.6     0.5
 24           SS    21.9      50     3.0     1.5

 25           KK   KNSW1
 26           KM    ROUTE CULVERT DISCHARGE TO HAPPY VALLEY ROAD AND I-17
 27           RK    8000  0.0091    0.03                0                20

 28           KK    NSW2
 29           KM    CALCUALTE RUNOFF FROM DA NSW2
 30           BA    0.70
 31           LS            78.66    89.7
 32           UD    0.32

 33           KK      C1
 34           KM    COMBINE HYDROGRAPHS NSW1 AND NSW2
 35           HC       2

 36           KK     RC1
 37           KM    ROUTE HYDROGRAPH C1 TO PINNACLE PEAK ROAD
 38           RK    4000  0.0078    0.03                0      20      150

 39           KK    NSW3
 40           KM    CALCULATE RUNOFF FROM DA NSW3
 41           BA    0.53
 42           LS            82.7    38.4
 43           UD    0.24
```

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

  44          KK   KNSW1
  45          KM    ROUTE FLOW THRU CAP STRUCTURE
  46          RS       1    STOR      -1
  47          SV       0       2      11      34      62      96     135     180
  48          SE      15      16      17      18      19      20      21      22
  49          SL      15    4.91     0.6     0.5
  50          SS    21.9      50     3.0     1.5

  51          KK   KNSW3
  52          KM    ROUTE CULVERT DISCHARGE TO PINNACLE PEAK ROAD AT I-17
  53          RK   11000  0.0095    0.03                0               20

  54          KK    NSW4
  55          KM    CALCULATE RUNOFF FROM DA NSW4
  56          BA    0.86
  57          LS          75.78     75.0
  58          UD    0.32

  59          KK    NSW5
  60          KM    CALCULATE RUNOFF FROM DA NSW5
  61          BA    1.17
  62          LS           84.3     20.3
  63          UD    0.39

  64          KK   KNSW5
  65          KM    ROUTE FLOW THRU CAP STRUCTURE
  66          RS       1    STOR      -1
  67          SV       0       2       7      24      43      67      95     127
  68          SE      15      16      17      18      19      20      21      22
  69          SL      15    9.62     0.6     0.5
  70          SS    21.9      50     3.0     1.5

  71          KK   KNSW5
  72          KM    ROUTE CULVERT DISCHARGE TO PINNACLE PEAK ROAD AT I-17
  73          RK   10000  0.0095    0.03                0               20

  74          KK    NSW6
  75          KM    CALCULATE RUNOFF FROM DA NSW6
  76          BA     0.3
  77          LS           75.95    58.0
  78          UD    0.34

  79          KK      C2
  80          KM    COMBINE HYDROGRAPHS C1, NSW3, NSW4, NSW5, NSW6
  81          HC       5

  82          KK     RC2
  83          KM    ROUTE FLOW THRU PINNACLE PEAK ROAD CULVERTS
  84          RS       1    STOR      -1
  85          SV       0     .05     1.2     9.1    35.6      65    94.5     139
  86          SE      11      12      14      16      18      19      20      21
  87          SQ       0      54     254     528     936    2344    5278   10401
```

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

 88           KK    KRC2
 89           KM    ROUTE CULVERT OUTFLOW TO I-17 CULVERTS
 90           RK    3000  0.0023    0.03                0      20      10

 91           KK    NSW7
 92           KM    CALCULATE RUNOFF FROM DA NSW7
 93           BA    0.96
 94           LS            81.6    21.0
 95           UD     0.4

 96           KK   RNSW7
 97           KM    ROUTE FLOW THRU CAP STRUCTURE
 98           RS       1    STOR      -1
 99           SV       0       2       9      30      55      85     120     160
100           SE      15      16      17      18      19      20      21      22
101           SL      15    7.07     0.6     0.5
102           SS    21.9      50     3.0     1.5

103           KK   RNSW7
104           KM    ROUTE CULVERT DISCHARGE TO I-17
105           RK   13000  0.0085    0.03                0              20

106           KK    NSW8
107           KM    CALCULATE RUNOFF FROM DA NSW8
108           BA    0.62
109           LS           75.99    54.8
110           UD    0.42

111           KK      C3
112           KM    COMBINE HYDROGRAPHS C2, NSW7, NSW8
113           HC       3

114           KK     RC3
115           KM    ROUTE FLOW THRU DETENTION BEHIND 2-8X7 RCBC AT I-17
116           RS       1    STOR      -1
117           SV       0   0.001    .220    1.16    8.44      17      30      49      67      76
118           SE     3.8       4       6       8      10      11      12      13    13.7      14
119           SQ       0       1     176     414     680     880    1091    1593    2678    3746

120           KK    DSSW
121           KM    DIVERT OVERFLOWS SOUTH TO SINGLE CULVERT AT MH PARK, AND WEST ONTO I-17
122           KM    DQ IS Q THRU 2-8X7 CULVERT (MAX 1312 CFS); DI IS TOTAL Q
123           DT     SSW
124           DI       1     880    1091    1593    2678    3746
125           DQ       1     880    1060    1184    1296    1312

126           KK    DI17
127           KM    SEPARATE OUT WEST OVERFLOWS ONTO THE FRONTAGE ROAD AND MAINLINE I-17
128           KM    THESE FLOWS HEAD SOUTH AND EVENTUALLY ENTER THE DEER VALLEY INTERCHANGE
129           KM    REMAINING FLOWS CONTINUE SOUTH TO 6X7 BOX CULVERT ON SCATTER WASH AT I-17
130           DT     I17
131           DI      31     409    1302    2434
132           DQ       0       0     215     840
```

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

 133          KK    NSW9
 134          KM    CALCULATE RUNOFF FROM DA NSW9
 135          BA    0.38
 136          LS            81.1    21.9
 137          UD    0.28

 138          KK   RNSW9
 139          KM    ROUTE FLOW THRU CAP STRUCTURE
 140          RS       1    STOR      -1
 141          SV       0       1       4      14      26      40      56      75
 142          SE      15      16      17      18      19      20      21      22
 143          SL      15    4.19    0.16     0.5
 144          SS    21.9      50     3.0     1.5

 145          KK   RNSW9
 146          KM    ROUTE CULVERT DISCHARGE TO I-17
 147          RK   14200  0.0078    0.03               0              20

 148          KK    SSW1
 149          KM    CALCULATE RUNOFF FROM DA SSW1
 150          BA    0.62
 151          LS           75.97    95.0
 152          UD    0.34

 153          KK      C4
 154          KM    COMBINE HYDROGRAPHS SSW, NSW9 AND SSW1--- SCATTER WASH FLOW EAST OF I-17
 155          HC       3

 156          KK     DC4
 157          KM    DIVERT FLOW ACROSS I-17 THRU 6X7 RCBC (MAX Q 510 CFS)
 158          DT    DDC4
 159          DI       0       1     510     511    1000    2000
 160          DQ       0       1     510     510     510     510

 161          KK    SSW2
 162          KM    CALCULATE RUNOFF FROM DA SSW2
 163          BA    0.14
 164          LS           76.32    95.0
 165          UD    0.23

 166          KK      C5
 167          KM    COMBINE HYDROGRAPHS SSW2 AND DDC4
 168          HC       2

 169          KK     DC5
 170          KM    DIVERT FLOW ACROSS I-17 THRU 65"X40" CMP AT ADOBE
 171          DT     DC5
 172          DI       0     115     116    1000    3000
 173          DQ       1     115     115     115     115
```

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

 174          KK    SSW3
 175          KM    CALCULATE RUNOFF FROM DA SSW3
 176          BA    0.20
 177          LS          75.45    95.0
 178          UD    0.26

 179          KK      C6
 180          KM    COMBINE HYDROGRAPHS SSW3 AND C5
 181          HC       2

 182          KK     DC5
 183          KM    DIVERT FLOW ACROSS I-17 THRU 6X3 RCBC AT LOUISE
 184          KM    DI REPRESENTS TOTAL FLOW TO DEPRESSED INTERCHANGE AT DEER VALLEY RD.
 185          DT     DC5
 186          DI       0       1     156     157    1000    3000
 187          DQ       0       1     156     156     156     156

 188          KK    R117
 189          KM    RETRIEVE HYDROGRAPH OF I-17 MEDIAN OVERFLOW FROM NORTH BRANCH OF SW
 190          DR     I17

 191          KK      C7
 192          KM    COMBINE WITH HYDROGRAPH DC5 FOR TOTAL FLOW INTO DEER VALLEY ROAD
 193          KM            DEPRESSED INTERCHANGE FROM SCATTER WASH DRAINAGE AREA
 194          HC       2

 195          KK    RNSW
 196          KM    RETRIEVE HYDROGRAPH OF NORTH BRANCH OF SCATTER WASH CULVERT DISCHARGE
 197          DR     SSW

 198          KK    RSSW
 199          KM    RETRIEVE HYDROGRAPH OF SOUTH BRANCH OF SCATTER WASH CULVERT DISCHARGE
 200          DR    DDC4

 201          KK      C8
 202          KM    COMBINE I-17 CULVERT DISCHARGES FOR TOTAL FLOW WEST OF I-17
 203          HC       2
 204          ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

   7        NSW1
               V
               V
  18       RNSW1
               V
               V
  25       KNSW1
               .
               .
  28           .        NSW2
               .           .
               .           .
  33          C1............
               V
               V
  36         RC1
               .
               .
  39           .        NSW3
               .           V
               .           V
  44           .       RNSW1
               .           V
               .           V
  51           .       KNSW3
               .           .
               .           .
  54           .           .       NSW4
               .           .          .
               .           .          .
  59           .           .          .        NSW5
               .           .          .           V
               .           .          .           V
  64           .           .          .       RNSW5
               .           .          .           V
               .           .          .           V
  71           .           .          .       KNSW5
               .           .          .           .
               .           .          .           .
  74           .           .          .           .        NSW6
               .           .          .           .          .
               .           .          .           .          .
  79          C2.......................................
               V
               V
  82         RC2
               V
               V
  88        KRC2
               .
               .
  91           .        NSW7
               .           V
```

```
                .          v
 96             .       RNSW7
                .          v
                .          v
103             .       KNSW7
                .          .
                .          .
106             .          .        NSW8
                .          .          .
                .          .          .
111           C3.......................
                v
                v
114          RC3
                .
                .
123             .------->     SSW
120         DSSW
                .
                .
130             .------->     117
126         DI17
                .
                .
133             .        NSW9
                .          v
                .          v
138             .       RNSW9
                .          v
                .          v
145             .       KNSW9
                .          .
                .          .
148             .          .        SSW1
                .          .          .
                .          .          .
153           C4.......................
                .
                .
158             .------->    DDC4
156          DC4
                .
                .
161             .        SSW2
                .          .
                .          .
166           C5............
                .
                .
171             .------->     DC5
169          DC5
                .
                .
174             .        SSW3
                .          .
                .          .
179           C6............
                .
                .
185             .------->     DC5
```

```
182          DC5
               .
               .
190            .            .<-------      117
188            .         RI17
               .            .
               .            .
191           C7............
               .
               .
197            .            .<-------      SSW
195            .         RNSW
               .            .
               .            .
200            .            .            .<-------    DDC4
198            .            .         RSSW
               .            .            .
               .            .            .
201            .           C8............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
****************************************                                    ************************************
*                                      *                                    *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                    *   U.S. ARMY CORPS OF ENGINEERS
*            FEBRUARY 1981             *                                    * THE HYDROLOGIC ENGINEERING CENTER
*          REVISED 31 JAN 85           *                                    *         609 SECOND STREET
*                                      *                                    *       DAVIS, CALIFORNIA 95616
*  RUN DATE 12-SEP-89    TIME  08:18:20 *                                    * (916) 440-3285 OR (FTS) 448-3285
*                                      *                                    *
****************************************                                    ************************************


                                SCATTER WASH DRAINAGE AND STORM DRAIN STUDY
                                GREINER, INC., PHOENIX, AZ    MAY 1989
                                FUTURE CONDITIONS,   100-YR, 24-HR STORM

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

     IT          HYDROGRAPH TIME DATA
                        NMIN           3  MINUTES IN COMPUTATION INTERVAL
                       IDATE      1    0  STARTING DATE
                       ITIME        0000  STARTING TIME
                          NQ         240  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE      1    0  ENDING DATE
                      NDTIME        1157  ENDING TIME

                  COMPUTATION INTERVAL    0.05 HOURS
                       TOTAL TIME BASE   11.95 HOURS

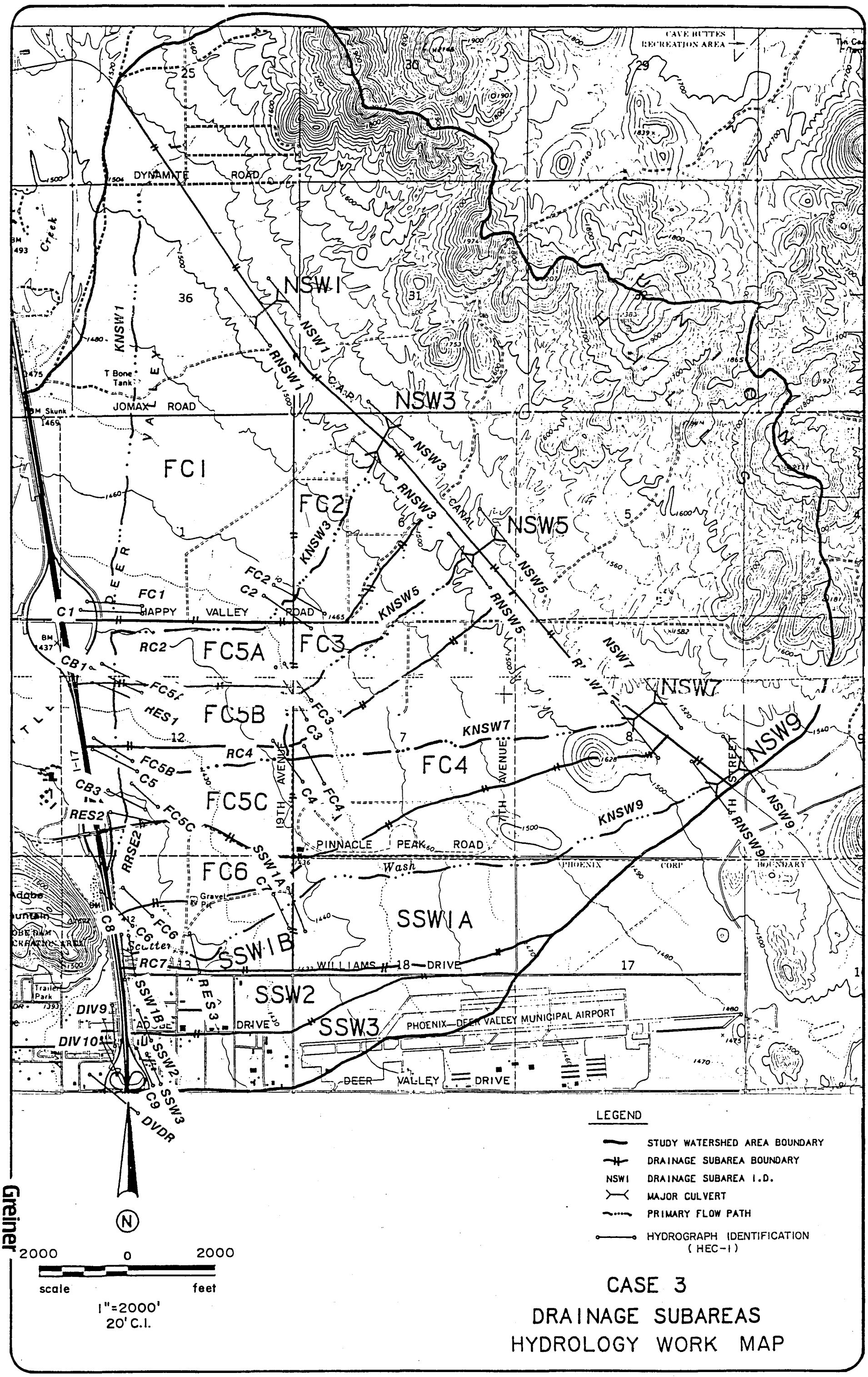
          ENGLISH UNITS
               DRAINAGE AREA          SQUARE MILES
               PRECIPITATION DEPTH    INCHES
               LENGTH, ELEVATION      FEET
               FLOW                   CUBIC FEET PER SECOND
               STORAGE VOLUME         ACRE-FEET
               SURFACE AREA           ACRES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

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        0. TO       54.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        0. TO      176.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)
```

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	NSW1	2555.	6.05	322.	170.	170.	1.07		
ROUTED TO	RNSW1	99.	7.85	97.	55.	55.	1.07	19.59	7.90
ROUTED TO	KNSW1	99.	8.40	93.	50.	50.	1.07		
HYDROGRAPH AT	NSW2	1780.	6.15	269.	144.	144.	0.70		
2 COMBINED AT	C1	1826.	6.15	352.	194.	194.	1.77		
ROUTED TO	RC1	1772.	6.30	351.	189.	189.	1.77		
HYDROGRAPH AT	NSW3	1204.	6.10	161.	85.	85.	0.53		
ROUTED TO	RNSW1	47.	8.05	47.	27.	27.	0.53	19.04	8.05
ROUTED TO	KNSW3	47.	8.80	43.	23.	23.	0.53		
HYDROGRAPH AT	NSW4	1982.	6.15	299.	160.	160.	0.86		
HYDROGRAPH AT	NSW5	2026.	6.25	334.	173.	173.	1.17		
ROUTED TO	RNSW5	124.	8.00	118.	64.	64.	1.17	21.95	8.00
ROUTED TO	KNSW5	123.	8.35	109.	56.	56.	1.17		
HYDROGRAPH AT	NSW6	599.	6.15	93.	50.	50.	0.30		
5 COMBINED AT	C2	4208.	6.20	879.	478.	478.	4.63		
ROUTED TO	RC2	3550.	6.35	875.	474.	474.	4.63	19.41	6.35
ROUTED TO	KRC2	3548.	6.45	875.	468.	468.	4.63		
HYDROGRAPH AT	NSW7	1527.	6.25	257.	133.	133.	0.96		
ROUTED TO	RNSW7	79.	8.35	76.	42.	42.	0.96	20.40	8.40
ROUTED TO	KNSW7	79.	9.25	67.	34.	34.	0.96		
HYDROGRAPH AT	NSW8	1089.	6.25	188.	100.	100.	0.62		
3 COMBINED AT	C3	4508.	6.40	1122.	603.	603.	6.21		
ROUTED TO	RC3	3830.	6.60	1120.	600.	600.	6.21	14.02	6.60
DIVERSION TO	SSW	1313.	6.60	820.	454.	454.	6.21		
HYDROGRAPH AT	DSSW	2516.	6.60	293.	147.	147.	6.21		
DIVERSION TO	I17	889.	6.60	63.	32.	32.	6.21		



CASE 3
DRAINAGE SUBAREAS
HYDROLOGY WORK MAP

Greiner

FIGURE 8

```
*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             FEBRUARY 1981             *
*           REVISED 31 JAN 85           *
*                                       *
*  RUN DATE 12-SEP-89    TIME  08:39:14 *
*                                       *
*****************************************
```

```
*************************************
*
*    U.S. ARMY CORPS OF ENGINEERS
*  THE HYDROLOGIC ENGINEERING CENTER
*          609 SECOND STREET
*       DAVIS, CALIFORNIA 95616
*  (916) 440-3285 OR (FTS) 448-3285
*
*************************************
```

```
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. THE VERSION RELEASED 31JAN85 CONTAINS NEW OPTIONS ON RL AND BA RECORDS, AND ADDS THE HL RECORD. SEE JANUARY 1985 INPUT DESCRIPTION FOR NEW DEFINITIONS.

CASE 3

DRAINAGE PLAN

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

  1           ID         SCATTER WASH DRAINAGE AND STORM DRAIN STUDY
  2           ID         GREINER, INC., PHOENIX, AZ    JUNE 1989
  3           ID         PROJECT HYDROLOGY---CASE 3---   100-YR, 24-HR STORM
  4           ID         LINEAR BASIN CONCEPT--2 BASINS
  5           IT       2                     300
  6           IN      30
  7           IO       5
              ÆDIAGRAM

  8           KK    NSW1
  9           KM    CALCULATE RUNOFF FROM DA NSW1
 10           PB    4.05
 11           PC       0    .005    .009    .010    .013    .019    .021    .028    .032    .044
 12           PC    .057    .100    .660    .745    .776    .800    .816    .830    .840    .850
 13           PC    .861    .868    .878    .884    .891    .900    .905    .912    .919    .923
 14           PC    .931    .934    .939    .944    .950    .958    .961    .963    .969    .971
 15           PC    .974    .979    .981    .985    .989    .991    .993    .996   1.000
 16           BA    1.37
 17           LS              83
 18           UD    0.26

 19           KK   RNSW1
 20           KM    ROUTE FLOW THRU CAP STRUCTURE
 21           RS       1    STOR      -1
 22           SV       0       4      17      52      96     148     209     279
 23           SE      15      16      17      18      19      20      21      22
 24           SL      15    9.62     0.6     0.5
 25           SS    21.9      30     3.0     1.5

 26           KK   RNSW1
 27           KM    ROUTE CULVERT DISCHARGE TO HAPPY VALLEY ROAD AND I-17
 28           RK    8000  0.0091    0.03                0              20

 29           KK    FC1
 30           KM    CALCUALTE RUNOFF FROM DA FC1
 31           BA    1.82
 32           LS            77.5
 33           UD    0.48

 34           KK      C1
 35           KM    COMBINE HYDROGRAPHS NSW1 AND FC1
 36           HC       2

 37           KK    NSW3
 38           KM    CALCULATE RUNOFF FROM DA NSW3
 39           BA    0.54
 40           LS            82.7
 41           UD    0.24

 42           KK   RNSW3
 43           KM    ROUTE FLOW THRU CAP STRUCTURE
 44           RS       1    STOR      -1
 45           SV       0       2      11      34      62      96     135     180
 46           SE      15      16      17      18      19      20      21      22
 47           SL      15    4.91     0.6     0.5
```

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

  48          SS    21.9      50      3.0     1.5

  49          KK   KNSW3
  50          KM    ROUTE CULVERT DISCHARGE TO HAPPY VALLEY ROAD
  51          RK    4300  0.0095    0.03            TRAP      16          2

  52          KK     FC2
  53          KM    CALCULATE RUNOFF FROM DA FC2
  54          BA    0.40
  55          LS           77.1
  56          UD    0.22

  57          KK      C2
  58          KM    COMBINE HYDROGRAPHS FROM NSW3 AND FC2
  59          HC       2

  60          KK     RC2
  61          KM    ROUTE HYDROGRAPH C2 TO DETENTION BASIN NO. 1
  62          RK    3700  0.0030   0.018            TRAP      16        2

  63          KK    FC5A
  64          KM    CALCULATE RUNOFF FROM DA FC5A
  65          BA    0.27
  66          LS           74.6
  67          UD    0.35

  68          KK     CB1
  69          KM    COMBINE HYDROGRAPHS C1, RC2 AND FC5A---TOTAL INFLOW TO BASIN NO. 1
  70          HC       3

  71          KK    RES1
  72          KM    ROUTE FLOW THROUGH BASIN NO.1
  73          KO       3
  74          RS       1    STOR      -1
  75          SV       0     142     179
  76          SE       0       4       5
  77          SL       0   15.90     0.6     0.5
  78          SS       4     100     3.0     1.5

  79          KK    NSW5
  80          KM    CALCULATE RUNOFF FROM DA NSW5
  81          BA    1.17
  82          LS           84.3
  83          UD    0.39

  84          KK   KNSW5
  85          KM    ROUTE FLOW THRU CAP STRUCTURE
  86          RS       1    STOR      -1
  87          SV       0       2       7      24      43      67      95     127
  88          SE      15      16      17      18      19      20      21      22
  89          SL      15    9.62     0.6     0.5
  90          SS    21.9      50     3.0     1.5
```

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

  91          KK   KNSW5
  92          KM    ROUTE CULVERT DISCHARGE TO FC3
  93          RK    6000  0.0095    0.03               0              20

  94          KK     FC3
  95          KM    CALCULATE RUNOFF FROM DA FC3
  96          BA    0.44
  97          LS            76.2
  98          UD    0.26

  99          KK      C3
 100          KM    COMBINE HYDROGRAPHS NSW5 AND FC3
 101          HC       2

 102          KK    NSW7
 103          KM    CALCULATE RUNOFF FROM DA NSW7
 104          BA    0.96
 105          LS            81.6
 106          UD     0.4

 107          KK   RNSW7
 108          KM    ROUTE FLOW THRU CAP STRUCTURE
 109          RS       1    STOR      -1
 110          SV       0       2       9      30      55      85     120     160
 111          SE      15      16      17      18      19      20      21      22
 112          SL      15    7.07     0.6     0.5
 113          SS    21.9      50     3.0     1.5

 114          KK   KNSW7
 115          KM    ROUTE CULVERT DISCHARGE TO FC4
 116          RK    9000  0.0085    0.03               0              20

 117          KK     FC4
 118          KM    CALCULATE RUNOFF FROM DA FC4
 119          BA    0.91
 120          LS           75.40
 121          UD    0.37

 122          KK      C4
 123          KM    COMBINE HYDROGRAPHS C3, NSW7 AND FC4
 124          HC       3

 125          KK     RC4
 126          KM    ROUTE HYDROGRAPH C4 TO BASIN NO. 2
 127          RK    4000  0.0030   0.018            TRAP      20       3

 128          KK    FC5B
 129          KM    CALCULATE RUNOFF FROM DA FC5B
 130          BA    0.24
 131          LS           74.60
 132          UD    0.37
```

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

 133          KK      C5
 134          KM    COMBINE HYDROGRAPHS C4 AND FC5--TOTAL REACH E FLOW TO BASIN 2
 135          HC       2

 136          KK    FC5C
 137          KM    CALCULATE RUNOFF FROM DA FC5C
 138          BA    0.37
 139          LS            74.8
 140          UD    0.34

 141          KK     CB3
 142          KM    COMBINE HYDROGRAPHS RES1, C5 AND FC5C---TOTAL INFLOW TO BASIN 2
 143          HC       3

 144          KK    RES2
 145          KO       3
 146          KM    ROUTE FLOW THRU BASIN NO. 2
 147          RS       1    STOR      -1
 148          SV       0     170     206
 149          SE       0       4       5
 150          SL       0   25.14     0.6     0.5
 151          SS       4     120     3.0     1.5

 152          KK    RRES2
 153          KM    ROUTE FLOW TO I-17 CULVERTS
 154          RK    3000  0.0023   0.018            TRAP      20        2

 155          KK     FC6
 156          KM    CALCULATE RUNOFF FROM DA FC6
 157          BA    0.23
 158          LS             75
 159          UD    0.25

 160          KK      C6
 161          KM    COMBINE HYDROGRAPHS C5 AND FC6-----TOTAL FLOW FOR NORTH BRANCH SCATTER WASH
 162          HC       2

 163          KK    NSW9
 164          KM    CALCULATE RUNOFF FROM DA NSW9
 165          BA    0.38
 166          LS            81.1
 167          UD    0.28

 168          KK   RNSW9
 169          KM    ROUTE FLOW THRU CAP STRUCTURE
 170          RS       1    STOR      -1
 171          SV       0       1       4      14      26      40      56      75
 172          SE      15      16      17      18      19      20      21      22
 173          SL      15    4.19     0.6     0.5
 174          SS    21.9      50     3.0     1.5
```

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

 175          KK   KNSW9
 176          KM    ROUTE CULVERT DISCHARGE TO I-17
 177          RK   14200  0.0078    0.03                0              20

 178          KK   SSW1A
 179          KM    CALCULATE RUNOFF FROM DA SSW1A
 180          BA    1.18
 181          LS           75.90
 182          UD    0.62

 183          KK      C7
 184          KM    COMBINE HYDROGRAPHS  NSW9 AND SSW1--TOTAL INFLOW TO BASIN NO.4
 185          HC       2

 186          KK    RES3
 187          KM    ROUTE FLOW THRU BASIN NO. 3 ON SOUTH BRANCH AT 19TH AVENUE
 188          RS       1    STOR      -1
 189          SV       0      38      49
 190          SE       0       4       5
 191          SL       0   25.14     0.6     0.5
 192          SS       4      80     3.0     1.5

 193          KK     RC7
 194          KM    ROUTE BASIN OUTFLOW TO I-17 CULVERT
 195          RK    4300   0.008   0.024                0      50       5

 196          KK   SSW1B
 197          KM    CALCULATE RUNOFF FROM DA SSW1B
 198          BA    0.06
 199          LS            86.0
 200          UD    0.10

 201          KK      C8
 202          KM   COMBINE HYDROGRAPHS SSW1B AND RC7--- TOTAL FLOW ON SOUTH BRANCH AT I-17
 203          HC       2

 204          KK    SSW2
 205          KM    CALCULATE RUNOFF FROM DA SSW2
 206          BA    0.28
 207          LS           76.32    30.0
 208          UD    0.29

 209          KK    DIV9
 210          KM    DIVERT FLOW ACROSS I-17 THRU 65"X40" CMP AT ADOBE
 211          DT     DC9
 212          DI       0     115     116    1000    3000
 213          DQ       1     115     115     115     115

 214          KK    SSW3
 215          KM    CALCULATE RUNOFF FROM DA SSW3
 216          BA    0.39
 217          LS           75.45    50.0
 218          UD    0.32
```

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

 219          KK      C9
 220          KM    COMBINE HYDROGRAPHS SSW3 AND DIV9
 221          HC       2

 222          KK   DIV10
 223          KM    DIVERT FLOW ACROSS I-17 THRU 6X3 RCBC AT LOUISE
 224          KM    DIV  REPRESENTS TOTAL FLOW TO DEPRESSED INTERCHANGE AT DEER VALLEY DRIVE
 225          DT    DC10
 226          DI       0       1     156     157    1000    3000
 227          DQ       0       1     156     156     156     156

 228          KK    DVDR
 229          KO       3
 230          KM    ROUTE FLOW THROUGH DEPRESSED INTERCHANGE AT DEER VALLEY DRIVE
 231          RS       1    STOR      -1
 232          SV       0       1    15.9    37.7    53.8    61.3    74.1    99.0   129.5
 233          SE      82      84      90      94      96    96.8      98     100     102
 234          SQ       0       0       0       0       0       1     808    5403   13835
 235          ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

   8         NSW1
                V
                V
  19        RNSW1
                V
                V
  26        KNSW1
                .
                .
  29            .        FC1
                .          .
                .          .
  34          C1............
                .
                .
  37            .       NSW3
                .          V
                .          V
  42            .      RNSW3
                .          V
                .          V
  49            .      KNSW3
                .          .
                .          .
  52            .          .         FC2
                .          .           .
                .          .           .
  57            .         C2............
                .          V
                .          V
  60            .        RC2
                .          .
                .          .
  63            .          .        FC5A
                .          .           .
                .          .           .
  68          CB1......................
                V
                V
  71         RES1
                .
                .
  79            .       NSW5
                .          V
                .          V
  84            .      RNSW5
                .          V
                .          V
  91            .      KNSW5
                .          .
                .          .
  94            .          .         FC3
                .          .           .
```

```
 99                 .          .           .
                    .        C3............
                    .          .
102                 .          .        NSW7
                    .          .           V
                    .          .           V
107                 .          .       RNSW7
                    .          .           V
                    .          .           V
114                 .          .       KNSW7
                    .          .           .
                    .          .           .
117                 .          .           .         FC4
                    .          .           .           .
                    .          .           .           .
122                 .        C4.......................
                    .          V
                    .          V
125                 .       RC4
                    .          .
                    .          .
128                 .          .        FC5B
                    .          .           .
                    .          .           .
133                 .        C5............
                    .          .
                    .          .
136                 .          .        FC5C
                    .          .           .
                    .          .           .
141               CB3........................
                    V
                    V
144              RES2
                    V
                    V
152              RRES
                    .
                    .
155                 .       FC6
                    .          .
                    .          .
160                C6............
                    .
                    .
163                 .      NSW9
                    .          V
                    .          V
168                 .     RNSW9
                    .          V
                    .          V
175                 .     KNSW9
                    .          .
                    .          .
178                 .          .       SSW1A
                    .          .           .
                    .          .           .
183                 .        C7............
                    .          V
```

```
                 .          V
186              .       RES3
                 .          V
                 .          V
193              .        RC7
                 .          .
                 .          .
196              .          .        SSW1B
                 .          .          .
                 .          .          .
201              .         C8.............
                 .          .
                 .          .
204              .          .        SSW2
                 .          .          .
                 .          .          .
211              .          .          .-------->     DC9
209              .          .       DIV9
                 .          .          .
                 .          .          .
214              .          .          .        SSW3
                 .          .          .           .
                 .          .          .           .
219              .          .         C9............
                 .          .          .
                 .          .          .
225              .          .          .-------->    DC10
222              .          .       DIV10
                 .          .          V
                 .          .          V
228              .          .       DVDR
```

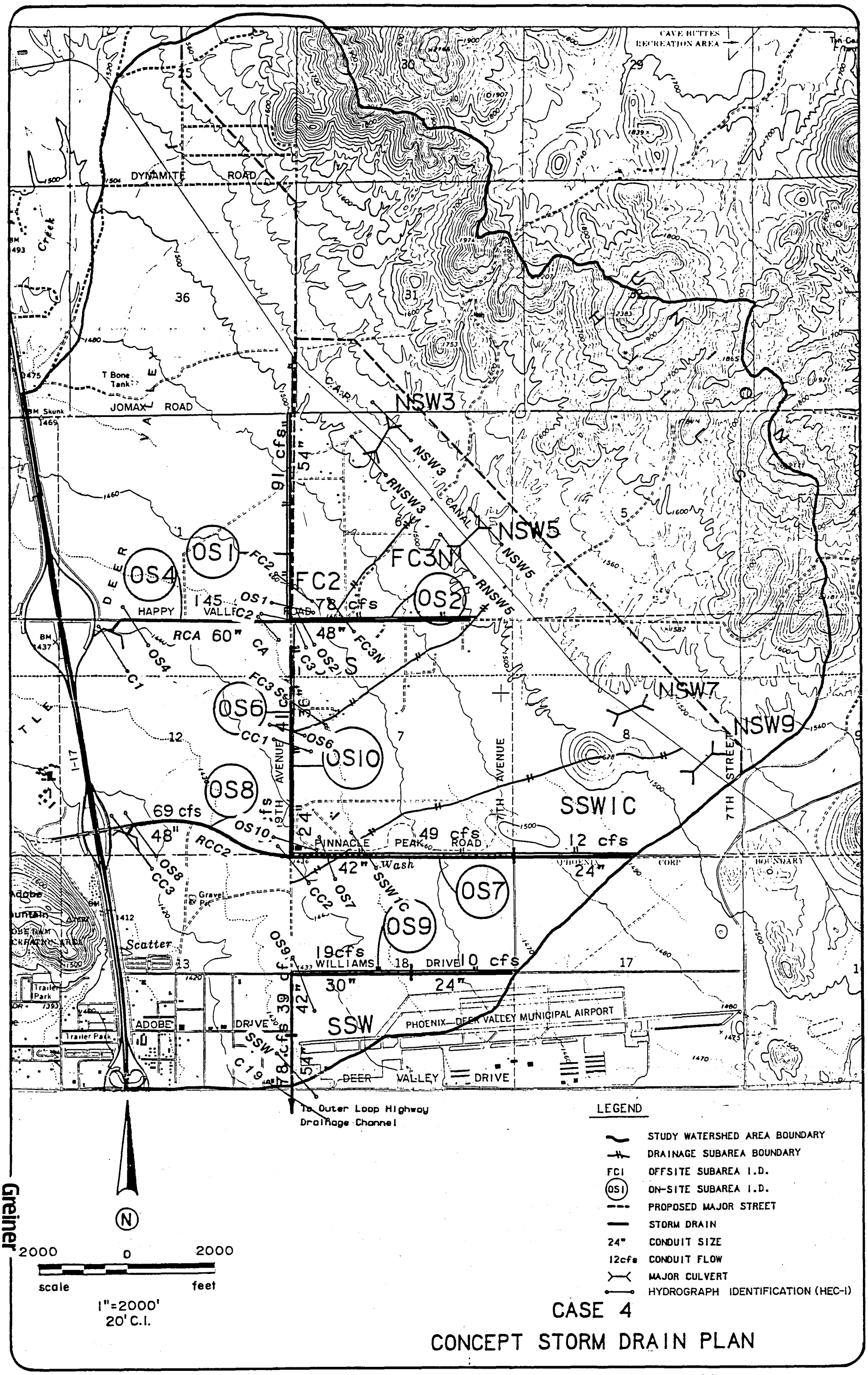
(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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	NSW1	2672.	6.13	339.	204.	204.	1.37		
ROUTED TO	RNSW1	101.	8.57	68.	41.	41.	1.37	19.79	8.60
ROUTED TO	KNSW1	101.	8.97	58.	35.	35.	1.37		
HYDROGRAPH AT	FC1	2001.	6.37	360.	217.	217.	1.82		
2 COMBINED AT	C1	2027.	6.37	418.	251.	251.	3.19		
HYDROGRAPH AT	NSW3	1076.	6.10	132.	80.	80.	0.54		
ROUTED TO	RNSW3	45.	8.13	30.	18.	18.	0.54	18.65	8.17
ROUTED TO	KNSW3	45.	8.30	28.	17.	17.	0.54		
HYDROGRAPH AT	FC2	667.	6.10	79.	48.	48.	0.40		
2 COMBINED AT	C2	687.	6.10	107.	65.	65.	0.94		
ROUTED TO	RC2	662.	6.17	105.	63.	63.	0.94		
HYDROGRAPH AT	FC5A	318.	6.23	48.	29.	29.	0.27		
3 COMBINED AT	CB1	2833.	6.30	570.	343.	343.	4.40		
ROUTED TO	RES1	510.	7.63	235.	142.	142.	4.40	5.09	7.63
HYDROGRAPH AT	NSW5	1948.	6.23	301.	181.	181.	1.17		
ROUTED TO	RNSW5	120.	8.03	78.	47.	47.	1.17	21.68	8.07
ROUTED TO	KNSW5	120.	8.40	70.	42.	42.	1.17		
HYDROGRAPH AT	FC3	655.	6.13	84.	50.	50.	0.44		
2 COMBINED AT	C3	667.	6.13	153.	92.	92.	1.61		
HYDROGRAPH AT	NSW7	1415.	6.27	224.	135.	135.	0.96		
ROUTED TO	RNSW7	77.	8.47	50.	30.	30.	0.96	20.10	8.47
ROUTED TO	KNSW7	77.	9.03	40.	24.	24.	0.96		
HYDROGRAPH AT	FC4	1074.	6.23	166.	100.	100.	0.91		
3 COMBINED AT	C4	1702.	6.20	360.	217.	217.	3.48		
ROUTED TO	RC4	1681.	6.27	353.	213.	213.	3.48		
HYDROGRAPH AT	FC5B	273.	6.23	42.	25.	25.	0.24		

2 COMBINED AT	C5	1953.	6.27	395.	238.	238.	3.72		
HYDROGRAPH AT	EC5C	446.	6.23	66.	40.	40.	0.37		
3 COMBINED AT	C83	2482.	6.27	697.	419.	419.	8.49		
ROUTED TO	RES2	672.	9.13	279.	168.	168.	8.49	5.08	9.13
ROUTED TO	RRES	672.	9.20	268.	162.	162.	8.49		
HYDROGRAPH AT	EC6	331.	6.13	42.	25.	25.	0.23		
2 COMBINED AT	C6	683.	9.20	310.	187.	187.	8.72		
HYDROGRAPH AT	NSW9	665.	6.13	87.	53.	53.	0.38		
ROUTED TO	RNSW9	42.	7.70	28.	17.	17.	0.38	19.45	7.73
ROUTED TO	RNSW9	42.	8.87	18.	11.	11.	0.38		
HYDROGRAPH AT	SSW1A	1010.	6.53	217.	130.	130.	1.18		
2 COMBINED AT	C7	1010.	6.53	235.	141.	141.	1.56		
ROUTED TO	RES3	515.	7.13	183.	110.	110.	1.56	5.01	7.13
ROUTED TO	RC7	510.	7.23	176.	106.	106.	1.56		
HYDROGRAPH AT	SSW1B	163.	6.00	17.	10.	10.	0.06		
2 COMBINED AT	C8	518.	7.23	192.	116.	116.	1.62		
HYDROGRAPH AT	SSW2	516.	6.13	72.	44.	44.	0.28		
DIVERSION TO	DC9	115.	6.13	39.	24.	24.	0.28		
HYDROGRAPH AT	DIV9	401.	6.13	33.	20.	20.	0.28		
HYDROGRAPH AT	SSW3	791.	6.17	117.	72.	72.	0.39		
2 COMBINED AT	C9	1191.	6.17	150.	92.	92.	0.67		
DIVERSION TO	DC10	156.	6.17	58.	37.	37.	0.67		
HYDROGRAPH AT	DIV10	1035.	6.17	92.	55.	55.	0.67		
ROUTED TO	DVDR	9.	6.83	1.	1.	1.	0.67	96.81	6.83

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



CASE 4

CONCEPT STORM DRAIN PLAN

HYDROLOGY WORK MAP

Greiner

FIGURE 11

```
*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             FEBRUARY 1981             *
*           REVISED 31 JAN 85           *
*                                       *
*  RUN DATE 12-SEP-89    TIME  08:22:11 *
*                                       *
*****************************************
```

```
*************************************
*                                   *
*    U.S. ARMY CORPS OF ENGINEERS   *
*  THE HYDROLOGIC ENGINEERING CENTER *
*          609 SECOND STREET        *
*       DAVIS, CALIFORNIA 95616     *
*  (916) 440-3283 OR (FTS) 448-3285 *
*                                   *
*************************************
```

```
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. THE VERSION RELEASED 31JAN85 CONTAINS NEW OPTIONS ON RL AND BA RECORDS, AND ADDS THE HL RECORD. SEE JANUARY 1985 INPUT DESCRIPTION FOR NEW DEFINITIONS.

CASE 4

STORM DRAIN PLAN

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

  1           ID         SCATTER WASH DRAINAGE AND STORM DRAIN STUDY
  2           ID         GREINER, INC., PHOENIX, AZ    JUNE 1989
  3           ID         PROJECT HYDROLOGY---CASE 4---   2-YR, STORM DRAIN HYDROLOGY
  4           IT       2                     300
  5           IN      30
  6           ID       5
              ADIAGRAM

  7           KK    NSW3
  8           KM    BEGIN HAPPY VALLEY RD. STORM DRAIN SYSTEM
  9           KM    CALCULATE RUNOFF FROM DA NSW3
 10           PB    1.57
 11           PC       0    .005    .009    .010    .013    .019    .021    .028    .032    .044
 12           PC    .057    .100    .660    .745    .776    .800    .816    .830    .840    .850
 13           PC    .861    .868    .878    .884    .891    .900    .905    .912    .919    .923
 14           PC    .931    .934    .939    .944    .950    .958    .961    .963    .969    .971
 15           PC    .974    .979    .981    .985    .989    .991    .993    .996   1.000
 16           BA    0.54
 17           LS            82.7
 18           UD    0.24

 19           KK   RNSW1
 20           KM    ROUTE FLOW THRU CAP STRUCTURE
 21           RS       1    STOR      -1
 22           SV       0       2      11      34      62      96     135     180
 23           SE      15      16      17      18      19      20      21      22
 24           SL      15    4.91     0.6     0.5
 25           SS    21.9      50     3.0     1.5

 26           KK   RNSW3
 27           KM    ROUTE CULVERT DISCHARGE TO PINNACLE PEAK ROAD AT 1-17
 28           RK   11000  0.0095    0.03                0               20

 29           KK     FC2
 30           KM    CALCULATE RUNOFF FROM DA FC2
 31           BA    0.38
 32           LS           77.1
 33           UD    0.22

 34           KK     OS1
 35           KM    CALCULATE ONSITE RUNOFF, 19TH AVE. NORTH OF HAPPY VALLEY RD.
 36           BA    0.02
 37           LS              95
 38           UD    0.24

 39           KK      C2
 40           KM    COMBINE HYDROGRAPHS FROM OS1, NSW3 AND FC2
 41           HC       3

 42           KK    NSW5
 43           KM    CALCULATE RUNOFF FROM DA NSW5
 44           BA    1.17
 45           LS           84.3
 46           UD    0.39
```

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

  47          KK   KNSW5
  48          KM    ROUTE FLOW THRU CAP STRUCTURE
  49          RS       1    STOR      -1
  50          SV       0       2       7      24      43      67      95     127
  51          SE      15      16      17      18      19      20      21      22
  52          SL      15    9.62     0.6     0.5
  53          SS    21.9      50     3.0     1.5

  54          KK   KNSW5
  55          KM    ROUTE CULVERT DISCHARGE TO FC3N
  56          RK    6000  0.0095    0.03                0               20

  57          KK    FC3N
  58          KM    CALCULATE RUNOFF FROM DA FC3N
  59          BA    0.19
  60          LS            76.2
  61          UD    0.19

  62          KK     OS2
  63          KM    CALCULATE RUNOFF FROM HAPPY VALLEY RD. EAST OF 19TH AVE.
  64          BA    0.02
  65          LS              95
  66          UD    0.24

  67          KK      C3
  68          KM    COMBINE HYDROGRAPHS OS2, NSW5 AND FC3N
  69          HC       3

  70          KK      CA
  71          KM    COMBINE HYDROGRAPHS C1 AND C3
  72          HC       2

  73          KK     RCA
  74          KM    ROUTE HYDROGRAPH CA TO  DRAINAGEWAY
  75          RK    3800  0.0040   0.013            CIRC     4.5

  76          KK     OS4
  77          KM    CALCULATE RUNOFF FROM HAPPY VALLEY RD. WEST OF 19TH AVE.
  78          BA    0.02
  79          LS              95
  80          UD    0.02

  81          KK      C1
  82          KM    COMBINE HYDROGRAPHS OS4 AND CA----TOTAL STORM DRAIN FLOW
  83          HC       2

  84          KK    FC3S
  85          KM    BEGIN CALCULATIONS FOR PINNACLE PEAK RD. STORM DRAIN SYSTEM
  86          KM   CALCULATE RUNOFF FROM DA FC3S
  87          BA    0.23
  88          LS            76.2
  89          UD    0.24
```

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

  90          KK   RFC3S
  91          KM    ROUTE HYDROGRAPH FC3S TO REACH E
  92          RK    1500  0.0020   0.013            CIRC     4.5

  93          KK     OS6
  94          KM    CALCULATE RUNOFF FROM 19TH AVE NORTH OF PINNACLE PEAK RD.
  95          BA    0.01
  96          LS              95
  97          UD    0.12

  98          KK     CC1
  99          KM    COMBINE HYDROGRAPHS OS6 AND FC3S
 100          HC       2

 101          KK    OS10
 102          KM    CALCULATE RUNOFF FROM 19TH AVENUE
 103          BA    0.01
 104          LS              95
 105          UD    0.12

 106          KK   SSW1C
 107          KM    CALCULATE RUNOFF FROM DA SSW1C
 108          BA    0.47
 109          LS            75.9
 110          UD    0.45

 111          KK     OS7
 112          KM    CALCULATE RUNOFF FROM PINNACLE PEAK RD. EAST OF 19TH AVE
 113          BA    0.03
 114          LS              95
 115          UD    0.36

 116          KK     CC2
 117          KM    COMBINE HYDROGRAPHS OS7,SSW1C AND OS10
 118          HC       3

 119          KK    RCC2
 120          KM    ROUTE HYDROGRAPH CC2 TO BASIN 2 OUTLET
 121          RK    3300  0.0040   0.013            CIRC       5

 122          KK     OS8
 123          KM    CALCULATE HYDROGRAPH FROM PINNACLE PEAK RD. WEST OF 19TH AVE.
 124          BA    0.02
 125          LS              95
 126          UD    0.24

 127          KK     CC3
 128          KM    COMBINE HYDROGRAPHS OS8 AND RCC2---TOTAL STORM DRAIN FLOW
 129          HC       2
```

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

 130          KK     OS9
 131          KM    BEGIN CALCULATION FOR 19TH AVENUE STORM DRAIN
 132          KM    CALCULATE RUNOFF FROM WILLIAMS DRIVE
 133          BA    0.02
 134          LS              95
 135          UD    0.24

 136          KK    ROS9
 137          KM    ROUTE HYDROGRAPH SOUTH ON 19TH AVE
 138          RK    2600    .004    0.02            CIRC       5

 139          KK     SSW
 140          KM    CALCULATE RUNOFF FROM DA SSW
 141          BA    0.28
 142          LS              80
 143          UD    0.32

 144          KK     C19
 145          KM    COMBINE HYDROGRAPHS SSW AND OS9---TOTAL STORM DRAIN FLOW
 146          HC       2
 147          ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

   7         NSW3
                V
                V
  19        RNSW1
                V
                V
  26        KNSW3
                .
                .
  29            .         EC2
                .           .
                .           .
  34            .           .         OS1
                .           .           .
                .           .           .
  39          C2.......................
                .
                .
  42            .        NSW5
                .           V
                .           V
  47            .       RNSW5
                .           V
                .           V
  54            .       KNSW5
                .           .
                .           .
  57            .           .        EC3N
                .           .           .
                .           .           .
  62            .           .           .         OS2
                .           .           .           .
                .           .           .           .
  67            .          C3........................
                .           .
                .           .
  70          CA............
                V
                V
  73         RCA
                .
                .
  76            .         OS4
                .           .
                .           .
  81          C1............
                .
                .
  84            .        EC3S
                .           V
                .           V
  90            .       REC3S
                .           .
```

```
 93                    OS6
                        .
 98              CC1............
                        .
101                    OS10
                        .
106                        .       SSW1C
                        .           .
111                        .           .         OS7
                        .           .           .
116                    CC2.......................
                        V
                        V
119                    KCC2
                        .
122                        .         OS8
                        .           .
127                    CC3............
                        .
130                        .         OS9
                        .           V
                        .           V
136                        .       KOS9
                        .           .
139                        .           .         SSW
                        .           .           .
144                        .         C19............
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             FEBRUARY 1981             *
*           REVISED 31 JAN 85           *
*                                       *
*  RUN DATE 12-SEP-89    TIME  08:22:11 *
*                                       *
*****************************************
```

```
*************************************
*                                   *
*    U.S. ARMY CORPS OF ENGINEERS
*  THE HYDROLOGIC ENGINEERING CENTER
*          609 SECOND STREET
*       DAVIS, CALIFORNIA 95616
*  (916) 440-3285 OR (FTS) 448-3285
*                                   *
*************************************
```

```
                    SCATTER WASH DRAINAGE AND STORM DRAIN STUDY
                    GREINER, INC., PHOENIX, AZ    JUNE 1989
                    PROJECT HYDROLOGY---CASE 4---   2-YR, STORM DRAIN HYDROLOGY

  6 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      1   0  STARTING DATE
                  ITIME       0000  STARTING TIME
                     NQ        300  NUMBER OF HYDROGRAPH ORDINATES
                 NDDATE      1   0  ENDING DATE
                 NDTIME       0958  ENDING TIME

                COMPUTATION INTERVAL    0.03 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

WARNING *** TIME INTERVAL IS GREATER THAN .29*LAG
```

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	NSW3	182.	6.13	23.	14.	14.	0.54		
ROUTED TO	RNSW1	29.	6.93	18.	11.	11.	0.54	16.49	6.93
ROUTED TO	KNSW3	29.	8.03	13.	8.	8.	0.54		
HYDROGRAPH AT	FC2	73.	6.17	10.	6.	6.	0.38		
HYDROGRAPH AT	OS1	19.	6.10	2.	1.	1.	0.02		
3 COMBINED AT	C2	91.	6.13	25.	15.	15.	0.94		
HYDROGRAPH AT	NSW5	345.	6.30	57.	35.	35.	1.17		
ROUTED TO	RNSW5	73.	7.20	45.	27.	27.	1.17	17.47	7.20
ROUTED TO	KNSW5	73.	7.60	40.	24.	24.	1.17		
HYDROGRAPH AT	FC3N	35.	6.13	4.	3.	3.	0.19		
HYDROGRAPH AT	OS2	19.	6.10	2.	1.	1.	0.02		
3 COMBINED AT	C3	78.	7.53	46.	28.	28.	1.38		
2 COMBINED AT	CA	145.	6.13	71.	43.	43.	2.32		
ROUTED TO	RCA	137.	6.20	70.	42.	42.	2.32		
HYDROGRAPH AT	OS4	23.	6.00	2.	1.	1.	0.02		
2 COMBINED AT	C1	140.	6.20	72.	43.	43.	2.34		
HYDROGRAPH AT	FC3S	37.	6.17	5.	3.	3.	0.23		
ROUTED TO	RFC3S	37.	6.23	5.	3.	3.	0.23		
HYDROGRAPH AT	OS6	11.	6.00	1.	1.	1.	0.01		
2 COMBINED AT	CC1	41.	6.20	6.	4.	4.	0.24		
HYDROGRAPH AT	OS10	11.	6.00	1.	1.	1.	0.01		
HYDROGRAPH AT	SSW1C	49.	6.43	10.	6.	6.	0.47		
HYDROGRAPH AT	OS7	23.	6.20	3.	2.	2.	0.03		
3 COMBINED AT	CC2	69.	6.37	15.	9.	9.	0.51		
ROUTED TO	RCC2	68.	6.40	15.	9.	9.	0.51		
HYDROGRAPH AT	OS8	19.	6.10	2.	1.	1.	0.02		

2 COMBINED AT	CC3	76.	6.37	17.	10.	10.	0.53
HYDROGRAPH AT	DS9	19.	6.10	2.	1.	1.	0.02
ROUTED TO	RDS9	18.	6.20	2.	1.	1.	0.02
HYDROGRAPH AT	SSW	60.	6.23	9.	6.	6.	0.28
2 COMBINED AT	C19	78.	6.23	12.	7.	7.	0.30

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

```
*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             FEBRUARY 1981             *
*           REVISED 31 JAN 85           *
*                                       *
*  RUN DATE 12-SEP-89    TIME  08:40:13 *
*                                       *
*****************************************
```

```
*************************************
*                                   *
*    U.S. ARMY CORPS OF ENGINEERS   *
*  THE HYDROLOGIC ENGINEERING CENTER *
*          609 SECOND STREET        *
*       DAVIS, CALIFORNIA 95616     *
*  (916) 440-3285 OR (FTS) 448-3285 *
*                                   *
*************************************
```

```
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. THE VERSION RELEASED 31JAN85 CONTAINS NEW OPTIONS ON RL AND BA RECORDS, AND ADDS THE HL RECORD. SEE JANUARY 1985 INPUT DESCRIPTION FOR NEW DEFINITIONS.

CASE 5

DRAINAGE AND STORM DRAIN PLAN

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

  1           ID         SCATTER WASH DRAINAGE AND STORM DRAIN STUDY
  2           ID         GREINER, INC., PHOENIX, AZ    JUNE 1989
  3           ID         PROJECT HYDROLOGY---CASE 5---   100-YR, 24-HR STORM
  4           ID         COMBINED MASTER DRAINAGE PLAN
  5           IT       2                     300
  6           IN      30
  7           IO       5
              *DIAGRAM

  8           KK    NSW9
  9           KM    CALCULATE RUNOFF FROM DA NSW9
 10           PB    4.05
 11           PC       0    .005    .009    .010    .013    .019    .021    .028    .032    .044
 12           PC    .057    .100    .660    .745    .776    .800    .816    .830    .840    .850
 13           PC    .861    .868    .878    .884    .891    .900    .905    .912    .919    .923
 14           PC    .931    .934    .939    .944    .950    .958    .961    .963    .969    .971
 15           PC    .974    .979    .981    .985    .989    .991    .993    .996   1.000
 16           BA    0.38
 17           LS            81.1
 18           UD    0.28

 19           KK   KNSW9
 20           KM    ROUTE FLOW THRU CAP STRUCTURE
 21           RS       1    STOR      -1
 22           SV       0       1       4      14      26      40      56      75
 23           SE      15      16      17      18      19      20      21      22
 24           SL      15    4.19     0.6     0.5
 25           SS    21.9      50     3.0     1.5

 26           KK   KNSW9
 27           KM    ROUTE CULVERT DISCHARGE TO I-17
 28           RK   14200  0.0078    0.03               0              20

 29           KK   SSW1A
 30           KM    CALCULATE RUNOFF FROM DA SSW1A
 31           BA    1.18
 32           LS           75.90
 33           UD    0.62

 34           KK     SD5
 35           KM    DIVERT 49 CFS TO STORM DRAIN ALONG 19TH AVE
 36           DT     SD5
 37           DI       0      49    2000
 38           DQ       0      49      49

 39           KK      C7
 40           KM    COMBINE HYDROGRAPHS  NSW9 AND SSW1--TOTAL INFLOW TO BASIN NO.4
 41           HC       2

 42           KK    RES3
 43           KM    ROUTE FLOW THRU BASIN NO. 3 ON SOUTH BRANCH AT 19TH AVENUE
 44           RS       1    STOR      -1
 45           SV       0      38      49
 46           SE       0       4       5
 47           SL       0   25.14     0.6     0.5
```

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

  48          SS       4      80     3.0     1.5

  49          KK     RC7
  50          KM    ROUTE BASIN OUTFLOW TO I-17 CULVERT
  51          RK    4300   0.008   0.024               0      30       5

  52          KK   SSW1B
  53          KM    CALCULATE RUNOFF FROM DA SSW1B
  54          BA    0.06
  55          LS            86.0
  56          UD    0.10

  57          KK      C8
  58          KM   COMBINE HYDROGRAPHS SSW1B AND RC7--- TOTAL FLOW ON SOUTH BRANCH AT I-17
  59          HC       2

  60          KK    NSW1
  61          KM    CALCULATE RUNOFF FROM DA NSW1
  62          BA    1.37
  63          LS              83
  64          UD    0.26

  65          KK   RNSW1
  66          KM    ROUTE FLOW THRU CAP STRUCTURE
  67          RS       1    STOR      -1
  68          SV       0       4      17      52      96     148     209     279
  69          SE      15      16      17      18      19      20      21      22
  70          SL      15    9.62     0.6     0.5
  71          SS    21.9      30     3.0     1.5

  72          KK   RNSW1
  73          KM    ROUTE CULVERT DISCHARGE TO HAPPY VALLEY ROAD AND I-17
  74          RK    8000  0.0091    0.03               0              20

  75          KK    FC1
  76          KM    CALCUALTE RUNOFF FROM DA FC1
  77          BA    1.82
  78          LS            77.5
  79          UD    0.48

  80          KK      C1
  81          KM    COMBINE HYDROGRAPHS NSW1 AND FC1
  82          HC       2

  83          KK    NSW3
  84          KM    CALCULATE RUNOFF FROM DA NSW3
  85          BA    0.54
  86          LS            82.7
  87          UD    0.24
```

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

  88          KK   KNSW3
  89          KM    ROUTE FLOW THRU CAP STRUCTURE
  90          RS       1    STOR      -1
  91          SV       0       2      11      34      62      96     135     180
  92          SE      15      16      17      18      19      20      21      22
  93          SL      15    4.91     0.6     0.5
  94          SS    21.9      30     3.0     1.5

  95          KK   KNSW3
  96          KM    ROUTE CULVERT DISCHARGE TO HAPPY VALLEY ROAD
  97          RK    4300  0.0095    0.03            TRAP      16         2

  98          KK     FC2
  99          KM    CALCULATE RUNOFF FROM DA FC2
 100          BA    0.40
 101          LS           77.1
 102          UD    0.22

 103          KK    DIV1
 104          KM    DIVERT 91 CFS INTO STORM DRAIN
 105          DT     SD1
 106          DI       0       1      91      92    2000
 107          DQ       0       1      91      91      91

 108          KK      C2
 109          KM    COMBINE HYDROGRAPHS FROM NSW3 AND FC2
 110          HC       2

 111          KK     RC2
 112          KM    ROUTE HYDROGRAPH C2 TO DETENTION BASIN NO. 1
 113          RK    3700  0.0030   0.018            TRAP      16       2

 114          KK    FC5A
 115          KM    CALCULATE RUNOFF FROM DA FC5A
 116          BA    0.27
 117          LS           74.6
 118          UD    0.35

 119          KK     CB1
 120          KM    COMBINE HYDROGRAPHS C1, RC2 AND FC5A
 121          HC       3

 122          KK    NSW5
 123          KM    CALCULATE RUNOFF FROM DA NSW5
 124          BA    1.17
 125          LS           84.3
 126          UD    0.39

 127          KK   KNSW5
 128          KM    ROUTE FLOW THRU CAP STRUCTURE
 129          RS       1    STOR      -1
 130          SV       0       2       7      24      43      67      95     127
 131          SE      15      16      17      18      19      20      21      22
 132          SL      15    9.62     0.6     0.5
```

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

 133          SS    21.9      50      3.0     1.5

 134          KK   KNSW5
 135          KM    ROUTE CULVERT DISCHARGE TO FC3
 136          RK    6000  0.0095    0.03                0                20

 137          KK    DIV2
 138          KM    DIVERT 78 CFS INTO STORM DRAIN
 139          DT    DIV2
 140          DI       0      78      79    2000
 141          DQ       0       0       1    1922

 142          KK    RSD1
 143          KM    RECALL DIV SD1
 144          DR     SD1

 145          KK     CC1
 146          KM    COMBINE HYDROGRAPHS SD1 AND DIV2--TOTAL  S.D. FLOW, HAPPY VALLEY RD.
 147          HC       2

 148          KK    RCC1
 149          KM    ROUTE S.D. FLOW FROM 19TH AVENUE TO DRAINAGEWAY
 150          RK    4000    .004    0.02            CIRC             4.5

 151          KK     CC2
 152          KM    COMBINE HYDROGRAPHS CC1 AND CB1 FOR TOTAL INFLOW TO BASIN 1
 153          HC       2

 154          KK    RES1
 155          KM    ROUTE FLOW THROUGH BASIN NO.1
 156          RS       1    STOR      -1
 157          SV       0     147     184
 158          SE       0       4       5
 159          SL       0   15.90     0.6     0.5
 160          SS       4     100     3.0     1.5

 161          KK     FC3
 162          KM    CALCULATE RUNOFF FROM DA FC3
 163          BA    0.44
 164          LS            76.2
 165          UD    0.26

 166          KK   RDIV2
 167          KM    RETRIEVE HYDROGRAPH DIV2
 168          DR    DIV2

 169          KK     CC5
 170          KM    COMBINE HYDROGRAPHS DIV2 AND FC3
 171          HC       2
```

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

 172          KK    DIV3
 173          KM    DIVERT 37 CFS TO STORM DRAIN
 174          DT     SD3
 175          DI       0      37      38    2000
 176          DQ       0      37      37      37

 177          KK    NSW7
 178          KM    CALCULATE RUNOFF FROM DA NSW7
 179          BA    0.96
 180          LS            81.6
 181          UD     0.4

 182          KK   RNSW7
 183          KM    ROUTE FLOW THRU CAP STRUCTURE
 184          RS       1    STOR      -1
 185          SV       0       2       9      30      55      85     120     160
 186          SE      15      16      17      18      19      20      21      22
 187          SL      15    7.07     0.6     0.5
 188          SS    21.9      30     3.0     1.5

 189          KK   RNSW7
 190          KM    ROUTE CULVERT DISCHARGE TO FC4
 191          RK    9000  0.0085    0.03               0               20

 192          KK     FC4
 193          KM    CALCULATE RUNOFF FROM DA FC4
 194          BA    0.91
 195          LS           75.40
 196          UD    0.37

 197          KK      C4
 198          KM    COMBINE HYDROGRAPHS FC4 AND NSW7
 199          HC       2

 200          KK     RC4
 201          KM    ROUTE HYDROGRAPH C4 TO BASIN NO. 2
 202          RK    4000  0.0030   0.018            TRAP      20       3

 203          KK    FC5B
 204          KM    CALCULATE RUNOFF FROM DA FC5B
 205          BA    0.24
 206          LS           74.60
 207          UD    0.37

 208          KK    RSD3
 209          KM    RETRIEVE HYDROGRAPH SD3
 210          DR     SD3

 211          KK      C5
 212          KM    COMBINE HYDROGRAPHS SD3, DIV3, C4 AND FC5B--TOTAL CHANNEL FLOW TO BASIN 2
 213          HC       4
```

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

 214          KK    EC5C
 215          KM    CALCULATE RUNOFF FROM DA EC5C
 216          BA    0.37
 217          LS            74.8
 218          UD    0.34

 219          KK     CB3
 220          KM    COMBINE HYDROGRAPHS RES1, C5 AND EC5C
 221          HC       3

 222          KK    RES2
 223          KM    ROUTE FLOW THRU BASIN NO. 2
 224          RS       1    STOR      -1
 225          SV       0     170     206
 226          SE       0       4       5
 227          SL       0   25.14     0.6     0.5
 228          SS       4     120     3.0     1.5

 229          KK    RSD5
 230          KM    RETRIEVE HYDROGRAPH SD5
 231          DR     SD5

 232          KK   RRSD5
 233          KM    ROUTE S.D. FLOW TO OUTLET OF BASIN 2
 234          RK    4000  0.004     0.02            CIRC     5.0

 235          KK     CC7
 236          KM    COMBINE RSD5 AND RES2
 237          HC       2

 238          KK   RRES2
 239          KM    ROUTE FLOW TO 1-17 CULVERTS
 240          RK    3000  0.0023   0.018            TRAP      20       2

 241          KK     EC6
 242          KM    CALCULATE RUNOFF FROM DA EC6
 243          BA    0.23
 244          LS              75
 245          UD    0.25

 246          KK      C6
 247          KM    COMBINE HYDROGRAPHS CC7 AND EC6-----TOTAL FLOW  NORTH BRANCH SCATTER WASH
 248          HC       2

 249          KK    SSW2
 250          KM    CALCULATE RUNOFF FROM DA SSW2
 251          BA    0.28
 252          LS           76.32    30.0
 253          UD    0.29
```

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

 254          KK    DIV6
 255          KM    DIVERT 39 CFS INTO STORM DRAIN
 256          DT     SD6
 257          DI       0       1      39    1000
 258          DQ       0       1      39      39

 259          KK    DIV9
 260          KM    DIVERT FLOW ACROSS I-17 THRU 65"X40" CMP AT ADOBE
 261          DT     DC9
 262          DI       0     115     116    1000    3000
 263          DQ       1     115     115     115     115

 264          KK    SSW3
 265          KM    CALCULATE RUNOFF FROM DA SSW3
 266          BA    0.39
 267          LS          75.45    50.0
 268          UD    0.32

 269          KK    DIV7
 270          KM    DIVERT 39 CFS INTO STORM DRAIN
 271          DT     SD7
 272          DI       0       1      39    1000
 273          DQ       0       1      39      39

 274          KK      C9
 275          KM    COMBINE HYDROGRAPHS SSW3 AND DIV9
 276          HC       2

 277          KK   DIV10
 278          KM    DIVERT FLOW ACROSS I-17 THRU 6X3 RCBC AT LOUISE
 279          KM    DIV  REPRESENTS TOTAL FLOW TO DEPRESSED INTERCHANGE AT DEER VALLEY DRIVE
 280          DT    DC10
 281          DI       0       1     156     157    1000    3000
 282          DQ       0       1     156     156     156     156

 283          KK    DVDR
 284          KM    ROUTE FLOW THROUGH DEPRESSED INTERCHANGE AT DEER VALLEY DRIVE
 285          RS       1    STOR      -1
 286          SV       0       1    15.9    37.7    53.8    61.3    74.1    99.0   129.5
 287          SE      82      84      90      94      96    96.8      98     100     102
 288          SQ       0       0       0       0       0       1     800    5403   13835

 289          KK    RSD6
 290          KM    RETRIEVE SD6 STORM DRAIN FLOW
 291          DR     SD6

 292          KK    RSD7
 293          KM    RETRIEVE SD7 STORM DRAIN FLOW
 294          DR     SD7
```

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

 295          KK     C19
 296          KM    COMBINE SD6 AND SD7 FOR TOTAL FLOW IN 19TH AVENUE S.D. AT DEER VALLEY DR.
 297          HC       2
 298          ZZ
```

SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

   8        NSW9
               V
               V
  19       RNSW9
               V
               V
  26       KNSW9
               .
               .
  29           .       SSW1A
               .           .
               .           .
  36           .           .------->     SD5
  34           .         SD5
               .           .
               .           .
  39          C7............
               V
               V
  42        RES3
               V
               V
  49         RC7
               .
               .
  52           .       SSW1B
               .           .
               .           .
  57          C8............
               .
               .
  60           .        NSW1
               .           V
               .           V
  65           .       RNSW1
               .           V
               .           V
  72           .       KNSW1
               .           .
               .           .
  75           .           .        FC1
               .           .           .
               .           .           .
  80           .          C1............
               .           .
               .           .
  83           .           .        NSW3
               .           .           V
               .           .           V
  88           .           .       RNSW3
               .           .           V
               .           .           V
  95           .           .       KNSW3
```

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                .           .           .
                .           .           .
 98             .           .           .        FC2
                .           .           .          .
                .           .           .          .
105             .           .           .          .-------->     SD1
103             .           .           .       DIV1
                .           .           .          .
                .           .           .          .
108             .           .         C2...........
                .           .           V
                .           .           V
111             .           .        RC2
                .           .           .
                .           .           .
114             .           .           .       FC5A
                .           .           .          .
                .           .           .          .
119             .        CB1........................
                .           .
                .           .
122             .           .       NSW5
                .           .          V
                .           .          V
127             .           .      RNSW5
                .           .          V
                .           .          V
134             .           .      KNSW5
                .           .           .
                .           .           .
139             .           .           .-------->    DIV2
137             .           .       DIV2
                .           .           .
                .           .           .
144             .           .           .          .<--------     SD1
142             .           .           .       KSD1
                .           .           .          .
                .           .           .          .
145             .           .        CC1...........
                .           .           V
                .           .           V
148             .           .       KCC1
                .           .           .
                .           .           .
151             .        CC2............
                .           V
                .           V
154             .       RES1
                .           .
                .           .
161             .           .        FC3
                .           .           .
                .           .           .
168             .           .           .          .<--------    DIV2
166             .           .           .      KDIV2
                .           .           .          .
                .           .           .          .
169             .           .        CC5...........
                .           .           .
                .           .           .
```

```
174                                  .------->     SD3
172                             DIV3
                                   .
                                   .
177                                .        NSW7
                                   .           v
                                   .           v
182                                .       RNSW7
                                   .           v
                                   .           v
189                                .       KNSW7
                                   .           .
                                   .           .
192                                .           .         FC4
                                   .           .          .
                                   .           .          .
197                                .          C4...........
                                   .           v
                                   .           v
200                                .         RC4
                                   .           .
                                   .           .
203                                .           .       FC5B
                                   .           .          .
                                   .           .          .
210                                .           .          .          .<-------     SD3
208                                .           .          .       KSD3
                                   .           .          .          .
                                   .           .          .          .
211                                .          C5..........................
                                   .
                                   .
214                                .        FC5C
                                   .           .
                                   .           .
219                          CB3.......................
                                v
                                v
222                         RES2
                                .
                                .
231                                .<-------     SD5
229                             RSD5
                                   v
                                   v
232                            KRSD5
                                   .
                                   .
235                          CC7............
                                v
                                v
238                        RRES2
                                .
                                .
241                             FC6
                                   .
                                   .
246                          C6............
                                .
                                .
```

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249          .          .        SSW2
             .          .           .
             .          .           .
256          .          .           .-------->     SD6
254          .          .        DIV6
             .          .           .
             .          .           .
261          .          .           .-------->     DC9
259          .          .        DIV9
             .          .           .
             .          .           .
264          .          .           .        SSW3
             .          .           .           .
             .          .           .           .
271          .          .           .           .-------->     SD7
269          .          .           .        DIV7
             .          .           .           .
             .          .           .           .
274          .          .          C9...........
             .          .           .
             .          .           .
280          .          .           .-------->    DC10
277          .          .       DIV10
             .          .           V
             .          .           V
283          .          .        DVDR
             .          .           .
             .          .           .
291          .          .           .           .<--------     SD6
289          .          .           .        RSD6
             .          .           .           .
             .          .           .           .
294          .          .           .           .           .<--------     SD7
292          .          .           .           .        RSD7
             .          .           .           .           .
             .          .           .           .           .
295          .          .           .         C19...........
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             FEBRUARY 1981             *
*           REVISED 31 JAN 85           *
*                                       *
*  RUN DATE 12-SEP-89    TIME  08:40:13 *
*                                       *
*****************************************
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*************************************
*                                   *
*    U.S. ARMY CORPS OF ENGINEERS   *
*  THE HYDROLOGIC ENGINEERING CENTER *
*          609 SECOND STREET        *
*       DAVIS, CALIFORNIA 95616     *
*  (916) 440-3285 OR (FTS) 448-3285 *
*                                   *
*************************************
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                                SCATTER WASH DRAINAGE AND STORM DRAIN STUDY
                                GREINER, INC., PHOENIX, AZ    JUNE 1989
                                PROJECT HYDROLOGY---CASE 5---   100-YR, 24-HR STORM
                                COMBINED MASTER DRAINAGE PLAN

   7 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      1    0  STARTING DATE
                       ITIME        0000  STARTING TIME
                          NQ         300  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE      1    0  ENDING DATE
                      NDTIME        0958  ENDING TIME

                  COMPUTATION INTERVAL    0.03 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

WARNING *** TIME INTERVAL IS GREATER THAN .29*LAG
```

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	NSW9	665.	6.13	87.	53.	53.	0.38		
ROUTED TO	RNSW9	42.	7.70	28.	17.	17.	0.38	19.45	7.73
ROUTED TO	KNSW9	42.	8.87	18.	11.	11.	0.38		
HYDROGRAPH AT	SSW1A	1010.	6.53	217.	130.	130.	1.18		
DIVERSION TO	SD5	49.	6.53	34.	21.	21.	1.18		
HYDROGRAPH AT	SD5	961.	6.53	182.	110.	110.	1.18		
2 COMBINED AT	C7	961.	6.53	200.	121.	121.	1.56		
ROUTED TO	RES3	441.	7.17	162.	97.	97.	1.56	4.81	7.17
ROUTED TO	RC7	437.	7.27	155.	93.	93.	1.56		
HYDROGRAPH AT	SSW1B	163.	6.00	17.	10.	10.	0.06		
2 COMBINED AT	C8	445.	7.27	171.	103.	103.	1.62		
HYDROGRAPH AT	NSW1	2672.	6.13	339.	204.	204.	1.37		
ROUTED TO	RNSW1	101.	8.57	68.	41.	41.	1.37	19.79	8.60
ROUTED TO	KNSW1	101.	8.97	58.	35.	35.	1.37		
HYDROGRAPH AT	FC1	2001.	6.37	360.	217.	217.	1.82		
2 COMBINED AT	C1	2027.	6.37	418.	251.	251.	3.19		
HYDROGRAPH AT	NSW3	1076.	6.10	132.	80.	80.	0.54		
ROUTED TO	RNSW3	45.	8.13	30.	18.	18.	0.54	18.65	8.17
ROUTED TO	KNSW3	45.	8.30	28.	17.	17.	0.54		
HYDROGRAPH AT	FC2	667.	6.10	79.	48.	48.	0.40		
DIVERSION TO	SD1	91.	6.10	35.	21.	21.	0.40		
HYDROGRAPH AT	DIV1	576.	6.10	44.	27.	27.	0.40		
2 COMBINED AT	C2	596.	6.10	73.	44.	44.	0.94		
ROUTED TO	RC2	586.	6.17	71.	43.	43.	0.94		
HYDROGRAPH AT	FC3A	318.	6.23	48.	29.	29.	0.27		
3 COMBINED AT	CB1	2729.	6.30	536.	323.	323.	4.40		

HYDROGRAPH AT	NSW5	1948.	6.23	301.	181.	181.	1.17		
ROUTED TO	RNSW5	120.	8.03	78.	47.	47.	1.17	21.68	8.07
ROUTED TO	KNSW5	120.	8.40	70.	42.	42.	1.17		
DIVERSION TO	DIV2	42.	6.50	22.	13.	13.	1.17		
HYDROGRAPH AT	DIV2	78.	6.50	48.	29.	29.	1.17		
HYDROGRAPH AT	RSD1	91.	5.77	35.	21.	21.	0.00		
2 COMBINED AT	CC1	169.	6.50	83.	50.	50.	1.17		
ROUTED TO	RCC1	169.	6.87	80.	48.	48.	1.17		
2 COMBINED AT	CC2	2840.	6.30	616.	371.	371.	5.57		
ROUTED TO	RES1	544.	7.77	258.	155.	155.	5.57	5.16	7.77
HYDROGRAPH AT	FC3	655.	6.13	84.	50.	50.	0.44		
HYDROGRAPH AT	RDIV2	42.	8.40	22.	13.	13.	0.00		
2 COMBINED AT	CC5	655.	6.13	105.	63.	63.	0.44		
DIVERSION TO	SD3	37.	6.13	27.	16.	16.	0.44		
HYDROGRAPH AT	DIV3	618.	6.13	79.	47.	47.	0.44		
HYDROGRAPH AT	NSW7	1415.	6.27	224.	135.	135.	0.96		
ROUTED TO	RNSW7	77.	8.47	50.	30.	30.	0.96	20.10	8.47
ROUTED TO	KNSW7	77.	9.03	40.	24.	24.	0.96		
HYDROGRAPH AT	FC4	1074.	6.23	166.	100.	100.	0.91		
2 COMBINED AT	C4	1074.	6.23	206.	124.	124.	1.87		
ROUTED TO	RC4	1059.	6.30	202.	122.	122.	1.87		
HYDROGRAPH AT	FC5B	273.	6.23	42.	25.	25.	0.24		
HYDROGRAPH AT	RSD3	37.	5.73	27.	16.	16.	0.00		
4 COMBINED AT	C5	1862.	6.23	350.	211.	211.	2.55		
HYDROGRAPH AT	FC5C	446.	6.23	66.	40.	40.	0.37		
3 COMBINED AT	CB3	2386.	6.23	674.	406.	406.	8.49		
ROUTED TO	RES2	638.	9.37	259.	156.	156.	8.49	5.01	9.37
HYDROGRAPH AT	RSD5	49.	5.83	34.	21.	21.	0.00		
ROUTED TO	RRSD5	49.	6.63	33.	20.	20.	0.00		
2 COMBINED AT	CC7	687.	9.37	292.	176.	176.	8.49		

ROUTED TO	RRES2	687.	9.43	281.	169.	169.	8.49		
HYDROGRAPH AT	FC6	331.	6.13	42.	25.	25.	0.23		
2 COMBINED AT	C6	697.	9.40	323.	194.	194.	8.72		
HYDROGRAPH AT	SSW2	516.	6.13	72.	44.	44.	0.28		
DIVERSION TO	SD6	39.	6.13	23.	14.	14.	0.28		
HYDROGRAPH AT	DIV6	477.	6.13	50.	30.	30.	0.28		
DIVERSION TO	DC9	115.	6.13	22.	14.	14.	0.28		
HYDROGRAPH AT	DIV9	362.	6.13	27.	16.	16.	0.28		
HYDROGRAPH AT	SSW3	791.	6.17	117.	72.	72.	0.39		
DIVERSION TO	SD7	39.	6.17	29.	19.	19.	0.39		
HYDROGRAPH AT	DIV7	752.	6.17	88.	53.	53.	0.39		
2 COMBINED AT	C9	1113.	6.17	115.	70.	70.	0.67		
DIVERSION TO	DC10	156.	6.17	37.	22.	22.	0.67		
HYDROGRAPH AT	DIV10	957.	6.17	79.	47.	47.	0.67		
ROUTED TO	DVDR	0.	0.03	0.	0.	0.	0.67	94.29	6.80
HYDROGRAPH AT	RSD6	39.	5.67	23.	14.	14.	0.00		
HYDROGRAPH AT	RSD7	39.	5.47	29.	19.	19.	0.00		
2 COMBINED AT	C19	78.	5.67	51.	33.	33.	0.00		

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

Greiner Engineering

Appendix C

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Phoenix 602 275-5400

Job Scatter Wash Drainage and Storm Drain Study Index No. ST-886366

HYDROLOGIC SUMMARY SHEET - Existing

Calculated by M.C. Date 2-28 Sheet No. 1 of 12

Checked by _____ Date _____

Drainage Area Identification NSW1

Area 1.37 square miles

Upstream Elevation 1865 Hydraulic Length (L) 1.7 miles

Downstream Elevation 1515 Slope (S) 206 feet/mile

L_c 0.28 miles

$Lag = C_t \left(\frac{L \cdot L_c}{S^{0.5}} \right)^{0.38}$ C_t 0.96 Lag = 0.26 hours

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments
0.05	4	Undeveloped	Desert	B	72	Fair Cover 30%-50%
0.66	48		"	C	81	
0.66	48		"	D	86	

Weighted CN .48(86) + .48(81) + 0.04(72) = 83

HYDROGRAPH ROUTING DATA

Channel Length (L) 8000 feet Channel Slope (S) .0091 ft./ft.

Channel Roughness (n) 0.03 Shape (Trap, Deep. Circ) Trap

Channel Bottom Width/Diameter 20 feet Side Slopes (Z) 150

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Job Scatter Wash Drainage and Storm Drain Study Index No. ST-886366

HYDROLOGIC SUMMARY SHEET - Existing

Calculated by mc Date 2-28 Sheet No. 2

Checked by _____ Date _____ of 12

Drainage Area Identification NSW2

Area 1.33 square miles

Upstream Elevation 1520 Hydraulic Length (L) 2.18 miles

Downstream Elevation 1442 Slope (S) 36 feet/mile

L_c 0.95 miles

$Lag = C_t \left(\frac{L \cdot L_c}{S^{0.5}} \right)^{0.38}$ C_t 0.72 Lag = 0.48 hours

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments
0.77	58	Undeveloped	Desert	B	75	Poor to Fair Cover 30%-70%
0.08	6		"	C	81	
0.48	36		"	D	86	

Weighted CN .58(75)+.06(81)+.36(86)= 79.3

HYDROGRAPH ROUTING DATA

Channel Length (L)_____feet Channel Slope (S)_____ft./ft.

Channel Roughness (n)_____ Shape (Trap, Deep. Circ)_____

Channel Bottom Width/Diameter_____feet Side Slopes (Z)_____

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Job Scatter Wash Drainage and Storm Drain Study Index No. ST-886366

HYDROLOGIC SUMMARY SHEET - Existing

Calculated by M.C. Date 2-28 Sheet No. 3

Checked by _____ Date _____ of 12

Drainage Area Identification NSW3

Area 0.54 square miles

Upstream Elevation 1800 Hydraulic Length (L) 0.98 miles

Downstream Elevation 1515 Slope (S) 291 feet/mile

L_c 0.44 miles

Lag = $C_t \left(\frac{L \cdot L_c}{S^{0.5}}\right)^{0.38}$ C_t 0.96 Lag = 0.24 hours

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments
0.02	4	Undeveloped	Desert	B	72	Fair Cover
0.29	54		"	C	81	30%-70%
0.23	42		"	D	86	

Weighted CN 0.04(72)+.42(86)+.54(81) = 82.7

HYDROGRAPH ROUTING DATA

Channel Length (L) 11,000 feet Channel Slope (S) 0.0095 ft./ft.

Channel Roughness (n) 0.03 Shape (Trap, Deep. Circ) Trap

Channel Bottom Width/Diameter 0 feet Side Slopes (Z) 20

Drainage Area Identification NSW4

Area 1.52 square miles

Upstream Elevation 1515 Hydraulic Length (L) 2.20 miles

Downstream Elevation 1411 Slope (S) 47 feet/mile

L_c 1.04 miles

Lag = $C_t \left(\frac{L \cdot L_c}{S^{0.5}}\right)^{0.38}$ C_t 0.72 Lag = 0.47 hours

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments
1.22	87	Undeveloped	Desert	B	75	Poor to Fair Cover
0.20	13		"	C	81	30%-70%

Weighted CN .87(75)+.13(81) = 75.78

HYDROGRAPH ROUTING DATA

Channel Length (L)_____feet Channel Slope (S)_____ft./ft.

Channel Roughness (n)_____ Shape (Trap, Deep. Circ)_____

Channel Bottom Width/Diameter_____feet Side Slopes (Z)_____

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Job Scatter Wash Drainage and Storm Drain Study Index No. ST-886366
HYDROLOGIC SUMMARY SHEET Existing
Calculated by M.C Date 2-28 Sheet No. 5
Checked by _____ Date _____ of 12

Drainage Area Identification NSWS

Area 1.17 square miles

Upstream Elevation 1920 Hydraulic Length (L) 1.93 miles

Downstream Elevation 1515 Slope (S) 210 feet/mile

L_c 0.68 miles

Lag = $C_t \left(\frac{L \cdot L_c}{S^{0.5}}\right)^{0.38}$ C_t 0.96 Lag = 0.39 hours

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments
0.02	2	Undeveloped	Desert	B	72	Fair Cover
0.33	28		"	C	81	30%-70%
0.82	70		"	D	86	

Weighted CN 0.02(72)+.28(81)+.70(86)= 84.3

HYDROGRAPH ROUTING DATA

Channel Length (L) 10,000 feet Channel Slope (S) 0.0095 ft./ft.

Channel Roughness (n) 0.03 Shape (Trap, Deep. Circ) Trap

Channel Bottom Width/Diameter 0 feet Side Slopes (Z) 20

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Job Scatter Wash Drainage and Storm Drain Study Index No. ST-886366

HYDROLOGIC SUMMARY SHEET -Existing

Calculated by M.C. Date 2-28 Sheet No. 6

Checked by _____ Date _____ of 12

Drainage Area Identification NSW6

Area 0.60 square miles

Upstream Elevation 1515 Hydraulic Length (L) 2.08 miles

Downstream Elevation 1420 Slope (S) 46 feet/mile

L_c 1.14 miles

$Lag = C_t \left(\frac{L \cdot L_c}{S^{0.5}}\right)^{0.38}$ C_t 0.72 Lag = 0.48 hours

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments
0.51	85	Undeveloped	Desert	B	75	Poor to Fair Cover
0.08	14		"	C	81	30% - 70%
0.01	1		"	D	86	

Weighted CN .85(75) + .14(81) + .01(86) = 75.95

HYDROGRAPH ROUTING DATA

Channel Length (L) 3000 feet Channel Slope (S) 0.0023 ft./ft.

Channel Roughness (n) 0.03 Shape (Trap, Deep. Circ) Trap

Channel Bottom Width/Diameter 20 feet Side Slopes (Z) 10

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Job Scatter Wash Drainage and Storm Drain Study Index No. ST-886366
HYDROLOGIC SUMMARY SHEET - Existing
Calculated by M.C. Date 2-28 Sheet No. 7
Checked by _____ Date _____ of 12

Drainage Area Identification NSW7

Area 0.96 square miles

Upstream Elevation 1800 Hydraulic Length (L) 1.70 miles

Downstream Elevation 1515 Slope (S) 168 feet/mile

L_c 0.76 miles

Lag = $C_t \left(\frac{L \cdot L_c}{S^{0.5}}\right)^{0.38}$ C_t 0.96 Lag = 0.40 hours

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments
0.14	15	Undeveloped Desert		B	72	Fair Cover
0.44	46		"	C	81	30%-70%
0.38	39		"	D	86	

Weighted CN .15(72) + .46(81) + .39(86) = 81.6

HYDROGRAPH ROUTING DATA

Channel Length (L) 13,000 feet Channel Slope (S) 0.0085 ft./ft.

Channel Roughness (n) 0.03 Shape (Trap, Deep. Circ) Trap

Channel Bottom Width/Diameter 0 feet Side Slopes (Z) 20

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Job Scatter Wash Drainage and Storm Drain Study Index No. ST-886366

HYDROLOGIC SUMMARY SHEET - Existing

Calculated by M.C. Date 2-28 Sheet No. 8 of 12

Checked by _____ Date _____

Drainage Area Identification NSW8

Area 1.23 square miles

Upstream Elevation 1515 Hydraulic Length (L) 2.56 miles

Downstream Elevation 1404 Slope (S) 43 feet/mile

L_c 1.33 miles

$Lag = C_t \left(\frac{L \cdot L_c}{S^{0.5}}\right)^{0.38}$ C_t 0.72 Lag = 0.56 hours

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments
0.83	91	Undeveloped	Desert	B	75	Poor - Fair
0.11	9		"	D	86	30% - 70%

Weighted CN .91 (75) + .09 (86) = 75.99

HYDROGRAPH ROUTING DATA

Channel Length (L)_____ feet Channel Slope (S)_____ ft./ft.

Channel Roughness (n)_____ Shape (Trap, Deep. Circ)_____

Channel Bottom Width/Diameter_____ feet Side Slopes (Z)_____

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Job Scatter Wash Drainage and Storm Drain Study Index No. ST-886366

HYDROLOGIC SUMMARY SHEET - Existing

Calculated by M.C. Date 2-28 Sheet No. 9 of 12

Checked by _____ Date _____

Drainage Area Identification NSW9

Area 0.38 square miles

Upstream Elevation 1850 Hydraulic Length (L) 1.19 miles

Downstream Elevation 1515 Slope (S) 282 feet/mile

L_c 0.57 miles

$Lag = C_t \left(\frac{L \cdot L_c}{S^{0.5}}\right)^{0.38}$ C_t 0.96 Lag = 0.28 hours

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments
0.12	30	Undeveloped Desert		B	72	Fair Cover
0.06	15		"	C	81	30%-70%
0.21	55		"	D	86	

Weighted CN .3(72)+.15(81)+.55(86) = 81.1

HYDROGRAPH ROUTING DATA

Channel Length (L) 14,200 feet Channel Slope (S) 0.0078 ft./ft.

Channel Roughness (n) 0.03 Shape (Trap, Deep. Circ) Trap

Channel Bottom Width/Diameter 0 feet Side Slopes (Z) 20

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Job Scatter Wash Drainage and Storm Drain Study Index No. ST-886366

HYDROLOGIC SUMMARY SHEET - Existing

Calculated by M.C. Date 2-28 Sheet No. 10 of 12

Checked by _____ Date _____

Drainage Area Identification SSW1

Area 1.24 square miles

0.65

Upstream Elevation 1500 Hydraulic Length (L) 2.79 miles

Downstream Elevation 1403 Slope (S) 35 feet/mile

L_c 1.66 miles

$Lag = C_t \left(\frac{L \cdot L_c}{S^{0.5}}\right)^{0.38}$ C_t 0.72 Lag = 0.66 hours

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments
0.06	5	M.H.	Park	B	86	
0.50	88	Desert		B	75	Poor Cover
0.09	7	Commercial (Incomplete)		B	81	

Weighted CN .05(86)+.88(75)+.07(81)= 75.97

HYDROGRAPH ROUTING DATA

Channel Length (L)_____feet Channel Slope (S)_____ft./ft.

Channel Roughness (n)_____ Shape (Trap, Deep. Circ)_____

Channel Bottom Width/Diameter_____feet Side Slopes (Z)_____

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HYDROLOGIC SUMMARY SHEET - Existing

Calculated by M.C. Date 3-9 Sheet No. 11

Checked by _____ Date _____ of 12

Drainage Area Identification SSW2

Area 0.28 square miles

Upstream Elevation 1475 Hydraulic Length (L) 1.71 miles

Downstream Elevation 1405 Slope (S) 41 feet/mile

L_c 0.76 miles

Lag = $C_t \left(\frac{L \cdot L_c}{S^{0.5}}\right)^{0.38}$ C_t 0.53 Lag = 0.29 hours

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments
0.05	22	Desert	undeveloped	B	75	n=0.030
	66	Mixed Use	28% Imp	B	75	n=0.02
0.03	12		30	D	86	

Weighted CN .88(75) + .12(86) = 76.32

HYDROGRAPH ROUTING DATA

Channel Length (L)_____ feet Channel Slope (S)_____ ft./ft.

Channel Roughness (n)_____ Shape (Trap, Deep. Circ)_____

Channel Bottom Width/Diameter_____ feet Side Slopes (Z)_____

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HYDROLOGIC SUMMARY SHEET - Existing

Calculated by M.C. Date 3-9 Sheet No. 12

Checked by _____ Date _____ of 12

Drainage Area Identification SSW3

Area 0.39 square miles

Upstream Elevation 1460 Hydraulic Length (L) 1.70 miles

Downstream Elevation 1405 Slope (S) 32 feet/mile

L_c 0.85 miles

$Lag = C_t \left(\frac{L \cdot L_c}{S^{0.5}}\right)^{0.38}$ C_t 0.53 Lag = 0.32 hours

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments
0.45	95	Mixed use	75% imp	B	75	n=0.022
0.02	5		50	D	86	

Weighted CN .95(75) + .05(86) = 75.45

HYDROGRAPH ROUTING DATA

Channel Length (L) _____ feet Channel Slope (S) _____ ft./ft.

Channel Roughness (n) _____ Shape (Trap, Deep. Circ) _____

Channel Bottom Width/Diameter _____ feet Side Slopes (Z) _____

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HYDROLOGIC SUMMARY SHEET – Future
Calculated by M.C. Date 3-6 Sheet No. 1
Checked by _____ Date _____ of 12

Drainage Area Identification NSW1

Area 1.37* square miles

Upstream Elevation 1865 Hydraulic Length (L) 1.7 miles

Downstream Elevation 1515 Slope (S) 206 feet/mile

L_c 0.28 miles

$Lag = C_t \left(\frac{L \cdot L_c}{S^{0.5}}\right)^{0.38}$ C_t 0.74 Lag = 0.20 hours

$C_t = 24n = 24(0.04(.55)+.02(.45))$

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments
0.14	10	Floodplain	—	C	81	0% Imp
0.32	24	Hillside	10%-15% - 1.8RAC	D	86	26% Imp
0.14	10	"	25% 0.6RAC	D	86	15% Imp
0.11	8	"	> 35% 0.2RAC	D	86	6% Imp
0.05	3	Res.	0-2 R/Ac	C (½) D (½)	81 86	27% Imp
0.61	45	Mixed Use	85% Imp	C D	81 86	85% Imp - n=0.02

n=0.04

Weighted CN 83

HYDROGRAPH ROUTING DATA

Channel Length (L) 8000 feet Channel Slope (S) .0091 ft./ft.

Channel Roughness (n) 0.02 Shape (Trap, Deep. Circ) Trap

Channel Bottom Width/Diameter 40 feet Side Slopes (Z) 3

* Reduced Area to 1.07 mi^2 to Reflect on-site retention (50%) for Mixed use

Total Imp Area = 36.2%

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HYDROLOGIC SUMMARY SHEET - Future

Calculated by M.C. Date 3-6 Sheet No. 2 of 12

Checked by _____ Date _____

Drainage Area Identification USW2

Area* 0.70 square miles

Upstream Elevation 1520 Hydraulic Length (L) 2.18 miles

Downstream Elevation 1442 Slope (S) 36 feet/mile

L_c 0.95 miles

Lag = $C_t \left(\frac{L \cdot L_c}{S^{0.5}}\right)^{0.38}$ C_t ~~0.55~~ 0.48 Lag = ~~0.37~~ 0.32 hours

$C_t = 24n = 24(0.02(.90) + 0.05(.10))$

LAND USE

Subarea* Mi²	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments
0.28	40	M.U.	85% Imp	B-D	80	n = 0.02
0.3	43	Comm	95% Imp	B-D	78	n = 0.02
0.05	7	Res	5-15 R/A - 75% imp	B	77	n = 0.02
0.07	10	Res	15+ R/A - 90% imp	B	77	n = 0.02
		Public	~~Park~~ 85% Imp	B		n = ~~0.05~~ 0.02

Weighted CN 78.66

HYDROGRAPH ROUTING DATA

Channel Length (L)_____ feet Channel Slope (S)_____ ft./ft.

Channel Roughness (n)_____ Shape (Trap, Deep. Circ)_____

Channel Bottom Width/Diameter_____ feet Side Slopes (Z)_____

*Reduced to reflect on-site retention

Total Imp. Area = ~~81.2%~~ 89.7

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HYDROLOGIC SUMMARY SHEET - Future

Calculated by M.C. Date 3-6 Sheet No. 3

Checked by _____ Date _____ of 12

Drainage Area Identification USW3

Area 0.53* square miles

Upstream Elevation 1800 Hydraulic Length (L) 0.98 miles

Downstream Elevation 1515 Slope (S) 291 feet/mile

L_c 0.44 miles

Lag = $C_t \left(\frac{L \cdot L_c}{S^{0.5}} \right)^{0.38}$ C_t 0.96 Lag = 0.24 hours

$C_t = 24n = .04 (2A)$

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments
0.07	13	Floodplain	-	C	81	
0.12	23	Hillside	10-15%	D	86 24% imp .15 imp .6% imp	n=0.04
0.02	4	"	25%			
0.02	4	"	>35%			
0.29	54	Res	0-2 R/A	B-C-D	82 27% imp	
0.01	2	m.u.	85% imp.	C	81	-n=0.02

Weighted CN 82.7

HYDROGRAPH ROUTING DATA

Channel Length (L) 11,000 feet Channel Slope (S) 0.0095 ft./ft.

Channel Roughness (n) 0.02 Shape (Trap, Deep. Circ) Trap

Channel Bottom Width/Diameter 40 feet Side Slopes (Z) 3

* Reflects on-site retention

Total Imp. Area = 38.4%

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HYDROLOGIC SUMMARY SHEET - Future

Calculated by M.C. Date 3-6 Sheet No. 4 of 12
Checked by _____ Date _____

Drainage Area Identification USW4

Area 0.86* square miles

Upstream Elevation 1515 Hydraulic Length (L) 2.20 miles

Downstream Elevation 1411 Slope (S) 47 feet/mile

L_c 1.04 miles

Lag = $C_t \left(\frac{L \cdot L_c}{S^{0.5}}\right)^{0.38}$ C_t ~~0.66~~ 0.49 Lag = ~~0.43~~ 0.32 hours

$C_t = 24n = 24[.018(.14)+.02(.36)+.022(.26)+.05(.24)]$

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments
0.21	24	Public	Park	B	~~77~~ 85% imp	~~0.05~~ 0.02
0.43→0.22	26	Res	2-5 R/A	B-C	81 - 47% imp	0.022
0.54→0.26	30	Res	5-15 R/A	B-D	79 - 75% imp	0.02
0.10→0.05	6	Res	15+ R/A	B	77 90% imp	0.02
0.24→0.12*	14	IND	–	B	77 95% imp	n=0.018

Weighted CN 75.78

HYDROGRAPH ROUTING DATA

Channel Length (L) _____ feet Channel Slope (S) _____ ft./ft.

Channel Roughness (n) _____ Shape (Trap, Deep. Circ) _____

Channel Bottom Width/Diameter _____ feet Side Slopes (Z) _____

* Reflects on-site retention

Percent Imp. Area = ~~53.4%~~ 75.0

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HYDROLOGIC SUMMARY SHEET - Future

Calculated by M.C. Date 3-6 Sheet No. 5

Checked by _____ Date _____ of 12

Drainage Area Identification NSW5

Area 1.17 square miles

Upstream Elevation 1920 Hydraulic Length (L) 1.93 miles

Downstream Elevation 1515 Slope (S) 210 feet/mile

L_c 0.66 miles

$Lag = C_t \left(\frac{L \cdot L_c}{S^{0.5}}\right)^{0.38}$ C_t 0.96 Lag = 0.39 hours

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments	
0.08	7	Floodplain	—	C	81	n = 0.04	
0.37	32	Hillside	10-15% slope	D	86	n = 0.04	26% imp
0.23	18	"	25% "				15% "
0.12	11	"	36% "				06% "
0.37	32	RES	0-2 R/A	C	81	n = 0.04	27% imp.

Weighted CN 84.3

HYDROGRAPH ROUTING DATA

Channel Length (L) 10,000 feet Channel Slope (S) 0.0095 ft./ft.

Channel Roughness (n) 0.02 Shape (Trap, Deep. Circ) TRAP

Channel Bottom Width/Diameter 40 feet Side Slopes (Z) 3

Percent Impervious: 20.3%

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HYDROLOGIC SUMMARY SHEET - Future

Calculated by M.C. Date 3-6 Sheet No. 6
Checked by _____ Date _____ of 12

Drainage Area Identification NSWG

Area* 0.30 square miles

Upstream Elevation 1515 Hydraulic Length (L) 2.08 miles

Downstream Elevation 1420 Slope (S) 46 feet/mile

L_c 1.14 miles

Lag = $C_t \left(\frac{L \cdot L_c}{S^{0.5}}\right)^{0.38}$ C_t 0.51 Lag = 0.34 hours

$C_t = 24n = 24[.77(.022) + .23(.018)]$

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments
0.23	77	RES	2-5 R/A	C-B	47% Imp	n=0.022
0.07	23	IND		B-D	95% Imp	n=0.018
0.005	N/A	RES	5-15 R/A	B	75% Imp	n=0.02

Weighted CN 75.95

HYDROGRAPH ROUTING DATA

Channel Length (L) 3000 feet Channel Slope (S) 0.0023 ft./ft.

Channel Roughness (n) 0.013 Shape (Trap, Deep. Circ) Trap

Channel Bottom Width/Diameter 20 feet Side Slopes (Z) 3

* Reduced Area to reflect on-site retention

Percent Imp. Area = 58%

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HYDROLOGIC SUMMARY SHEET - Future

Calculated by M.C. Date 3-6 Sheet No. 7
Checked by _____ Date _____ of 12

Drainage Area Identification NSW7

Area 0.96 square miles

Upstream Elevation 1800 Hydraulic Length (L) 1.70 miles

Downstream Elevation 1515 Slope (S) 168 feet/mile

L_c 0.76 miles

$Lag = C_t \left(\frac{L \cdot L_c}{S^{0.5}}\right)^{0.38}$ C_t 0.96 Lag = 0.40 hours

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments
0.12	12	Floodplain	–			
0.44	46	RES	0-2 R/A		27% imp	
0.24	25	Hillside	10-15%		20% Imp	n=0.04
0.15	12	"	25%		15% imp	
0.05	5	"	>35%		6% imp	

Weighted CN 81.6

HYDROGRAPH ROUTING DATA

Channel Length (L) 13,000 feet Channel Slope (S) 0.0085 ft./ft.

Channel Roughness (n) 0.02 Shape (Trap, Deep. Circ) Trap

Channel Bottom Width/Diameter 20 feet Side Slopes (Z) 3

Percent Impervious = 21.0%

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HYDROLOGIC SUMMARY SHEET - Future

Calculated by M.C. Date 3-6 Sheet No. 8
Checked by _____ Date _____ of 12

Drainage Area Identification NSW8

Area * 0.62 square miles

Upstream Elevation 1515 Hydraulic Length (L) 2.56 miles

Downstream Elevation 1404 Slope (S) 43 feet/mile

L_c 1.33 miles

Lag = $C_t \left(\frac{L \cdot L_c}{S^{0.5}}\right)^{0.38}$ C_t 0.54 Lag = 0.42 hours

$C_t = 24n = 24[.08(.04) + .68(.022) + .24(.018)]$

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments
0.04	8	O.S.	undeveloped			n=0.04
0.34	68	RES	2-5 R/A		47% imp	n=0.022
0.12	24	IND			95% imp	n=0.018

Weighted CN 75.99

HYDROGRAPH ROUTING DATA

Channel Length (L)_____ feet Channel Slope (S)_____ ft./ft.

Channel Roughness (n)_____ Shape (Trap, Deep. Circ)_____

Channel Bottom Width/Diameter_____ feet Side Slopes (Z)_____

* Reduced Area to reflect on-site retention

Percent Impervious = 54.8%

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HYDROLOGIC SUMMARY SHEET - Future

Calculated by M.C. Date 3-6 Sheet No. 9

Checked by _____ Date _____ of 12

Drainage Area Identification NSW9

Area 0.38 square miles

Upstream Elevation 1850 Hydraulic Length (L) 1.19 miles

Downstream Elevation 1515 Slope (S) 282 feet/mile

L_c 0.57 miles

$Lag = C_t \left(\frac{L \cdot L_c}{S^{0.5}} \right)^{0.38}$ C_t 0.96 Lag = 0.28 hours

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments
0.06	16	Floodplain	—	B		
0.16	42	RES.	0-2 R/A	B-C	27% imp	
0.15	40	Hillside	10-15%	D	26% imp	n=0.04
0.01	2	Hillside	25%	D	6% imp	

Weighted CN 81.1

HYDROGRAPH ROUTING DATA

Channel Length (L) 14,200 feet Channel Slope (S) 0.0078 ft./ft.

Channel Roughness (n) 0.02 Shape (Trap, Deep. Circ) Trap

Channel Bottom Width/Diameter 20 feet Side Slopes (Z) 3

Percent Impervious = 21.9%

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HYDROLOGIC SUMMARY SHEET - Future

Calculated by M.C Date 3-6 Sheet No. 10

Checked by _____ Date _____ of 12

Drainage Area Identification SSW1

Area* 0.62 square miles

Upstream Elevation 1500 Hydraulic Length (L) 2.79 miles

Downstream Elevation 1403 Slope (S) 35 feet/mile

L_c 1.66 miles

$Lag = C_t \left(\frac{L \cdot L_c}{S^{0.5}}\right)^{0.38}$ C_t 0.43 Lag = 0.34 hours

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments
	100	IND		B	95% imp	n=0.018

Weighted CN ~~78.69~~ 75.97

HYDROGRAPH ROUTING DATA

Channel Length (L)_____feet Channel Slope (S)_____ft./ft.

Channel Roughness (n)_____ Shape (Trap, Deep. Circ)_____

Channel Bottom Width/Diameter_____feet Side Slopes (Z)_____

* Reduced to Reflect on-site retention

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HYDROLOGIC SUMMARY SHEET - Future

Calculated by M.C. Date 3-13 Sheet No. 11

Checked by _____ Date _____ of 12

Drainage Area Identification SSW2

Area 0.14 square miles

Upstream Elevation 1475 Hydraulic Length (L) 1.71 miles

Downstream Elevation 1405 Slope (S) 41 feet/mile

L_c 0.76 miles

$Lag = C_t \left(\frac{L \cdot L_c}{S^{0.5}} \right)^{0.38}$ C_t 0.43 Lag = 0.23 hours

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments
	100	Industrial		B/D	95% Imp.	n=0.018

Weighted CN 76.32

HYDROGRAPH ROUTING DATA

Channel Length (L)_____ feet Channel Slope (S)_____ ft./ft.

Channel Roughness (n)_____ Shape (Trap, Deep. Circ)_____

Channel Bottom Width/Diameter_____ feet Side Slopes (Z)_____

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HYDROLOGIC SUMMARY SHEET -Future

Calculated by M.C. Date 3-13 Sheet No. 12

Checked by _____ Date _____ of 12

Drainage Area Identification SSW3

Area 0.20 square miles

Upstream Elevation 1460 Hydraulic Length (L) 1.70 miles

Downstream Elevation 1405 Slope (S) 32 feet/mile

L_c 0.85 miles

Lag = $C_t \left(\frac{L \cdot L_c}{S^{0.5}}\right)^{0.38}$ C_t 0.43 Lag = 0.26 hours

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments
	100	Industrial		B/D	95% Imp	n=0.018

Weighted CN 75.45

HYDROGRAPH ROUTING DATA

Channel Length (L)_____ feet Channel Slope (S)_____ ft./ft.

Channel Roughness (n)_____ Shape (Trap, Deep. Circ)_____

Channel Bottom Width/Diameter_____ feet Side Slopes (Z)_____

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HYDROLOGIC SUMMARY SHEET - Project

Calculated by M.C. Date 4-24 Sheet No. 1
Checked by _____ Date _____ of 10

NSW1

Drainage Area Identification FC1

Area 1.82 square miles

Upstream Elevation 1520 Hydraulic Length (L) 2.18 miles

Downstream Elevation 1445 Slope (S) 34 feet/mile

L_c 0.95 miles

$Lag = C_t \left(\frac{L \cdot L_c}{S^{0.5}}\right)^{0.38}$ C_t 0.72 Lag = 0.48 hours

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments
	75			B	75	
	5			C	81	
	20			D	86	

Weighted CN 77.5

HYDROGRAPH ROUTING DATA

Channel Length (L) _____ feet Channel Slope (S) _____ ft./ft.

Channel Roughness (n) _____ Shape (Trap, Deep. Circ) _____

Channel Bottom Width/Diameter _____ feet Side Slopes (Z) _____

NSW 3

Drainage Area Identification FC2

Area 0.40 square miles

Upstream Elevation 1515 Hydraulic Length (L) 0.81 miles

Downstream Elevation 1460 Slope (S) 68 feet/mile

L_c 0.47 miles

$Lag = C_t \left(\frac{L \cdot L_c}{S^{0.5}}\right)^{0.38}$ C_t 0.72 Lag = 0.22 hours

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments
	65	Future	2-5 RAC	B	75	
	35		2-5 RAC	C	81	

Weighted CN 77.1

HYDROGRAPH ROUTING DATA

Channel Length (L) 4000 feet Channel Slope (S) 0.004 ft./ft.

Channel Roughness (n) 0.024 Shape (Trap, Deep. Circ) Trap

Channel Bottom Width/Diameter 20 feet Side Slopes (Z) 5

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HYDROLOGIC SUMMARY SHEET - Project

Calculated by M.C. Date 4-24 Sheet No. 3 of 10

Checked by _____ Date _____

NSWS

Drainage Area Identification FC3

Area 0.44 square miles

Upstream Elevation 1515 Hydraulic Length (L) 1.0 miles

Downstream Elevation 1450 Slope (S) 65 feet/mile

L_c 0.54 miles

$Lag = C_t \left(\frac{L \cdot L_c}{S^{0.5}}\right)^{0.38}$ C_t 0.72 Lag = 0.26 hours

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments
	80	Future	2-5 RAC	B	75	
	20		2-5 RAC	C	81	

Weighted CN 76.2

HYDROGRAPH ROUTING DATA

Channel Length (L) 4700 feet Channel Slope (S) 0.006 ft./ft.

Channel Roughness (n) 0.024 Shape (Trap, Deep. Circ) Trap

Channel Bottom Width/Diameter 50 feet Side Slopes (Z) 5

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HYDROLOGIC SUMMARY SHEET

Calculated by M.C. Date 4-24 Sheet No. 4 of 10

Checked by _____ Date _____

NSW7

Drainage Area Identification FC4

Area 0.91 square miles

Upstream Elevation 1515 Hydraulic Length (L) 1.5 miles

Downstream Elevation 1445 Slope (S) 47 feet/mile

L_c 0.81 miles

$Lag = C_t \left(\frac{L \cdot L_c}{S^{0.5}}\right)^{0.38}$ C_t 0.72 Lag = 0.37 hours

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments
	76		2-5 RAC	B	75	
	4	Future	2-5 RAC	D	86	
	20		Ind.	B	75	

Weighted CN 75.4

HYDROGRAPH ROUTING DATA

Channel Length (L) 4000 feet Channel Slope (S) 0.006 ft./ft.

Channel Roughness (n) 0.024 Shape (Trap, Deep. Circ) Trap

Channel Bottom Width/Diameter 50 feet Side Slopes (Z) 5

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HYDROLOGIC SUMMARY SHEET

Calculated by M.C. Date 6-7 Sheet No. 5 of 10

Checked by _____ Date _____

Drainage Area Identification FC5A

Area 0.27 square miles

Upstream Elevation 1455 Hydraulic Length (L) 0.85 miles

Downstream Elevation 1427 Slope (S) 33 feet/mile

L_c 0.43 miles

$Lag = C_t \left(\frac{L \cdot L_c}{S^{0.5}} \right)^{0.38}$ C_t 0.72 Lag = 0.35 hours

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments
	20	Basin		B	69	
	80	Existing		B	76	

Weighted CN 74.6

HYDROGRAPH ROUTING DATA

Channel Length (L) _____ feet Channel Slope (S) _____ ft./ft.

Channel Roughness (n) _____ Shape (Trap, Deep. Circ) _____

Channel Bottom Width/Diameter _____ feet Side Slopes (Z) _____

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HYDROLOGIC SUMMARY SHEET

Calculated by M.C. Date 6-7 Sheet No. 6

Checked by _____ Date _____ of _____

Drainage Area Identification FC5B

Area 0.24 square miles

Upstream Elevation 1450 Hydraulic Length (L) 0.85 miles

Downstream Elevation 1427 Slope (S) 27 feet/mile

L_c 0.43 miles

$Lag = C_t \left(\frac{L \cdot L_c}{S^{0.5}}\right)^{0.38}$ C_t 0.72 Lag = 0.37 hours

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments
	20		Basin	B	69	
	80		Existing	B	76	

Weighted CN 74.6

HYDROGRAPH ROUTING DATA

Channel Length (L)_____ feet Channel Slope (S)_____ ft./ft.

Channel Roughness (n)_____ Shape (Trap, Deep. Circ)_____

Channel Bottom Width/Diameter_____ feet Side Slopes (Z)_____

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HYDROLOGIC SUMMARY SHEET

Calculated by M.C. Date 6-7 Sheet No. 7

Checked by _____ Date _____ of 10

Drainage Area Identification FC5C

Area 0.37 square miles

Upstream Elevation 1445 Hydraulic Length (L) 0.85 miles

Downstream Elevation 1411 Slope (S) 40 feet/mile

L_c 0.43 miles

$Lag = C_t \left(\frac{L \cdot L_c}{S^{0.5}}\right)^{0.38}$ C_t 0.72 Lag = 0.34 hours

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments
	17		Basin	B	69	
	83		Existing	B	76	

Weighted CN 74.8

HYDROGRAPH ROUTING DATA

Channel Length (L)_____ feet Channel Slope (S)_____ ft./ft.

Channel Roughness (n)_____ Shape (Trap, Deep. Circ)_____

Channel Bottom Width/Diameter_____ feet Side Slopes (Z)_____

Drainage Area Identification FC6

Area 0.23 square miles

Upstream Elevation 1436 Hydraulic Length (L) 0.91 miles

Downstream Elevation 1412 Slope (S) 26 feet/mile

L_c 0.34 miles

$Lag = C_t \left(\frac{L \cdot L_c}{S^{0.5}} \right)^{0.38}$ C_t 0.72 Lag = 0.25 hours

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments
	100	future	IND.	B	75	

Weighted CN 75

HYDROGRAPH ROUTING DATA

Channel Length (L) _____ feet Channel Slope (S) _____ ft./ft.

Channel Roughness (n) _____ Shape (Trap, Deep. Circ) _____

Channel Bottom Width/Diameter _____ feet Side Slopes (Z) _____

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Job Scatter Wash Drainage and Storm Drain Study Index No. ST-886366

HYDROLOGIC SUMMARY SHEET

Calculated by M.C Date 4-25 Sheet No. 9 of 10

Checked by _____ Date _____

Drainage Area Identification SSW1A

Area 1.18 square miles

Upstream Elevation 1500 Hydraulic Length (L) 2.55 miles

Downstream Elevation 1415 Slope (S) 33 feet/mile

L_c 1.5 miles

$Lag = C_t \left(\frac{L \cdot L_c}{S^{0.5}}\right)^{0.38}$ C_t 0.72 Lag = 0.62 hours

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments
	85	Future	Ind	B	75	
	15	Exist	Comm	B	81	

Weighted CN 75.90

HYDROGRAPH ROUTING DATA

Channel Length (L) 1500 feet Channel Slope (S) 0.008 ft./ft.

Channel Roughness (n) 0.024 Shape (Trap, Deep. Circ) Trap

Channel Bottom Width/Diameter 50 feet Side Slopes (Z) 5

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HYDROLOGIC SUMMARY SHEET

Calculated by M.C. Date 4-25 Sheet No. 10

Checked by _____ Date _____ of 10

Drainage Area Identification SSW1B

Area 0.06 square miles

Upstream Elevation 1415 Hydraulic Length (L) 0.28 miles

Downstream Elevation 1403 Slope (S) 43 feet/mile

L_c 0.14 miles

$Lag = C_t \left(\frac{L \cdot L_c}{S^{0.5}}\right)^{0.38}$ C_t 0.72 Lag = 0.10 hours

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments
	100	Exist	M.H.	B	86	

Weighted CN 86

HYDROGRAPH ROUTING DATA

Channel Length (L)_____ feet Channel Slope (S)_____ ft./ft.

Channel Roughness (n)_____ Shape (Trap, Deep. Circ)_____

Channel Bottom Width/Diameter_____ feet Side Slopes (Z)_____

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Job Scatter Wash Drainage and Storm Drain Study Index No. ST-886366

HYDROLOGIC SUMMARY SHEET - stormdrain

Calculated by M.C. Date 6-1-89 Sheet No. 1

Checked by _____ Date _____ of _____

Drainage Area Identification FC3N

Area 0.19 square miles

Upstream Elevation 1515 Hydraulic Length (L) 0.64 miles

Downstream Elevation 1465 Slope (S) 78 feet/mile

L_c 0.42 miles

$Lag = C_t \left(\frac{L \cdot L_c}{S^{0.5}}\right)^{0.38}$ C_t 0.72 Lag = 0.19 hours

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments

Weighted CN 76.2

HYDROGRAPH ROUTING DATA

Channel Length (L) 5000 feet Channel Slope (S) 0.004 ft./ft.

Channel Roughness (n) .013 Shape (Trap, Deep. Circ) Circ

Channel Bottom Width/Diameter 4.5 feet Side Slopes (Z) _____

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Job Scatter Wash Drainage and Storm Drain Study Index No. ST-886366
HYDROLOGIC SUMMARY SHEET - stormdrain

Calculated by M.C. Date 6-1-89 Sheet No. 2
Checked by _____ Date _____ of _____

Drainage Area Identification FC35

Area 0.23 square miles

Upstream Elevation 1500 Hydraulic Length (L) 0.91 miles

Downstream Elevation 1450 Slope (S) 55 feet/mile

L_c 0.44 miles

Lag = $C_t \left(\frac{L \cdot L_c}{S^{0.5}} \right)^{0.38}$ C_t 0.72 Lag = 0.24 hours

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments

Weighted CN 76.2

HYDROGRAPH ROUTING DATA

Channel Length (L) 4500 feet Channel Slope (S) 0.002 ft./ft.

Channel Roughness (n) .013 Shape (Trap, Deep. Circ) Circ

Channel Bottom Width/Diameter 4.5 feet Side Slopes (Z) _____

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Job Scatter Wash Drainage and Storm Drain Study Index No. ST-886366

HYDROLOGIC SUMMARY SHEET - storm drain

Calculated by M.C. Date 6-1-89 Sheet No. 3

Checked by _____ Date _____ of _____

Drainage Area Identification SSW1C

Area 0.47 square miles

Upstream Elevation 1500 Hydraulic Length (L) 1.74 miles

Downstream Elevation 1440 Slope (S) 34 feet/mile

L_c 0.95 miles

$Lag = C_t \left(\frac{L \cdot L_c}{S^{0.5}} \right)^{0.38}$ C_t 0.72 Lag = 0.45 hours

LAND USE

Subarea Mi^2	% Total Area	Zoning Status	Development Status	Soil Group	CN	Comments

Weighted CN 75.9

HYDROGRAPH ROUTING DATA

Channel Length (L) 3500 feet Channel Slope (S) 0.004 ft./ft.

Channel Roughness (n) 0.013 Shape (Trap, Deep. Circ) Circ.

Channel Bottom Width/Diameter 5.0 feet Side Slopes (Z) _____

Greiner Engineering

Appendix D

LONG. = 112° 05' 30" LAT = 33° 42' 50"

PRECIPITATION VALUES
SCATTER WASH

RETURN PERIOD (YEARS)	PRECIPITATION VALUES (INCHES)			
	6 HOUR DURATION		24 HOUR DURATION	
	MAP VALUE	CORRECTED VALUE	MAP VALUE	CORRECTED VALUE
2	1.20	1.22	1.52	1.57
5	1.70	1.72	2.20	2.19
10	2.05	2.05	2.52	2.58
25	2.62	2.47	3.19	3.10
50	2.85	2.84	3.54	3.56
100	3.20	3.21	4.10	4.05

$$Y_2 = -0.011 + 0.942\left(\frac{X_1^2}{X_2}\right)$$

$Y_2 =$ 0.88

$$Y_{100} = 0.494 + 0.755\left(\frac{X_3^2}{X_4}\right)$$

$Y_{100} =$ 2.41

X_1 = 2 YEAR 6 HOUR CORRECTED PRECIPITATION VALUE

X_2 = 2 YEAR 24 HOUR CORRECTED PRECIPITATION VALUE

X_3 = 100 YEAR 6 HOUR CORRECTED PRECIPITATION VALUE

X_4 = 100 YEAR 24 HOUR CORRECTED PRECIPITATION VALUE

Y_2 = 2 YEAR 1 HOUR CALCULATED PRECIPITATION VALUE

Y_{100} = 100 YEAR 1 HOUR CALCULATED PRECIPITATION VALUE

JOB NO. _____

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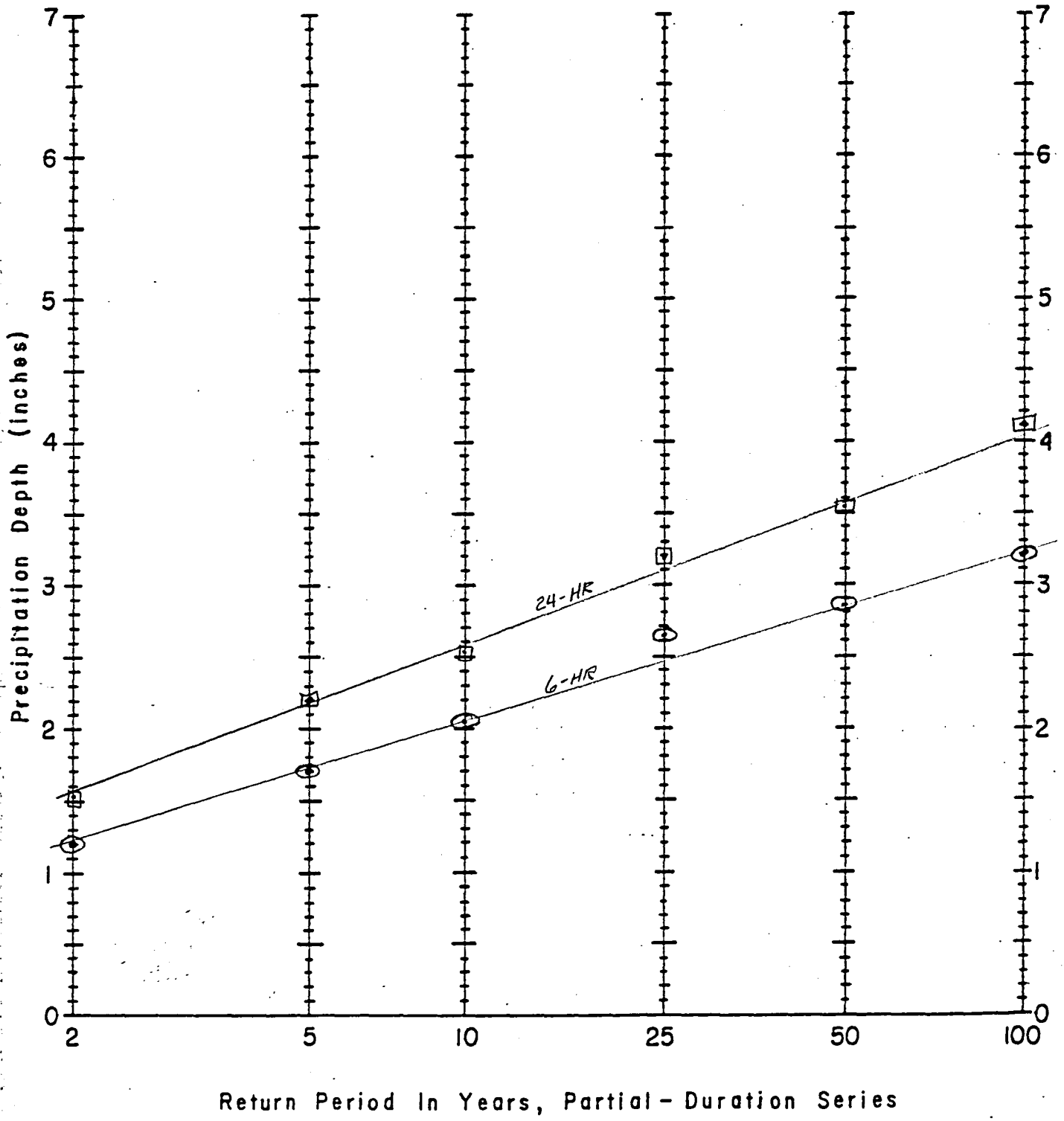
Job: SCATTER WASH
Description: HYDROLOGY

Calculated by: RHF Date: 2-24-89 Sheet No. 2
Checked by: _____ Date: _____ of _____



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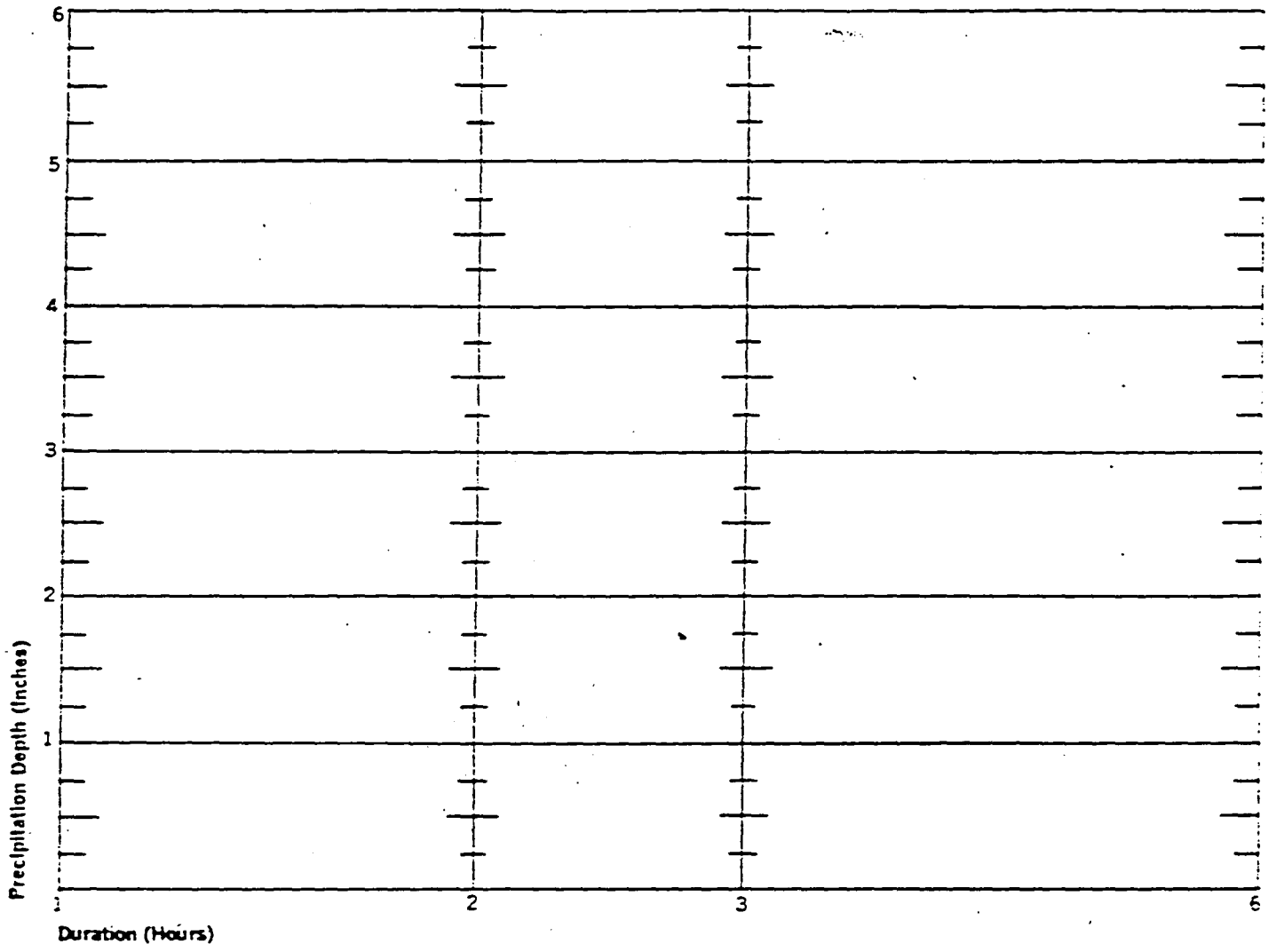
Phoenix 602 275-5400

Job: SCATTER WASH
Description: HYDROLOGY

Calculated by: RHF Date: 2-24-89 Sheet No. 3
Checked by: _____ Date: _____ of _____



NOMOGRAPH FOR 2-, 3-HOUR DURATIONS

2-hr = 0.341 (6-hr) + 0.659 (1-hr)
2-hr: 2-YR = 1.00 100-YR = 2.68
3-hr = 0.569 (6-hr) + 0.431 (1-hr)
3-hr: 2-YR = 1.07 100-YR = 2.87

CALCULATED TOTAL STORM DEPTH

DURATION	2-YR	100-YR
1-HR	0.88	2.38
2-HR	1.00	2.68
3-HR	1.07	2.87
6-HR	1.22	3.21
24-HR	1.57	4.05

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Phoenix 602 275-5400

Job E171134 SCATTER WASH
Description STAGE - STORAGE
2-8x7 RCBC UNDER PINNACLE PEAK RD.
Calculated by RHF Date 2-28-89 Sheet No. 1
Checked by _____ Date _____ of 3

STAGE (FT.)	PLANIMETER READING (IN^2)	AVERAGE READING (IN^2)	AREA (Ac)	VOLUME (Ac-FT)	STORAGE VOL. (Ac-FT.)
1411	Ø	Ø	Ø		Ø
				0.048	
1412	0.403 0.837 1.240	0.413	0.095		0.048
				1.121	
1414	4.464 9.021 13.408	4.469	1.026		1.169
				7.881	
1416	29.853 59.691 89.575	29.858	6.855		9.050
				26.583	
1418	86.025 85.886 85.901	85.937	19.728		35.633
				58.849	
1420	170.516 170.392 170.330	170.413	39.121		94.482
				44.869	
1421	220.411 219.992 221.062	220.488	50.617		139.351

LOW PT. ACTUALLY 1417.60
WEIR LENGTH = 265' @ 1418.0
WEIR LENGTH = 772' @ 1420.0
WEIR LENGTH = 1000' @ 1421.0

REFER TO COMPUTER PRINTOUT FOR WEIR RESULTS

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Job E171134 SCATTER WASH

Description STAGE DISCHARGE
2-8x7 RCBC UNDER PINNACLE PEAK RD.

Calculated by RHF Date 2-28-89 Sheet No. 2

Checked by _____ Date _____ of 3

ELEVATION (FT.)	HW (FT.)	D (FT.)	HW÷D (FT.)	INLET Q (cfs)	OUTLET Q (cfs)	CONTROL Q (cfs)
1411	Ø	7	Ø	Ø	Ø	Ø
1412	1	7	0.14	42	—	42
1414	3	7	0.43	254	—	254
1416	5	7	0.71	528	—	528
1418	7	7	1.00	864	880	864
1420	9	7	1.29	1152	1210	1152
1421	10	7	1.43	1296	1330	1296

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Job E171134 SCATTER WASH

Description STAGE - VOLUME - QCULVERT - QWEIR - QT

2-8x7 RCBC UNDER PINNACLE PEAK RD.

Calculated by RHF Date 3-2-89 Sheet No. 3

Checked by _____ Date _____ of 3

SE	SV			SQ
STAGE (FT)	STORAGE VOLUME (AC-FT)	CULVERT DISCHARGE (cfs)	WEIR * DISCHARGE (cfs)	TOTAL DISCHARGE (cfs)
1411	Ø	Ø	Ø	Ø
1412	0.048	42	–	42
1414	1.169	254	–	254
1416	9.050	528	–	528
1418	35.633	864	72	936
1420	94.482	1152	4126	5278
1421	139.351	1296	9105	10401

*REFER TO COMPUTER OUTPUT FOR WEIR RESULTS

1419 65 1024 1320 2344

Greiner Engineering Job No.

Computed by: RHF Checked by: _____ Date 2-28-89

ARIZONA DEPARTMENT OF TRANSPORTATION

CULVERT COMPUTATION RECORD

PROJECT: E171134

STATION: PINNACLE PK. RD.

INLET CONTROL

DESIGNER: RHF

DATE: _____

HYDROLOGIC AND CHANNEL INFORMATION

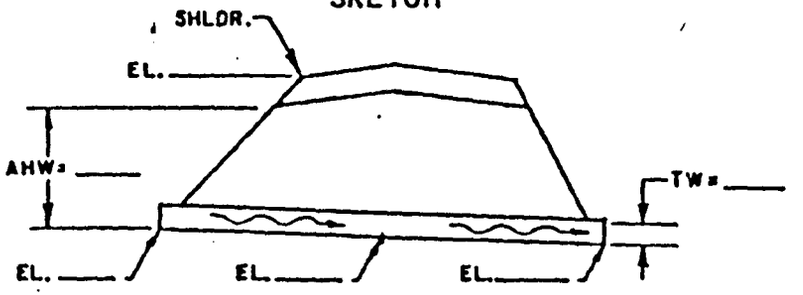
DRAINAGE AREA _____

Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25})
(Q_2 = CHECK DISCHARGE, SAY Q_{50})

SKETCH



S_0 = 0.45% L = 75' L/100 S_0 = 0.34

MEAN STREAM VELOCITY = _____

CULVERT DESCRIPTION: SIZE	CULVERT DESCRIPTION: ENTR. TYPE	Q / 2Q	CAP. CHART HW	HEADWATER COMPUTATION: INLET CONT. HW/D	INLET CONT. HW	OUTLET CONTROL HW = H + h_o − LS_o: K_e	H	d_c	$\frac{d_c + D}{2}$	TW	h_o	LS_o	HW	CONTROL HW	OUTLET VELOCITY	COST	DHW ELEV.	COMMENTS
2-8x7 RCBC	45° WING.	21 / 42		0.14*	1	0.4												
		127 / 254		0.43	3	0.4												
		264 / 528		0.71	5	0.4												
		432 / 864		1.00	7	0.4												
		576 / 1152		1.29	9	0.4												
		648 / 1296		1.43	10	0.4												

SUMMARY & RECOMMENDATIONS

1 BOX / 2 BOXES

* AN $\frac{HW}{D}$ OF 0.14 IS LESS THAN THE CHART READS. THE Q WAS DETERMINED FROM $EG = Y_c + (1+K_e)\left(\frac{V_c^2}{2g}\right)$ THROUGH SUBSTITUTION THE ABOVE EQUATION BECOMES:

$$EG = \left(\tfrac{1}{g}\left(\tfrac{Q}{B}\right)^2\right)^{1/3} + \left(\frac{1+K_e}{2g}\right)\left(\frac{Q}{B}\right)^2\left(\left(\tfrac{1}{g}\left(\tfrac{Q}{B}\right)^2\right)^{1/3}\right)^{-2/3}$$

20-4403 12/74

Sht ____ of ____

Greiner Engineering Job No.

Computed by: _____ Checked by: _____ Date _____

ARIZONA DEPARTMENT OF TRANSPORTATION

CULVERT COMPUTATION RECORD

PROJECT: _____

STATION: _____

OUTLET CONTROL

DESIGNER: RHF

DATE: 3-2-89

HYDROLOGIC AND CHANNEL INFORMATION

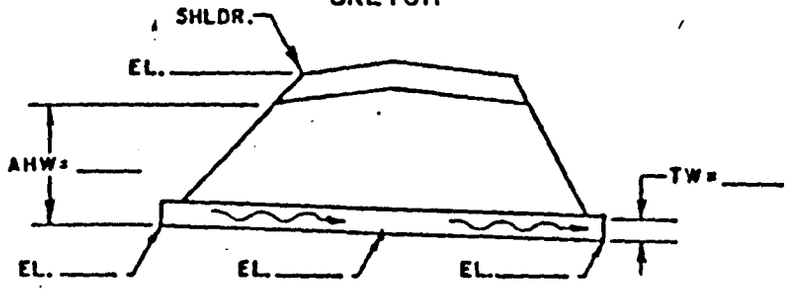
DRAINAGE AREA _____

Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}; Q_2 = CHECK DISCHARGE, SAY Q_{50})

SKETCH



S_o = 0.45 % L = 75' L/100 S_o = 0.34

MEAN STREAM VELOCITY = _____

CULVERT DESCRIPTION		Q	CAP. CHART HW	HEADWATER COMPUTATION										CONTROL HW	OUTLET VELOCITY	COST	DHW ELEV.	COMMENTS
				INLET CONT.		OUTLET CONTROL $HW = H + h_o - LS_o$												
SIZE	ENTR. TYPE			$\frac{HW}{D}$	HW	K_e	H	d_c*	$\frac{d_c + D}{2}$	TW	h_o	LS_o	HW					
		X				0.4	X	0.7	3.85	Ø	3.85	0.34	1					
		X				0.4	X	2.0	4.50	Ø	4.5	0.34	3					
		X				0.4	0.24	3.2	5.10	Ø	5.1	0.34	5					
		440/880				0.4	1.54	4.5	5.75	—	5.8	0.34	7					INLET CONTROL
		605/1210				0.4	3.04	5.6	6.3	—	6.3	0.34	9					INLET CONTROL
		665/1330				0.4	3.74	6.1	6.6	—	6.6	0.34	10					INLET CONTROL

SUMMARY & RECOMMENDATIONS

$H = HW - h_o + LS_o$

* dc BASED ON INLET CONTROL Q AND THEN ADJUSTED SUCH THAT OUTLET CONTROL Q = Yc BY $Y_c = \sqrt[3]{\frac{1}{g}\left(\frac{Q}{A}\right)^2}$

07:44:38 2-MAR-89

SESCALSESCALSESCALSESCALSESCALSESCALSESCALSESCALSESCALSESCALSESCALSESCAL

USER : RON FERGUSON

.**********
SCATTER WASH E171134: IRRIGULAR WEIR RATING @ PINNICLE PK. RD.

****

IRREGULAR WEIR GEOMETRY
COEFICIENT = 3.00

ELEVATION 1421.0 1420.0 1418.0 1417.6 1418.0 1420.0 1421.0

STATION 0.00 77.00 250.00 420.00 517.00 848.001000.00

WEIR FLOW ELEVATION-DISCHARGE CURVE

DISCHARGE	EG	DISCHARGE	EG
0.00	1417.60	12.66	1417.80
71.65	1418.00	207.39	1418.20
399.36	1418.40	647.66	1418.60
953.90	1418.80	1320.24	1419.00
1748.39	1419.20	2241.06	1419.40
2799.84	1419.60	3427.22	1419.80
4125.79	1420.00	4969.90	1420.20
5887.44	1420.40	6880.63	1420.60
7952.19	1420.80	9104.69	1421.00
10357.61	1421.20	11679.72	1421.40

EL.	Q
1418	72
1420	4126
1421	9105

1

07:44:38 2-MAR-89

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USER : RON FERGUSON

1

Greiner

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Tucson 602 887-1800
Phoenix 602 275-5400

Job E171134 SCATTER WASH
Description STAGE - STORAGE
2-8x7 RCBC UNDER I-17
Calculated by RHF Date 2-28-89 Sheet No. 1
Checked by _____ Date _____ of 3

STAGE (FT.)	PLANIMETER READING (IN^2)	AVERAGE READING (IN^2)	AREA (Ac)	VOLUME (Ac-FT)	STORAGE VOLUME (Ac-FT.)
1403.77	Ø	Ø	Ø		Ø
				0.001	
1404	0.047 0.093 0.140	0.047	0.011		0.001
				0.219	
1406	0.930 1.796 2.713	0.904	0.208		0.220
				0.942	
1408	3.209 6.371 9.595	3.198	0.734		1.162
				7.280	
1410	28.427 56.839 85.545	28.515	6.546		8.442
				8.556	
1411	45.958 92.055 138.074	46.025	10.566		16.998
				12.749	
1412	65.240 64.868 65.038	65.049	14.932		29.747
				19.006	
1413	100.595 100.425 100.570	100.530	23.079		48.753
				18.258	
1413.70	126.961 126.542 126.604	126.702	29.087		67.011
				8.726	
1414	—	—	29.087		75.737

WEIR CREST EL. = 1411.2
WEIR LENGTH @ 1412 = 40'
WEIR LENGTH @ 1413 = 235'
WEIR LENGTH @ 1413.7 = 280'

REFER TO COMPUTER PRINTOUT FOR WEIR RATING

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Phoenix 602 275-5400

Job E171134 SCATTER WASH
Description STAGE - DISCHARGE
2-8x7 RCBC UNDER I-17
Calculated by RHF Date 2-28-89 Sheet No. 2
Checked by _____ Date _____ of 3

ELEVATION (FT.)	HW (FT.)	D (FT.)	HW÷D (FT)	INLET Q (cfs)	OUTLET Q (cfs)	CONTROL Q (cfs)
1403.77	Ø	7	Ø	Ø	Ø	Ø
1404.00	0.23	7	0.03	13	—	1
1406.00	2.23	7	0.32	176	—	176
1408.00	4.23	7	0.60	414	—	414
1410.00	6.23	7	0.89	736	680	680
1411.00	7.23	7	1.03	896	880	880
1412.00	8.23	7	1.18	1072	1060	1060
1413.00	9.23	7	1.32	1184	1220	1184
1413.70	9.93	7	1.42	1296	1320	1296
1414.00	10.23	7	1.46	1312	1380	1312

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Job E171134 SCATTER WASH

Description STAGE - STORAGE - CULVERT Q - WEIR Q - TOTAL
2-8'X7' RCBC AT I-17

Calculated by RHF Date 3-2-89 Sheet No. 3

Checked by _____ Date _____ of 3

SE SV SQ

STAGE (FT)	STORAGE VOLUME Ac.-Ft.	CULVERT DISCHARGE cfs	WEIR * DISCHARGE cfs	WEIR ** DISCHARGE cfs	TOTAL DISCHARGE (cfs)
1403.77	Ø	Ø	Ø	Ø	Ø
1404	0.001	1	—	—	1
1406	0.220	176	—	—	176
1408	1.162	414	—	—	414
1410	8.442	680	—	—	680
1411	16.998	880	—	—	880
1412	29.747	1060	31	—	1091
1413	48.753	1184	409	—	1593
1413.7	67.011	1296	1167	215	2678
1414	75.737	1312	1594	640	3746

* REFER TO COMPUTER PRINTOUT FOR WEIR RESULTS
WEIR DIRECTING FLOW TO THE SOUTH

** REFER TO COMPUTER PRINTOUT FOR WEIR RESULTS
WEIR DIRECTING FLOW TO THE WEST ACROSS THE
FRONTAGE ROAD.

Greiner Engineering Job No.

Computed by: EHF Checked by: _____ Date 2-28-89

ARIZONA DEPARTMENT OF TRANSPORTATION

CULVERT COMPUTATION RECORD

PROJECT: E171134

STATION: SCATTER WASH @ I-10

INLET CONTROL

DESIGNER: RHF

DATE: 2-28-89

HYDROLOGIC AND CHANNEL INFORMATION

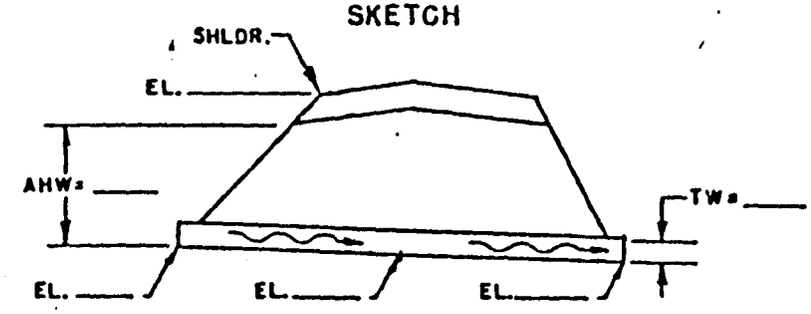
DRAINAGE AREA _____

Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}; Q_2 = CHECK DISCHARGE, SAY Q_{50})

SKETCH



S_0 = _____ L = _____ L/100 S_0 = _____

MEAN STREAM VELOCITY = _____

CULVERT DESCRIPTION		Q	CAP. CHART HW	HEADWATER COMPUTATION										CONTROL HW	OUTLET VELOCITY	COST	DHW ELEV.	COMMENTS
				INLET CONT.		OUTLET CONTROL $HW = H + h_0 - LS_0$												
SIZE	ENTR. TYPE			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c + D}{2}$	TW	h_0	LS_0	HW					
2-8x7 RCBC	45° WING	0.5/1		0.03*	0.23	0.4												
"	"	88/176		0.32	2.23	"												
"	"	207/414		0.60	4.23	"												
"	"	368/736		0.89	6.23	"												
"	"	448/896		1.03	7.23	"												
"	"	536/1072		1.18	8.23	"												
"	"	592/1184		1.32	9.23	"												
SUMMARY & RECOMMENDATIONS																		
"	"	648/1296		1.42	9.93	"												
"	"	656/1312		1.46	10.23	"												

* AN $\frac{HW}{D}$ OF 0.03 IS LESS THAN THE CHART READS. THE Q WAS DETERMINED FROM $EG = V_c + (1+K_e)\left(\frac{V_c^2}{2g}\right)$. THROUGH SUBSTITUTION THIS EQUATION BECOMES:

$$EG = \left(\tfrac{1}{9}\left(\tfrac{Q}{B}\right)^2\right)^{1/3} + \left(\frac{1+K_e}{2g}\right)\left(\frac{Q}{B}\right)^2\left(\left(\tfrac{1}{2}\left(\tfrac{Q}{B}\right)^2\right)^{1/3}\right)^{-2/3}$$

20-4403 12/74

Sht ____ of ____

Greiner Engineering Job No.

Computed by: RHF Checked by: _____ Date 3-2-89

ARIZONA DEPARTMENT OF TRANSPORTATION

CULVERT COMPUTATION RECORD

PROJECT: SCATTER WASH

STATION: PINNACLE PK. RD.

OUTLET CONTROL

DESIGNER: RHF

DATE: 3-2-89

HYDROLOGIC AND CHANNEL INFORMATION

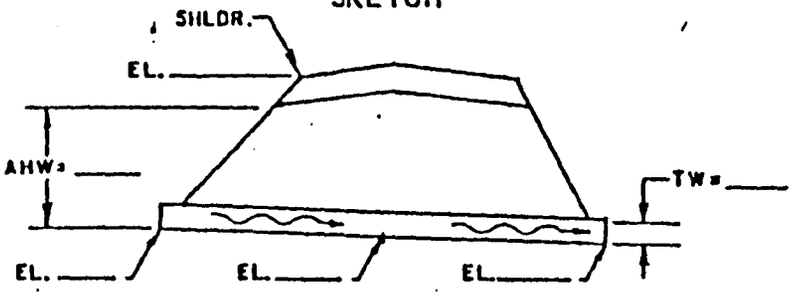
DRAINAGE AREA _____

Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50})

SKETCH



S_o = 0.04% L = 267' L/100 S_o = 0.1

MEAN STREAM VELOCITY = _____

CULVERT DESCRIPTION		Q	CAP. CHART HW	HEADWATER COMPUTATION										CONTROL HW	OUTLET VELOCITY	COST	DHW ELEV.	COMMENTS
				INLET CONT.		OUTLET CONTROL HW = H + h_o − LS_o												
SIZE	ENTR. TYPE			HW/D	HW	K_e	H	d_c*	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW					
2-8x5		X				0.4	X	0.3	3.70	—	3.7	0.1	0.23					INLET CONTROL
		X				0.4	X	1.6	4.3	—	4.3	0.1	2.23					INLET CONTROL
		X				0.4	X	2.7	4.9	—	4.9	0.1	4.23					INLET CONTROL
		340/680				0.4	0.93	3.9	5.5	—	5.4	0.1	6.23					OUTLET CONTROL
		440/880				0.4	1.53	4.5	5.8	—	5.8	0.1	7.23					OUTLET CONTROL
		530/1060				0.4	2.23	5.1	6.1	—	6.1	0.1	8.23					OUTLET CONTROL
		610/1220				0.4	3.03	5.7	6.3	—	6.3	0.1	9.23					INLET CONTROL
		660/1320				0.4	3.53	6.0	6.5	—	6.5	0.1	9.93					INLET CONTROL
		690/1380				0.4	3.83	6.0	6.5	—	6.5	0.1	10.23					INLET CONTROL

SUMMARY & RECOMMENDATIONS

$H = HW + LS_o - h_o$

* d_c BASED ON INLET CONTROL Q AND THEN ADJUSTED SUCH THAT CONTROL Q FROM $H = HW + LS_o - h_o$ = Y_c BY $Y_c = \sqrt[3]{Y_3 (Q/B)^2}$

16:13:51 2-MAR-89

SESCALSESCALSESCALSESCALSESCALSESCALSESCALSESCALSESCALSESCALSESCALSESCALSESCAL

USER : RON FERGUSON

SCATTER WASH E171134: IRREGULAR WEIR RATING FOR I-17 BOXES
DIRECTING FLOW TO THE SOUTH TO SCATTER WASH BOX

IRREGULAR WEIR GEOMETRY
COEFFICIENT = 3.00

ELEVATION	1414.0	1413.7	1413.0	1412.0	1411.2	1412.0	1413.0	1413.7	1414.0
STATION	0.00	6.00	9.00	12.00	32.00	52.00	242.00	287.00	310.00

WEIR FLOW ELEVATION-DISCHARGE CURVE

DISCHARGE	ES	DISCHARGE	ES
0.00	1411.20	0.48	1411.35
2.62	1411.50	7.20	1411.65
14.79	1411.80	25.03	1411.95
48.08	1412.10	69.32	1412.25
106.66	1412.40	157.25	1412.55
222.78	1412.70	304.76	1412.85
404.35	1413.00	537.07	1413.15
685.72	1413.30	850.07	1413.45
1029.85	1413.60	1225.90	1413.75
1430.55	1413.90	1670.57	1414.05

STAGE	Q
1412.0	31
1413.0	409
1413.7	1167
1414	1594

16:13:51 2-MAR-89

SESCALSESCALSESCALSESCALSESCALSESCALSESCALSESCALSESCALSESCALSESCALSESCALSESCAL

USER : RON FERGUSON

15:52:25   2-MAR-89

SESCALSESCALSESCALSESCALSESCALSESCALSESCALSESCALSESCALSESCALSESCALSESCALSESCAL

USER : RON FERGUSON

****
SCATTER WASH E171134: IRREGULAR WEIR FOR THE I-17 BOXES.
WEIRING OVER THE FRONTAGE ROAD DIRECTING FLOW TO THE WEST.
****

IRREGULAR WEIR GEOMETRY
COEFFICIENT = 3.00

ELEVATION 1414.0 1413.6 1413.5 1413.3 1413.7 1414.0

STATION 0.00 217.00 424.00 656.00 889.001028.00

WEIR FLOW ELEVATION-DISCHARGE CURVE

DISCHARGE	EG	DISCHARGE	EG
0.00	1413.30	1.03	1413.35
5.83	1413.40	16.09	1413.45
32.00	1413.50	60.90	1413.55
99.60	1413.60	151.54	1413.65
214.61	1413.70	291.94	1413.75
380.01	1413.80	478.75	1413.85
588.01	1413.90	708.45	1413.95
839.63	1414.00	987.28	1414.05
1144.18	1414.10	1309.31	1414.15
1482.99	1414.20	1662.96	1414.25

STAGE	Q
1413.7	215
1414	840

1

15:52:25   2-MAR-89

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USER : RON FERGUSON

Greiner Engineering Job No.

Computed by: RHF Checked by: _____ Date 3-3-89

ARIZONA DEPARTMENT OF TRANSPORTATION

CULVERT COMPUTATION RECORD

PROJECT: SCATTER WASH

STATION: _____

DESIGNER: RHF

DATE: 3-3-89

HYDROLOGIC AND CHANNEL INFORMATION

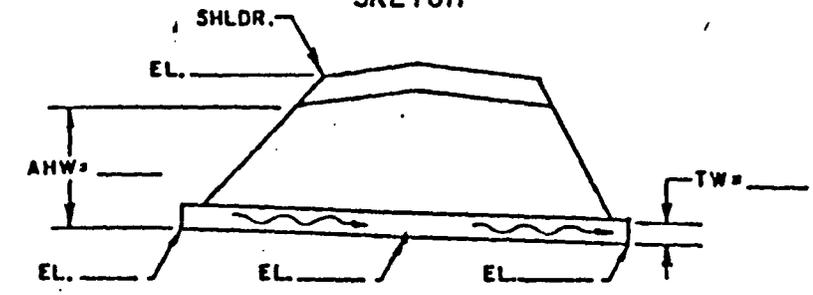
DRAINAGE AREA _____

Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50})

SKETCH



S_o = 0.36% L = 280' L/100 S_o = 1.0

MEAN STREAM VELOCITY = _____

CULVERT DESCRIPTION		Q	CAP. CHART HW	HEADWATER COMPUTATION										CONTROL HW	OUTLET VELOCITY	COST	DHW ELEV.	COMMENTS
				INLET CONT.		OUTLET CONTROL $HW = H + h_o - LS_o$												
SIZE	ENTR. TYPE			$\frac{HW}{D}$	HW	K_e	H	d_c	$\frac{d_c + D}{2}$	TW	h_o	LS_o	HW					
1-6x7	45° WING.	516		1.5	10.5	0.4												INLET CONTROL
																		OUTLET CONTROL
		510				0.4	4.9	6.1	6.6	—	6.6	1.0	10.5					
		400		1.35	9.5													
		300		0.95	6.7													

SUMMARY & RECOMMENDATIONS CULVERT IS IN OUTLET CONTROL Q = 510 cfs FOR HW EL OF 1412.0

20-4403 12/74

Sht ____ of ____

PROJECT: Scotter Wash

DESIGNER: M.C.

DATE: 3-3-89

HYDROLOGIC AND CHANNEL INFORMATION

Existing Condition

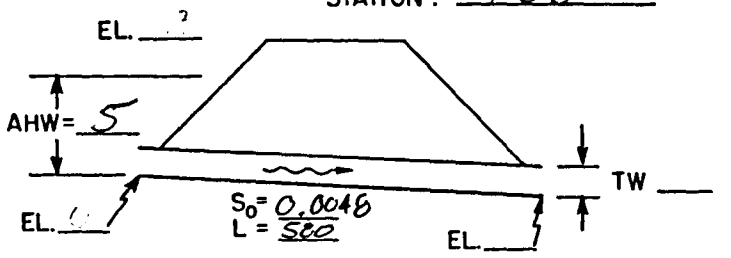
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: Louise



MEAN STREAM VELOCITY = _____

MAX. STREAM VELOCITY = _____

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. $\frac{HW}{D}$	HW	OUTLET CONTROL $HW=H+h_o-LS_o$: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
RCBC	156	6x3	1.67	5								5				use
	160				0.2	4.1	2.75	2.9			2.8	4.2				

SUMMARY & RECOMMENDATIONS:

Figure 7

PROJECT: Scotter Wash

DESIGNER: M.C.

DATE: 3-3-89

HYDROLOGIC AND CHANNEL INFORMATION

Existing Conditions

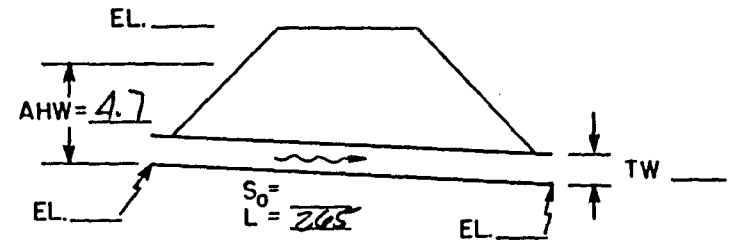
Q_1 = _____ TW_1 = _____

Q_2 = _____ TW_2 = _____

(Q_1 = DESIGN DISCHARGE, SAY Q_{25}
Q_2 = CHECK DISCHARGE, SAY Q_{50} OR Q_{100})

SKETCH

STATION: Adobe Rd.



MEAN STREAM VELOCITY = _____

MAX. STREAM VELOCITY = _____

CULVERT DESCRIPTION (ENTRANCE TYPE)	Q	SIZE	HEADWATER COMPUTATION: INLET CONT. $\frac{HW}{D}$	HW	OUTLET CONTROL HW=H + h_o − LS_o: K_e	H	d_c	$\frac{d_c+D}{2}$	TW	h_o	LS_o	HW	CONTROLLING HW	OUTLET VELOCITY	COST	COMMENTS
Arch	115	65"x40"	1.41	4.7								4.7				Capacity of culvert 48

SUMMARY & RECOMMENDATIONS:

Figure 7